

UNDERSTANDING FARMERS' MOTIVATIONS FOR WOODLOT MANAGEMENT
AND THEIR PERCEPTION OF FOREST MANAGEMENT PLANS IN LOS PLANES
DE LA PALMA, EL SALVADOR

By

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This report: “Understanding Farmers’ Motivations for Woodlot Management and Their Perception of Forest Management Plans in Los Planes de La Palma, El Salvador” is hereby approved in partial fulfillment of the requirements for the Degree MASTER OF SCIENCE IN FORESTRY.

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LIST OF ACRONYMS

ACOPO	Asociación Cooperativa de Producción Agropecuaria (Cooperative Association of Agriculture)
ADESCO	Asociación para el Desarrollo Comunitario (Community Development Association)
ADESCOME	Asociación de Desarrollo Comunal de Mujeres Emprendedoras Los Planes (Association of Communal Development of Entrepreneurial Women)
BCIE	Banco Centro-Americano de Integración Económica (Centro-American Bank of Economic Integration)
CENTA	Centro Nacional de Tecnología Agropecuaria y Forestal (National Center for Agricultural Technology and Forestry)
CEREN	Centro de Recursos Naturales (The Natural Resource Center)
COHDEFOR	Corporación Hondureña de Desarrollo Forestal (Honduran Forestry Development Corporation)
DGFCR	Dirección General de Ordenación Forestal, Cuencas y Riego (General Direction of Forestry, Watershed, and Irrigation Ordination)
MAG	Ministerio de Agricultura y Ganadería (Ministry of Agriculture and Livestock)
MARN	Ministerio Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural Resources)
MINED	Ministerio de Educación (Ministry of Education)
PAES	Programa Ambiental de El Salvador (Environmental Program of El Salvador)
PRODERT	Proyecto de Desarrollo Sostenible en Zonas de Fragilidad Ecológica en la Región del Trifinio (Sustainable Development Project in Ecologically Fragile Zones of the Trifinio Region)
USAID	United States Agency for International Development

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ABSTRACT

In this study, farmers' motivations, attitudes and values for owning and managing woodlots were indentified in the rural village of Los Planes in El Salvador. To understand this I asked farmers: what are their motivations for owning woodlots, what are the constraints (disadvantages) and benefits (advantages) of the forest management, and what have farmers learned through the forest management planning process. An open-ended questionnaire was developed to conduct informal, unstructured interviews with farmers over the period of a year. Field surveys were conducted to describe the woodlots. The interviews revealed that timber harvesting, inheritance, resale value, diversification, and ecotourism are reasons that farmers own and manage their woodlots. Woodlot owners identified government incentives, improved silvicultural practices, and sustainable timber harvesting as advantages associated with the required forest management plans. Owners felt that harassment by the environmental police, labor-intensive requirements of the plans, and the distribution of poor quality seedlings by PRODERT were problems associated with woodlot management. Woodlot managers have learned to apply silvicultural techniques that improve stand quality and protect their forest resources. Additionally, woodlot owners have developed a broad sense of ecological stewardship over the years.

OVERVIEW

This study was conducted during my two years as a U.S. Peace Corps volunteer in El Salvador. I was placed in the rural village of Los Planes, where I worked in agroforestry and environmental education projects with several community groups. Los Planes is located in the highlands of Chalatenango, a department in the north of El Salvador. One of the few protected areas in the country, Cerro El Pital (the highest peak), is located less than 45 minutes away from the village, which attracts tourists to the region. The highlands of Chalatenango are considered one the few remaining forested parts of El Salvador.



Figure 1. Los Planes de La Palma. Photo by Gisselle Mejia.

The mountainous landscape offers visitors a view of Honduras. The cool and refreshing climate is appealing to those from hotter parts of the country, who visit the villages looking for fresh produce unique to the region. However, Los Planes has been severely affected by deforestation resulting from illegal logging during the Civil War (1980-1992). Community residents often talk about how dense forests used to be and of the biodiversity of flora and fauna characteristic of the region. Although the forest is not what it used to be, it has partially recovered since the end of the war.

Deforestation has had serious consequences. The reduction of forest cover on steep mountains increases soil erosion and increases the risk of landslides. During every rainy season, small mudslides cover the road, paralyzing traffic and causing accidents. Although illegal logging has decreased over the years, hillside farming still contributes to land degradation. Government projects, designed to promote soil conservation practices, provided trees seedlings to community members. Fruit trees were handed out to community members to promote crop diversification and income generation. However, woodlot management had been ignored in conservation and reforestation projects.

In 2002, a government project funded the design of forest management plans for woodlot owners in the community of Los Planes. This was the first time that farmers, the primary residents of the community of Los Planes, had the opportunity to apply silvicultural practices to woodlot management. The purpose of this research report is to identify woodlot owners' attitudes, motivations, and values for owning and managing woodlots and how the development and implementation of a forest management plan affects them.

Chapter 1 is a brief description of the environmental situation in El Salvador. It introduces the federal forestry law and the forest management plan and outlines the objectives of the study.

Chapter 2 is a general background of El Salvador. The reader will learn about the geography, soils, climate and vegetation, as well as the environmental history leading to the current situation in El Salvador. The chapter includes a site description and background of Los Planes.

Chapter 3 describes study methods and data collection. This includes the way interviews were conducted, the information gathered through field surveys, and the methods used to analyze the data.

Chapter 4 presents results and discussion. The three research topics are addressed: Farmers' motivations for owning and managing woodlots are listed, the constraints (disadvantages) and benefits (advantages) of the forest management, and what farmers learned through the forest management plan. Finally, a discussion of these findings is included, as well as findings not originally hypothesized.

Chapter 5 highlights study conclusions. Recommendations for improving the forest management plan are offered based on the results.

Chapter 1: INTRODUCTION AND OBJECTIVES

El Salvador

El Salvador is the most deforested country in the continental Americas, containing only 2-5% of forest cover in an area approximately the size of Massachusetts (Hecht, et al. 2006). Most are small parcels scattered around the mountainous areas. The Civil War (1980-1992) played an important role in the mass deforestation of El Salvador. During the conflict, the rebels or revolutionary front took refuge in the mountains and countryside to build their bases and fight the military regime. The military burned forests with bombs and torches to drive out the rebels (Leiken and Rubin 1987). Lawlessness at the time prevented forest technicians from doing jobs such as issuing permits, marking trees for harvest, and monitoring post-logging sites (Gonzalo, personal communication, November 14, 2008). As a result, the people took advantage of the situation to exploit the forests and make a quick profit. Most of the remaining tree cover is in shade-grown coffee plantations (Hirsch, 2005).

Federal Forest Law

Private shade-grown coffee plantations are considered forests, but because they are under a different land use category, they are not subject to having a forest management to conduct certain activities. Private commercial forest plantations are forests that have been entirely planted, as opposed to naturally regenerated forests. These are allowed to be freely managed, without a forest management plan. Forests that are not plantations are those like in the community of Los Planes that have grown naturally over time. Non-commercial harvesting permits are issued if a tree is damaged by natural

causes, is infected with a disease or pest, or if the land owner needs wood to construct a house. These permits are only issued for incidental harvesting.

Even small commercial woodlots must have a forest management plan. Under the forestry law, coffee, fruit and forest tree plantations are exempt from a forest management plan. Owners of these types of plantations are allowed to freely manage their land for commercial purposes, as long as the trees are not endangered and conservation methods are applied. The transportation of timber and forest products requires the appropriate permits, regardless of whether the person has a forest management plan. The forest technicians are in charge of implementing the rules and regulations of the forest law and making sure woodlot owners with forest management plans comply with the law. On the other hand, the Policia Ambiental (the environmental branch of the national police force) are the ones allowed to charge, arrest, convict, and penalize people for any violations of the law (Forestry Law 2002).

Forest Management Plans

From 2001 to 2007, the Ministry of Agriculture and Livestock (MAG) headed a project called PRODERT, a program designed to start income-generating projects to promote small businesses and to diversity income among rural people around the country. This project was funded by Banco Centro-Americano de Integracion Economica (BCIE) and the Government of El Salvador (GOES). Incorporated in the general goals was the topic of developing forest resource management (DGFCR 2009). With this goal in mind PRODERT started working in the community of Los Planes, one of the few areas in El Salvador where people own small parcels of woodlots. The objective was to promote sustainable forest management, a practice fairly new to woodlot owners in Los Planes.

The people of Los Planes are aware of the extensive deforestation due to clear-cutting and illegal logging during the Civil War. Sustainable forest management is a new concept in the community and people had never had a forest management plan until PRODERT introduced the idea in 2002.

