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Gender, trees, and hardship or the dilemma of the Haitian farmer

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Gender, trees, and hardship or the dilemma of the Haitian farmer

by

Maritza Pierre

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degrees of

MASTER OF COMMUNITY AND REGIONAL PLANNING
MASTER OF SCIENCE

Co-majors: Community and Regional Planning; Sustainable Agriculture

Program of Study Committee:
Francis Owusu, Major Professor
Ann Oberhauser
Richard Schultz

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University
Ames, Iowa
2018

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DEDICATION

This thesis is dedicated to the farmers of Dondon and Grande Rivière du Nord.
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ABSTRACT

Agroforestry has been advocated as a sustainable way to bridge the gap between food needs and tree cover maintenance. While there is a wealth of literature on agroforestry adoption, little attention has been given to the decline of agroforestry practices in communities where agroforestry is still common. In addition, research on the intersection of gender and agroforestry tends to be skewed towards African countries. Using Haiti as a case study, this research explores the factors causing the decline of agroforestry practices, with a focus on external factors such as farmers’ socio-economic background and access to resources, internal factors including their knowledge and perceptions, and gender. While such factors have been considered independently in prior research, their combined effects on agroforestry adoption or decline have been ignored. Haiti has a history of agroforestry, however the global pattern of land clearing for agriculture is creating deforestation and decline in agroforestry practices. Data for the study is based on a survey of 62 farmers and two focus groups in Dondon and Grande Rivière du Nord, 2 communes in Northern Haiti. The findings indicate that agricultural spaces as expected are gendered - women control tree products, while men control the production of cash crops. It was also found that when individual perceptions of agroforestry were positive, financial hardship and collective attitudes towards tree-cutting had greater impact on agroforestry practices. While both male and female farmers had positive attitudes towards agroforestry, there was a gender difference with regards to aspects of agroforestry that were most important to farmers. In contrast to much of the literature on gender and agroforestry, it was found that the women tended to value tree profitability as benefits of agroforestry more than did the men who attributed greater importance to ecosystem services. We argue that in the Haitian context, such difference is conformed to gender expectations and to some degree can be seen as a result of gender inequality.
CHAPTER 1.  
AGROFORESTRY, GENDER, AND DEVELOPMENT

1.1 The Case for Agroforestry

With the rising concerns of environmental degradation and climate change, the importance of a protective, restorative, and sustainable agriculture has never been more evident. Indeed, farming contributes greatly to environmental pollution and degradation. Sakrabani, Deeks, Kibblewhite, and Ritz (2012) argue that the negative effects of modern agriculture, including soil compaction, erosion, loss of biodiversity, soil salinization, and water pollution, contribute to the eutrophication of water sources and a decrease in biodiversity as well as overall ecosystem services. Agriculture also generated about 30 to 35% of greenhouse gases emissions and accounts for 70% of freshwater withdrawal in crop irrigation (Tanentzap, Lamb, Walker, and Farmer, 2015). While the effects of intensive farming are being felt globally, the level of contribution to these problems as well as their repercussions are being felt differently in different parts of the world. It has been demonstrated that developed countries have a much greater ecological footprint than developing countries and tend to farm more intensively. Indeed, developed countries contribute to greenhouse gas emissions more than the developing world (Wei, 2016). Nonetheless, it is sometimes the smaller contributors to greenhouse gas emissions that are feeling the strongest impact. It has been shown that with regards to climate change, poorer countries are more likely to experience major negative impacts, while some rich countries are more likely to benefit (Mendelsohn and Williams, 2006). In addition to regional disparities - even within a single country - the poorest of the poor tend to be the most affected by environmental degradation.

The negative impact of environmental degradation is also heightened for poor women, who may have less say in their communities and less access to financial resources. Gezon (2012) argues
that women tend to be more vulnerable to environmental degradation since they are often in a subordinate position and must meet household needs by relying on natural resources. The severe social-economic and environmental impact of the contamination and over-exploitation of natural resources, to which large-scale and intensive agriculture greatly contributes, speaks to the necessity to invest in less destructive farming systems. To face the challenges of increasing food production while mitigating environmental impacts, the promotion and utilization of sustainable agro-ecosystems that allow intensification of food production becomes imperative.

Agroforestry, defined as “the art and science of cultivating trees (or other woody perennial plants) in association with crops or animals,” is among the agroecosystems with potential to diversify and maximize food production while minimizing environmental impact, particularly in the tropics (Torquebiau, 2000, p 1011). Agroforestry systems have been shown to increase yields and crop resilience and improve farm livelihoods (Waldron et al, 2017). Consequently, agroforestry research tends to focus on the potential of agroforestry for developing countries, many of which have tropical climates. Although the coexistence of trees and crops is not an avant-garde concept, the global attention that it has been receiving in the past decades is relatively new. While some researchers have explored practices in traditional agroforestry systems, more emphasis had been put into developing a more modern, science-based agroforestry. The increasing conversion of agroforests and forest farms to croplands makes such research even more relevant.

Indeed, in many parts of the world, including Haiti, the traditions of agroforestry, although still present, are declining as annual crops are grown on increasingly more land that are cleared (Jickling and White, 1995). Agroforestry projects promoting improved/modern agroforestry techniques have attempted to increase the spread of agroforestry practices in Haiti but have not always been successful. Deforestation and resulting erosion are major problems in Haiti. Since
two-thirds of the country’s land is comprised of steep slopes, it becomes difficult for peasants to farm the land without using mountainous marginal land. Agroforestry practices are thought to be a potential way of reducing deforestation and erosion in the country, problems which are further exacerbated by a growing population. However, in order to increase the practice of agroforestry in Haiti and address why previous attempts at promoting agroforestry have been unsuccessful, it is important to identify the factors that leading to abandonment/reduction as well as retention of agroforestry by farmers, including the influence of social structures and spaces. In fact, a social structure that has significant implications for behavior attitudes, cultural expectations, and overall socio-economic factors is gender. Accordingly, gender is a particularly important lens for this type of work.

While gender dynamics shape many forms of agriculture, they play a unique role in agroforestry as women is associated with certain tree species found in agroforestry systems, as well as with species richness and traditional knowledge (Kiptot, Franzel, and Degrande, 2014). Therefore, looking at adoption factors for agroforestry practices and systems through a gender lens can help with understanding the socio-economic, cultural, and political factors that creates a conducive environment for agroforestry adoption. This study seeks to understand how socio-economic and environmental characteristics intersect with gender and knowledge/perceptions of agroforestry to influence the adoption or continued practice of agroforestry.

The rest of this chapter presents an overview of the concept of agroforestry and its implications to sustainability, the problem of deforestation in Haiti, and the role of gender in agriculture and in agroforestry. It concludes with a summary of the research questions, an outline for the thesis, and a description of the methodology used to carry out the study.
1.2 Traditional Agroforestry

The term “traditional agroforestry” in this study refers to practices that have evolved in a locality/region over generations, as opposed to science-based agroforestry techniques. However, the goal of the study is not to set up these two types of agroforestry in opposition to each other, as superior/modern and inferior/traditional. As stated by Germond-Duret (2016), “the modernity/tradition dichotomy is a simplification that is consequently irrelevant when applied to the real world. These two terms are, in addition, not mutually exclusive” (Germond-Duret, 2016, p 1545). The term “traditional,” often used interchangeably with “indigenous,” is chosen in this chapter to acknowledge the fact that many displaced populations maintain their cultural practices and traditions.

Agroforestry techniques have a long history. In many parts of Asia and Europe, farmers have been incorporating trees onto their farmland and farming within forest spaces for hundreds of years. In the Americas, traditional agroforestry has a shorter recorded history but is highly common in the tropical zone. However, with the emergence of agroforestry as a science, traditional agroforestry was sometimes overlooked by researchers, or even considered primitive as farmers’ knowledge and land management rationales were questioned (Gomez-Pompa and Brainbridge, 1995; Abiyot, Bogale, and Baudouin, 2013). Such views fuel the unhelpful dichotomy mentioned previously and ignore the fact that science-based agroforestry builds on traditional agroforestry and can still learn from it.

The most common forms of traditional agroforestry systems identified are based on spatial configuration, temporal sequence, size, and proximity to dwellings. An example of agroforestry based on temporal sequence is found in West Java, Indonesia. This form of traditional agroforestry, known as kebun-talun (existing under different appellations in other cultures) is a sequential
growing of crops and trees, in which the land is first mostly allocated to crops, but then shifts into a fallow period as the trees grow bigger (Christanty, Abdoellah, Marten, and Iskandar, 1986). Another version of the *kebun-talun* is the Mesoamerican *milpa*, which starts with slash and burn followed by maize planting. Trees are then progressively incorporated, and the forest regeneration process starts at the end of the maize cycle (Ford and Nigh, 2010). Trees on pasture, a system more prevalent in Europe, is also a long-held agroforestry tradition.

The homegarden remains the archetype of traditional agroforestry, since it allows food production and income diversification in the immediate vicinity of one’s home and is also a part of many indigenous cultures. Homegardens have been classified into tropical and temperate as the climate affects the structure and species composition of such systems: tropical homegardens tend to have more and taller perennials, and therefore are more complex in their vertical structure (multiple stories) than temperate homegardens, which are likely to have more annual species and shorter perennials (Huai and Hamilton, 2009). The composition of homegardens also depends on geographic location and culture, which offers further basis for categorization. In Vietnam, four categories of homegardens were determined based on the most common use; they are homegardens with 1) fruits trees, 2) pond and covered livestock area, 3) vegetables, and 4) forest trees. These four types of homegardens are location also specific, which illustrates the influence of the geographic location and resulting environmental conditions as well as culture/subculture on agroforestry practices. Researchers have recognized the social and ecological sustainability potential of homegardens, despite their low input/labor (Huai and Hamilton, 2009).

Another significance of the homegarden is the propensity of women to be more involved in it (Kumar and Tiwari, 2017; Nguyen et al, 2017). Shillington (2008) looked at attitudes and uses towards and of trees in female-managed patios/homegardens of the slum areas of Managua,
Nicaragua and study found the following three types of socio-ecological relationships: corporeal, aesthetic, and economic. The author argued that women have trees in their garden sustain the “bodies” of the household members by providing food, fodder, and shelter. In addition to being used for household consumption, the trees also served the purpose of providing cooling by shading the home as well as privacy for daily activities such as cooking and showering which were often carried out in the patio. Indeed, the corporeal socio-ecological relationship seen in the homegardens is not surprising as women are in many cultures responsible for the provision of food. Another socio-ecological benefit of homegardens is aesthetic because Nicaraguan women used them to decorate the often poorly built homes and mask the smell of buried organic waste. This socio-ecological relationship is also gendered as women often perceived as homemakers will likely be in charge of decorating the living space. Very low economic value was associated with the trees: the products were rarely sold and therefore had little exchange value. Also, the economic value of trees in Nicaraguan urban homegardens is mostly tied to their direct use for the household, which is thus linked to the corporeal socio-economic relationship described earlier. Those findings support the idea that economic/monetary value is not always the main driver for keeping trees on the land/farm in traditional agroforestry. Although applied to an urban setting in that study, the corporeal, aesthetic, and economic attributes of the socio-ecological relationships found in Nicaraguan homegardens could also be used to understand the motivations of farmers for practicing traditional agroforestry. This suggests that culture and social norms underline the social and ecological benefits that favor tree retention. Farmers may choose to maintain trees on their farm for the benefits they provide to their households which could expand into community benefits. The homegarden thus hold with its traditions tremendous socio-economic benefits.
One argument against traditional agroforestry is that it is not viable economically compared to large-scale and heavily mechanized ways of producing food (Herzog, 1998). Nonetheless, researchers have demonstrated that the economic prospects of traditional agroforestry are considerable: tree products provide 62 percent of the income of Mayan farmers’ income in southern Belize, in addition to food and wood (Levasseur and Olivier, 2000). The value of traditional agroforestry has been recognized as more researchers explore the importance of agroforestry beyond monetary gains. Traditional agroforestry also holds culture and history: agroforestry practices play a significant role in maintaining local knowledge of tree propagation and uses. The social and cultural appeal that traditional agroforestry exerts at both household and community level are crucial in helping to unveil some of the factors favoring farmers’ decision to practice agroforestry.

In sum, whether taking the form of trees on pasture, kebun-talun, milpa, or homegardens, traditional agroforestry is important in helping communities ensure food production with a lesser environmental impact. Yet agroforestry is not a widespread practice globally, and with a continuous increase in global population and consumption, it must contend with the rising and destructive phenomenon of deforestation.

1.3 The Problem of Deforestation

Deforestation is a global issue. The world’s tree cover has significantly declined in recent years and continues to decline. It has been observed that “deforestation occurred at the rate of 9.2 million hectares per annum from 1980-1990, 16 million hectares per annum from 1990-2000 and decreased to 13 million hectares per annum from 2000-2010” (Chakravarty, Ghosh, Suresh, Dey, and Gopal Shukla, 2012, p. 4). Following rapid urbanization and the industrial revolution, forested areas have been transformed into agricultural land, cities, as well as tree plantations for the
exploitation of timber. Despite a profusion of evidence of the major environmental impacts of deforestation, reforestation efforts currently do not outweigh the ongoing clearing of forests to meet human needs and greed. Geist and Lambin (2001) differentiate between proximate causes and structural conditions of deforestation in the tropics. The proximate causes of deforestation are believed to be agricultural and infrastructure expansion as well as wood extraction, but the underlying causes include market growth, industrialization, urbanization, informal and formal policies, agricultural technologies, and socio-cultural and demographic factors (Geist and Lambin, 2001).

Effects of deforestation range from hydrologic modification to harmful human health outcomes. Runyan and D’Odorico (2016) assert that the hydrology of deforested areas is altered as evapotranspiration is reduced while water yields and the speed of snowmelt increase. Deforestation was also found responsible for modifying microclimates and rainfall regimes by altering landscape hydrology, reducing biodiversity by destroying habitats, and adversely affecting human health by increasing interactions between humans and wildlife (whose population increases) thus increasing exposure to zoonotic pathogens (Runyan and D’Odorico, 2016).

As stated earlier, Haiti faces a lot of environmental issues, many of which are related to deforestation. Deforestation in Haiti can be traced to colonial times, when timber was first exploited. In more recent years, rapid population growth in a country where the majority of the population does not have access to electric or gas stoves has led to more deforestation partly driven by charcoal production. However, charcoal production, although inducing forest degradation, has been found to account for only less than 7 percent of deforestation in the tropics (Chidumayo and Gumbo, 2013). Forest clearing to grow cash crops (mostly maize), illegal logging, lack of rural infrastructure as well as access to credit, and local policies have all been linked to deforestation in
Haiti (Dolisca, McDaniel, Shannon, and Jolly, 2009). To promote or prevent specific practices or behavior, the Haitian government has a history of employing strong castigatory measures against tree cutters in protected forested land but with limited effect because such measures tend to antagonize people and do not result in sustainable reforestation practices. While this pressure was more felt by farmers during the dictatorship era when they were fined for cutting tree without permission, subsequent post-dictatorship Haitian governments have for the most part ignored farmers and failed to implement policies to strengthen agriculture, despite their assertion that agriculture is essential to the economy. The reflex of imposing arbitrary measures has also not been forgotten: the Haitian government in 2014, to address the critical state of environmental degradation caused by deforestation in part of Grand’Anse, Haiti, decided to ban charcoal production in the area (Janvier, 2014). Maertens et Stork (2017) denounced the tendency of the Haitian government to impose bans while failing to promote alternatives. It has been argued that “government policies only consist of regulations and taxes rather than providing resources and incentives for appropriate land use” and that the “policies aim to eliminate the symptoms of rural decline (such as deforestation, soil erosion) rather than reversing its causes” (Dolisca et al, 2009, p 130). In that light, governmental policies (and the lack thereof) could be seen as being part of the problem as well.

1.4 Women, Land, and Trees: Why Gender Matters

While agroforestry is often framed as a potential tool for developing countries, it took a while for agroforestry research with a gender framework to emerge. Indeed, it was not until the 1970s that the idea that development approaches were impacting men and women differently, often to the detriment of the latter group, started to emerge in the literature. Razavi and Miller (1995) noted that earlier efforts dubbed as “Women in Development” (WID) approach, although shedded
light on the importance of giving opportunities to women and girls as well as showing the
collection of women to agriculture, did little to address power imbalances between men and 
women. Despite the large presence of women in agricultural and forestal spaces, their contributions 
as well as their access to various resources is often constrained by established or tacit local customs 
and policies. Since the integration of gender in the development discourse, there has been a 
tendency in the development field to argue for the inclusion of women for the purpose of 
addressing food insecurity. This notion stems from the common perception of women as being 
more financially responsible or more likely to engage in activities linked to direct provision of 
food for the household. According to the World Bank, “when women have an income, substantial 
evidence indicates that the income is more likely to be spent on food and children’s needs”. (World 
Bank, 2009, p12). The WID narrative also encouraged such discussion of women’s roles and 
potential contribution to development as a strategy to also increase visibility of their work (Miller, 
1995). Heavily critiqued for ignoring intersectionality and more importantly for being rooted in 
modernization theory, WID gave way to WAD: Women and Development (Rathgeber, 1990). 
WAD, closer to dependency theory, opened the discussion to North-South relationship and 
suggested that women’s situations will improve when the subordination of developing countries 
to developed countries ceases to exist. But since WAD also failed to address intersectionality and 
the structural roots of inequality between men and women - namely overlooking women’s 
reproductive role, as the WID framework also did - WAD was replaced by GAD, Gender and 
Development (Rathgeber, 1990).

The shift from “women” to “gender” was meant to emphasize the different societal 
expectations placed on men and women and the deleterious effects on the latter group. GAD 
considers both productive and reproductive roles. Sarker (2006) argues that GAD offers a “more
detailed examination of the roots of women’s subordination…through the analysis of the global working of capitalism in combination with patriarchy.” (Sarker, 2006, p 15). Building on that narrative, institutions such as the Food and Agriculture Organization (FAO) highlight not only the potential of women’s inclusion for development, but also present the lack of women’s inclusion as an injustice. The organization acknowledges that “women are typically discriminated against as food producers, as waged workers, and as self-employed workers in off-farm activities,” an idea which is reinforced by the assertion that women bear the brunt of economic and ecological crises (Asian Development Bank, 2013, p 13). Beyond gender, another related viewpoint is that the complete inclusion of all members of a community in decision-making is a matter of social justice, and that finding other benefits to justify the importance of inclusion is not necessary. Indeed, some authors see social justice “as requiring, inter alia, social inclusion. We take social inclusion to represent the participation of people in society, and to be the converse of social exclusion, represented by non-participation” (Farrington and Farrington, 2005 p 4). This emphasis on the links between reproductive and productive roles and a focus on intersectionality and overall social inclusion still govern today’s gender research and gender mainstreaming programs.

Overall it has been shown that when it comes to agroforestry, forest use, and afforestation projects, needs and participation are gendered: “women and men, the landed and landless, differ in the nature and extent of their dependence on and use of local forests, predicated especially on the gender division of labor and economic endowments” (Agarwal, 2009, p 2785). Such gendered division of participation includes the spaces in which participation occurs, the nature of the activities involved, and the level of participation accepted/allowed. While trends vary across regions and culture, a commonality is in the power dynamics that govern decision-making at both household and community level. In a study of women’s participation in Nicaraguan communal
forests, the authors assert that “power dynamics overlap among family relationships, households, and community” and that the “household is the place where gender norms are not only learnt and internalized, but also where they are reinforced or modified” (Evans et al, 2017 p 40). Therefore, power imbalances tended to be found at multiple levels/spaces starting with the household as a central unit and going outwards. Rocheleau and Edmunds (1997) discuss gendered spaces and places in agriculture and forestry by referring to the marginal spaces/land that are allocated to women as well as the gender roles inside and outside the home (places) where women’s work get turned over to men when profit is involved. Singh (2012) contends that in forested areas of the developing world, despite having their livelihoods tied to forests, women’s voice are often silenced both structurally at the community level and institutionally at the state level.

Scholars also discuss the complexity of gendered power relations which can take different forms at different levels and offer the idea of complementarity. Sithole (2005) explores the differences between women’s voices in the public versus in the private sphere in a study conducted in Zimbabwe, in which the power held by men is believed to be “balanced” by women’s influence. Such difference is illustrated by the women who sat quietly at public meetings but could nonetheless shout at a foolish husband in private if in disagreement with his position. Sithole argues that “western notions of participation or involvement, which assume participation as an open and public action, have blinded us to the real dynamics of participation in small groups and especially the participation of women in particular cultural settings” (Sithole, 2005, p183). While local and cultural contexts should be taken under account when designing forestry and agroforestry projects, such a statement seems to undermine the conditions that maintain power imbalances in the first place and even legitimate the silence of women in a subordination system that mostly benefit men. Would women speak if they did not fear the stigma of non-conforming and behaving
like men? But the author’s description of some women bringing men into women’s groups to “lend weight” to the group in order to be taken more seriously suggests some form of acceptance by women of the power of men. Nemarundwe (2005) also contends that the informal setting for decision making was not to be neglected precisely because power relations are constantly renegotiated. The author found that women in Zimbabwe use various strategies to informally gain more decision-making power in natural resource management in their community. Such strategies included engaging in male dominated activities such as planting trees mostly used for poles and carving, or by partaking in smaller gardening projects where they outnumbered men and had more say. Bolaños and Schmink (2005) observed that in Bolivia, women and men in addition to having different opportunities also had different expectations of each other in forestry projects. The authors concluded that to overcome the obstacles to women’s participation in forestry projects, it is important to ensure that women have access to leadership positions as well as public participation venues susceptible of addressing power imbalances shaped by cultural expectations and related constraints.

Regardless of men’s and women’s positions with regards to tree products’ uses, understanding how those views are shaped, how spaces and places are made accessible or inaccessible based on one’s sex, and whose voices are heard remain fundamental to the promotion and implementation of successful agroforestry initiatives that benefit all.

1.5 Research Problem

The economy of Haiti relies mostly on agriculture. Close to 50 percent of the population depends directly on agricultural activities for their livelihood (UNESCO, 2008). Highly mountainous, the country has about half of its land in slopes of at least 40 percent inclination while plains make up 20 percent of the landscape (MARDNR, 2011). As the population has grown and
the demand for food increased, more and more trees have been cleared out to allow crops to grow, even in highly sloped areas. But this not does imply more food availability, since the actual agricultural production has been declining. In 1970, agriculture contributed to 49.2 percent to the Gross Domestic Product of Haiti (Promodev, 2014). This contribution has decreased to 24.7 percent in 2014, and the exportation of coffee went from generating approximately 50 million of dollars in the early 1970s to less than 4 million in 2010 (MARND, 2011; Vaval, 2015). In 2009, the Enquête Nationale de la Sécurité Alimentaire (National Census of Food Security) revealed that the national production was only meeting 46 percent of the food demand of the population: 80 percent of the rice, a staple food in Haiti, is imported. Nonetheless, 3.6 of the 10 million Haitians living in the country were classified as food insecure in 2016 (WFP, 2016). Women and children comprise the most vulnerable group with regards to food insecurity (Charlier et Warnotte, 2007). Indeed, female-headed households experienced food insecurity 1.81 times more than male headed households in 2015, although severe food insecurity affected both sexes equally (Brisson, 2016).

Additionally, more and more individuals have been leaving the rural areas to migrate to the cities to find better prospects. This leads to more deforestation as migrating people from the rural areas tend to clear out the trees in the sloping land surrounding the city to build houses. Indeed, desertification and erosion are endemic problems in Haiti. The consequences are numerous; female-headed households in rural areas are often the most heavily impacted as they suffer more from the reduction in agricultural productivity induced by deforestation, due in part to smaller farm sizes and less access to loans (Haiti Libre, 2016; SYFAAH, 2015).

Deforestation has also rendered the country more vulnerable to natural disasters. Drought is becoming more and more prevalent and is subsequently affecting agriculture, food security, and the economy. The negative impacts of hurricanes have heightened over the years and the damages
are worse in areas with less tree cover. Understanding the impacts of Haiti’s shrinking tree cover is further complicated because of the use of different measurements for tree cover and forest cover and at times the confusion surrounding differentiating one from the other. In addition, there has not been a rigorous monitoring of the country’s forest and tree cover. The popular statistics with regards to Haiti’s forested land is 2 percent, not far from the World Bank data which shows a 3.53 percent estimate as of 2015 (Data World Bank). Tree cover is less discussed and often conflated with forest cover, but those who measure it estimated that Haiti’s tree cover spans over 29 to 30 percent of the country (Churches et al, 2014). Statistics regarding changes in Haiti’s forested land tend to look back to the early 1900s, prior to American occupation, when forest cover was estimated to have stretched over roughly 50 percent of the country’s surface but decreased to 21 percent by 1945 (Septembre, 2005). More recent data shows that from 2001 to 2017, tree cover has declined by 7% (globalforestwatch.org).

Traditional agroforestry practices, despite their potential to mitigate the impact of erosion and soil fertility loss, have been declining in favor of cash crops. Understanding the factors favoring agroforestry decline and retention in Haiti would help provide a framework for promotion of agroforestry adoption in the country. Addressing gender imbalances will be key in this work since, based on local gender roles as well as tenure issues, such imbalances are very likely to be found in Haitian agricultural spaces gender roles as well as land tenure issues. Although women play an important role in Haitian agriculture, they lack decision-making power in almost all aspects of agriculture (Singh and Cohen, 2014). Since gender has been shown to greatly influence how agroforestry is practiced, the intersection of gender and agroforestry in Haiti offers a more holistic point of analysis for assessing adoption and retention of agroforestry in the country. Literature on agroforestry (developed in the following chapter) points to external/extrinsic factors impacting
adoption including the political context and the socio-economic characteristics of farmers and their access to resources (environmental and social), as well as internal/intrinsic factors impacting adoption such as perceptions, knowledge, and attitudes about agroforestry.

