Land Management Strategies and Fuelwood Collection in the Indigenous Ngäbe Village of Hato Horcón, La Comarca Ngäbe-Buglé, Panamá

By
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The report: “Land Management Strategies and Fuelwood Collection in the Indigenous Ngäbe Village of Hato Horcón, La Comarca Ngäbe-Buglé, Panamá” is hereby approved in partial fulfillment of the requirements for the Degree of MASTER of SCIENCE in FORESTRY

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Abstract

Fuelwood is a basic necessity used to sustain the lives of people throughout the developing world. Each day within the village of Hato Horcón subsistence farmers use their local knowledge and best judgment to locate fuelwood sources. The eventual development of local knowledge and the understanding of the surrounding environment allow these farmers to locate good places to find fuelwood and to identify species preferred for use as fuelwood.

Over time, the population of Hato Horcón has increased and agricultural land use has intensified. The combination of both factors has affected the supply of fuelwood throughout the village. Trees once used as public sources of fuelwood have been claimed through usufruct land tenure, and public fuelwood collection areas known through local knowledge have been converted to agricultural land. The current conditions have caused farmers to adapt to and create new methods of how to locate and collect fuelwood through land management strategies.

The purpose of this study was to analyze a set of variables to investigate the process a farmer goes through in locating a fuelwood site and how this process relates to land management strategies. The study found that the farmers of Hato Horcón prefer the use of large trees in areas of high basal area, which tend to be river basins, with a dominant vegetation of mixed and agroforestry species. They have adapted to the changing environment and population through the use of agroforestry and large-tree systems on their farmland.

Chapter One

General Introduction

At the beginning of my service as a sustainable agricultural volunteer in Peace Corps Panamá my primary responsibilities were to observe my surroundings, learn the language and participate in the daily happenings of the village. The primary responsibilities were to evolve into new responsibilities as I became more comfortable and began to understand the needs of the village. The natural evolution of responsibility led to teaching sustainable farming and helping indigenous farmers teach other indigenous farmers new and innovative agricultural techniques.

Shortly after moving into the village where I was to spend the next two years, I quickly realized I had only a basic understanding of the language, I had everything to learn and the power of observation would be my most useful tool. I asked questions to the best of my ability, but my understanding of the innate workings of the village of Hato Horcón came though my observations. It was during the first few months in the village the initial observation that this study is based upon emerged.

Each morning, the women of Hato Horcón awake before dawn and start a fire. The fire provides a source of heat in which to cook breakfast and the customary pot of coffee. As the children and men begin their days, the women serve them steaming plates of rice and warm cups of coffee. After breakfast it is common to hear men chopping firewood while the women extinguish embers from the morning meal to conserve fuelwood for the evening meal. At this point in the day the men head out to the fields while the women continue with household chores.

As I continued observing my surroundings and learning the rituals of each day there was one aspect that I did not understand. While much of life followed a regular routine, the men would not return home at the same time each day and, as the rainy season approached, they returned later and later. I was having a hard time deciphering exactly what was causing the men to return at different times each day. Eventually, I began to notice that each time the men did come back they were carrying fuelwood.

As I became more comfortable in my language capabilities and my relationships with the villagers I began asking questions. Particularly, why were the men were not getting home until dark? They responded by telling me that the men were out in the fields for a portion of the day and during the other part of the day there were out searching for fuelwood. When I asked where they were searching I was told that they searched all over the village and sometimes knew of "good" locations to find fuelwood. Often times these "good" fuelwood locations would be far away, requiring the men to hike long distances to locate the fuelwood, and as the rainy season approached it became more difficult to locate dry, usable fuelwood.

The villagers spent significant amounts of their days in search of fuelwood because it was absolutely imperative to their lives. At this realization I began asking myself questions: Where were these "good" places to find fuelwood? What determines these locations as "good"? Would people from other villages think the same locations are "good"? Do they manage their lands to conserve "good" fuelwood areas? What happens when their local fuelwood resources are used up? At this point I knew I wanted to study fuelwood.

The objective of this study is to investigate the process a farmer goes through in locating and determining a site "good" in terms of fuelwood and how this relates to land management strategies. I hypothesized that there would be statistical patterns correlating a "good" site for fuelwood based upon indigenous knowledge with standard forestry variables.

Chapter two gives a general background on the country of Panamá with an in depth look at the indigenous Comarca Ngäbe-Buglé. Chapter two concludes with a look at the geography, people, natural resources and agriculture of the specific study site of Hato Horcón.

In chapter three the experimental design used to carry out the research in both quantitative and qualitative data collection is presented. The methods in chapter three are followed by a summary of the data collected while out in the field at the study site.

Chapter four presents the results of the study with a discussion of those results. Land management strategies in response to labor costs, tree size, population pressures and land tenure concerns are explored in relation to the statistical findings. A look at other literature in relation to this study is reviewed.

Chapter five covers the conclusions of the study and the recommendations for the future of the subsistence farmers in the village Hato Horcón.

SECTION ONE

General Background

Chapter Two

Background

Panamá

The country of Panamá, formally known as the Republic of Panamá, is located in Central America and is bordered by Costa Rica to the West and by Colombia to the South (Figure 1). Panamá is located between 7° and 10° north latitude and 77° and 83° west longitude (Kluck, 1989). The capital of Panamá, Panamá City, is the largest city in Panamá and contains approximately one third of the population of Panamá (World Atlas, 2007). The country is approximately the size of South Carolina, with 2,490 km (1,547 miles) of coastline on the Caribbean Sea and the North Pacific Ocean (CIA, 2007). The country is an S-shaped isthmus connecting North and South America (Encyclopedia of the Nations, 2007). The Atlantic and Pacific oceans are also connected by the country of Panamá through the 80 kilometer (50 mile) Panamá Canal. The central mountain range within Panamá, the Cordillera, runs from east to west and divides the country into two distinct regions: the Caribbean and the Pacific. The Caribbean region is described as the humid tropics while the Pacific is considered tropical with a seven to nine month rainy season (Kluck, 1989). The country consists of nine provinces: Bocas del Toro, Chiriquí, Colon, Coclé, Herrera, Los Santos, Veraguas, Darien, Panamá, and three indigenous comarcas: Kuna Yala, Embera Wounaan, and Ngäbe-Buglé (Figure 2). The population of Panamá is 3,242,173 with the majority of mestizo (mixed American Indian and White) ethnicity (70%) and Africans, whites and Native Americans making up the rest (CIA, 2007).

Figure 1. Central America. (arrow indicating location of Panamá) CIA, 2007

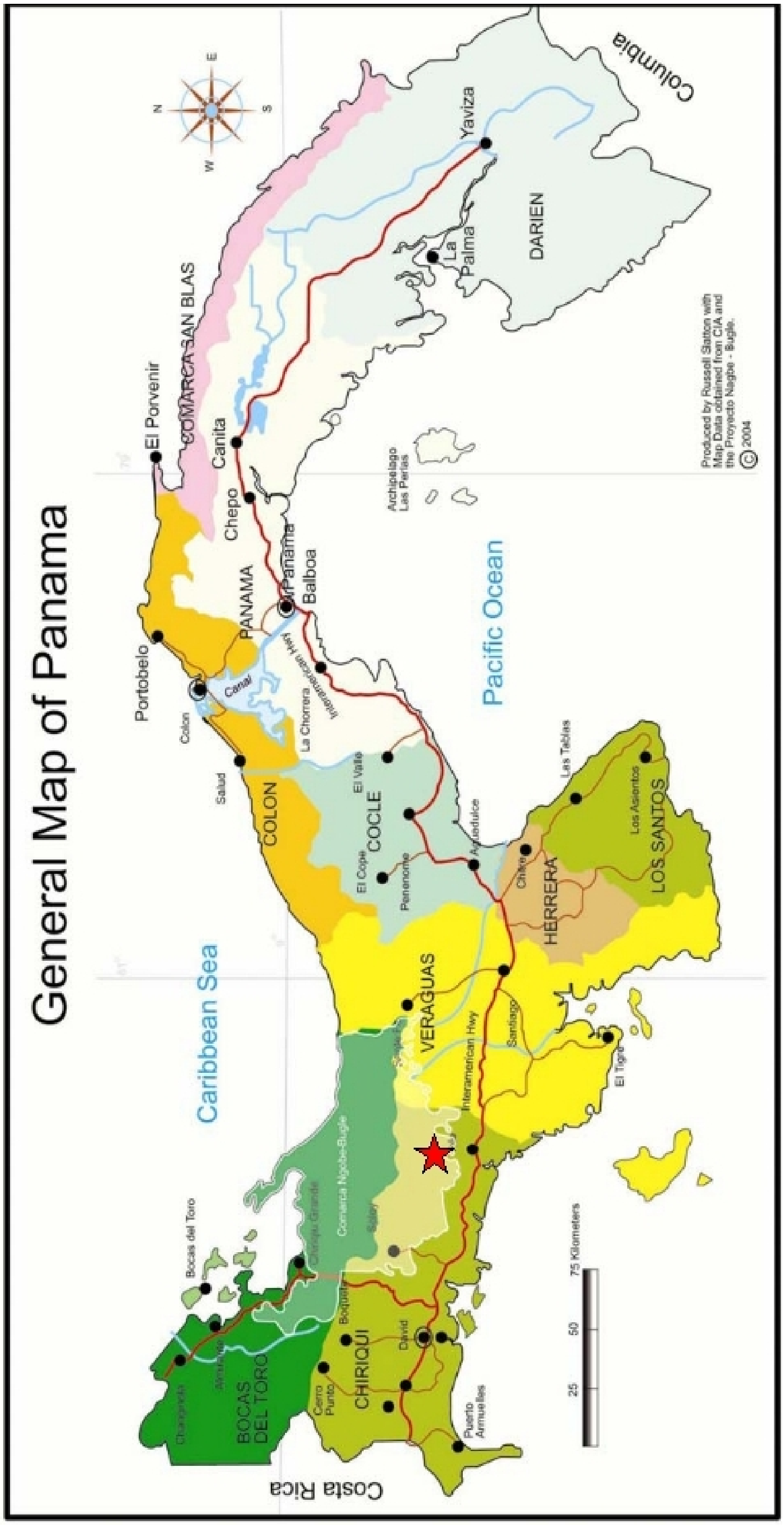

Figure 2. Provincial Map of Panamá. Slatton, 2004

Approximate location of the village of Hato Horcón. ★

The Comarca Ngäbe-Buglé of Panamá

Introduction and Geography

A comarca is a semi-autonomous political state of collective landholding, or reservation (Ortiga, 2004). Once land is titled as a comarca the inhabitants can form their own governing body and laws within their territory. The territory is nationally recognized as autonomous, but the inhabitants must still abide by the laws of the national government.

During the 1980s and 1990s mining and hydroelectric companies began showing interest in the lands where the Ngäbe and Buglé people resided. The national government became involved and supported a new mining project in Chiriquí Province. The indigenous people of the area felt their lands, farms and homes were being threatened and began to organize. They attended numerous congressional meetings voicing their opinions and fears over the proposed project, but were unsuccessful in being heard. Eventually in 1997, after years of struggle, 400 indigenous men, women and children took initiative and marched 400 kilometers to Panamá City in protest (Regional Handbook, 2006). The Comarca Ngäbe-Buglé was officially formed in March of 1997 under Ley 10, the Panamanian law recognizing the comarca.

The Comarca Ngäbe-Buglé occupies 6,944 km^2 (2,500mi^2), approximately 9.2% of the country of Panamá (Bort and Young, 1985). It is located within three of the westernmost provinces in Panamá: Bocas del Toro, Chiriquí, and Veraguas. The comarca is divided into three regions: Kädri, formerly part of the province of Veraguas, Nedrini, formerly part of Chiriquí, and Ñö Kribo, formerly part of Bocas del Toro (ANAM, 2002). Within these three regions the comarca is further divided into seven districts: Besiko, Mirono, Nole Duima, Müna, Ñürüm, Kankintú and Kusapin (ANAM, 2002). The districts are further divided into *corregimientos*. A *corregimiento* is an area within a district comprised of a handful of communities usually within three to five hours walking distance.

The Comarca Ngäbe-Buglé ranges in altitude from 20 meters above sea level in the Ñö Kribo region (Slatton, 2004) to over 1524 meters in the high mountains of the Nedrini region (Young, 1971). The lands of the comarca are defined by the central mountain range, the Cordillera. To the north of the Cordillera, in the Ñö Kribo region there is no dry season, on the southern side, in the Nedrini and Kädri regions, there is a distinct dry season. The dry season runs from mid-December until approximately May and dominates the agricultural practices of the regions.

The population of the comarca is increasing at an annual rate of 4.27% (ANAM, 2002). A Panamanian census in 1960 estimated the number of indigenous people living within the comarca at 35,867 and in a 2000 census the population had grown to 148,472 (ANAM, 2000). The Ngäbe represent 63.6% of the indigenous people within the country, the largest Panamanian indigenous group (Garcia, 2004). The people of the Comarca Ngäbe-Buglé were formerly referred to as the Guaymí. The name Guaymí is no longer used, but refers to all the Indians of Western Panamá with the exception of the Teribe (Johnson, 1948 as cited in Young, 1971). As of 2000, the comarca was comprised of 92% Ngäbe, 5% Buglé and 3% of ethnic origin mixed afro-antillian and mestizo (ANAM, 2000).

Government

There are two government structures within the Comarca Ngäbe-Buglé: administrative and traditional. Within the administrative system leaders are officially recognized by the national Panamanian government, whereas in the traditional system the leaders are non-official, being recognized only within the comarca by the Ngäbe and Buglé people.

Within the administrative, or official, comarca political structure there are *corregidores* who lead the system. The *corregidores* live within an area consisting of various communities, or *corregimientos*, and deal with the internal affairs of the specific *corregimiento* and the external affairs related to the national government. The *corregidores* appoint police and other officials (Young, 1971).

Each year, an official meeting, or *congresso*, is held with all official *corregidores* and other representatives of the Comarca Ngäbe-Buglé. Inhabitants of the Comarca Ngäbe-Buglé travel to attend this meeting and take part in the elections being held to appoint new *corregidores* and representatives. It is during the *congresso* that official external issues are discussed. The issues can involve ministry relations and decisions on what projects will take place within the comarca from outside agencies. For example, during the 2007 *congresso* officials discussed the construction of a police-checkpoint where comarca lands intersect the Pan-American highway. The purpose of the proposed checkpoint was to prevent narcotics smuggling within the boundaries of the comarca.

The *corregidores* also manage internal affairs of the particular *corregimiento* they are residing over. The internal duties of the *corregidor* include recording births and deaths, keeping the peace, punishing criminals or offenders of the comarca laws and settling internal disputes (Young, 1971). The internal disputes are often related to land disagreements or marriage problems. Land disagreements are associated with boundaries, crop damage or crop theft while child custody battles and domestic violence are the marriage-related problems. When these types of problems arise the inhabitants of a particular *corregimiento* can file paperwork with the *corregidor* to hold what would be similar to a hearing. During the "hearing" the *corregidor* will listen to both parties and make an official decision on how to settle the problem (Young, 1971).

Within the traditional government system of the Comarca Ngäbe-Buglé there are local chiefs, or *cacique locales*, within each district. The *cacique local* is recognized by the inhabitants of the district and deals primarily with culturally related affairs. The cultural affairs of a *cacique local* involve promoting the native language in schools, encouraging cultural activities and ensuring projects from outside organizations do not jeopardize the local environment or cultural practices. The *cacique local* of the district where this research was conducted granted approval for the project (Appendix A). The approval of the *cacique local* ensured the research would not jeopardize the environment or the cultural integrity of the village (Regional Handbook, 2007).

Language

There are three languages spoken among the indigenous people within the comarca: Spanish, Ngäbere, and Bugleré. Ngäbere and Spanish dominate the area with little Bugleré being spoken. Adults speak their native language within the household and speak Spanish as their second language. Many adults, especially elders, struggle with the Spanish language because no schools existed in the comarca when they were children. Currently, children are taught both Ngäbere and Spanish within the school system and are brought up speaking both languages. Children tend to use both languages interchangeably depending upon who is speaking with them and what language the speaker is using. From my experience, the children were comfortable conversing in both languages while adults appeared to be more comfortable speaking in their native language.

Community

Communities have been formed around the schools that were constructed in the Comarca Ngäbe-Buglé during the 1970s (Regional Handbook, 2006). Before the construction of schools the population density was low and dispersed (Young, 1971). Communities were spread across large regions of land without a village center. Prior to the construction of schools it was difficult to define where the border of one community ended and another started. Schools provided a central location for families. Eventually, as schools were constructed families migrated towards them and established family compounds. A family compound consists of houses, or huts, constructed within one small area (Figure 3). Each hut is inhabited by a nuclear family with the entire compound consisting of an extended family. As schools are constructed more families migrate towards them and communities are established.

Figure 3. Family compound within the Comarca Ngäbe-Buglé.

Culture within communities is based around a collective work system (Regional Handbook, 2006). Manual labor, such as agricultural labor, is generally approached as a cooperative group effort. The cooperation within and between families and family compounds is viewed as efficient, reciprocal and safe. Cooperation is efficient because there are more hands for the task and reciprocal because if one family works on another family's farm it is expected that the favor will be returned. Cooperation is also safe because a portion of the products produced are generally distributed to those involved in the labor contribution. The system does fail when labor is not reciprocated or products are not distributed to those involved. The break-down of the collective work system is also partially related to seasonal out-migration as more individuals seek work outside of the village. The out-migration is a result of the yearly coffee harvest in the high mountains of Chiriquí and employment on the banana plantations in Bocas del Toro. The money earned through outside employment makes families less reliant upon the cooperative labor system to ensure food supply by minimizing the farm labor needs. Farm labor needs are lessened because a portion of the food can be purchased.