A forest management plan is required of people who plan to use their woodlot for commercial timber harvesting. The objective of the forest management plan is to sustainably manage woodlots for timber harvesting and forest products. The forest management plan lists some of the methods used to collect the information and the way the data was analyzed. An approved plan allows woodlot owners to harvest mature trees, thin their forests, and undertake prescribed fires and other silvicultural prescriptions (Forestry Law 2002). Forest management plans include basic information about the owner and physical information about the woodlot, such as size, land-use type, basal area and timber volume by species, rotation period of trees, forest stratification, vegetation type and wildlife habitat, climate and topological characteristics, and silvicultural activities to be applied over a period of five years.

The document includes tables and maps to summarize and help the owner visualize the data (Forest Management Plan 2004). Maps are particularly helpful to the owner by offering a visual understanding of the land structure and its physical aspects. A forest management plan gives the woodlot owner an economic estimate of the total harvest value, total cost of activities, and net profit, but for most people the actual profit is less than the estimates in the forest management plan.

Forest management plans allow technical assistance by the forest technicians who work for the Dirección General de Ordenación Forestal Cuencas y Riego (DGOFCR

2009), the forest service branch under the MAG. The technicians issue harvesting permits and transportation permits, mark trees for harvest, offer suggestions and recommendations to owners, conduct visits and monitor logged areas, educate community members about forest fire prevention, and report forest law violations and crimes. In the past, forest technicians designed forest management plans, but in the mid 1990s the MAG contracted out this work, hiring independent foresters to design forest management plans for people. The government does not pay for forest management plans, but they have a list of consulting foresters they recommend to people who want forest management plans. The consulting foresters and the woodlot owners enter into contract and agree upon the price, tasks, time and dates. The job of the consulting foresters is to take measurements and field surveys of the woodlots and write the forest management plans. They then submit the documents to government foresters at the central DGOFCR office in San Salvador, where they are reviewed and approved or rejected. The approved documents are then sent to corresponding district offices where forest technicians are in charge of implementing forest management plans (Gonzalo, personal communication 2008 November 14).

Objective

The objective of this study is to understand private family woodlot owners' motivations, attitudes and values for owning and managing woodlots. What are farmers' motivations for owning and managing woodlots? What are the constraints (disadvantages) and benefits (advantages) of having a forest management plan? What have farmers learned through the forest management plan? Do they apply all the techniques learned under forest management plans, and if so, how? The motivations and

reasons for owning and managing private family forests are different among woodlot owners. Although not everyone follows their forest management plan accordingly, they apply basic forest management techniques that they find appropriate for sustainable forest management. Knowing owners' motivation, attitudes and values is important when designing a forest management plan that owners all find acceptable. Without this understanding, one cannot know the impact and effectiveness of the forest management plan. For this reason motivation and management practice of small private forestlands have been widely studied, especially in Europe and North America.

Erickson et al (2002) interviewed family woodlot owners in Michigan to find the attitudes and motivation behind farmer and non-farmer woodlot owners in the state. Similar to farmers in Los Planes, woodlot owners in Michigan consider timber harvesting an incentive to own and manage their woodlots. At the same time, non-farmers were more likely to own woodlots for environmental and aesthetic reasons. Another study shows that woodlot owners who are professionals, or white collar workers, are less likely to consider harvesting an incentive due to their economic status (Boon and Melby 2004; Joshi and Arano 2009). Woodlot owners whose primary occupation is farming, also value their woodlots for other important resources, such as firewood (Erickson et al. 2002). Creighton et al. (2002) point out that woodlot owners consider inheritance an important aspect of management, because they want their families to continue managing the woodlot when they no longer can.

Joshi and Arano (2009) explain that woodlot owners involved in commercial timber harvesting were more likely to be better owners, and to apply silvicultural activities. Unlike, woodlot owners without forest management plans who oppose

commercial harvesting, woodlot owners with forest management plans implemented silvicultural activities. Similar studies have also found that woodlot size did not play a role in woodlot owners' motivation to maintain and properly owner their woodlots (Boon and Melby 2004; Joshi and Arano 2009). Qualitative studies of woodlot owners' attitudes and motivations have concluded that owners value their woodlot for various reasons other than commercial timber harvesting, and that they care about properly managing their woodlots to improve their quality (Hugosson and Ingemarson 2004; Erickson et al.2002).

Chapter 2: EL SALVADOR COUNTRY BACKGROUND

Geography, Soils, Climate, Vegetation.

El Salvador is located in Central America, one of the most ecologically diverse regions in the world. It is composed of different types of bioregions that are home to thousands of plant species unique to the region, and diverse wildlife including jaguars, monkeys, manatees, snakes, and lizards. Popular bird species, such as the thrush, warbler, and flycatcher are known to live in jungles of Central America for part of the year. However, exploitation of resources, warfare, and high population growth have degraded the natural environment and reduced the population of native fauna and flora (Faber 1993).

El Salvador is composed of coastal plains along the Pacific ocean, coastal mountains, volcanoes along the interior, and rugged, steep mountains in the northern region bordering Honduras and Guatemala. The highest peak is El Pital in the northern part of Chalatenango, reaching 2,730 meters. Marked by frequent geologic activities, earthquakes and volcanic eruptions continue to shape El Salvador today (Daugherty 1969). The eruption of the Ilopango volcano (5th century A.D.) had the greatest impact on El Salvador's landscape, causing massive devastation, destruction, and displacement of populations throughout Mayan cities. The volcano is now known as Lake Ilopango, the largest lake in the country (MINED, 1994). The most recent natural disaster was an earthquake in 2001, destroying thousands of houses and structures in central El Salvador (BBC News 2001). There are four major rivers in El Salvador: Lempa River (the largest in Central America), Paz River in the far west of the country, Grande River in the east, and Guajoyo River in the northern region of the country (Daugherty 1969).

Volcanic activities contributed to rich and fertile soils in the central plains, which over the years have been degraded by human activities. The Salvadoran government adopted a soil classification system that ranks soils from Class I-Class VIII. Developed by the Soil Conservation Service (known today as the Natural Resource Conservation Service), this system rates the first four classes as suitable for cultivation, the next three are more suitable for forests or tree plantations, and Class VIII is unsuitable for any type. However, a common problem in El Salvador is that farmers grow unsuitable crops on certain lands, contributing to soil erosion and degradation. It is estimated that only 34% of total land mass is suitable for agriculture (Nuñez, et al. 1990).

The climate of El Salvador is classified as “tropical savanna.” The average annual temperature in the lowlands is between 25-29 °C, around 23 °C in the central plains and 12 °C in the cooler, mountainous areas. The dry season or “summer” occurs between November-April, while the rainy season or “winter” occurs in May-October (Harcourt and Sayer 1996).

According to J. Hampshire, “man's effect on the vegetation has been such that it is virtually impossible to speculate on the natural structure of the vegetation of El Salvador (Hampshire 1989).” It is believed that human activities are the main factor that contributed to the loss of flora, most of which were destroyed before they could be documented (Weinberg 1991). It has been suggested that Mexican and Guatemalan vegetation might be similar to the original flora of El Salvador based on lowland and upland formations (Daugherty 1969)

Deforestation: Cattle ranching, indigo, cotton and coffee plantations.

In the past, clearing land for cultivation has been the primary cause of deforestation in El Salvador. The development of agriculture in pre-Columbian times altered the natural environment and facilitated the exploitation of ecological niches for the benefit of humans. Later, colonialism led to greater exploitation of natural resources (Daugherty 1969). Today, El Salvador is the most densely populated, most deforested, and most industrialized country in Central America (Boyce 1996). What was once a land blessed with natural wealth, now, has virtually no wildlife and poor flora diversity (Faber 1993).

Since the adoption of agriculture, native populations of El Salvador have used the land to grow crops essential for their livelihood. Before the agricultural revolution, climate, abundant water resources and fertile volcanic soils made El Salvador ideal for agriculture. The staple foods grown in the time agriculture was developed (6000-1500 B.C.), and still important today, were maize, beans, avocados, tomatoes, green peppers, and chipilin. Before colonialism, cacao was one of the most important crops grown in El Salvador and was traded among indigenous populations in Central America (MINED 1994).

Upon the arrival of Europeans more land was cleared for cattle ranching (MINED 1994). In the 17th century, the elite class of San Salvador exploited the production of indigo, a coloring made from the plant *Jiquilite*. Indigo was considered the highest quality blue dye for fabrics and was in great demand in Europe. The industrial revolution in Europe led to better technology, increased textile production and more demand for indigo. Not only were forests cleared extensively, but every three years the land was

cleared and planted. By the 18th century 30% of El Salvador's forests had been clear for cattle ranching and indigo production (Faber 1993).

