Perception, Knowledge and Use of the Rainforest: Ethnobotany of the Barí of Venezuela

by

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Date

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1997

For my wife, Rissa,

for my children, Rafael and Marina

and for

my parents

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PREFACE

The Barí orthography used in this study is adopted from R. Lizarralde (1979) and Marshall Durbin (pers. comm. from R. Lizarralde 1995). The Barí have 19 consonants and six vowels (each of which can be nasalized or leng tuned).

Consonant chart	Labial	Dental	Retroflex	Palatal	Velar	Postvelar	Glottal
Occlusive mute		t		ch	k	q	‘
Occlusive w/sound	b	d	l [≈r]	r			
Fricative	w	s		sh	h		j
Nasals	m	n		ny	ng		
Semiconsonants				y			

Vocal Chart:	Anterior	Central	Posterior
High	i, ii	ï, ïï	u, uu
Medium	e, ee		o, oo
Low		a, aa	

The vowels (a, e, i, ï, o, and u) and consonants (b, ch, d, j, k, l, m, n, ñ, r, s, sh, t, w and y) in Barí are pronounced much as those in Spanish, except for ï, ü, ö, which are high central unrounded vowels. The consonant "l" is closer to an "r" than the Spanish "l" (e.g., the pronunciation of "lore" and "rore" is very similar in the first consonant but clearly not the same for the second consonant). Nasalizations are vowels followed by an "n" or "˜". A fricative velar sound will be indicated with a "h" and a fricative palatal sound "sh". Beside the flat sound of the vowels, there is also a rising tone indicated with an accent on the last vowel and declining tone marked with an accent on the first vowel. The long vowels are indicated with a double vowel as "aa" or "oo" and are sometimes indicated as a longer pronunciation with an accent.

The Barí terms are in ***bold italics*** in the text. All the scientific terms are in *italics.*

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I would like to thank the whole Barí people for letting me conduct my research, and reside in their cultural and natural environment. In all the years that I have come to Saimadodyi, Andrés Achirabu has invited me to stay in his house and eat with his family: the late Mercedes, the late Antonina, Jaime, Atilio, Edgar, Raquelita, Nola, Orlando, Nuceli, and Adrián, all of whom they all helped me in an unlimited way. Many other Barí friends provided great help in many ways: Daniel, Lorenzo, Isaac Aleobadda, Emilio, Eugenio, Oroksá, Moises, Atdakubí, Aïgsaridó, Mandabou, Asokbá, Iribi, Dario, Ramón, Agustin, Gabriel, Raul, Kamachikae, Baishishi, Akuero, Atubitrogbodou and the late Ashibia.

In the field, two excellent Barí colleagues were extremely helpful. The first, David Aleobadda, was literally my main colleague and friend. His help was incredible and his foresight made my research possible. David was my diplomat, native manager and counselor. He was a loyal friend and serious colleague. The second, Akirida, is one of the most knowledgeable Barí plant specialists. He took me to the forest to learn about Barí ethnobotanical knowledge when I started to survey the Barí forest for my dissertation in 1988. When problems occurred, Akirida was the first to search for solutions and tried to assure my well being.

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My father, Roberto Lizarralde, is a key instructor in fieldwork techniques and ethics, mapping, and ethnography, and opened the path for me to work with the Barí. My mother, Elizabeth de Lizarralde, was very supportive of all stages of my work. My sister, Anne Lizarralde, often acted as an assistant during my fieldwork and acted as a field doctor to cure and assist the Barí medically. My brother-in-law, Michel Mothes, helped me to get supplies, gave me the use of his jeep, came many times to the field to help me in my project and once rescued me from illness in the field.

I am grateful to my wonderful wife, Nerissa Russell, who was very patient, caring and helpful during my departures to the field and in the process of writing up my

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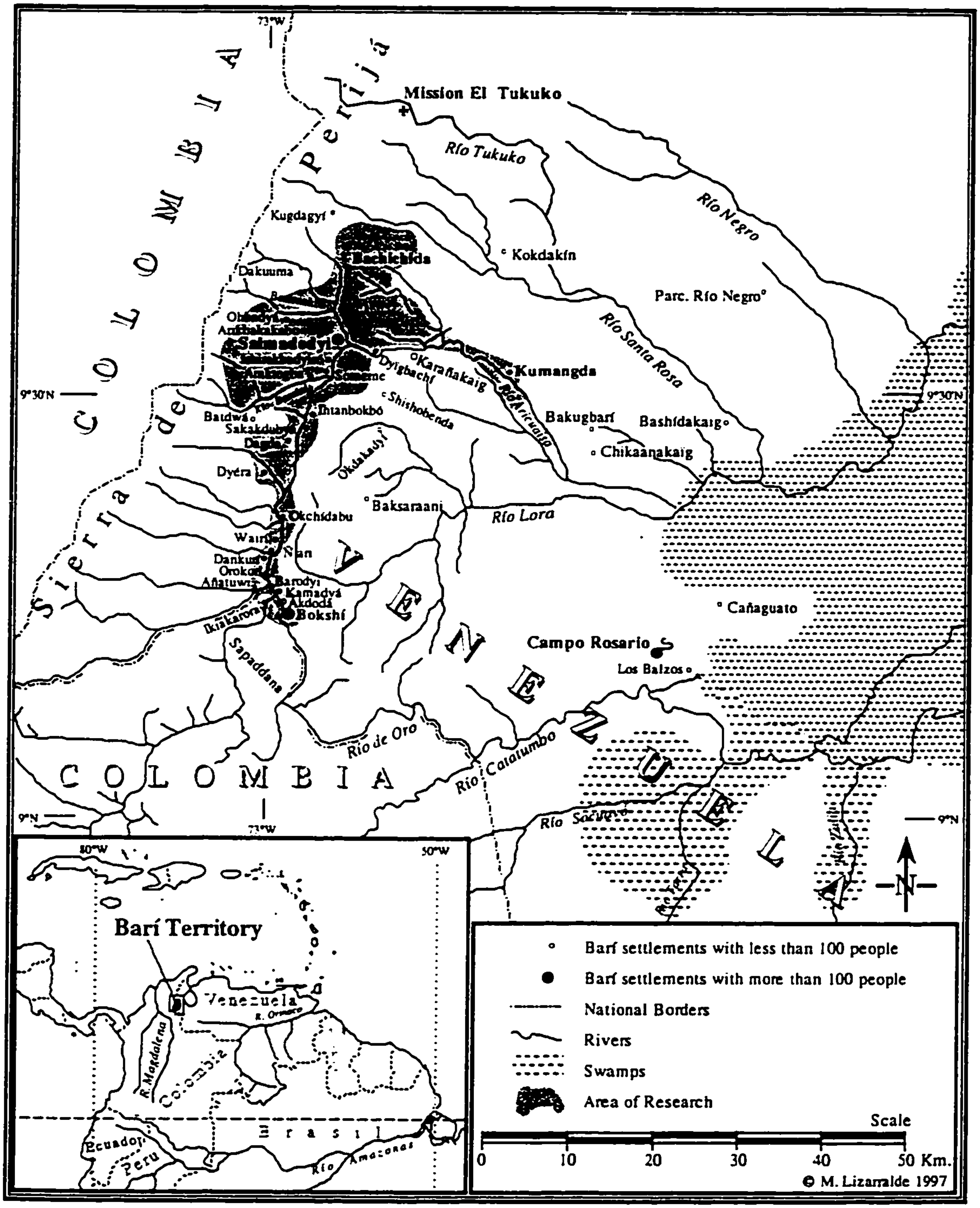
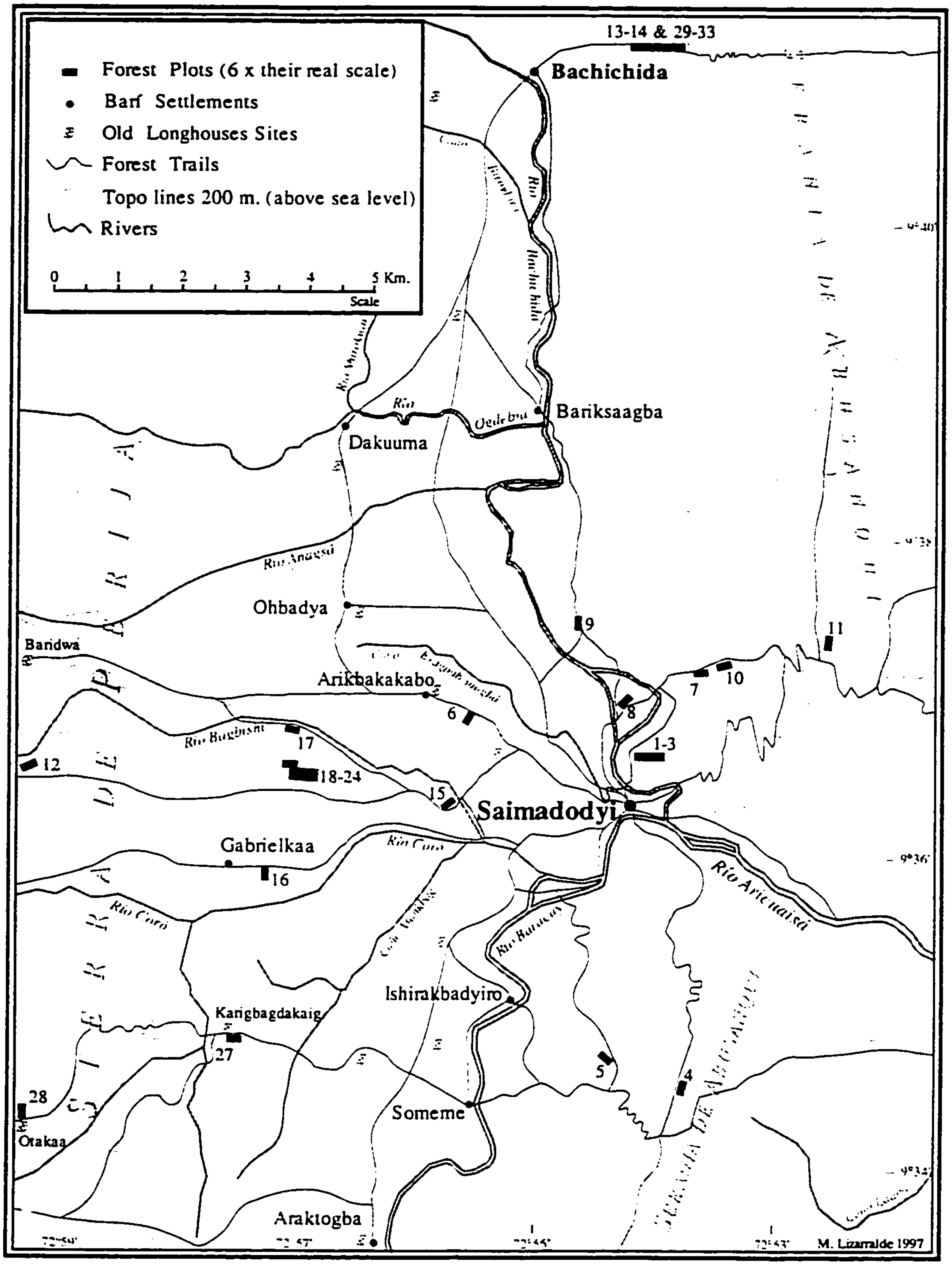


MAP 1: BARÍ SETTLEMENTS AND AREA OF RESEARCH



MAP 2: SITES OF FOREST PLOTS, SETTLEMENTS AND TRAILS OF THE STUDY AREA

CHAPTER 1: INTRODUCTION TO THE RESEARCH

> Without a thorough understanding of the world's plant resources, the human race would cease to exist. (Smith 1995:175)

> Many challenges face ethnobotanists in future years, particularly the rapid loss of biodiversity and the concomitant loss of indigenous knowledge systems. ...Thus ethnobotanists preserve traditions that otherwise would surely be lost. (Balick and Cox 1996:206)

THE PROBLEM

The primary motive for this research is the urgent need to record indigenous plant knowledge. The plant world is quite important for both people and the global environment. People would not have survived if they had not developed an acute perception of their botanical world. The mapping of knowledge, specifically knowledge of plants, is a cognitive process wherein the human mind establishes its individual and cultural identity and situates itself in a given environment. The human need to name the organisms in the environment derives from the need for detailed knowledge of plants and animals that is essential for subsistence. In the humid tropics, especially the neotropics, the diversity and thin distribution of organisms adds another level of difficulty to the study and knowledge of these resources.

This dissertation addresses the question of the nature and structure of Barí knowledge of their tropical rainforest trees. (The Barí are an indigenous people living in the northwest lowlands of Venezuela, on the border with Colombia.) This question is rather complex and broad. I focus on rainforest tree knowledge and the variation in this knowledge. The last issue I examine is how the Barí directly and indirectly use the forest in order to provide data on the potential availability of forest resources.

However, there is a question that we need to ask first: Why should we bother studying indigenous knowledge? It is well agreed among social scientists studying people's relation to their environment that

> traditional inhabitants of tropical regions frequently possess a profound knowledge concerning natural resources and their sustained use [but] such knowledge has been rarely documented in Amazonia (Anderson 1990:65).

Anderson is not the only scientist to raise this point. Twenty-two years ago, Goodland and Irwin (1975:65) also wrote a quite meaningful statement still relevant in the present:

> Amerindians not only profoundly appreciate what exists, but also understand ecological interrelations of the various components of the Amazonian ecosystem better than do modern ecologists. Indians perceive specific relationships which biologists are only now discovering to be accurate. And since the Amazon jungle is the most complex, richest, and least understood ecosystem in the world, the Amerindians' knowledge of it is of inestimable value. We remain in abject ignorance of the identity, location and mode of use of myriad Indian drug plants, cures for specific ailments, contraceptives, abortifacients, arrow poisons, and fish-stunning substances. Our ignorance of seasonality, migration and succession in the jungle is almost total.

Balick and Cox (1996:3) also provide a relevant observation on indigenous knowledge:

> ...the efficacy of the indigenous tradition is empirically tested. It appears that indigenous traditions and science are epistemologically closer to each other than Westerners might assume. The contexts of trials performed by Western scientists and by Shipibo Indians or Tahititian healers are obviously very different, but the empiricism in both is of interest.

These "traditional inhabitants" or indigenous people have accumulated empirical knowledge of their local resources tested and used through many generations. This knowledge is experiencing a rapid loss, reported everywhere in the world. For example, J. Howe wrote in the foreword for Ventocilla et al. (1995:X) the following statement:

> As many Kuna see it, the problem comes in part through loss of knowledge, the intimate knowledge of forest and marine environments retained by the oldest hunters, fishermen agriculturists, and especially, medicinal curers. As many young Kuna abandon traditional subsistence for paid labor, either in Kuna Yala or in the city, and as almost no one under thirty seriously apprentices to learn traditional medicine, the store of environmental knowledge rapidly diminishes and, with it, the intimacy of the Kuna's connection with the natural world.

This situation has been observed all around the world. The ethnobiological information that is held by many traditional societies is the first thing to go with acculturation and shifts in ways of life. Unfortunately, these indigenous people have not been acknowledged properly in their own countries, as Gerardo Reichel-Dolmatoff (1990:17) states:

> The tragic aspect of this situation is that, in Latin America, the *true value* of the aboriginal element is either being ignored or it is totally misrepresented by people who have little knowledge of Indian societies and their cultures, or who have their own reasons for avoiding the topic of an Indian heritage.

The value of indigenous societies and their knowledge needs to be recognized. If this does not happen, these areas can become politically unstable, with the development of small-scale warfare causing the destruction of the natural environment and local cultures. Their knowledge is essential for developing and maintaining ecologically and economically sustainable relations with their environment.