Village of Hato Horcón

Geography

The village of Hato Horcón lies within the province of Chiriquí within the Comarca Ngäbe-Buglè. The village is in a valley of the foothills of the central mountain range, the Cordillera, at an elevation of 342 meters. It is on the Pacific southwest side of Panamá in the region of Nedrini, the district of Nole Duima and the *corregimiento* of Lajero. In order to reach the village one must travel in a bush taxi, or "chiva", for 40 minutes from the Pan American highway then travel by foot approximately two hours across the mountains and down into the valley.

The district of Nole Duima ranges in elevation from 301 to 600 meters and is sandwiched between the San Felix and Santiago Rivers (Baúles, 1999). The population of Nole Duima is 9,294 and has a population density of 54.1 people/km^2, the highest population density of all the districts in the comarca (ANAM, 2000).

People

The village of Hato Horcón is 100% indigenous, comprised primarily of Ngäbe people with a few Buglè. There are about fifteen houses with an approximate total population of 100 people in the village. The majority of the village members are related through kinship ties. The main family within the village is comprised of the male and female elder who had ten children; seven males and three females. All but one of the children resides in the village and each have families of their own with an average of four children per household. Cousins, aunts and uncles of this family also reside in the village making up the remainder of the population.

All Ngäbe females wear a traditional dress called a *nagua*. From the moment a female is born they are put in a *nagua* and they wear them throughout their lives. The *nagua* is brightly colored with three different designs around the collar, waist and sleeves. The most common *nagua* consists of teeth-like designs surrounded by bold solid colored lines, another consists of only bold lines and the other of only teeth-like designs (Figures 4 and 5). A woman in the village once told me that the teeth represent the mountains of the Comarca Ngäbe-Buglè and the bold lines represents the continuity of life.

Figure 4. Adult women of Hato Horcón in different designs of traditional *naguas*.

Figure 5. Small child of Hato Horcón in a traditional *nagua*.

The males of the village wear t-shirts and a variety of home-made pants; the most common are made of polyester. The clothing of the males is donated through outside organizations and handed out at meetings or in health clinics.

The tasks within the village are defined by gender although some tasks may be performed by both sexes (Young, 1971). The main responsibilities of the women are to care for the children and maintain the household. Household chores involve cooking, cleaning, washing the laundry, and mending clothing. Aside from their household duties the women also play an important role on the farms. They harvest farm products and participate in the planting of rice, maize and tuber roots. The harvest tends to be the responsibility of the women because it is so closely tied to cooking but, on occasion, men will also participate.

The main responsibilities of the men within the village are the "hard labor" tasks. These tasks include maintaining the farm, clearing lands for cultivation, searching for fuelwood and chopping fuelwood. During the rainy season the primary task of the men is to locate usable fuelwood for cooking purposes while during the dry season they are primarily responsible for land preparation. If the primary tasks of the men leave them with energy and free-time they will sometimes aid in the planting or harvesting of farm products.

Tasks shared by both sexes are done so for efficiency. For example, both men and women participate in the planting of rice on hillsides because there is a large area of land to cover in a short period of time and the terrain is difficult. It is not uncommon to see women, men and children all planting rice simultaneously in order to complete the task more efficiently.

Natural Resources

The natural environment of Hato Horcón in defined by the Panamanian government as a zone of production (ANAM, 2006). A zone of production is described as an area of medium fertility with intensive land-use through slash and burn agriculture. The soils in the area are described as class VII indicating they are moderately arable with limitations, while the land cover is classified as secondary partial forestland with mixed agricultural use (ANAM, 2002).

The people of Hato Horcón have designated certain areas as "protected" within the village although the protection is not officially recognized by the government (Figure 6). The protected areas are near streams and river basins where the vegetation is lush and large trees are thriving. The villagers chose the particular areas for protection based on the available resources that can be extracted and regenerate naturally. The protected areas provide the public with plants used for medicinal and consumption purposes, fuelwood from fallen branches and a source of water during the dry season when most village streams dry out. The large thriving trees also provide natural protection for the watershed. It is understood by the people within the village that the protected areas are not to be farmed or destroyed, and the rule is generally followed.

Figure 6. Protected area.
Photo by Jessica Mehl

Agriculture

The villagers of Hato Horcón are subsistence farmers, relying on agriculture within their fields to produce food for home consumption. The staple crop within the village is rice. As long as there is a supply of rice, it is eaten with every meal. The other crops grown in the area include maize, tuber roots, sugarcane, coffee and several types of beans. There are also seasonal fruit trees within the village supplying mangos, avocados, oranges and limes.

Agriculture within the village of Hato Horcón can be challenging as it depends on the weather and seasons. There are two distinct seasons in the area, the wet season and the dry season. The wet season occupies the majority of the year, from June to December, and can range in duration from seven to nine months. The annual precipitation is approximately 2500mm with most falling in the wet season (ANAM, 2002). The climate is classified as humid tropical (ANAM, 2002). The farmers of the village develop a sense of the weather patterns throughout their lives, knowing when to cultivate their fields for the best possible results. Fluctuations and irregularities in weather patterns can affect farm planning and devastate harvest yields (Bort and Young, 1985).

Farms are generally prepared for planting through slash and burn agriculture where land is cleared of existing vegetation and subsequently burned. The slashing and burning aspect of preparation is carried out in April or May, prior to the onset of the wet season to allow time for planting. Ideally, the farmers want to plan their slashing and burning with enough time to plant the crops, but without too much time before the rains begin to fall in June. Once the crops have been planted and the rains begin to fall many soil nutrients, in the form of ash, are carried downhill, deposited into streams and carried away by the rivers.

Additionally, after planting, households must depend upon the previous years harvest to sustain their consumption needs until the next harvest. July, August and

September are considered the "hungry months" among the villagers as the food supply begins to dwindle and the rains are still falling to produce the next harvest.

Land degradation and soil nutrient loss from repeated slash and burn has become a problem the farmers of Hato Horcón are facing. As weather patterns are difficult to predict and soil nutrient depletion reduces harvest yields the farmers are turning to the alternative methods of agroforestry and fish and rice tank farming introduced by outside agencies.

The Future

The village of Hato Horcón is located in Nole Duima, the most densely populated district of the Comarca Ngäbe-Buglè. The people of this village are subsistence farmers depending upon their lands to sustain their lives. The gradual increase in population in Hato Horcón results in land pressures from usufruct land tenure and agricultural practices. Land that was once considered public is claimed through usufruct land tenure and is subsequently cultivated through slash and burn agriculture. The practice of slash and burn agriculture depletes vital nutrients from the soil and eliminates the existing vegetation.

The lands of the village provide a means to produce food; they supply nutrients to the thriving trees as a source of fuelwood and sustain the rivers and streams used for washing laundry, drinking and bathing. As the population continues to increase and more pressure is put on the land the farmers must develop and practice new and innovative land management strategies. The strategies must sustain farm output on small parcels of land to cope with the population and land pressures and secure available sources of fuelwood for the future of their children and families.

SECTION TWO

Research

Chapter Three

Methods and Data

Introduction

From 2005 until 2007 I lived and worked as an agricultural Peace Corps volunteer and graduate research student with the indigenous Ngäbe people in the village of Hato Horcón in Panamá (Figure 7). Upon arriving in the village I began living with a host-family. The host family helped me to adapt to the people, climate, food and the general culture of the Ngäbe people. On a daily basis I shared in the activities of the family I was living with, both observing and participating. These activities ranged from collecting water and washing clothes in the local river to collecting fuelwood for cooking as well as planting, harvesting and preparing local farm products for meals and visiting local village members to participate in social events.

During my host-family stay I developed a strong relationship with the head of the household who took it upon himself to involve me in activities and always provided me with answers to questions to the best of his ability. The head of the household eventually became my key informant during my stay in Hato Horcón (Figure 8). A key informant can be described as a member of the village who is particularly knowledgeable about village matters such as social etiquette and gender roles and is often reliable on factual matters, such as water and medical services available to the village (Nichols, 2000). The information provided by a key informant is immediate and readily available, whereas it would take an outside observer a significant amount of time to discern the same information based on observation and personal experience alone.

Figure 7. Ngäbe people of the village of Hato Horcón.

Figure 8. Key Informant.

Figure 9. Ngäbe man hauling fuelwood.

Through participatory observation, a method in which an observer takes part in the daily activities and events of the people being studied as a means of learning about their local culture, I had realized fuelwood was an important and valued resource within the village of Hato Horcón (Bernard, 2000) (Figure 9). I began conversing more with my key informant and other members of the village about various aspects of fuelwood in their lives. Through these conversations and my role as a participatory observer it became apparent that the people of the village held a practical knowledge about various aspects of fuelwood: where to look for it, what places are better than others, what type to look for in relation to the season, and which species are preferred over others. As people work in their surrounding environment they begin to develop adaptive practices to local situations, for example, lack of water sources and collection of fuelwood, that ultimately form the body of local knowledge (Mahiri, 1998). The village members of Hato Horcón held local knowledge about a highly valued and important local resource: fuelwood.

In small villages, practices are habitually learned and passed down through oral tradition. In the collection of fuelwood people are tapping into a village based knowledge developed through their understanding of the environment rather than a formal, systematized scientific method (Mahiri, 1998). As both a Peace Corps volunteer working and living among the indigenous Ngäbe of Panamá and a graduate student in forestry, I wanted to study this important aspect of their lives and put a portion of that knowledge into a formal written document.

During my second year of service when I was ready to start my research, I requested the participation of seven farmers and all willingly agreed to help me, in part, because we had built a trusting and working relationship with one another over the past year. The seven farmers were part of an agricultural group and lived and worked in the village of Hato Horcón (Figure 10).

Figure 10. Farmers of the agricultural group of Hato Horcón.

Experimental Design

My research was designed to looks at patterns of fuelwood collection in different ecotypes, both managed and unmanaged, in the village of Hato Horcón, Panamá. The study also investigates the quality of local fuelwood sites. Both qualitative and quantitative data were collected. Quantitative data were collected by traversing a set of randomly selected transects within the village. At the transects, the qualitative aspect was collected through a participating village member's responses to a survey. The objective of the survey was to collect information about the fuelwood knowledge base of village members, determine its relationship to standard forestry variables, and explain how community members adapt to their environment when collecting fuelwood. Quantitative and qualitative data were analyzed together to investigate the quality of several local fuelwood sites and to look at patterns of fuelwood collection.

A pretest of the experimental design and methods was performed prior to the data collection. The pretest provided the opportunity to estimate the time it would take to collect all of the data, to verify the study stayed within the boundaries of the village and to ensure the research participants would clearly understand their role and responsibilities while out in the field.

Human subject research permission was granted by Michigan Technological University prior to fieldwork with the village participants. Permission was also granted by the local indigenous government of the Comarca Ngäbe-Buglé to carry out the study on local lands (Appendix A). The study was also approved by the Peace Corps Panamá country director.

The research was conducted within the boundaries of the village of Hato Horcón within the indigenous Comarca Ngäbe Buglé. The four corners of the village were located and marked with a GPS (global positioning system). The size of the village was approximated utilizing the GPS information of the four corners and was estimated at 250,000 m^2, or approximately 25 hectares (61.78 acres). The UTM coordinates of the southwestern corner, where every point north and east of the point was within the village and the northeastern corner, where every point south and west of the point was in the village were identified. The UTM coordinates of these corners (southwestern and northeastern) were then inserted into a spreadsheet to generate random start points and transect directions located within the boundaries of the village (Appendix B).

Each start point was entered into a GPS unit and was scouted to determine functionality and location. Functionality of a start point, for the purpose of this study, can be defined as a start point that allows for variability within the data. Because the village of Hato Horcón is comprised of subsistence farmers the majority of land is farmland. Farmland is prepared through slash and burn agriculture, a land-clearing technique were all vegetation is slashed (Figure 11) and subsequently burned (Figure 12) (Palm *et al.,* 2005). Because the practice of slash and burn agriculture clears lands of almost all vegetation to prepare for the planting of food crops, a small number of trees are left in the fields (some trees are left to provide shade). If trees were not present farmers would not go there to collect fuelwood. Therefore, farmland plots provided little information about fuelwood collection. In order to assure enough sample plots within the data set I determined some farmland start points as non-functional. During the scouting process these start points were occasionally discarded and directions were sometimes changed to avoid placing too many plots in farmland. In the case that a start point had to be discarded the next start point and random direction on the spreadsheet was used.

Figure 11. Land being “slashed” in preparation to burn.

Figure 12. Land being burned after slashing in slash and burn agriculture.

Transects of 200 meters (656.17 feet) were established within the village boundaries. Five plots were spaced 40 meters (131.23 feet) along the 200 meter transects. A compass and GPS were used to determine direction and location, while pacing was used to determine plot locations.

Data were collected over a three week period from May 1 to May 19, 2007. Five transects consisting of a total of 25 plots were investigated with each farmer. The data set contains information from 175 plots within 35 transects with seven individual farmers providing information (Appendix E).

The data sheet is shown in Figure 13. At the plot center a prism of 10 BAF (basal area factor) was used to calculate basal area. DBH of "in" trees was recorded. Coarse woody debris with a diameter of six centimeters and above was measured. The participating farmers said the smallest size of wood they would pick up as fuelwood was six centimeters. Following Lloyd (2005) an equilateral triangle with three meters on a side was placed on the ground within each plot. Each piece of coarse woody debris that crossed the triangle and was at least six centimeters in diameter was tallied. The ecotype and topography was recorded as well as the dominant species or vegetation within the plot.

<u>Transect Data</u>:

Fuelwood Transect Data Sheet

A. Transect Information

1. Starting Point
2. Transect Direction
3. Interval between sample points

B. Farmer Information

1. Farmer Code
2. Age
3. Family Size

C. Data Points/Plots

1. Point Number
2. Basal Area/dbh
3. Dominant vegetation/species
4. Topography/ecotype
   a) Farm Land
   b) Steep Hillside
   c) River Basin
   d) Residential
   e) Pastureland

5. Coarse Woody Debris (cwd) measurements $\geq$ 6cm

6. Farmer Fuelwood Rating
   How would you rate this site for fuelwood?
   1 (poor) 2 3 (average) 4 5(excellent)

7. Farmer description and identification of fuelwood species (# and identity).
   Why did you give this site a rating of ____?
   Answer:

8. Is this land part of someone's farm? Is it private property?

9. Occasionally as a data check:
   "You called this site a <*fuelwood ranking number*>, with <*slightly better than average fuelwood*>, is it similar to the stop we just made or are there differences?"

Figure 13. Data sheet used in fieldwork data collection.

At each plot the farmer chose a fuelwood rating number (Table 1) and identified fuelwood tree species. Time was also provided for the farmer to add any additional information regarding the plot. Additional information could involve whether the area was protected or preserved, species properties in relation to burning and further explanation on why they chose the particular number from one to five. The reference card provided a small amount of information. For example, if a farmer designated a plot as a number two the reference card indicated there was almost no fuelwood, but some was present. The farmer would often give further detail on the plot explaining and defending the number chosen.

Table 1. Fuelwood Rating Description

Rating	Significance	Description
1	poor	no fuelwood present
2	mediocre	almost no fuelwood, but some present
3	average	fuelwood present, but not significant
4	great	fuelwood present with good quality or quantity or both
5	excellent	perfect in terms of quality, quantity or both

The farmer also indicated if the plot area was farm or private property (Figure 14). Traditionally, land rights within the village are usufruct tenure: informal property rights to use unclaimed land (Palm *et al.,* 2005). Farmland is used, but not owned through occupying an otherwise unoccupied portion of land and can be divided among family members (Figure 15). There are no formal legal bases for occupying or inheriting land. In order to legally claim land as private property one must have title papers written and signed by the local government. For the purpose of the study the participants indicated if the area was farmland, used but not owned, or land legally owned by someone who held papers to distinguish it as private property.

Figure 14. Farmland within the village of Hato Horcón.

Figure 15. Farmland under usufruct land tenure.

Data

This section provides a summary of the data set in this study. The data set includes qualitative data from farmer's local knowledge and opinions and quantitative data from standard forestry variables within 175 plots. Seven farmers participated in the study with an average age of 33 years where the youngest was 17 and the oldest was 43.

A total of 585 trees were measured for dbh with an average of 3.34 being measured in each plot, standard deviation 3.17 (Table 2). The maximum number of trees measured within a plot was 15 while the minimum was zero. The largest individual tree measured at 396 cm dbh (155.9 in). The average basal area of all plots measured was 7.56 m^2/ha (32.91 ft^2/acre), ranging from zero to 34.44 m^2/ha (150 ft^2/acre), with a standard deviation of 7.19 (Table 2). The average number of pieces of coarse woody debris measured within a plot was 3.42 with a standard deviation of 3.92 (Table 2). The maximum amount of coarse woody debris collected within one plot was 24, while the minimum was zero.

Table 2. Summary of Standard Forestry Variables

Variable	Mean	Std. Dev	Minimum	Maximum
# Measured for dbh	3.34	3.17	0	15.00
Basal Area (m^2/ha)	7.56	7.19	0	34.44
Basal Area (ft^2/acre)	32.91	7.19	0	150.00
#Measured cwd	3.42	3.92	0	24.00

The most common dominant vegetation was mixed species, followed by fallow (weedy mix) and crops (Table 3). In mixed species plots there were too many species present to identify one as the dominant species. Hillside was the most common ecotype identified, closely followed by river basin and stream ecotype (Table 4). Hillside ecotype was recorded as an area where land was being cultivated, with either rice or corn, or had been cultivated and was now fallow.