In the 1890s coffee production was at its peak. The highlands of El Salvador, with an altitude below 1000 m, were well suited for coffee production. The widespread coffee plantations replaced pine-oak forests, severely reducing forest cover. Most fertile, arable agricultural lands were appropriated by large farmers, forcing many poor farmers to move higher into the mountains. By the beginning of the 20th century, only 10% of total forest cover remained. However, at higher altitudes with steep slopes Coffee Gliridicia (a shade-grown variety) helped preserve some of the existing forest and reduce erosion (Faber 1993).

In the post-WWII era, cotton production increased dramatically and land under cultivation expanded from 24,200 to 302,100 acres. Most cotton plantations were owned by eighteen families, who also controlled the majority of productive lands (Faber 1993). As a result, small farmers were displaced to steep slopes unsuitable for agriculture (Daugherty 1969). Lastly, cotton production was dependent on DDT and dieldrin pesticides, contributing to high contamination of water sources and staple crops, and affecting human and animal populations (Faber 1993). Agricultural expansion resulted from the displacement of small farmers to mountains and marginal lands (Hetch 2006). The agricultural frontier is no longer expanding in El Salvador due to industrialization, high out-migration to cities and the United States, and cultivation confined to small parcels (Hecht, 2006).

The Forestry Law and Forest Management Plans

The Forestry Law was enacted February 8, 1973 to address these problems, but legislators failed to write regulations for it, making the document weak and inefficient. The Natural Resource Center (CEREN), the former forest service under the MAG, was appointed as the implementing institution. However, jurisdiction problems arose when the MAG was decentralized (Nuñez, et al. 1990). The biggest issues affecting forest management in El Salvador are education, alternative sources of wood, land tenure, the forestry law and conservation programs (Nuñez 1990).

The forestry law was updated in 2002, offering clearer rules and more incentives for woodlot owners. The biggest revision made was the change from sanctions to incentives, which has had a positive response among farmers who viewed the former requirements as an obstacle to agriculture. Incentives allow farmers to use their resources and gain returns, which might encourage them to invest in their woodlots. Educational programs have helped woodlot owners understand that trees are a valuable resource in agriculture, and that both can be integrated. Forest management plans were an important new element in the management of commercial woodlots.

As defined by the forestry law, a forest management plan “is a document that contains the technical tasks to regulate and promote the sustainable use of forest resources with the goal of obtaining optimum economic benefits, conserving and protecting forest resources.” The forest management plan defines the silvicultural activities to be carried out over a five-year period by woodlot owners conducting commercial harvesting.

A forest management plan requires that each owner be responsible for protecting vegetative regeneration, adapting silvicultural management, harvesting methods, weeding and protecting the forest. Each management plan contains basic information about the property, such as the size, location, physical characteristics and climate, description of vegetation, and description of fauna. A management plan contains a map for each of the five years of management describing the silvicultural prescriptions and activities planned annually, and the maps also describe the structure of the property (e.g. what areas are designated for agriculture, protection, harvesting, weeding). Other information included in each management plan is an estimate of costs and profits for the owner based on the volume to be harvested over the five years of management. Finally, the management plan explains the limitations of land use and offers general recommendations owners.

Forest technicians are in charge of marking the trees to be harvested. Technicians use the forest management plan to guide them based on desired stocking level for a particular parcel. Forest technicians also use their judgment to mark trees; they are trained to know which trees should be harvested and which should not based on their own visual assessment of the woodlot. Also, they can mark more than the trees scheduled to be harvested for that year in a particular parcel if the tree has been damaged by natural events.

According to a forest technician, a forest management plan is only approved for people who own 6.9 ha of woodland. However, the forestry law does not define how large or small a woodlot must be to qualify for a forest management plan. The forest technician explained that the forest management plan commercial harvesting is allowed, woodlots smaller than 6.9 ha or more acres are not considered suitable for commercial

harvesting. For this reason, harvesting permits are provided for people with woodlots under 6.9 ha, which allows them to remove deformed trees, those damaged by natural causes, or for non-commercial use by the woodlot owner. Commercial harvesting is not permitted with a harvesting permit, but does allow the woodlot owner to use the resources in his woodlot.

Land tenure, agrarian reform of 1980 and civil war.

Before the 1980 agrarian reform in El Salvador, the land tenure structure could be divided into four different types: ownership, leasing with the option of buying, leasing without a purchasing option, and haciendas. Of the total farmed area in the country, less than 20% was in the hands of small farmers, those with less than 5 ha. Meanwhile, 38.7% of the total farmlands were controlled by those owning 100 ha or more. In 1975, the United Nations reported that the number of rural people with land ownership had increased from 12% to 40%, but evidence showed that El Salvador still had the highest land inequality in Latin America (Nuñez, et al. 1990).

The solution to the land disparity was the Agrarian Reform Act of 1980. The land reform was backed by the United States and developed by USAID to calm the unrest of small farmers who felt disenfranchised by the obvious unequal distribution of land. The reform was divided into three phases, 1) large estates were nationalized and sold to cooperatives, 2) large coffee plantations were selected to be redistributed, and 3) small farmers received more land. However, large land holders, coffee oligarchs and the politicians who supported them succeeded in working their way around the act. As a result, land reform was never implemented and the failure only exacerbated the problem (Faber 1993).

The land that was distributed was marginal and some was unsuitable for agriculture. Some farmers were limited to the small plots of land provided, which prevented them from applying traditional, sustainable shifting cultivation, in turn, this contributed to more land degradation. The cooperatives accrued debt, leaving them no choice but to sell their properties, which ended up back in the hands of wealthy land holders. The government also failed to provide technical assistance and credit programs that would give small farmers a chance to improve and invest in their newly acquired parcels (Faber 1993).

Peasant farmers have tried over the years to rebel against the oppressive system that has favored the agricultural elite in El Salvador. Coffee oligarchs had influence in the political system allowing them to control the military. The 1932 military led massacre of El Mozote claimed the lives of 10,000-30,000 people and marked the beginning of the conflict. Obvious injustice coupled with the influence of political revolt in nearby countries prompted the socially conscious citizens to rebel against the military and national government (Boyce, 1996). The National Farabundo Martí National Liberation Front (FMLN) was the leading organization in opposition to the conservative government; FMLN officially declared an uprising after the 1982 elections. Bombings and torching of forests contributed to more land degradation and ecological destruction (Leiken and Rubin 1987).

El Salvador was once a tropical paradise, with rich soils, abundant water, animal and plant species diversity, and plenty of forest resources. Agriculture changed the landscape leading to environmental problems. An increase in population put more pressure on natural resources. Colonialism exacerbated the problems, more land was

cleared, the population continued to increase, and commercial trading of goods exploited the limited resources. Indigo, cotton, and coffee plantations contributed to massive deforestation, pollution, land degradation, and land tenure inequality. Extreme land and wealth disparity forced many poor farmers to move to higher elevations and cultivate in steep slopes, leading to more environmental problems and soil erosion. Lack of environmental regulations, a weak forestry law and persisting land tenure issues had a significant impact on the current state of natural resources in El Salvador. This eventually led to a civil war, during which military tactics and lawlessness led to more deforestation and environmental devastation.

Throughout El Salvador's history, inappropriate agricultural techniques and crop selection, land tenure inequality and ineffective regulations have played a central role in environmental devastation. In recent years, the government has made changes to address deforestation in El Salvador. Strengthening the forestry law has created awareness of environmental issues and given woodlot owners incentives that may encourage sustainable forest management.

Chapter 3: METHODS AND DATA

El Salvador is notorious for widespread deforestation that is driven by high population density, expanding urbanization, and growing industrialization (Hecht, et al. 2006). About 2-5% of forests remain in the country, and most of those forests are located in the northern territories, including the Department of Chalatenango (Hecht, et al. 2006). In the community of Los Planes, located in the northern part of Chalatenango, many farmers own private family forests, which comprise most of the forest cover in the region (Hecht, et al. 2006). Over the years the government has launched several projects to promote sustainable development in agricultural sectors, and recently expanded its focus to sustainable forest management.

Study Site

This study focuses on woodlot management in the rural village of Los Planes, El Salvador. Los Planes is one of the communities in this region that suffered extreme loss of forest cover during the Civil War (1980-1992) and is now starting to recuperate from the effects (Hecht, et al. 2006). Forest management is a new concept in Los Planes, where many people own parcels of mixed pine (*Pinus* spp.) and mixed pine-oak (*Quercus* spp.) forests. The common pine species in the area are *Pinus oocarpa*, *Pinus maximinoi*, *Pinus pseudostrobus*, and *Pinus rudis*. Apart from Oak and Pine, Cypress (*Cupressus* sp.), and to a lesser degree, Liquidambar (*Liquidambar styraciflua*) are also found in the community. Los Planes is located in the northern most and mountainous part of the Department of Chalatenango also known as La Zona Alta. Figure 2 shows the mountainous landscape of Los Planes. The forests of this region are classified as humid lower montane, which were originally and continue to be primarily composed of conifers

(Aguilar 2004). The rough and uneven hills that support and surround the village reach elevations between 1700-1800 masl with 31-60% slope (Aguilar 2004). Annual estimated mean precipitation is 2300mm, and the annual mean temperature is 22 °C. The typical soils found at this site are stony clay loams, and are believed to be good for agriculture (Aguilar 2004; Soil Survey Manual 1951). However, intensive hillside farming has made the soils susceptible to erosion (Rodriguez-Meza 2002). Although water can sometimes be scarce in the dry season, it is a fairly abundant resource in this region of the country. The Sumpul and Chiquito Rivers run through this area as well as the Lempa River, the source of hydropower in the country (Aguilar 2004).