Bearing all these issues in mind, the objectives of my fieldwork with the Barí were to 1) collect botanical specimens to document scientifically the organisms known to them, 2) map trees in forest plots to understand their distribution and abundance as well as using them as a questionnaire, 3) interview informants on the names of trees in the forest plots to determine the extent of their knowledge and its variation, and 4) interview informants on the ecological and economic value of the trees. This study will produce data useful for the Barí and for specialists in this region as well as show the value of indigenous people to nations that still have them.

THE PEOPLE

The Barí live in the tropical rainforest of Sierra de Perijá in northwest Venezuela and northeast Colombia (see Map 1). Isolated from direct contact with the Western world until recently, the Barí were contacted in 1960 and underwent great changes ecologically, demographically and socially. The Barí still rely primarily on swidden cultivation and fishing, hunting, and gathering (in order of importance). Swidden cultivation based on manioc and banana production provides 90% of the total food but more time is spent in hunting, fishing and gathering (Beckerman 1983b).

Over the past twenty years, many Barí have shifted from their traditional forest-based economy into cattle raising and cash cropping (Lizarralde 1991). They produce cheese and small amounts of rice, black beans, corn, and plantains for sale. The Barí are under pressure to deforest for cattle pasture partly as a source of cash income but primarily to secure their claim to their land before non-Barí do it. The conversion of tropical forests into cattle pastures has eminently "negative ecological and socioeconomic consequences" in South America (Serrão and Toledo 1990:196).

The Barí are the perfect group of people for this type of research for several reasons. No extensive ethnobotanical study has been carried out among them. Both Beckerman and R. Lizarralde have made some studies of plant uses, mostly focusing on cultivated plants (Beckerman 1975, 1983a, Lizarralde 1991). Beckerman (1977) also wrote a paper on palm use among the Barí. Due to the rapid acculturation process, they are experiencing a rapid loss of ethnobiological knowledge as they shift their subsistence activities. Moreover, their forest is rapidly being destroyed by cattle ranchers and cash crop production in the area (cf. Behrens, et al. 1994, Lizarralde 1991). The elders are the only Barí who grew up fully using the extensive knowledge of plants. Therefore, this could be the last decade such ethnobotanical research can be done to record and understand the Barí knowledge of their forest. The extensive research on Barí settlement patterns, subsistence economy, genealogy, history and culture that has been carried out over the last thirty-seven years by R. Lizarralde and more recently by S. Beckerman provides an extensive source of information that will place the ethnobotanical data in a complex cultural and ecological context.

Another key issue addressed in this research is whether 'traditional' knowledge and cultural systems will be robust enough to survive the onslaught of modernization.

My research shows that the loss of knowledge for the first generation born after contact is noticeable, and is much greater for the second generation. This decrease is going to be a great loss not only for them but for us, too.

THE FOREST

In tropical rainforest, unlike temperate forest, there are no homogeneous groves of single tree species and species densities per hectare are commonly between 100 and 350 (Gentry 1988, 1990, Phillips and Gentry 1993a, 1993b, Prance, et al. 1987, Richards 1996). It is well known that half of the species of the world flora are in the tropics, most of them in South America, providing a great amount of unknown resources (Mendelsohn and Balick 1995)(Mendelsohn and Balick 1995, Richards 1996, Toledo 1988). The tropical rainforest of the Amazon and surrounding regions, such as the Sierra de Perijá, are in desperate need of further research focusing on indigenous peoples' relations to their own environments, as many scientists have recently pointed out (Berlin 1984, Clay 1988, Clay 1990, Conklin and Graham 1995, Davis and Bernstam 1991, Denslow and Padoch 1988, Head and Heinzman 1990, Hecht and Cockburn 1990, Martin 1995, Posey and Balée 1989, Prance 1995, Raven 1988, Schultes and Reis 1995, Sponsel 1995, Taylor 1988, Toledo 1987, Zent 1994).

One of the most serious problems, aside from our lack of knowledge of these forests, is that most tropical rainforests are going through great changes. Smith (1995:177) gives an example:

> One of my first field trips for the collection of ethnobotanical information... left me with the mistaken impression that there was more forest in Colombia than could ever be cut by human labor. It appeared that local customs would survive for millennia and that ethnobotanical information always would be available for collection. Return visits to Colombia have proven amply that humans with a will to survive and axes to aid them will clear-cut enormous acreage, including some of the most forbidding rain forest. I traveled a road in 1975 that I had first traveled in 1940, and the scenery was completely unrecognizable. The trees... were all gone, and the soil surface was covered largely by herbaceous turf, except along fence rows and waterways. The forest lore had disintegrated with the destruction of the forest.

I have also observed the same phenomena in the Lake Maracaibo basin, and they are occurring as well in Malaysia, Central Africa, Costa Rica, Mexico, Haiti and Brazil (Caufield 1982, Clay 1988, Denslow and Padoch 1988, Hecht and Cockburn 1990, Huber and Frame 1989, Myers 1989, Nations 1988, Raven 1988, Richards 1996, Wilson 1992). It is believed that at the current increasing rate of destruction, "the whole of the Tropical Rain Forest may disappear in the lifetime of those now living" (Richards 1996:489).

The Barí are under pressure to expand forest clearance to raise cattle as a source of cash income. In the last six years, due to inflation and national currency devaluation, cattle raising has not been profitable for the Barí. In the last four years, they have shifted to selling timber for cash. Although many Barí have misgivings and would like to find a way to preserve their forest, they need cash to buy medicine, pay for public transportation when they go to the city and buy Western goods that will make their life easier.

Research on their resources, their management and their knowledge of the forest is crucial in order to establish a dialogue between them and national and international institutions to assure a secure future for the Barí and their rainforest (see Balée 1989, 1995, 1989, Balick and Cox 1996, Gómez-Pompa 1996, Irvine 1989, Mendelsohn and Balick 1995, Peluso 1992, Plotkin 1995, Posey 1990, 1996, Prance 1995, Schultes and Reis 1995, Sponsel 1995, Toledo 1992). The Venezuelan Institute of National Parks (INPARQUES) has very little information about indigenous people living in the national parks and finds it virtually impossible to develop policies that include indigenous people such as the Barí in parks (Lizarralde 1993b).

This research will show that the Barí knowledge of the flora of a specific region is the key to the existence of these forests. These forests are not entirely natural because they appear to be modified, thus becoming anthropogenic forest (see Balée 1989, 1995, 1989, Irvine 1989). The intention of this research is to provide scientific documentation for an ethnobotanically and botanically unstudied region and to find alternatives for the Barí people to coexist with what remains of their rainforest (Huber and Frame 1989, Steyermark and Delascio 1985).

My research is focused mainly on trees. Trees are the ideal life form for exploring Barí indigenous knowledge and perception of their rainforest, because they do not move, they are big, visible, and abundant and they occur everywhere in the Barí territory. They are the biggest form of organism, making up the greatest part of the biomass in the Barí territory. I could interview as many Barí as needed on specific trees in order to understand their world view of the flora and ecosystem. Because of their size, I can estimate the density of folk-species on a specific unit of land (0.15 or 1 hectare and 5.83 hectares) and the number of individuals per species. Trees are thoroughly integrated into Barí existence, in their myth, diet, technology, construction materials and medicine. They can name all the trees and know nearly all the species growing in their territorial rainforest.

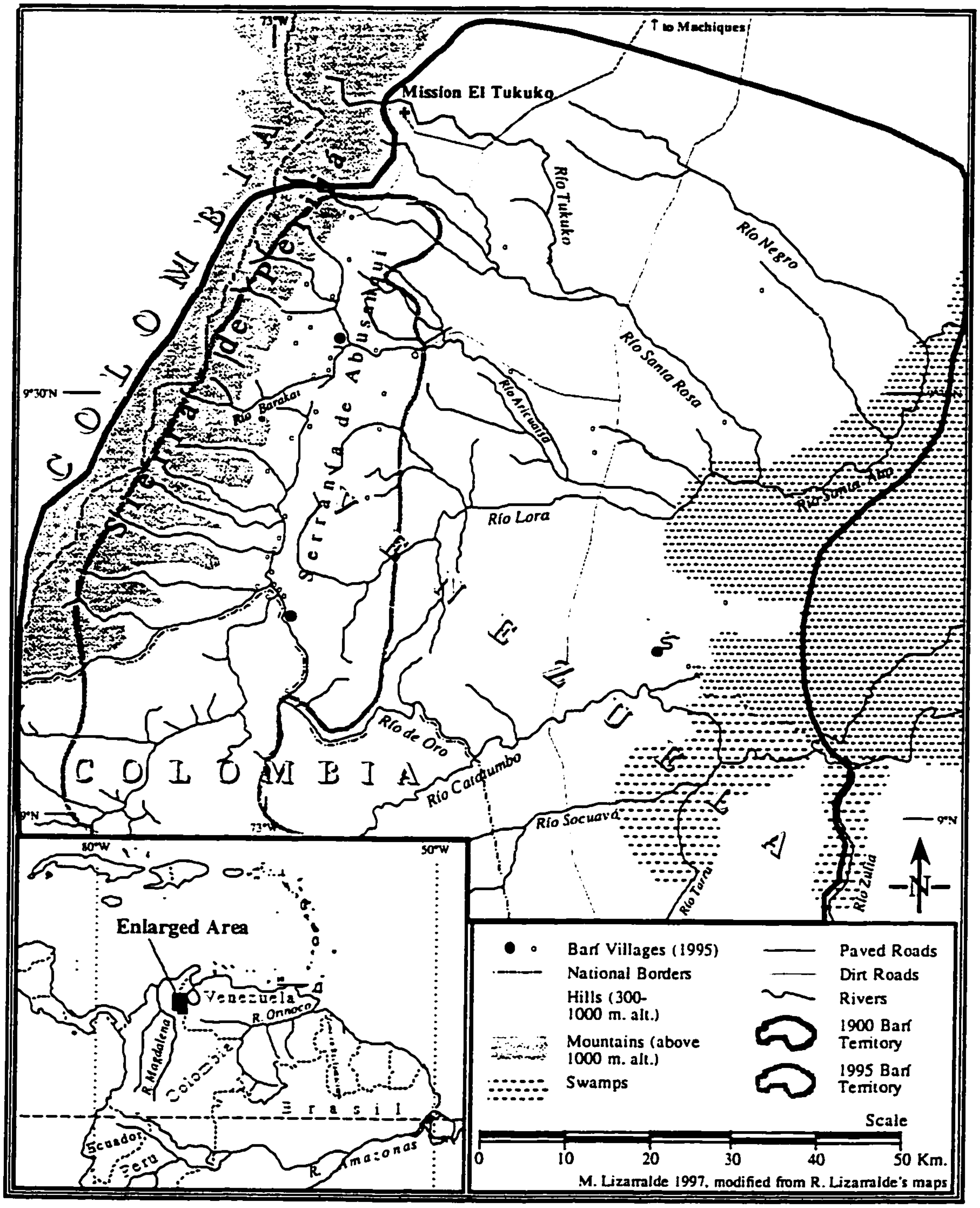
In this dissertation, there are eight chapters, including this introduction. The second chapter contains a biogeographical description of the Barí territory, including a description of the vegetation. The third chapter provides a brief ethnographic description of the Barí. The fourth chapter is a summary of the theory and methods used in this research. The fifth chapter is a description and analysis of the Barí perception of their flora. The sixth chapter is an evaluation of the individual variation in knowledge among the Barí informants. The seventh chapter is a description of the Barí use of forest trees and plants arranged by types of uses (edible, fuel, medicine, construction, technology, for the market and game animal food). The last chapter is a summary and conclusion.

CHAPTER 2: BIOGEOGRAPHICAL SETTING

> The virtual disappearance of the world's tropical rain forests will inevitably have profound consequences, due to effects on rainfall both local and world-wide, and on atmospheric carbon dioxide... Biologically the most far-reaching result of rain-forest destruction will be the probable extinction of vast numbers of plant and animal species. (Richards 1996:489)

As Richards states above, the understanding and study of rainforest have "profound" local and global implications. These changes have taken place in the Barí people territory. The Barí once occupied an area that extended over the southern and western side of the Lake Maracaibo basin. Today, sixty percent of the Barí population is restricted to 15% of this territory on the western margin of this area in the foothills of the Sierras de Perijá and Abusanqui, while the remainder lives on small plots of land amidst the cattle ranches between Río Negro and Río Catatumbo (see Map 3). This territorial change is important for this study because most of the Barí have been relocated to a formerly less used ecosystem, and may thus show less knowledge and use of their forest than other indigenous groups. Moreover, in interviews about their flora, they constantly made reference to the lowlands they once occupied.

Biogeographically, all of this region is a very humid tropical rainforest environment. Geographically, it is mostly flatlands, with some of the surface seasonally flooded by the Santa Rosa, Lora, Catatumbo, Tarra, and Zulia Rivers and an extensive area of swamps reaching to the shores of Lake Maracaibo (see Map 3). Westward, 60 to 80 kilometers from the shore of Lake Maracaibo, it includes a small area of rolling hills and low mountains. Farther west (100 km) and south (60 km) from Lake Maracaibo lie the mountain ranges of the Sierra de Perijá and the Cordillera de los Andes.



MAP 3: LANDFORMS OF THE PERIJÁ REGION AND BARÍ TERRITORY IN 1900 AND 1995

This entire region was once covered by evergreen rainforest, montane forest and cloud forest, changing gradually to deciduous forest with medium-sized trees at its northern boundary, near the town of Machiques, the district capital of Perijá. Toward the southwestern portion of the past and present Barí territory is found the most humid rainforest of Venezuela, with the highest rainfall: as much as 5,690 millimeters per year (1988) and an average of 4,300 mm in the last twenty years, which is a remarkable contrast to the 2,280 mm of rainfall per year in the northern parts of the current Barí territory between Mission El Tukuko and Machiques (Gines and Foldats 1953, MARNR 1997, Paolisso 1985). The area crossed by the Aricuaisa river, where this research took place, has 3,200 mm of rain per year (see Map 5). Most of the region is at an altitude of 50-200 meters with on average temperature of 26°C-28°C ranging from 18°C to 36°C (Gines and Foldats 1953:330-40). In sum, this region is basically very humid and hot year-round (Beckerman 1975, Gines and Jam 1953, Lizarralde ms., MARNR 1982c, Paolisso 1985). The typical vegetation is medium to tall rainforest, although there is great variation in forest types micro-ecologically.

The Sierra de Perijá is an ecotone region sharing the flora and fauna of both the Amazon and Central America (cf. Emmons 1990, Gentry 1993, Jiménez Madrigal 1993, Ventocilla, et al. 1995). Before the formation of the Sierra de Perijá, the Lake Maracaibo basin and the Magdalena basin were parts of the same lowland (see inset in Map 2 for the location of Magdalena River). This history explains the similarities in fish species found on both sides of the mountain range. Since the Magdalena basin is located between the Amazon basin and Central America, its fauna has elements of both geographical areas. However, 7% of the fauna in the Sierra de Perijá is endemic (Venezuela 1990:8). In this region, 860 species of vertebrates have been recorded. These include 115 species mammals, 61 species of reptiles, 77 species of fish and 617 species of birds. Of these recorded species of vertebrates, 60 are endemic to the Sierra de Perijá: 7 mammals, 2 reptiles, 6 fish and 46 bird species (Venezuela 1990:8, Viloria and Calchi 1989). Some species are rare: spectacled bear (*Tremarctos ornatus*), harpy eagle (*Harpia harpyja*), Andean condor (*Voltur gryphus*), Andean cock-of-the-rock (*Rupicola peruviana*), red-and-green macaw (*Ara chloreoptera*), jaguar (*Panthera onca*) and helmeted curassow (*Pauxi pauxi*).