Table 3. Distribution of dominant vegetation observations recorded within transect plots. Dominant vegetation categories are ordered from highest number of observations to lowest number of observations.

Dom. Veg. #	Dom. Veg. Description	# Observations
4	Mixed	69
2	Fallow (weedy mix)	25
1	Crops	19
5	Fruit Trees	18
3	Brush	15
7	Wood Species	15
8	Invasive Weeds	8
6	Leguminous Balo	6

Table 4. Distribution of ecotype observations recorded within transect plots. Ecotype categories are ordered from highest number of observations to lowest number of observations.

EcoType #	EcoType Description	#Observations
2	Hillside	59
3	River Basin/Stream	47
0	Farm	17
6	Woodlot	17
4	Residential	17
1	Agroforestry Area	14
5	Pasture	4

The ratings between the plots were evenly distributed with rating one (32 plots): **poor quality with no fuelwood present**, rating two (33 plots): **almost no fuelwood, but some present,** rating three (39 plots): **average quality with fuelwood present, but not significantly**, rating four (39 plots): **fuelwood present with good quality quantity or both**, , and rating five (32 plots): **perfect for fuelwood in terms of quality, quantity or both** (Table 5).

Table 5. Distribution of the number of plots recorded within each rating.

Rating	**Description**	**# of Plots**	**% of Plots**
1	**no fuelwood present**	**32**	**18.28**
2	**almost no fuelwood, but some present**	**33**	**18.85**
3	**fuelwood present, but not significant**	**39**	**22.28**
4	**fuelwood present with good quality or quantity or both**	**39**	**22.28**
5	**perfect for fuelwood in quality, quantity or both**	**32**	**18.28**

Plots where rating was based on reason one: good variety of different species was chosen most frequently followed by reason five: very few fuelwood species being present and reason four: no fuelwood species present (Table 6). The farmers often provided further information as to why a particular reason was chosen, but the reason categories were developed to assure consistency throughout all seven farmer's responses.

Table 6. Distribution of the reasons farmers provided for why they chose a particular fuelwood rating in transect plots Reasons are ordered from highest number of observations to lowest number of observations.

Reason #	Reason Description	# Observations
1	good variety of different species	66
5	very few fuelwood species present	37
4	no fuelwood species present	34
6	average amount of fuelwood species present	25
3	many smaller	8
2	good sized	5

Data were also collected on 60 tree species present within the 175 plots. The complete data set can be found in Appendix E. Categories were developed for species farmers identified as preferred (Table 7) as well as species identified for agroforestry systems (Table 8).

Table 7. Preferred Species List

Common Name	Scientific Name
Higueron	*Ficus apollinaris*
Sangrio	*Otoba acuminata*
Palo Raton	*Gliricidia sepium*
Guabo	*Inga sapindoides*
Mango	*Mangifera indica*
Mangle	*Rizophora mangle*
Laurel Negro	*Cordia alliodora*
Nance	*Byrsonima crassifolia*

Table 8. Agroforestry Species List

Common Name	Scientific Name
Fruta de Pan	*Artocarpus sapindoides*
Macano	*Diphysa Americana*
Café	*Coffea arabica*
Guabo	*Inga sapinoides*
Naranja	*Citrus sinensis*
Mango	*Mangifera indica*
Aguacate	*Persea americana*
Cacao	*Theobroma cacao*
Membrillo	*Grias cauliflora*
Nance	*Byrsonima crassifolia*

Statistical Analysis

Variables were analyzed using Pearson's Correlation Coefficients with the SAS system (Steel and Torrie, 1960). Correlations were declared significant at $P < 0.05$. P values are reported throughout the following results and discussion chapter. Some data was additionally analyzed using an ANOVA test with Tukey's Studentized Range test of honestly significant difference to determine which differences among dbh means and maximums were significant (Appendices C and D). Some categorical data were analyzed using a chi-square test.

SECTION THREE

Implications of Study

Chapter Four

Results and Discussion

The lands of the Comarca Ngäbe-Buglé have gone through years of cultivation, deforestation, and reforestation and are currently undergoing the same processes with an increasing population (ANAM, 2002). Fuelwood is a basic necessity of households in the developing world, as well as Hato Horcón (Heltberg *et al*., 2000). Subsistence farmers in the village of Hato Horcón use local knowledge and their best judgment to locate fuelwood and manage their lands in the current environmental conditions. The years of use on these lands has caused the current population to adapt to and create methods, or patterns, of how to locate and collect fuelwood.

In this study a set of variables were analyzed to investigate the process a farmer goes through in locating an ideal fuelwood site and how this relates to land management decisions. The study finds that the farmers of Hato Horcón prefer the use of large trees in locations of high basal area, which tend to be river basins, with a dominant vegetation of mixed or agroforestry species. Preferred species, identified by farmers, were also found to be located within river basins and among the mixed and agroforestry vegetation types.

Labor Costs and Tree Size

Both Leach and Mearns (1988) and Gelder and O'Keefe (1995) argue that people in the developing world prefer to grow small trees, harvest small fuelwood and burn small fuel because the labor costs are small. The preference for small tree systems is a common view utilized in the planning of fuelwood management schemes in developing countries. In the village of Hato Horcón the opposite is found to be true. Farmers find value in large sized trees as a source of fuelwood. A rating where the plot was determined excellent for fuelwood in terms of quality, quantity or both was significantly correlated to both basal area ($r = 0.58$, $p < .0001$) and maximum dbh ($r = 0.45$, $p < .0001$). These larger trees are more likely to drop dead and dying branches. When asked, farmers indicated the fallen branches as valuable sources of fuelwood because they can be burned immediately and do not require the felling of trees.

Tukey's studentized range test of honestly significant difference with ratings as categories was used to determine if mean dbh and maximum dbh were different in plots where farmers chose different ratings. Results are shown in Figures 16 and 17.

Farmer Rating	5	4	3	2	1
Mean DBH (in)	41.45	33.81	22.89	19.94	11.39
Mean DBH (cm)	105.03	85.88	58.14	50.65	28.93

Figure 16. Tukey's Studentized Range Test of Mean dbh with Farmer Ratings as Categories. Ratings are from 5 (excellent fuelwood site) to 1 (poor fuelwood site). The figure shows categories ordered from highest mean dbh on the left to lowest mean dbh on the right.

Farmer Rating	5	4	3	2	1
Max DBH (in)	71.34	54.19	29.80	25.41	11.92
Max DBH (cm)	181.20	139.47	75.69	64.54	30.28

Figure 17. Tukey's Studentized Range Test of Maximum dbh with Farmer Ratings as Categories. Ratings are from 5 (excellent fuelwood site) to1 (poor fuelwood site). The figure shows categories ordered from highest maximum dbh on the left to lowest maximum dbh on the right.

Figure 16 shows significant differences between mean dbh when farmer rankings are used as categories. Figure 17 shows significant differences between maximum dbh when farmer rankings are used as categories. Plots with higher rankings consistently had both higher mean and maximum dbh when compared to plots with lower rankings. The differences were often significant. Farmers preferred plots with large trees for fuelwood production and collection.

The branches falling from the preferred large trees become the coarse woody debris which is used as fuelwood. The prevalence of coarse woody debris within a plot is positively correlated with the maximum dbh ($r = .030$, $p < .0001$). Additionally, a positive correlation exists between the amount of coarse woody debris within a plot and the rating ($r = 0.33$, $p < .0001$). The correlations indicate that in areas where larger trees exist there is more coarse woody debris and, therefore, a higher rating. The higher rating is consistent with farmers indicating a value in larger sized trees and fallen branches that measured six centimeters or more as functional fuelwood.

Farmers in Hato Horcón find the labor costs of small trees, as discussed in Leach and Mearns (1988) and Gelder and O'Keefe's (1995) systems, to be higher than the labor costs associated with larger trees. How can this be? The subsistence farmer in Hato Horcón does not require labor input when planting, felling or waiting for fuelwood to dry, as is the case in the smaller tree system. The labor costs involved in the collection process of a farmer in Hato Horcón are hiking to locate an area of large existing trees, or high basal area, which tended to fall into the river basin and stream ecotype as well as the agroforestry area and woodlot ecotypes (Figure 18). Within the preferred ecotype farmers would pick up fallen branches, or coarse woody debris, where basal area was positively correlated to the number of coarse woody debris within a plot ($r = 0.27$, $p < .0001$), and chopping them to a proper size to fit an open-flamed stove.

Ecotype	3	1	6	4	2	0	5
BA (ft^2/acre)	56.81	45.00	44.71	34.71	14.41	12.14	10.00
BA (m^2/ha)	13.04	10.33	10.27	7.97	3.31	2.79	2.29

Figure 18. Tukey's Studentized Range Test of Basal Area with Ecotype as Categories. The figure shows categories ordered from highest basal area on the left to lowest basal area on the right. Ecotype descriptions can be found on page 34 Table 4.

Figure 18 shows significant differences between ecotypes with basal area as categories. The highest basal area fell into ecotype three, river basin and stream, which is significantly different from all other ecotypes, with the exception of ecotype one, agroforestry area, and ecotype six, woodlot. Although the river basin and stream ecotype was not significantly different from the agroforestry area and woodlot ecotypes these two ecotypes (one and six) were not significantly different from ecotypes four, residential, ecotype two, hillside, ecotype zero, farm and ecotype five, pasture.

A relationship between excellent ratings and ecotype was also found (Chi-square value = 147.6, $p < .0001$, d.f. = 24). The river basin and stream ecotype was related to a rating of excellent.

These findings are consistent with farmers reducing the labor costs associated with fuelwood collection. The costs are lowered by seeking out large species that drop their branches in the protected river basins and streams (Figure 18).

Figure 19. River basin and stream ecotype.
Photo by Jessica Mehl

The farmers in Hato Horcón do plant tree species, but the species planted are not only meant for fuelwood as they are in the smaller tree system used in other parts of the world. The species planted are intended for long-term uses such as timber for construction or as a source of fruit or food for consumption (Figure 19). The longevity of these tree species is viewed as a reduction in labor cost because the trees will not be repeatedly planted and felled as is the case in the smaller tree system discussed by Leach and Mearns (1988) and Gelder and O'Keefe (1995).

Figure 20. Mango tree, identified as a multi-purpose species, planted near a residence as a source of food through the fruit and a source of fuelwood through the fallen branches. Photo by Jessica Mehl

Planting fruit or other economically valuable trees, in that they are long-lasting and continuously productive, is an example of farmers of Hato Horcón maintaining a system appropriate to their environment and usufruct land tenure system (Raintree, 1986). With limited land availability and an increasing population farmers are applying alternative strategies to maximize production on the land they currently own, this can mean planting long-lasting fruit and timber trees while cultivating cash and staple crops around them. Examples of this economic approach, where farmers shorten or completely eliminate the fallow period through the establishment of long-term species in agroforestry systems, have also been seen in Borneo, China, Papua New Guinea, Sahel and the Phillipines (Raintree, 1986).

Gelder and O'Keefe (1995) also state that wood that is small, quick to light and good for heat is young wood. The young wood can be burned immediately and does not require an extensive drying period. The farmers of Hato Horcón indicated that they seek out preferred species when in search of fuelwood for immediate burning. The majority of the preferred species identified by the farmers of Hato Horcón were preferred because they could be burned green without a drying period. There was also a significant positive correlation of the preferred species to total basal area ($r = 0.31$. $p < .0001$). Locating trees that can burn green minimizes the labor cost through the elimination of a drying period, while still using a large tree system.

Population and Tenure

Population pressures in Hato Horcón are leading to an increase in land that is cultivated through usufruct land tenure and inheritance. Once land is claimed under usufruct land tenure it is no longer considered a free area for the entire village to search for and collect fuelwood. The new "owners" begin cultivating the land and in turn claim trees, once used by the general population as a source of fuelwood, as "private property". The continuous division of land through inheritance also reduces the number of trees once used as public fuelwood sources. The farmers are currently adapting to the population pressures and land tenure issues through the use and development of agroforestry systems. The agroforestry systems merge a diverse combination of species within the same area in a layered system to maximize environmental benefits and production (Negash, 2007). The agroforestry systems being practiced in Hato Horcón have been introduced and supported through the Panamanian government and are being further developed and sustained through NGOs and international agencies, such as the United States Peace Corps (Figure 20).

Figure 21. Participants of the village of Hato Horcón at a closing ceremony of an agroforestry project with Peace Corps.

The population of the Comarca Ngäbe-Buglé, in the area of Hato Horcón, has increased at a rate of 4.27% annually in the last 10 years (ANAM, 2002). This increase is occurring at a slow enough rate within the village of Hato Horcón that public forestland still exists. Within the forestlands village members are still able to locate and collect fuelwood. As the population grows and more land is claimed, the forestland is cleared or no longer considered public. At this point, individual farmers begin a decision process involving a dynamic set of choices to ensure a secure source of fuelwood in addition to public forestlands (Checkland, 1981; Checkland and Scholes, 1990 as cited in Huxley, 1999). The decision process of the individual farmers leads to the transition occurring in Hato Horcón. The transition is the use of agroforestry farming in a large tree system. Some farmers find it absolutely necessary to begin transforming their farms into this new system, while others have not yet been affected enough by the pressure to act.

The recorded observations of ecotype within the data set provide insight into the agroforestry transition occurring in Hato Horcón. The most frequently observed ecotype within the data set was hillside, 34%, immediately followed by river basin streams, 27%, and eventually agroforestry, 8%, the remaining 31% was distributed among farm, residential, pasture and woodlot ecotypes. The occurrence of these three ecotypes portrays a picture of how land is managed and decisions are made as a result of population pressures and tenure concerns. As the population increases the cultivation of land increases, which in turn increases the incidence of the hillside ecotype. Hillside ecotype was recorded as an area where land was being cultivated, with either rice or corn, or was left fallow. The hillside ecotype increases because land is prepared through slash and burn agriculture, cultivated with rice or corn and subsequently left fallow while the farmers seek out new land to cultivate (Figure 21).

Figure 22. Hillside ecotype with patches of slash and burned and fallow land.

The hillside ecotype is closely followed, in number of observations, by river basins and streams, which are public lands. The river basin and stream ecotype showed a significant correlation with plots farmers identified as excellent for fuelwood in terms of quality, quantity or both ($r = 0.41$, $p < .0001$). This finding is consistent with river basins and streams as public lands preserved by the village. The species left standing in the river basins are not only protecting the watershed but are providing a source of fuelwood to the general public though fallen branches.

The number of river basin and stream ecotypes observed (47) was close to, but lower than, the number of hillside observations (59). The higher number of observations of hillside ecotypes suggests that land pressures are becoming more prominent in the village as more people are claiming land and cultivating it. The people of Hato Horcón have begun adapting to these pressures by developing a new system. This recent pressure is related to the fourteen observations of agroforestry ecotypes.

During data collection the sampling of different ecotypes was stratified by sampling the farmland ecotype less intensively than the other ecotypes categories. The stratification prevents a comparison of other ecotype categories with the farmland ecotype category in terms of land percentage based on number of observations. The percentage of land among other ecotype categories based on numbers of observations remains valid as farmland plots that were discarded were redistributed randomly among the other ecotype categories.

The practice of agroforestry systems in Hato Horcón is consistent with the findings of Raintree (1986) in which intensification of land use evolves as people transition from shifting to continuous agriculture in different stages. The people of Hato Horcón are in the process of establishing a system where land use is approached as a culturally integrated development method to diversify and sustain the economy (Raintree, 1986; Mahiri, 2003). The integrated system is based on stages of land intensification in relation to population pressures and land tenure concerns because they no longer have the option to shift to new agricultural areas. As the population increases and land becomes increasingly sparse a more integrated farming approach is practiced: this is what we see in Hato Horcón.

The integrated systems of agroforestry in Hato Horcón are practiced on hillsides under usufruct land tenure. It is common for individual farmers to have one or two steep hillsides to farm on as well as a smaller, more level, hillside farm area. The hillsides are generally cultivated with rice, maize and beans. Often, intercropping is practiced where maize or beans are planted with rice. In both intercropping scenarios the rice is harvested and the remaining maize or bean crops are left until maturation. Large shade trees are also becoming more commonly found in fields where rice, maize and beans are being cultivated as farmers are adapting to a more integrated farming approach. The large trees provide a source of fuelwood to the family farming the land from fallen branches.

It is the smaller farm area where the more intensive integrated approach to agroforestry farming is being practiced. The smaller farm area consists of a canopy layer of large and medium sized fruit and timber trees including mango (*Mangifera indica*), avocado (*Persea Americana*), and cashew (*Anacardium occidentale*), as well as laurel (*Corida alliodora*) and sangrio (*Otoba acuminate*) trees. The next layer of the system is comprised of smaller sized products such as pigeon pea bean shrubs (*Cajanus cajun*), a variety of bananas, and other small shrubs, including hot peppers. The bean and banana layer is then followed by tuber root crops, such as taro root (*Colocasia esculenta*) and cassava (*Manihot esculenta*), ground products such as kidney and green beans, followed by the lowest ground level of rice and fish tanks. The boundaries of these areas are often planted with leguminous tree species. The bordering tree species are permanent, nitrogen-fixing and coppicing providing a continuous source of fuelwood while improving soil fertility.