1.6 Research Questions
This study explores the interplay between agroforestry, gender, farmers’ socio-economic characteristics and perceptions of agroforestry, and local social structures. It aims to answer the following specific questions. 1) What is the relationship between internal and external factors of agroforestry adoption/involvement in Haiti? 2) How do Haitian farmers’ perceptions impact of agroforestry impact its practice? 3) How does gender influence farmers’ perceptions and decision-making with regards to agroforestry in Haiti? 4) What policies are necessary to sustain the practice of agroforestry in Haiti?

1.7 Thesis Outline
The thesis is organized as follow:
Chapter two builds on the presentation of the gendered dimensions of agroforestry introduced in chapter one and presents a literature review on agroforestry adoption. Chapter three describes the forces that have influenced Haitian agriculture while chapter four expands on the research findings. The fifth and last chapter discusses the results and provides policy recommendations.

1.8 Methods
1.8.1 Theoretical Approach
The study was influenced by three main theories/frameworks: Caroline Moser’s (1993) triple gender roles, Meinzen-Dick et al (2011) gendered livelihood framework and Meijer et al (2015) framework for agroforestry adoption. Moser’s triple gender roles pertain to the differences between men and women with regards to reproductive roles, productive roles, and community
responsibilities. The gendered livelihood framework builds on sustainable livelihood framework, which postulates that one’s livelihood is a function of five main capitals (natural, human, social, physical, and financial) which are vulnerable to shocks. The gendered livelihood framework views one’s relationship to the capitals and vulnerability to shocks as gendered. The agroforestry adoption framework proposed by Meijer et al (2015) asserts that agroforestry adoption is driven by extrinsic such as farmers’ and farms’ characteristics, gender (viewed as a social construct), and intrinsic factors such as knowledge, attitudes, and perceptions of agroforestry.

The study used both deductive and inductive reasoning to explore the interactions between gender, external/extrinsic and internal/intrinsic factors of agroforestry adoption, and farmers’ behavior with regards to agroforestry. The three theories described above were used to develop a framework (see chapter 2) to guide the data collection process. The combination of external and internal variables employed in this study has rarely been done in the study area where gender and agroforestry has not been the object of much research.

**1.8.2 Data Collection**

**1.8.2.1 Target population and site selection**

The target population for the study was farmers who were engaged in some form of agroforestry practices. Respondents included both male and female farmers as gender differences are part of the focus of the research. The study sites were selected to importance of agroforestry practices in the area and partly out of convenience. To ensure the participation of farmers who were practicing agroforestry, mountainous areas which typically have more farms with trees were thought to be ideal. I decided that two sites would be the object of the study to minimize locality bias. The suggestion of an agronomist from a local agricultural non-governmental organization (contacted to initially serve as a gate keeper) influenced the choice of the specific locations/communes. He
described the prevalence of coffee and cocoa in two different but adjacent mountainous sites and suggested that they would make ideal sites for agroforestry study. Considering that the varieties grown require a minimum of shade, the likelihood of finding farmers practicing agroforestry on those sites would be higher. The fact that the sites were only an hour away from where the researcher and the research assistant were staying simplified research logistics.

The study took place in two “communes” (local appellation) in Northern Haiti: the communes of Dondon and Grande Riviere du Nord (Figure 1.1). Administratively, Haiti is divided into 10 “départements” (departments/states), 42 “arrondissements” (boroughs), 140 “communes” (municipalities), and 577 sections communales (smallest administrative units). Each department has a “chef-lieu” (capital), which serves as both an arrondissement and a commune. Each commune is divided into “section communales” including the main urban “section communale”, the “seat” of the commune which shares its name and other typically rural sections communales. For the purpose of this study, only the rural sections communales of each commune were considered.

Figure 1.1. Map of Study Sites. Source: arcgis online.
1.8.2.2 Research instrument

The data reported in this thesis was collected via a pre-structured survey and two focus groups administered to farmers from each locality. Morgan (1996) noted how surveys can be used in different sequential combinations with focus groups with the former providing more breadth and the latter more depth. The survey included both closed- and open-ended questions. While the survey questionnaire was strictly followed, the focus group questionnaire guide was applied in a flexible manner partly based on participants’ responses. The farmers who took part in the survey (in their homes) were not given any incentives while light refreshments were provided to the farmers who came to the focus groups to abide to cultural expectations of politeness. A Haitian research assistant, chosen based on the recommendation of a local researcher and who also underwent IRB training, helped in administering the survey and the focus group.

1.8.2.3 Sampling

The survey participants were selected from the various “sections communales” of each commune to ensure representation. The survey was initially designed to follow a random sampling method in which houses would be chosen randomly (every nth house) but it became clear while in the field that the selection should simply be guided by farmers who are in their residence at the time of survey. The researcher and research assistant ensured that both male and female farmers were represented. The survey was administered to a total of 62 farmers and targeted mostly heads of the household and/or partners of heads of the household. When possible, the survey was administered to both men and women (separately) in the same home, but in most cases, only one gender was available to be surveyed per household.

With regards to the focus groups, gate-keepers were approached to facilitate the process of meeting with farmers. For Grande Rivière du Nord, I contacted the regional director of the non-
governmental organization CECI in Cap-Haitien (Northern Haiti), which conducts food security and gender equity programs. I was directed to the director’s assistant who referred me to the organization’s contact person in Grande Rivière du Nord who helps conduct the organization’s focus groups and meetings. In Dondon, following the advice of my research assistant, I approached the director of a small agricultural technical school in the area, the École Moyenne d'Agriculture de Dondon (EMAD), known for its extension work. He agreed to help coordinate a focus group with farmers in the area with whom the school already had a relationship. The focus group in Dondon included 12 participants while the focus group in Grande Rivière du Nord had 20 participants.

1.8.3 Ethical Considerations

The principal investigator in the research gained approval from the Institutional Review Board (IRB) of her institution prior to conducting the research (Appendix A). The researcher ensured that participants were aware of the purpose of the identity of the researcher, the research purpose, and their right to withdraw at any time or not answer questions that they do not wish to answer. Consent was verbally obtained from all participants prior to the collection of information. No participant was under the age of 18 or belonged to any group that would be considered vulnerable. Attention was given to formulate questions in a way that was aligned with cultural sense of appropriateness and politeness. For instance, a somewhat sensitive question such as the number of meals consumed on average in a given day was preceded by an explanation regarding the reason the question was asked (estimate food security given the country’s context) and the formula “would it bother you to tell me…” or “are you ok telling me…” to protect cultural sensitivity. Participants were asked for permission prior to recording during focus groups and guaranteed privacy.
1.8.4 Data Analysis

The recorded focus groups were transcribed and translated from Haitian Creole to English. The survey responses obtained on paper were coded and/or translated (open-ended questions) and processed in Excel and SAS/JMP. The survey data was subjected to descriptive analysis in the form of frequency distributions. Since most of the data was ordinal data, spearman rho correlation tests were conducted to test the relationship between variables. For socio-economic characteristics, education and financial standing were used as proxies. A score based on three variables which are number of meals per day, land tenure type, and farm size (see chapter 4) was used to estimate financial standing. Variables such as tree cover variation, tree cutting frequency, and tree diversity were used to evaluate behavior. The correlation between financial standing and behavior was then investigated using the spearman rho correlation test. Farmers perceptions (investigated with statements proving for disagreement, neutrality, and agreement) were also tested for correlation with financial standing as well as differences across gender. A contingency analysis was used to test for gender difference with regards to tree cover variation (increased, decreased, no change). The transcripts from the focus groups and interviews were coded and analyzed for theme emergence.

1.8.5 Study Limitations

1.8.5.1 Researcher bias

The position of the researcher as an insider (i.e. sharing similar social and cultural characteristics, etc. with the group studied) or an outsider (thus not sharing specific characteristics with the participants) matters. Researchers who are perceived as insiders are likely to gain the acceptance of participants quicker and thus speed up data collection process. The insider-
researcher avoids culture shock, is able to “blend in”, assesses the context better which is reflected in the questions, and notices cultural aspects including non-verbal clues that an outside might not or need more time for (Greene, 2014, p 3). While acknowledging the benefits of being an insider, some researchers warn that it can also induce bias in the researcher’s interpretations if said researcher is too close to the subject matter and that “the participant will make assumptions of similarity and therefore fail to explain their individual experience fully” (Dwyer and Buckle, 2009, p 58). Dwyer and Buckle (2009) also argue that there is no evidence that outsider status had any negative impact on research and admitted that there were various levels of positionality which can create insider or outsider status at the same time.

In the study, although the researcher and the research assistants are both Haitians, it is likely that the respondents sometimes saw the researchers as outsiders. As a citizen of Haiti, my nationality and proficiency in the local language portray me as an insider to a certain extent. I am also a Northerner and as such speak creole with a Northern accent similar to that of the farmers who participated in the study. However, my higher education and my urban upbringing makes me an outsider who is unfamiliar with the daily rural reality as well as specific local farming terminology. In addition, when I speak to male farmers, gender adds more distance. My simultaneous insider-outsider position with regards to participants is likely to have influenced their interaction with me. My research assistant shared similar characteristics with me with the exception of gender. He had however the (insider) advantage of prior exposure to field work in the country side of Haiti as well as a greater knowledge of Haitian agriculture including terminology used by farmers.
1.8.5.1. Scope

The main limitation of the study was time constraint. The study was at first designed to be conducted on a three-month period but due to unforeseen travel documentation complications, the study was in fact conducted over a three-week period. A pilot testing with a smaller sample size was thus not feasible: the survey was tested on just one farmer for ease of comprehension and cultural adaptability. The survey initially written in English was translated to creole by the researcher and revised by the research assistant. There were questions that despite the revision seemed to not match completely local wording. More data collection time would have favored a greater sample size as well as a more culturally appropriate and locality specific formulation by allowing for a greater survey testing window. There is also the possibility that because prior contact had not been made with participants, the level of trust that would favor less guarded responses was not there. In addition, it appeared that some farmers were dealing with research/census fatigue. It was initially decided that narrative walks on the farms would be the approach for survey administration to get a visual estimate of tree cover and allow for more farm specific open-ended questions but due to time constraint, it was easier to ask farmers questions in their residences which are often located away from the farms.
CHAPTER 2
AGROFORESTRY ADOPTION: A LITERATURE REVIEW

Agroforestry is an old practice that has been identified as a sustainable solution to degraded environments. This study adopts Somarriba’s (1992) definition of agroforestry that views agroforestry as an intercropping system which contains at least two plant species, a minimum of one woody perennial, and in which at least one species is intended for food production, fodder, or commercial purposes. Finlayson, (2016) described agroforestry as an essential development tool for the concretization of most of the Sustainable Development Goals (SDG) including hunger elimination, poverty eradication, environmental sustainability, and what he describes as the "soft side" of the SDG which deals with conflict, equity, and gender. The FAO has also recognized agroforestry as an important factor to the improvement of rural livelihoods in developing countries (El-Lakany, 2004). Indeed, the environmental, social, and economic potential along with the versatility of agroforestry have attracted many researchers. Prior research in this area has placed a lot of emphasis on the applicability of specific agroforestry techniques and the environmental benefits of agroforestry. Pelleck (1992) discussed the prospects of contour hedgerows in hilly terrains as a cost-effective technique for erosion control and water retention when trees are placed close enough to one another. Droppelmann and Berliner (2003) found that in semi-arid and arid regions, highest productivity and water use efficiency were achieved with annuals and perennials intercrop systems in which trees were significantly pruned during critical growth periods of the annual crops. Kuyah et al. (2016) reviewed 350 journal articles exploring the relationship between trees on farms and ecosystem services. They found that in the majority of the studies, the presence of trees on farms resulted in increasing the benefits of ecosystems services.
Agroforestry researchers have also explored the relationship between agroforestry and rural development, the effect of agroforestry on food insecurity, and the common barriers to agroforestry adoption. Yamada and Gholz (2002) established that in Brazil, some agroforestry systems have been more productive than pastures whereby 10 to 20 hectares have generated the income equivalent of 400 to 1,200 hectares of grassland. In Malawi, the planting of fertilizer-trees on farms was associated with an increase in food security for maize farmers due to an increase in maize productivity as well as food production value (Coulibaly, Chiputwa, Nakelse, and Kundhlande, 2016). Delayed positive returns on investment along with poorly developed market systems for tree products were among common impediments to agroforestry adoption (Buttoud, 2013).

Gender has also been the focus of agroforestry research namely the impact of agroforestry on women’s poverty reduction, the influence of gender roles and gendered tree preferences on agroforestry adoption, the participation of women in agroforestry programs, and the overall benefits of agroforestry for women. Kiptot (2015) found differences in tree preferences and knowledge of tree products' uses between men and women. Uisso and Massao (2016) conducted a cross-sectional study in Tanzania where they found that agroforestry activities tended to bring higher income to women who practiced agroforestry. Research on gender within Forest, Trees, and Agroforestry (FTA) valued chains confirmed the global tendency for women to be more involved in small-scale retail while men took part in larger businesses (Haverhals, Ingram, Petersen, and Sola, 2016). The authors found that the gendered management of FTAs was a function of social and cultural contexts and presented similarities and differences across regions. As a result of and often in conjunction with the research mentioned above, the adoption of agroforestry has been given considerable attention. This chapter discusses the literature on
agroforestry adoption, including types of agroforestry practices, the use of agroforestry as a remedy for environmental degradation and poverty, and the intersection of gender and agroforestry. Attention is paid to the external and internal factors of agroforestry adoption as well as gendered inclusion in agricultural spaces.

2.1 Agroforestry Definition and Practices

Agroforestry is interchangeably described as a practice or a technology. Having been used in certain parts of the world mainly in tropical regions for centuries, the practice started being researched when the descriptor "agroforestry" was coined in the 1970s. Verheij (2003) described agroforestry as "a new name for an old practice" and Nair (1993) described how a proposal to establish research on agriculture and forestry was approved leading to the creation of the International Council for Research in Agroforestry (ICRAF) in 1977. Researchers typically speak of “practices” when they want to emphasize the general uses and types of disposition of trees and crops and refer to the terms "technology" and "innovations" to signal the introduction of specific intercropping systems or spatial/temporal arrangements to an area. This study refers to agroforestry as a practice or set of practices.

Agroforestry systems are described as "systems which need to be socially, culturally, and economically acceptable to maximize total output at given input levels and minimize damage to the total environment" (Lagemann et Heuveldop, 1983, p105). Agroforestry, as indicated by the combination of the two words "agriculture" and "forestry", combines both types of land uses. Indeed, agroforestry practices entail the integration of trees in cropland. Thus, it permits a type of land exploitation that does not restrict canopy cover. Nair (1993) defines agroforestry as “the deliberate growing of woody perennials on the same unit of land as agricultural crops and/or animals, either in some form of spatial mixture or sequence” with “significant interaction (positive
and/or negative) between the woody and non-woody components of the system, either ecological and/or economical” (p.13). In addition to being intentional, agroforestry is also described as being a “dynamic system in which some plant species with high nutritional, medicinal, economic and ecological values are used by local people for their well-being, through integrating trees and/or animals on the farm” (Atangana, Khasa, Chang, and DeGrande, 2014, p 35). The authors also noted that agroforestry systems ought to be productive, sustainable, adoptable, simple, and robust.

The most widely used classification of agroforestry is that of Nair (1985) who suggested over 20 types of agroforestry systems among which the most widely used are based on the nature of the system components, their spatial and temporal arrangements, and their function. The socio-economic and ecological implications of agroforestry served also as criteria in the early stages of agroforestry classification. A non-exhaustive list of agroforestry categories is presented in Table 2.1. Classification can also be made depending on whether intercropping has a concurrent or time sequential design. Functionality coupled with ecology were also identified as criteria of classification by Nair (1993) although no distinct category resulted from those considerations. The main utilization of tree/shrubs often serves as a basis for assigning subcategories: this is the case of protein banks, fodder banks, et cetera. In Haiti, some farmers instead of intercropping will maintain woodlots on parts of their land. All those classifications support the idea that the possibilities and potentialities of agroforestry are numerous and as such justify the push for agroforestry as a solution to poverty and environmental degradation.

2.2 The Agroforestry-Poverty-Environmental Degradation Triangle.

Agroforestry is often presented as an answer to poverty and deterioration of the environment. The relationship between the three variables is a messy triangle in which poverty
and environmental degradation form a vicious cycle while agroforestry practices, although seen as a solution to both problems, can at times be constrained by them.

2.2.1 Environmental Degradation and Agroforestry

When agroforestry gained scientific attention in the 1980s, the main focus was on the biophysical interaction between trees and crops along with the ecological benefits of the practice. There is a wealth of literature on the multiple environmental benefits of agroforestry practices: agroforestry practices have proven effective in fighting erosion, improving water quality and soil productivity, enhancing carbon sequestration and conservation, increasing biodiversity, and overall helping to mitigate climate change (Jose, 2009; Smith, 2010; Nair, 2011).

Agroforestry Systems (AF) provide greater erosion control to agricultural lands than the common mechanical barriers used in alternate conservation practices. König (1992) describes five ways in which agroforestry systems act to control erosion. Agroforestry systems can protect the soil from splash erosion by providing mulch and canopy cover. They can also increase water infiltration through greater soil structural stability because of the increased biological activity of the soil receiving constant green manure (leaf litter).

Agroforestry practices like hedgerows especially when following contours can decrease the speed of runoff water and contribute to more infiltration. Agroforestry practices also help reduce slopes (by favoring sedimentation in hedgerows) and soil seepage. Windbreaks and shelterbelts are also strongly advocated because of their ability to decrease wind-induced erosion and protect crops from strong winds (Verheij, 2003). In Nigeria and the Philippines, the erosion control properties of AF with respectively alley cropping of maize and Leucaena and contour hedgerows of Leucaena were found to be effective (Lal, 1990). In Rwanda, however, Konig (1992) argued that the use of hedgerows only was not enough to slow down erosion on 28 percent slopes or greater and needed
to be supplemented by leguminous perennials. Trees have also been shown to improve water quality and soil fertility. (Paudel, Udawatta, and Anderson, 2011) demonstrated that agroforestry and grass buffer treatments in pastured watersheds were successful at reducing sediment and nitrogen loss. Atangana et al. (2014) argue that in both tropical and temperate climates, various agroforestry techniques have great potential to increase carbon sequestration in the soil. The ability of AF to enhance soil fertility has not been found to be consistent in all systems since factors such as tree spacing, the degree of resource competition, and allelopathy could have a positive or negative impact on the yield of crops grown with perennials (Kohli et al., 2008). Regarding the effect of AF on biodiversity, Thevathasan and Gordon (2004) showed that intercropping trees and crops resulted in increased bird and insect diversity. Lastly, Schoeneberger et al. (2012) opined that AF could mitigate climate change due to its capacity to sequester carbon and reduce greenhouse gases.

Agroforestry is rightfully regarded as an effective way to meet agricultural production needs without putting great strain on the environment. The great potential of agroforestry to remedy environmental problems is often used to frame discussions around adoption. Environmental degradation although a justification for the application of AF could also be an obstacle to its adoption. Verheij (2003) found that on soil that lacks nutrients, trees will grow poorly except nitrogen-fixing trees.

2.2.2. Environmental Degradation and Poverty

The discourse around environmental degradation and poverty usually positions the former as a consequence of the latter. "The poor do not willfully degrade the environment, but poor families often lack the resources to avoid degrading their environment" (Biot et al, 1995, p 25). Alternatively, the two conditions are presented as a downward spiral in which poverty
Table 2.1: Classification of Agroforestry

<table>
<thead>
<tr>
<th>Basis of Classification</th>
<th>Types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong> (Nair, 1985)</td>
<td><strong>Agrisilviculture</strong></td>
</tr>
<tr>
<td>Trees + crops</td>
<td>Trees + pasture/animals</td>
</tr>
<tr>
<td><strong>Spatial arrangement</strong> (Nair, 1993)</td>
<td><strong>Densely mixed</strong></td>
</tr>
<tr>
<td>Alley cropping (strips of trees)</td>
<td>Windbreaks (perimeter), hedgerows (strips of shrubs)</td>
</tr>
<tr>
<td><strong>Socio-economic factors</strong></td>
<td><strong>Subsistence</strong></td>
</tr>
<tr>
<td>Lundgreen and Raintree, 1982; Atangana et al., 2014)</td>
<td></td>
</tr>
<tr>
<td>Small scale, home consumption</td>
<td>Mixes characteristics of commercial and subsistence</td>
</tr>
<tr>
<td><strong>Torquebiau (2000)</strong></td>
<td><strong>Crops under trees</strong></td>
</tr>
<tr>
<td>crops under dispersed or aligned upperstorey</td>
<td>Very dense, resembles forest while offering the productivity of an agricultural system (forest gardens, homegardens)</td>
</tr>
</tbody>
</table>
foster environmental degradation, which in turns creates more poverty (Nadkarni, 2000). This point of view positions the poor (farmer) as both a victim and a perpetrator of environmental degradation. This argument has been since then been questioned. While not rejecting the environmental degradation - poverty feedback loop, some researchers believe that one major cause of environmental degradation is the proletarianization of rural dwellers and farmers, which weakens social structures favoring sustainable resource management (Garcia-Barrios and Garcia-Barrios, 1990). The migration of farmers to the city to obtain factory jobs results in a decrease of farm labor as well as a weakening of indigenous institutions in rural Mexico. Since those institutions often play a role in environmental protection, the consequence is environmental degradation. The same argument could be made on a more general basis considering how rural to urban migration has increased globally leading to settlements on urban fringes often requiring a land clearing of some sort. Some argue that focusing on poverty mainly to explain environmental degradation is a rather simplistic way of viewing the phenomenon. Duraiappah (1998) found that poverty induced environmental degradation depends on institutional and market failures as well as the activities of wealthier groups. Ravnborg (2003) also went against the classical poverty and environmental degradation cycle theory and argued that the limited access of poor people to certain resources was proportional to the effect they had on natural resource management. The author believed that the explanation to environmental degradation is rather found in “the social and political relations that shape access to natural resources and the norms for their management” (Ravnborg, 2003, p 1943). The investigation of the poverty-environmental degradation relationship in Swat, Pakistan, showed no difference in environmental degradation generated by different income groups. It was rather found that land tenure and ill-defined resource rights were stronger indicators of natural resource degradation (Rafi Khan, 2009). The type of environmental
degradation was also found to be a potent factor in establishing relationship between resource degradation and economic status. A study in Burkina Faso found that deforestation was mostly done by the most impoverished farmers while the less-poor and wealthy farmers were more likely to be responsible for overgrazing (Etongo et al., 2016). The relationship between environmental degradation and poverty is complex. While poverty can to a certain extent explain environmental degradation, there are many other factors at play. The research is consistent, however, in establishing a correlation between deforestation as a driver of environmental degradation and poverty. As a result, many believe that agroforestry as a way to maintain tree cover while engaging in other agricultural activities could be a remedy to the situation.

2.2.3. Agroforestry and Poverty

Agroforestry is typically portrayed as a poverty mitigation practice based on its potential to provide alternate sources of income to farmers and decrease food insecurity. In a study in Humbo, Ethiopia, the communities involved in agroforestry project were able to harvest firewood and timber within a year and non-timber products within three years (Brown, Dettman, Rinaudo, Tefera, and Tofu, 2010). Those practices also had a positive economic impact on farmers who made profits with harvested tree products. Raj and Chandrawanshi (2016) argue that agroforestry practices such as Jatropha plantation, lac cultivation, and gum-yielding trees are helping alleviate poverty by increasing the livelihood security of farmers in Chhattisgarh, India. In this regard, the income generating potential of agroforestry is seen as an incentive for farmers to engage in the practices while helping reverse environmental degradation. However, although poor farmers could reap some economic benefits from the practice, poverty is many times more of a deterrent than a favoring factor to the adoption of agroforestry practices. As Jerneck and Olsson (2013) explain, “smallholders have other priorities because they may be caught in the food imperative, the health
imperative and in the position of being among the poorest of the poor”. Indeed, the day-to-day pressure that subsistence farmers face to put food on their tables and take care of their families while lacking resources makes investing in agroforestry, although possibly desired very challenging.

2.3 The Discourse around Agroforestry Adoption

The research on agroforestry adoption include justification for the practice, presentation of the adoption factors, the intersection of gender and agroforestry, and the importance of context.

2.3.1 On Innovation Adoption

The term "adoption" itself carries the idea of novelty. Innovation adoption theorists define innovation adoption as "making full use of a new idea as the best course of action available." (Rogers and Shoemaker, 1971 as cited by Eveland 1979, p3). In the case of agroforestry adoption, the idea in question is agroforestry and the best course of action available is determined by various adoption factors. With regards to "making full use" of agroforestry, the complexity and versatility of AF constitute an inherent contradiction to that statement. Adoption can still be determined or measured with regards to an action or set of actions on the part of adopters. Eveland (1979) noted that with regards to adoption, it is equally important to examine decisions and non-decisions.

While the author's statement pertained to understanding the "what" and the "who" of adoption, his argument can also be interpreted as having sequential implications. Adoption is a process, and one decision might not lead to the next. Indeed, exposure to a practice and even the testing of the practice by potential adopters does not necessarily result in adoption which requires some form of assessment prior to reaching the decision to adopt or reject. (Figure 2.1). Rogers (1983) identified four characteristics of innovations that determined their rate of adoption: their relative advantage,
compatibility, complexity, trialability, and observability. The relative advantage pertains to the perceived benefit of the innovation. The innovation needs also be compatible with the beliefs and needs of potential adopters. Rogers (1983) argues that ideas and innovations that are easier to be understood by adopters are more likely to be adopted. The author also believed that the ability to try an innovation on a restricted basis reduces uncertainty and is likely to induce adoption. Lastly, being able to witness the positive results of an innovation is likely to increase one's desire to adopt it. Byerlee and Hesse de Polanco (1986) looked at the speed of adoption of technological packages by Mexican farmers and presented similar factors justifying the speed of adoption with the addition of riskiness. Those factors tend to focus more on the characteristics of the innovation than they do on the adopters' characteristics. Rogers (1983) presented five stages of adoption which are the innovator (first user), the early adopter, the early majority, the late majority, and the laggard. Diederen et al. (2003) re-used a condensed version of Roger’s categories and came up with the following three types of farmer-adopters: the innovator-farmer (first user), the early adopter-farmer, and the laggard-farmer. Rasmussen (2016) also revisited Roger’s work, finding common trends into two close concepts typically kept separate: the model of innovation adoption presented as a group affair and that of innovation decision seen as an individual process (Figure 2.1).