LANDFORMS

The basic landforms in the region are, moving from east to west: (1) swampland close to Lake Maracaibo, (2) an extensive plain, (3) hills, and then (4) mountains (see Map 3 for details). The swamps cover a very large area of approximately 3,750 km^2 near and inland from Lake Maracaibo, and are not habitable. Traditionally, the Barí inhabited the low plains, 0-75 meters above sea level, which are sometimes partly flooded, and cover approximately 8,000 km^2. These lowland areas are smilar to the varzea, known as "tatucal" by the locals (Pittier 1948:67). To the west, these plains are bordered by a narrow range of hills, called Serranía de Abusanqui (from the Barí word ***abusanki***, meaning ridge), about 5-12 kilometers wide with peaks not taller than 800 meters, which, in Venezuela, extend northward from the Río de Oro and nearly disappear on the northern boundary of the current Barí territory. The mountains of the Sierra de Perijá, which rise above the hills, form an abrupt range with heights from 2,000 to 3,638 meters running roughly in a north-south direction and serve as a boundary between Venezuela and Colombia. Tectonic movements during the Tertiary raised the sedimentary strata to create these hills and mountains, with steep slopes on the west and gradual slopes on the east (Paolisso 1985, Ruddle 1974, Venezuela 1990). The geological processes which created these highlands also left a wide structural valley that runs north-south between the mountain and hill formations. The hills and mountains cover an area of approximately 5,350 km^2, but they are practically uninhabitable, except for the structural valley where nearly 60% of the Barí now live in 20 villages within a 300 km^2 area.

The Barí also recognize four basic types of landform, although these do not correspond perfectly to those described above: ***asharoó***(plain), ***dyera*** and ***dyeraroó*** (hills and mountains), ***dyerakobairã*** or ***ashakorãã*** (valleys) and ***baróona*** (swampland). Most of the Barí settlements were in the ***asharoó*** environment in 1900 (Lizarralde and Beckerman 1982). Both the Sierra de Perijá and the Serranía de Abusanqui are considered ***dyera***. The Barí traditionally used this area to hunt monkeys and birds during the rainy season, specifically at the altitudes of 500-1000 meters above sea level. Some species of plants and animals are found only in ***dyera*** (e.g., *Ramphastos citreolaemus*, ***shirohkoo***, citron-throated toucan or *Pauxi pauxi*, ***dyera bagbaa,*** helmeted curassow and *Tremarctos ornatus*, ***sabaidakú***, spectacled bear). The ***dyera*** zone is an area full of calcareous rock formations ten meters or more in height where caves and sinkholes abound. The Barí call this formation ***agdou***, found mostly in the higher parts of the Sierra de Perijá, above 600 meters above sea level from west of Bachichida to the Río de Oro. The valley running from the Barí villages of Bachichida to Bokshí is not considered ***asharoó*** or ***dyera***, and not named as a specific geographical place, but is sometimes referred to as ***dyerakobairã*** (which means "valley" in Barí).

SOILS

The Sierra de Perijá is the northernmost mountain formation of the Andean range. It is a young formation, from the mid-late Tertiary period, 20-10 million years ago (Gines and Jam 1953:16). The Barí territory is covered mostly by alluvial and colluvial soils with variable amounts of clay mixed with sand and a little humus (Arvelo 1987, MARNR 1982a, MARNR 1982b, MARNR 1982c). The most common types of soils in this region are ultisols and oxysols (Venezuela 1990:5). In the southern part of the current Barí territory around the Río de Oro, the soils are mostly entisols and inceptisols (Venezuela 1990:5). This type of soil (sand and clay) is also very common in the Amazonian "terra firme" (Jordan 1985, Richards 1996). Due to the fact that the Sierra de

Perijá was formed by geological processes occurring during the Devonian and Cretaceous, its sediments are mostly composed of Pre-Cambrian quartzite, schist and some granite.

In the Barí territory, some areas, such as around Río Aricuaisa, whose soils derive from sandstones, have more sand than clay, while others, such as between the Ríos Lora and Catatumbo, are quite high in clay. In the forest near Saimadodyi, there is also a wide variation in the proportions of clay and sand, with varying degrees of a small layer of humus. In the flooded areas, e.g., near Kumángda or near most rivers, whose soils are younger, there is more humus mixed with the sand and less clay. These soils tend to be used for banana and plantain swidden gardens. On the other hand, in the interfluvial lands the soils are much older, and less fertile; this is where the Barí usually establish their manioc swidden gardens. In sum, the soils are generally poor for intensive agricultural production (Arvelo 1987, MARNR 1982c).

RIVERS

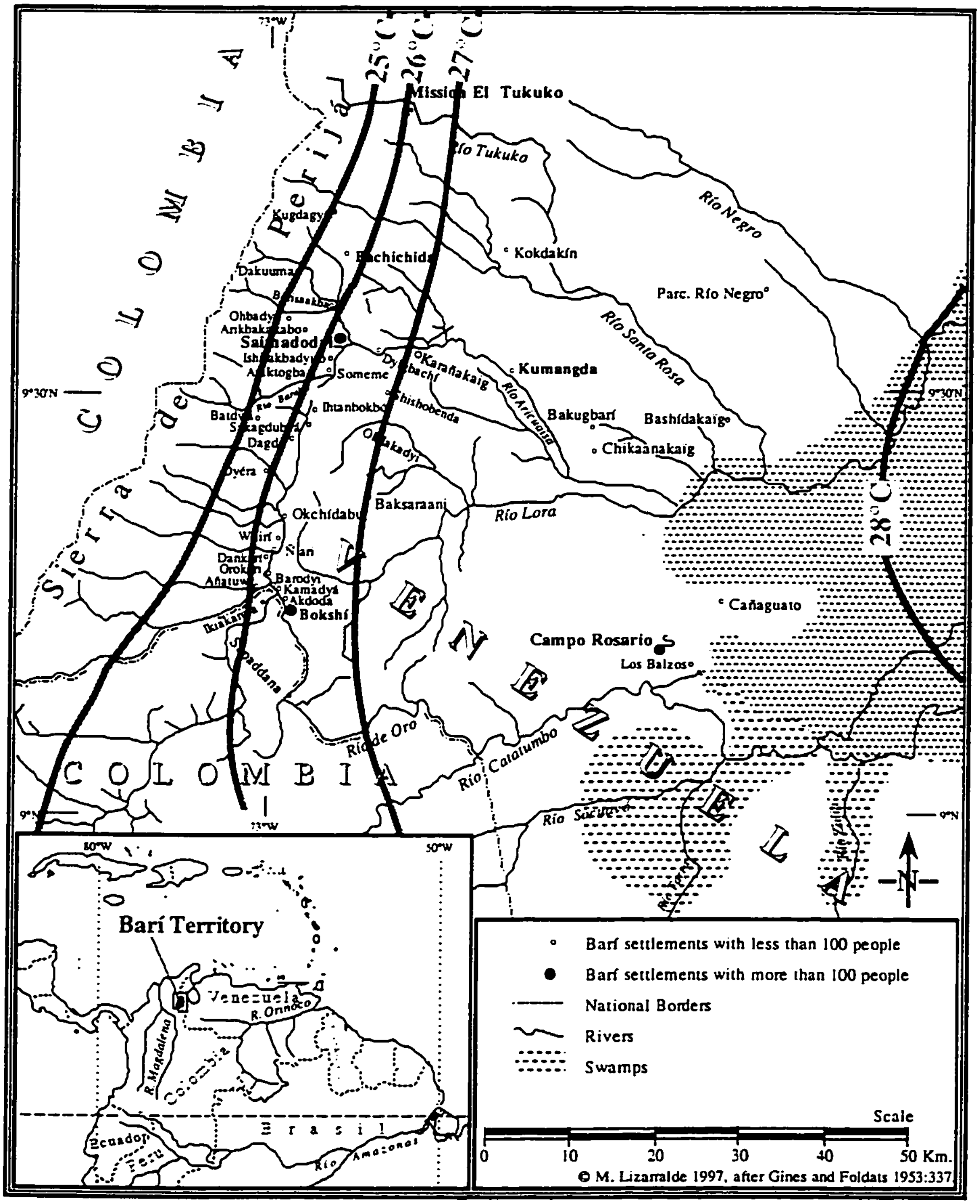
The Barí territory is drained by two major river systems. The main river is the Río Catatumbo, whose very large basin covers most of the southern part of the territory, and is fed by a very dense network of creeks and rivers, the product of high rainfall. The adjacent Santa Ana river basin drains the central and northern part of the Barí territory. Flash floods are not rare in the areas near the hills and mountains, where some Barí have lost their lives to them. For the Barí, rivers are a quite important source of resources and a perceptible landmark. Rivers cover approximately five percent of the surface of the territory according to a recent satellite image study of the region (Behrens, et al. 1994:303). This surface coverage is five times higher than the average on earth (Abramovitz 1996:60).

The rivers in the Barí territory are mostly clear/white water-rivers. Almost all these rivers have their headwaters in the Sierra de Perijá in Venezuela and Sierra de Ocaña in Colombia, and flow from west to east, providing the majority of fresh water to Lake Maracaibo. When the rivers approach the shore of Lake Maracaibo, they become mostly slow-moving and meandering because of the low gradient and the great amount of sediment they are carrying. In their last seventy kilometers, the Santa Ana and Catatumbo Rivers cross a very extensive swamp with many lakes known as Cienagas del Catatumbo, covering some 250,000 hectares that seems to have been an ancient bay and delta that was totally filled by sediments durring the Quaternary (see Map 3).

The rivers in Perijá are rich in aquatic fauna, with 77 species of fish and many species of reptiles, birds and mammals, which are important in the Barí diet (Beckerman 1983b, Venezuela 1990:8). The clarity of water is important for the Barí fishing strategies. Rivers are an important consideration in the location of their settlements due to the high contribution of fish to their diet (Beckerman 1975, Beckerman 1983b).

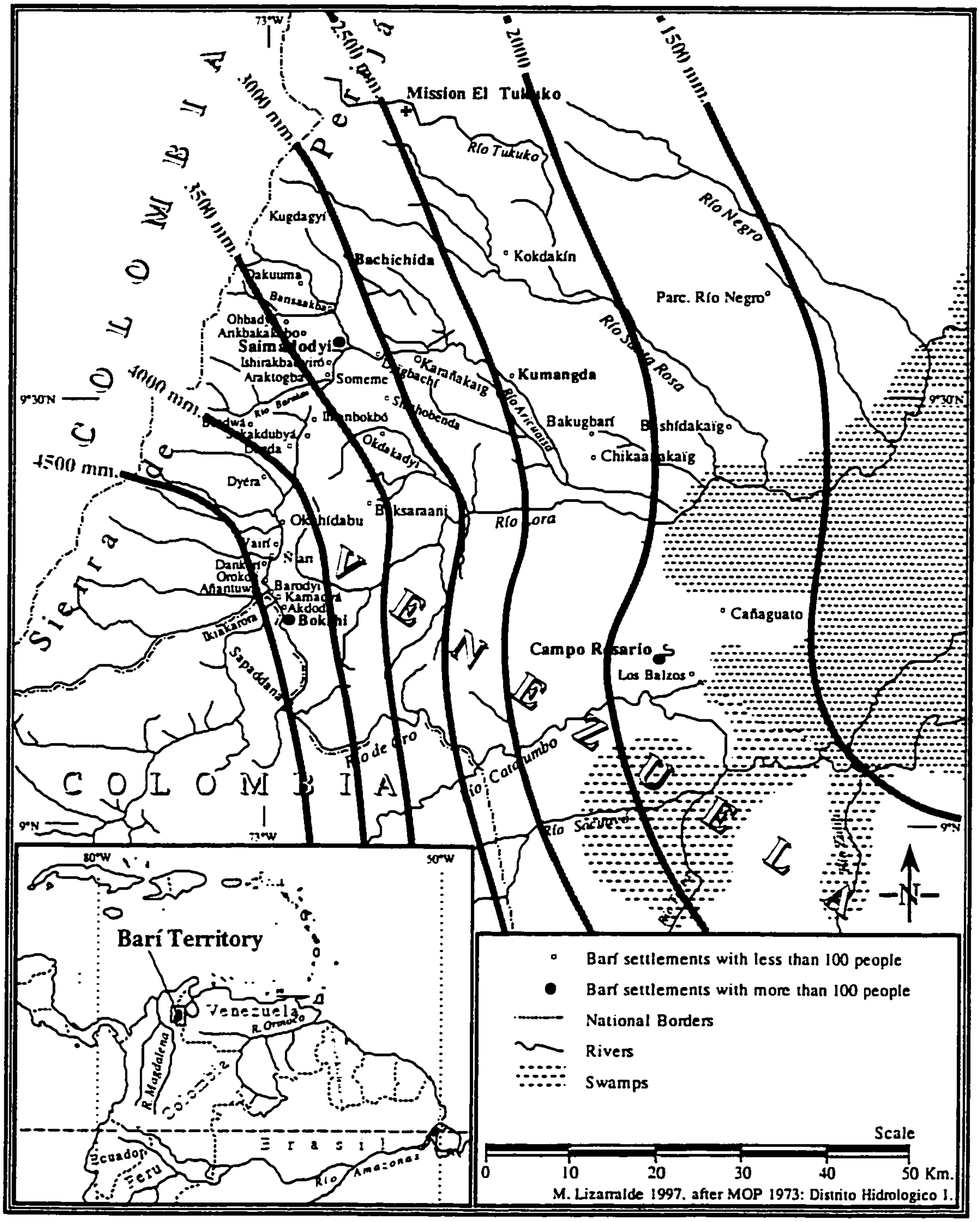
CLIMATE

The climate of the lowland region adjacent to the Sierra de Perijá is basically humid tropical, with high humidity almost year-round. Three-quarters of the Barí territory prior to 1960 is less than 100 meters above sea level with a quite humid (90-95%) and hot climate (27.5°C average with a range of 18-38°C, see Map 4). Now, two-thirds of the Barí villages are in the Sierra de Perijá at 150-200 meters above sea level, scattered along the structural valley between the high mountains and the hills, where it is less hot (26°C annual mean with a range of 16-34°C, R. Lizarralde pers. comm.). Hence, all the villages from Dyera to Bachichida get cool mountain air at night that comes from a height of 2000 meters. In contrast, in the lowland village of Kumanda, one is likely to sweat on most nights of the year.



MAP 4: MADIAN ANNUAL TEMPERATURE IN THE PERIJÁ REGION

The humidity in the region is very high for ten months of the year, as the result of the high precipitation and evaporation, so that any clothing hanging inside gets moldy in a few days if not exposed to the sun. In the Maracaibo basin the rainfall pattern varies according to latitude and orography, increasing rapidly from north to south, and northeast to southwest in the Barí territory: from about 1,200 mm in the northeastern villages to 3,000 in the middle Aricuaisa rivers and up to 4,500 mm per year in Río de Oro (also in Gines and Foldats 1953:327, see Map 5, modified from R. Lizarralde pers. comm. 1997, mainly from MARNR 1997, MOP 1973). In some seasons, rainfall has reached 5,690 mm in the Río de Oro region and 4,050 in the Aricuaisa (MARNR 1997). This region is hyper-humid, one of the wettest places in South America (Richards 1996) and the most humid place in Venezuela (Huber and Alarcon 1988). The yearly rainfall pattern is characterized by two peaks, in May (400 mm per month) and September-October (410-420 mm per month), when it rains almost every day. It is not rare in the beginning of April to see one or two weeks of daily rain in Saimadodyi, and to have as much as 716 mm (recorded in May of 1993, see Figure 2.1). The dry season starts in mid-December and ends in March (Gines and Foldats 1953:327). The driest months are January-February with an average of 59 mm per month and a range of 7-180 mm (MARNR 1997). However, most rain occurs at night, and it is rare to see more than five days without rain even in the dry season. In contrast to Saimadodyi, the typical rainfall pattern for the village of Bokshi and surrounding areas peaks during the months of October, with an average of 607 and maximum of 825 mm (Beckerman 1983b, Gines and Foldats 1953, MARNR 1982c, MARNR 1997).