The rice and fish tanks are an alternative approach to producing rice on hillsides and intensifying production on farmland as well as providing a protein source to the household. The tanks are constructed to the preferred dimensions of the farmers, depending on each individual's farm size, and allow them an increased output on a smaller portion of land. At the ground level, the perimeters of the rice and fish tanks are lined with lemongrass, a live barrier that stabilizes the ground through an extensive and deep root system. The lemongrass is also used to create live barriers on the natural slopes of the farming areas to prevent erosion and distinguish different farm sections. Additionally, lemongrass serves medicinal purposes and as tea. Within these smaller farm areas the landscape is converted to maximize production using the available spatial components involving layers from the ground level and up (Figure 22).

The farmers of Hato Horcón are in the early stages of converting their farms and forests into agroforestry systems to offset the decreasing public fuelwood sources, adapt to an increasing population and decreasing land availability and to manage lands with the available labor. Farmers incorporate trees into their lands or incorporate themselves into forests to create agroforestry systems and deal with the population and tenure concerns (Raintree, 1986). Both methods are practiced by the farmers of Hato Horcón.

Figure 23. An agroforestry system in Hato Horcón where the ground layer is a fish pond, second layer is leguminous trees, followed by fruit and wood species.

When farmers incorporate trees into their farms they are ensuring themselves a source of fuelwood in addition to other products of the tree (Raintree, 1986; Beets, 1990). The farmers of Hato Horcón continue to look for fuelwood on public forestland, but have provided themselves with a “savings” of fuelwood on the land they claim under usufruct land tenure. The farmers search for fuelwood on public lands during the dry season, when it is easier to locate usable fuelwood, and rely on their personal farmland supply during the rainy season, when it is more difficult to locate usable fuelwood.

The incorporation of trees into farm areas also decreases time spent locating fuelwood as most farms are established close to the household (Mahiri, 2003), and are managed and protected to provide products useful to the farmer (Beets, 1990). This tree incorporation can reduce the labor necessary to manage the farm by condensing the farm area. In the developing world farm management is the responsibility of the household.

Individual households have different numbers of family members who are capable, old enough, and strong enough to participate in farm labor. The agroforestry system intensifies production in one area of a farm as opposed to shifting to new farm area, making it more manageable for the participating members of the household.

In the second method, where farmers are incorporating themselves into existing forested land there is already an established source of fuelwood accessible and ready to use. The farmers cultivate the land around these pre-existing trees to get an increased return out of a parcel of land. This is what is practiced in Hato Horcón on hillsides where rice, maize and beans are cultivated around shade trees. In the farmlands of Hato Horcón it is becoming more common to see established shade trees, or tree layers, while the ground is being cultivated with maize, manioc and fish ponds. The layers of this agroforestry system provide a source of fuelwood with minimal maintenance.

The agroforestry system allows individual farmers and households fuelwood security with sources on their own land and prevents them from relying completely on diminishing public lands, while increasing production on a small parcel of land through land-use mix (Raintree, 1986). The land-use mix slowly converts a single species landscape into a mixed species landscape. Various tree species are incorporated into the system while staple and cash crops are still produced for the benefit of the household. Farmers rated plots with a dominant vegetation of mixed species as excellent ($r = 0.52$, $p < .0001$). In plots where a dominant vegetation of mixed species was identified there was a positive correlation to basal area ($r = 0.54$, $p < .0001$), the number of trees measured for dbh ($r = 0.55$, $p < .0001$) and the maximum dbh ($r = 0.57$, $p < .0001$). The correlations support the farmers' preference for large tree systems in a mixed species environment.

In plots where agroforestry species were present there was a positive correlation with maximum dbh ($r = 0.30$, $p < .0001$) indicating farmers are incorporating themselves into forests and cultivating around large pre-existing trees. These large pre-existing trees provide a source of fuelwood. Within the agroforestry ecotype there was a positive correlation to preferred ($r = 0.23$, $p < .0001$) and agroforestry species ($r = 0.48$, $p < .0001$), indicating that farmers are conserving or planting the trees they prefer within agroforestry ecotypes. These preferred species provide a source of fuelwood. In plots where a dominant vegetation of agroforestry, or fruit, species were found there was a significant positive correlation to basal area ($r = 0.50$, $p < .0001$), the number of trees measured for dbh ($r = 0.61$, $p < .0001$), and the maximum dbh ($r = 0.45$, $p < .0001$). These findings show farmers favor plots with a dominant vegetation of agroforestry species, in addition to mixed species vegetation, because there is a high incidence of large trees and basal area, which is consistent with their preference for large tree systems.

The large tree systems preferred by the farmers within the village of Hato Horcón provide multiple benefits. Aside from providing a source of fuelwood, the large trees being maintained within the system offer shade to understory crops, recycle organic matter to increase soil fertility, strengthen the soil to prevent erosion and provide a natural barrier to strong winds and rain (Lundgren, 1985). These benefits enhance the sustainability of the land, providing landowners the advantage of continuous output from the same parcel.

<u>Other Literature</u>

Subsistence farmers move into forested lands to meet the basic food and fuel needs of the household. The encroachment into forested areas becomes necessary as basic needs are not met from declining agricultural production, increasing populations and land tenure issues (Lundgren, 1985; Balasubramanian and Egli, 1986; Ezaza, 1988; Heltberg *et al*., 2000; Negash, 2007). In order to prevent the devastation of these forests and meet the needs of subsistence farmers, different strategies must be developed and practiced. In parts of the developing world, farmers are managing trees in agroforestry systems to support their livelihoods in response to increasing population, tenure and agricultural pressures (Lundgren, 1985; Balasubramanian and Egli, 1986; Raintree, 1986; Neupane *et al*., 2002; Negash, 2007). A similar strategy for minimizing the effect of increasing population pressures and deteriorating environmental conditions on individual households is practiced in Hato Horcón. Subsistence farmers in the village are practicing agroforestry systems where large trees are managed within the system to provide a source of fuelwood and food.

The preference for large tree systems in Hato Horcón is substantially different from studies that argue people in the developing world prefer the use of small tree systems because the labor costs are small (Leach and Mearns, 1988; Gelder and O'Keefe, 1995). Small tree systems have low labor costs because farmers in the developing world do not have to wait for stem diameters to increase and the smaller trees are easier to harvest and burn. In the developing world farmers do not have the time to wait for trees to reach larger diameters (Leach and Mearns, 1988; Gelder and O'Keefe, 1995). These results do not agree with the findings in this study: in Hato Horcón farmers prefer the use of large tree systems and labor costs are reduced with the use of large tree systems.

Households in the developing world cope with the declining supply of fuelwood by developing different strategies depending upon the socio-economic, environmental and cultural conditions of the area (Neupane, 2002; Mahiri, 2003). One strategy is to collect fuelwood on their farmlands as public collection areas diminish (Mahiri, 2003). The branches and twigs of tree species in farming systems on farmlands are often used for fuelwood (Balasubramanian and Egli, 1986; Heltberg *et al*., 2000; Negash, 2007). These findings are consistent with the findings of this study. As public collection areas decrease due to increased population pressure and land tenure concerns the farmers of Hato Horcón are using agroforestry on their own farmland as a strategy to supply household fuelwood.

Chapter Five

Conclusion and Recommendations

This study investigated the process a farmer in Hato Horcón goes through in locating and determining a "good" site in terms of fuelwood and how the variables involved in the process are related to land management. The farmers of Hato Horcón prefer the use of large trees in areas of high basal area, which tend to be river basins, with a dominant vegetation of mixed and agroforestry species.

The current environmental conditions and population pressures in the village have caused farmers to adapt and create methods, or land management strategies, of how to locate and collect fuelwood. The strategies demonstrated by the farmers were the use of agroforestry and large trees systems. These methods allow the farmers to continue to locate and collect fuelwood in terms of their preferences.

The farmers of Hato Horcón are still in the early stages of incorporating trees into their farming systems and converting their farmlands to agroforestry. There are currently a handful of farmers experimenting and practicing the new methods while others have not yet felt enough pressure to change their farming systems. As the farmers currently practicing these approaches become more comfortable and confident, other farmers within the village can see the effectiveness and identify with the need for change (Bunch, 1982). The acceptance of change by additional village farmers can eventually lead to an efficient agricultural system with a greater output on a smaller portion of land.

The use of trees in agricultural systems can provide numerous advantages (Bunch, 1982). In the village of Hato Horcón, the use of trees, or agroforestry, provides an increase in production among other advantages. The increase in production not only provides households a source of food, but also provides them an immediate and local source of fuelwood. The farmers of Hato Horcón can maintain the increased production through the continual use of and eventual expansion of agroforestry.

The use of agroforestry within the village allows farmers to utilize all spatial components of their farm areas. It is becoming more common to see rice and fish tanks at the ground level of farms. The rice and fish tanks provide an increased output on a smaller portion of land as well as a source of protein. In addition, rice and fish tank farming opens up large areas of land previously farmed for rice. An increase in the use of rice and fish tank farming will allow for the preservation of fuelwood sources in lands once farmed for rice. Fuelwood sources can be preserved in these because there will no longer be the need for the slash and burn of existing vegetation. The people of the village can then define more of their landscape as preserved where large trees will be left to thrive. Not only will the village members be providing themselves a source of fuelwood but the large trees will also preserve the watershed, providing a source of water for drinking, bathing and washing clothes.

The people of Hato Horcón will continue to farm on the lands within the village as the need for food and fuelwood will continue in the future. As more villagers utilize appropriate technologies to increase production and manage environmental deterioration their confidence in these new methods will strengthen. Confidence among the farmers will evolve into eagerness for further improvement as they see progress in their agricultural systems and daily lives. These qualities are contagious throughout small villages in the developing world; no one wants to fail alone, but once one sees another's success they seek the opportunity to follow in their footsteps.

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Appendix A. Permission from the *cacique local*

Cuerpo de Paz • Panamá

Panamá, 15/2/07

Atención Señor Morales.
Cacique Local
Nole Duima
La Comarca Ngabe-Bugle

Estimado Señor Julián Morales:

Soy la voluntaria de Cuerpo de Paz en la comunidad de Hato Horcòn en La Comarca Ngabe-Bugle. Yo he vivido con la gente de Hato Horcòn desde Noviembre de 2005 trabajando con agricultura sostenible. Nosotros han hicido proyectos de reforestación con árboles nativos, abono orgánico y lombrices, arroz en fangeo con piscicultura y algunos mas.

Yo soy un clase de voluntaria especial porque estoy haciendo dos programas juntos; Cuerpo de Paz y mí maestría en agroforestal. El programa se llama maestría internacional con Cuerpo de Paz. Yo soy una estudiante en una universidad en Los Estados Unidos en Michigan, la escuela tecnología de Michigan. La idea del programa es trabajar como una voluntaria para el desarrollo de la comunidad e identificar proyectos que pueden ayudar la gente de la comunidad. Cuando los proyectos han sido identificados necesito escoger uno que tiene más importancia en la comunidad. Con el proyecto yo he escogido voy a trabajar junto con la gente de la comunidad estudiar la situación que esta ocurriendo.

Durante mí tiempo en Hato Horcòn yo he notificado gente buscando leña por un periodo mas de una o dos horas, especialmente durante los meses de invierno cuando todo de la leña esta mojada. En conversación con la gente yo aprendí que la gente tiene mucha experiencia y conocimiento de las clases de leña y las áreas que están mejor buscar la leña. Por eso, yo escogí un proyecto de leña hacer con la gente de Hato Horcòn para mi maestría.

El proyecto va a incluir la participación de 7 grajeros de la familia Guerrero en Hato Horcòn. Ellos van a caminar conmigo y enseñarme que clases de leña están mejor de los otros y donde podemos encontrar diferente clases de leña. Específicamente, estoy estudiando que aspectos pueden determinar si un área esta bueno y malo en relación de leña. Con toda de la información yo puedo informar la gente de Hato Horcòn que clases de leña deben sembrar tener una buena cantidad de leña para el futuro de los niños y la gente del área.

Estoy informando Usted que estoy haciendo y preguntando para su permisión hacer el proyecto en la comunidad de Hato Horcòn en el parte de Nole Duima en La Comarca Ngabe-Bugle.

Usted esta informado y esta acuerdo con el proyecto que estoy haciendo en Hato Horcòn.

Firma de Cacique Local Julian morales Reyes. C. 4-PI-16-627. 20 de febrero de 2.007.

Firma de la Voluntaria de Cuerpo de Paz Casey 2 Rosengarden

Usted puede contactarme vía email, Por favor déjame un mensaje de voz, a veces no tengo recepción en la comunidad de Hato Horcòn.
Estoy muy agradecido para su ayuda a cumplir el proyecto. Yo quiero conocer Usted y establecer una buena relación para el beneficio de todos. Sin otro particular, reiteramos nuestro más cordial y sincero saludo.

Atentamente,
Licda. Casey Rosengarden
Voluntaria de Hato Horcòn
Cuerpo de Paz

Appendix B. UTM Coordinates of Random Start Points and Directions

x coord	y coord	x (E-W)	y (N-S)	direction
214	271	414302	918580	W
494	701	414384	918997	W
289	489	414324	918792	SE
230	198	414307	918510	NW
4	910	414241	919199	SW
115	976	414273	919263	NE
391	865	414354	919156	NE
459	44	414374	918361	N
525	359	414393	918666	NE
179	899	414292	919189	NE
563	702	414404	918998	NW
10	98	414243	918413	E
435	681	414367	918978	N
14	803	414244	919096	SW
833	102	414483	918417	N
138	778	414280	919072	NE
874	651	414495	918949	SW
562	884	414404	919174	SW
16	988	414244	919275	S
16	344	414244	918651	E
217	384	414303	918690	E
29	501	414248	918803	SW
112	810	414272	919103	N
312	498	414331	918800	S
769	170	414464	918483	NW
703	295	414445	918604	W
355	736	414343	919031	E
215	741	414303	919036	SE
602	973	414416	919261	SE
210	542	414301	918843	SE
279	334	414321	918642	N
331	456	414336	918760	S
890	451	414500	918755	NW
264	414	414317	918719	S
691	989	414441	919276	SW
663	67	414433	918383	SW
757	878	414461	919168	E
803	390	414474	918696	S
882	822	414497	919114	SW

Appendix C. Tukey's Studentized Range Test of honest significant difference:Mean dbh

Code:

```
proc glm; class  Rating ;
model MeanDBH =  Rating ;
means  Rating/tukey alpha=.05 ;

proc END;
```

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The GLM Procedure

Class Level Information

Class	Levels	Values
Rating	5	1 2 3 4 5

Number of Observations Read	175
Number of Observations Used	175

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The GLM Procedure

Dependent Variable: MeanDBH   MeanDBH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	18442.04428	4610.51107	17.83	<.0001
Error	170	43947.57485	258.51515		
Corrected Total	174	62389.61913			

R-Square	Coeff Var	Root MSE	MeanDBH Mean
0.295595	61.69994	16.07841	26.05903

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Rating	4	18442.04428	4610.51107	17.83	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Rating	4	18442.04428	4610.51107	17.83	<.0001

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The GLM Procedure

Tukey's Studentized Range (HSD) Test for MeanDBH

NOTE: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	170
Error Mean Square	258.5151
Critical Value of Studentized Range	3.89938

Comparisons significant at the 0.05 level are indicated by ***.

Rating Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
5 - 4	7.645	-2.929	18.220	
5 - 3	18.563	7.989	29.137	***
5 - 2	21.514	10.515	32.513	***
5 - 1	30.067	18.984	41.150	***
4 - 5	-7.645	-18.220	2.929	
4 - 3	10.918	0.878	20.957	***
4 - 2	13.868	3.383	24.354	***
4 - 1	22.422	11.848	32.996	***
3 - 5	-18.563	-29.137	-7.989	***
3 - 4	-10.918	-20.957	-0.878	***
3 - 2	2.951	-7.535	13.436	
3 - 1	11.504	0.930	22.078	***
2 - 5	-21.514	-32.513	-10.515	***
2 - 4	-13.868	-24.354	-3.383	***
2 - 3	-2.951	-13.436	7.535	
2 - 1	8.553	-2.445	19.552	
1 - 5	-30.067	-41.150	-18.984	***
1 - 4	-22.422	-32.996	-11.848	***
1 - 3	-11.504	-22.078	-0.930	***
1 - 2	-8.553	-19.552	2.44	

Appendix D. Tukey's Studentized Range Test of honest significant difference: Max dbh

Code:

```
proc glm; class  Rating ;
model MaxDBH =  Rating ;
means  Rating/tukey alpha=.05 ;

proc END;
```

The SAS System   13:54 Saturday, November 10, 2007   9

The GLM Procedure

Class Level Information

Class	Levels	Values
Rating	5	1 2 3 4 5

Number of Observations Read   175
Number of Observations Used   175

The SAS System   13:54 Saturday, November 10, 2007 10

The GLM Procedure

Dependent Variable: MaxDBH   MaxDBH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	74079.5831	18519.8958	25.06	<.0001
Error	170	125647.1812	739.1011		
Corrected Total	174	199726.7643			

R-Square	Coeff Var	Root MSE	MaxDBH Mean
0.370905	69.41077	27.18641	39.16743

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Rating	4	74079.58314	18519.89579	25.06	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Rating	4	74079.58314	18519.89579	25.06	<.0001

The SAS System 13:54 Saturday, November 10, 2007 11

The GLM Procedure

Tukey's Studentized Range (HSD) Test for MaxDBH

NOTE: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	170
Error Mean Square	739.1011
Critical Value of Studentized Range	3.89938

Comparisons significant at the 0.05 level are indicated by ***.