Regardless of stages, the adoption of a practice, technology, or innovation is measured with regards the number of individuals who decide to use it. While adoption is easily measured on an individual basis, it becomes harder to discuss adoption by a community, a country or a region. The rate of adoption could be an estimate of such measure but would still not explain the process by which the practice spreads in a community/region. The communication process facilitating adoption at community level is defined as diffusion (Rogers, 1983) and as an aggregate adoption of the practice by Abera (2008) who put more emphasis on the post-diffusion phase beyond
communication and experimentation. Most of agroforestry literature focuses more on individual adoption and often uses adoption and diffusion interchangeably.

Another aspect of the discourse around adoption is the adoption of the whole versus the part. Abera (2008) reviewed the literature on agricultural technology adoption and found that even though technology is often presented as a package, said package is not necessarily adopted in its entirety. Early adopters tend to adopt part of the package while it was more likely that late adopters would adopt the whole package. This reinforces Rogers' argument that trialability and observability are important contributors to adoption. Rogers' framework has been examined in the context of organic agriculture as well. Simin and Janković (2014) found that in the case of organic agriculture adoption, the theory of diffusion although not sufficient to explain all aspects of technology dissemination is useful in describing knowledge exchange between farmers. They found that innovators have more social capital both within and outside of their community while early adopters were more interested in the commercial prospects of the practice.

2.3.2 On Agroforestry Adoption

Whether to foster adoption or to increase practice agroforestry is widely advocated to farmers because of its beneficial environmental outcomes susceptible of reversing the adverse effects of the intensification of cash crop production. The practice is often encouraged by stressing the direct and indirect benefits of agroforestry to farmers. Along with the research on the biophysical properties of agroforestry practices, a lot of research has been conducted to understand the motivations of farmers to engage in agroforestry. The intercropping of annuals and perennials is often presented as a new practice for farmers. Kiyani et al. (2017) presented agroforestry as a new technology whose adoption is lagging in Rwanda due to lack of capital, technological knowledge, and good quality seeds. Kabwe et al. (2016) found that after limited access to seeds,
lack of interest was the second most significant factor explaining why agroforestry practices including improved fallows and biomass transfer were taking so long to diffuse in Zambia despite two decades of promotion. Additionally, some attention has been given to the introduction of new tree species to an area and/or the establishment of new spatial arrangements and intercropping combinations. Thangata and Alavalapati (1999) studied the adoption of the modified contour hedgerow intercropping of nitrogen-fixing *Gliricidia sepium* and maize, in Malawi. Manivong and Cramb (2008) discussed the introduction and expansion of rubber agroforestry in Laos after an increase in market demand for rubber namely from China.

It is also worth noting that agroforestry adoption is not dependent on agroforestry projects or extension efforts to promote the practice. The decision to transition to or scale up agroforestry practices is in many cases taken by smallholders for various reasons. In Laos, the decision to intercrop with rubber came from small-scale farmers encouraged by demand as well as local policies which encouraged the planting of trees over slash and burn practices. Alongside with tree species introduction, tree domestication is often presented as a way to establish or spread trees on farms. Simon and Leakey (2004) defined tree domestication as the way "humans select, manage and propagate trees where the humans involved may be scientists, civic authorities, commercial companies, forest dwellers or farmers". Like the decision to intercrop, tree domestication is often instigated by farmers themselves. Michon et De Foresta (1997) refuted the notion that "true" or complete domestication is the prerogative of temperate regions and involves the adaptation of wild tree species to genetically modified trees in artificially designed and simple systems, which the authors referred to as "the grain model". They argue that domestication has been taken place in the tropics by indigenous people for many years under the more complex "garden model" which can
mimic natural ecosystems. Simon and Leakey (2004) make the same argument that the intentional selection of trees for non-timber forest products had been undertaken in the tropics.

As previously stated, research focus on either the introduction of agroforestry as a land use management system or on the application of new and improved agroforestry techniques. Are the factors impeding the uptake of agroforestry by farmers the same as those resulting in the decline of the practice? While there might be some commonalities in the root causes and trends leading to the two outcomes, some underlying factors may differ in nature or prevalence. Adopting a new practice requires considerations that are different from the decision to abandon or reduce a practice. Consequently, the factors of a potential re-adoption or expansion of agroforestry practices could differ from the elements contributing to initial adoption. The decision to abandon a new technology is seen as "a reflection of either a loss of profitability due to increasing costs of inputs, falling yields or the results of a switch to another more profitable technology" (Abera, 2008, p 49). When it comes to initial adoption, challenges to the practice of agroforestry have been found to be small land size, land tenure, slash and burn practices, and lack of technological, and lack of awareness about the benefits of agroforestry (Rioux, 2012). It is evident that the lack of knowledge as a deterrent to agroforestry adoption is less likely to be the case in a region where there is more exposure to the practice. In Zimbabwe where traditional agroforestry is common, Chitakara and Torquebiau (2010) deemed the main obstacles to the adoption of innovative agroforestry to be the destructive action of pests and animals.
Figure 2.1. Rasmussen’s Restructuration of Rogers’ Model. Rasmussen (2014).
Although few studies have been conducted on declining agroforestry practices, some research does present a few explanations for agroforestry decline when investigating an area with a history of agroforestry. The decreasing practice of agroforestry is typically linked to population increase. Kaswamila and Mkavidanda (n.d) identified land pressure induced by population pressure as one of the factors driving a decrease in traditional agroforestry as people move to sparsely populated areas. Moreover, as a result of increasingly small farmland, farmers tended to plant more horticultural crops than trees which were often cut without replacement and used as fuel. The authors also found that the introduction of alternative conservation practices (non-agroforestry based) aiming at controlling for soil erosion resulted in a reduction of traditional agroforestry as erosion control. Other reasons identified for the decline of the practice included drought, unreliable market, inappropriate intercropping combination, lack of seedlings for traditional trees, and change of priority. There is an intersection between leading factors of agroforestry decline and factors impeding agroforestry adoption, nonetheless failed intercropping experiences as well as priority changes are unique to places that have dealt with agroforestry and knowing that is be helpful in planning for re-adoption.

While identifying what prevents farmers from adopting or makes farmers abandon agroforestry practices is important, it is equally important to understand factors favorable to adoption. Significant research has been conducted on the initial adoption as well as the enhancement and expansion of agroforestry. Less research has been conducted to explain the decline of agroforestry practices and even less research examining the factors favoring a return to agroforestry practices after a decline in places with a history of agroforestry. When the history of agroforestry in a region is acknowledged, it is typically framed in terms of the facilitation of adoption with local knowledge mostly in Asia and Africa or as a dying or struggling land use
management model that preceded intensive agricultural production in temperate regions. In the study of maize and *Gliricidia sepium* in Malawi, the researchers anticipated that prior exposure to agroforestry would result in higher adoption of that specific intercropping practice (Thangata et Alavalapati, 1999). When that hypothesis was not confirmed, the researchers outlined the possibility that farmers may have been invested in other agroforestry techniques already and/or were waiting to see results on fellow farmers' fields (the implication of local knowledge as an internal factor of agroforestry adoption is further investigated in this chapter). Eichhorn et al. (2004) discussed of agroforestry systems that are threatened or extinct in Europe.

The decline of agroforestry in a given area may be induced by circumstances that either contributed to changing the farmers' perceptions of the practices or introduced new factors that changed farmers' situation, environmental conditions, and local policies. Makino (2003) reviewed the AF in Tonga and observed the decline of agroforestry practices in the kingdom. The expansion of modern agriculture was identified as the main reason for the decline as monocultures accompanied with high inputs of agrochemical spread rapidly driven by wealthy farmers. Belcher et al. (2005) found that in addition to markets forces and population pressure, agricultural policies had severe impacts on the development of forest garden systems. This is the case of Indonesia where the massive production of rubber was encouraged by local policies. The same pattern was observed in West Sumatra where extension agents provided insecticides only to farmers producing nutmeg in "well-ordered orchards" to the detriment of forest gardens which tended to be less orderly (Belcher et al., 2005, p 250). The authors also identified the tendency of agricultural research to favor species that develop better in full sun which made it less profitable to grow species that tolerate shade. Perhaps the answer to declining agroforestry practices could also partly be found in the reasons that motivate farmers to adopt modern agroforestry. Along with motivating
factors, a non-negligible aspect of agroforestry adoption is gender. Indeed, the gendered nature of involvement and inclusion in agriculture expands to agroforestry and create different dynamics of participation, and decision-making which affects adoption.

2.3.3 Gender, agriculture, and development

Research that focuses on the intersection of agroforestry and gender in the developing world is typically framed in terms of women’s empowerment. As stated in the introduction, the model “Gender and Development” (GAD) was the approach to development that finally considered the subordination of women to men similar to in many cases the subordination of developing countries to the western world. Building on GAD’s principles, researchers who treat the subject of gender, instead of limiting women’s issues to access and opportunities also address the degree to which women are included in various spaces. Moser (1993) discussed how gender affects the triple roles that women and men play both at household level and at community level. Moser identified those roles as being productive, reproductive, and community-oriented. The author argued that while women inherited reproductive roles, men even when involved in domestic work did not have a clearly defined reproductive role. Moreover, women’s productive roles were often ignored since not always monetized. With regards to community, Moser noted the differences between the community managers embodied by women and the community leaders comprised of men whose leadership often had institutional political ties. The selective inclusion of women in certain activities is clearly rooted in the view of women being subordinate to men. Research and programs seeking to measure or help bring about empowerment to women look for the degree of involvement of women in various spheres and spaces. The Women’s Empowerment in Agriculture Index (WEAI), a tool commissioned by the Feed of The Future Initiative of the United States Agency for International Development (USAID, helps measure women’s inclusion,
agency, and empowerment in agricultural activities and places (Alkire et al, 2013). The tool, a survey, allow researchers to make evaluations regarding women’s levels and types of inclusion based on five main aspects called “domains of empowerment” which are production, resources, income, leadership, and time (Table 2.2).

A third theory/index to measure the gendered spaces of agriculture is the gendered livelihood framework, presented by Meinzen-Dick et al (2011), which builds upon the sustainable livelihood theory. The sustainable livelihood theory is defined as "an example of the ‘multiple capital’ approach where sustainability is considered in terms of available capital (natural, human, social, physical and financial) and an examination of the vulnerability context (trends, shocks and stresses) in which these capitals (or assets) exist" (Morse and McNamara, 2013, p28). The five capitals are natural, social, human, physical, and economic capital. Those capitals are a way to "engage more fruitfully and meaningfully with the world, and most importantly the capability to change the world"(Bebbington, 1999, p. 2022). Meinsen-Dick et al (2011) argue that access to such capitals is gendered and proposed a framework based on the alternating joint and separate nature as well as gendered aspect of assets, livelihood strategies, income, and expenditure (Figure 2.2). The gendered participation and inclusion presented in the aforementioned theories and framework were recurring themes in agroforestry research as well.

2.3.4 Agroforestry and gender participation

Gender has been investigated throughout the literature as a separate variable which interacts with both external and internal factors of adoption (detailed in the next section). In this study, gender is also seen as a category in its own because of the complexity of separating between gender as a societal construct formed externally [the reason Meijer et al. (2015) consider it as an extrinsic factor] and the internalization of gender roles and expectations which have been passed
down for centuries. Although external and extrinsic factor are essentially the same, the term “external” is preferred to “extrinsic” in this study to avoid the conflation of gender with external factors.

**Table 2.2: WEIA Index**

<table>
<thead>
<tr>
<th>Domains of Empowerment</th>
<th>Production</th>
<th>Resources</th>
<th>Income</th>
<th>Leadership</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Decision making about agriculture and autonomy</td>
<td>Decision making about productive resources</td>
<td>Control of finances and expenses</td>
<td>Community leadership</td>
<td>Allocation of time to reproductive and productive roles as well as leisure</td>
</tr>
</tbody>
</table>

Source: Meinzen-Dick, Alkire, Peterman, Quisumbing, Seymour, and Vaz (2012)

**Figure 2.2. The Gendered Livelihood Framework.** Meinzen-Dick et al (2011)
Gender is understood in this study as the construction of expectations based on societal understanding of sexual differences. Research that explores agroforestry adoption through a gender lens is nonetheless not very extensive. There is also a geographical imbalance in the research as much of agroforestry research on gender has been conducted in Africa (Colfer et al., 2015; Haverhals et al., 2016). Since gender does impact agroforestry adoption, studying whether and how the intersection between gender and internal and external factors of adoption influence the practice of agroforestry could provide a broader understanding of farmers' rationales for engaging in the practice. Gender is a crucial aspect of agroforestry adoption and maintenance, and there could be more research on the intersection of gender and agroforestry. Alka et Alaok (2014) argue that despite a general belief that women are passive in agroforestry participation, they are, in fact, primary users of forestry products since the men tend to be more interested in selling those products. The authors also argued that most Indian movements against deforestation and forest destruction have been led by women. Women are also found to be more responsible for feeding livestock, collect firewood, harvest fruits, and nuts: all activities with agroforestry implications (Fortman and Rocheleau, 1985; Kiptot and Frazel, 2014). A study in Sierra Leone revealed that women were more knowledgeable about tree attributes than men: they could name up to thirty-one uses for tree species while men only identified eight (Fortmann and Rocheleau, 1985). Kiptot and Frazel, (2014) describe how men and women have different interests regarding tree uses and often utilize different parts of the trees or different tree species. Moreover, it has been found that women tend to use tree products in a more environmentally protective way than their male counterparts whether they do it for practical economic and political reasons or in accordance with gender roles (Jackson, 1993). Women, however, remain limited in their use of agroforestry practices since they often have to use men's tree byproducts as opposed to the economically
valuable parts of the tree (Kiptot and Frazel, 2014). Knowing the differences and similarities between the choices men and women make regarding tree uses and more importantly the reasons behind those decisions is crucial to facilitate the adoption of practices that will match existing needs.

Moreover, agroforestry practices are not equally beneficial to male and female farmers. Indeed, in many societies, women tend to harness the benefits of practicing agroforestry less due to cultural practices, local gender roles, and power relationships that structure access to agroforestry as a livelihood strategy. Kiptot and Franzel, (2012), identify insecure land tenure in both patrilineal and matrilineal African societies as an impediment to their engaging in agroforestry. Patrilineal societies connect generations through the father’s line while in matrilineal societies the mother’s line prevails. In a patrilineal society, a woman can only access land through her husband while in a matrilineal society she can obtain land from her family/mother. The expectation is that women in matrilineal societies would have greater land tenure. Kiptot and Franzel nonetheless argue that “even in matrilineal societies such as in western Ghana, women do not possess inheritance rights since land is often transferred from a deceased man to his brother or nephew (sister’s son)” (Kiptot and Franzel, 2012 p 466). This view is echoed by a study in matrilineal Eastern Tanzania where it was found that although membership to clans is determined by maternal line, women would have to relocate with their husband clan which restricted land control (Dondeyne, Vanthournout, Wembah-Rashid, and Deckers, 2003). This brings up the question of whether land tenure or land control is the real obstacle to agroforestry adoption. Indeed, one who does not own land may have little say about its management but owning land especially for women does not guarantee control. Since agroforestry often involves permanent crops, not being able to control land use can deter women from the long-term investment that agroforestry
entails. The authors also found that women in Eastern Tanzania benefit substantially from harvesting agroforestry products such as fodder, firewood, fruits, and vegetables, activity deemed as subsistence activity and neglected by men. However, women have less access to agroforestry information than do men and are typically confined to the small trade market meaning they generally are engaging in small retail and selling less valuable products. Haverhals et al., (2016) also found that men occupied more favorable positions than women with regards to FTA value chains of products. Nonetheless, gender-oriented projects tend to focus more on fostering the increased participation of women in agroforestry while ignoring the power relationships between men and women that underlined the issue (Haverhals et al., 2016). The lack of decision power and opportunities that women face which limits their full access to agroforestry benefits has been found to be less prevalent in some regions depending on the cultural context. Colfer et al. (2015) argue that cultural norms are stronger than laws in determining gendered access to agroforestry products and suggest that in Indonesian regions where gender norms tend to put women in a complementary position to men, women might have better chances at harnessing the benefits of agroforestry practices.

2.3.5 On internal and External Factors of Agroforestry Adoption

The factors favoring the uptake of agricultural practices namely agroforestry can be grouped into two categories: internal and external factors. The internal factors are those that are linked to the mental associations that farmers have of agroforestry whereas the external factors are the ones that shaped the farmers living situation and surroundings. Perceptions and knowledge of agroforestry are in that regard internal factors. The external elements take the form of farmers’ socio-economic status, farms’ characteristics, environmental state, land tenure, access to extension services, and policies. Internal and external factors are also presented in the literature as extrinsic
and intrinsic variables. The extrinsic variables are "the characteristics of the adopter and the external environment in the decision-making process" whereas intrinsic variables are identified as "knowledge, perceptions, and attitudes" (Meijer, Catacutan, Ajayi, Sileshi, and Nieuwenhuis 2015 p44). These intrinsic and extrinsic factors are contextually equivalent to the external and internal factors described previously.

Research on agroforestry adoption tends not to address external and internal factors equally. Considerable studies have been conducted on the external factors and socio-economic determinants of agroforestry adoption. A lesser emphasis has been put into addressing the internal factors of agroforestry.

2.3.5.1. External factors of agroforestry adoption

As previously stated, the recurring themes in research on external factors of agroforestry adoption are the following: farmers’ characteristics, farm characteristics, access to information, market trends, policies, land tenure, and social capital. Pattanayak et al (2003) did a review of 120 articles on the adoption of agricultural and forestry technology by farmers and found the following five main categories of factors influencing uptake: "preferences, resource endowments, market incentives, biophysical factors, and risk and uncertainty" (Pattanayak et al, 2003, p 175). The preferences relate to farmers' attitudes and risk tolerance and are evaluated with farmers' characteristics as proxies. The researchers cite land, labor, and savings as resources that could facilitate implementation. Physical access to market as well as pricing were also found to affect adoption. Lastly, farm characteristics such as slope and soil quality as well risk level often reflected by the security of land tenure influence the decision making of farmers. The authors also pointed out that the potential of agroforestry for diversification was likely to reduce risk. Farmers' characteristics particularly socio-economic factors have received a lot of attention from
researchers. This emphasis could be attributed to the intersectional nature of these variables with other agroforestry adoption drivers. Indeed, a farmer with higher income is likely to have bigger land, more capable in investing in seedlings, and more able to withstand market variability. Surprisingly, Scherr (1995) found that in Kenya urbanization was associated with a rise in agroforestry practices as market demand grew for fuelwood.

Differences between uses of tree products based on economic status has also been found: poor farmers tended to use trees to build poles and for firewood while average income farmers used trees for timber. Suyanto et al (2005) identified land tenure has the main incentive for communities in Sumatra, Indonesia to adopt agroforestry practices. Sanou et al (2017) noted that food secure farmers had greater inclination to adopt agroforestry. Irshad et al (2011) found that agroforestry adoption was fostered by household size as well as farmers' income and education level: bigger household size, higher education and income were positively associated with presence of trees on farms. Scherr (1995) noticed another trend with regards to land size which they found to not be related to wealth necessarily. In addition to big differences in tree numbers, bigger farms tended to have trees for fuelwood and building poles while smaller farms grew trees for fruits and green manure. Had the dissociation between farmers' income and farm size not been made, this finding would have contradicted the author's argument regarding poor farmers using trees for fuelwood rather than timber.

In Vietnam, the non-complementarity of agricultural and forestry policies exacerbated by the lack of support for agroforestry (while there was for other form of agriculture) by both national and provincial institutions resulted in the promotion of monocultures rather than agroforestry (Simelton et al 2016). Gitonga and Mukoya (2016) found that access to information was critical to the adoption of agroforestry especially if the information came from neighbors and extensions
agents. The reliance on neighboring farmers for information also speaks to the importance of social capital for agroforestry adoption. Social capital is defined as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition - or in other words, to membership in a group - which provides each of its members with the backing of the collectivity-owned capital, a 'credential' which entitles them to credit, in the various senses of the word". (Bourdieu 1986 pp 248-249 as cited by Hauberer, 2010 p 38). Two dimensions of social capital, the bylaws for conflict resolution and natural resource management as well as the number of collective actions, were found to favor agroforestry adoption in southwestern Uganda (Sanginga et al. 2006). The researchers also discovered that conflicts were positively associated with agroforestry except for conflicts regarding tree cutting. They concluded that it was the presence of a mature social capital that allow this positive correlation between the occurrence of conflicts in a community and agroforestry.

**2.3.5.2 Internal factors of agroforestry adoption**

One research focus of agroforestry adoption is the internal factors of agroforestry adoption namely the perceptions and attitudes of farmers regarding the practice. Farmers gain knowledge through their experience which also shapes their perceptions. Local knowledge is critical in understanding the needs of a community in terms of agroforestry development. Farmers in Nepal showed extensive knowledge of over 90 tree species in their area. They were also very knowledgeable about erosion by leaf droplets. They asserted that shape and texture of leaves affect the degree of erosion which was in contradiction with what local researchers believe. It was eventually shown by other research that the farmers were correct in their assertions (Thapa, Sinclair, & Walker, 1995).
Despite the apparent contribution of local knowledge gathered from traditional agroforestry, farmers' knowledge does not always get the recognition they deserve. In Bolivia, it was found that local and traditional knowledge were undervalued due to biases of researchers towards the western scientific model (Jacobi, Mathez-Stiefel, Gambon, Rist, & Altieri, 2016). Exogenous agroforestry projects based on scientific research tended to be very narrow in scope, focusing on specific species of trees and crops that have been heavily used in agroforestry systems globally, and ignoring the more diverse traditional agroforestry methods (Jacobi et al., 2016). Farmers also felt like their social and spiritual ties to agroforestry practices were overlooked due to researchers' focus on economic benefits of practices. When researchers expected farmers to be incentivized by profit, sometimes a desire to give back to "mother earth" was the main motivation which tended not to be embraced by researchers. In Costa-Rica, farmers had very detailed knowledge about the ecosystem services provided by agroforestry practices and had developed their own classification for identifying positive and negative tree-crop interaction (Cerdán, Rebolledo, Soto, Rapidel, & Sinclair, 2012). Indeed, while there could be room for misinterpretations in farmers’ comprehension of certain ecological phenomena, the "evaluation of the combined knowledge of farmers and researchers related to interdisciplinary land use problems by the creation of explicit, encyclopedic knowledge bases, offers the possibility of targeting research more precisely to gaps in knowledge constraining the productivity and sustainability of the farming system" (Thapa et al., 1995 p 249).

A common assumption is that a positive outlook on agroforestry will result in the adoption of the practice. However, the findings regarding the implications of positive perceptions of agroforestry differ. In Penablanca, in the Philippines, smallholders demonstrated great awareness of climate change effects and knowledge regarding coping strategies involving trees. Nonetheless,
the majority did not engage in any mitigating activities (Evangelista et al. (2016). Meijer et al. (2015) found that in the districts of Mzimba and Chiradzulu, Malawi, farmers’ attitude towards planting trees to be overall positive meaning that farmers believe that tree planting will result in positive outcomes. Likewise, they also had a negative attitude towards cutting down trees from the forest. It was also found that there were more factors favoring tree planting than impeding it. No significant direct association was established between the attitudes towards planting trees and the attitudes towards cutting trees. Nonetheless, the farmers who had been more inclined to plant trees also reported feeling "more pressure from others not to cut down trees”. This attests to the influence that social norms and collective attitudes may have on individual behavior. In Chiradzulu, farmers who felt more confident in their ability to plant trees also felt more "discouraged" to cut down trees. Farmers in Chiradzulu were also found to believe more strongly that fellow farmers, extension workers, and their village chief wanted them to plant more trees. Farmers in that district were also more willing to align with the views of their spouses, peers, and village chief compared to the other region of Mzimba. Although behaviors towards cutting and planting trees were not found to be directly related, farmers who had planted trees in the past five years held more positive attitudes about planting trees and more negative attitudes towards cutting down trees.

The Malawian case study captures how farmers’ experiences and social ties shape their attitudes towards agroforestry practices. It also shows that the relationship between perceptions and the practice of agroforestry might not be straightforward. In the context of agroforestry decline, when a type of agricultural practices has endured in a locality for a long period, unless the system is challenged by new events, ideologies, improvements, or inventions, it is likely to remain as is.
2.3.5.3 Combining internal and external factors

While farmers' perceptions of agroforestry are undeniably important to explain behavior patterns towards the practice, perceptions alone do not account for other factors that determine the adoption or continued practice of agroforestry. Indeed, the decision to adopt an agricultural technique depends on circumstances other than farmers’ perception of said techniques such as farmers’ characteristics, farm characteristics, land tenure, and local policies. While understanding external and internal factors of agroforestry adoption is important, it is also important to address the relationship between external and internal factors and how such relationship affects the uptake of agroforestry practices. Research that emphasizes external characteristics tend to not recognize the contribution of farmers' attitudes to the decision-making process. On the other hand, research that focuses only on internal factors ignore the elements influencing such factors as perceptions are shaped by their circumstances and environment. Meijer et al., (2015) argue that the study of farmers’ intrinsic/internal attributes in addition to extrinsic/external factors provides a more holistic framework to understanding agroforestry adoption.

2.3.6 Agroforestry Research in Haiti

The type of agroforestry practiced in Haiti tends to be traditional. Civil-Blanc (2007) identified 4 types of AFs in Haiti in the form of homegardens, sparse plantations, perennials under trees, and fallow. Jean Denis et al (2014) offers a classification that is based on the proximity of trees to the farmers’ residents as well as the fertility of the soil. Farmers were found to have homegardens near their homes in which they grow trees and subsistence crops. Further away from their homes, they would grow trees and cash crops on fertile soil and would leave the unfertile soil covered with trees in a longer fallow period interrupted by short periods of slash and burn. While farmers are often blamed for deforestation, they play an important role in maintaining tree cover
in Haiti. Bellande (2015) argues that, in Haiti, more than 75% of arboreal spaces comprised of useful tree species particularly fruit trees are planted or maintained by Haitian farmers. Given the Haitian landscape however, it would be beneficial if much more farmers were involved in agroforestry.