MAP 5: MEDIAN ANNUAL RAINFALL IN THE PERIJÁ REGION

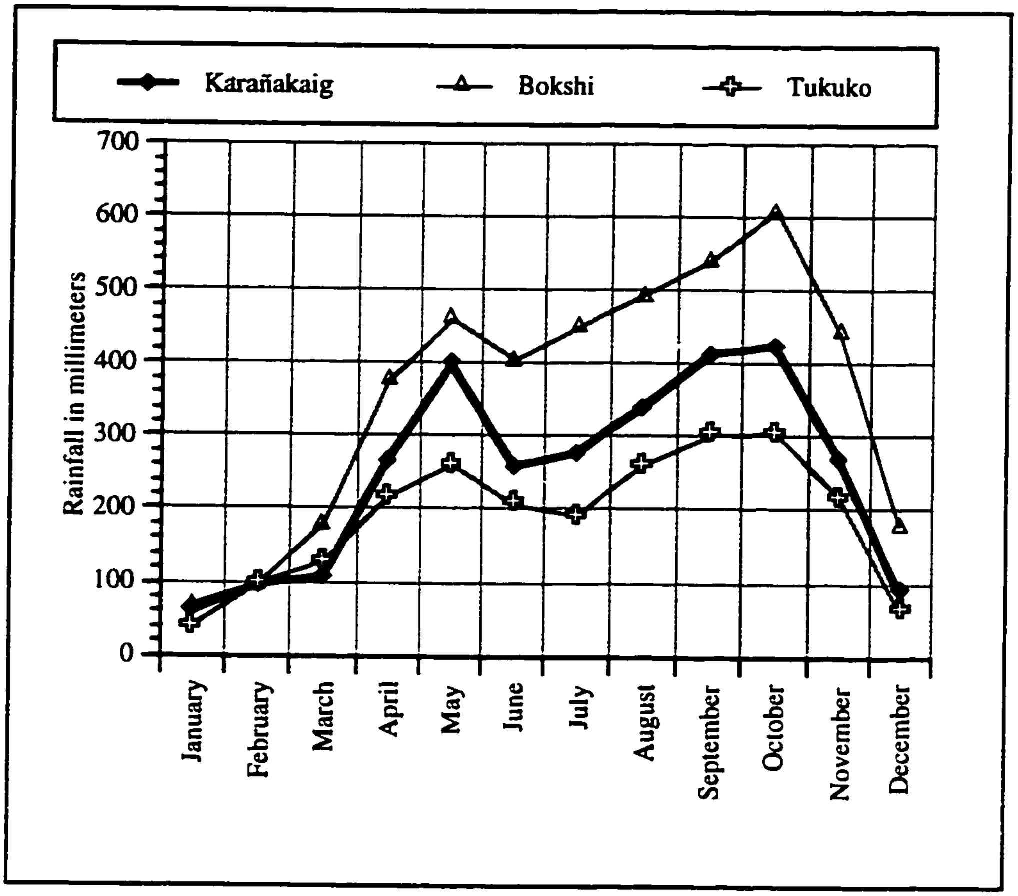


FIGURE 2.1: AVERAGE MONTHLY RAINFALL PATTERN FOR KARAÑAKAIG (EAST OF SAIMADODYI), BOKSHI AND TUKUKO (ADAPTED FROM 1972-1995 RECORDS REGISTERED BY SINAIHME SISTEMA NACIONAL DE INFORMACION HIDROLOGICA Y METEROLOGICA, MARNR)

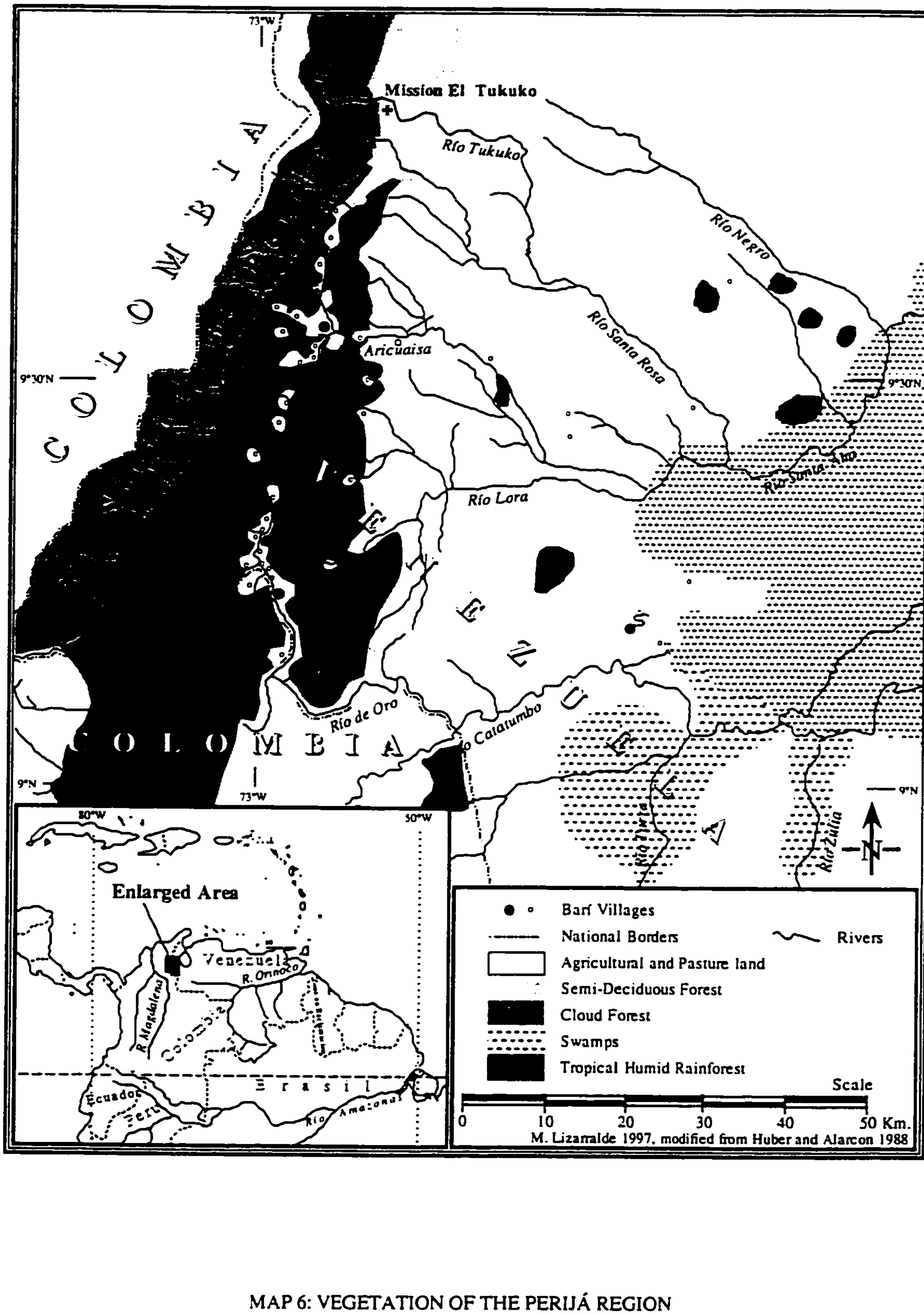
If we look at the annual rainfall, Bokshí gets 1000 mm more rain than Saimadodyi (4300 versus 3300 mm). Bokshí is constantly covered by clouds, so that it is virtually impossible to get a satellite image of the Bokshí region with less than 40% cloud coverage most of the year (Behrens, pers. comm. in 1989). The rainfall in the Mission El Tukuko is only about 2290 mm a year (MARNR 1997).

The climate changes if one goes 40 kilometers in any direction. To the east of Saimadodyi, it is hotter and less humid. Just 15 km to the north, it is slightly cooler because there are higher mountains nearby, particularly at night when colder air descends into the valley. On the south, where the rainfall and the cloud cover are greater, the temperature is slightly lower. Correlating with this variation, I have observed differences in the vegetation. In general, this region is classified as "tropical superwet" (Hueck and Seibert 1981, Richards 1996:160-161).

VEGETATION

The vegetation of the Sierra de Perijá and its adjacent lowlands is poorly known and has been poorly collected (Huber and Frame 1989:367). Unfortunately, the forest of the state of Zulia has been largely destroyed (see Map 6). This region has had the most extensive deforestation in the country. Aerial photography together with the data presented in the most recent vegetation map of the region (Huber and Alarcon 1988) reveal that about 900,000 hectares of forest were destroyed to be converted into cattle pasture and agricultural fields during the past 40 years. Government documents report that the Sierra de Perijá has 1,393 species of plants identified, comprising 156 families, 640 genera and 12 species new to science (Venezuela 1990:7). The Barí have the largest untouched rainforest in the state of Zulia, but it has not been studied botanically. Since it is the main focus of this research, I provide more details to illustrate its complexity.

According to Huber and Alarcon (1988), the lowland Sierra de Perijá region has deciduous and semi-deciduous vegetation. This evaluation a bit incorrect, and Huber admits that this region is not well known botanically (Huber pers. comm. 1994). The vegetation is basically evergreen medium-tall rainforest (up to 50 meters), much wetter and seasonally flooded in the south around Catatumbo and the Río de Oro region in the rainy season. The forest by the Lora, Aricuaisa, Santa Ana and Catatumbo rivers has several species of trees taller than 50 meters (*Copaifera langsdorffii*, *Pouteria* sp., *Cariniana pyriformis*, *Ceiba pentandra*, *Spondias mombin* and *Tabebuia chrysantha*). This region may have the tallest trees in Venezuela (S. Tillett, pers. comm. 1994, also Hamilton et al. 1977:86).



MAP 6: VEGETATION OF THE PERIJÁ REGION

For example, in the lowlands near the Aricuaisa River, between Lake Maracaibo and the Sierra de Perijá, I measured a 65-meter tall *Ceiba pentandra* that had a buttress with a diameter of 10 meters at breast height in one of my forest plots (no. 25). (According to the Barí of the Kumanda, there is an even bigger one in the same area not far from the one I measured.) In 1922, the botanist Henri Pittier (1948) noted tall trees in the forest along the Río Lora. As Pittier observes: "I have seen many trees that are certainly higher than 50 meters in the Rio Lora and Santa Ana" (translation mine \Pittier 1948:78). The northernmost Barí territory has a few deciduous trees. Between the Aricuaisa River and Río de Oro, the land is totally covered by evergreen forest.

According to Otto Huber (1988), the vegetation in the Sierra de Perijá has the following characteristic trees: *Anacardium excelsum*, *Gustavia hexapetala*, *Cariniana pyriformis*, *Ceiba pentandra*, *Sterculia apetala*, *Trichilia pleeana*, *Trichilia maynasiana*, *Faramea capillipes*, *Ochoterenaea colombiana*, *Miconia mocquerysii* and *Vochysia lehmannii*. Pittier described it with the following species: *Copaifera langsdorffii*, *Copaifera fissicuspis*, *Cariniana pyriformis*, *Goupia glabra*, *Dialium divaricatum*, *Gustavia fustis-mortui*, *Labatia parviflora*, *Cuoma sapida*, *Zschokkea armata*, and various palm species of the following genera: *Jessenia*, *Bactris* and *Attalea* (Pittier 1971:46). Pittier also says that "undoubtedly, the three most abundante trees and also the largest are *Copaifera langsdorffii*, *Cariniana pyriformis* and *Ceiba pentandra* (translation mine, Pittier, 1948:77). Other references state that tree species for the forest of the area are: *Pouteria anibaefolia*, *Parkia pendula*, *Inga nobilis*, *Licania arborea*, *Protium carana*, *Astronium graveolens*, *Spondias mombin*, *Xylopia* spp., *Cuoma sapida*, *Cariniana pyriformis*, *Ceiba pentandra*, *and Bellucia aricuaizensium* (Behrens, et al. 1994:299). For the secondary forest, the following species have been found for the same area: *Acalypha schiedeana*, *Trema micrantha*, *Solanum* spp., *Crescentia cujete*, *Hymenaea courbaril*, *Cordia alliodora*, *Cecropia* spp., *Cochlospermum vitifolium*, *Spondias mombin* L., *Didymopanax* spp., and *Terminalia* spp. (Behrens, et al. 1994:299).

Based on my forest plot inventories, I get a number of different dominant tree species. There are 26 species of trees represented by 30 or more individuals, which account for 63.75% of all plotted trees (N=2017). Therefore, the dominant species in the Sierra de Perijá are: *Oenocarpus mapora*, *Brownea coccinea*, *Sagotia racemosa*, *Protium* sp., *Jessenia polycarpa*, *Bactris major* var. *major*, *Pouteria* sp., *Attalea butyracea*, *Jacaranda copaia*, *Sloneae* sp., *Astronium graveolens*, *Micropholis* sp., *Rinorea lindeniana*, *Oxandra venezuelensis*, *Warscewiczia coccinea*, *Pouteria anibaefolia*, *Euterpe oleracea*, *Spondias mombin*, *Inga scabriuscula*, *Ampelocera edentula*, and *Cariniana pyriformis* (see Table 2.1 for details).

TABLE 2.1: NUMBER AND PERCENTAGE OF DOMINANT TREE SPECIES IN ALL SAMPLE PLOTS

FAMILY	Genus and Species	Bari Taxon	# Trees	%*
PALMAE	*Oenocarpus mapora*	***keki***	276	8.7
LEGUM./CAESALPINIOIDEAE	*Brownea coccinea*	***ishkubaba***	228	7.2
EUPHORBIACEAE	*Sagotia racemosa*	***ahkaa***	209	6.6
BURSERACEAE	*Protium* sp.	***ishkugbaa***	105	3.3
PALMAE	*Jessenia polycarpa*	***aruu***	101	3.2
PALMAE	*Bactris major var. major*	***karigbái***	102	3.2
SAPOTACEAE	*Pouteria* sp.	***buruma***	83	2.6
PALMAE	*Attalea butyracea*	***arakta***	83	2.6
BIGNONIACEAE	*Jacaranda copaia*	***shirigbaa***	82	2.6
ELAEOCARPACEAE	*Sloneae* sp.	***kochiña***	71	2.2
ANACARDIACEAE	*Astronium graveolens*	***tumma***	63	2.0
SAPOTACEAE	*Micropholis* sp.?	***bagdrõw***	51	1.6
VIOLACEAE	*Rinorea lindeniana*	***twingbai***	49	1.6
ANNONACEAE	*Oxandra venezuelensis*	***chirabuu***	47	1.5
RUBIACEAE	*Warscewiczia coccinea*	***totuubikaa***	46	1.5
SAPOTACEAE	*Pouteria anibaefolia*	***abogboo***	46	1.5
SAPOTACEAE	indeterminate	***lorogbaa***	45	1.4
PALMAE	*Euterpe oleracea*	***arihbei***	44	1.4
ANACARDIACEAE	*Spondias mombin*	***baroo***	42	1.3
LEGUM./MIMOSOIDEAE	*Inga scabriuscula*	***nondyiruhkuu***	42	1.3
LECYTHIDACEAE	*Eschweilera* sp.?	***sobogboo***	38	1.2
MELASTOMATACEAE	*Miconia* sp.	***chirohdo***	35	1.1
ULMNACEAE	*Ampelocera* cf. *edentula*	***luri***	35	1.1
LECYTHIDACEAE	*Cariniana pyriformis*	***bahku***	32	1.0
INDETERMINATE	indeterminate	***agdodakaa***	32	1.0
MELASTOMATACEAE	indeterminate	***dandoborogbaa***	30	0.9
Total:	**26**		**2017**	**63.8**

* Percentages are based on the total number of trees plotted (N=3162).

Besides these 26 dominant species, four species are also important because of their size, but are not numerically representative: *Parkia pendula*, *Lecythis corrugata*, *Ceiba* *pentandra*, *Tabebuia chrysantha*, and two species of *Ficus*. The first two are found mostly on the Serranía de Abusanqui. The last four trees are found all over the Barí territory and are quite visible in the valley from mountain ridges.