Rating Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
5 - 4	17.148	-0.731	35.028	
5 - 3	39.600	21.720	57.479	***
5 - 2	45.932	27.334	64.529	***
5 - 1	59.419	40.679	78.159	***
4 - 5	-17.148	-35.028	0.731	
4 - 3	22.451	5.476	39.427	***
4 - 2	28.783	11.053	46.513	***
4 - 1	42.270	24.391	60.150	***
3 - 5	-39.600	-57.479	-21.720	***
3 - 4	-22.451	-39.427	-5.476	***
3 - 2	6.332	-11.398	24.062	
3 - 1	19.819	1.940	37.699	***
2 - 5	-45.932	-64.529	-27.334	***
2 - 4	-28.783	-46.513	-11.053	***
2 - 3	-6.332	-24.062	11.398	
2 - 1	13.487	-5.110	32.085	
1 - 5	-59.419	-78.159	-40.679	***
1 - 4	-42.270	-60.150	-24.391	***
1 - 3	-19.819	-37.699	-1.940	***
1 - 2	-13.487	-32.085	5.110	

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
1	1	1	43	11	1	0	0	1	1	0	0
2	1	1	43	11	1	0	0	1	0	0	0
3	1	1	43	11	3	2	0	1	0	0	0
4	1	1	43	11	3	2	0	0	0	1	1
5	1	1	43	11	4	3	0	0	0	0	1
6	2	1	43	11	4	3	0	0	0	0	0
7	2	1	43	11	4	3	0	0	0	0	0
8	2	1	43	11	4	3	1	0	0	0	0
9	2	1	43	11	7	5	0	1	0	0	0
10	2	1	43	11	7	5	0	0	0	1	0
11	3	1	43	11	5	1	0	0	0	0	1
12	3	1	43	11	5	1	0	0	1	0	1
13	3	1	43	11	6	2	0	0	0	0	1
14	3	1	43	11	2	2	0	0	0	0	1
15	3	1	43	11	4	3	1	0	0	0	0
16	4	1	43	11	7	4	0	0	0	0	0
17	4	1	43	11	8	2	0	0	0	0	0
18	4	1	43	11	2	4	0	0	0	0	0
19	4	1	43	11	3	0	0	0	0	0	0
20	4	1	43	11	5	1	0	0	0	0	0
21	5	1	43	11	4	6	0	0	0	1	0
22	5	1	43	11	4	6	0	0	0	0	0
23	5	1	43	11	2	2	0	0	0	0	0
24	5	1	43	11	4	3	0	0	0	0	0
25	5	1	43	11	1	0	0	0	0	0	0
26	1	2	34	8	1	0	0	1	0	0	0
27	1	2	34	8	3	3	0	0	0	0	0
28	1	2	34	8	1	0	0	0	0	0	0
29	1	2	34	8	1	0	0	1	0	0	0

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
30	1	2	34	8	4	3	0	0	0	1	1
31	2	2	34	8	5	4	0	1	0	0	0
32	2	2	34	8	4	6	0	0	0	0	1
33	2	2	34	8	3	2	0	1	0	0	0
34	2	2	34	8	4	3	0	0	0	0	0
35	2	2	34	8	2	2	0	0	0	0	0
36	3	2	34	8	2	4	0	1	0	0	0
37	3	2	34	8	4	3	0	1	0	1	0
38	3	2	34	8	4	3	0	0	0	0	0
39	3	2	34	8	4	3	0	0	0	0	0
40	3	2	34	8	7	2	0	0	0	1	0
41	4	2	34	8	1	4	0	0	0	0	0
42	4	2	34	8	7	2	0	0	0	0	0
43	4	2	34	8	7	4	0	0	0	0	0
44	4	2	34	8	7	2	0	1	0	0	0
45	4	2	34	8	7	2	0	1	0	0	0
46	5	2	34	8	4	4	0	1	0	0	1
47	5	2	34	8	4	2	0	0	0	0	1
48	5	2	34	8	4	6	0	1	0	1	0
49	5	2	34	8	4	2	0	1	0	1	1
50	5	2	34	8	4	2	0	1	0	0	0
51	1	3	29	6	4	3	0	0	0	0	0
52	1	3	29	6	5	1	0	0	0	0	0
53	1	3	29	6	4	3	0	0	0	0	0
54	1	3	29	6	4	2	0	0	0	1	0
55	1	3	29	6	4	3	0	0	0	0	0
56	2	3	29	6	3	5	0	0	0	0	0
57	2	3	29	6	1	0	0	0	0	0	0
58	2	3	29	6	3	5	0	0	0	0	0
59	2	3	29	6	4	2	0	1	0	1	0

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
60	2	3	29	6	1	2	0	0	0	0	0
61	3	3	29	6	2	2	0	1	0	0	0
62	3	3	29	6	7	2	0	0	0	0	0
63	3	3	29	6	7	4	0	1	0	0	1
64	3	3	29	6	2	2	0	0	0	0	0
65	3	3	29	6	6	3	0	1	0	0	1
66	4	3	29	6	5	4	0	0	0	1	0
67	4	3	29	6	4	3	1	0	0	0	0
68	4	3	29	6	4	3	1	0	0	0	0
69	4	3	29	6	4	3	1	0	0	1	0
70	4	3	29	6	1	0	0	0	0	0	0
71	5	3	29	6	5	1	0	0	0	0	0
72	5	3	29	6	2	2	0	0	0	0	0
73	5	3	29	6	2	2	0	0	0	0	0
74	5	3	29	6	2	2	1	0	0	0	0
75	5	3	29	6	8	2	0	0	0	0	0
76	1	4	38	8	4	3	0	0	0	0	0
77	1	4	38	8	4	3	0	0	0	0	0
78	1	4	38	8	4	3	0	0	0	0	0
79	1	4	38	8	2	2	0	0	0	1	0
80	1	4	38	8	2	2	0	0	0	0	0
81	2	4	38	8	1	0	0	0	0	0	0
82	2	4	38	8	6	2	0	1	0	0	0
83	2	4	38	8	2	2	0	0	0	0	0
84	2	4	38	8	3	2	0	1	0	0	1
85	2	4	38	8	2	2	0	0	0	0	0
86	3	4	38	8	1	4	0	1	0	0	1
87	3	4	38	8	5	4	0	0	0	0	0
88	3	4	38	8	4	1	0	0	0	0	0
89	3	4	38	8	4	1	0	0	0	0	0

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
90	3	4	38	8	7	4	0	0	0	0	0
91	4	4	38	8	4	3	0	0	0	0	1
92	4	4	38	8	8	2	0	0	0	0	0
93	4	4	38	8	4	6	0	0	0	0	0
94	4	4	38	8	4	6	0	0	0	1	0
95	4	4	38	8	4	6	0	0	0	0	0
96	5	4	38	8	5	4	0	0	0	0	0
97	5	4	38	8	1	0	0	0	0	0	0
98	5	4	38	8	4	4	0	0	0	0	0
99	5	4	38	8	4	6	0	0	0	0	0
100	5	4	38	8	2	2	0	0	0	0	0
101	1	5	17	0	4	6	0	0	1	0	0
102	1	5	17	0	3	2	0	0	0	0	0
103	1	5	17	0	8	2	0	0	0	0	0
104	1	5	17	0	4	3	0	0	0	0	0
105	1	5	17	0	4	3	0	0	0	0	0
106	2	5	17	0	4	3	0	1	0	0	0
107	2	5	17	0	5	1	0	0	0	0	0
108	2	5	17	0	4	3	0	0	0	0	0
109	2	5	17	0	4	3	0	0	0	0	0
110	2	5	17	0	5	3	0	0	0	0	0
111	3	5	17	0	5	3	0	0	0	0	0
112	3	5	17	0	4	1	0	0	0	0	0
113	3	5	17	0	8	2	0	1	0	0	0
114	3	5	17	0	5	4	0	0	0	0	0
115	3	5	17	0	1	0	0	0	0	0	0
116	4	5	17	0	3	2	0	0	1	0	0
117	4	5	17	0	2	2	0	1	1	0	0
118	4	5	17	0	3	2	0	0	0	0	0
119	4	5	17	0	4	3	0	0	0	0	0

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
120	4	5	17	0	4	3	0	0	0	0	0
121	5	5	17	0	2	2	0	0	0	0	0
122	5	5	17	0	2	2	0	0	0	0	0
123	5	5	17	0	8	2	0	0	0	0	0
124	5	5	17	0	2	2	0	0	0	0	0
125	5	5	17	0	4	1	0	1	0	0	0
126	1	6	29	4	3	2	0	1	0	0	0
127	1	6	29	4	6	1	0	0	0	0	0
128	1	6	29	4	6	2	0	0	0	0	1
129	1	6	29	4	7	2	0	1	0	0	0
130	1	6	29	4	7	2	0	0	0	0	0
131	2	6	29	4	5	3	0	0	0	0	0
132	2	6	29	4	4	3	0	0	0	0	0
133	2	6	29	4	5	1	0	0	0	1	0
134	2	6	29	4	2	2	0	0	0	0	1
135	2	6	29	4	6	0	0	1	0	0	1
136	3	6	29	4	4	3	0	0	0	0	1
137	3	6	29	4	4	3	0	0	0	0	0
138	3	6	29	4	3	3	0	0	0	0	0
139	3	6	29	4	4	3	0	0	0	0	0
140	3	6	29	4	4	3	0	0	0	0	0
141	4	6	29	4	4	3	0	0	0	0	0
142	4	6	29	4	8	2	0	0	0	0	0
143	4	6	29	4	8	2	0	0	0	0	0
144	4	6	29	4	5	1	0	0	0	0	0
145	4	6	29	4	1	0	0	0	0	0	0
146	5	6	29	4	5	1	0	1	0	1	0
147	5	6	29	4	4	6	0	1	0	1	1
148	5	6	29	4	1	0	0	0	0	0	0
149	5	6	29	4	2	2	0	0	0	0	0

Appendix E. Data Set

Plot	Transect	Farmer	Age	FamSze	DomVeg	EcoType	PaloAgua	Laurel	Guachapi	Sangrio	Guarumo
150	5	6	29	4	4	6	0	1	0	0	1
151	1	7	40	8	4	6	0	0	0	0	0
152	1	7	40	8	1	0	0	1	0	0	0
153	1	7	40	8	2	2	0	1	0	0	0
154	1	7	40	8	2	2	0	0	0	0	0
155	1	7	40	8	2	2	0	0	0	0	0
156	2	7	40	8	4	6	0	0	0	1	0
157	2	7	40	8	4	3	0	0	0	1	0
158	2	7	40	8	4	3	0	0	0	1	0
159	2	7	40	8	4	3	0	0	0	1	0
160	2	7	40	8	4	3	0	0	0	1	0
161	3	7	40	8	4	6	0	0	1	1	1
162	3	7	40	8	4	3	0	0	1	1	1
163	3	7	40	8	3	2	0	1	0	0	0
164	3	7	40	8	7	2	0	1	0	0	0
165	3	7	40	8	4	3	0	1	0	1	0
166	4	7	40	8	2	2	0	0	0	0	1
167	4	7	40	8	1	0	0	0	0	0	1
168	4	7	40	8	1	4	0	0	0	0	0
169	4	7	40	8	3	2	0	0	0	0	0
170	4	7	40	8	5	2	0	1	0	0	0
171	5	7	40	8	7	4	0	1	0	0	1
172	5	7	40	8	4	6	0	1	0	1	0
173	5	7	40	8	4	6	0	0	0	0	0
174	5	7	40	8	4	6	0	0	0	0	0
175	5	7	40	8	4	3	0	0	0	0	0

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	1	1	1	1	0	1	1	0	0	0	0
6	1	1	1	1	0	1	0	0	1	1	0
7	1	1	1	1	0	1	0	0	1	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	1	0
11	0	0	0	0	0	0	0	0	1	0	0
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	1	0	0	0	0	1	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	1	0	0	0	0	1	0	0
16	0	0	0	1	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	1
19	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	1	0	0	0	0	0	0	0
21	1	1	0	0	0	0	0	0	0	0	1
22	1	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	1	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	1	0	0
28	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	1	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
30	0	0	0	1	0	0	0	0	0	0	0
31	0	0	0	0	1	0	0	0	0	0	0
32	0	1	0	0	0	0	0	0	1	0	0
33	0	0	0	1	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	1	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0
36	0	1	1	0	1	0	0	0	0	0	0
37	0	1	0	0	0	1	0	0	0	0	0
38	1	1	0	1	0	0	0	0	1	1	0
39	0	0	0	1	0	0	0	0	0	0	0
40	0	0	0	0	0	1	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	1	0	0	0	0	0	0	0
43	0	0	0	1	1	1	0	0	1	0	0
44	0	0	0	0	1	0	0	0	0	0	0
45	0	0	0	1	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	1	1	0	0	0	0	0
48	0	0	0	1	0	0	0	0	0	0	0
49	0	0	0	0	0	1	0	0	0	0	0
50	0	1	0	1	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	1
52	0	0	0	0	0	0	0	0	1	0	0
53	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	1	0	0	0	0	0	1	0
55	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	1	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
60	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	1	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	1	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	1	0	0	0	0	0	0	0
66	0	0	0	1	0	0	0	0	0	0	1
67	0	0	0	1	0	1	0	0	1	0	0
68	0	0	0	1	0	1	0	0	1	0	0
69	0	0	0	0	0	0	0	0	1	0	0
70	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	1	0	0	0	0	0	0	1
72	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	1	0
74	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	1	0	0	0	0	0	0	1
77	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	1	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	1	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0
88	0	1	0	0	0	0	0	0	0	0	1
89	0	0	0	0	0	0	0	0	0	0	1

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
90	0	1	0	0	0	0	0	0	0	0	0
91	0	0	0	0	1	0	0	0	0	0	1
92	0	0	0	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	1	1	0	0	0	0	1
96	0	0	1	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0
98	0	1	0	1	0	0	0	0	0	0	1
99	1	1	0	1	0	0	0	0	0	0	0
100	0	0	0	0	1	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	0	1
102	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	1
106	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	1
108	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0	0	0	1
114	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	1

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
120	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0	1
123	0	0	0	0	0	0	0	0	0	0	1
124	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0		1
126	0	0	0	1	0	0	0	0	0	1	0
127	0	0	0	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	0	0	0	0
129	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0
131	0	0	0	0	0	1	0	0	0	0	1
132	0	0	0	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0	0	0	0
134	0	0	0	1	0	0	0	0	0	0	0
135	0	0	0	0	1	0	0	0	0	0	0
136	0	0	0	1	0	0	0	0	0	0	0
137	0	0	0	0	0	0	0	0	0	0	0
138	0	0	0	0	0	0	0	0	0	0	0
139	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0
141	0	0	0	1	0	0	0	0	1	0	0
142	0	0	0	1	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	1	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	1	0	0	0	0	0	0	1
147	0	0	0	0	0	1	0	0	1	0	0
148	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	PalRaton	OrejaMul	Corotu	GColordo	GBlanco	GuabaBla	GuaAmari	GuaNegra	Guaba	GuaColrd	Guabo
150	0	0	0	0	0	0	0	0	0	0	1
151	1	1	1	0	0	0	0	0	1	0	0
152	0	0	0	0	0	0	0	0	0	0	0
153	0	0	0	0	0	0	0	0	0	0	0
154	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
156	0	1	0	1	0	0	0	0	1	0	0
157	0	1	0	1	0	0	0	0	1	0	0
158	0	1	0	1	0	0	0	0	1	0	0
159	0	1	0	1	0	0	0	0	1	0	0
160	0	1	0	1	0	0	0	0	1	0	0
161	0	0	0	1	0	0	0	0	1	0	0
162	0	0	0	1	0	0	0	0	1	0	0
163	0	0	0	1	0	0	0	0	0	0	1
164	0	0	0	1	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	1
166	0	0	0	0	0	0	0	0	0	0	1
167	0	0	0	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0
169	1	1	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	1	0	1
171	0	0	0	0	0	0	0	0	0	0	0
172	0	1	0	0	0	0	0	0	1	0	0
173	0	0	0	0	0	0	0	0	1	0	0
174	0	0	0	0	0	0	0	0	1	0	0
175	0	0	0	0	0	0	0	0	1	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	0	0	0	0	0
9	0	0	0	0	0	0	1	0	0	0	0
10	0	0	0	0	0	0	1	0	0	0	0
11	0	0	0	0	0	1	0	1	0	0	0
12	0	0	0	0	0	0	1	1	1	1	0
13	0	0	0	0	0	0	1	0	0	0	1
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	1
19	0	0	0	0	0	0	0	0	0	0	0
20	0	1	0	1	1	0	0	0	0	1	1
21	0	1	0	0	1	0	0	0	0	0	1
22	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	1	0	1	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
30	0	0	0	0	0	0	0	0	0	0	0
31	0	1	0	0	1	0	0	0	0	0	0
32	0	1	1	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0
36	0	0	1	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	1	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	1
41	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	1
43	0	0	0	0	0	0	1	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	1	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	1	1	0	0	0
48	0	0	0	0	0	0	1	0	0	0	0
49	0	0	0	0	0	0	1	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	1	0	0	0	0	0
52	0	0	1	1	1	0	0	0	0	0	1
53	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	1	0	0	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
60	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	1	0	0	1	0	1	0	0
63	0	0	0	0	0	0	0	0	1	0	0
64	0	0	0	0	0	0	0	1	1	0	0
65	0	0	0	0	0	0	0	0	1	0	0
66	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	1	0	0	0	0	0	0	0
68	0	0	0	1	0	0	0	0	0	0	0
69	0	0	0	1	0	0	1	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0
71	0	1	0	0	1	0	1	0	0	0	1
72	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	1	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	1	0	0
83	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	1	0	0	0	0	0	0	0
87	0	0	0	1	1	0	1	0	0	1	0
88	0	0	1	0	0	0	1	0	0	0	1
89	0	0	1	0	1	0	0	0	0	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
90	0	0	0	0	0	0	0	0	0	0	0
91	0	0	1	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	1	0	0	0	0
94	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0
98	0	0	1	0	0	0	0	0	0	0	1
99	0	0	1	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	1	0	0	0	0
101	0	0	0	1	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	1	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	1	0	0	0	0	0	0	0
112	0	0	0	1	0	0	1	0	0	0	0
113	0	0	0	0	0	0	1	0	0	0	0
114	0	0	0	0	1	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0
119	1	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
120	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0	0	0	0
125	0	0	1	0	1	0	0	0	0	1	0
126	0	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	1	1	0
128	0	0	0	0	0	0	0	0	1	0	0
129	0	0	0	0	0	1	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0
131	0	0	1	0	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0	0	0	0	0
133	0	0	1	1	1	0	0	0	0	0	1
134	0	0	0	0	1	0	0	0	0	0	0
135	0	0	0	0	0	0	1	0	1	0	0
136	0	0	1	0	0	0	0	0	0	1	0
137	0	0	0	0	0	0	0	0	0	0	0
138	0	0	0	0	0	1	0	0	0	0	0
139	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0
141	0	0	0	1	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0	1	0	0
145	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	1	0	0	0	0
147	0	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	1	0	0	0	0	0	0