Figure 2. Mountainous landscape of Los Planes. Photo by Gisselle Mejia.

In 2002, PRODERT (Proyecto de Desarrollo Sostenible en Zonas de Fragilidad Ecológica en la Región del Trifinio) helped fund the forest management plans for woodlot owners in Los Planes and other communities that compose the Zona Alta. Normally, the cost of forest management plans are paid by the woodlot owners. The price depends on the size of the woodlot and the price that consulting foresters charge. PRODERT's goal was to promote sustainable land management and conservation by providing technical assistance to farmers and rural peoples in different areas of agriculture. The forest management plan is administered by the government and was part of the activities implemented by the Ministry of Agriculture and Livestock technicians working with PRODERT.

Interviews

In order to acquire information about woodlot management in Los Planes, the author selected ten woodlot owners with forest management plans and four woodlot owners without forest management plans. The small sample size allowed for longer, informal, unstructured interviews where the participants gave detailed answers. Bliss and Martin (1989) explains how qualitative study strengthens research because it gives the participant the opportunity to converse freely with the interviewer. This allows the interviewer to find out more, quality information. Furthermore, open-ended questions allow the interviewer to ask more questions based on the discovery new information not originally hypothesized (Ingemarson et al. 2006).

To collect this information numerous unstructured and semi-structured interviews were conducted over the course of one year, they were recorded, then critical segments were transcribed (Bernard 1995). A questionnaire (Appendix) was developed to identify

woodlot owners' attitudes, preferences beliefs, and values regarding forest management as well as how they apply and follow the requirements in the management plan. This questionnaire was approved by the Michigan Technological University Institutional Review Board. The questionnaire contained open-ended questions in order to have conversations with owners about their woodlots and management plans over an extended period of time. In order to have more interactions with owners the author did a field survey of each woodlot assisted by each owner. The author also used direct observation to describe the various practices and techniques used by woodlot owners (Bernard 1995). The author observed logging and weeding operations. At the time the data was collected owners had not received trees to plant because the project had ended the previous year, but recently planted trees were noted in conversations with owners and in woodlot surveys.

Woodlot Field Surveys

Woodlot surveys were conducted to describe the condition and physical aspects of the woodlot; Figure 3 shows a typical woodlot. For non-management plan woodlots, the woodlot boundaries were mapped using a GPS unit. For woodlots with management plans, only the corners of the woodlots were recorded, because maps were already drawn for all woodlots with management plans. At each woodlot, six random points per stand were selected. The field data collected included woodlot size, dominant species, basal area, DBH, regeneration plots, distance to owner's home, percent of ground cover, ground cover type, coarse woody debris, aspect, and topography. The woodlot size was measured by mapping the woodlot boundaries, was recorded from conversations with the owner, and was extracted from the management plan document. The basal area was

recorded using a 10 BAF prism at each point, each in-tree was tallied and DBH was taken, and dominant species was noted (Avery and Burkhardt 1983). Regeneration taller than 1.2 m and less than 15 cm DBH and coarse woody debris over 5 cm was acquired by setting up plots of 2.8 m radius (1/400ha) (Husch, et al. 1982). At each plot aspect and topography was observed, and percent of ground cover and ground cover type was recorded.



Figure 3. Mixed Pine woodlot. Photo by Gisselle Mejia.

Table 1 shows a summary of the field survey data collected and describes the dominant species, basal area, stand density, regeneration, and trees per hectare. While DBH was fairly uniform there was substantial variability in basal area, stand density and regeneration among the woodlots. There was only one woodlot that was significantly bigger than the rest, which belonged to a non-forest management plan woodlot owner.

Table 1. Summary of Woodlot Characteristics.

Woodlot Number	Woodlot Size (ha)	Forest Management Plan	Dominant Species	BA (m ² /ha)	Stand Density trees/ha	Regeneration (trees/ha)	Mean DBH (cm)
1	7.6	yes	Pine	17.6	219	4601	37
2	7.8	yes	Pine	20.7	184	1827	43
3	9.8	yes	Pine	23.0	367	2301	36
4	3.9	yes	Pine-Cypress	18.8	215	2030	42
5	3.4	yes	Pine	13.8	142	1150	43
6	8.6	yes	Pine	24.2	412	677	35
7	2.8	yes	Pine-Oak	12.7	175	2977	38
8	10.0	yes	Pine	14.2	261	1421	38
9	7.1	yes	Pine	20.7	193	2301	45
10	10.0	yes	Pine	13.4	129	2368	38
11	11.2	yes	Pine	19.2	251	4060	36
12	2.8	no	Pine	12.3	172	1895	34
13	3.5	no	Pine	19.6	348	1962	35
14	16.0	no	Pine	8.8	227	8459	25
15	8.4	no	Pine	14.2	344	2165	30
16	64.2	no	Pine	19.9	534	5481	30

Chapter 4: RESULTS AND DISCUSSION

The community of Los Planes is an agricultural village in the highlands of northern El Salvador, where farmers grow cabbage and small parcels of garden vegetables. Before the civil war, farmers grew staple crops in small plots of land and depended on Granadilla (*Passiflora ligularis*) production as a cash crop. While timber harvesting was a common practice before the civil war, lawlessness during the conflict led to extensive illegal logging, resulting in massive deforestation. After the peace accords were signed in 1993, the government began to implement agricultural projects, which promoted intensified agriculture and farmers began using the cleared land to grow cabbage.

Agricultural and agroforestry projects in Los Planes had not emphasized forest management. In 2002, PRODERT introduced forest management to the community for the first time. Other projects that started around the same time gave away fruit trees such as avocado and peach to promote crop diversification and soil conservation. The biggest accomplishment of PRODERT was the forest management plan provided to each woodlot owner participating in the project. Not all woodlot owners in the community were able to participate in the project because their woodlot did not meet PRODERT's 6.9 ha minimum size requirement. According to one consulting forester who has been designing management plans for years, "a [forest] management plan is a document where you list all the activities that will take place in the woodlot over five years, the silvicultural prescriptions that will be realized in the woodlot." The forest management plan aims to provide woodlot owners with the tools to conduct sustainable use and management of forest resources (Forestry Law 2002).

The following questions were asked to understand the role a forest management plan plays in woodlot management:

- What are farmers' motivations for owning and managing woodlots?
- What are the constraints (disadvantages) and benefits (advantages) of the forest management plan? What have farmers learned through the forest management plan?
- Do they apply all the techniques learned under the forest management plan, and if so, how?

This chapter answers these research questions using the interviews responses provided by the woodlots owners. The interviews revealed that woodlot owners recognize the ecological benefits forests provide, and understand that the forest management plan activities will improve their woodlots over time. This chapter also discusses the broader environmental attitudes of woodlot owners although this was not an initial interview topic.

What are farmers' motivations for owning and managing woodlots?

Timber harvesting provides additional income

Although woodlot owners depend on agriculture, timber harvesting provides them with extra income that can be used to reinvest in the woodlot or help pay for other things, such as fertilizer, crop seeds, and hired labor. Woodlot owners also said having a woodlot was valuable because trees provided them with firewood, medicinal plants, wood for construction and in some cases a woodlot provided them with water resources for the house, irrigation or livestock.

Inheritance

Seven people out of ten said that inheritance was a motivation to maintain and manage their woodlots so their sons, daughters, or grandchildren would not have to worry about forest resource scarcity in the future. One woodlot owner said the reason for owning a woodlot was,

“to help protect the flora, and also the fauna. That’s an incentive. Another reason is that I would not want my kids to not have a place to go rest under a tree. Another is to protect the soil. The other reason is that [the woodlot] guarantees that we will always have firewood, not just for us, but for our kids more than anything.” Another owner explained to me that he is trying to preserve the woodlot so that his grandchildren can benefit from it when they are older. “I’m planting and taking care of the trees not for me, but for the future...I’m not going to be alive when those trees are big enough to harvest. That job will be for my grandchildren.”