Previous studies have covered different aspects of agroforestry adoption in Haiti. Zimmerman (1986) investigated the types of agroforestry practices that are more likely to succeed in Haiti. White and Jickling (1995) studied various agroforestry projects (non-traditional) in Haiti. They found that those projects tended to die off after implementation due to neglect, livestock predation, or harvest with no replacement. However, the authors found one project, led by Pan American Development Foundation (PADF) to be exceptionally successful: 48 million seedlings of mostly exotic species were planted between 1981 and 1991. The spatial arrangement of the trees did match traditional agroforestry arrangement, and upon peasants' request, more local species were introduced. The authors attribute the success of the project to the incorporation of traditional knowledge.

Bayard et al. (2007a) examined the socio-economic factors that favored the adoption of alley cropping (a conservation practice coupling rows of trees and rows of crops) in Haiti. Bannister and Nair (2003) looked at the role that different characteristics of farms and households play in agroforestry adoption in Haiti. Dorisca et al., (2007a; 2007b) looked at Haitian farmers' perceptions of forests as well as the types of factors that were linked to the participation of farmers in reforestation program management. Reforestation and agroforestry although similar in terms of environmental benefits; they are different as reforestation programs are not conducted on farmers’ land and does not require any investment on their part. Mirroring the international trend, the research focuses more on socio-economic, technical, and environmental factors to explain
agroforestry adoption. Gender is barely examined in an already poor literature on Haitian agroforestry. When it is mentioned, it is treated as any socio-economic parameters such as age or education: Nair and Bannister (2003) found that female-headed households tend to plant fewer trees than male-headed households. Notions of gender imbalances are typically not considered. Bayard et al, (2007b) investigated the relationship between environmental perceptions and behavior change in Haitian hillside farmers and found a positive relationship between behavior and a positive attitude towards the environment. However, the ongoing decline in tree cover including a decrease in the scale and intensity of agroforestry in the country seems to imply that either such positive association have shifted or that farmers’ attitude towards the environment have grown increasingly negative. Have farmers’ perceptions changed? Is there a combination of factors that could explain this decline? How can said factors inform policies and strategies to curb and potentially reverse agroforestry decline in Haiti? As mentioned previously, focusing only on perceptions leaves out other relevant variables that may be at play just like external factors fail to consider a critical component of the decision-making process of farmers. There is also a deficit in agroforestry research in Haiti.

2.4 Framework and Theoretical Perspectives

Declining agroforestry practices in Haiti could be explained by the same factors examined in agroforestry adoption literature as well as to frame our understanding of the re-adoption process. Research on agroforestry adoption, however, tends to be skewed toward external factors of adoption. The explanation of agroforestry adoption by socio-economic, local, and environmental factors although helpful for understanding the types of farmers, the market forces, and the environmental conditions favorable to adoption cannot fully explain the behavior of farmers with
regards to agroforestry practices. Farmers' perception and knowledge play an equally important role in influencing farmers' decision to adopt, maintain or abandon agroforestry practices. Both external and internal factors of adoption need to be taken into consideration to have a holistic view of the factors at play in agroforestry adoption, maintenance, or re-adoption. Since gender impacts those factors, it can also be expected to impact agroforestry adoption. To fully understand the relationship between gender and agroforestry adoption one must understand how gender affects both external and internal factors of adoption. This study’s framework combines Moser (1993) ideas of the gendered triple reproductive, productive, and community-oriented roles; an alternate version of Meijer et al. (2015) framework for agroforestry adoption based on external and internal factors (rather than extrinsic and intrinsic); and the gendered livelihood framework of Meinzen-Dick et al (2011) to explore the trends of agroforestry in Northern Haiti (Figure 2.3). Unlike in the model presented by Meijer et al. (2015) where external factors lead to internal factors which result in adoption, we postulate that although external factors and internal factors influence each other, they also independently impact agroforestry adoption, maintenance, or decline.

This study aims to explore the relationship between external and internal factors of adoption, and the gendered decision-making of farmers determining maintenance, reduction, or abandonment of agroforestry practices. The conceptual framework followed stems from the notion that gender influences farmers’ external circumstances (access to education, finances, land tenure, etc.) and their perceptions/knowledge of agroforestry (internal factors). Farmers’ expected contribution to household work, farming, and community activities is also assumed to be influenced by local gender roles. The combination of external and internal factors as well the expression of agricultural gender roles will determine how likely a farmer is to maintain or adopt agroforestry practices.
Figure 2.3. Conceptual Framework
CHAPTER 3.

AGRICULTURE AND PEASANTRY IN HAITI

Exhibiting elements of both agriculture and forestry, agroforestry is technically the intersection of both disciplines. Yet in practice, it is viewed as an alternative/unconventional practice and therefore is relegated to the periphery of agriculture and forestry. Indeed, agroforestry is not deemed as profitable as conventional agriculture despite studies showing that agroforestry can be a remunerative practice. Moreover, agroforestry goes against typical forest management methods which have not always exhibited interest in people and crops. Now disciplines such as social forestry or community forestry tend to practice a type of people-oriented forestry that can encompass some form of agroforestry practices (forest farming). In a nutshell, the aforementioned forestry models allow individuals whose livelihoods depend on forests to continue exploiting forest resources which departs from the typical prohibitive regulation that accompany forestry programs (Moeliono, Thuy, Bong, Wong, and Brockhaus, 2017). Programs and literature about agroforestry are linked to forestry departments in many countries. In Haiti, agroforestry tends to fall under the purview of the Ministry of Agriculture. To better define the prospects of agroforestry in Haiti, it is essential to understand the social, cultural, economic, environmental, and political background of the country which are presented in this chapter. The chapter also presents a brief history of the formation of the peasantry in Haiti, the organization of agriculture in Haiti (labor and land tenure), the impacts of the American Occupation as well as neoliberalism the agricultural economy, and the advent of non-governmental organizations (NGOS) in the country.

Haitian agriculture is characterized by three descriptors: small-scale, family-based, and market-oriented. There are age old debates attempting to determine whether Haitian agriculture is based on latifundia (done on vast estates) or minifundia (done mostly on small plots of land). The
main view is that small scale agriculture prevails. However, the idea of the dominance of agricultural *minifundias* in Haiti has been contested. It is argued that despite the fact that the majority of peasants’ own very small acreages, a greater portion of land is owned by a small minority creating a *latifundism* controlled by the government and the urban elite (Pierre-Charles, 1967; Université Antilles-Guyane, 1993;).

With a large rural population, Haiti’s economy has extensively relied on agriculture and have faced myriad challenges including its topography, natural disasters, poor governance, and the more recent blow of neoliberalism, which has adversely impacted agricultural production. Haitian peasants, the faces and hands of Haitian agriculture, have been socio-politically neglected as has been reflected by national agricultural policies since independence. Indeed, some authors have found similarities between the “black code”—the set of rules dictating slaves’ behavior during colonization by the French, and the “rural code” that peasants had to abide by that were established in 1827. Osna (2017) argues that the rural code had the ultimate goal of controlling the peasantry and reducing it to a labor force good only for national production while stripping it from its liberty. If the male peasant is marginalized, the female peasant is doubly marginalized as gender adds another layer to the limitations that she faces. Beyond the first rural codes, many have argued that the Haitian government has continuously applied “anti-peasant” policies which not only failed to invest in the peasantry but also allowed conditions that have amplified the economic fragility of Haiti further exacerbated by the application of neoliberal policies towards the mid-1980s. (McGowan, 1997; Thomas, 2014). Such perception has contributed to a general distrust in the government which has facilitated the proliferation of non-governmental organizations (NGOs).

Intended to propel the Haitian economy via market liberalization, neoliberal policies applied as structural adjustment programs (SAPs) did not however live up to the expectations of
neoliberalism proponents and have had negatively consequences on the economy and the society at large. Haiti was barely recovering from the great recession of 2008 when a major earthquake struck in 2010. That unfortunate event brought about a wave of hope for the future of the country as more monetary aid poured in giving rise to an unprecedented number of NGOs: Haiti became “the republic of NGOs” leading worldwide for the number of NGOs per capita (Schuller, 2012). The overwhelming presence of organizations bypassing the government also had its own repercussions on local agriculture.

It could be argued that the current state of agriculture in Haiti is due to the culmination of multiple successive and ongoing bad, weak, or inappropriate policies both nationally and internationally that have led to a drastic decrease of the national agricultural production, a dependence of foreign goods, an overall trade deficit, and a quality of life that keeps getting lower. Haitian peasants who are more vulnerable to the economic shocks that the country has had to withstand are often accused of deforesting specifically for charcoal production to make ends meet, accusation which attests to the obliviousness of urban dwellers who for the most part depend on charcoal for cooking. Haitians peasants are given the least, expected to feed a population in conditions that have seen little changes since independence, and are somehow perceived as responsible for all arboreal matters. This chapter presents the evolution of the conditions of Haitian farmers/peasants, the various forms of land tenure and labor organization and the effect of external factors such as American occupation and neoliberalist policies on Haitian agriculture.
3.1 Social, Economic, and Environmental Profile of Haiti

3.1.1 Climate, Geography, and Topography

Occupying more than one third of the west side of the island of Hispaniola, Haiti stretches on approximately 27,750-kilometer square of land including the satellite much smaller islands which along with the mainland form the Republic. Ayiti, Quisqueya, or Bohio, the Native American names of the island stand for “mountainous land”. Indeed, the topography of the country is marked by 80% of mountainous areas, two third of which have slopes greater than 20% (Institut Interaméricain, 2009; Septembre, 2005). The temperature varies between 23 C to 31 C (“Haiti-Climate”). Haiti has two rainy seasons: the first one goes from April to June and the second one goes from October to November. The dry season occurs from December to March since the summer months intercalated between the two main rain seasons are also perceived as part of the larger rain period from April to November. Since 2000, it has been observed that the rainy season have been delayed by up to three months lengthening the arid season which is not only bad for agriculture but also makes it difficult for farmers to plan (Cohen and Singh, 2014). Although, the population growth rate is steadily decreasing, from 2.35% in 1983 to 1.26% in 2016, the total population has almost doubled from roughly 5.6 million in 1980 to 11 million in 2018 (Université de Sherbrooke, 2016). Mirroring the global trend of rural to urban migration, the country has witnessed tremendous urban growth over the years. Indeed, the urban population has experienced a 283% increase from 1960 to 2016 while the rural population which in 1960 comprised 84% of the total population was down to 40% in 2016 (Université de Sherbrooke, 2016; World Bank, 2018). Haiti is still very rural compared to its neighbors and as such agriculture occupies a very important part of the national economy which has neglected to adequately (diversify its financial portfolio or) develop other fields and sources of revenue.
3.1.2 Socio-Economic Situation

One of Haiti’s major economic problems is its trade deficit, which is in part linked to a low agricultural productivity. The Haitian diaspora plays an important role in the economy. Remittances which amounted to 8% of the GDP in 1998 rose to 29.4 in 2016 (World Bank, 2018). With a Gini coefficient of 0.59 in 2012, inequality deeply affects the Haitian society (World Bank, 2018). The 1960s saw the beginning of industrial investment mostly in the form of light manufacturing and sub-contracting mostly by American companies who were given tax advantages and a very cheap labor force. The World Bank estimated the unemployment rate in Haiti to be 14% as of 2017 (World Bank, 2018), a number which may not reflect the totality of the informal sector employing most Haitians and may also underestimate women’s contribution to the labor force.

3.1.3 Environmental Condition and Policies

From 1804 to 1844, forestial resources were protected by a forestial police. It was not until 1926 that a department of Agriculture and National Forest Reserves was established. Later on, legislative measures such as the law of the conservation and protection of private forest in 1933, the law against deforestation in 1936, and the decree on forestial regulation were passed to ensure environmental protection and the maintenance of adequate tree cover in the country (AVSI, 2012). Those measures had little impact on deforestation and were later counteracted by the decree of 1941 allowing a multinational American company to exploit the forests of Morne La Selle and Morne des Commissaires (both mountains) for fifty years (AVSI, 2012). Forest cover which was 60% of the country before the American occupation in 1915 went down to 21% after the occupation in 1945 (Roc, 2008). Other laws followed criminalizing the cutting of certain tree species as well as trees in certain areas under the penalty of up to 6 months in prison and the
confiscation of the cut trees, penalties which were reduced by the rural code of 1962. In 1971, a new decree demanded that all municipalities put aside 50 hectares of land to be reforested in 10 portions of 5 hectares (AVSI, 2012). There is no record of this particular measure having been implemented.

The 1987 constitution currently in effect, ratifies the law mandating the 50 hectares of forest in municipalities and adds a 5-hectare requirement for rural areas (Victor, 1995). Permits are supposedly required to cut trees even though it is not certain whether the institutions supposed to issue such permits exist in certain areas. There is no indication of enforcement of such measures which if enforced in a democratic context (as opposed to the dictatorship era) may not necessarily have positive implications for agroforestry adoption. Indeed, the prohibition on tree cuttings may imply that farmers will have less say on the tree species that they harvest if they were to adopt agroforestry practices. Moreover, depending on the tree species awarded or denied permits, women and men could be affected differently if they have differential preferences for tree species or uses. On the other hand, since women’s utilization of tree products often involves only parts of the tree, women might be favored by those laws in terms of agroforestry practices and adoption.

3.2 The Roots of Agricultural Decline: The Effects of Post-Colonial and Current Policies

Land tenure, agricultural policies, and their effect on the peasantry have strong colonial roots. At the dawn of independence, the economic future of Haiti was bleak as burnt and devastated plantations stretched over hundreds of acres. Trade opportunities were meager, and the people who picked cotton and tended to sugarcane plantations wanted to spend their time differently, drunken by the prospects of independence. Since its inception in 1804, the Haitian peasantry, heavily taxed, often displaced, deprived of real social security provisions and insurance, has
always been at the bottom of any real investment considerations of the government. Peasants nonetheless remain the driving force of the Haitian economy as agriculture, particularly small scale, contributes significantly to the gross domestic product (GDP) although its contribution has significantly declined over the years. Agriculture which once contributed to 95% of the GDP now contributes to roughly 23 to 25% (Paul, Dameus, and Garrabe, 2011; MARDNR, 2013). Haitian agriculture provided 70 to 75% of national food needs in 1970 but is currently meeting only half of national food needs with the remaining coming from importation that has tripled since 1995 (FAO, 1999; Pressoir et al, 2016). While this pattern is seen in many other countries particularly western countries with the advent of industrialization, Fatton (2014) argues that in Haiti such decline was mainly due to a decrease in agricultural production as well as the departure of the agricultural labor force. Indeed, industrialization has never seen a substantial development in Haiti despite the government’ efforts encouraged by the international community, especially the United States. The numerous challenges coming from both national and international fronts faced by Haitian agriculturists fueled a lot of resistance on their part. Indeed, the government’s various attempts (reinforced and rooted in neoliberal prescriptions) to upscale agriculture and encourage the monoculture of specific crops had little success and resulted in negative economic and social consequences for the country. Lastly, because all the focus on agriculture has overall disfavored the peasantry to benefit the elite class, and to a certain extent American farmers, the national economy and the wellbeing of the Haitian society have been greatly impacted (McGowan, 1997).

3.2.1 Urban Bias Policies and the Creation of the Haitian Peasantry

The experience of Haitian peasants differs much from those of American farmers. Haitian farmers were not given land that they could manage and invest in at their leisure. During the early times of the newly founded Republic, peasants were expected to work on vast fields owned by the
government and the elite under what is known as the “agrarian capitalism” which to some authors is the substitution of the White rule. Many were prevented from migrating within the country in ways far too similar to slavery days. The similarities between the “black code” which regulated slaves’ behavior under French colonialism and the first “rural code” established by Haitian President Jean Pierre Boyer in 1827 partly to finance the “independence debt” requested by France have been noted by many (Université Antilles-Guyane, 1993). The rural code regulated agricultural practices, land contracts and tenure, conflicts, and peasants’ behavior. While the first rural code did certainly not consider peasants as property and stipulate that they be treated as such, it obligated any person who did not exert a civil profession or had received an education (which was the case of most Haitians at the time) to work the land. The rural code also legislated the restriction of peasants’ mobility, requiring that their offspring be tied to agriculture unless given special permission to learn a profession, and made sure that those laws, especially the fight against “vagrancy,” were enforced by a rural police.

Haitian Rural Code of 1826- Article 3

“It being the duty of every citizen to aid in sustaining the state, either by his active services or by his industry, those who are not employed in the civil service, or called upon for the military service; those who do not exercise a licensed profession; those who are not employed in felling timber for exportation; in fine, those who cannot justify their means of existence, shall cultivate the soil”.

Haitian Rural Code of 1826- Article 4

“ Citizens whose employment is agriculture shall not be permitted to quit the country to inhabit the towns and villages, without a permission from the justice of peace of the commune they desire to quit, and of the commune in which they desire to establish themselves. The justice of peace shall give this permission only after having ascertained that the person asking it is of good morals, that
his conduct has been regular in the canton he is about to quit, and that he possesses the means of existence in the town he desires to inhabit. All those who do not conform to these regulations shall be considered as vagabonds, and treated as such”.

Haitian Rural Code of 1826- Article 5

Children of either sex, whom their parents, being attached to agriculture, may be desirous of sending into the towns or villages, either for their apprenticeship or their education, shall be received by contractors, or by public or private teachers, only upon a certificate from a justice of peace; which certificate shall be granted upon the demand of the proprietor, or principal farmer of the place; of the officer commanding the rural police or of the father or mother. Every infraction of these regulations shall be punishable by a fine of twenty-five dollars payable by him who receives the child without a certificate”.

Those severe laws resulted in many peasants fleeing and squatting in the mountains where they practiced slash and burn to grow crops and harnessed the logwood Campeche (Haematoxylum campechianum) and Mahogany (Swietenia mahagoni). The mountains of Haiti were thus being farmed long before population pressure was an issue. Boyer eventually loosened his grip and allowed some peasants to buy land (Université Antilles-Guyane, 1993). Later, other governments would grant some land here and there mostly to the military until 1860 (Université Antilles-Guyane, 1993). In addition to giving land, the state undertook the sale of land during the first century of Independence. However, the process involved so many steps and paperwork that it took approximately nineteen years to lease land from the government first, purchase it, and settle on it for five years per state requirements (Riddick, 2012). Changes have been made since then regarding land purchase from private parties (the government is no longer actively giving land) but no deep structural changes have been achieved to ensure the Haitian peasant’s access or
ownership to arable land. The peasantry had to take a good portion of the land that it now owns by squatting abandoned plantations and land as well as the mountains.

Midy (2011) argues that the exclusion of peasants to benefit an urban elite in the Haitian society is institutionalized and best encapsulated by the creole phrase to designate people living in rural areas, “moun andeyo” which means “outside people or outsiders”. The author also described the triple economic, social, and political exclusion of Haitian peasants. The lack of interior roads to connect rural communities to each other and to the cities and the insufficient provision of public schools and healthcare centers in rural areas is very telling of the low level of priority that the government allocates to the countryside. When public schools started to be put in place in rural areas, they were for a long time administered by the ministry of agriculture as opposed to the ministry of education which oversaw education in the cities. The label “peasants” was even printed on birth certificates up until 1960 to differentiate the peasantry from other professions (Midy, 2011). Indeed, since the peasantry was in a way a type of social class in Haiti, at the very bottom of all social classes, it could be argued that the very harsh agricultural policies were not the only element that the Haitian society inherited from slavery. It also kept its discriminatory ways and a great disdain for agriculture and the people involved in it. The political scene was also dominated by the urban elite which sought to assuage its own interests. According to Mathurin and Danroc (2007), Haitian peasants have lost their greatest resistance tool, their food sovereignty to unfavorable local economic conditions, unreasonable taxes, and a disruption of their way of life by western influence particularly North-American.
3.3 Organization of Agriculture: Access to Land and Labor

3.3.1 Land Tenure

Land tenure which implies specific rights to a land goes beyond simple ownership. The FAO defines land tenure as a system that “determines who can use what resources for how long, and under what conditions” and “is multi-dimensional, bringing into play social, technical, economic, institutional, legal and political aspects”. (FAO, 2002, p 7) Land tenure can be defined by laws or traditions, involve different groups of people and be the object of different interests. The type of tenure based on the people involved can be private, communal, open access, or state regulated whereas the interest of the various parties can be overriding, overlapping, conflicting, and complementing (FAO, 2002) In Haiti, land tenure dictated by both legal procedure and local/regional traditions can be complicated particularly when there is a dissonance between the two systems. Land tenure falls under three main types: land ownership, renting, and sharecropping. The complexity of the Haitian tenure system lies in the interconnectedness of the three types of tenure which are often used in tandem as well as the power relationships between different parties within each system.

3.3.2 Land ownership

Farmers acquire land through purchase and inheritance. The most secure tenure is however realized when ownership is obtained through purchase as inheritance often leads to a subcategory of tenure called “indivision”. Indeed, farmland has gotten so small from being passed down from generation to generation that in many cases the land is not formally divided to different family members and form a tenure type called indivision. Each form of ownership carries its challenges. As previously stated, the peasantry has historically been disadvantaged in terms of land distribution. Thus, some of the land owned by farmers particularly in mountainous areas is land
that was acquired via squatting and has become de facto their land. Such process is not too different than that by which the state and the elite had obtained land in earlier times except that the state and the elite could provide/create legal proof of ownership. Some farmers however were able to purchase land from the state and other larger landowners during the first post-independence century for which they had formal land titles. Since that era, the purchased of land has been liberalized and peasants who have the economic means to purchase land can do so. Purchasing land that has already been surveyed is indeed the most secure of obtaining land whose ownership cannot be disputed. Complications arise however when the land being purchased does not come with a title because the former landowner did not possess one: such tenure is not fully secure as the land has the potential to be disputed.

### 3.3.3 The complications of land inheritance

Inheritance based on Haitian civil code is ambilineal. The civil code of 1825 also established an egalitarian land repartition between inheritors of both sexes (Oriol and Dorner, 2012). However, the catholic heritage in Haiti has promoted a form of discrimination between children of married parents deemed “legitimate” and children of unmarried parents called “natural” in terms of land inheritance as land could be legally be passed on to “legitimate” inheritors. Such discrimination prevented many Haitians from accessing land, but peasants were the most affected as official/legal marriage was not very common in the peasantry. Even presently, less people get married in the rural areas: they tend to have common law unions. Thus, it was difficult for all those “natural” children to access land and when access was granted (by a parent), the right to the land could not be proven legally. It is worth noting that despite the rigidity of the law, culturally land distribution in rural areas tended to be more linked to the existence presence of children in a union. A woman in a natural union was more likely to inherit land from her companion if she had children.
than a married woman with no children (Université Antilles-Guyane, 1993). To legally secure land to their “natural” children, some peasants would at times orchestrate fake sales to their unmarried partner. This unfair law would not be challenged until 1959 when equal right to land was given to all children regardless of the nature of their parents’ union (Oriol and Dorner, 2012).

Land inheritance also leads to different scenarios based on whether a written or oral testament was put in place before the landowner passed. The provision of a testament makes separation easier if the formal division of the land is done by the generation involved. However, the land survey and notary fees which are necessary to obtain a formal land title in Haiti are so exorbitant that the average smallholder cannot afford it. The Haitian surveying process is such that a fee is not only charged for the total perimeter of the land being surveyed but also for each of the subdivisions’ perimeters. It is also very common for the surveyor to be paid in land which reduces further the size of the land for smallholders (Oriol and Dorner, 2012). In addition, although the civil code stipulates that all land transactions be registered, a third of rural parcels are not registered and only 19% of rural dwellers have receipts for land purchase, which further jeopardizes the security of tenure (Le Nouvelliste, 2010). A testament may also attribute specific plots of land to heirs in a way that may not exactly reflect the constitutional egalitarian distribution regardless of gender or age. Indeed, if the land is very small, the older male offspring is typically favored in terms of percentage of land inherited or rights to farm the land which can remained undivided and owned by all. Indivision, the absence of formal and legal land separation creates additional difficulties for peasants. The term “indivision” is however misleading as the land can still be divided among inheritors outside of the legal process as amicable agreements are reached between family members with regards to land repartition. A family member may decide to sell his or her part but traditionally the offer is expected to be made to other family first. When this happen, a
new land title will be made for the plot of land for sale granted that there was an original land title for the larger property.