By assembling all the trees in major botanical families, we get the following 14 most important families. These families account for a total of 2463 trees that represent 77.89 percent of all plotted trees (3162). (See Figure 2.2 for details of percentages and all counts in parentheses.)

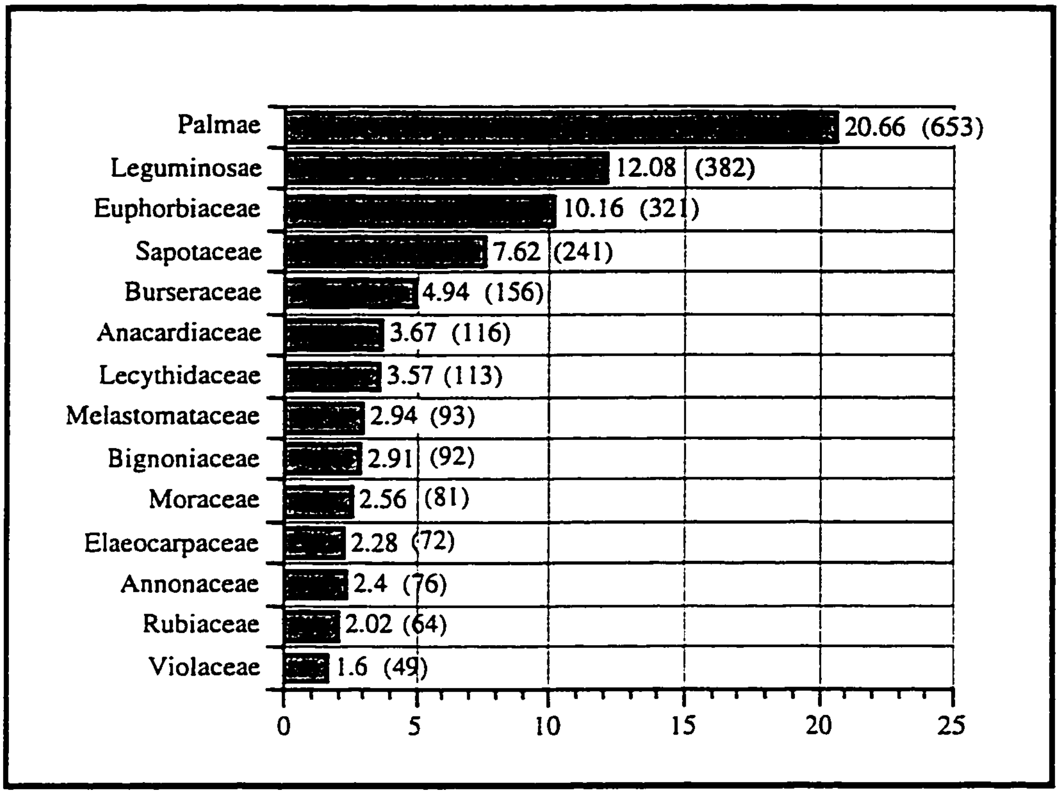


FIGURE 2.2: PERCENTAGES OF DOMINANT TREE FAMILIES IN ALL SAMPLE PLOTS (N=3162, ALL COUNTS IN PARENTHESES AFTER %)

Four botanical families (Palmae, Leguminosae, Euphorbiaceae and Sapotaceae) constitute half of all the trees (50.51% and 1597 trees, see Figure 2.2 and 2.3). The most important botanical family is Palmae. One of every five trees is a palm. In the 4.83 hectares plotted, 653 individuals (of 9 different taxa) were recorded. The Barí recognize 30 palm taxa, of which nine are not present in the plotted sectors of forest. Three other palm taxa occurred in the plots but were not registered due to their small size.

The second most important botanical family is Leguminosae with 382 trees and 12.08% of all the trees. Although I treat them as one family, the Leguminosae family is sometimes treated as three families (Caesalpinioideae [8.48%], Mimosoideae [2.97%], and Papilionoieae [0.63%]). However, there may be more Leguminosae trees that have not been identified. The Leguminosae percentage is probably higher, but not by more than 2 or 3%. The third most important family is Euphorbiaceae with 10.16%, mostly represented by a single species (*Sagotia racemosa*). The fourth family is Sapotaceae with 7.62% and 241 trees.

Seventy-three botanical families have been identified during this study. This number of families should increase. I have not yet been able to collect many tree taxa known by the Barí and I still have 129 plants without identifications (see Appendix D for details).

However, by looking at the relationship between the individuals and species, considerable diversity is apparent. Many species are represented by few individuals. For example, 78 species of trees are represented by only one individual in 4.83 hectares of forest or 3,162 trees. There is a total of 223 different tree taxa in this area. That means 34.98% of the species are represented by one individual and 12.56% of species are represented by two. In fact, in this forest 61.43% of tree species are represented by fewer than six individuals. Therefore, we get a dominance of 26 species, but a high diversity of other species (see Figure 2.3 and Appendix D for number of trees in plots for each species).

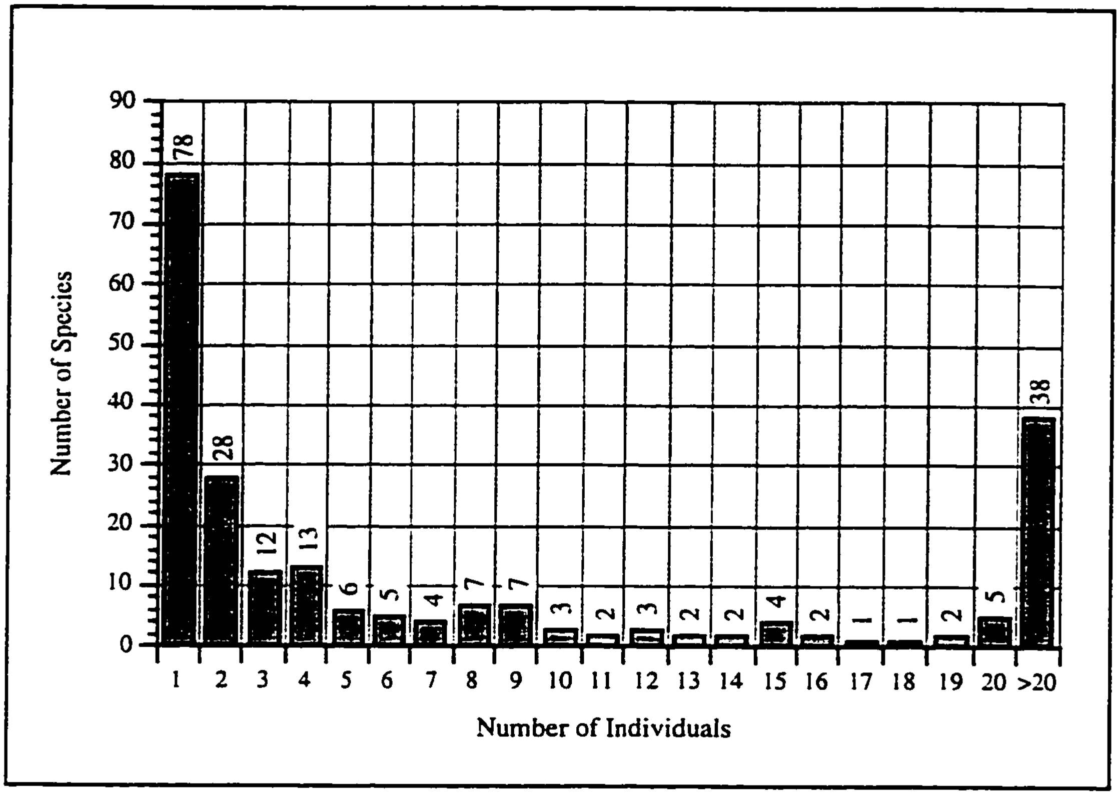


FIGURE 2.3: NUMBER OF INDIVIDUALS INVENTORIED PER SPECIES

Figure 2.3 shows that there are three groups of species. The first two columns, showing 106 species (47.53%), are rare species represented by one or two individuals. Then, we have the second group represented by 81 species (36.32%), which have 3-20 individuals and are not so rare, but not widely distributed. The last column represents 38 species with more than 20 individuals. This is only 17.04% of all the plotted species, but represents 73.52% of all the trees (N=2,325), and these can be considered very common species in the area. This forest is unusual in having many species that have large numbers of individuals (McDade, et al. 1994, Richards 1996:308-310). Compared to other regions of tropical rainforest in South America, the number of species per hectare in Perijá (mean=96, see Chapter 7, Table 7.1) is below average (Balée 1994, Cain, et al. 1956, Cañada 1965, Förster 1972, Förster 1973, Lamprecht 1990, Lizano 1966, Marmillod 1982, McDade, et al. 1994, Milliken, et al. 1992, Prance, et al. 1987, Richards 1996).

The diversity for the Amazonian forest in Brazil Ecuador and Peru is between 100 and 400 species (Balée 1994:124, Gentry 1988, Korning and Balslev 1994, Prance, et al. 1987, Richards 1996:289-93). For example, in two one-hectare forest plots in the Barí rainforest, there are 93 and 102 species of trees and 595 and 776 individual trees with 10 cm diameter at breast height (dbh). These figures are about average compared to 1 hectare plot in many parts of the tropical regions where there are 100-150 species per hectare (Richards 1996:308). However, in tropical America with high rainfall rate, "the number of tree species is probably considerably more than" other parts of the world, as many as "313 tree species ≥10 cm dbh have been recorded on one hectare in Ecuador and still larger number from a relic of the Atlantic rain forest in Bahia" (Korning and Balslev 1994, Richards 1996:292).

To the south, in the Catatumbo and Río de Oro region, the forest is evergreen and more dense than the rainforest of the Aricuaisa River. There are different tree species present in the Bokshí area that a Barí from Saimadodyi did not recognize. One clear example is the palm called ***araktogbaa*** (*Attalea butyracea*), found in the northern territory but totally absent south of the Barakai river or Araktogbaa village (named after the tree to mark the boundary, see Map 3). In many interviews, the Barí pointed to the fact that the territorial variation in trees is quite remarkable. This variation is largely due to variation in rainfall. The type of vegetation and rainfall clearly changes as one moves north and east from Saimadodyi. Thus just 60 km. northeast of Saimadodyi, one can see more semi-deciduous to deciduous trees as rainfall drops to 1,500 mm.

Landscape Composition

In pre-Columbian times, it is likely that as much as 92-94% of the Barí territory was covered with rainforest (extrapolated from Behrens, et al. 1994, Huber and Alarcon 1988). In the recent satellite and ground study by Behrens, Baksh, and Mothes (1994:303), the images show 80% primary and secondary forest (see Table 2.2). They also show the proportions of different land uses for the villages around Saimadodyi and

Bachichida. Behrens, Baksh, and Mothes' (1994:300) Figure 3 is based on the maximum travel distance the Barí cover to perform agricultural work, generally 10-30 minutes walk. These figures are not useful for evaluating the vegetation cover of areas not used. However, by analyzing and extrapolating the surface data from their Figure 3 (Behrens, et al. 1994:300), I get the following data for types of cover for an area of 20 by 20 kilometers with Saimadodyi two kilometers south of the center of the image (see Table 2.2):

TABLE 2.2: GROUND COVER COMPOSITION FOR THE AREA SURROUNDING SAIMADODYI

Surface Type	Hectares	Percentage
Primary Forest	23,500	62.50
Secondary Forest and Low Vegetation	5,900	15.69
Agricultural	6,200	16.49
Water	2,000	5.32
Total	37,600	100.00

The percentage of forest is larger and agricultural zones smaller for the territory the Barí still have (approximately 86% forest and 7% for agricultural areas). This difference is due to the fact that two cattle ranches and several non-Barí cash-croppers are included in the 20 by 20 kilometer image. However, these proportions do represent the real situation that the Barí are facing with their present geophysical environment.

To sum up this biogeographical description, the lowlands and foothills inhabited today by the Barí are a humid tropical environment covered by rainforest and with very high rainfall. Geographically the region is low in altitude with poor soil drained by a dense network of creeks and rivers. The modern human population has destroyed much of the natural fauna and flora. Still, a good proportion of it remains in the hands of the Barí.

CHAPTER 3: ETHNOGRAPHIC BACKGROUND OF THE BARÍ INDIANS

> The rapid clearing of the forest by the cattlemen's bulldozers, advancing steadily during each dry season, destroyed the longhouses one by one, as well as the Barí gardens. ...The Barí... stopped building longhouses because they couldn't find enough soai leaves (*Geonoma* [*stricta*]) in the surrounding small forest patches left after massive deforestation. ...[S]maller houses were not only built in response to a lack of adequate roofing materials, but also because of social pressure from the whites, who kept criticizing Barí communal housing as immoral... and insisted that they should live in single family houses like "civilized" people. (R. Lizarralde 1991:445)

The Barí are a Chibchan-speaking Amerindian group living on the southwestern side of the Lake Maracaibo basin, whose territory is crossed by the Venezuelan-Colombian border. Barí speak one of the nine Chibchan languages. The other seven Chibchan-speaking peoples are the Kuna, Cabecar, Bribri, Ijka, Kogi, Sahja, Chimila and Tunebo (Grosvenor, et al. 1992, Lizarralde 1993a). All of them are found in northern Colombia, except for three, the Kuna (found in eastern Panama), Cabecar and the Bribri (found in southeastern Costa Rica). Today, since no more Tunebo live along its southwestern border, the Barí are the only Chibchan-speaking people found in Venezuela. In 1997, there are approximately 1,850 Barí in Venezuela spread among 37 villages and hamlets (population estimated by projecting from the changes between the two censuses carried out by R. Lizarralde as part of the Venezuelan Indian Census Program of 1982 and 1992, Venezuela 1985, 1993 [R. Lizarralde pers. comm. in 1997]). On the Colombian side of the border another 800 live in two villages, few hamlets and possibly three longhouses (R. Lizarralde pers. comm. in 1997, Beckerman 1994:83). Their villages are all rural and most have rainforest near or around them. They are all located in lowland areas not higher than 250 meters above sea level and rarely below 50 meters above sea level.

Since their first peaceful contact in this century by Roberto Lizarralde in July 1960, the Barí people have been studied in detail by several researchers. The first detailed ethnographic study was carried out by R. Jaulin and S. Pinton in 1964 along the Venezuelan-Colombian border (Jaulin 1966a, 1966b, Pinton 1965, 1972). In 1970-72, Beckerman conducted a detailed human ecological study of subsistence patterns among the Barí of Colombia (Beckerman 1975, Beckerman 1977, Beckerman 1978, Beckerman 1980, Beckerman 1983a, Beckerman 1983b, Beckerman 1983c, Beckerman 1983d, Beckerman 1987, Beckerman 1991a, Beckerman and Sussenbach 1983). Since 1960, R. Lizarralde has also made a large number of field trips to collect information on Barí culture and demography. In the early 1960s, the Capuchin priest Antonio de Alcácer published an historical account of the Barí in the seventeenth and eighteenth centuries based on archival research (Alcácer 1962, 1964, Alcácer 1965). In the late 1970s, another Capuchin priest, Dionisio Castillo, collected extensive information on the culture and myths of the Barí in Saimadodyi (Castillo Caballero 1981). A demographic study of the Barí of the village of Saimadodyi was conducted by M. Zaldívar with data collected by herself in 1988 as well as the census and genealogical data collected by R. Lizarralde (Zaldívar, et al. 1991). In 1990 and 1992, Clifford Behrens, Michael Baksh and Michel Mothes performed a field study of Barí land use with the aid of satellite imagery (Behrens, et al. 1994). In 1992 and 1994, through the Fundación Zumaque funded by the Venezuelan national oil company, Maraven, a multi-disciplinary team made a study of the health of the Barí in three of the large settlements, Campo Rosario, Bachichida and Saimadodyi (Holmes and Scorza 1993). In 1994, a Barí scholar, Nubia Korombara, collected extensive information on the mythology from 19 informants from the villages Saimadodyi, Bakugbarí and Karañakaig (1995). These are the most important of the twenty scholars who have done fieldwork among the Barí.