A woodlot owner explained his reasons for owning a woodlot,

“first, because they were selling it. Second because it was near the river, and since water is a necessity. The woodlot prevents scarcity of water. There are springs all over the woodlot. Instead of drying out they provide me with water in the dry and winter season. Also, with a family [one thinks of the future], you do not want them to go out somewhere looking for wood to build their houses...My dad had huge trees, which we used to get

permits to harvest and from that we built our houses. We did not have to go anywhere to get the wood.”

Handing over property to family members when the owner passes away is common, yet informal practice in Los Planes, most people keep their land with hopes to leave it to their children when they pass away. In woodlot management, land distribution is a disadvantage because the forest parcels are subdivided into smaller ones and with time no longer qualify as legal woodlots. According to the forest technician, people with less than 6.9 ha of woodland are not allowed to enroll in a forest management plan.

According to the forest technician, this gives farmers the opportunity to expand agriculture. He explained that

“under the forestry law, people with private forest plantations do not need a permit to harvest in their woodlots. A person could have 50 trees planted along the boundaries and the law with that is practically saying that [all those trees] can be cut.”

One woodlot owner was able to meet the woodlot size requirement by combining his woodlot and his father’s woodlot, which were adjacent to each other, and submitting the woodlots as one forest management plan.

Resale value

There is an economic incentive to owning a woodlot other than timber harvesting. Some people are willing to sell the land if the right price is offered. Wooded land is preferred by affluent Salvadorans looking for land to build houses in the woods. These

prospective buyers want to preserve forestland for aesthetic or environmental reasons. Some owners pointed out that the motivation to sell a woodlot is most times driven by need. Only two people expressed a desire to sell, and both woodlot owners owed the bank for land previously purchased.

Diversification

All woodlot owners own several land parcels, which have been acquired over time, when availability and affordability were not an issue. This removes the pressure of converting forest resources in marginal lands in order to expand agriculture. One woodlot owner's property is too large to be put into agriculture, in part because he is an absentee owner and in part because he has other properties in the community he resides in, which are under coffee cultivation. Another woodlot owner is in the same situation because he owns various parcels of land through out the community. He dedicates some land to pasture, some he dedicates to maize and beans or cabbage cultivation, and some he maintains as a woodlot. People own various parcels in different parts of the community because of price, accessibility, and availability of water. Cleared land is a priority to people, because farming is the main occupation. Farm land near streams is desired because it provides water for irrigation during the dry season. Moreover, proximity to the house, accessibility, and topography are also important factors. Farm land is versatile because it can be used for cultivation and pasture or grassland.

Ecotourism

Ecotourism is one of the emerging businesses in this part of the country because of its forests and landscape. One owner, without a management plan, uses his woodlot as an ecotourism center to attract tourists who frequent the region for its landscape and

climate. The woodlot is about 3.2 ha and offers natural space for people to camp or hike. He makes little money from it, but has received assistance to improve the property with trees and plants, to build benches and small cabins, and to make some repairs along the creek.

“The idea emerged from the construction of the agromarket in Los Planes, so the agromarket could be a tourist attraction, there had to be open natural space, and from there we got the idea. The agromarket has not been working well, but we have kept our business going.”

Two other woodlot owners who have forest management plans are both entertaining the idea of turning their woodlots into an ecotourism center after observing the success of this woodlot owner. One of the woodlot owners said he already planning to build trails so people can come and hike around the woodlot, “we want to [fix around the river] so people can come bathe and enjoy, because we are involved in developing tourism.” Another woodlot owner expressed his motivation to plant more trees on his property, “I want to fix the area, especially around the river, so people can come spend afternoons here. I am thinking of planting more trees, taking the cows out of there, making it all nice and pretty.”

What are the constraints (disadvantages) and benefits (advantages) of the forest management plan?

Woodlot owners were asked a series of questions about the constraints (disadvantages) and benefits (advantages) of their forest management plans. Responses were aggregated into ten categories.

1. Forest management plan affordability

The original hypothesis was that the forest management plan was too expensive for woodlot management. However, seven out of ten people agreed that they would renew the forest management plan at their own expense when it expires, but this depends on whether they would still have mature trees to harvest over an additional five years. Approval of a new forest management plan will depend on whether sustainable harvesting is taking place. Six people said they have the money to pay for the renewal, while others expressed that renewing a forest management plan is too expensive for them to afford. One woodlot owner paid for the forest management plan himself in order to conduct commercial harvesting. This is the main incentive in acquiring a forest management plan, and the reason why some people criticize it.

A common misconception in the community regarding woodlot management is that cutting down trees is wrong. This belief is not shared by woodlot owners with a forest management plan, but some woodlot owners without forest management plans still believe that those with management plans are not good owners because they want to conduct commercial harvesting. One woodlot owner without a forest management plan said that,

“the forest management plan is in my belief, a good thing, but not if the woodlot is badly managed. If you have noticed there are woodlots under forest management plans where parcels are clear-cut, but they don’t plant trees and then that area is used for fruit planting or growing corn. Those

areas are not reforested, and are instead used in other ways. That is a problem.”

While the criticisms of the forest management plan are not unfounded one woodlot owner explained,

“many times we see the necessities of today, we don’t see the necessities of tomorrow. But that’s personal consciousness. For example, I know that managing it now is much better...[the woodlot] regenerates naturally. But there are some people that do not have that consciousness, they don’t care.”

Those with a forest management plan have learned the benefits of harvesting, as long as it is done in a sustainable manner. Other people seem to think that commercial harvesting is a gateway to clear-cutting. According to one consulting forester,

“there is a major disorganization in the forestry sector and in the whole ministry of agriculture. Why? Because the forest technicians are going out there telling people to maintain their woodlots, and then another entity is telling people to grow coffee in their woodlots and change the land use. They do not agree. One is working to maintain woodlots and the other is trying to integrate it with agriculture. The woodlot would remain, but the land use will change. Even if they have cypress, pine or oak as shade trees, the land use would be a coffee plantation. Under the forestry law this qualifies as a coffee plantation, and so they can say ‘well, since you

have coffee here, cut all the forest trees and change them for Pepeto or Cuje.’ Or whatever species in the Inga genus, which are more suitable shade trees for coffee plantations in El Salvador.”

2. Forest management plan requirements

Of the ten woodlot owners with management plans three feel that firebreaks and weeding are time-consuming and tedious, which makes it hard for them to comply with those required activities. Though most woodlot owners agree that the practices mandated by the forest management plan are reasonable, proper, and applicable, they do not apply all the activities listed in the forest management plan. Firebreaks are required in order to prevent the spread of forest fires over the woodlot. However, many people ignore this requirement when implementing the forest management plan. When woodlot owners were asked what type of activities were required to conduct proper management in the woodlot, the majority of times people left out building firebreaks. One woodlot owner had built fire breaks, but he explained that,

“what I do not agree with, but I did comply with, was to do those firebreaks. Logically, this is the winter season, to have built that during this time...there was no necessity. How is the woodlot going to go up in flames right now? But the forest technician requested it and I did it.”

Another woodlot owner said “I do everything they tell me to do. I always weed the woodlot. The only thing I don’t like is that the forest technicians never mark any trees.”

Some owners had woodlots that seem neglected and abandoned, which can result from not weeding. Tall shrubs and plants covered the cleared areas of the woodlots, and while they weeded some parts, others were left without weeding. Weeding is a time-consuming and labor intensive process for woodlot owners because it requires hired help to complete the work in the entire woodlot. In the rainy season, plants tend to grow tall and fast, which requires frequent weeding in order to keep the understory from competing with desired species regeneration. When weeds are left to grow tall they tend to grow everywhere and dominate the understory, which prevents pine, cypress, and other valuable tree species from proper growth and development.

3. Law enforcement

While people did not feel corruption was an issue within the forest service regional office, they expressed some concern about the environmental police, a branch of the national police force in charge of enforcing the forestry law and issuing penalties for legal violations. Some people recounted stories of instances when the police had taken away their chainsaws or their workers' chainsaws during legal logging operations. Owners claimed the activities were legal and they had the proper documentation at the time to prove it. They said the police are unfair and sometimes ignore the permits held by the woodlot owners. The police are entitled to confiscate chainsaws if the law is violated, and if the woodlot owner wants to reclaim it they are required to go through bureaucratic hurdles.

4. Poor control of transportation permits

Two people said they have a problem with the way transportation permits are handled, and how easy it is to obtain them sometimes. One woodlot owner said “there are

a lot of people that sell wood here and do not have management plans.” Talking about a community member who is not even a woodlot owner he said, “she sold two trucks full of wood with someone else’s transportation permit, she said someone sold it to her.” Transportation permits are issued to people who are transporting large amounts of timber to a different location, usually San Salvador. The permits are designed to prevent distribution of illegal timber by monitoring the amount of wood that is being moved around the country. They are available to people with or without a forest management plan who conduct logging in their woodlots.