Appendix E. Data Set

Plot	Zapatero	Cacao	Coffee	Avacado	Mango	Espave	Macanu	Frijolio	Balo	Orange	Cedro
150	0	0	0	0	1	0	0	0	0	0	0
151	0	0	0	0	0	0	0	0	0	0	1
152	0	0	0	0	0	0	0	0	0	0	0
153	0	0	0	0	0	1	1	0	0	0	1
154	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	0	0	0
157	0	0	0	0	0	0	0	0	0	0	0
158	0	0	0	0	0	0	0	0	0	0	0
159	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0
161	0	0	0	0	0	0	0	0	0	0	0
162	0	1	0	0	0	0	0	0	0	0	0
163	0	0	0	0	0	0	0	0	0	0	0
164	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	1	0	0	0	1
166	0	0	0	0	0	0	0	0	0	0	0
167	0	0	0	0	0	0	1	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0
169	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	1	0	0	1	0	0	0	0
171	0	0	0	0	0	0	0	0	0	0	0
172	0	0	0	0	0	1	0	0	0	0	0
173	0	0	0	1	0	1	0	0	0	0	0
174	0	0	0	1	0	1	0	0	0	0	0
175	0	0	0	1	0	1	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	1	0	0	0	0	0	0	0	0	0
13	1	0	0	0	0	0	0	0	0	0	0
14	1	0	1	0	0	0	0	0	0	0	0
15	0	0	0	1	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	1	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	1	1	0	0	0	0	0
21	0	0	0	0	0	0	1	1	1	0	0
22	0	0	0	0	0	0	1	0	0	1	0
23	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	1
28	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
30	0	0	0	0	0	0	0	0	0	0	1
31	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	1	0	0	0	0
38	0	0	0	0	0	1	0	0	0	0	0
39	0	0	0	0	0	1	0	0	1	0	0
40	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0
42	0	1	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0
46	0	1	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	1	0	0	0	0	0
52	0	0	0	0	0	0	0	0	1	0	0
53	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
60	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	1	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	1	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
90	0	0	0	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
120	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0
126	0	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	0	0	0	0
129	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0
131	0	0	0	0	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0	1	0	0
134	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0
136	0	1	0	0	0	0	0	0	0	0	0
137	0	0	0	0	0	0	0	0	0	0	0
138	0	0	0	0	0	0	0	0	0	0	0
139	0	1	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0
141	0	1	0	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	0	0	1	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	0	0	0	0	0
147	0	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Tortuga	Guayaba	Macanill	PalPaila	Mamey	PalMaria	Paloma	Igeron	Maya	Eucalypt	Camaron
150	0	0	0	0	0	0	0	1	0	0	0
151	0	0	0	0	0	0	0	0	0	0	0
152	0	0	0	0	0	0	0	0	0	0	0
153	0	0	0	0	0	0	0	0	1	0	0
154	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	1	0	0
157	0	0	0	0	0	0	0	0	1	0	0
158	0	0	0	0	0	0	0	0	1	0	0
159	0	0	0	0	0	0	0	0	1	0	0
160	0	0	0	0	0	0	0	0	1	0	0
161	0	0	0	0	0	0	0	0	0	0	0
162	0	0	0	0	0	0	0	0	0	0	0
163	0	0	0	0	0	0	0	0	0	0	0
164	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	1	0	0
166	0	0	0	0	0	0	0	0	0	0	0
167	0	0	0	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0
169	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0
171	0	0	0	0	0	0	0	1	0	0	0
172	0	0	0	0	0	0	0	0	0	0	0
173	0	1	0	0	0	0	0	0	1	0	0
174	0	1	0	0	0	0	0	0	1	0	0
175	0	1	0	0	0	0	0	0	1	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	1	0
7	0	0	0	0	0	0	0	0	0	1	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	1	0
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
30	1	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0
32	1	0	1	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	1	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0
38	1	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0
40	1	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0
42	1	0	0	0	0	0	0	0	0	0	0
43	0	0	1	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	1	1	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0
48	1	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	1	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0
55	1	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0
57	1	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
60	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	1	0	0
63	1	0	0	0	0	0	0	0	1	0	0
64	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0
67	1	0	0	0	0	0	0	0	1	0	0
68	1	0	0	0	0	0	0	0	1	0	0
69	1	0	0	0	0	0	0	0	1	1	1
70	0	0	0	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0
77	1	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0
84	1	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	1	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
90	0	0	0	0	0	0	0	1	0	0	0
91	0	0	0	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0
94	1	0	0	0	0	0	0	0	0	0	0
95	1	0	0	0	0	0	0	0	1	0	0
96	0	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	0	0
102	1	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
120	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0
126	1	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	0	0	0
128	1	0	0	0	0	0	0	0	0	0	1
129	1	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0
131	0	0	0	0	0	0	0	0	1	0	0
132	0	0	0	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0	0	0	0
134	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0
136	0	0	0	0	0	0	0	0	0	0	0
137	1	0	0	0	0	0	0	0	1	0	0
138	0	0	0	0	0	0	0	0	0	0	0
139	1	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0
141	0	0	0	0	0	0	0	0	0	0	0
142	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	0	0	0	0	0
147	0	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Mangle	Cimaron	Crillo	Corona	Capote	Candelio	Gusanill	LaurelNg	Jobo	ArbolPan	Caoba
150	0	0	0	0	0	0	0	0	0	0	0
151	0	0	0	0	0	0	0	0	0	0	0
152	0	0	0	0	0	0	0	0	0	0	0
153	0	0	0	0	0	0	0	0	0	0	0
154	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	1	0	0
157	0	0	0	0	0	0	0	0	1	0	0
158	0	0	0	0	0	0	0	0	1	0	0
159	0	0	0	0	0	0	0	0	1	0	0
160	0	0	0	0	0	0	0	0	1	0	0
161	0	0	0	0	0	0	0	0	0	0	0
162	0	0	0	0	0	0	0	0	0	0	0
163	0	0	0	0	0	0	0	0	0	0	0
164	1	0	0	0	0	0	0	0	1	0	0
165	0	0	0	0	0	0	0	0	0	0	0
166	0	0	0	0	0	0	0	0	0	0	0
167	0	0	0	0	0	0	0	0	0	0	1
168	0	0	0	0	0	0	0	0	0	0	0
169	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0
171	1	0	0	0	0	0	0	0	0	0	0
172	0	0	0	0	0	0	0	0	0	0	0
173	1	0	0	0	0	0	0	0	0	0	0
174	1	0	0	0	0	0	0	0	0	0	0
175	1	0	0	0	0	0	0	0	0	0	0

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
1	0	0	0	0	0	0	0	0	0	0	10
2	0	0	0	0	0	0	0	0	0	0	30
3	0	0	0	0	0	0	0	0	0	1	20
4	0	0	0	0	0	0	0	0	0	0	10
5	0	1	0	0	0	0	0	1	0	1	150
6	0	0	0	0	0	0	0	0	0	0	90
7	0	0	0	0	0	0	0	0	0	1	100
8	0	0	0	0	0	0	0	0	0	0	50
9	0	0	0	0	0	0	0	0	0	0	20
10	0	0	0	0	0	0	0	0	0	1	10
11	0	0	0	0	0	0	0	0	0	0	70
12	0	0	0	0	1	0	0	0	0	0	10
13	0	0	0	0	0	0	0	0	0	0	30
14	0	0	1	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	60
16	0	0	0	0	0	0	0	0	0	0	40
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	10
20	0	0	0	0	0	0	0	0	0	0	70
21	0	0	0	0	0	0	0	0	0	0	70
22	0	0	0	0	0	0	0	0	0	0	10
23	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	40
25	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	10
27	0	0	0	0	0	0	0	0	0	1	20
28	0	0	0	0	0	0	0	0	0	0	10
29	0	0	0	0	0	0	0	0	0	0	50

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
30	0	0	0	0	0	0	0	0	0	0	70
31	0	0	1	0	0	0	0	0	0	0	120
32	1	0	0	0	0	0	0	0	0	1	60
33	0	0	0	0	0	0	0	0	0	0	20
34	0	0	0	0	0	0	0	0	0	0	50
35	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0
37	1	0	0	0	0	0	0	0	0	0	50
38	0	0	0	0	0	0	0	0	0	0	90
39	0	0	0	0	0	0	0	0	0	0	110
40	0	0	0	0	0	0	0	0	0	0	10
41	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	30
43	0	0	0	0	0	0	0	0	0	1	30
44	0	0	0	0	0	0	0	0	0	0	10
45	0	0	0	0	0	0	0	0	0	0	10
46	1	0	0	0	0	0	0	0	0	0	0
47	1	0	0	0	0	0	0	0	0	1	30
48	0	0	0	0	0	0	0	0	0	0	20
49	0	0	0	0	0	0	0	0	0	0	80
50	1	0	0	1	0	0	0	0	0	0	20
51	0	0	0	0	0	0	0	0	0	1	60
52	0	0	1	0	0	0	0	0	0	0	40
53	0	0	0	0	0	0	0	0	0	1	20
54	0	0	0	0	0	0	0	0	0	1	0
55	0	0	0	0	0	0	0	0	0	1	60
56	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	1	10
58	0	0	0	0	0	0	0	0	0	0	10
59	0	0	0	0	0	0	0	0	0	0	10

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
60	0	0	0	0	0	0	0	0	1	0	0
61	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	1	20
63	0	0	0	0	0	0	0	0	0	0	40
64	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	20
67	0	0	0	0	0	1	0	0	0	0	30
68	0	0	0	0	0	1	1	0	0	1	130
69	0	0	0	0	0	0	0	0	0	1	50
70	0	0	0	0	0	0	0	0	0	0	10
71	0	0	0	0	0	0	0	0	0	0	110
72	0	0	0	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	1	0
75	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	80
77	0	0	0	0	0	0	0	0	0	1	20
78	0	0	0	0	0	0	0	0	0	1	70
79	0	0	0	0	0	0	0	0	0	0	10
80	0	0	0	0	0	0	0	0	0	0	10
81	0	0	0	0	0	0	0	0	0	0	10
82	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	10
85	0	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0	0	1	50
87	0	0	0	0	0	0	0	0	0	0	30
88	0	0	0	0	0	0	0	0	0	1	40
89	0	0	0	0	0	0	0	1	0	0	80

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
90	0	0	0	0	0	0	0	0	0	0	30
91	0	0	0	0	0	0	0	0	0	1	30
92	0	0	0	0	0	0	0	0	0	0	10
93	0	0	0	1	0	0	0	1	0	1	50
94	0	0	0	0	0	0	0	0	0	1	60
95	0	0	0	0	0	0	0	0	0	1	40
96	0	0	0	0	0	0	0	0	0	0	90
97	0	0	0	0	0	0	0	0	0	0	10
98	0	0	0	0	0	0	0	0	0	0	50
99	0	0	1	0	0	0	0	0	0	1	60
100	0	0	0	0	0	0	0	0	0	1	40
101	0	0	0	0	0	0	0	0	0	1	80
102	0	0	0	0	0	0	0	0	0	0	10
103	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	1	30
105	0	0	1	0	0	0	0	0	0	1	80
106	0	0	0	0	0	0	0	0	0	1	20
107	0	0	0	1	0	0	0	0	0	0	10
108	0	0	0	0	0	0	0	0	0	1	60
109	0	0	0	0	0	0	0	0	0	1	20
110	0	0	0	0	0	0	0	0	0	1	40
111	0	0	0	0	0	0	0	0	0	1	40
112	0	0	0	0	0	0	0	0	0	1	30
113	0	0	0	1	0	0	0	0	0	1	10
114	0	0	0	1	0	0	0	0	0	1	70
115	0	0	0	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	1	0
117	0	0	0	0	0	0	0	0	0	1	10
118	0	0	0	0	0	0	0	0	0	1	20
119	0	0	0	0	0	0	0	0	0	1	90

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
120	0	0	0	0	0	0	0	0	0	1	50
121	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	1	20
123	0	0	0	0	0	0	0	0	0	1	30
124	0	0	0	0	0	0	0	0	0	1	10
125	0	0	0	0	0	0	0	0	0	1	50
126	0	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	0	0	40
128	0	0	0	0	0	0	0	0	0	0	30
129	0	0	0	0	0	0	0	0	0	0	20
130	0	0	0	0	0	0	0	0	0	1	60
131	0	0	0	0	0	0	0	0	0	1	10
132	0	0	0	0	0	0	0	0	0	1	70
133	0	0	0	0	0	0	0	0	0	0	20
134	0	0	0	0	0	0	0	0	0	0	20
135	0	0	0	0	0	0	0	0	0	0	0
136	0	0	0	0	0	0	0	0	0	1	30
137	0	0	0	0	0	0	0	0	0	1	140
138	0	0	0	0	0	0	0	0	0	1	0
139	0	0	0	0	0	0	0	0	0	1	70
140	0	0	0	0	0	0	0	0	0	1	40
141	0	0	0	0	0	0	0	0	0	1	30
142	0	0	0	0	0	0	0	0	0	0	20
143	0	0	0	0	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0	0	0	0	20
145	0	0	0	0	0	0	0	0	0	0	0
146	0	0	1	0	0	0	0	0	0	0	40
147	0	0	0	0	0	0	0	0	0	1	30
148	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	10

Appendix E. Data Set

Plot	Caracha	Choga	Membrill	Nance	Lucaena	Corpachi	Suera	Corteza	Guandu	NoName	BA
150	0	0	0	0	0	0	0	0	0	0	40
151	0	0	0	0	0	0	0	0	0	0	30
152	0	0	0	0	0	0	0	0	0	0	20
153	0	0	0	0	0	0	0	0	0	1	20
154	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	0	1	20
157	0	0	0	0	0	0	0	0	0	1	80
158	0	0	0	0	0	0	0	0	0	1	30
159	0	0	0	0	0	0	0	0	0	1	90
160	0	0	0	0	0	0	0	0	0	1	60
161	0	0	0	0	0	0	0	1	0	0	60
162	0	0	0	0	0	0	0	1	0	0	60
163	0	0	0	0	0	0	0	0	0	0	60
164	0	0	0	0	0	0	0	0	0	0	20
165	0	0	0	0	0	0	0	0	0	1	40
166	0	0	0	0	0	0	0	0	0	1	10
167	0	0	0	0	0	0	0	0	0	0	40
168	0	0	0	0	0	0	0	0	0	0	10
169	0	0	0	0	0	0	0	0	0	0	30
170	0	0	0	0	0	0	0	0	0	1	60
171	0	0	0	0	0	0	0	0	0	0	10
172	0	0	0	1	0	0	0	0	0	1	40
173	0	0	0	0	0	0	0	0	0	0	30
174	0	0	0	0	0	0	0	0	0	0	60
175	0	0	0	0	0	0	0	0	0	0	60

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
1	1	48	48	0	0	1	4	0	1	0	0
2	3	21.3	48.1	3	7.3	1	4	0	1	0	0
3	2	15.65	18.2	0	0	2	5	2	0	0	1
4	1	65.8	65.8	0	0	3	3	2	0	0	1
5	15	29.5	62.5	7	21.8	5	1	2	0	0	0
6	9	50.9	86.7	8	8.9	5	1	2	0	0	0
7	10	36.7	56	4	20.2	5	1	2	0	0	0
8	5	66.2	106	15	11.43	5	1	2	0	0	0
9	2	48.35	37.7	0	0	3	5	2	0	0	0
10	1	31.4	31.4	0	0	3	5	2	0	0	0
11	7	39.6	73	1	16.25	5	1	1	0	0	0
12	1	31.3	31.3	0	17.8	4	1	1	0	0	0
13	3	10.4	12.7	4	21.9	3	6	2	0	0	0
14	0	0	6.5	1	6.5	2	5	2	0	1	0
15	6	43.96	144.6	12	8.45	4	1	2	0	0	0
16	4	48.2	53.4	7	12.06	3	6	2	0	0	0
17	0	0	0	0	0	1	4	2	0	0	0
18	0	0	0	2	6.45	2	5	2	0	1	0
19	1	32.4	32.4	2	9.65	1	4	0	0	0	1
20	7	32.86	58.8	2	9.05	3	6	1	0	0	0
21	7	50.08	118.5	4	8.85	5	1	2	0	0	0
22	10	29.64	47.4	2	7.1	5	1	2	0	0	0
23	0	0	0	2	6.54	1	4	2	0	1	0
24	4	45.93	90	12	14.18	4	2	2	0	0	0
25	0	0	0	2	7.8	1	4	0	1	0	0
26	1	16.3	16.3	1	7.8	3	6	2	1	0	0
27	2	31.3	21.6	2	7.6	1	4	0	0	0	1
28	1	8.3	8.3	0	0	1	4	0	1	0	0
29	5	10.18	18.7	1	10.4	2	5	0	1	0	0