The informal division of land becomes a barrier when this legal indivision is maintained over multiple generations who receive portions of the familial property registered under a unique initial land title while the land remains undivided informally as long as the principal owner is alive. For the legal and lineal heir, their initial title called “the mother paper” is kept with typically the oldest person alive to have inherited the land, the most responsible co-inheritor, or with a notary. As the land become more and more fragmented over the years, the title would cover an increasing number of small parcels of land. This introduces another subcategory of tenure under land indivision, the right to farm which is different than ownership. While many inheritors have ownership, if the land is really small, only one or two inheritors may receive the right to farm upon agreement by all or based on the desire of the deceased parent. A type of rotational right to farm in which each inheritor only farm for a designated period has also been noted. Land shared between many generations often lack clear boundaries and anybody will have the right to the pasture on the land which unfortunately tends to lead to soil degradation. Sometimes indivision would continue for so long that attempting to divide the land even informally would be futile. As a result, the land in indivision is either rented and the revenue shared among co-inheritors or a portion of the land is divided among some inheritors (Oriol and Dorner, 2012). While the right to farm might be reserved to one or two heir, the right to pasture is given to all with no exception. Additionally, all inheritors can typically use tree products but only the main person farming the land has the right to cut down trees (Oriol and Dorner, 2012). The right to farm is also strongly dependent on presence/residence on the property which results in women being deprived of their right when they marry or move in with a partner.
3.3.4 Conflicts and insecurity of land indivision

Because the distribution of inherited land is so informal and involves at times so many people, conflicts often tend to arise among co-inheritors. The reasons for conflicts are multiple. When family members proceed to dividing their part of the land, sometimes errors occur, and more land is taken: the misattribution goes unnoticed until the next person (sometimes generations later) undergoes the same process. Conflicts also arise when division was made verbally, and the details of the agreement is forgotten. It is also possible for later generations to lose track of the title as the identity of the family member responsible for holding the document is not known to all. Peasants are so afraid of dispossession that they sometimes hide the existence of the title to others as a way of increasing the safety of the guarded document: if said person die, the document may not be retrieved (Université Antilles-Guyane, 1993). The security of tenure decreases when that happens and ownership of a ramification of the family might be questioned. In case of natural disaster or fire, that document might become lost and along with it the right of the owner to the land. Many people became “paper-less” in that manner. Even though the sale receipts are kept at the General Center for Taxes, people would have to travel to the capital of the nearest big to medium town to obtain, which could be expensive, not to mention that that knowledge was not accessible to all. The central office in Port-au-Prince collapsed during the last earthquake, which is an administrative nightmare that is still being dealt with. It is not unusual for farmers however to have multiple types of tenure. Informal and amicable land division is indeed a very messy process for those who will inherit the land many generations later as they are likely to file lawsuits over what was done in the past. It is possible and not very uncommon for people to seek reimbursement for land that was unrightfully sold a century ago (by other family members) and get a discounted price for the land based on year of sale value.
3.3.5 Sharecropping and Renting

Farmers also engage in sharecropping which is a system in which they agree to give a percentage of the harvest to the landowner. Sharecropping agreements in Haiti are typically verbal. In such tenure system favored by small peasants wanting to expand, the risks are diminished: if the harvest is lost, they will not have to pay the landowner. Sharecroppers are typically younger and/or have lower economic status (Université Antilles-Guyane, 1993). Renting on the other hand is done with a written contract and payments are made in advance. The landlord in this case often has, unlike in western countries, lower financial means than the renter who has more bargaining power. Renting and sharecropping are sometimes intertwined: a well-off peasant would rent the land from a poorer peasant and after paying the rent immediately open it up to the landlord for sharecropping (Université Antilles-Guyane, 1993). The landowner thus ends up working on his or her own land and the transaction serves as a loan in exchange of a portion of the harvest over a determined period which may or may not equal the number of years the land was rented for. Because of the power structures within those relationships, farmers who put land for rent and sharecroppers might receive a less advantageous deal than farmers who rent and have sharecroppers farm their land.

3.3.6 Farm labor and the importance of community

Farmers who cannot afford paid labor get help from family members who typically live with the landowner. Since farmers in Haiti still rely on hand tools to farm, they have created community-based labor systems to complement individual work. Depending on the area, the systems may take different names but are not very different in composition. There are two main types of community-oriented labor systems: the “ranpanno” also known as “eskwad” or “kòve” and the “konbit”. The first type, the “ranpanno” functions on a membership like mechanism
whereby farmers belonging to the same group take turn to farm each other’s land but can also sell their services to other farmers who do not belong to their group. Ranpanno workers are assigned specific parcels of land. Said parcel is delimited by a set of ropes whose length vary by area/region: workers thus at times refer to the number of “rope pieces” they farmed during the day. The second system, the “konbit” is always non-remunerated and much larger in scale than the “ranpanno”: it is a type of communal rotational work exchange in which landowners provide food to members of the community who work on their land. Farmers and farm workers who partake in paid labor are paid either for the duration of their work (full day and half day) or to accomplish a specific task. It is not uncommon for farmers to also pay their workers with harvested crops.

Although agricultural labor is often perceived as a male dominated world, the last agricultural census reveals that only approximately 25% of farms are female headed, women contribute to half of the agricultural labor and are involved in weeding and harvesting (McGowan, 1997). While cash crops geared towards exports are essentially male dominated, women are more involved in food production and market distribution (McGowan, 1997). In addition to the female farmer who sells her household agricultural products to market, there is a much larger number of women called “madan-sara” with or without agricultural ties who are responsible for the distribution of food throughout the country. Indeed, the madan-sara, a Haitian rural woman, is the face of a multigenerational Haitian internal market system, transporting farm produce from the countryside to towns/cities and bringing imported goods from the city back to the countryside. Although highly informal, the system is very efficient: the madan saras connect roughly 700,000 small farms together (Schwartz, 2015). Hossein (2015) conducted a study on gender-based violence of madan-saras in Haiti and identified 3 main types of madan-saras. the first type stays in the village, has little cash, and has to buy on credit. The second type travels locally and regionally
and can finance her travel fees. The third type buys on a much larger scale and is able to give loans to farmers. As previously stated, women were less likely to be hold the land title when given inheritance and thus at difficulty at accessing land even if in theory they can own land. The need for financial independence is a big motivation for women who enter this business. The study revealed that although many madan-sara were illiterate, the literate ones were choosing to not do bookkeeping as a way of escaping the control of their partners asserting that “men can be mean with money” (Hossein, 2015 p 44). Madan-saras are praised by many in Haiti for the risks that they take on a daily basis travelling in dire conditions, night or day, on very bad roads, and often confronted to sexual assaults and thefts. The Haitian rural woman plays a crucial role in the advancement of agriculture from food production to distribution.

3.4 The Legacy of the American Occupation

From 1915 to 1934, Haiti was occupied by the United States following multiple consecutive coup-d’états. The American occupation had many consequences on the Haitian society and economy, but the most disastrous effects were experienced by the peasantry who were dispossessed of their land, forced to build roads and a railroad without remuneration, pressured to not practice their traditional religions, and severely abused by racist marines (Millet, 1978; Université Antilles-Guyane, 1993).

The displacement of Haitian peasants to accommodate American agricultural and industrial companies including the Haitian American Sugar Company (HASCO), the West Indian Corporation specialized in cotton production, and a sisal plantation along with the incessant abuses ignited a strong resistance among peasants (Pierre Charles, 1967; Millet, 1978). While under Haitian law of the time, the peasantry was required to build roads, the unpopularity of the law has
long led the government to not exert rigor for its application: the construction of roads was rather
negotiated and its benefits to peasants’ livelihood stressed. The US militia used that law to force
Haitian peasants into labor. Millet (1978) asserts that peasants violently were removed from their
homes sometimes at night and refusal to obey could be fatal. Thus, the “cacos”, a group of armed
peasants and former soldiers from Northern Haiti who have been involved in prior revolts against
the Haitian government, using the same tactics they have used in the past orchestrated an armed
resistance attacking the troops by surprise which eventually led to the death of their leaders and of
many peasants by 1920 and even more violent repression as the resistance has rendered US troops
more suspicious of peasants (Millet, 1978). The occupation lasted 19 years and was credited for
the beginning of the rural exodus of Haitian peasants to Cuba and the Dominican Republic as well
as the loss of full sovereignty of Haiti as the influence of the United States never fully subsided
even after the occupation (Millet, 1978). It was also during the occupation that the Haitian
constitution was amended by American leadership to allow non-Haitians to own land in the
country which up until that point was prohibited. Lastly, the American occupation also contributed
to deforestation as the forest went from covering 60% of the country in 1915 to 21% post-
occupation (Roc, 2008; Saint Pre, 2016).

3.5 The Impact of Neoliberalism on Agriculture

The International Monetary Fund (IMF) and the World Bank are arguably the main drivers
of the implementation of neoliberalist structural adjustment programs (SAPs) in the third world.
SAPs focus on the formal sector and target specific macroeconomic indicators despite the many
critics showing evidence such programs/policies not only do not improve the conditions of the
poor but also heighten social inequality (Easterly, 2003). The author asserts that in many
developing countries, the poor works in the informal sector and as such does not reap any benefit from the adjustments: such argument has been refuted by the IMF who stated that those conditions exist because some developing countries have resisted globalization (IMF, 2000).

As mentioned before, Haiti’s “independence debt” was among the early factors impeding the economic growth of the country. In 1919, under the American occupation, Haiti contracted another debt from the United States to help repay the “independence debt” to France with a loan of 40 million dollars which led to a set of other loans from various International Financial Institutions (IFIs) to reimburse the contracted loan (Lahens, 2014). Development aid officially started in the 1950s and continued into the Dictatorship era of 1957 to 1986. It was partly justified by the desire of the United States to limit the influence of communism in the region despite the government’s many human right abuses and its low compliance with the conditions of the aid (Lahens, 2014). SAPs were initiated in the 1980s. This period marked the end of the Duvaliers’ dictatorial regime in 1986. The few multiple coup d’états and short-lived governments that followed up until the U.S. facilitated return of Jean Bertrand Aristide in 1994, provided the perfect conditions for neoliberalism in a newly democratic Haiti overburdened with debt. The implementation of SAPs in 1995 led to the privatization of seven major national companies including a flour and an oil mill (Perchellet, 2010). Such measures had negatives social and economic consequences, but agriculture remains the sector most affected by neoliberalism. Indeed, free market is not a level playing field. Penetrating the heavily subsidized agricultural market of the United States was not an easy task for Haiti and was strictly limited to sectors endorsed by the US such as mango exports which were heavily pushed in fulfillment of SAPs. Mango production for export started under the Duvalier regime in the early 1980s. When Haiti underwent trade liberalization in 1986, more emphasis was placed on exporting mangoes, particularly one variety,
the “mango fransique” mainly to the United States (Steckley and Weis, 2016). This trend was reinforced under SAP despite the fact that farmers although willing to sell already established mangoes at first did not want to establish mango monocultures (Steckley, 2015).

While the American agricultural market was to some extent fenced up to protect U.S. farmers, Haitian markets’ barriers were being knocked down by the free markets policies. The most cited example is what has become known as the rice scandal of Haiti, the ultimate failure story of neoliberalism in Haiti. As part of SAPs, in 1994 Haiti’s rice tariffs dropped from 35% to 3% in 1994 which is much lower than the 20% commonly accepted in the Caribbean region (Phillips, Watson, and Derrill, 201; Thomas, 2014). As a result, Haiti went from being self-sufficient in rice to importing 80% of its rice from the United States, making it among the four main importers of U.S. rice in the world and generating $200 million in revenue to the United States (Thomas, 2015; Cochrane, Childs, Rosen, 2016). Although the Haitian rice is preferred by Haitian consumers, since it cost more than the American rice, many only consume it on special occasions and purchase what they call “Miami rice” (imported rice) even though a significant portion of the rice comes from the South of the United States (Jolly, Bayard, Nyugen, 2011). In addition to putting a lot of farmers out of business, the massive rice importation greatly altered the diet of Haitians as rice consumption spiked.

The implementation of neoliberalism in Haiti has adversely impacted agriculture and the economy at large. The implications of such consequences are not ideal for agroforestry. Indeed, abandonment of rice farming by farmers unable to compete with imported rice, and the lack of investment of the Haitian government in agriculture and general supporting infrastructure are likely to yield more rural exodus as farmers look for employment in nearby cities. Fréguin and Devienne (2006) have found that rice farmers in Arcahaie, Haiti had favored the culture of plantain
although relying on the cheap calories of imported rice for house consumption. Other farmers with less diversification options have had to find a different line of work mostly in the cities (Théodat, 2009). SAPs have also been linked to the increase deforestation as it can favor resources extraction for exportation, push the poor rendered poorer to reclaim more land to the forest, and reduce government interventions in deforestation regulation (Shandra, Shircliff, and London, 2011). Indeed, SAP induced deflation and the decrease in government spending worsened the condition of the poor who tends to use marginal land and plant more cash crops encouraged by the high focus on exports (Hussein, 1996). Moreover, despite the sustainable development goals identified by the United Nations, there is little to no emphasis on environmental and social considerations in SAPs. The rural poor in Haiti has gotten poorer and is now facing heightened food. Structural Adjustment Programs in Haiti have remained the same in essence still the 1990s. Still being implemented in the country, they are now being called Staff Monitored Programs (SMPs). The following statement by the IMF mission chief to Haiti outlines the program:

Under the SMP, fiscal policy will focus on mobilizing revenues and rationalizing current expenditure, to make room for critical public investment in infrastructure, health, education and social services. This will include measures to improve tax collection and efficiency, and to eliminate excessive subsidies, including on retail fuel. Other reforms will focus on stemming the losses of the public electricity company (EDH), which in recent years have amounted to a sizeable portion of the public deficit, by improving the efficiency of billing, and by reforming contracting practices.

- Chris Walker (IMF Press release No 18/68, 2018)

Indeed, SMP like SAPs carries the same idea of reducing the spending of the few government programs that are providing a semblance of service to favor other areas which in
practice do not really get invested in as they are often privatized. Said reforms have been partly responsible for the riots of July 2018 following a sharp increase of the prices of gasoline, diesel, and kerosene by 38%, 47%, and 51% respectively and the announcement of the cessation of subsidies for electricity (Le Nouvelliste, 2018). When the gas prices go up, it generates an overall increase in the prices of all goods. The farmer will have to sell his/her products at a higher price which may lower the consumption of certain food items in the country while also having to purchase the imported staple food items that the country has become dependent on following trade liberalization. With all the attention of farmers directed to survival, investing in or maintaining agroforestry is less likely to be among a farmer’s priorities. Moreover, the cumulative negative effects of poor governance and inappropriate neoliberal policies has made many Haitians especially farmers suspicious of any alliance between the Haitian government and the IFIs and has fostered the notion that the creation of Haiti’s dependence of foreign as well as the crippling of its agriculture is deliberate (Grain, 2010). Overall, the Haitian government’ lack of investment in agriculture and the application of neoliberalists policies have adversely put agriculture in Haiti in crisis state which makes the promotion of sustainable agricultural practices such as agroforestry more difficult.

3.6 Post-Earthquake Haiti: More Neoliberalism and Ngotization

Since the earthquake of 2010, Haiti has witnessed a spur of economic investment. Neoliberalist agenda still prevails however, better captured by the phrase of the last administration, “Haiti is open for business”. During the years following the earthquake of 2010, the Haitian government’s motto was to attract investors like past governments, with a high focus on free zones and tourism. The free zones are ground to light manufacturing particularly textile. In 2012, the
Haitian government inaugurated the industrial park of Caracol, housing at the time one Korean apparel company which was supposed to “create 20,000 jobs in one of Haiti's economically disadvantaged regions” (“Parc Industriel de Caracol, 2012). The government describes the industrial park as being “planned in partnership with the communities of the North and diligent attention to civil works and the environment” (“Parc Industriel de Caracol, 2012). Nonetheless, the number of jobs provided was about a fifth of the 20,000 projection (Thomas, 2014). The government did invest in an agricultural free zone of 950 hectares promoting the monoculture of organic bananas and eliciting many accusations on the part of peasants who claimed to have been dispossessed of their land which had been previously granted to them by the government (Thomas, 2015). They were the last to know about the displacement and the promises of compensation and employment have not been fully met (Shamsie, 2014). This speaks volume to the high level of land tenure insecurity that the Haitian peasantry still continues to face. The resulting insecurity of tenure that large scale farming for exports create for small farmers risking dislodgment has the potential to discourage other farmers in similar situation from making long term investments such as planting trees on their land.

NGOs have also been working in the agricultural sector but mostly pushing the production of cash crops such as coffee, cocoa, and mangoes for exportation. The work of NGOs has received controversial feedback on the part of farmers who do not think that these approaches benefit them. An example of such involvement is Technoserve, a nongovernmental organization based in the United States who launched a post-earthquake mango project in 2010 called “Haiti Hope” in order to increase the mango income for 25,000 Haitian farmers through training on production and marketing, access to finance and access to markets (Technoserve, 2016). The NGO asserts that despite difficulties encountered to reach farmers whose access was guarded by farmers’
cooperative leaders and local institutions, the project was able to provide $3.25 million dollars for farmers to invest on their farms and resulted in the planting of 63,214 mango trees (Technoserve, 2016). According to Technoserve, farmers received agronomic and marketing training. While it is unclear what proportion of farmers received training and/or loans, the organization argues that over 25,000 farmers have been trained and that “Haiti Hope: was very successful in the country. A study by Steckley (2015) showed that the project was met with controversy as many farmers were skeptical. The researchers found that some farmers were reluctant to participate in the project which they believe did not offer enough financial advantage, had the potential to become exploitative, and did not align with their desire to diversify. Indeed, the farmers interviewed in the study felt that participating in the project could make them lose their food security if they focus only on growing mangoes. Farmers were saying that “The strategy [of Haiti Hope] is to get peasants to abandon their own production – the production that supports their lives – to plant mangoes to sell!? No way! The peasants might get some money, but he’ll soon be in a position where in spite of that money, he won’t have food! If the US decides they’re not going to buy Mango Fransique again, we’re dead, we’re finished. That’s why we have to diversify production” (Steckley, 2015, pp 13-14). Farmers also complained about having to absorb all production risks: “In [Haiti Hope’s] arrangement all the risk is on the peasants. Because the mango business doesn’t want to hear about it if the harvest is low, [or] if the flies get the mangoes! He doesn’t want to know if the workers are sick! He doesn’t want to know about those things. He’s only interested in the mangoes when they’re ready for harvest” (Steckley, 2015, p13).

The experience of “Haiti Hope” demonstrates that although successful on paper and more effective at using bottom-up approaches and promoting gender equality than the Haitian government, NGOS often still fail to fully understand and work within the local context. The
monoculture model that is used in western countries with vast farms and large tractors does not apply to Haiti. With little land to farm on, the average Haitian farmers have learned to diversify by growing different types of crops and trees and choosing various ecological niches. Indeed, it is not uncommon for farmers to rent land farther away from the land that they own and in different altitudes in order to grow different crops of different varieties of one crop, a strategy deemed inefficient by the western eye who sees the distances that the farmers have to walk from one parcel of land to another as a waste of time (Dufumier, 1988). In order for such project to work, an agroforestry approach that promotes an intercropping system of mangoes and other crops that are important to farmers is more likely to succeed. Religious based NGOS are also very common in Haiti and despite good intentions and grassroots approaches, their imposition of western standards and a form of distrust in the judgement of the locals jeopardized the viability of the partnership (Hefferan et al, 2009). The Haitian intermediaries who work for the NGOS are not seen as fully capable but as always needing direction, thus they “feel they do not have any choice other than to abide by the rules and assume the role of intermediaries” and “are torn between their ideal vision of work and the requirements they feel exposed to” (Schöneberg, 2016, p16). The era of NGOs in Haiti might be coming to a halt as the Haitian government has been taking actions towards subjecting NGOs to a certain level of accountability including reporting their projects periodically to the government. In 2017, 257 NGOs were banned on the ground that they either were not addressing the needs of the Haitian people or violating the decree of September 14, 1989 regulating NGOs’ activities (Senat, 2017).
3.7 Conclusion

Haiti faces multiple social, economic, environmental, and political challenges. When considering the country’s ecological problems posed by deforestation and natural disasters, the trade deficit, and rising food insecurity, the necessity to engage in an aggressive promotion of agroforestry becomes evident. While agroforestry cannot possibly solve all these problems, it offers a viable and sustainable model for Haitian smallholders. The benefits of agroforestry will be even more apparent if the precarity of land tenure is addressed and farmers receive necessary support and incentives to engage in the practice. Haitian farmers have consistently shown their ability to practice risk aversion despite the difficulties they encounter in farming. Nonetheless, in the midst of changing rain seasons, rising food prices, insecure land tenure, and shrinking land, the capacity of the Haitian farmers to maintain diversity of their farm is decreasing daily – a process which is likely to favor land conversion to cash crop monocultures.
CHAPTER 4
AGROFORESTRY AND THE HAITIAN FARMER: THE ILLUSION OF CHOICE

This chapter presents the different ways in which external and internal factors of agroforestry adoption as well gender are connected to farmers’ decision to practice agroforestry in Dondon and Grande Riviere du Nord. The external factors considered are socio-economic characteristics such as financial standing and education and farm characteristics such as tree cover and types of crops. The internal factors pertain to the perceptions that farmers have about the potential benefits and risks of planting trees, the importance they attribute to the trees on their farm, their tree preferences, and their perceptions of environmental degradation especially degradation induced by deforestation. The gender dimension of both external and internal factors was considered and gender dynamics within the household and on the farm were explored as well. Lastly, the frequency of tree cutting and the temporal variation in tree cover were used as proxy for farmers’ involvement in agroforestry. The chapter specifically answers the following questions: 1) What is the relationship between internal and external factors of agroforestry adoption/involvement in Haiti? 2) How do Haitian farmers’ perceptions impact of agroforestry impact its practice? 3) How does gender influence farmers’ perceptions and decision-making with regards to agroforestry in Haiti? 4) What policies are necessary to sustain the practice of agroforestry in Haiti?

4.1 Study Considerations

As stated in the methodology section (chapter 1), the data collection was conducted over a three-week span in August 2017 and consisted of a survey and two focus groups. The first commune in which the survey was administered was Dondon. The communal sections included
were the following: Brostage, Mathador, Forestier, Dondon, Bassin-Caiman, Laguille, and Haut-du-Trou. In the neighboring commune, Grande Rivière du Nord, I and my research assistant administered the survey questionnaire in the following places: Cormier, Vye Kay (part of Cormier), Jolitrou, Du Fally, Grand Gilles, and Nan Jan. A total of 62 farmers participated in the survey, 32 from Dondon and 30 from Grande Rivière du Nord. Women accounted for 60% of the participants in Grande Rivière du Nord while 62.5% female farmers partook in the survey in Dondon. The survey questions as previously mentioned sought to investigate farmers’ and farms’ characteristics, and farmers perceptions about agroforestry.

The focus groups were conducted the week following the survey’s application. The main objective of the focus groups was to investigate attitudes towards tree cutting and planting, relationships with local organizations and cooperatives which could potentially favor agroforestry practices, perceptions of environmental degradation including the risks of farming in mountainous area, and farmers’ positions with regards to the adoption of policies that could help maintain and/or increase tree cover in the Haitian countryside. The focus group discussion held in Grande Rivière had more participants than expectedviii. In all, 12 and 21 farmers participated in the focus group discussions in Dondon and Grande Rivière du Nord respectively. The gender ratio was also different in the two focus groups – 6 women and 6 men participated in Dondon whereas only 4 women were present at Grande Rivière Du Nord along with 17 men. Most focus groups attendees belonged to peasant organizations or cooperatives. Overall, the women in Dondon also spoke more frequently and seemed less hesitant about giving their opinion than the women in Grande Rivière du Nord. The women in Grande Rivière du Nord started talking only half way through the meeting and did not interrupt the men but were interrupted by men multiple times. In Dondon on the other hand, the women participants were very vocal from the beginning to the end of the meeting and
one woman interrupted the men multiple times without receiving any obvious disapproving reactions from other participants. In Grande Rivière du Nord, when I encouraged one woman who seemed willing to intervene to talk, a male farmer made the following comment: “The men are still talking”. The differences observed should not automatically be attributed to locality however as the focus group conducted in Dondon took place in the seat of the commune which is more urban while the focus group in Grand Rivière occurred in a more rural setting. While all participants were involved in agriculture, some the women who participated in the Dondon focus group also worked as agricultural technicians, were pursuing post-secondary education and were overall younger. Some of the same gender dynamics were observed as well during the surveying process. Many women thought that we wanted to speak to their partners whom some of them deemed as more knowledgeable about farming.

While the focus groups occurred in neutral environments and were facilitated by third parties (see chapter 1), the survey took place in the home of the farmers. As the houses were for the most part very small, the front yard/patio area in front of the house, most farmers’ living room was the space used to talk. This made it difficult to ensure full privacy as the living fences surrounding the house were relatively short and did not provide a complete isolation from neighbors or at times other household members who might be engaged in other tasks in the same space. One challenge of the study was to determine involvement in agroforestry. As previously stated, the sites were chosen with the assumption that the participants in those areas would be involved in agroforestry. While all definitions of agroforestry point to a basic criterion of the practice, that of the intercropping of trees/shrubs and crops or pasture, there are no specific requirements with regards to the ratio of crops to trees that could be used as a cut off to decide whether agroforestry is practiced or not. It is evident that the presence of just one tree on a farm or
a garden could not be considered as agroforestry, but the exact number of trees or percentage of land covered by trees needed has not been determined in agroforestry literature. Moreover, topographic differences make it difficult to have a one size fits all approach to agroforestry. In this study, farmers who mentioned having multiple trees on their land or multiple plots of land on which they were intentionally maintaining tree cover or planting trees were thought of as practicing agroforestry. To estimate financial standing, three variables, the number of daily meals, the size of land, and the type of land tenure, were considered. The number of meals that household members consume on average per day was used as a proxy for food security and economic status although such variable does not capture the diversity and nutritional value of the meal.