PREHISTORY

The prehistoric existence of the Barí is not known. There are no excavated archaeological sites in the Barí territory (Arvelo 1987, Beckerman 1978:7, Sanoja 1972).

The types of material collected from archaeological sites west of Lake Maracaibo, but outside of the former Barí territory at Tortolitas, Ranchón, Berlin and Diluvio date from 50 years BC. to 1500 AD, and are not related to the known material culture of the Barí according to Arvelo (1987). The environmental conditions (extremely humid and hot) do not favor the preservation of Barí material culture, which is largely made of organic materials. Traditional Barí implements consist mostly of items made of wood, vines, plant fibers, poorly fired ceramic pots and bone. Until 1960, the Barí made clay pots, but they were quite crude and did not last longer than 20 to 30 years in the forest. (One clay pot my father and I found was nearly complete and some 30 years old but it crumbled into 20 to 25 pieces while being transported in 1972.)

To my knowledge, the only archaeological tools found in Barí territory are three stone axes and one stone mano. In the area of Campo Rosario, R. Lizarralde found two small stone axes (approximately 4 cm by 2 cm). In March of 1994, I also found a quite weathered stone ax (11 cm long, 5.5 cm wide and 2 cm thick) on a trail 1 km west of Saimadodyi. When asked about this stone ax, the Barí people identified it as a natural stone and not as an ax. This stone ax resembles in size and shape those axes found at the site of El Ranchón excavated to the south of Lake Maracaibo (Sanoja 1969). Further, a good-sized stone mano (11 cm by 6 cm) was found by my companion and friend, Dan Ruskin, on a trail east of Saimadodyi in the Serranía de Abusanqui. There is no historical record of the Barí making such tools (cf. Beckerman 1978). There is no doubt that the Barí used stone axes at some point in the past before they could acquire metal tools, starting in the sixteenth century. However, they have apparently used metal tools for so long that today they have become unable to recognize stone tools. Further, when I asked several elders about stone tools, one declared that they might have used a kind of calcareous stone, called ***agdou***, for tools. These stones are dense and found with natural sharp edges. The only reference for the Barí using stone axes is in the diary of Guillén's trip to the Barí territory in September of 1772 (Alcácer 1962:267, in Beckerman 1978:33).

I doubt that the stone mano belongs to the Barí, since they are manioc agriculturalists and do not cultivate corn, unless it was used by old people without teeth to grind smoked fish and meat (as one that I observed among the Matsiguenga people in Peru in 1996). The stone mano is more likely associated with other ethnolinguistic groups who practiced corn agriculture (quite common among the neighboring Yukpa).

Without any archaeological evidence, the Barí origins can only be linked to ethnolinguistic groups sharing the same language family, such as the Chibchan speakers of the Sierra de Santa Marta. Did they then come from Sierra Santa Marta and if so, when? The answer can only be inferred from ethnohistorical documents.

ETHNOHISTORY

Beckerman (1978) asserts that the Barí were already settled in the lowlands west and south of the Lake Maracaibo by the time of the first European expedition of conquest. Alfinger's expedition in 1529 named the tribes (Onotos, Bobures, Pacabures, Caquetíos, Bugures, Pemenos, Juruara and Quiriquires) that they encountered around Lake Maracaibo (Beckerman 1978:10-11, Nectário 1959:166, Sanoja 1969:138). None of these tribal names seem to have any relationship to the Barí, although any of these names could later have been a label used to designate them, as has been seen in many cases for South American indigenous groups (Lizarralde 1993a).

There are two main hypotheses regarding why the Barí were not observed in the region before the early seventeenth century. One is, as historical documents suggest, that their density was very low and they were well hidden (Beckerman 1978:14). This is quite possible, because their traditional subsistence required quite a low density, and since they were not river people they left little evidence visible to people not used to the tropical forest and traveling primarily by river. The other hypothesis is that the Barí arrived relatively recently from another area (Beckerman 1978:18). The stone mano for grinding maize mentioned above might support this view, if that artifact is not an isolated occurrence.

However, there is no direct evidence or historical record of the Barí until the early seventeenth century, although Beckerman believes that the Barí are likely to have been in the Catatumbo River basin in the sixteenth century (1978:18).

The Barí were first referred to as "Motilones" in 1622 by Spanish expeditions on the Zulia River (Beckerman 1978:14). The term Motilón, applied because they mutilated their hair, was still in use for the Barí until the late 1960s. The Barí seem also to have been called Zulia Indians in 1638 (Alcácer 1964:15, Beckerman 1978:16). While most of the local tribes in the region were eliminated, the Barí remained quite elusive until then. They also continued to be aggressive, stealing metal tools and killing some Spaniards on the edges of their territory. Moreover, the Spanish were not able to conquer the Barí territory during the seventeenth century partly because Maracaibo and its lake were constantly attacked by European pirates. The frequent sacking of this provincial capital left it unable to finance expeditions to pacify or exterminate the Barí. These are the main reasons why the Barí remained unknown and uncontacted for so long (Beckerman 1978, Lizarralde and Beckerman 1982).

After repeated attacks by the Barí beginning in the early eighteenth century, and many failed punitive expeditions by the colonial government, a string of attacks ending with the killing of two Spanish men attributed to the Barí led the Maracaibo authorities to organize a punitive expedition that brought back 27 Barí, then called Motilones, in 1767 (Beckerman 1978:25). Most of these Barí died after few days, but a few survived, one of whom, with his young wife, became an "interpreter" (R. Lizarralde pers. comm. in 1997, also in Beckerman 1978:25). After more Barí attacks, the Maracaibo government finally organized an expedition with the intent of making peaceful contact with the help of the Barí interpreter. This expedition was made in 1771 and succeeded in establishing a peaceful contact with several Barí villages (Beckerman 1978:26). Beckerman (1978:26) suggest that the success of this expedition may have been due to the influence of this Barí interpreter, who dissuaded the authorities from sending a punitive expedition, and convinced them to bring a good amount of western gifts.

After this contact, the Barí were "reduced" gradually, first to two missions in 1774, which increased to thirteen missions by 1792, where 1140 Barí lived (Beckerman 1978:47). These missions were under the control of the Capuchin order. Beckerman (1978:51) estimates that there were about 2,000-2,500 Barí living then in approximately 150 longhouses (figuring that there were 50 local groups with 3 longhouses and a mean population of 50 people each). The Barí occupied an approximate area of 20,000 km^2 in the 1780s (Beckerman 1978:52). Towards the end of the Venezuelan war of independence, in 1818, the Capuchins were expelled from the region. The Barí then returned to their local territory and lived their traditional lives until the late 1950s, based on the comparison of historical documents from the 1770s and post-contact observations (Beckerman 1978, Lizarralde and Beckerman 1982, Lizarralde, et al. 1987).

From 1818 till 1910, the Barí were left alone. By 1912, oil companies started to penetrate their territory prospecting for oil, and started to drill wells and pump oil almost immediately. Two oil companies, Standard and Shell, penetrated and took about 24% of the Barí territory as it existed in 1900 (Lizarralde 1982:16-24). In 1950, peasants and cattle ranchers began to invade and settle in the territory the oil companies had taken from the Barí. Cattle ranchers also hired mercenaries to kill Barí in their territory and claim those lands as uninhabited. Several longhouses were raided and burnt by hired killers, killing many Barí.

With the objective of stoping the killing on both sides, the Venezuelan government put R. Lizarralde in charge of contacting the Barí. In July of 1960, the Barí accepted a peaceful contact with R. Lizarralde and stopped being hostile to Europeans. The other objective of the peaceful contact was to protect the Barí and their land from cattle ranchers. Unfortunately, this peaceful contact was a green light for cattle ranchers and peasants who invaded the remaining Barí land (Lizarralde and Beckerman 1982, Lizarralde and

Beckerman 1986). By then, the Barí territory had been reduced to 5.76% of their original territory in the sixteenth century (33,000 km^2 to 1,900 km^2 in 1983; R. Lizarralde pers. comm. in 1997; Lizarralde and Beckerman 1986:78). Their population also dropped 66% from 2,500 in the sixteenth century to 850 in 1965 (or 1520 in 1983).

SOCIO-POLITICAL ORGANIZATION

Traditionally, the highest office amongst Barí is that of headman. The headman generally leads the people of a local group, which formerly rotated among five to eight longhouses within its territory. Barí society is relatively egalitarian. There are no particular privileges for anyone in terms of the allocation of any kind of resources, including the headman. The headman is like everyone else but generally a wise, cautious, strong man who is an expert in subsistence activities and culturally knowledgeable (Lizarralde 1991, Lizarralde and Beckerman 1982).

There are several hierarchically ordered headmen in each group who are in charge of particular activities. The headman is called ***ñaatubai*** in Barí. For a headman to gain his political position, he informally organizes and leads a group of Barí to build a longhouse. When there is a general consensus that he is leading the people properly, he is accepted as a headman and called ***ñaatubai***. In this particular longhouse, he becomes the primary headman. For any event in the longhouse, including receiving visitors, the headman is in charge of where people should go, where the visitors will sleep and what and where communal activities will take place. Longhouse and village inhabitants always turn to the headman for suggestions and decision making.

The headman is backed by assistants, nominated by him, who are known as the secondary (***duashina*** or ***rurubibái***) and tertiary (***ibáibaibái***) headmen who generally are from his cohort (Castillo Caballero 1981:63, Lizarralde and Beckerman 1982:4). The longhouse headman provides guidance to the inhabitants for most communal events.

Some men can be headmen in different longhouses, but it is unlikely that all the longhouses of a particular territorial group would have the same headman.

Besides these longhouse headmen, each subsistence activity (fishing, gathering and hunting) also has headmen. In general, in these activities the headmen are nominated by informal consensus in the longhouse. These activity headmen may change from year to year, although some are so good at organizing the activity that they stay in office for many years. They tend to be the best person at these activities (e.g., fishing or hunting). However, like any headman, they only suggest what is to be done and not every Barí always agrees to what they suggest (Beckerman 1994, Castillo Caballero 1981, Lizarralde 1991, Lizarralde and Beckerman 1982).

In the present, the functions of a headman have changed, with a gradual introduction of the western system of elective political leaders. Because there are no more longhouses in existence, the headman is nominated in each village in different ways. Some headmen have been the founder of a particular village and are its headman until the present. Many of them were asked by missionaries to lead a group of people to found a village, as is the case for Saimadodyi and Bachichida. Other Barí simply founded a hamlet because they could not tolerate the current social environment in the village where they lived. In recent times, we see the replacement of headmen because they cannot speak Spanish or follow the changes from subsistence economy to market economy that most villagers have followed, as in Bokshí where the traditional mature headman was replaced by a younger Barí man who speaks Spanish and is a schoolteacher under an election proposed by by younger men. Some villages, e.g., Karañakaig, have a formally elected headman. In a particular and very atypical case, a woman (rather than a man) nominated herself (rather than informally accepting leadership) to lead the whole village of Bakugbarí because the male headman she replaced did not speak up enough for their rights and was not "strong" enough to represent the community interests. In a few villages, the headman is the son of a former headman and founder of the village (e.g., Kumangda). The most common trend is that the traditional headmen face the informal competition of younger Barí who speak Spanish and try, often succeeding, to represent the village interests and thus appear like headmen in meetings both in and outside of the village (e.g., Saimadodyi or Bokshí). These headmen have difficulties convincing every individual in a village to get involved in specific activities because interests have become fragmented, especially in the largest villages where extended families tend to divide the community.

The basic social unit among the traditional Barí is the extended family (usually a parent, and/or uncles and aunts, and siblings), most of them divided into nuclear family households. Each family is a strong political unit and tends to agree on their activities. The headman tends to belong to one of them and tries to get the involvement of the other families, which is a delicate matter but valuable for many reasons. Culturally, the Barí value a large number of people in their villages, in the present or in the longhouses of the past. The number of people in a longhouse was important for subsistence activities as well as for protection (Beckerman 1980, 1983d, 1991b, Beckerman and Lizarralde 1995, Castillo Caballero 1981). Several extended families need each other due to the requirements of communal activities. Thus, common interests encouraged them to gather and they tended to agree with relative ease. When there were disagreements, the aggrieved families would normally move to another of their longhouses or form a new one. This response by aggrieved families is more common in the present, with an increase in the number of small hamlets (e.g., around Bokshí and Saimadodyi). The involvement in the market economy with reduction in communal size and decrease of communal activities might interfere with the transmission of traditional knowledge. This situation is a great contrast to the past, when everyone shared the center of the longhouse where cooking took place and where all the members were exposed to the communal knowledge.

SETTLEMENT PATTERNS

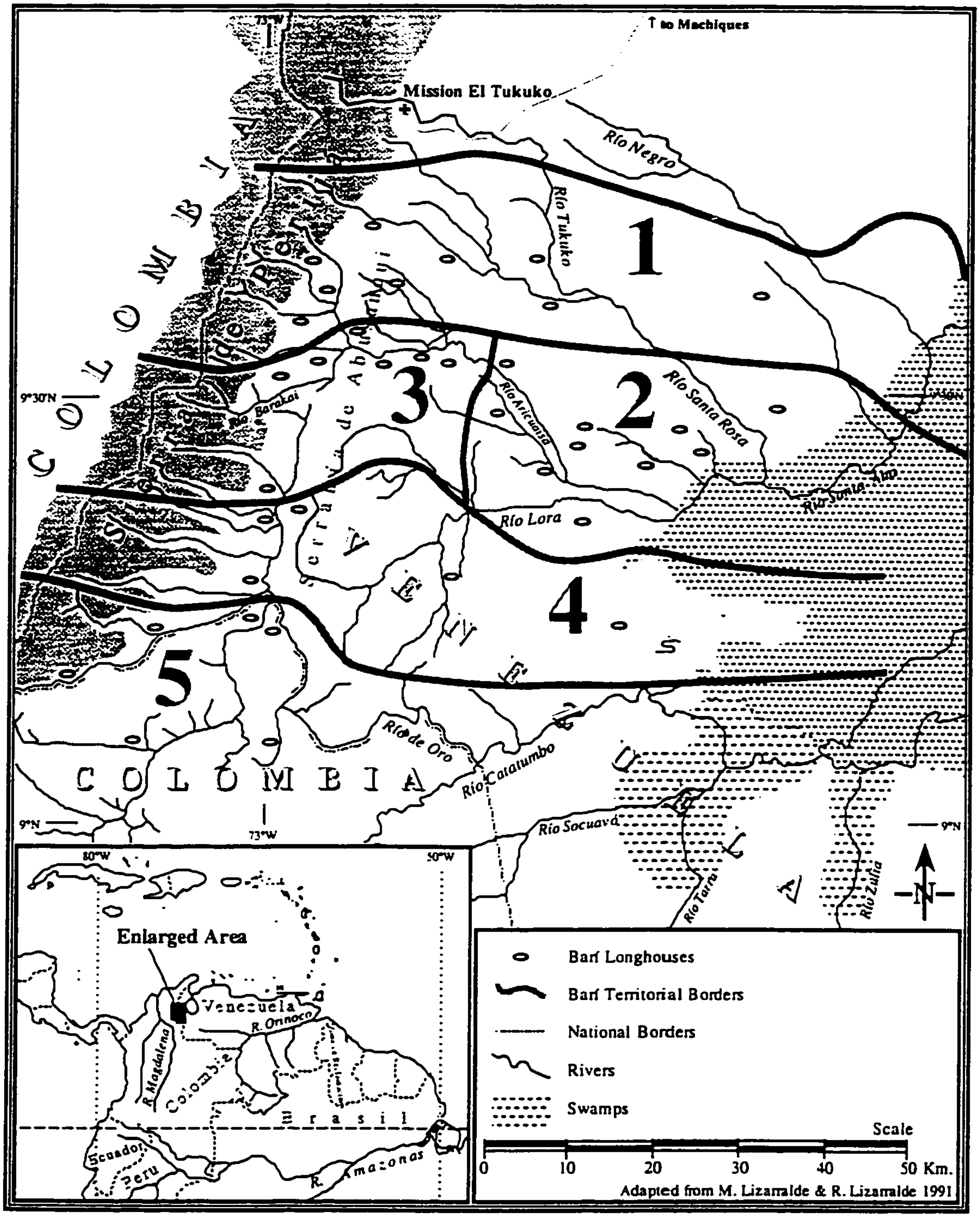
S. Beckerman and R. Lizarralde have published extensive information on the Barí settlement patterns including a historical and geographical perspective (Beckerman 1978, Lizarralde 1991, Lizarralde and Beckerman 1982). Prior to 1970s, all the Barí people used to live in longhouses (Beckerman 1975, 1994, Lizarralde 1991, Lizarralde and Beckerman 1982). By 1960, the Barí had approximately 35-37 longhouses in Venezuela and Colombia (R. Lizarralde pers. comm. in 1995, Beckerman 1994, Castillo Caballero 1981, Lizarralde 1991). Based on data collected by R. Lizarralde, nearly 160 longhouses existed in their territory during the last 80-90 years, 22-40 at a time. This number of longhouses can be estimated from the genealogical data collected by R. Lizarralde (Lizarralde and Lizarralde 1991, Lizarralde 1991).