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
30	7	16.93	19.6	6	8.57	4	1	2	0	0	0
31	12	30.65	64	5	8.8	3	6	2	0	0	0
32	6	33.77	71.2	0	0	5	1	2	0	0	0
33	2	24.8	25.6	0	0	2	5	2	0	0	1
34	5	29.16	63.5	18	9.16	3	6	2	0	0	0
35	0	0	0	1	9.3	1	4	2	0	1	0
36	0	0	0	0	0	4	3	2	0	1	0
37	5	30.96	36	3	6.53	5	1	2	0	0	0
38	9	33.64	64	1	6.6	5	1	2	0	0	0
39	11	40.64	118.5	7	24.96	4	1	2	0	0	0
40	1	39.2	39.2	2	7.15	3	6	2	0	0	0
41	0	0	0	0	0	1	4	2	1	0	0
42	3	38.2	65	3	9.17	2	5	2	0	0	0
43	3	39.67	55	4	9.57	3	6	2	0	0	0
44	1	22.5	22.5	4	7.96	2	5	2	0	0	0
45	1	41.2	41.2	0	0	1	4	2	0	0	0
46	0	0	0	0	0	3	3	2	0	0	0
47	3	3.9	4.2	0	0	4	1	2	0	0	0
48	2	20.5	32.5	9	10.58	4	1	2	0	0	0
49	8	10.03	19	15	9.71	5	1	2	0	0	0
50	2	33.75	45	3	16	5	1	2	0	0	0
51	6	61.6	92	5	12.2	5	1	2	0	0	0
52	4	35.65	46	1	6.7	4	1	1	0	0	0
53	2	55.1	74.2	24	9.09	4	1	2	0	0	0
54	0	0	0	8	7.58	3	6	2	0	0	0
55	6	55.83	53.2	5	7.6	5	1	2	0	0	0
56	0	0	0	3	7.37	1	4	2	0	0	1
57	1	24.2	24.2	0	0	2	5	0	1	0	0
58	1	28.5	28.5	9	7.92	1	4	2	0	0	1
59	1	14.5	14.5	1	15.5	4	3	2	0	0	0

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
60	0	0	0	4	6.48	3	3	2	1	0	0
61	0	0	0	0	0	2	5	2	0	1	0
62	2	16	17.9	2	6.5	3	1	2	0	0	0
63	4	11.05	16.8	4	8.95	3	1	2	0	0	0
64	0	0	0	2	6	2	5	2	0	1	0
65	0	0	0	0	0	4	3	2	0	0	0
66	2	22.55	27.3	0	0	3	6	2	0	0	0
67	3	38.37	61.9	1	8.8	4	2	2	0	0	0
68	13	35.35	65	2	9.3	5	1	2	0	0	0
69	5	22.3	30.8	0	0	4	1	2	0	0	0
70	1	15	15	3	6.8	1	4	0	1	0	0
71	11	31.08	59.8	2	8.9	5	2	1	0	0	0
72	0	0	0	4	6.4	1	4	2	0	1	0
73	0	0	0	3	7.5	2	5	2	0	1	0
74	0	0	0	8	11.1	3	5	2	0	1	0
75	0	0	0	1	25.2	1	4	2	0	0	0
76	8	68.09	53.3	8	9.61	5	1	2	0	0	0
77	2	14.55	17.1	7	30.59	4	1	2	0	0	0
78	7	46.34	98.6	4	11.08	4	1	2	0	0	0
79	1	26.6	26.6	2	19.1	1	4	2	0	1	0
80	1	27.7	27.7	0	0	1	4	2	0	1	0
81	1	26.3	26.3	0	0	1	4	0	1	0	0
82	0	0	0	8	15.45	3	6	2	0	0	0
83	0	0	0	0	0	1	4	2	0	1	0
84	1	16.9	16.9	6	12.33	2	5	2	0	0	1
85	0	0	0	1	19.5	1	4	2	0	1	0
86	5	33.08	51.8	5	10.18	2	5	2	1	0	0
87	3	23.77	32.4	0	0	3	6	2	0	0	0
88	4	61.6	86.1	2	6.35	4	1	2	0	0	0
89	8	39.66	60.3	0	0	4	1	2	0	0	0

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
90	3	26.47	34	9	21.03	3	5	2	0	0	0
91	3	37.9	48	5	18.46	4	1	2	0	0	0
92	1	6	6	0	0	1	4	2	0	0	0
93	5	19.76	29.6	3	5.7	3	5	2	0	0	0
94	6	27.57	45.5	0	0	4	1	2	0	0	0
95	4	52.63	63.5	6	15.35	4	1	2	0	0	0
96	9	38.89	87.7	2	6.75	2	5	2	0	0	0
97	1	34	34	0	0	1	4	0	1	0	0
98	5	29.2	33.9	0	0	3	6	2	0	0	0
99	6	49.37	95.3	1	9.1	5	1	2	0	0	0
100	4	20.1	28.2	5	9.12	3	5	2	0	1	0
101	8	27.25	47.1	8	9.45	4	1	2	0	0	0
102	1	18.2	18.2	0	0	2	4	2	0	0	1
103	0	0	0	0	0	1	4	2	0	0	0
104	3	41.77	52.9	3	19.9	4	1	2	0	0	0
105	8	45	130.9	6	9.6	5	1	2	0	0	0
106	2	28.2	45.5	9	8.76	4	1	2	0	0	0
107	1	17.7	17.7	5	6.96	2	5	1	0	0	0
108	6	43.08	123.1	4	6.95	5	1	2	0	0	0
109	2	31.2	44.3	9	12.88	2	5	2	0	0	0
110	4	50.6	71.9	3	8.27	2	5	2	0	0	0
111	4	60.3	87.3	0	0	3	6	2	0	0	0
112	3	21.87	22.6	1	7.2	4	1	1	0	0	0
113	1	20.2	20.2	1	7	3	6	2	0	0	0
114	7	39.43	53.7	3	8.4	4	1	2	0	0	0
115	0	0	0	0	0	1	4	0	1	0	0
116	0	0	0	0	0	2	5	2	0	0	1
117	1	19.8	19.8	2	7.15	2	5	2	0	1	0
118	2	39.6	44.1	6	7.4	3	3	2	0	0	1
119	9	24.22	58.5	3	22.17	5	1	2	0	0	0

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
120	5	33.28	38.5	4	6.04	4	1	2	0	0	0
121	0	0	0	0	0	1	4	2	0	1	0
122	2	14.3	17.9	0	0	2	5	2	0	1	0
123	3	7.43	8.2	0	0	3	6	2	0	0	0
124	1	20.7	20.7	1	14.2	2	5	2	0	1	0
125	5	32.5	42.2	1	10.7	5	1	2	0	0	0
126	0	0	0	0	0	3	6	2	0	0	1
127	4	11.58	16.5	0	0	3	3	1	0	0	0
128	3	14.1	18.8	5	17.06	3	6	2	0	0	0
129	2	32.95	34.9	1	15.6	2	5	1	0	0	0
130	6	8.25	11.3	8	9.18	2	5	2	0	0	0
131	1	61.5	61.5	0	0	4	1	2	0	0	0
132	7	35.29	65	4	9.35	5	2	2	0	0	0
133	2	30.55	43.5	1	6.3	3	6	1	0	0	0
134	2	16.2	19.4	11	13.94	2	5	2	0	1	0
135	0	0	0	1	11	3	2	2	0	0	0
136	3	59.7	100	3	7.7	4	1	2	0	0	0
137	14	33.04	55.3	3	12.87	5	1	2	0	0	0
138	0	0	0	2	9.1	4	1	2	0	0	1
139	7	36.89	97	8	10.11	3	6	2	0	0	0
140	4	67.98	112	3	13.6	5	1	2	0	0	0
141	3	57.43	96.8	4	9.05	4	1	2	0	0	0
142	2	19.95	25.8	6	7.72	2	5	2	0	0	0
143	0	0	0	1	8.1	1	4	2	0	0	0
144	2	16.1	17.2	1	12.6	3	6	1	0	0	0
145	0	0	0	3	10.87	1	4	0	1	0	0
146	4	22.35	35	0	0	3	6	1	0	0	0
147	3	16.17	24	6	10.08	4	1	2	0	0	0
148	0	0	0	0	0	1	4	0	1	0	0
149	1	34.2	34.2	1	7.2	2	5	2	0	1	0

Appendix E. Data Set

Plot	MsureDBH	MeanDBH	MaxDBH	NumCWD	MeanCWD	Rating	Reason	FPAgrof	DomVeg1	DomVeg2	DomVeg3
150	4	76.2	89	1	10.5	4	1	2	0	0	0
151	3	77.67	155.9	0	0	4	1	2	0	0	0
152	2	30.75	35	0	0	2	4	0	1	0	0
153	2	36	52.4	4	23.4	3	6	2	0	1	0
154	0	0	0	2	13	1	4	2	0	1	0
155	0	0	0	1	14.5	1	4	2	0	1	0
156	2	20.4	28	1	7.7	4	1	2	0	0	0
157	8	53.39	102	6	13.78	5	1	2	0	0	0
158	3	31.33	34	10	10.82	5	1	2	0	0	0
159	9	35.48	65	9	10.22	5	1	2	0	0	0
160	6	35.08	54.5	8	13.58	5	1	2	0	0	0
161	6	23.23	57.6	5	9.54	4	1	2	0	0	0
162	6	47.75	86.2	3	10.77	4	1	2	0	0	0
163	6	24.15	50	0	0	3	6	2	0	0	1
164	2	25.25	25.5	3	10.2	2	5	2	0	0	0
165	4	22.18	43	4	7.25	4	1	2	0	0	0
166	1	27	27	1	18.3	2	5	2	0	1	0
167	4	22.63	31.8	3	7.63	2	5	0	1	0	0
168	1	17.8	17.8	4	8.6	1	4	2	1	0	0
169	3	26.47	28.5	5	9	2	5	2	0	0	1
170	6	12.63	29.8	3	8.87	3	6	2	0	0	0
171	1	17.5	17.5	2	10	2	5	2	0	0	0
172	4	15.2	24	14	7.91	4	1	2	0	0	0
173	3	44	64	16	11	5	1	2	0	0	0
174	6	55	125.5	8	8.23	5	1	2	0	0	0
175	6	45.07	47	4	18.78	5	1	2	0	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
1	0	0	0	0	0	1	0	0	0	0	0
2	0	0	0	0	0	1	0	0	0	0	0
3	0	0	0	0	0	0	0	1	0	0	0
4	0	0	0	0	0	0	0	1	0	0	0
5	1	0	0	0	0	0	0	0	1	0	0
6	1	0	0	0	0	0	0	0	1	0	0
7	1	0	0	0	0	0	0	0	1	0	0
8	1	0	0	0	0	0	0	0	1	0	0
9	0	0	0	1	0	0	0	0	0	0	1
10	0	0	0	1	0	0	0	0	0	0	1
11	0	1	0	0	0	0	1	0	0	0	0
12	0	1	0	0	0	0	1	0	0	0	0
13	0	0	1	0	0	0	0	1	0	0	0
14	0	0	0	0	0	0	0	1	0	0	0
15	1	0	0	0	0	0	0	0	1	0	0
16	0	0	0	1	0	0	0	0	0	1	0
17	0	0	0	0	1	0	0	1	0	0	0
18	0	0	0	0	0	0	0	0	0	1	0
19	0	0	0	0	0	1	0	0	0	0	0
20	0	1	0	0	0	0	1	0	0	0	0
21	1	0	0	0	0	0	0	0	0	0	0
22	1	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	1	0	0	0
24	1	0	0	0	0	0	0	0	1	0	0
25	0	0	0	0	0	1	0	0	0	0	0
26	0	0	0	0	0	1	0	0	0	0	0
27	0	0	0	0	0	0	0	0	1	0	0
28	0	0	0	0	0	1	0	0	0	0	0
29	0	0	0	0	0	1	0	0	0	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
30	1	0	0	0	0	0	0	0	1	0	0
31	0	1	0	0	0	0	0	0	0	1	0
32	1	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	1	0	0	0
34	1	0	0	0	0	0	0	0	1	0	0
35	0	0	0	0	0	0	0	1	0	0	0
36	0	0	0	0	0	0	0	0	0	1	0
37	1	0	0	0	0	0	0	0	1	0	0
38	1	0	0	0	0	0	0	0	1	0	0
39	1	0	0	0	0	0	0	0	1	0	0
40	0	0	0	1	0	0	0	1	0	0	0
41	0	0	0	0	0	0	0	0	0	1	0
42	0	0	0	1	0	0	0	1	0	0	0
43	0	0	0	1	0	0	0	0	0	1	0
44	0	0	0	1	0	0	0	1	0	0	0
45	0	0	0	1	0	0	0	1	0	0	0
46	1	0	0	0	0	0	0	0	0	1	0
47	1	0	0	0	0	0	0	1	0	0	0
48	1	0	0	0	0	0	0	0	0	0	0
49	1	0	0	0	0	0	0	1	0	0	0
50	1	0	0	0	0	0	0	1	0	0	0
51	1	0	0	0	0	0	0	0	1	0	0
52	0	1	0	0	0	0	1	0	0	0	0
53	1	0	0	0	0	0	0	0	1	0	0
54	1	0	0	0	0	0	0	1	0	0	0
55	1	0	0	0	0	0	0	0	1	0	0
56	0	0	0	0	0	0	0	0	0	0	1
57	0	0	0	0	0	1	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	1
59	1	0	0	0	0	0	0	1	0	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
60	0	0	0	0	0	0	0	1	0	0	0
61	0	0	0	0	0	0	0	1	0	0	0
62	0	0	0	1	0	0	0	1	0	0	0
63	0	0	0	1	0	0	0	0	0	1	0
64	0	0	0	0	0	0	0	1	0	0	0
65	0	0	1	0	0	0	0	0	1	0	0
66	0	1	0	0	0	0	0	0	0	1	0
67	1	0	0	0	0	0	0	0	1	0	0
68	1	0	0	0	0	0	0	0	1	0	0
69	1	0	0	0	0	0	0	0	1	0	0
70	0	0	0	0	0	1	0	0	0	0	0
71	0	1	0	0	0	0	1	0	0	0	0
72	0	0	0	0	0	0	0	1	0	0	0
73	0	0	0	0	0	0	0	1	0	0	0
74	0	0	0	0	0	0	0	1	0	0	0
75	0	0	0	0	1	0	0	1	0	0	0
76	1	0	0	0	0	0	0	0	1	0	0
77	1	0	0	0	0	0	0	0	1	0	0
78	1	0	0	0	0	0	0	0	1	0	0
79	0	0	0	0	0	0	0	1	0	0	0
80	0	0	0	0	0	0	0	1	0	0	0
81	0	0	0	0	0	1	0	0	0	0	0
82	0	0	1	0	0	0	0	1	0	0	0
83	0	0	0	0	0	0	0	1	0	0	0
84	0	0	0	0	0	0	0	1	0	0	0
85	0	0	0	0	0	0	0	1	0	0	0
86	0	0	0	0	0	0	0	0	0	1	0
87	0	1	0	0	0	0	0	0	0	1	0
88	1	0	0	0	0	0	1	0	0	0	0
89	1	0	0	0	0	0	1	0	0	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
90	0	0	0	1	0	0	0	0	0	1	0
91	1	0	0	0	0	0	0	0	1	0	0
92	0	0	0	0	1	0	0	1	0	0	0
93	1	0	0	0	0	0	0	0	0	0	0
94	1	0	0	0	0	0	0	0	0	0	0
95	1	0	0	0	0	0	0	0	0	0	0
96	0	1	0	0	0	0	0	0	0	1	0
97	0	0	0	0	0	1	0	0	0	0	0
98	1	0	0	0	0	0	0	0	0	1	0
99	1	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	1	0	0	0
101	1	0	0	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	1	0	0	0
103	0	0	0	0	1	0	0	1	0	0	0
104	1	0	0	0	0	0	0	0	1	0	0
105	1	0	0	0	0	0	0	0	1	0	0
106	1	0	0	0	0	0	0	0	1	0	0
107	0	1	0	0	0	0	1	0	0	0	0
108	1	0	0	0	0	0	0	0	1	0	0
109	1	0	0	0	0	0	0	0	1	0	0
110	0	1	0	0	0	0	0	0	1	0	0
111	0	1	0	0	0	0	0	0	1	0	0
112	1	0	0	0	0	0	1	0	0	0	0
113	0	0	0	0	1	0	0	1	0	0	0
114	0	1	0	0	0	0	0	0	0	1	0
115	0	0	0	0	0	1	0	0	0	0	0
116	0	0	0	0	0	0	0	1	0	0	0
117	0	0	0	0	0	0	0	1	0	0	0
118	0	0	0	0	0	0	0	1	0	0	0
119	1	0	0	0	0	0	0	0	1	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
120	1	0	0	0	0	0	0	0	1	0	0
121	0	0	0	0	0	0	0	1	0	0	0
122	0	0	0	0	0	0	0	1	0	0	0
123	0	0	0	0	1	0	0	1	0	0	0
124	0	0	0	0	0	0	0	1	0	0	0
125	1	0	0	0	0	0	1	0	0	0	0
126	0	0	0	0	0	0	0	1	0	0	0
127	0	0	1	0	0	0	1	0	0	0	0
128	0	0	1	0	0	0	0	1	0	0	0
129	0	0	0	1	0	0	0	1	0	0	0
130	0	0	0	1	0	0	0	1	0	0	0
131	0	1	0	0	0	0	0	0	1	0	0
132	1	0	0	0	0	0	0	0	1	0	0
133	0	1	0	0	0	0	1	0	0	0	0
134	0	0	0	0	0	0	0	1	0	0	0
135	0	0	1	0	0	1	0	0	0	0	0
136	1	0	0	0	0	0	0	0	1	0	0
137	1	0	0	0	0	0	0	0	1	0	0
138	0	0	0	0	0	0	0	0	1	0	0
139	1	0	0	0	0	0	0	0	1	0	0
140	1	0	0	0	0	0	0	0	1	0	0
141	1	0	0	0	0	0	0	0	1	0	0
142	0	0	0	0	1	0	0	1	0	0	0
143	0	0	0	0	1	0	0	1	0	0	0
144	0	1	0	0	0	0	1	0	0	0	0
145	0	0	0	0	0	1	0	0	0	0	0
146	0	1	0	0	0	0	1	0	0	0	0
147	1	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	1	0	0	0	0	0
149	0	0	0	0	0	0	0	1	0	0	0