4.2 Respondents’ Background

The majority of farmers who participated in the survey were between 31 and 50 years and a sizeable 21% was 61 years old or older (Table 4.1). Most farmers had primary education, but a higher percentage of female farmers had never attended school. Male farmers were tended to be more educated than the female farmers (Table 4.1). More than half of the farmers were cohabiting with a partner. While 58.33% men self-identified as head of the household, only 36.84% of the women reported being heads of the household. Men and women were in roughly equal proportion to report both partners as heads of the households. As expected, cohabitation was the main form of relationship status with over half of the farmers reporting living with a partner without marriage which could potentially have some impact on land tenure namely for the women. 28 out of 62 farmers reported having one meal a day and 26 farmers ate at least twice a day. A higher percentage of male farmers reported eating only once a day or even skipping meals at times (Appendix A, Table A.1).
Table 4.1: Respondents’ Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>% of Female Respondents</th>
<th>% of Male Respondents</th>
<th>All Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grande Rivière du Nord</td>
<td>47.37%</td>
<td>50.00%</td>
<td>48.39%</td>
</tr>
<tr>
<td>Dondon</td>
<td>52.63%</td>
<td>50.00%</td>
<td>51.61%</td>
</tr>
<tr>
<td>Both locations</td>
<td>61.29%</td>
<td>38.71%</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>5.26%</td>
<td>0.00%</td>
<td>3.23%</td>
</tr>
<tr>
<td>26-30</td>
<td>7.89%</td>
<td>0.00%</td>
<td>4.84%</td>
</tr>
<tr>
<td>31-40</td>
<td>21.05%</td>
<td>20.83%</td>
<td>20.97%</td>
</tr>
<tr>
<td>41-50</td>
<td>34.21%</td>
<td>33.33%</td>
<td>33.87%</td>
</tr>
<tr>
<td>51-60</td>
<td>13.16%</td>
<td>16.67%</td>
<td>14.52%</td>
</tr>
<tr>
<td>60+</td>
<td>18.42%</td>
<td>25.00%</td>
<td>20.97%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>28.95%</td>
<td>20.83%</td>
<td>25.81%</td>
</tr>
<tr>
<td>Primary</td>
<td>57.89%</td>
<td>45.83%</td>
<td>53.23%</td>
</tr>
<tr>
<td>Secondary</td>
<td>10.53%</td>
<td>29.17%</td>
<td>22.58%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0.00%</td>
<td>4.17%</td>
<td>1.61%</td>
</tr>
</tbody>
</table>
This finding is at odd with cultural expectations of men given priority with regards to the quality and quantity of food consumed. Perhaps the same subjectivity of what is viewed as a meal plays a role in the differences found. Indeed, as the economy of the country gets worse and financial hardships increase, the men may be eating less than they used too while the women who are used to eating after ensuring that the entire family has eaten may not have noticed a sharp difference in their eating habits. Culture also plays a role in what is considered as a meal. A male farmer who reported eating at least twice a day said that: “If I buy two patties (fried stuff pastries) and one avocado in the streets, that is not food for me”. While the quantity of the food (the patties are large and the Haitian avocado is three times the size of what the avocado typically sold in the U.S.) would be enough to serve as a meal, it is the nature of the food (street food/snack) that prevents it from constituting a “real meal” for the respondent. This also shows that the responses are likely to not accurately capture daily meals’ numbers as the term in itself has different connotations for different people.

Many respondents had multiple land tenure situations although more than half claimed to own their land and are possession of proof of land ownership (Figure 4.1). As expected, land ownership is gendered: three quarter of the men claimed to have documentation for their land while
less than half of the women reported being able to prove ownership. Likewise, a higher percentage of women (18%) reported that their partners owned the land and had the land title compared to 4% of men who attributed land ownership to their partners (Figure 4.1). Conformed to the literature presenting Haitian agriculture as mostly small-scale, it was found that most farmers were farming on small acreages. The Haitian unit to measure land area is the “karò” which is the equivalent of 1.59 acres. The responses were recorded in that unit. A sizeable number of respondents is farming on less than 1.59 acres and over half of the farmers in the study were farming on land smaller than 3.19 acres (Appendix A, Table A.1).

Almost all farmers reported having trees on their land. The majority of farming operations are rain fed (Appendix A, Table A.1): the very few farmers who occasionally irrigate use water from the river or nearby streams to irrigate their transplants. Farmers for the most part partook in some form of income diversification. 95% of respondents listed farming as a source of income. Farmers identified 15 sources of incomes which are grouped into five categories (Appendix A, Table A.1). The main ones are farming and street/informal commerce which is practiced by 91.67% of the women. These two activities were also found to be the activities that farmers engaged in the most timewise and were also the most profitable ones overall for farmers. It was also found that while both male and female farmers listed farming as their main source of income, there were much more women involved in small commerce than men (Figure 4.2).

Most participants were deliberately keeping trees on their farms but for some the practice was jeopardized by financial hardships. The individual responses differ from the focus groups in that tree cutting was reported as a rare occurrence when farmers were asked individually but the behavior was reported as being more common when farmers were responding as a collective.
Figure 4.1. Land Tenure by Gender

Figure 4.2. Sources of Income by Gender
4.3 Economic Factors and Agroforestry

4.3.1 Tree Cover and Tree Cutting

To get an estimate of the trends in agroforestry practices in the study sites, the survey investigated the tree cover relative to crops on farmland (more, less, same), the variation of tree cover over time (increase, decrease, no change), the frequency of tree cutting, and the utilization of harvested trees. As expected cash crops occupied a greater portion of respondents’ land. 13% percent of respondents in Grande Rivière du Nord and 28% of respondents from Dondon reported that trees rather than cash crops occupied a larger portion of their land. A sizeable percentage of respondents (48.38%), asserted that their tree cover had increased over the past five years. For the farmers who reported the opposite, the main reasons listed for the loss of trees were weather and diseases.

With regards to tree cutting, the majority of farmers said that they rarely cut trees on their farms. However, a greater percentage of male farmers claimed to cut trees once every two months or rarely while a few women (yet more than men) admitted to higher tree cutting frequency (Figure 4.3). When compared by site, farmers from Grande Rivière du Nord reported cutting tree more (Figure 4.4). Most farmers sounded very apologetic about tree cutting and would quickly explain that cutting trees was a difficult choice that they felt forced to make. They explained that they cut trees to pay school fees. The most common response was that trees were cut when farmers had “a problem” meaning a financial burden. Farmers also expressed the feeling of being “cornered” or “having no way out”. The main uses mentioned for cutting trees were charcoal making, firewood, furniture/boards, and farming activities (Appendix A, Figure A.1). Some farmers would say that they “sold” the trees when they did not want to take responsibility for a utilization that they
anticipated being judged for. One female farmer said: “you sell the trees and the person does what he/she (neutral pronouns in creole) wants with it”.

As mentioned previously, farmers were much more open about the frequency of tree cutting when not singled out. During the focus groups farmers were asked if they perceive the rate of tree cutting as a problem in their area. Farmers in Dondon recognized that “people” were cutting the trees without replacement. A male farmer in Grande Rivière du Nord acknowledged more directly that peasants were involved in cutting tree: “There are trees that disappeared because we cut them and did not plant new ones. Moreover, it is because of nature also when you consider the shock of the oranges and limes which have left viii(died) (there is a nationwide disease affecting citrus trees), we do not know why they left (died)”.

Another farmer stressed the notion that while trees were being cut, they were not being replaced: “Regarding the trees, only a few people plant trees. If you see trees, it is the small animals that are planting them for the people” (male farmer, Dondon).

![Figure 4.3. Tree Cutting Frequency by Gender](image-url)
4.3.2 Barriers to Tree Planting

The survey also explored the perception of farmers with regards to tree planting. Farmers were presented with the statement that the planting or keeping of trees on the farm has become more difficult in the past five years: only 4% of male farmers and 5% of female farmers agree with the statement. However, when asked what prevented them from planting/keeping trees on the farm, while some farmers (16% women and 21% men) maintained that nothing prevented them from planting trees, over half of both the men and women stated that the problem was mostly financial which was confirmed in the focus groups where farmers vehemently claimed that lack of money was keeping them from planting trees (Table 4.2). Respondents also saw the lack of irrigation, land, and labor as obstacles to tree planting. Both gender provided similar responses except with regards to labor which was perceived as a barrier by a greater percentage of male respondents.

![Figure 4.4. Tree Cutting Frequency by Site](image)
Table 4.2: Barriers to Tree Planting/Maintenance

<table>
<thead>
<tr>
<th>Responses</th>
<th>lack of money</th>
<th>Land size</th>
<th>lack of labor</th>
<th>No irrigation</th>
<th>Animals/pests</th>
<th>nothing</th>
<th>no nursery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>55%</td>
<td>29%</td>
<td>18%</td>
<td>18%</td>
<td>18%</td>
<td>16%</td>
<td>11%</td>
</tr>
<tr>
<td>Male</td>
<td>54%</td>
<td>25%</td>
<td>29%</td>
<td>17%</td>
<td>13%</td>
<td>21%</td>
<td>8%</td>
</tr>
</tbody>
</table>

4.3.3 Economic Situation and Tree Cover Variation

As stated previously, three variables were used to assess financial standing: the number of meals per day, the acreage of the farm, and the type of land tenure. A score from 1 (lower financial standing) to 3 (higher financial standing) presented in table 4.3, was assigned to each and combined into a total score. The scores were assigned based on the reasoning that people who had higher food security, larger farm, and better land tenure security would be in better financial standing. With regards to land tenure, based on the implications of the tenure types described in chapter 3, people who own land with proof of ownership were assumed to have highest tenure security, landowner without documentation and tenants were assumed to have moderate tenure security, farmers using the familial land as well as sharecroppers were thought of as having the least tenure security.

For farmers who had multiple tenure situations, a sum of individual scores was obtained. The acreage for each tenure type was unknown but it was assumed that when all 3 scores were combined a large acreage for a tenant could lead to a higher score than a small acreage for a documented landowner.
Table 4.3: Financial Standing Scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Number of meals/day</td>
<td>At most once a day</td>
</tr>
<tr>
<td>Land tenure</td>
<td>Sharecropping, family owned</td>
</tr>
<tr>
<td>Acreage</td>
<td>Less than 3.19 acres</td>
</tr>
</tbody>
</table>

The three variables’ scores along with reported tree cover temporal variation (increased, decreased, no change in past five years) were tested for a spearman’s correlation. No correlation was found between the three variables used to estimate financial standing: the number of meals consumed in a day was not correlated to the security of tenancy or the acreage. Tree cover variation was also not correlated to financial standing assessed by the three individuals scores and with the total score. (Table 4.4).

The tree cover variation was also examined via a contingency analysis with regards to sex and it was found that overall, male farmers tended to report that tree cover on the land had increased in five years more than the women did but the difference was not significant (figure 4.5; table 4.5). A lesser number of farmers reported no change in tree cover, but no significant difference was found between men and women regarding the three patterns of tree cover (Figure 4.6; table 4.6). Educational attainment and temporal tree cover variation were also tested for
correlation. It was found that there was a moderate positive correlation (r=0.3073) between educational attainment and tree cover variation numerically ranked from decrease, no change, and increase (p=0.0169): more educated farmers tended to report increased in tree cover.

Table 4.4: Correlation between Financial Standing and Tree Variation

| Variable by Variable | Spearman ρ | Prob>|ρ| |
|-----------------------|------------|--------|
| score acreage score meal | 0.0376 | 0.7913 |
| score tenancy score meal | 0.0112 | 0.9359 |
| score tenancy score acreage | 0.2338 | 0.0858 |
| tree cover variation score meal | 0.0388 | 0.7764 |
| tree cover variation score acreage | 0.1417 | 0.2931 |
| tree cover variation score tenancy | 0.1114 | 0.3968 |
| tree cover variation total score | 0.1869 | 0.1458 |

Figure 4.5. Contingency Analysis of Tree Cover Variation by Gender (a)

Figure 4.6. Contingency Analysis of Tree Cover Variation by Gender (b)
Table 4.5 Reported Increase in Tree Cover by Gender: Contingency analysis results

<table>
<thead>
<tr>
<th>Test</th>
<th>ChiSquare</th>
<th>Prob&gt;ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood Ratio</td>
<td>3.154</td>
<td>0.0757</td>
</tr>
<tr>
<td>Pearson</td>
<td>3.088</td>
<td>0.0789</td>
</tr>
<tr>
<td>Fisher’s Exact Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>3.154</td>
<td>0.0757</td>
</tr>
<tr>
<td>Alternative Hypothesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>0.9806</td>
<td>Prob(tree cover variation=increased) &gt; for female farmers</td>
</tr>
<tr>
<td>Right</td>
<td>0.0700</td>
<td>Prob(tree cover variation=increased) &gt; for male farmers</td>
</tr>
<tr>
<td>2-Tail</td>
<td>0.0938</td>
<td>Prob(tree cover variation=increased) is different across gender</td>
</tr>
</tbody>
</table>

Table 4.6: Variation in Tree Cover by Gender

Contingency analysis results

<table>
<thead>
<tr>
<th>Test</th>
<th>ChiSquare</th>
<th>Probability&gt;ChiSquare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood Ratio</td>
<td>5.181</td>
<td>0.0750</td>
</tr>
<tr>
<td>Pearson</td>
<td>5.049</td>
<td>0.0801</td>
</tr>
<tr>
<td>Fisher’s test</td>
<td>Table Probability (P)</td>
<td>Two-sided Probability ≤ P</td>
</tr>
<tr>
<td></td>
<td>0.005974</td>
<td>0.0878</td>
</tr>
</tbody>
</table>

4.3.4 Perceptions of Deforestation Prevalence and Cause.

Farmers in both areas linked erosion, temperature rise, and a reduction of the soil’s water retention to deforestation whose causes they asserted to be financial hardship and a lack of support from the Haitian government. When asked about the causes of deforestation, farmers became very animated.
The reason is because of extreme poverty! ... My father has four children, I am the first born, I have never heard him say one day - Let me go cash this check- They (peasants) do not know what a check is (do not use a check) ...They do not have someone to whom to say: ‘Hello boss’. They have the trees. This tree cutting phenomenon, the government can do whatever, it will never go away because we are overwhelmed with poverty. People rely on trees to make charcoal...Jovenel (the current president) can’t prevent tree cutting from happening.

- Female farmer from Dondon

Another Dondon farmer stressed the desire of farmers to have on their farms trees that they could use in their old age but also described the sentiment of helplessness that farmers feel when faced with the decision of cutting trees to respond to familial obligations. This echoed the same feeling of burden that farmers expressed during the surveys when faced with the difficult choice of cutting trees.

What I can say is that it is the absence of the government as well as poverty, hunger, unemployment, et cetera which is driving the people crazy... We heard that there is a Haitian government but for us peasants, us the poor, the government does not exist for us. That’s why there are no laws to protect us. The trees that we should leave as resources for the kids, we are forced to destroy them early.

-Male farmer from Grande Rivière du Nord

After 1986, the pig\textsuperscript{x} were gone and we had a long drought. They (peasants) use to grow beans and corn a lot. They used to raise livestock. All of that had disappeared, they only had the trees to use. Most people rely on trees to sell for charcoal or timber. I am under
the impression that the reason why the trees are being cut so much is because first of all the government does not encourage the people to plant but the poverty is so rough that they have no other source of income than to cut the trees, it is poverty.

-Focus group coordinator of Grande Rivière du Nord

Another reason for reduction of tree cover was identified by the EMAD agronomist of Dondon to be diseases namely citrus greening responsible for the disappearance of orange trees as well as a practice whereby peasants sell fruits before maturation which impedes seed saving and natural propagation. The agronomist and another male farmer also indicated the increased cutting of breadfruit trees and chestnut trees for charcoal production and noted that those trees are not typical trees that one would select for charcoal making. Significant historic events were also associated with the rise in tree cutting.

You’ll see that it is only the better-off people who have built their land (giving it more value by planting trees). The trees are not cut because the government does not provide jobs.

Back in the day, the government did not provide jobs, but people used to work and plant trees. The trees used to be protected (under Duvalier dictatorship which ended in 1986). An agronomist used to come here to put pressure on people, so they do not cut trees. Trees were not cut then...but if you gave money to that agronomist (in charge of controlling tree cutting), you could cut whatever trees you wanted to cut, the disorder started then because he was supposed to encourage reforestation but he gave people permit to cut trees, a person may request a permit to cut 2 trees and end up cutting up to 50 trees.

-Male farmer from Grande Rivière du Nord

As previously stated, the two sites were chosen because of their mountainous terrain as well as the cultivation of coffee and cocoa done under tree cover respectively in Dondon and
Grande Rivière du Nord. As tree cover recedes, there seem to also be a similar pattern in coffee production. Roughly 70% stated that they no longer planted the same amount of coffee that they used. Most farmers, particularly farmers from Dondon, would add that they plant less because of a beetle infestation a few years ago, lack of money, lack of trees to protect them from the water, reduction in soil fertility, lack of access to irrigation, and pest. Farmers in Grande Rivière du Nord had mixed views. Some farmers reported planting less because of lack of rain, lack of trees coupled, no land ownership, too much trees, and lack of productivity while other claimed to plant more because of a NGO in the area which give transplants to farmers. One male farmer noted the barrier that tenancy can pose to agroforestry: “The sun kills the cocoa. There is not enough tree cover. One time we had 8 consecutive months of sun (dry period). It's not my land. I am renting it for 4 years. I can't build it for the owner”.

4.4 Perceptions of the Risks of Mountain Farming with Little Tree Cover

Farmers’ perceptions of the environmental and personal risks associated with farming on highly sloped land were also explored. Most farmers recognized the great level of erosion caused by farming in highly sloped areas. Farmers describe how the presence of livestock attached to trees can accelerate the process of erosion as the same areas are being intensely grazed. The vicious cycle of environmental degradation impeding agroforestry practices and leading to more environmental degradation was captured by the following quote from a male farmer in Grande Rivière du Nord: “When it rains...there are certain parts of the mountains, even when you plant cocoa, if the gullies are not treated, even big trees can be uprooted by the water, the people who own land next to the big gullies and rivers are worse off because when the water rises, it destroys everything”. Similar sentiments were echoed by other farmers who described losing crops and soil
to rain events. Farmers also stressed the perilous aspect of farming in slippery and hilly terrains which can result in fatalities as well the importance of using physical barriers such as ramps (made of a combination of rocks and organic matter) and big trees to reduce erosion. However, many of the respondents thought that economic hardship was one the main obstacles preventing them from using the conservation practices which they were speaking of. As one more farmer (male, Grande Rivière Du Nord) was saying: “We do not have the means. If somebody could help us...” the farmer was interrupted by the focus groups coordinator who interjected: “It is not because of money that the soil is going away it is going away because you guys ‘fork’ the soil. It is because conservation practices are not applied”. Farmers were all agreeing when he added: “You (to all) need to plant trees to support the soil. Why don’t you do conservation practices?” Despite the previous motion of the coordinator to a farmer who claimed that money was an issue, a female farmer replied: “We do not have the means. We do not know what to do”. The same argument is reflected in the remarks of other farmers who explained that not all types of soil protection techniques required the same treatment or were available to farmers.

“There are certain types of land, you have to protect it with gabion, you need money to buy it and you need to pay people to do it. In other places, it (the barrier) needs to be in concrete. There are things that the peasant can do alone but there are things that peasants can’t do by themselves (individually). What could help is ranpanno and konbit”

male farmer, Grande Rivière du Nord

An additional comment illustrating farmers’ perceptions of preventive measures against erosion was made by a male farmer from the same locality who believes that soil loss in the mountain farms can be remedy “by reforesting, not burning weeds, (and) making ramps (barriers made of
“When the hay breaks down, it becomes compost for the soil and it prevents water from eroding the soil”.

It is obvious that in addition to being aware of the benefits of agroforestry, farmers were also well aware of the necessity to practice it given that they were farming in mountainous areas. Gender differences also surfaced in the responses regarding farming risks as this part of the conversation was dominated by male farmers. Such differences are likely to be influenced by work distribution which is explored in the following section.

4.5 Gender Dynamics in the Household and in the Field

4.5.1 Work Distribution and Decision Making

The survey revealed gendered places of work: the home and the market place were women’s domains while the farm was perceived as a man’s territory. Female farmers were more involved with trading; they were also the ones in charge of taking farm products to market. This was confirmed by both women and men: 78.5% of women reported being the market person while 79.2% of male respondents said their companions/spouses oversaw taking products to market (Table 4.7). While small (informal) commerce as a source of income and selling farm products are sometimes conflated, the two activities are differentxvi.

Gender division of labor in Haiti is not very different from other developing countries. Although there are differences in the amount of time men and women spend on farm work, both male and female farmers reported spending over four hours daily on farm work (Appendix A, Figure A.2). The men tended to work longer on the farm whereas the women spent more time on household workxvii (Appendix A, Figure A.3). The women were also unsurprisingly found to be the ones mostly responsible for carrying water to the homes (Appendix A, Figure A.4). With regards
to farm work, apart from farming with their partners, farmers reported using 2 systems of labor described in chapter 3: ranpanno, and konbit\textsuperscript{xiii}. Farmers were asked about the person responsible for tilling, weeding, and harvesting. In most cases, a combination of labor forms was mentioned with some farmers reported all four labor persons/systems which are: the farmer, the farmer’s partner, ranpanno, and konbit. This is also reflected by the male farmers’ responses: while 21.1% of female farmers stated that they tilled and 42.1% said that their partners tilled (not mutually exclusive), none of the men who participated in the survey mentioned the involvement of their female partners in tilling (Figure 4.7).

Table 4.7: Market Person

<table>
<thead>
<tr>
<th>Categories</th>
<th>% Female</th>
<th>% Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self</td>
<td>78.9%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Souse/companion</td>
<td>13.2%</td>
<td>79.2%</td>
</tr>
<tr>
<td>Family</td>
<td>7.9%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Employee/neighbor</td>
<td>2.6%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Do not sell them</td>
<td>5.3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The responses were somewhat similar for weeding, but a disparity was found in the responses about harvesting: while 91.7% of men declared to be involved in harvesting, only 39.5% of women mentioned the involvement of their male partners (Figures 4.8 and 4.9). On the other hand, roughly 70% women reported being responsible for harvesting and close to 70% of men identified their female companions as involved in harvesting. This shows that both female and male farmers agreed with regards to women’s role in harvesting but the role of men in harvesting was either exaggerated by the men or overlooked by the women. Konbit was the least mentioned
form of labor out of the four categories to the favor of ranpanno. Farmers in Grande Riviere du Nord reported greater use of both systems than farmers in Dondon.

**Figure 4.7. Tilling Work Distribution**

**Figure 4.8. Weeding Work Distribution**
4.5.2 Decision Making and Management

Farmers were asked about the person who makes most of the decisions within their households. The survey also inquired about decision making on the farm. Farmers’ responses dictated a different range of options. Many farmers (more so the male farmers) strongly emphasized that both partners were making decisions and refused to entertain follow-up questions about who makes most decisions between the two partners. While a higher percentage of men than women reported that decisions were taken together in the house, with regards to farm work 41.7% of men identified themselves as the main decision maker whereas 28.9% of women had the same sentiment (Figure 4.10). Likewise, a higher percentage of women referred to their partners as the main decision maker on the farm whereas the men tended to identify their partners as the main decision maker in the household. Overall, the majority of male and female farmers declared that both partners decides jointly whether pertaining to household issues or farming activities but more so for the household: the farm is perceived as more of a male territory.
Respondents were also asked about their rights to the land. The majority of farmers declared to have the same rights as their partners, but a smaller percentage of women reported having equal rights with their partners. Women were also more likely to claim having greater rights to the land. While no male farmer identified their partner as having more rights, a small percentage of female farmers thought their partners had more rights (Figure 4.11). The survey also investigated the control of tree products’ uses and financial profits from both crops and trees. Roughly 60% of female respondents reported controlling the use of tree products and the associated financial revenue (Table 4.8). 68.4% of women declared managing the financial profits from cash crops as well. Male respondents tended to either identify themselves or both partners as being in charge for tree uses, the management of cash crops profits, and the control of tree products profits. A small percentage of male respondents claimed that their female companions were in charge while an even lower percentage of women saw their companions as being in charge (women saw themselves as being in charge).

### 4.6 Crops and Trees: Preferences, Prevalence, Profitability, and Importance

The survey investigated what types of crops and trees farmers in the area were already planting, found profitable, preferred and perceived as important. With regards to tree preferences, the participants greatly favored fruit trees (Table 4.9). Trees were also preferred if they could make timber or charcoal. Perennial cash crops such as cocoa, and coffee were also listed among respondents’ preferred trees. Farmers engaged mostly in polyculture: the average number of crops’ types (by species or genus) cited was 4.85: farmers were planting on average at least 4 different types trees on their farm. As the survey was conducted in Haitian creole, not all crops could be identified by species as they were reported by the species or the genus by farmers.
Figure 4.10. Decision Making in the household and on the Farm
It is certain that farmers could identify different species or varieties of plants on their farm, but they used general terms during the interview. The crop listed the most were the following: beans, cocoa, coffee, corn, peanuts, plantain, yam, and taro (Appendix A, Table A.3).

![Graph showing gender differences in land rights](image)

**Figure 4.11. Who has more rights to the land?**

A t-test was run to find whether male farmers identified more crops on the farm than female farmers. For this specific test, the sample was restricted to the main decision makers on the farm i.e. only the female and male farmers who reported making most of the decisions on the farm were compared. It was found that the male respondents listed significantly more crops than the female respondents (difference=1.64545, p=0.0044, standard error=0.56373). A similar test was run to see if female farmers listed more species/genera of trees than male farmers. For this test, since very few male farmers reported being in charge of managing the trees uses and profits (table 4.8), the sample was not restricted. No significant difference was found between the number of tree
types listed by males and female farmers. A spearman rho correlation test also indicated a moderate positive correlation between the number of tree types cited species/genera cited and financial standing using the financial score described in previous sections \(r=0.3159, p=0.0139\).

**Table 4.8: Control of Tree Utilization and Profit**

<table>
<thead>
<tr>
<th>Responses</th>
<th>Who manages/uses the tree harvest the most?</th>
<th>Who manages the financial profit from the cash crops on the farm?</th>
<th>Who manages the financial profit from the trees or shrubs on the farm?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>female</td>
<td>Male</td>
</tr>
<tr>
<td>Myself</td>
<td>33.3%</td>
<td>60.5%</td>
<td>20.8%</td>
</tr>
<tr>
<td>My companion/spouse</td>
<td>29.2%</td>
<td>10.5%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Family</td>
<td>8.3%</td>
<td>7.9%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Both of us</td>
<td>25.0%</td>
<td>18.4%</td>
<td>41.7%</td>
</tr>
<tr>
<td>Not profitable</td>
<td>8.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With regards to trees on the farms, the most prevalent ones included avocado, mango, orange, and oak trees (Appendix A, Tables A.4 and A.5). Many farmers reported a declining number of oranges as citrus greening has been on the rise throughout the country in recent years. Cocoa, coffee, beans, and plantains featured among plants deemed the most profitable by farmers. While cocoa was the most profitable plant identified by Grande Riviere du Nord farmers, pigeon peas were thought of as being most profitable by Dondon farmers (Appendix A, Tables A.6 and
During the focus group however, farmers from Grande Rivière du Nord also added (although not asked) that the only trees that still have monetary values for them are cocoa, avocado, and pineapple trees. Farmers tended to view the same crops they estimated were profitable as important but many farmers asserted that all plants in their farms as important (Appendix A, Tables A.9 and A.10).