People with management plans receive free and preapproved transportation permits and people without management plans are charged a small fee. Because the harvesting permit and transportation permit are issued by the forest technicians, they approve both documents together. The transportation permit contains information about the person transporting the timber and the volume of wood that is being transported. For people with management plans the permits are preapproved because they are issued when they first receive the forest management plan. Therefore, the transportation permits do not have to be signed or verified by the forest technicians. The problem occurs when people with management plans give away or sell their transportation permits to people without management plans who harvest in their own or someone else’s woodlot. This facilitates illegal logging because the person can provide false information about the amount of wood being transported. Since these transportation permits are preapproved, they may not coincide with the woodlot and owner where the product was extracted.

5. *The forest management plan is well designed*

Most woodlot owners agree with the forest management plan design and could not identify any problems with the way it was designed for them. One consulting forester explained that the management plan was created using Microsoft Excel to analyze field data and the maps are created through an online program called MapMaker. While the management plan format is standard, the information they input into the program varies by woodlot. The reason for this, he explained is that,

“[In El Salvador] the woodlots are small, while in Honduras the woodlots are big and they have computer programs where you only have to input the information like: volume, basal area, trees per hectare, etc. I don’t have that program, because the woodlots are small, I only work with Excel. Some people use ArcView or MapMaker which is a free program you download from the internet to make maps. Since I don’t have the license to ArcView, I use MapMaker and that’s how I make the maps.”

Woodlot owners did not feel limited or constricted by what the forest management plan entails. They felt that the rules are appropriate for them and that the forest management plan does not entirely restrict the way they manage their woodlots. This is a positive outcome resulting from changes made to the forestry law in 2002, which gave woodlot owners incentives to apply sustainable management to their woodlots while profiting from the use of forest resources. This allows them to reinvest in their woodlots. Some people explained the need to harvest and at the time care for their property by following the activities listed in the forest management plan. One woodlot

owner explained that “with the forest management plan...I could invest from my own pockets to maintain and provide proper care of the woodlots and utilize the resources in the woodlot. The forest management plan has made all that possible, while improving the woodlot.”

6. Logging practices

One of the objectives of the forest management plan is to generate employment in the community. Eight out of ten woodlot owners hire the same person to conduct all the logging operations in their woodlots. This person is also a woodlot owner, but resides in another community. He is known throughout the highland region because his occupation is logging and buying and selling wood. He owns chainsaws and a portable sawmill that cuts wood to specified dimensions. He negotiates a contract with woodlot owners, but a hired team of loggers from outside the community conduct the logging operations. People claim that no one in the community would work for the amount he pays his workers, making it difficult to hire people within the community. The typical field worker is paid \$7 for a day’s labor, but the loggers are paid \$5.

Logging operations are not required to follow rules and guidelines, therefore, loggers are unskilled laborers who learn on the job. Woodlot owners are instructed on the proper way to harvest trees, and this helps them have an idea of how logging should be conducted and demand that loggers working in their woodlots follow some guidelines. One owner said that,

“the PRODERT technicians who were helping us take out the forest management plan brought videos and we watched them in big screen. This

was so we could have an idea of how to log trees. If I throw [the tree] one way and there are a lot of young trees in that side, then I can not throw it on top of them. I have to get up on the tree and prune it, then throw it to the side where there are no trees.”

While woodlot owners are advised on proper logging, it is a weakness of the forestry law and the forest management plan that loggers are not required to be trained or certified in best management practices, which would prevent carelessness. Woodlot owners have expressed some concern about logger’s reckless practices, not minding where trees fall and disregarding understory regeneration.

7. Tree planting and regeneration

Seeds or seedlings are not provided by the MAG or the regional forest service offices. Some people claimed that woodlot owners received plants from forest technicians to plant in owners’ woodlots after harvesting. However, the forest technicians had said that although they had maintained a nursery before the conflict started, the trees have never been free. The tree seedlings were provided at a low cost as an incentive to promote replanting. The trees that woodlot owners have planted in recent years have been provided through projects like PRODERT and PAES. Both projects provided farmers with forest and fruit trees to generate income, increase forest cover, and reduce soil erosion. While fruit trees tend to be planted in house yards and parts of farm fields where they will not interfere with crops, it is not common for trees to be planted in barren areas. Forest trees were provided to people with forest management plans with the intention that they replant after logging.

Many times people plant more trees than necessary in one area of the woodlot leading to high stand density. In fact, several people have mentioned that out of the trees they plant only half or so would survive. It is unclear as to why the trees do not survive, but woodlot owners say that the forestry law states they need to plant ten trees per tree harvested.

“What the forest technician is doing, what he is applying and what the ministry is asking is that if you cut down a tree you have to plant 20 or 30, so at least 10 or 15 can survive. Not everything can be harvested to be sold because some trees may have too many branches, get struck by lightning or get wind-thrown. The forestry law has always been like that, since before, it has always been that if we harvest we have to replant. I do not think that has ever changed, that has always been the main practice.”

Referring to the trees given to him through PAES he said, “This week I planted around 150 trees in the whole area I have been working in the woodlot. Some I had already planted and they already died.” There is no single explanation of why every tree does not survive when planted, but several factors may be involved: cattle eat the seedlings, improper planting, plant competition, and poor quality seedlings.

Five out of ten woodlot owners have purchased trees to plant on their property. The people that have purchased trees had planted them a long time ago, and most of those trees are at a harvestable age now.

“Before, my dad used to go to Miramundo and bring trees to plant. Now, the trees are big and mature. Have you seen the cypress and pine trees planted along the woodlot boundary? They are big now; those were the trees that the ministry used to give before.”

Some complain that they lost trees as result of forest fires, mainly caused by arsonists during and after the war. A woodlot owner explained that sometimes, “[fires are] a careless accident caused by workers or other people working in the woodlot.” Some woodlot owners claim good quality, valuable mature trees are no longer present due to the fires, and one woodlot owner admitted that the frequent fires were enough to discourage him from planting.

Two people explained their concern regarding the trees provided by PRODERT and PAES. Some claim the varieties used by project owners are of inferior quality, explaining that natural regeneration grows quicker and hardier than the ones grown at the nurseries. They also say nursery trees are less likely to survive, grow tall, and are susceptible to deformities. One owner said “natural generation seedlings grow better than the trees technicians give. I do not plant trees there so they can grow in an area less dense. There is never a defect with natural regeneration, all summer they were growing and had no problems.”

The field survey showed that natural regeneration of pine is present in all woodlots. This coincides with woodlot owners’ interest in protecting pine trees, which is the most valuable species. According to a woodlot owner “pine is the best because it is easy to work with in construction and is also strong. Cypress can work too, but pine is

preferred.” Oak is also naturally regenerating in woodlots where oak is present. It is recognized and valued as good firewood. Oak is preferred by people who search for firewood in other people’s woodlots, because it burns longer. Woodlot owners use the slash that is left after harvesting pine as firewood, leaving non-timber species, which other people cut down if they can not find slash in the woodlot.

Cypress regeneration was not found in the understory which can be explained by two factors. While cypress is a valuable species for timber harvesting, nine out of ten woodlot owners plant cypress along woodlot boundaries. It was rare to see mature cypress deep in the woodlot, and if they happened to be recorded in a plot it was likely that the plot was close to the woodlot boundary. Cypress seedlings were not observed in any woodlot, but planted cypress trees were found in several woodlots. Only one woodlot was found to have cypress as a co-dominant species and according to the owner they grew from the trees planted along the boundaries. He said that the land used to be a farm field, but when cypress seedlings started to grow, he took care of them and stopped farming there so they could grow undisturbed. Another woodlot owner explained that cypress does not grow well in areas where pine is the dominant species, and the presence of pine prevents the natural regeneration of cypress.

8. Forest management plan misunderstandings

Technicians are in charge of marking the trees to be harvested in the woodlots with or without management plans. In properties without forest management plans many of the trees selected for cutting are deformed, uprooted or damaged by natural causes; there is no standard method to select trees for logging. Only woodlot owners with a forest management plan are allowed to conduct commercial harvesting, this is when forest

technicians apply proper forest measurement techniques to select the trees to be harvested. Technicians select trees for harvesting based on the total volume of harvestable wood per hectare. The woodlots are divided into parcels, and from there the volume is calculated, which determines how much will be harvested in each woodlot parcel. The calculations are based on forest measurement guidelines developed by the Honduran Forest Service.

While seven woodlot owners agree with the forest management plan and the amount of harvestable trees per year they are allotted, two people expressed some disagreement with the number of trees selected for cutting. One woodlot owner complained that the forest technicians do not mark enough trees, while they mark dozens of trees for other people,

“they never give me enough trees, I do not know why. [The forest technician] only marked 11 trees in the whole year. I have had the management plan for four years, and in that time they have only marked 55 trees for me, not even close to how much they marked for the other guy.”