The main settlement unit was a core group of people who shared the same longhouse, which R. Lizarralde and Beckerman (Beckerman 1994, Lizarralde 1991) called the residential group or local group. Two or more local (or residential) groups formed a territorial group, composed of 150-200 people using 5-8 longhouses over a territory of 1200-1600 km^2 (Lizarralde 1991:441-442). Each longhouse was separated by a one- to four-hours walking distance (3-10 kilometers).

The Barí population was semi-sedentary and rotated from longhouse to longhouse depending on seasonal availability of resources (Lizarralde 1991). Each longhouse used to have five to twelve nuclear families and members of their extended families. The population for a longhouse was generally between thirty and seventy people. Each Barí local group maintained several longhouses at a time to maximize the productivity of their gardens, forest products and river fish.

The longhouse population was divided from the point of view of any individual into kin (***sagdoodyí***) and affines (***ogdyũba***). In principle, the Barí practiced patrilineal descent. They had a conceptual division between ***sagdoodyí*** or ***ogdyũba***, but in fact these boundaries were fluid. The territorial group was preferentially endogamous. Rules were manipulated with selective amnesia to increase the selection of partners for marriage (Lizarralde and Beckerman 1982:14, 1987:8).

As has been observed by R. Lizarralde and Beckerman (1982), the longhouse population fluctuated and different families went from one longhouse to another during all seasons, for many reasons, including visiting relatives and avoiding social conflicts. However, the main reason for the shifting from longhouse to longhouse was the seasonal variation in the availability of their main resources (forest products, fishing, hunting and garden production), although fear of evil spirits may also have played a part (Lizarralde 1991). Further, minimizing vulnerability to white men's attacks appears to have been a motive for moving from house to house from 1930-1960 (Beckerman and Lizarralde 1995). Many local groups had a longhouse for the dry season near good fishing areas, and a wet season longhouse where monkeys (*Ateles belzebuth*, *Alouatta seniculus*, *Cebus albifrons* and *Aotus trivirgatus*) and oilbirds (*Steatornis caripensis*) were abundant and fat at the first peak of rainy season (April-May). These wet season longhouses were at the altitude of 700-1000 meter above sea level on both sides of the Sierra de Perijá (R. Lizarralde pers. comm. in 1997). Some new longhouses were not habitable because they had new gardens that were not yet productive. The Barí tended to abandon old longhouses gradually and finally burn them. Longhouses rarely lasted more than ten years because the surrounding forest products were nearly exhausted and garden soils were depleted (Lizarralde 1991:439).



MAP 7: BARÍ TERRITORIAL GROUPS AND THEIR LONGHOUSES IN 1947 (INTERPRETED BY R. LIZARRALDE FROM AERIAL PHOTOGRAPH)

Before contact, the ancestors of the contemporary Venezuelan Barí were divided into five territorial groups that were similar in terms of the number of people, number of longhouses and territorial size (see Map 7). Even though these territories have shifted slightly, they persist into the present. Today, four of them are in Venezuela and maintain a certain distance socially from one to another, although they do visit each other and there is a small proportion of intermarriage (Lizarralde and Lizarralde 1991). The fifth is now entirely in Colombia. By 1960, there were among these people around 35-37 longhouses and a mission village with nuclear family houses (Castillo Caballero 1981:69). At present, it is believed that some of the Colombian Barí way still live in "three isolated longhouse" (Beckerman 1994:83).

In general, most Venezuelan Barí are now fully sedentary in 39 different villages with nuclear family houses, five of them in missions. Three villages have more than a hundred people, Saimadodyi being the largest with 310 people. Bokshí is the next largest village with 250 people, followed by Campo Rosario (150). These three villages are missions with a church, schools and dispensary established by Capuchin missionaries (who come once a month) and resident nuns from the Madre Laura congregation (who are based in Bokshí and Campo Rosario but left Saimadodyi recently). Most villages are restricted to the extended families of descendants of the local headman, 20-30 people. Most Barí live in nuclear family houses now and few houses have extended family members. Many Barí still have two houses, one in a big village where their children can go to the public schools and another in a remote region where forest products and garden sites are plentiful.

SUBSISTENCE

The Barí are swidden agriculturists growing sweet manioc and complementing their diet with fishing, hunting and gathering. Agriculture still supplies the great bulk of food, with manioc providing 80-90% of the calories. The time investment in traditional agriculture was 400-500 person-hours/year for men and for women "a bit less" (Beckerman 1994:84). Fishing provided 75% of the protein and hunting 25% (Beckerman 1980, 1983b, 1994, 1983). "Barí men spent about 1,500 person-hours/year in hunting and fishing combined" (Beckerman 1994). The fishing returns was 360 grams of meat per person/hour and hunting returns 135 grams/person/hour (Beckerman 1994:84). The Barí daily average meat consumption, recorded in the early 1970s, was 405 grams per person (Beckerman 1980:101). Gathering provided a diversity of fruits, nuts, palm grubs, some greens and honey. Together these activities formed a balanced and abundant diet in the past. They did not starve at any season and claim that the forest provides good quantities of food if needed. In sum, agriculture required 8 hours per week while hunting and fishing traditionally took 28 hours/week for men (possibly 15 to 20 hours in the present).

However, in recent times, the traditional diet has shifted to less protein and more sugar and oils, reflected in the presence of more obese individuals, more cavities and reddish hair in children (a sign of protein deprivation). Because many Barí are selling their labor to ranches and producing cash crops, they are not hunting enough and buy more processed food from nearby towns. Another factor contributing to their new diet is the increase in population density and sedentism, depleting local resources (Lizarralde 1991).

Agriculture

Agriculture provides the main bulk of food for the Barí. The main crops are manioc and bananas and plantains. While some Barí gardens mimic the diversity of the forest with many species, other do not mimic it with their monocrop fields, as is typically expected for tropical South American indigenous peoples (Beckerman 1983a, 1983c). The productivity of the traditional Barí garden measured in terms of energy investment (caloric input-output ratio) was 1:30 (Beckerman 1994:84). The production per hectare per year for a first year harvest was 18 metric tons of manioc roots and 4.5 of banana fruit (Beckerman 1983a:97-99).

In their gardens, the Barí currently cultivate about 39 species of plants. Before the contact of 1960, they probably had 25 species of cultivated plants (adapted from Beckerman 1983a): manioc (four varieties, *Manihot esculenta*), banana (19 varieties, *Musa balbisiana* X *acuminata*, introduced 350-400 years ago), plantain (two varieties, *Musa balbisiana* X *acuminata*, introduced 350-400 years ago), sugar cane (three varieties, *Saccarum officinarum*, introduced before the contact of 1960), sweet potato (*Ipomoea batatas*), yam (2 varieties, *Dioscorea alata*), chile pepper (three varieties, *Capsicum frutescens*), small type of 'bell' pepper (two varieties, *Capsicum annuum* var. *annuum*), squash (two varieties, *Cucurbita maxima*), pineapple (three varieties, *Ananas comosus*), cotton (*Gossypium barbadense*), bottle gourd (*Lagenaria siceraria*), tree gourd (two varieties, *Cressentia cujete*), barbasco (*Tephrosia sinapou*), conopio (two varieties, *Renealmia alpinia*), ocumo or tannia (*Xanthosoma sagittifolium*), achiote (*Bixa orellana*), papaya (*Carica papaya*), canna (*Canna indica*), Job's tear (*Coix lacryma-jobi*), avocado (three varieties, *Persea americana*), two bromeliads for fiber (*Bromelia* spp.), arrow cane (*Gynerium sagittatum*), tobacco (*Nicotiana tabacum*) and peach palm (*Bactris gasipaes*). Recently, the Barí are cultivating for cash two introduced cultivars: rice (*Oryza sativa*) and beans (*Phaseolus vulgaris*). Corn (*Zea mays*) has also been introduced recently and is cultivated to feed their chickens, ducks and turkeys. In the kitchen garden, the Barí also added after contact the mango (*Mango indica*), passion fruit vine (*Passiflora vitifolia*), lemon (*Citrus limon*), oranges (*Citrus sinensis*), grapefruit (*Citrus* x *paradisi*), icaco (*Chrysobalanus icaco*), cashew (*Anacardium occidentale*), ice cream bean (*Inga spectabilis*), cacao (*Theobroma cacao*), coconut (*Cocos nucifera*) and guava (*Psidium guayaba*).

The work involved in making and maintaining gardens requires about 500 hours/year for men and 450 for women, or 97 minutes for men and 83 minutes for women per day for a 0.5 hectare garden (Beckerman 1994:83). First, the Barí clear a patch of forest starting in mid-December to early January. This requires 31 man-hours of work per hectare. Then follows the felling of trees, which requires approximately 55 man-hours per hectare. After clearing the bushes and felling trees, the Barí let them dry for three or four weeks. The burning takes about one or two hours of work and the field is left to burn for one or two days, depending on the mass of wood. The burning is essential to provide a better soil for cultivation. Some big trees will take longer to burn. Planting a hectare of manioc and banana field takes about 193 hours. Weeding, harvesting and replanting takes about 650-700 hours per hectare. A 0.5 hectare garden produces about 7-8 metric tons of food per year (adapted from Beckerman 1983a, 1987, 1994). The Barí clear new gardens every year.

Traditionally, the Barí have four basic types of gardens. The kitchen garden or longhouse garden has crops arranged in rings by cultigen around the house with a surface of 1.5-2.5 hectares (Beckerman 1983a, Lizarralde and Beckerman 1982). A garden near the rivers or moist soils is used to cultivate banana and plantains (Beckerman 1983a, Lizarralde and Beckerman 1982). A third garden where soils are more sandy and well-drained is used for manioc, ranging from 0.85-1.5 hectares (Beckerman 1983a:94). Sometimes manioc and bananas are grown in a single garden, with the banana and plantain as a narrow ring near the forest where it is more humid. The last garden is for arrow cane, which seems from aerial photographs to cover 0.5-0.7 hectare (still in use between Bachichida and Dakuuma). The longhouse garden generally has many different kinds of crops arranged in concentric rings, with banana and plantains near the outer edge, manioc in the middle and covering the largest surface, and a mixture of other crops in small numbers near the longhouse or inner circle (Beckerman 1983a, Lizarralde 1991). Therefore, extrapolating from the figures on fields and population provided by Beckerman (1983a), the average garden area per capita is 0.12-0.24 hectares. This figure translate to 3 hectares of gardens per longhouse of 50 people or 6-12 hectares of gardens per local group maintaining 2-5 longhouses (to 20 hectares for 8 longhouses for 200 people). (Additional analysis of aerial photographs shows that this garden size per longhouse is quite accurate even for the northern Barí.)

More recently, the Barí have added a fifth types of garden: the cash-crop garden. The present kitchen gardens sometimes have all the crops but in other cases do not contain manioc and banana, and are not bigger than 0.25 hectares. These kitchen gardens have some or many of the newly introduced cultigens, specifically trees such as mango, lemon, oranges, grapefruit, icaco, cashew, ice cream bean, cacao, coconut and guava. The manioc and banana garden has not changed, maintaining its typical size of 0.5-.0.8 hectares. The arrow cane garden is the same old one (meaning that they are not planting new ones) each local group shared. The cash crop garden is generally either rice or beans and cultivated communally, ranging from 5 to 12 hectares. The other gardens have lost their communal nature and are normally cultivated by extended families. The per capita garden size was 0.12-0.24 hectares in 1960-1970s and is 0.71-0.88 hectares in the present, which includes pasture land for cattle (interpreted from aerial photographs and adapted from Beckerman 1983a, Behrens, et al. 1994). Since pasture lands are a great proportion (2/3) of the agricultural lands, the garden size per capita apparently has not changed very much. Hence, the Barí gardens produce a generous amount of 7-12 times the calories they really need (estimated from data in Beckerman 1983a, Carneiro 1983:105-106).

Fishing

Fishing traditionally provides approximately 75% of the protein in the Barí diet (Beckerman 1983b). The Barí normally go fishing three times a week during the dry season when the rivers are low and the water clear. They still go fishing, at times when rivers get low and clear in the rainy season, once or twice per month (Beckerman 1980). The location of the fishing areas plays an important role in determining the site of the longhouses, which is usually near several large river islands and many small streams (Beckerman 1980).

Fishing is generally a communal activity, involving most of the longhouse or settlement population (Beckerman 1980, 1983b, 1983d, 1991a). The reason is that many people are required for their type of fishing. Generally, the Barí fish in rivers containing islands, where they can build a dam on one side of the island. Building a dam is time-consuming if there are few people. The more people involved in the fishing expedition, the faster is the process of building a dam. Increasing the number of people decreases the number of fish per capita per hour only slightly (Beckerman 1983d). Traditionally, and still in the present, the fishing headman keeps the potential place where the fishing will take place under observation . When the conditions appear to be optimal, he informs the community that fishing will take place in the river section, which generally has a name. Most people leave early mid-morning with their gear, with the men carrying two or three spears, a little bow with a long fishing arrow, and a knife and the women carrying a basket with food. On the upper part of the river, the men spend 1-3 hours building the dam 25-40 meters in length (Beckerman 1983d). Some men lifte rocks up to 50 kilograms while a few others bring large bunches of Heliconia leaves. On the lower part of the river, the women build a little dam to prevent the fish from escaping. When much of the water is running on the other side of the island and all the holes of the dam have been patched with the Heliconia leaves, fishing proceeds for the next two to four hours.

In the past men could get an average of 2.3 kg per person (or 360 grams/person-hour) and as much as 4.88 kg of fish per person (Beckerman 1980:83). In the present, the average catch rarely surpasses 1-2 kilograms (50-120 grams/person-hour, cf. Beckerman 1983b, 1983d, Bennett 1991). The main fish caught is ***bashiko*** (bocachico in Spanish, *Prochilodus reticulatus*, Characidae), making up two-thirds of all the fish "and 50% of the meat in the Barí diet" (Beckerman 1991a:530).