Table 4.9: Tree Preferences

<table>
<thead>
<tr>
<th>Types</th>
<th>Male</th>
<th>Female</th>
<th>Dondon</th>
<th>Grande Rivière du Nord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit trees</td>
<td>83%</td>
<td>68%</td>
<td>66%</td>
<td>77%</td>
</tr>
<tr>
<td>Charcoal</td>
<td>13%</td>
<td>13%</td>
<td>19%</td>
<td>7%</td>
</tr>
<tr>
<td>Medicine</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Timber</td>
<td>13%</td>
<td>24%</td>
<td>28%</td>
<td>10%</td>
</tr>
<tr>
<td>All types</td>
<td>0%</td>
<td>13%</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>Cash crops</td>
<td>8%</td>
<td>26%</td>
<td>16%</td>
<td>23%</td>
</tr>
<tr>
<td>Shade</td>
<td>4%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Soil Nutrition/fertilizer</td>
<td>4%</td>
<td>3%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Soil protection</td>
<td>4%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>No answer</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

4.7 Farmers’ Perceptions of Tree Benefits and Agroforestry

Farmers were asked about their perceived benefits of having trees on their farm, the benefits mostly cited (Figure 4.12) were erosion control, shade, fertilizer, profit, and overall protection against the elements. The term “protection” was vaguely used by many farmers and
combined with the other specific references to soil protection/erosion control and crop protection. None of the female farmers used the term “erosion” although they described it well. Unlike seen in literature, the female respondents tended to value profitable trees more than their male counterparts which could potentially be linked to women being more involved in managing the profits from tree harvest than the men. Male respondents also listed on average more benefits of trees than their female counterparts. The average number of benefits listed by individual male farmers was 1.91 while the women identified an average of 1.72 benefits. The difference in a pooled t-test was however not significant (standard error=0.28778, p=0.2592).

Tree benefits were also expressed in terms of the cost of not having trees such as lack of moisture retention due to insufficient tree cover.

Since deforestation got to the rate at which it is happening, for example, let’s say it rains today, tomorrow, when the sun comes it feels as if it did not rain at all because the sun hits (the soil) directly. Moreover, we see that the water sources and streams which used to hold water, because people are cutting trees everywhere, trees that are near water or upstream, there are many places where the main water sources have dried up, because people are cutting trees everywhere, trees that are near water or upstream, there are many places where the main water sources have dried up. I remember in the years 1976-1977, when you would get to November and have to wake up in the morning, it used to be so cold! Today, you hardly ever feel cold, it is the heat (that you feel).”

male farmer, Grande Rivière du Nord

To assess various aspects attitudes of farmers towards agroforestry, the survey questionnaire also included questions in a likert scale format (1=strongly disagree to 5=strongly
agree) with different statements about agroforestry, trees benefits, and environmental concerns. and asking respondents to agree or disagree. The statements included four main themes which

were benefits of trees to farmland, profitability of trees, environmental awareness, and general importance of trees and agroforestry. As mentioned in chapter 1, while a lot of farmers were amused and enthusiastic about the unfamiliar format of the question, some seemed confused about the necessity of making a difference between “agree” and “strongly agree”. To reduce measurement error, during the analysis, the responses were aggregated in terms of agreement, disagreement, and neutrality. 80 to 90% of farmers showed positive attitudes towards having trees on their farms and in the environment, great appreciation for the contribution of trees to the soil as well as their financial benefits (Tables 4.10). A slightly stronger positive feedback was detected on the part of male farmers compared to women farmers except with regards to tree profitability:

Figure 4.12. Perceived Benefits of Trees to Farmers
a greater percentage of women than men tended to find trees profitable. All farmers agreed that the trees on their land should be left to the next generations. A correlation test was done to estimate the relationship between farmers’ financial standing as well as education and the four main types of perceptions mentioned above. Scores ranging from 1 to 3 were given to the following responses: disagree, neutral, agree. Each of the statements presented in tables 4.10 were thus assigned a unique score (from 1 to 3). An average score was computed per observation/respondent for each of the four themes (Table 4.11). It was found that higher financial standing was associated with positive perceptions of benefits of trees to the soil and general importance of trees (respectively r= 0.2949 and p=0.0200, r=0.2851 and p=0.0247). The correlations were low. On the other hand, education was negatively correlated with perceptions of profitability: the more educated farmers tended to give less consideration to profitability. However, since education tends to be higher for men, education being negatively correlated with the perception of profitability is likely reflective of the gendered trend found when farmers were asked to list the benefits of trees on their farm (Figure 4.12).

**Table 4.10: Farmers’ Perceptions towards Trees and the Environment**

<table>
<thead>
<tr>
<th>Perceptions</th>
<th>Gender</th>
<th>Disagree (1)</th>
<th>Neutral (2)</th>
<th>Agree (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benefits of Trees to Farm Land</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The trees on the farm can increase soil productivity</td>
<td>Male</td>
<td>8.3%</td>
<td></td>
<td>91.7%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5.3%</td>
<td>5.3%</td>
<td>89.4%</td>
</tr>
<tr>
<td>The trees on the farm protect the soil against erosion</td>
<td>Male</td>
<td>4.8%</td>
<td>4.8%</td>
<td>91.7%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5.2%</td>
<td>2.6%</td>
<td>92.1%</td>
</tr>
<tr>
<td>The trees on the farm can facilitate water infiltration</td>
<td>Male</td>
<td></td>
<td>12.5%</td>
<td>87.5%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>13.2%</td>
<td>7.9%</td>
<td>78.9%</td>
</tr>
</tbody>
</table>
Table 4.10. Continued

<table>
<thead>
<tr>
<th>The trees on the farm provide fertilizer to the soil</th>
<th>Male</th>
<th>100.0%</th>
<th>Female</th>
<th>2.6%</th>
<th>94.7%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Profitability of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placing trees on the farms is not financially profitable</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Farmers can increase their profit by planting more trees</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Having trees on the farm can help farmers feed their family</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to take care of the environment</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>The state of the environment has worsened in the past 5 years</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>It is important to protect trees</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General Importance of Trees/Agroforestry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agroforestry programs are good for farmers</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Table 4.10. Continued

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers should leave trees on</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>their farm for their children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and grandchildren</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important that farmers</td>
<td>100.0%</td>
<td>2.6%</td>
<td>97.4%</td>
</tr>
<tr>
<td>plant trees on their farm</td>
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Table 4.11: Scoring System for Measuring Perceptions

<table>
<thead>
<tr>
<th>Themes and Statements</th>
<th>Scores</th>
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</thead>
<tbody>
<tr>
<td>Benefits of Trees to Farm</td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>1</td>
</tr>
<tr>
<td>B1</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td></td>
</tr>
<tr>
<td>B4</td>
<td></td>
</tr>
<tr>
<td>B total</td>
<td></td>
</tr>
<tr>
<td>Total score for benefits of</td>
<td></td>
</tr>
<tr>
<td>trees</td>
<td></td>
</tr>
<tr>
<td>Profitability of Trees</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td></td>
</tr>
<tr>
<td>P total</td>
<td></td>
</tr>
<tr>
<td>Total score for profitability</td>
<td></td>
</tr>
<tr>
<td>of trees</td>
<td></td>
</tr>
<tr>
<td>Environmental Awareness</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.11. Continued

<table>
<thead>
<tr>
<th>E1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E total</td>
<td>Total score for environmental awareness</td>
<td></td>
</tr>
<tr>
<td>General Importance of Trees/Agroforestry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G total</td>
<td>Total score for general importance of trees</td>
<td></td>
</tr>
</tbody>
</table>

4.8 The Role of Community

The main community-oriented labor systems were explored during the focus group and the difference between the two explained by people in the area.

*The difference between ranpanno and konbit is that ranpanno is a contract. You “cut” a parcel of land for the person to work on and it has to be finished. If I am going too slow, the others might help me when they are done with their parcels. In konbit, people come when they feel like it, they may or may not come whereas in ranpanno if you do not make it you owe the person (on whose land you were supposed to work). When it is a konbit, you may decide not to go, you do not owe anything.*

(Male agronomist, Dondon)
4.8.1 Konbit Attendance

As social networks are critical to the implementation of community-oriented agroforestry project, the survey also explored farmers’ relationship with their neighbors as well as participation to konbits. While the work distribution inquiry indicated that very few farmers used konbit as a main form of labor on their farm, the majority of farmers reported still attending konbits on others’. The frequency of attendance was not investigated; however, the re-exploration of this question in the focus group gave a deeper understanding of patterns of participation. As observed before, the respondents from Grande Riviere du Nord seem to partake more in konbit than those of Dondon which may be indicative of a greater sense of community there. Male respondents also showed greater participation than female respondents which confirmed the notion of the farm being seen as a male space as konbit often entails land preparation work and women are expected to provide the food (Figure 4.13). Since some of the farmers who responded to the survey indicated participating in konbit less, the focus group was an opportunity to explore the presumed reduction in konbit in the area. Farmers in both localities agreed that people were attending konbits less which they attributed to an aging farming population, limited financial resources to host konbits, a lack of reliable help.

![Figure 4.13. Participation to Konbit](image-url)
4.8.1.1 Aging farming population

Farmers believed that a labor shortage was in part responsible for the decrease of konbits. As stated earlier, most of the respondents were over forty years of age. The out migration of young male farmers to the cities or other countries coupled with a disinterest in farming was identified as a reason for the reduced frequency of the communal labor exchange events. This sentiment is captures in the following statement: “Who do you invite to a konbit? Young men. Most of young men migrated to the Dominican Republic. Most of young men have a motorcycle that they use as taxis. There is nobody left to work the land.” Focus group coordinator, Grande Rivière du Nord.

4.8.1.2 Limited financial resources

The same financial barriers that farmers stated were preventing them from adoption conservations practices were also suggested as impediments to carrying out successful konbits: “It is the same economic issue. These days, konbits are very demanding because the people who are coming to help are making requirements regarding what you should give them (to eat).” Female farmer, Grande Rivière du Nord. Beyond a simple annoyance against picky eaters, this statement also speaks to the difficulty that farmers face to provide food to attendees. It is likely that to avoid to embarrassment of not having enough food or providing food that will be subject to criticism some farmers choose to not host konbits.

4.8.1.3 Lack of reliable help

Laslty, farmers felt like they could no longer trust the word of their fellow farmers when it comes to konbit attendance and were growing tired of no-shows.

“The reason why there is less konbit is because is because you might invite 50 people to a konbit on Saturday morning, they all say ‘yes’. So, you go to market, you buy a gallon of cooking
oil, a bag of rice, beans and everything to cook and when Saturday comes, you thought you would have people to help you, if enough of them show up, you are lucky.”

male farmer, Dondon

Nowadays, in Dondon, there are less konbits. I am not saying that it does not exist, it has decreased because people think that konbit is more problematic, that it is less productive than ranpanno. There is another thing called ‘veye’ that has somewhat replaced the konbit. This is how veye works. I go to your place. I tell you that I will be planting so that you can come help, even then you do not have to come. In some communes however, the person (needing help) will bring food to the people so to create a commitment. I don’t know if it is like this everywhere but in certain communal sections, that’s how it is. If I tell miss Mary (a farmer in the focus group) about a veye, well, if I brought her food, whenever she has the time, she will go work on the parcel because she ate my food. There are places where people may not be obligated to go but if I invite you don’t come when you invite me I won’t go either.

Male agronomist, Dondon

The men were more numerous to answer the question pertaining to konbit. Once more, gender roles were re-iterated as the women who responded tended to focus more on problem linked reproductive roles, for instance having to comply with picky eaters. The problem of an aging farming population suggested by the age of respondents was also confirmed when farmers mentioned the lack of young male farmers to help.

4.8.2 The Importance of Peasants’ Organizations and Cooperatives

Focus group questions inquired about membership to agricultural cooperatives and/or organizations and reasons for joining. All participants found that belonging to a cooperative or a peasant organization was advantageous to them. Advantages listed can fit into three categories: a
sense of community, knowledge gain, and profit. Participants noted that joining a cooperative or an organization was a necessity. Farmers also noted that the cooperatives were profitable as they constitute a market for them. The farmers in Dondon were for the most part in a coffee cooperative while the farmers from Grande Rivière du Nord belonged to a cocoa cooperative. Farmers from both localities were particularly satisfied with the bonus that they would obtained from cooperatives a few weeks/months after selling.

While all agreed that they benefited from the workshops that the organizations and cooperatives hold, farmers from Dondon unlike farmers from Grande Rivière du Nord showed some dissatisfaction towards the cooperatives. Such dissatisfaction stems from what farmers identify as lack of transparency, concentration of power and profit in the hands of a few, and overall lack of benefits for farmers. Some farmers think that labor should also be offered or coordinated by the cooperatives and that the government should facilitated the implementation of such design.

4.9 Perceptions of Solutions to Deforestation

When asked about potential means of addressing deforestation, the solutions tended to target the deforestation problems identified. Since the government was a recurring agent identified by farmers as partly responsible for the problem of deforestation, farmers were asked in what tangible ways could the government curb the problem of deforestation in the country. Many felt that this could be achieved by employing farmers on state owned land, giving them transplant to plant trees, and putting a nursery in the areas where they live. Farmers also think that the government needed to provide jobs, agricultural activities/projects to farmers, and access to market. Nonetheless, some farmers gave arguments that weakened the notion according to which
a nursery and transplants are the missing elements to hem planting or keeping trees on their land and brought up corruption and lack of transparency. Farmers also pointed to the effect unemployment in other sectors had on them. Many farmers express the frustration they felt with regards to supporting their children after paying for the studies. Farmers were also asked whether the government should enact policies to encourage tree planting. Many farmers suggested that policies regarding the regulation of tree cutting be put in place. A few people mentioned the necessity of a forestry agent to ensure the application of rules around tree cutting. Some farmers offered that the policy should be about replacing trees after cutting. The capacity of the government to apply those measure was nonetheless met with skepticism. Overall, a lot of distrust towards the government and the Haitian elite was conveyed.

### 4.9.1 Feeling of Distrust

I remember one time a project came (in the area) ...The rich do not want to see the poor prosper. When they (project managers) say on paper that peasants are supposed to get 500 coffee trees, they (the rich) do not want to give 500 coffee trees to the peasants, they see the money so they say: ‘I will give you 200, 300. 300 will be good for you; I will give you money for 300 transplants’. There is no nursery for you to make transplants and plant them...Some projects help sometimes. They give us transplants: the people who get them don’t give them much importance.

female farmer, Dondon.

### 4.9.2 Employment Provision

What the government can do to help us is to create activities (jobs, projects) in the community. That way I can make 50 gourdes, another person can make 100 gourdes. Everyone can have a different job that will allow them to make more money. That way, I won’t be inclined to cut the trees, I won’t think about harvesting the oranges before they are ready.
female farmer, Dondon

They (the government) need to help peasants farm, put a system in place for them to be able to work, have a market to sell their products.

male farmer, Dondon

Give them (children of farmers) work, the moment you allow them to work, the mother and fathers who have invested everything they had in them will be relieved”.

male farmer, Dondon

4.9.3 Should the state/government legislate?

While farmers all agree that there should be some legislation to regulate tree cutting in mountainous areas, opinions on the punitive measures for failure to comply with policy varied. After inquiring about government’s role in maintaining tree cover, subsequent questions probed at whether farmers had obligations towards the government if given incentives. Although, farmers were not asked specifically about punitive measures, many express the sentiment that there should be some consequences when policies are not followed. Some farmers advocated for draconian measures such as prison while others thought a fine would be enough. The idea of punishing farmers for cutting trees was nonetheless questioned by several farmers who felt like as long they were replacing trees they should be allowed to cut them which is in alignment with some of the ideas about which policies should be adopted. There were also farmers who questioned governmental regulations on tree cutting by raising the question of tree ownership” “The trees do not belong to the government; they belong to you. (male farmer, Dondon). The notion of tree ownership was brought up by farmers whose opinions varied with regards to the acceptability of government intervention in tree cutting. While farmers believe that trees should be replaced and that tree cutting should be regulated, many believe that not all trees should be subject to regulation
especially trees grown on private land. Although farmers recognized that trees cut should be replaced some farmers think that only trees provided by the government should be regulated by the government. Few farmers voiced the importance of personal and community values as a way to help maintain tree cover rather than governmental regulation. One farmer also opined that the provision of transplants by the government is not enough to guarantee the practice of agroforestry. Lastly, some farmers believed that the establishment of policies around tree cutting should be contingent upon governmental investment in agriculture and/or agroforestry. While farmers seem concerned about the potential of abuses from the tree cutting regulations, there were mixed opinions regarding compliance with said regulations. A female farmer believe that no one would accept to pay to cut their own tree even if the policy should be implemented according to her. An older male farmer attested to the authority of the government: "They will accept because the government has all power. Once they (government officials) decide, everyone will respect it. Everyone is below the government."

In Haiti, everyone is relying on the government. In other countries the rich people help the poor. Lowering the unemployment is not the responsibility of the government alone...there is another sector, the bourgeoisie. They are the meanest, they are responsible for our situation”.

Older male farmer Dondon

The government can protect you but there are certain things, you need not wait for the government to do them for you. It might never be done. Some people are living without government
help. So, we must try, if we think that the government should do something for us, it is not good for us.

Male farmer, Grande Riviere du Nord

4.10 Summary

The study sought to uncover the relationship between internal factors of agroforestry adoption namely farmers' attitudes towards and perceptions of agroforestry and external factors such as financial standing and education in the Haitian context. Farmers' behavior and attitudes towards tree cutting, their decision-making on the farm and in the household, and their social network also investigated. Lastly, most variables were interpreted with a gender lens. Female farmers were more likely to report managing tree products and related revenue as well as profits from cash crops. Women were also more involved in taking products to market. No significant difference was found between male and female farmers' perceptions of agroforestry. Financial standing was positively correlated with farmers' perceptions of the benefits of trees to the soil as well as overall importance of the practice of agroforestry while education was negatively correlated with tree profitability. Farmers who were more educated also tended to report an increase in tree cover on their farm in the past five years. Since male farmers were found to be more educated than female farmers on average, the relationship between education and both perceptions of agroforestry and observed patterns of tree cover variation (increase, decrease, no change) can be thought of as gendered as well. While financial standing was not correlated with temporal tree cover variation, a positive correlation was found between financial standing and the number of tree species/genera mentioned by farmers. The study also suggests that social networks and labor exchange systems have changed from a communal focus to a hybrid model (small
groups, emphasis on reciprocity). Farmers showed a great awareness of environmental degradation and the negative consequences of massive tree cutting. While seemingly having a great desire to continue agroforestry practices, most farmers expressed a great sentiment of burden and helplessness with regards to their capacity of being able to maintain trees on their land due to financial hardships. Most farmers were favorable to potential regulations with regards to tree cutting in the mountains to minimize environmental impacts but were concerned about the fairness of said regulations as many farmers showed distrust towards the government and reticence towards following rules on their own farms. The relationship between internal and external factors of agroforestry adoption/involvement in Haiti that the study sought to answer is found in the effect of education and financial standing on perceptions. Farmers who were doing better economically tended to value the benefits of trees to their soil more and ranked tree profitability lower. The gender implications of both of those socio-economic factors support the idea that gender affect both internal and external factors of agroforestry adoption/participation. The study also posed the question of whether Haitian farmers’ perceptions of agroforestry as well as their gender affect agroforestry involvement and decision making. Farmers’ positive perceptions of agroforestry did not seem to affect their behavior which was more influenced by economic factors. Female farmers who were more involved in tree management seemed somewhat more concerned about the profitability of trees.
CHAPTER 5

CAN THEY HAVE THEIR TREES AND EAT IT TOO?

The study sought to uncover whether gender affected farmers’ perceptions of agroforestry as well as their involvement in the practice. The relationships between farmers’ characteristics, farm characteristics, and perceptions/attitudes about agroforestry was also investigated. Gendered patterns were observed in the three main spaces – the household, the farmland, and the community. Farmers’ characteristics as well as farm characteristics were also different across gender. While gender did not seem to play a major role in shaping farmers’ perceptions about agroforestry and all farmers had overall positive perceptions of agroforestry, some gender differences were observed with regards to aspects of agroforestry benefits farmers valued the most. As expected, it was found that male farmers tended to be more educated and own land more than female farmers. Male farmers were more likely to report that their tree cover had increased and less likely to report frequent tree-cutting. While most farmers reported making decision jointly with their partners (in the household and on the farm), both men and women were more likely to think that men had more say in farming activities. A slightly higher percentage of women reported making more decision in the household while men tended to report joint decision more than women whether on the farm or in the house. The responsibility of taking product to market, getting water for the household, and engaging in household chores fell unsurprisingly on female farmers. The female respondents also reported managing tree products as well as the profits obtained from both trees and cash crops.

When asked about the importance of trees to them, it was found that the female farmers tended to list profitability of trees more than the male farmers who showed greater awareness of ecosystem services of trees. The study also showed that farmers who had greater financial standing and more education tended to have greater appreciation of the benefits of trees to the soil and rated
the overall importance of agroforestry higher. Although individual farmers were conservative in discussing the frequency at which they cut trees, when asked as a group, farmers recognized that massive tree-cutting was endemic in their community and identified poverty as the root cause of the behavior. The study also revealed a shift in existing social networks with regards to labor. Farmers were practicing “konbit” (see chapters 3 and 4) less and were more dependent on a smaller labor exchange system called “ranpanno” in which verbal contracts guarantee labor between a very small group of farmers.

We argue that the seeming parity in decision-making and the management of profits by women is to a certain extent an extension of gender roles. The study also suggests that extreme economic hardship and a collective reframing of the acceptability of massive tree-cutting is undermining the survival of agroforestry in the mountains of Haiti rather than negative attitudes about the practice. Another argument made is that the apparently contradictory (based on literature) tendency of women to value the profitability of trees while men ranked ecosystem services higher is in fact a result of gender expectations and gender inequality.

5.1 Impact of Gender on Decision-Making

The findings indicate that male and female farmers tended to report joint decision making with their partners in the household and over two-third of both male and female farmers felt like regardless of who own the land, they both have the same rights to it. This is somewhat at odd with Rocheleau and Edmunds (1997) assertion that women tended to be relegated to using marginal land. It is also not in accordance with the findings of Kiptot and Franzel (2012) regarding the fragility of land control/tenure for women even when they had ownership. While women still owned land less than men, their feeling of equal rights suppose a greater access to land than what
indicated in agroforestry literature. Male farmers were however more likely to report joint decision making and equal rights. Agroforestry researchers tend to find women to be more involved in managing the profits from tree products but not for cash crops. It is also common that when tree products become more profitable, women are pushed out. The fact that both male and female farmers had similar responses regarding the control of finances for both cash crops and tree products cannot be dismissed. Women having more say in the household whether deciding with their partners or alone is not surprising as reproductive work falls on women. Farmers’ definition of joint decision-making was not investigated but could have revealed the extent to which one partner would have more say on specific matters. Was one person informing the other about a decision or was there a true partnership?

It was also within local gender norms, perhaps influenced by western colonization, that farming was a men’s job since men do most of the tilling. Additionally, women (who were not head of households) see themselves more as helpers even though they also along with the men partake in farming activities particularly weeding and harvesting. It seems that the perception of the “real” farm labor was linked to activities that were more energy depletive. Since tilling required greater energy, the men who were involved in tilling were perceived as doing the most important work. This perception of farming as being a man’ domain could be partly the reason why men were more likely to make farming decision (such as what to plant). Despite most farmers claiming equal rights to the farmland, men were still the main decision makers regarding what gets planted and other farming related decisions. This somewhat contradicts the sentiment expressed by female farmers (and seconded by male farmers) of having equal rights. Perhaps, having equal rights for the female farmers was perceived in terms of their rights to use the land. The management of trees by women is likely contingent upon what happens on the farm. If the men decide to expand and
plant more crops, this might mean that some trees must be taken down to make space for the new crops. The prioritization process that shape the landscape of the farm is needed to have a deeper understanding of gender patterns of decision making in the household and on the farm.

5.2 Internal and External Factors of Agroforestry Involvement

The reluctance of farmers to admit to tree-cutting and their insistence to justify their actions indicate that individual farmers have a negative perception of tree-cutting. Farmers did not want to be judged. Interestingly, male farmers were more likely to say that they rarely cut trees or that tree cover increased on their farms. It is important to note that many respondents were living with a partner and that the gender differences observed did not pertain to land/trees managed exclusively by male or female farmers. Farmers also felt the need to justify their actions to non-members of the community (researchers) when asked individually whereas in the focus groups, their responses were less guarded.

The gender difference in admitting the frequency of tree-cutting and reporting increase in tree cover could be because male farmers were more exposed to educational information about the benefits of trees than female farmers and therefore were more self-conscious about a behavior they were told to be destructive to farming in mountains. However, despite the observed concerns about their image as farmers, massive tree-cutting was accepted by members of the community since they could justify it with extreme poverty. It is worth pointing that this has not always been the case as one farmer mentioned that in the beginning (before tree-cutting became widespread in farming communities), people would cut trees early in the morning to not be seen. The behavior must have been progressively normalized to the point that farmers no longer hide from each other but somehow still carry a sense of shame vis à vis outsiders. In the example of Chiradzulu, Malawi
presented in chapter 2, the farmers who felt discouraged to cut trees thought that their community members wanted them to plant trees and not cut them down (Meijer et al, 2015). Noppers et al (2014) found that environmental and symbolic (status enhancer, identity definer) attributes of sustainable innovations were greater predictors of adoption than economic attributes. Both case studies underline the importance of self-image and identity in encouraging environmentally friendly behavior. It seems that in the case of Dondon and Grande Riviere du Nord, farmers did not have their self-image or identities as farmers tied to their behavior towards cutting trees since most community members also cut trees. While there seem to be a positive perception towards maintaining trees on farm, financial needs weigh more as most farmers would indicate having to cut their trees to make ends meet.