He claims he does not understand the reason why the technicians do not mark many trees in his woodlot, which might also mean he does not understand the forest management plan. According to the field survey conducted and his forest management plan, the woodlot owner’s property is understocked and the few trees present were too young to be harvested.

Three woodlot owners also said they are dissatisfied with the type of trees that forest technicians mark for harvesting. They like to cut bigger, better quality trees that would produce more valuable wood so they can make a larger profit. “I would like to cut the bigger trees, but they do not mark those, they mark the most deformed and ugly one with a bunch of branches. That’s the one the forest technician marks, not the prettiest one.” Despite this, most woodlot owners noted that without some kind of guideline deforestation would be a grave problem. “Without laws there would be no [forest technician]. Without regulations the people would cut everything, there would be no trees left.” They claim that the forestry law has been successful at curtailing illegal logging. It is agreed that law enforcement is necessary to prevent deforestation, but some have expressed annoyance with situations in which they have been harassed by the environmental police.

A common misunderstanding regarding the forest management plan is that since commercial harvesting is allowed, the owner is also allowed to take out all the trees that he wants. For this reason some people in the community disagree with the management plan claiming it encourages owners to exploit their resources. There are some people who have had forest management plans that have been revoked because they failed to comply with the requirements listed in the document. Some of these people either clear-cut part of their woodlot to plant agricultural crops, or fail to weed, remove slash, and plant after logging. But the misunderstanding that woodlot owners have about woodlot management reflects the lack of education and training about the forest management plan.

9. Forest management plan incentives

Owners said that timber harvesting is not the only benefit to having a woodlot.

Firewood is an important resource in most households. Everyone has firewood stoves, which makes having a woodlot essential. Those who do not have woodlots have to buy firewood or trespass on other people's property and steal firewood. For some people their woodlot provides water for irrigation and use at home, therefore maintaining and caring for their woodlot is essential to their livelihood. When asked if people steal firewood woodlot owners explained that they understood the economic hardship of these people and as long as they did not harm young pines, cypress, and liquidambar, there was no problem. One woodlot owner said "it is not a big problem. A lot of people take the slash away. One takes away what one needs and then there are people that have needs. As long as they do not take the standing trees, or if it is another type of tree they want to take."

Fourteen percent of the woodlot survey plots contained coarse woody debris, but eight of the fourteen percent were found in one woodlot. The presence of coarse woody debris can mean that people have not come in to that woodlot to look for firewood or that the owner had not removed the slash himself as mandated by the forest management plan. After logging occurs, the slash that is left behind by the owner is usually taken by people looking for firewood. Woodlot owners understand this and do not complain about people taking the slash. In one particular woodlot coarse woody debris was found in all plots, logging had occurred recently, but no one removed the slash. The owner explained that,

"If I would have left it all cut they would have stolen everything. If I lived closer [to the woodlot] that would be possible, I would be able to cut it and leave it all stacked up. But how is that possible all the way over there?"

*On the other side I went and cut some firewood, and they quickly stole it.
They went in at night. Here, people do not respect.”*

The woodlot owner has had several quarrels with people over illegal trespassing and it is possible people now avoid this woodlot when searching for firewood.

Woodlot owners also use the woodlots for pasture, although this is prohibited by the forest management plan and the forest technicians. Using a woodlot for pasture is a common practice, but woodlot owners claim that the cows do not eat pine and cypress, the two trees considered to have economic value. At the same time, most woodlot owners do not own many cattle. The forest management plan takes into consideration areas designated for agriculture within the property. Most woodlot owners have a farm field adjacent to or within the property designated as “forest.” One owner’s woodlot surrounds a farm field in the center of the entire property. This is one advantage of the forest management plan, because it allows the woodlot owner to continue using the land already under cultivation or pasture, while improving and maintaining his woodlot. When people are given the freedom to manage their resources, they are more willing to protect and conserve those resources.

10. Positive results of the forest management plan

Despite a few complaints, woodlot owners said the forest management plans have a positive impact in the community. A woodlot owner explained that “the best thing is a forest management plan. There is a thorough use of forest resources and this improves the woodlot.” He also explained that with the forest management plan,

“I am more excited and motivated to conduct all the activities promoted by the forest management plan. Because I know now I am to have money and invest more. The kid’s are going to school, and all I make from it pays for many things...the house.”

One would think that woodlot owners with management plans would prefer harvesting and management plans because they have larger woodlots (based on the minimum size requirement of PRODERT), but this was not the case. All woodlot owners had woodlots with similar sizes. All woodlot owners seemed to understand the need for sustainable management, and the activities involved in proper maintenance of woodlots. One woodlot owner explained that a benefit of the forest management plan is that “one is not going to just go and cut down ten trees; the trees are authorized.” In his opinion the limits imposed on woodlot owners guarantees that they will have more trees to harvest in the future, he said “right now I do not want to cut anymore trees, I want them to keep growing so in five years I have [trees to cut] again.”

Mass migration of rural residents to cities and the United States has been a contributing factor to environmental deterioration in El Salvador (Hecht, 2006). This may be true in the community of Los Planes where migration to the United States was prevalent, in part because of the freedom involved in selling and buying land. During the conflict it was possible to get away with illegal logging because forest service personnel and law enforcement were absent. People exploited their forest resources and put up their land for sale. Over the years there has been a lot of change in land ownership, which had had an impact on land use and management. However, in recent years affluent and

environmentally conscious Salvadorans are buying forest land to protect and preserve it. Woodlot owners are finding the benefits of maintaining their woodlots; an outsider may want to buy their land.

What have farmers learned through the forest management plan? Do they apply all the techniques learned under the forest management plan? How?

Planting, weeding, and pruning are three of the basic and generally recommended activities in the forest management plan. Woodlot owners have only recently learned to implement these techniques within their woodlots. A woodlot owner explained that the basic, general activities required by the forest management plan,

“where you have harvested...you try to plant, at least, in most [of the area]. And you have to [weed] in all of the woodlot, whether you have planted or not you always have to weed. For example this month we are weeding in the bottom part of the woodlot, so [the part of the area where we harvested] grows.”

Owners stated that labor intensive activities such as pruning and thinning are practiced less because they require hired help, time, and money. Woodlot owners hire the same young men to carry out these activities who they already hire to work in farm fields.

The forest management plan is designed in a way that allows woodlot owners to take responsibility while guiding them on proper forest resource management over the five year period. According to a woodlot owner the management plan,

“is based on what the forest technician indicates. For example, trees can be harvested and trees can not be harvested. So, there is a harvesting plan

that the forest technician decides in accordance with what has been harvested [before], what is remaining and the regeneration occurring in the woodlot. [Regeneration] can be planted or natural. And to protect them for the future.”

Woodlot owners said decades ago, woodlots were so dense it was unimaginable that forest resources would become scarce. Planting, weeding, and pruning were not common practices because natural regeneration was abundant, but today they see the importance of applying those techniques.

Only three woodlot owners expressed some disagreements with the activities and requirements listed in the forest management plan, but overall agreed that the forest management plan allowed them to make adequate use of resources and improve their woodlots. Woodlot owners' disagreement with some activities shows how the forest management plan introduced some change in the way they used to manage their woodlots. One woodlot owner explains that “when you read the forest management plan you know what you need to do and what you can not do. I am not going to say that one does everything verbatim as written in the forest management plan, because one has ones weaknesses. And maybe the consequences do not allow one to manage one's woodlot [how it is expected], but we are always working hard [to manage it].” Woodlot owners recognize that the basic activities are appropriate for their woodlots and improper management is not due to weaknesses in the forest management plan, but is based on the motivation and decisions made by individual woodlot owners.

Evolution of ecological attitudes resulting from woodlot management.

Interviews with woodlot owners revealed information not originally anticipated. Woodlot owners have developed a broader ecological attitude towards forest resource management. Their experience with woodlot management has given them the opportunity to value forests for the ecological benefits they provide to the greater community. Community members as well have shown an interest in the way forests are managed and how this affects them. These attitudes have inspired the development of ecotourism to provide aesthetic and recreational benefits, and have attracted affluent Salvadorans interested in owning forest land.

Forest management plans have taught woodlot owners that following the recommended silvicultural practices are important to improve stand quality. All woodlot owners explained that proper management, weeding, removing slash, protecting natural regeneration, and planting trees, are important to securing forest resources for the future. A woodlot owner explained that,

“[the forest management plan] has two types of impacts, an economic one and an ecological one. Ecologically, protecting nature and forest life, it has a negative impact because people think ‘darn it, they are cutting the forests.’ The economic one is that every penny one gains from harvesting is invested in the woodlot. That is a major factor. The result of those impacts is going to be seen in eight or ten years. When those people who are now saying ‘look at how much they are harming the forests, cutting the trees,’ they are going to see that in ten years that [the forest

management plan] is having a good result and how quickly the forest grew.”