Appendix E. Data Set

Plot	DomVeg4	DomVeg5	DomVeg6	DomVeg7	DomVeg8	EcoType0	EcoType1	EcoType2	EcoType3	EcoType4	EcoType5
150	1	0	0	0	0	0	0	0	0	0	0
151	1	0	0	0	0	0	0	0	0	0	0
152	0	0	0	0	0	1	0	0	0	0	0
153	0	0	0	0	0	0	0	1	0	0	0
154	0	0	0	0	0	0	0	1	0	0	0
155	0	0	0	0	0	0	0	1	0	0	0
156	1	0	0	0	0	0	0	0	0	0	0
157	1	0	0	0	0	0	0	0	1	0	0
158	1	0	0	0	0	0	0	0	1	0	0
159	1	0	0	0	0	0	0	0	1	0	0
160	1	0	0	0	0	0	0	0	1	0	0
161	1	0	0	0	0	0	0	0	0	0	0
162	1	0	0	0	0	0	0	0	1	0	0
163	0	0	0	0	0	0	0	1	0	0	0
164	0	0	0	1	0	0	0	1	0	0	0
165	1	0	0	0	0	0	0	0	1	0	0
166	0	0	0	0	0	0	0	1	0	0	0
167	0	0	0	0	0	1	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	1	0
169	0	0	0	0	0	0	0	1	0	0	0
170	0	1	0	0	0	0	0	1	0	0	0
171	0	0	0	1	0	0	0	0	0	1	0
172	1	0	0	0	0	0	0	0	0	0	0
173	1	0	0	0	0	0	0	0	0	0	0
174	1	0	0	0	0	0	0	0	0	0	0
175	1	0	0	0	0	0	0	0	1	0	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
1	0	0	0	0	1	0	0	1	0	0	1
2	0	0	0	0	1	0	0	1	0	0	1
3	0	0	0	0	0	1	0	1	0	0	0
4	0	0	0	1	0	0	0	0	1	0	0
5	0	1	0	0	0	0	0	0	1	0	0
6	0	1	0	0	0	0	0	0	1	3	0
7	0	1	0	0	0	0	0	0	1	3	0
8	0	1	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	1	0	1	0	1	0
10	0	0	0	0	0	1	0	0	1	1	0
11	0	1	0	0	0	0	0	0	0	2	0
12	0	1	0	0	0	0	0	0	1	2	0
13	0	0	0	0	0	0	1	0	0	2	0
14	0	0	0	0	0	1	0	0	0	1	0
15	0	1	0	0	0	0	0	0	0	1	0
16	0	0	0	0	0	0	1	0	0	0	0
17	0	0	0	0	1	0	0	0	0	0	1
18	0	0	0	0	0	1	0	0	1	1	0
19	0	0	0	0	1	0	0	0	0	0	1
20	0	0	0	0	0	0	1	0	1	4	0
21	1	1	0	0	0	0	0	0	5	3	0
22	1	1	0	0	0	0	0	0	1	0	0
23	0	0	0	0	1	0	0	0	0	0	1
24	0	0	1	0	0	0	0	0	0	0	0
25	0	0	0	0	1	0	0	0	0	0	1
26	0	0	0	0	0	0	1	1	0	0	0
27	0	0	0	0	1	0	0	0	0	1	1
28	0	0	0	0	1	0	0	0	0	0	1
29	0	0	0	0	0	1	0	1	1	1	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
30	0	1	0	0	0	0	0	0	2	0	0
31	0	0	0	0	0	0	1	1	1	3	0
32	1	1	0	0	0	0	0	0	1	3	0
33	0	0	0	0	0	1	0	1	0	0	0
34	0	0	0	0	0	0	1	0	0	0	0
35	0	0	0	0	1	0	0	0	0	0	1
36	0	0	0	1	0	0	0	1	0	1	0
37	0	1	0	0	0	0	0	1	1	0	0
38	0	1	0	0	0	0	0	0	2	1	0
39	0	1	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	1	0	2	0	0
41	0	0	0	0	1	0	0	0	0	0	1
42	0	0	0	0	0	1	0	0	1	0	0
43	0	0	0	0	0	0	1	0	0	2	0
44	0	0	0	0	0	1	0	1	0	0	0
45	0	0	0	0	1	0	0	1	0	1	1
46	0	0	0	1	0	0	0	2	0	0	0
47	0	1	0	0	0	0	0	0	0	1	0
48	1	1	0	0	0	0	0	1	2	1	0
49	0	1	0	0	0	0	0	1	1	1	0
50	0	1	0	0	0	0	0	1	2	1	0
51	0	1	0	0	0	0	0	0	1	1	0
52	0	1	0	0	0	0	0	0	1	5	0
53	0	1	0	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	1	0	1	0	0
55	0	1	0	0	0	0	0	0	1	0	0
56	0	0	0	0	1	0	0	0	0	0	1
57	0	0	0	0	0	1	0	0	1	0	0
58	0	0	0	0	1	0	0	0	0	0	1
59	0	0	0	1	0	0	0	1	1	1	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
60	0	0	0	1	0	0	0	0	0	0	0
61	0	0	0	0	0	1	0	1	0	0	0
62	0	1	0	0	0	0	0	1	1	2	0
63	0	1	0	0	0	0	0	2	2	0	0
64	0	0	0	0	0	1	0	0	1	0	0
65	0	0	0	1	0	0	0	1	1	0	0
66	0	0	0	0	0	0	1	0	2	1	0
67	0	0	1	0	0	0	0	1	1	2	0
68	0	1	0	0	0	0	0	1	1	2	0
69	0	1	0	0	0	0	0	1	2	4	0
70	0	0	0	0	1	0	0	0	0	0	1
71	0	0	1	0	0	0	0	0	3	4	0
72	0	0	0	0	1	0	0	0	0	0	1
73	0	0	0	0	0	1	0	0	0	0	0
74	0	0	0	0	0	1	0	0	1	0	0
75	0	0	0	0	1	0	0	0	0	0	1
76	0	1	0	0	0	0	0	0	1	1	0
77	0	1	0	0	0	0	0	0	1	0	0
78	0	1	0	0	0	0	0	0	0	0	0
79	0	0	0	0	1	0	0	0	1	0	1
80	0	0	0	0	1	0	0	0	0	0	1
81	0	0	0	0	1	0	0	0	0	0	1
82	0	0	0	0	0	0	1	1	1	0	0
83	0	0	0	0	1	0	0	0	0	0	1
84	0	0	0	0	0	1	0	1	1	0	0
85	0	0	0	0	1	0	0	0	0	0	1
86	0	0	0	0	0	1	0	1	0	1	0
87	0	0	0	0	0	0	1	0	1	4	0
88	0	1	0	0	0	0	0	0	1	3	0
89	0	1	0	0	0	0	0	0	2	3	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
90	0	0	0	0	0	1	0	0	1	0	0
91	0	1	0	0	0	0	0	0	1	2	0
92	0	0	0	0	1	0	0	0	0	0	1
93	1	0	0	0	0	1	0	0	1	2	0
94	1	1	0	0	0	0	0	0	2	0	0
95	1	1	0	0	0	0	0	1	2	1	0
96	0	0	0	0	0	1	0	0	0	0	0
97	0	0	0	0	1	0	0	0	0	0	1
98	0	0	0	0	0	0	1	0	1	2	0
99	1	1	0	0	0	0	0	0	1	2	0
100	0	0	0	0	0	1	0	0	0	1	0
101	1	1	0	0	0	0	0	0	1	2	0
102	0	0	0	0	1	0	0	0	1	0	0
103	0	0	0	0	1	0	0	0	0	0	1
104	0	1	0	0	0	0	0	0	2	1	0
105	0	1	0	0	0	0	0	0	1	2	0
106	0	1	0	0	0	0	0	1	0	0	0
107	0	0	0	0	0	1	0	0	2	2	0
108	0	1	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	1	0	0	0	0	0
110	0	0	0	0	0	1	0	0	0	0	0
111	0	0	0	0	0	0	1	0	0	1	0
112	0	1	0	0	0	0	0	0	0	2	0
113	0	0	0	0	0	0	1	1	2	3	0
114	0	1	0	0	0	0	0	0	2	2	0
115	0	0	0	0	1	0	0	0	0	0	1
116	0	0	0	0	0	1	0	0	0	0	0
117	0	0	0	0	0	1	0	1	0	0	0
118	0	0	0	1	0	0	0	0	0	0	0
119	0	1	0	0	0	0	0	0	1	1	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
120	0	1	0	0	0	0	0	0	0	0	0
121	0	0	0	0	1	0	0	0	0	0	1
122	0	0	0	0	0	1	0	0	1	1	0
123	0	0	0	0	0	0	1	0	1	1	0
124	0	0	0	0	0	1	0	0	0	0	0
125	0	1	0	0	0	0	0	1	2	4	0
126	0	0	0	0	0	0	1	1	1	0	0
127	0	0	0	1	0	0	0	0	1	1	0
128	0	0	0	0	0	0	1	0	2	0	0
129	0	0	0	0	0	1	0	1	1	0	0
130	0	0	0	0	0	1	0	0	0	0	0
131	0	1	0	0	0	0	0	1	1	2	0
132	0	0	1	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	1	0	2	3	0
134	0	0	0	0	0	1	0	0	1	1	0
135	0	0	1	0	0	0	0	1	1	1	0
136	0	1	0	0	0	0	0	0	0	2	0
137	0	1	0	0	0	0	0	1	1	0	0
138	0	1	0	0	0	0	0	0	0	0	0
139	0	0	0	0	0	0	1	0	1	0	0
140	0	1	0	0	0	0	0	0	0	0	0
141	0	1	0	0	0	0	0	0	0	2	0
142	0	0	0	0	0	1	0	0	0	0	0
143	0	0	0	0	1	0	0	0	0	0	1
144	0	0	0	0	0	0	1	0	1	0	0
145	0	0	0	0	1	0	0	0	0	0	1
146	0	0	0	0	0	0	1	1	2	3	0
147	1	1	0	0	0	0	0	1	1	1	0
148	0	0	0	0	1	0	0	0	0	0	1
149	0	0	0	0	0	1	0	0	1	1	0

Appendix E. Data Set

Plot	EcoType6	Reason1	Reason2	Reason3	Reason4	Reason5	Reason6	NoPrefer	Preferred	AgroFrst	Rating1
150	1	1	0	0	0	0	0	1	3	2	0
151	1	1	0	0	0	0	0	0	1	1	0
152	0	0	0	0	1	0	0	1	0	0	0
153	0	0	0	0	0	0	1	1	0	1	0
154	0	0	0	0	1	0	0	0	0	0	1
155	0	0	0	0	1	0	0	0	0	0	1
156	1	1	0	0	0	0	0	1	1	1	0
157	0	1	0	0	0	0	0	1	1	1	0
158	0	1	0	0	0	0	0	1	1	1	0
159	0	1	0	0	0	0	0	1	1	1	0
160	0	1	0	0	0	0	0	1	1	1	0
161	1	1	0	0	0	0	0	0	1	1	0
162	0	1	0	0	0	0	0	0	1	2	0
163	0	0	0	0	0	0	1	1	1	1	0
164	0	0	0	0	0	1	0	2	1	0	0
165	0	1	0	0	0	0	0	1	2	2	0
166	0	0	0	0	0	1	0	0	1	1	0
167	0	0	0	0	0	1	0	0	0	1	0
168	0	0	0	0	1	0	0	0	0	0	1
169	0	0	0	0	0	1	0	0	1	0	0
170	0	0	0	0	0	0	1	1	1	4	0
171	0	0	0	0	0	1	0	1	2	0	0
172	1	1	0	0	0	0	0	1	2	2	0
173	1	1	0	0	0	0	0	0	1	2	0
174	1	1	0	0	0	0	0	0	1	2	0
175	0	1	0	0	0	0	0	0	1	2	0

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
1	0	0	0	0
2	0	0	0	0
3	1	0	0	0
4	0	1	0	0
5	0	0	0	1
6	0	0	0	1
7	0	0	0	1
8	0	0	0	1
9	0	1	0	0
10	0	1	0	0
11	0	0	0	1
12	0	0	1	0
13	0	1	0	0
14	1	0	0	0
15	0	0	1	0
16	0	1	0	0
17	0	0	0	0
18	1	0	0	0
19	0	0	0	0
20	0	1	0	0
21	0	0	0	1
22	0	0	0	1
23	0	0	0	0
24	0	0	1	0
25	0	0	0	0
26	0	1	0	0
27	0	0	0	0
28	0	0	0	0
29	1	0	0	0

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
30	0	0	1	0
31	0	1	0	0
32	0	0	0	1
33	1	0	0	0
34	0	1	0	0
35	0	0	0	0
36	0	0	1	0
37	0	0	0	1
38	0	0	0	1
39	0	0	1	0
40	0	1	0	0
41	0	0	0	0
42	1	0	0	0
43	0	1	0	0
44	1	0	0	0
45	0	0	0	0
46	0	1	0	0
47	0	0	1	0
48	0	0	1	0
49	0	0	0	1
50	0	0	0	1
51	0	0	0	1
52	0	0	1	0
53	0	0	1	0
54	0	1	0	0
55	0	0	0	1
56	0	0	0	0
57	1	0	0	0
58	0	0	0	0
59	0	0	1	0

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
60	0	1	0	0
61	1	0	0	0
62	0	1	0	0
63	0	1	0	0
64	1	0	0	0
65	0	0	1	0
66	0	1	0	0
67	0	0	1	0
68	0	0	0	1
69	0	0	1	0
70	0	0	0	0
71	0	0	0	1
72	0	0	0	0
73	1	0	0	0
74	0	1	0	0
75	0	0	0	0
76	0	0	0	1
77	0	0	1	0
78	0	0	1	0
79	0	0	0	0
80	0	0	0	0
81	0	0	0	0
82	0	1	0	0
83	0	0	0	0
84	1	0	0	0
85	0	0	0	0
86	1	0	0	0
87	0	1	0	0
88	0	0	1	0
89	0	0	1	0

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
90	0	1	0	0
91	0	0	1	0
92	0	0	0	0
93	0	1	0	0
94	0	0	1	0
95	0	0	1	0
96	1	0	0	0
97	0	0	0	0
98	0	1	0	0
99	0	0	0	1
100	0	1	0	0
101	0	0	1	0
102	1	0	0	0
103	0	0	0	0
104	0	0	1	0
105	0	0	0	1
106	0	0	1	0
107	1	0	0	0
108	0	0	0	1
109	1	0	0	0
110	1	0	0	0
111	0	1	0	0
112	0	0	1	0
113	0	1	0	0
114	0	0	1	0
115	0	0	0	0
116	1	0	0	0
117	1	0	0	0
118	0	1	0	0
119	0	0	0	1

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
120	0	0	1	0
121	0	0	0	0
122	1	0	0	0
123	0	1	0	0
124	1	0	0	0
125	0	0	0	1
126	0	1	0	0
127	0	1	0	0
128	0	1	0	0
129	1	0	0	0
130	1	0	0	0
131	0	0	1	0
132	0	0	0	1
133	0	1	0	0
134	1	0	0	0
135	0	1	0	0
136	0	0	1	0
137	0	0	0	1
138	0	0	1	0
139	0	1	0	0
140	0	0	0	1
141	0	0	1	0
142	1	0	0	0
143	0	0	0	0
144	0	1	0	0
145	0	0	0	0
146	0	1	0	0
147	0	0	1	0
148	0	0	0	0
149	1	0	0	0

Appendix E. Data Set

Plot	Rating2	Rating3	Rating4	Rating5
150	0	0	1	0
151	0	0	1	0
152	1	0	0	0
153	0	1	0	0
154	0	0	0	0
155	0	0	0	0
156	0	0	1	0
157	0	0	0	1
158	0	0	0	1
159	0	0	0	1
160	0	0	0	1
161	0	0	1	0
162	0	0	1	0
163	0	1	0	0
164	1	0	0	0
165	0	0	1	0
166	1	0	0	0
167	1	0	0	0
168	0	0	0	0
169	1	0	0	0
170	0	1	0	0
171	1	0	0	0
172	0	0	1	0
173	0	0	0	1
174	0	0	0	1
175	0	0	0	1