Farmers also conceded that cutting trees was not a problem per se and that it was the unsustainable cutting of the trees without replacement that posed a problem. Despite individual claims indicating low tree-cutting rates and increased tree cover by many farmers (mostly male), farmers did recognize that tree cover had significantly decreased in the community. Individual attitudes towards agroforestry seem to matter less than the collective attitude towards agroforestry. Indeed, while all farmers find trees desirable on their land and would want to keep them, the collective acceptance of tree-cutting (granted with the justification of poverty) somewhat encourages the behavior. The positive correlation found between farmers’ financial situation and the number of tree types (species/genera) cited supported the notion that better off farmers tend to have greater diversity of trees and that poverty was indeed a factor influencing farmers behavior. The fact that tree cover variation (increased, decreased, same) was also not correlated to financial standing could mean that individual farmers were overestimated their increase in tree cover for the reasons described above. This is even more apparent when compared to the responses provided by
farmers during the focus groups. No correlation was found between farmers’ perceptions and both tree cover variation and number of tree types cited. This does not mean however that farmers’ characteristics especially financial standing are the greatest predictors of farmers behavior. Farmers’ collective attitudes i.e. acceptance and justification of tree-cutting also seemed to influence their behavior.

The findings also depart from the common trends of men being more interested in making profits from trees than women who would be more interested in environmental protective practices (Jackson, 1993; Shiva et Alaok, 2014; Kiptot and Frazel, 2014). When asked directly about the benefits of trees, women tended to value trees profitability more than men who mentioned the benefits of trees to the soil more. This is also related to two other findings regarding farmers’ perceptions of agroforestry. Education was found to be negatively correlated with perception of profitability of trees whereas financial standing was positively correlated with perceptions of benefits of trees to the soil. While there was no significant difference between men and women regarding perceptions about agroforestry, certain socio-economic differences were observed. Men as previously stated tended to be better educated and own land more than women. The negative association between tree profitability perception and education is likely influenced by gender as a confounding variable rather than being an indication of less educated people valuing profit more. Indeed, women tended to list profitability more as a benefit of agroforestry to them. Women favoring tree profitability also does not imply a completely inverse pattern in gender roles in the Haitian context compared to what is observed elsewhere. Since women are responsible for feeding the house, providing household essentials, and in some cases paying for their children’s tuition, it becomes evident why the profitability of trees is particularly important to them especially considering that they were the ones managing the finances. The men’s greater awareness and
ranking of certain ecosystem services of trees supports the idea of their greater involvement in participating in educational workshops and reflects their higher education. It was very noticeable that none of the female farmers used the term “erosion” although they described it well while most of the men did. There could also be some gender bias regarding who gets invited to workshops. Indeed, the women in the focus groups who all belong to peasant organizations (unlike most women who participated in the survey) were on par with the men in using technical words to describe environmental degradation. Moreover, the men’s seemingly greater interest in conservation did not seem to translate into behavior. The gender disparity in description of tree variation pattern (men claiming that tree cover has increased on the farms more than women) could also be indicative of men’s greater desire to present the image of the good environmental steward especially considering that women are more involved in tree management.

5.3 Changes in Social Networks: Impact of Collective Perceptions

The study also found that the use of an existing community-oriented labor exchange system, the konbit (see chapter 3), had decreased in the communities investigated. Farmers reported still attending konbits hosted in the communities but hosting them much less. This could be because farmers do not rely on the practice to get daily work done but would occasionally use it. It could also mean that the recurring konbits are often put together by the same (few) farmers. The lack of interest of the youth in farming coupled with the unreliability of labor (people promising to come but not showing up) has made many farmers rely more on another contract-based small group work exchange model called ranpanno (see chapter 3). This could be indicative of a shift towards a more individualist mentality in the community whereby people are less interested in partaking in work that will not benefit them. While the reason for this shift is unclear,
it is possible that it could have been influenced or exacerbated by the presence of the numerous NGOs serving the community. The transplants provided by some NGOs are appreciated by farmers and so is the market that certain NGOs offer for crops like coffee and cocoa. However, those programs don’t necessarily reach all farmers. Indeed, while NGOs were not the focus of the study, some farmers would mention how not everyone would be the recipient of transplants and others would even suggest that people with larger network were favored. It is understandable how such feeling could lessen social ties between farmers to a certain extent.

The market-based approach used by many NGOs is also likely to not benefit all farmers and reinforce the nascent or perhaps already established individualistic mindset of farmers. Haque (2002) argued that in Bangladesh NGOs were “depoliticizing the rural poor” by making them less inclined to make demands from the government (as some needs were being met by the NGOs). Using microfinance as an example, Haque also asserted that the economic approach of the NGOs was oversimplifying poverty and dividing the rural poor into recipients and non-recipients of micro-credits. The same argument can be made in the case of the Haitian farmers who although recognizing the responsibilities of the state towards them have become dependent on the NGOs. A few farmers also critiqued the NGOs model and opined that they wished important issues to them such as labor exchange or technical services were provided. One could also argue that the services provided by the NGOs were getting in the way of farmers showing more creativity in solving their problems or perhaps discouraging them from relying more on their community power. Farmers nonetheless found peasant organizations important for voicing their issues. Therefore, it could be argued that while farmers were increasingly being less involved in collective labor, they were still maintaining parts of their collective identity.
5.4 Policy Recommendations

Due to farmers’ distrust in the Haitian government, policies generated without actively building trust in rural communities will likely not be effective. It is therefore in the interest of the government to not employ top-down strategies that peasants are so suspicious of. A partnership between the government and relevant NGOs is likely to make farmers more receptive to governmental policies as they tend to have a closer relationship with local NGOs. Most farmers agreed on massive tree-cutting being a problem in their community and were in favor of regulations about tree-cutting. Farmers seem to think however that those regulations should apply to trees that are on public land and not their own. To maintain and/or expand the practice of agroforestry as well as reduce deforestation in the mountains of Haiti, the government will need to enforce regulations about sustainable tree-cutting on public land while implementing measures that alleviate some of the main barriers to the continued practice of agroforestry in Haiti. Such measures could entail land reform as farming on extremely small plots of land makes it difficult for farmers to grow enough crops to sustain them while still maintaining trees on their farm. Since women tend to own land less in addition to not being legally entitled to inherit their partners’ land (majority living with partners without marriage), gender sensitive policies favoring the ownership of land by female farmers should be considered. Farmers could also be given seeds and transplants with the stipulation that they would keep a certain percentage of their farm covered in trees. Konbits could be revived if incorporated in community-based agroforestry projects in which trees would be planted and cared for (pruned or turned to charcoal when necessary) by the collective while the individual families particularly the female farmers who are more involved in tree management continue to control the profit of tree products. The desire of many farmers to be provided with jobs/activities by the government could be realized in the form of payments for
ecosystems services in which farmers are remunerated or given other social benefits for maintaining tree cover on surrounding public land/forest remnants. Another impediment to agroforestry identified by farmers was the lack of infrastructure whether in terms of irrigation or roads. This is more of a national issue which might not be easily fixed. Nonetheless, implementing irrigation systems combining rain water harvesting cisterns and swales should be explored. Lastly, educational workshops on agroforestry targeting both male and female farmers and emphasizing local knowledge should be offered.

5.5 Research Opportunities

Because ordinal data was collected to save time when verbally administrating the survey, a more rigorous quantitative analysis could not be performed. Moreover, the study did not fully investigate the external factors of adoption which were limited to financial standing (food security, land tenure and size), education, tree cover variation, and tree types. The study also raises some questions that can be the object of future research. How do farmers decide on which trees to cut or plant? Are tree harvests (timber/charcoal) incorporated into the family budget or are they mostly cut in emergency cases as suggested by farmers? How are decisions communicated in the household and on the farm gender wise? What types of community development activities are farmers willing to use the konbit model for? In areas where general perceptions of agroforestry are positive, what combination of social and economic resources are required to maintain agroforestry practices i.e. what essential socio-economic needs must be met? How would farmers react to gender sensitive policies pertaining to land reform? How do farmers perceive agroforestry in the context of climate change?
5.6 Conclusion

The study shows that individual perceptions/attitudes towards agroforestry alone are not enough to affect behavior. Indeed, when financial and social resources (income, land, agricultural inputs, infrastructures, labor organizing groups, social benefits) are limited, positive perceptions towards agroforestry were not enough to prevent farmers from engaging in unsustainable tree-cutting which they recognized lead to environmental degradation in the highly slopes areas in which they were farming. While most farmers still had trees on their farm, they admitted to the deleterious collective effect of the depletion on trees in the communities. Farmers described water retention issues as well severe erosion. Farmers nonetheless felt helpless and blamed extreme poverty for the depletion of tree cover. The concept of poverty leading to environmental degradation is partly supported by the study’ findings. Farmers often reported they would cut trees when they have a “problem” with the example the most cited being paying for their children’s tuition. Since women tend to be responsible for child-rearing, cooking, and other domestic work it is understandable that the profitability of trees would be particularly important to them given that they go to market (to sell charcoal) and reported controlling the wallet in the household. The study did not go as far to uncover who controlled how the money was spent despite women managing it. It is likely that the argument of Moser (1993) about women being the managers and men being the C.E.O.s hold here. Women’s involvement in tree management as well as their valuing tree profitability somewhat more than ecosystem services reflect their gender role as homemakers. Since the responsibility of cooking and ensuring that all household members’ needs particularly that of the children are met, it is understandable that women (who are also more involved in small scale retail) would be particularly interested in ensuring that they have the necessary financial means to meet those needs. It is important to note however that both male and
female farmers showed positive perceptions of agroforestry overall and great awareness of the environmental benefits of trees.

The study also revealed a seemingly collective acceptance of tree-cutting since the behavior could be justified with economic hardship. Collective attitudes towards agroforestry might be more important in determining behavior than individual attitude. While farmers might not necessarily care more about the effect of deforestation on the community than on their farms, a collective negative perception of tree-cutting and tree-cutters is likely to curb tree-cutting. Indeed, if the focus shifts from tree-cutting as simply having negative consequences to tree-cutters being perceived negatively, farmers will be less likely to jeopardize their status and self-image. It remains to be seen whether such shift in collective attitude would occur if there was an amelioration of the socio-economic conditions of farmers. Tree-cutting whether for timber or charcoal is a good incentive to practice agroforestry. The problem arises however when trees are cut unsustainably. Charcoal usage, often blamed for deforestation in Haiti, is likely to remain high in the country. Nonetheless, with effective policies and hopefully the transition to a cleaner source of fuel, deforestation can be halted, and agroforestry can be maintained/expanded.

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i Peasants and farmers are used interchangeably.
ii Spearman rho is a non-parametric measure of rank correlation
iii A contingency analysis is a test that allows the measurement of the association of qualitative data and ordinal data.
iv Fertilizer-trees are trees that help fix nitrogen.
v The term “peasant” which designates any person living in a rural area in Haiti, is used in this chapter to refer to those who farm the land. The peasantry is in the Haitian context a social class based on profession, power, education, and wealth. Because the term “peasants” does have an agricultural connotation, in this study, the terms “farmers” and “peasants” are used interchangeably.
vi Natural children did not have inheritance rights legitimized by marriage.
vii The coordinator had invited more people in case some farmers did not come.
viii There is a nationwide disease affecting citrus trees.
ix Spearman’s correlation used to establish correlation between ordinal data (Mukaka, 2012).
x In 1978, the pigs in Haiti contracted the African swine fever which killed a lot of pigs. Encouraged by the American and Canadian governments who wanted to contain the disease, the
Haitian government ordered the systematic killing of all creole pigs in 1982 (Le Nouvelliste, 2010; The public archive, 2011)

xi Small scale commerce in Haiti typically refers to small retail, including the sale of imported food items, hygiene products, clothing, and other household products that are bought from the cities and even from neighboring countries at times to be sold in the countryside. Women who sell farm products to market do not necessarily partake in other small informal commerce while the opposite is often true.

xii While household work information was gathered for both men and women, it was revealed halfway through the data collection that many men were just giving the estimated time they thought their companion spent on housework as they thought the research was mostly concerned about that specific information.

xiii Ranpanno and konbit described in chapter 3 are two work exchanges systems.
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Global Forest Watch (nd) Tree Cover Loss. Retrieved from https://www.globalforestwatch.org/map/country/HTI?analysis=eyJzaG93QW5hbHlzaXMiOnRydWV9&map=eyJ6b29tIjoxNjIwMzUxNjQwNiwiY2VudGVyIjoiaHR0cHM6Ly9tZXN0aW9uLWluZG93bmxpbmFsaXZlcy5zaG93LmN0b3J5Iiwic2NoZW1hdGlvbiI6IjIzNzIyNzY5ODA5IiwicmVxdWVzdCIsImNsaW1hdGUifQ%3D%3D

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### APPENDIX A

### ADDITIONAL RESULTS’ TABLES

**Table A.1: Respondents’ Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>% of Female Respondents</th>
<th>% of Male Respondents</th>
<th>All Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self</td>
<td>36.84%</td>
<td>58.33%</td>
<td>45.16%</td>
</tr>
<tr>
<td>Spouse/Companion</td>
<td>28.95%</td>
<td>4.17%</td>
<td>19.35%</td>
</tr>
<tr>
<td>Children</td>
<td>2.63%</td>
<td>4.17%</td>
<td>3.23%</td>
</tr>
<tr>
<td>Cousin</td>
<td>0.00%</td>
<td>4.17%</td>
<td>1.61%</td>
</tr>
<tr>
<td>Both partners</td>
<td>26.32%</td>
<td>25.00%</td>
<td>25.81%</td>
</tr>
<tr>
<td>Father in law</td>
<td>2.63%</td>
<td>0.00%</td>
<td>1.61%</td>
</tr>
<tr>
<td>Parents</td>
<td>2.63%</td>
<td>4.17%</td>
<td>3.23%</td>
</tr>
<tr>
<td># meals/day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>missed meals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sometimes</td>
<td>0.00%</td>
<td>8.33%</td>
<td>3.23%</td>
</tr>
<tr>
<td>once</td>
<td>39.47%</td>
<td>54.17%</td>
<td>45.16%</td>
</tr>
<tr>
<td>twice</td>
<td>34.21%</td>
<td>20.83%</td>
<td>29.03%</td>
</tr>
<tr>
<td>3 times</td>
<td>10.53%</td>
<td>12.50%</td>
<td>11.29%</td>
</tr>
<tr>
<td>4 times</td>
<td>2.63%</td>
<td>0.00%</td>
<td>1.61%</td>
</tr>
</tbody>
</table>
Table A.2: Farmers’ Sources of Income

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sources of Income</td>
<td>Farmer</td>
</tr>
<tr>
<td></td>
<td>95.16%</td>
</tr>
<tr>
<td>Main Source of Income Time wise</td>
<td>Farmer</td>
</tr>
<tr>
<td></td>
<td>82.26%</td>
</tr>
<tr>
<td>Highest Source of income</td>
<td>Farmer</td>
</tr>
<tr>
<td></td>
<td>79.03%</td>
</tr>
<tr>
<td>Size of Farmed Land</td>
<td>&lt; 3.19 acres</td>
</tr>
<tr>
<td></td>
<td>27.42%</td>
</tr>
<tr>
<td>Irrigation/tree cover</td>
<td>Rain water only</td>
</tr>
<tr>
<td></td>
<td>96.77%</td>
</tr>
</tbody>
</table>
Figure A.1. Uses of Cut-Down Trees

Figure A.2. Time Spent Farming by Gender
**Figure A.3. Time Spent on Household Chores**

**Figure A.4. Person who fetches water**
## Table A.3: Crops Listed

<table>
<thead>
<tr>
<th>Types</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia</td>
<td>2%</td>
</tr>
<tr>
<td>Avocado</td>
<td>6%</td>
</tr>
<tr>
<td>Beans</td>
<td>65%</td>
</tr>
<tr>
<td>Breadfruit</td>
<td>5%</td>
</tr>
<tr>
<td>Cabbage</td>
<td>2%</td>
</tr>
<tr>
<td>Cassava</td>
<td>16%</td>
</tr>
<tr>
<td>Cocoa</td>
<td>34%</td>
</tr>
<tr>
<td>Coffee</td>
<td>45%</td>
</tr>
<tr>
<td>Corn</td>
<td>42%</td>
</tr>
<tr>
<td>Eggplant</td>
<td>2%</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>2%</td>
</tr>
<tr>
<td>Hot Peppers</td>
<td>2%</td>
</tr>
<tr>
<td>Mahogany</td>
<td>2%</td>
</tr>
<tr>
<td>Mango</td>
<td>8%</td>
</tr>
<tr>
<td>Mirliton</td>
<td>3%</td>
</tr>
<tr>
<td>Oak</td>
<td>3%</td>
</tr>
<tr>
<td>Orange</td>
<td>10%</td>
</tr>
<tr>
<td>Papaya</td>
<td>2%</td>
</tr>
<tr>
<td>Passion Fruit</td>
<td>2%</td>
</tr>
<tr>
<td>Peanuts</td>
<td>29%</td>
</tr>
<tr>
<td>Pigeon Peas</td>
<td>6%</td>
</tr>
</tbody>
</table>
### Table A.3. Continued

<table>
<thead>
<tr>
<th>Item</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pineapple</td>
<td>11%</td>
</tr>
<tr>
<td>Plantain</td>
<td>73%</td>
</tr>
<tr>
<td>Raintree</td>
<td>2%</td>
</tr>
<tr>
<td>Sugar Cane</td>
<td>13%</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>6%</td>
</tr>
<tr>
<td>Taro</td>
<td>47%</td>
</tr>
<tr>
<td>Upstorey Trees</td>
<td>2%</td>
</tr>
<tr>
<td>Yam</td>
<td>47%</td>
</tr>
</tbody>
</table>

### Table A.4: Types of Trees Listed in Dondon

<table>
<thead>
<tr>
<th>Tree (Species/Genera) Listed</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia</td>
<td>3%</td>
</tr>
<tr>
<td>Avocado</td>
<td>38%</td>
</tr>
<tr>
<td>Beans</td>
<td>16%</td>
</tr>
<tr>
<td>Breadfruit</td>
<td>25%</td>
</tr>
<tr>
<td>Chestnut</td>
<td>16%</td>
</tr>
<tr>
<td>Coconut</td>
<td>3%</td>
</tr>
<tr>
<td>Coffee</td>
<td>3%</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table A.4. Continued
<table>
<thead>
<tr>
<th>Ice cream bean</th>
<th>6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahogany</td>
<td>16%</td>
</tr>
<tr>
<td>Mango</td>
<td>59%</td>
</tr>
<tr>
<td>Oak</td>
<td>56%</td>
</tr>
<tr>
<td>Orange</td>
<td>28%</td>
</tr>
<tr>
<td>Passionfruit</td>
<td>3%</td>
</tr>
<tr>
<td>Pine</td>
<td>3%</td>
</tr>
<tr>
<td>Plantain</td>
<td>3%</td>
</tr>
<tr>
<td>Raintree</td>
<td>44%</td>
</tr>
<tr>
<td>Yam</td>
<td>3%</td>
</tr>
<tr>
<td>Yellow monbin</td>
<td>3%</td>
</tr>
</tbody>
</table>

**Table A.5: Types of Trees Listed in Grande Rivière du Nord**

<table>
<thead>
<tr>
<th>Trees Types (Species/Genera) Listed</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia</td>
<td>7%</td>
</tr>
<tr>
<td>Avocado</td>
<td>47%</td>
</tr>
<tr>
<td>Beans</td>
<td>3%</td>
</tr>
<tr>
<td>Breadfruit</td>
<td>17%</td>
</tr>
<tr>
<td>Cashew</td>
<td>7%</td>
</tr>
<tr>
<td>Cedar</td>
<td>10%</td>
</tr>
</tbody>
</table>
Table A.5. Continued

<table>
<thead>
<tr>
<th>Plant</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chestnut</td>
<td>7%</td>
</tr>
<tr>
<td>Cocoa</td>
<td>13%</td>
</tr>
<tr>
<td>Coconut</td>
<td>20%</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>3%</td>
</tr>
<tr>
<td>Ice cream bean</td>
<td>17%</td>
</tr>
<tr>
<td>Lime</td>
<td>3%</td>
</tr>
<tr>
<td>Mahogany</td>
<td>7%</td>
</tr>
<tr>
<td>Mango</td>
<td>70%</td>
</tr>
<tr>
<td>Oak</td>
<td>43%</td>
</tr>
<tr>
<td>Orange</td>
<td>27%</td>
</tr>
<tr>
<td>Pine</td>
<td>10%</td>
</tr>
<tr>
<td>Pineapple</td>
<td>3%</td>
</tr>
<tr>
<td>Raintree</td>
<td>7%</td>
</tr>
<tr>
<td>Spanish lime</td>
<td>3%</td>
</tr>
</tbody>
</table>

Table A.6: Profitability of Crops and Trees

<table>
<thead>
<tr>
<th>Most Profitable Plants (ALL)</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>15%</td>
</tr>
<tr>
<td>Coffee</td>
<td>13%</td>
</tr>
<tr>
<td>Pigeon Peas</td>
<td>2%</td>
</tr>
<tr>
<td>Black Eyed Peas</td>
<td>2%</td>
</tr>
</tbody>
</table>
Table A.6. Continued

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa</td>
<td>18%</td>
</tr>
<tr>
<td>Equally profitable</td>
<td>2%</td>
</tr>
<tr>
<td>Everything</td>
<td>3%</td>
</tr>
<tr>
<td>Mahogany</td>
<td>2%</td>
</tr>
<tr>
<td>Peanut</td>
<td>11%</td>
</tr>
<tr>
<td>Pineapple</td>
<td>6%</td>
</tr>
<tr>
<td>Plantain</td>
<td>39%</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>2%</td>
</tr>
<tr>
<td>Yam</td>
<td>10%</td>
</tr>
</tbody>
</table>

Table A.7: Profitability of Crops and Trees

<table>
<thead>
<tr>
<th>Dondon</th>
<th>Most profitable plants</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Peanuts</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Pigeon Peas</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>Plantain</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Yam</td>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>
Table A.8: Profitability of Crops and Trees in Grande Rivière du Nord

<table>
<thead>
<tr>
<th>Most Profitable Plants</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Eyed Peas</td>
<td>3%</td>
</tr>
<tr>
<td>Cocoa</td>
<td>37%</td>
</tr>
<tr>
<td>Equally profitable</td>
<td>3%</td>
</tr>
<tr>
<td>Everything</td>
<td>7%</td>
</tr>
<tr>
<td>Mahogany</td>
<td>3%</td>
</tr>
<tr>
<td>Peanut</td>
<td>20%</td>
</tr>
<tr>
<td>Pineapple</td>
<td>13%</td>
</tr>
<tr>
<td>Plantain</td>
<td>23%</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>3%</td>
</tr>
<tr>
<td>Yam</td>
<td>3%</td>
</tr>
</tbody>
</table>

Table A.9: Importance of Trees

<table>
<thead>
<tr>
<th>Most Important Plants (ALL)</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>3%</td>
</tr>
<tr>
<td>Cocoa</td>
<td>23%</td>
</tr>
<tr>
<td>Coffee</td>
<td>24%</td>
</tr>
<tr>
<td>Equally important</td>
<td>2%</td>
</tr>
<tr>
<td>Everything</td>
<td>18%</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>3%</td>
</tr>
<tr>
<td>Mahogany</td>
<td>2%</td>
</tr>
</tbody>
</table>
Table A.9. Continued

<table>
<thead>
<tr>
<th>Plant</th>
<th>% Female Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango</td>
<td>3%</td>
</tr>
<tr>
<td>Not profitable</td>
<td>2%</td>
</tr>
<tr>
<td>Oak</td>
<td>2%</td>
</tr>
<tr>
<td>Orange</td>
<td>5%</td>
</tr>
<tr>
<td>Peanuts</td>
<td>3%</td>
</tr>
<tr>
<td>Pineapple</td>
<td>3%</td>
</tr>
<tr>
<td>Plantain</td>
<td>26%</td>
</tr>
<tr>
<td>Raintree</td>
<td>3%</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>2%</td>
</tr>
<tr>
<td>Taro</td>
<td>2%</td>
</tr>
<tr>
<td>Yam</td>
<td>3%</td>
</tr>
</tbody>
</table>

Table A.10: Importance of Trees by Gender

<table>
<thead>
<tr>
<th>Most Important Plants</th>
<th>% Female Farmers</th>
<th>Most important plants</th>
<th>% Male Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>5%</td>
<td>Coffee</td>
<td>13%</td>
</tr>
<tr>
<td>Cocoa</td>
<td>18%</td>
<td>Everything</td>
<td>17%</td>
</tr>
<tr>
<td>Coffee</td>
<td>32%</td>
<td>Grapefruit</td>
<td>4%</td>
</tr>
<tr>
<td>Equally important</td>
<td>3%</td>
<td>Mahogany</td>
<td>4%</td>
</tr>
<tr>
<td>Everything</td>
<td>18%</td>
<td>Mango</td>
<td>4%</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>3%</td>
<td>Orange</td>
<td>8%</td>
</tr>
<tr>
<td>Fruit</td>
<td>%</td>
<td>Fruit</td>
<td>%</td>
</tr>
<tr>
<td>------------</td>
<td>----</td>
<td>-----------</td>
<td>----</td>
</tr>
<tr>
<td>Mango</td>
<td>3%</td>
<td>Peanut</td>
<td>4%</td>
</tr>
<tr>
<td>Not profitable</td>
<td>3%</td>
<td>Pineapple</td>
<td>8%</td>
</tr>
<tr>
<td>Oak</td>
<td>3%</td>
<td>Plantain</td>
<td>21%</td>
</tr>
<tr>
<td>Orange</td>
<td>3%</td>
<td>Raintree</td>
<td>8%</td>
</tr>
<tr>
<td>Peanut</td>
<td>3%</td>
<td>Yam</td>
<td>8%</td>
</tr>
<tr>
<td>Plantain</td>
<td>29%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugarcane</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taro</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

IRB APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Date: 5/24/2017

To: Maritza Pierre
219 S. 5th St. Apt. 5
Ames, IA 50010

CC: Dr. Francis Owusu
156 College of Design
Dr. Ann Oberhauser
217B East Hall

From: Office for Responsible Research

Title: Agroforestry Adoption in Haiti: A Gendered Perspective

IRB ID: 17-173

Study Review Date: 5/23/2017

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- You do not need to submit an application for an annual continuing review.

- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designees may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4556 or irb@iastate.edu.