Growing interest in ecotourism is a sign of how woodlot management has changed over time. Apart from timber management, woodlot owners have an ecological perspective and recognize the non-economic value their woodlots provide. One woodlot owner involved in ecotourism explained that living from this business alone is difficult because of the current economic situation and because people tend to vacation sporadically (during holidays or long weekends). He also mentioned that permits are hard to obtain because of the line of business he is in and the idea people have about timber harvesting. “There were several times I went [to the forest service office] and it has been difficult. When I go ask for a permit it is complicated, because when one is in ecotourism, it is complicated. The other thing too is that it is not convenient to harvest trees. The idea, or the concept, one is selling is that we are protecting nature. Therefore, if we start to harvest trees, we are not selling that concept.” Despite this, he is hopeful and believes that “ecotourism has a future, not in the short run, but in the long run. We plan on making more changes...the idea is to keep fighting.”

Prospective buyers have made woodlot management more appealing. Wealthy Salvadorans have an interest in buying woodlots to build houses out in the woods where they can be close to nature and escape to during the weekends and holidays. Woodlot owners explained that these people have no need to conduct harvesting and their aim is to preserve the forest for esthetic and environmental reasons. One woodlot owner said “people are realizing that without the forest there is no life.” All woodlot owners

explained that the forests are not the same as before, but since the end of the war a change has occurred in the way people manage their forest resources. A woodlot owner explained, “I have the belief that without forests we will not survive, therefore, I try to take care of mine.”

Chapter 5: CONCLUSION WITH RECOMMENDATIONS

During the war, deforestation and environmental devastation affected the community of Los Planes. Since the war, illegal logging has decreased and woodlands have regenerated. Woodlot owners have managed their land to conserve the remaining forests. Woodlots offer various benefits to owners, such as firewood, water, and extra income. All surveyed woodlot owners are happy with their forest management plan. Incentives, such as cost reduction of forest management plans, ranked higher among woodlot owners' reasons for having a forest management plan. Woodlot owners approved of the forest management plan because it allowed them to profit from commercial harvesting while investing in their woodlots and allowed the multi-purpose use of land. Being able to leave their woodlots to their children was also an important reason. Silvicultural activities, such as weeding and planting, were believed to be essential to improving stand quality. There were some woodlots owners who disagreed with building firebreaks, felt that the environmental police abused their power, and tree seedlings provided through projects were of poor quality.

This study identified the attitudes and motivations behind woodlot management in Los Planes, as well as woodlot owners' concerns. Based on these concerns six recommendations are presented below:

Recommendation 1- Firebreaks:

Building firebreaks was not a popular practice among woodlot owners, they either ignored this requirement or found it tedious to apply. It is not known whether firebreaks work, therefore, the forest service should investigate the effectiveness of firebreaks in the

region. If it is determined that building firebreaks is effective then this should be mandatory for all woodlot owners, if not, this requirement should be eliminated.

Recommendation 2- Education of environmental police:

A concern of woodlot owners is the power given to the environmental police, who many times use their authority to harass woodlot owners. Woodlot owners feel that the environmental police, like most community members, are always suspicious of illegal logging. The environmental police should be more informed about the proper documentation necessary for certain forest management activities. Furthermore, since the environmental police serves by region, they should have a list of the registered woodlot owners in the region so they can keep better track of illegal logging and transporting of wood products.

Recommendation 3- Tree seedlings:

Woodlot owners complained about the quality of seedlings given to them through government reforestation projects. The forest service should emphasize and promote silvicultural activities that focus on maximizing natural pine regeneration. This will also eliminate reliance on government nurseries and reduce costs for woodlot owners who buy tree seedlings.

Recommendation 4- Simplification of the forest management plan

Only one woodlot owner was able to properly explain what the forest management plan entails. Although, all woodlot owners have a general idea of the forest management plan requirements, not all of them completely understand the forest management plan. Two woodlot owners admitted to never having read the forest management plan because they do not understand the numbers and figures. Therefore, the

forest management plan should be changed to a simpler version that woodlot owners would be able to read and understand.

Recommendation 5- Outreach and Education

Forest technicians should try to reach out more to people in the community, by organizing educational workshops where they can inform people about the forest management plan. This would prevent misunderstandings among community members, and clarify the difference between commercial harvesting and overharvesting.

Recommendation 6- Promotion of forest management plans

The community of Los Planes would benefit from more forest management plans since they have been a success among current forest management plan woodlot owners. More forest management plans would allow people who did not participate in the PRODERT project have an opportunity to learn proper woodlot management. Also, some people who already have forest management plans and are happy with their plan, have expressed they might not be able to afford a renewal without subsidies.

Woodlot owners in Los Planes not only use and value their woodlots for the economic benefits it offers, but also for the ecological benefits it provides to the community as a whole. They witnessed the environmental devastation caused by rampant illegal logging during war, and have learned from those experiences to see the forest differently. The forest management plan has played an important role in educating woodlot owners to properly manage their land and conserve the scarce resources, therefore the government should continue the promotion of this program by offering incentives to

poorer woodlot owners. Woodlot owners' sense of environmental stewardship is an immense leap forward in conservation and the key to ecological restoration and sustainable development of El Salvador.

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APPENDIX

Questionnaire (Part 1)

I. Demographics & History

Farmer age:

What is the primary source of household income?

How big is the household?

Are you a current resident of the community or absentee owner?

How long have you owned land?

Who was the previous owner?

How did you acquire the land?

How large is your woodlot?

II. Woodlot Management

Do you have a forest management plan? If yes:

How long have you had the forest management plan?

How did you learn about the forest management plan?

Do you have a copy?

Can I see the forest management plan?

Questionnaire (Part 2)

II. Woodlot Management

Can you explain to me the type of activities or practices involved in managing a woodlot?

Is there any use of land other than timber? What? (Other than harvesting, what other purpose does the woodlot serve?)

Did you harvest before the forest management plan? Have you harvested since the forest management plan was developed?

Was it hard to obtain a forest management plan?

What kind of forest management plan do you have?

Did technicians give you advice, what is it, did you find it useful, did you follow it?

How has your woodlot and its management changed over time?

What are you required to do as a land owner with a forest management plan? Do you follow all the requirements?

Is there some requirement in the rules of the management plan that you disagree with?

Has there been anything you have been prohibited to do as a result of the forest management plan?

Are there any benefits to the forest management plan?

Are there any weaknesses or problems with the forest management plan?

Do you think the forest management plan has had a good impact in the community?

III. Foresters and Forest Technicians

Are the technicians clear on their goals and what they expect from you?

Have the technicians recited and explained the regulations of the Forestry Law to you?

How often do technicians come to visit you?

How do the foresters help you when they come to look at your land to design management plan? What do they tell you?

Do they explain the forest management plan to you? Do you understand it?

Do you agree with the harvesting plan that was designed for you?

IV. Harvesting Process

When technicians mark the trees you are to cut, do you cut other trees that are not marked? Have you ever had any problems with loggers harvesting more trees than the ones marked?

Do you conduct the cutting yourself, or do you hire people to do the work? If yes to the latter, are you present during the cutting process?

When all the marked trees have been cut, and the process is over, what do you do?

Do you harvest all the marked trees at once, or do you harvest little by little (several times in the year)?

Who do you sell the wood you harvest to? And how much do you get for it?

V. Reforestation

Do you plant trees in the property? Where do you get the seeds or trees from? Do you plant a specific species?

How often do you plant trees or seeds in the property? For how long have you been planting?

Where in the property do you plant seeds?

Do you have a nursery? What is the obstacle to having your own nursery?

Is it difficult to plant trees?

Questionnaire (Part 3)

Why do you sell the wood in the community in not in San Salvador? Is it difficult to find someone who would buy the wood here in the community?

Is it difficult to find loggers in the community?

What is your preferred logging method? (Machine, chainsaw, or handsaw)

Have you ever been offered or received trees or seeds from the forest technician (not through PRODERT)?

Have you pruned trees in the woodlot? How is that done, and why?

Have you ever had a pest or disease problem in the woodlot, an infested tree or trees?

If so, what have you done in that situation or what is one supposed to do?

If bought, how did you buy the land? Did you pay directly or did you get a loan?

Do you plan to sell the woodlot or part of it in the future? Why or why not?

Have you had any problems or legal issues regarding land tenure or acquiring the land title?

Have you ever had any problems with trespassing by neighbors/people who own land/fields next to or around your woodlot?

Why do you have a woodlot and/or decide to have one?

Once your current management plan expires, do you plan to acquire another one? Will it be difficult to acquire another one?

Is the price of wood now cheaper or more expensive now than before the war or during the war?

Is harvesting wood more profitable now or was it more profitable then?