Hunting

The Barí practice hunting to obtain sufficient protein in their diet, specially when they cannot fish because it is raining and rivers are too high and cloudy. Hunting, in the

1970s, provided 25% of the protein, each man spending an average of 125-145 hours per month to provide 2.2 kg per person/month (Beckerman 1980:98, Beckerman 1983b:294-295). In the present, the yield is much lower but there are no quantitative data for comparison. Moreover, I should add that hunting is also a by-product of scouting for fishing spots, forest resources and enemies, which was also Beckerman's impression (1980:96). Whenever the Barí men go to the forest or travel, they pick up their bows and arrows or shotguns in case they run across some game. They hunt birds (mainly parrots [*Amazonas* spp., *Pionus* spp. and *Aratinga* spp.], macaws [*Ara* s *ararauna*, *Ara chloroptera*, and *Ara severa*], guans [*Crax daubentoni*, *Crax alector*, *Pauxi pauxi*, *Penelope montagnii*, *Penelope argyrotis* and *Penelope purpuranscens*] and toucans [*Pteroglossus torquatus*, *Ramphastos ambiguus* and *Ramphastos cuvieri*]), mammals (mostly peccaries [*Tayassu pecari* and *Dycotiles tajacu*], squirrels [*Sciurus granatensis*], agoutis [*Dasyprocta punctata*], red brocket deer [*Mazama americana*], capybara [*Hydrochaeris hydrochaeris*], tayras [*Eira barbara*], armadillos [*Dasypus novemcinctus* and *Cabassous unicinctus*], river otter [*Lutra longicaudis*], kinkajou [*Potus flavus*], monkeys [*Ateles belzebuth*, *Alouatta seniculus*, *Cebus albifrons* and *Aotus trivirgatus*], anteaters [*Tamandua tetradactyla* and *Myrmecophaga tridactyla*] and pacas [*Agouti paca*]) and reptiles (turtles [*Rhinoclemmys* spp.], crocodilians [*Crocodylus intermedius*] and iguanas [*Iguana iguana*]) approximately every other day as I observed in Saimadodyi. In the past, hunting was done almost every other day, too (Beckerman 1980). The contribution of hunting to their diet is 73 grams of meat/person/day (extrapolated from chart 9 Beckerman 1983b:98). There is little fishing in the rainy season and hunting occurs more often then (Beckerman 1983b).

Hunting is divided into two types: solitary hunting expeditions and group hunting expeditions. Many men seem regularly to go hunting an hour before sunrise to catch the nocturnal animals (night monkeys [*Aotus trivirgatus*], kinkajou [*Potus flavus*], porcupine [*Coendou mexicanum*], armadillo [*Dasypus novemcinctus* and *Cabassous unicinctus*] and olingo [*Bassaricyon gabbii*]) that are trying to find a sleeping place as well as the hungry diurnal animals that are trying to get their first meal of the day. The Barí also go hunting alone in the afternoon to ambush agoutis that regularly feed on specific tree fruits 30-45 minutes before sunset. These two solo hunting expeditions appeared to be made regularly every other day by the men I was able to observe.

Hunting expeditions requiring a group of Barí men are for hunting peccaries, tapir (*Tapirus bairdii*), crocodiles and monkeys. When a Barí spots any evidence of these animals, he will call all the men in the village for the hunt. These expeditions take several hours to track and surround or ambush the animal. If the animal or herd does not escape, the hunt generally is successful and will bring lots of meat to the whole community.

To hunt crocodiles (called ***kanta*** in Barí, *Crocodylus intermedius*), the process is different from the previous group hunting expeditions. At the peak of the summer and when rivers are very low and clear, which is generally mid-to late January, the Barí will check if there is a large crocodile (3 to 6 m.) in one of the river pools. While it sleeps at the bottom of the pools, a Barí will dive and put a rope around the waist of the crocodile. Then, six to ten Barí men are required to pull the rope and take the crocodile out of the water. The crocodile usually resists and the battle can last up to half an hour. Afterward, the crocodile is usually quite exhausted and a Barí will kill it by slashing its brain and spine with a machete. The crocodile is butchered by the river and the meat divided among all the families of the men who participated. The teeth of the crocodile, used in necklaces, belong to the man who put the rope around the waist of the crocodile.

When the rainy season is at its peak and fishing is nearly impossible, the Barí traditionally went to hunt oilbirds (called ***iakoko*** in Barí, *Steatornis caripensis*). When the first avocados are ripe, a Barí man, who will organize the hunt, checks the caves to see if the ***iakoko*** chicks are fat, being larger than the adults and looking like a ball of fat. Then, the oilbird hunt is organized and takes seven to nine days. In the process, each family can catch several dozen to a hundred ***iakoko*** each day, getting enough meat for two or three weeks. While hunting oilbirds, the Barí also hunt large birds, monkeys and spectacled bears, which are quite abundant in the area where the caves are located.

Gathering

As they did in the past, the Barí still gather forest products to complement their diet (e.g., honey, palm grubs, palm hearts, fruits, river snails, turtles and iguana eggs). When on trips, hunting or collecting forest products, the Barí are constantly eating fruits, honey, and shoots, calling them collectively ***kandashi karaba*** (which means forest food in Barí). (While doing my forest plots, I managed to learn this art and did not need to carry any food for lunch because I was able to eat from the forest.) Palm grubs (called ***kugdu*** in Barí, *Rhynchophorus palmarum*) and palm fruits can be collected year round (see chapter 5 for details of Barí food trees). Palm grubs are collected three weeks after felling a palm trunk. Honey, river snails, turtles, turtle eggs and iguana eggs are normally collected in the dry season. Honey is quite abundant with a density of two to four hives per hectare in primary forest. Shoots of some Heliconias are available year-round, and most abundant during the rainy season. Fruits from trees are generally seasonal, with their availability mostly concentrated between April and August. Therefore, in varying abundance, the Barí always find something to eat in the forest all year round. Many times, they bring some of these forest products to the village to share with their kin.

INTEGRATION INTO THE NATIONAL MARKET

Since the late 1960s, the Barí have been getting more involved with the national market economy, from starting to sell their labor in the cattle ranches that invaded their lands to (more recently) selling their garden and forest produce (mainly manioc, bananas and plantains). Some of the mission villages (e.g., Bokshí, Saimadodyi and Bachichida) have been raising cattle since 1969. More recently, they have been cutting lumber to sell. Their involvement in the national market is increasing and is destroying their self-sufficiency, due to increased consumption of western goods, medicine and foods.

In the early 1960s, a few Barí started to sell their labor to the cattle ranchers even though they did not speak Spanish well. They wanted to earn hard currency to be able to buy western goods. With the increased demand for western goods such as metal tools such as machetes, axes, knives and aluminum pots, the Barí required other ways to obtain these goods. They also increased their needs for western medicines and formal education for their children. All these factors increased their need to have more currency to acquire these resources.

Some of the areas where the Barí are located are excellent for the cultivation of banana, plantains and manioc. Merchants from nearby cities such as Machiques come to visit the Barí and see if they will sell a full truckload of bananas, plantains and manioc, because they say that the Barí produce the tastiest bananas and biggest plantains in the state, and their manioc is quite good-looking. The Barí started to sell these products to these merchants, but quickly noticed that they were being paid lower prices than local peasants. Now they are selling less because they are demanding higher prices. The western goods are increasing in price and they are having difficulty buying them.

Capuchin missionaries introduced cattle production among the Barí in 1968 at the mission villages of Saimadodyi, Bachichida and Bokshí. From 12 cows in 1968, the Barí increased their herds to over 1000 head in the mid-1980s (Behrens 1991:284-284). Saimadodyi alone had approximately 600 head of cattle by the early 1980s (Behrens 1991:284-285). These cattle required 200-300 hectares of pasture to feed them, for Saimadodyi alone (extrapolating that three hectares of pasture is needed for fifteen cows for three weeks). Massive destruction of the forest and increased investment of labor was necessary to maintain these cattle herds. Due to the increase in costs of veterinary medicine, herbicides and tools, the cattle economy became unsustainable and the Barí were losing money with it. Since the mid-1980s, the size of the cattle herds has decreased rapidly to less than two hundred recently for the villages between Bachichida and Bokshí (R. Lizarralde pers. comm. 1997).

In the early 1990s, the Barí sold cattle and West Indies cedar trees (called ***daiba*** in Barí, *Cedrela odorata* L., Meliaceae) to subsidize their needs for medicine, goods and western education for their children. In villages where out-board motors for the river boats are essential for traveling, such as Bokshí, the Barí have been selling West Indies cedar logs to cover their high cost. A 48 horse-power out-board motor costs $2,500. The one that the village of Bokshí has is not enough for 250 people. Due to the increase in population as well as individual needs for western goods, every extended family wants an out-board motor. About twelve large *Cedrela odorata* trees can bring enough cash to buy one out-board motor. Because West Indies cedar has become the major source for cash, it is being depleted rapidly. The region once had an abundance of West Indies cedar, as I observed at the beginning of my fieldwork, but it is rapidly decreasing around the villages and near the rivers.

The villages, such as Saimadodyi, Bachichida and Dyera, that are accessed by land (not by public roads, but by narrow dirt trails that the Barí themselves make and keep in acceptable condition), require mules and horses for transporting goods and people. While before they used to carry almost all the produce on their backs, now the Barí use pack animals even to carry their firewood and garden produce. The mules are less expensive than out-board motors. Each costs about $200-250. Around Saimadodyi, every family has one or two mules and horses. Added to the expense of the mules and horses is the hardware to be put on them and the vitamins and medicines. These are required in order to keep mules and horses useful.

Western goods that have more recently been felt as needed include shotguns, shotgun shells, radios, stereos, televisions, gas-powered chain saws and gas stoves. The Barí see many of these goods as essential to their lives, and others as luxuries. The radios and TV lets them know about the local and national news to keep up with the surrounding world. The stereos are a group amusement to enjoy music and share it among friends. The gas-powered chain saws allow them to make their houses much more quickly and not to have to hire non-indigenous peasants (who demand fifty percent of the profits) to cut the logs of West Indies cedar. The gas stove is a luxury and reduces the work load by not having to seek firewood, cut it and transport it, which is two days of work per week for one person to provide enough fuel for a family of 5-10 members. All these goods add costs and increase the need to sell their labor, lumber and produce.

DEMOGRAPHY

Demographically speaking, there are four main factors that affect their populations: birth, death, morbidity and migration. The Barí population is currently around 1850 people living in Venezuela and approximately 800 in Colombia (R. Lizarralde pers. comm. in 1997). Their population is growing quickly at an annual rate of 4.25% [extrapolating from the data from the two censuses carried out by R. Lizarralde, (Venezuela 1985, 1993)]. The first census registered 1071 Barí in 1983 (Lizarralde and Lizarralde 1991:457). In the 1992 census, 1520 Barí were recorded, distributed among 34 villages. Nearly half (46%) of the Barí population is under the age of 15 years (see Figure 3.1).

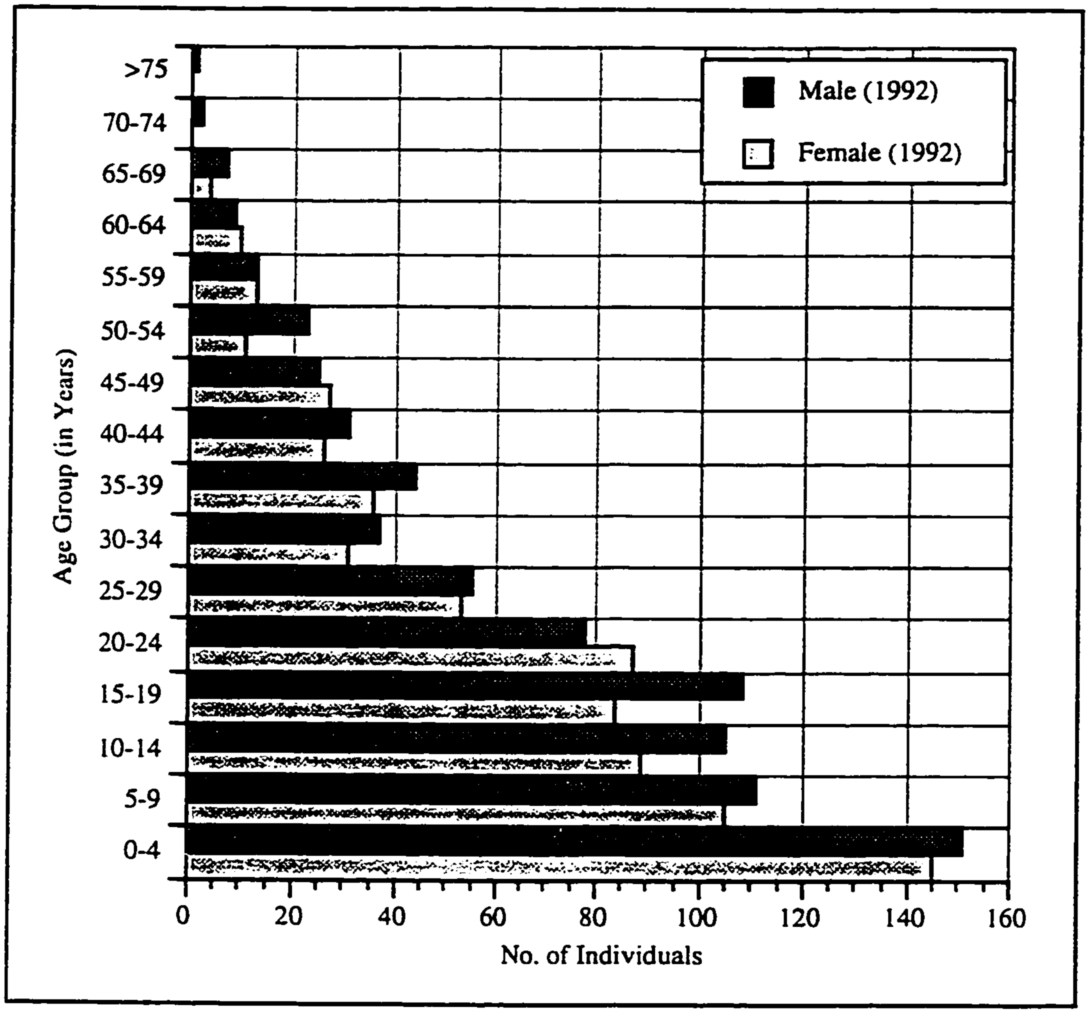


FIGURE 3.1: BARÍ AGE GROUP COMPOSITION FOR 1992 IN VENEZUELA (VENEZUELA 1993:394, FOR OLDER THAN 20 YEARS, ADAPTED FROM FIELDNOTE DATA OF R. LIZARRALDE, PERS. COMM.)

From one census to the next, the Barí population grew 50.8% with 512 new children under the age of 10 years. At this current rate, the Barí will double their population in 17 years. Migration are low (6.38%) and illness is quite high (approximately above 50%). Comparing the two censuses, 63 Barí died from 1983 to 1992 (5.9%). However, this figure does not include all the young children who died at an early age and who were not counted in either census. Mortality is relatively high for babies and no figures have been published yet. Moreover, the highest mortality was for the age group of 0-4 years, with 16 children (11 girls out of 100 and 5 boys out of 100) who did not survive to the next census.

The Barí sex ratio is slightly high compared to other South American indigenous peoples. For every 100 women, there are 111 Barí men (720 women and 800 men), calculated from the 1992 census (Venezuela 1993:394). The sex ratio increased from 109 in 1983, which is typical for all South American indigenous peoples (Salzano and Callegari-Jacques 1988). The main reason behind the increase in the sex ratio from one census to the next is higher female mortality, especially among young girls and women in their late reproductive age (43 women died versus 20 men between 1983 and 1992). The children's sex ratio is 104.8 boys per 100 girls under the age of ten years (250 girls and 262 boys). Moreover, the sex ratio at birth is 95, "much lower than among the lowest described for human populations, and is much lower than the sex ratios usually recorded for other South American Indian populations" (Zaldívar, et al. 1991:488). Although Zaldívar et al. (1991) do not find any differences in mortality between girls and boys, nor that cultural expectations that could explain it (girls and boy are equally valued), the difference of the two census show that there is a higher female infant mortality.

Morbidity is a major problem for the Barí, who were possibly well-equipped to treat traditional diseases and reduce the effects with their local plants. However, they are not able to treat newly introduced illnesses, even though they seem quite strong physically to face them. At the time of contact, the Barí lost at least 23% of their population between 1960 and 1965. Although there are not complete epidemiological data for the period covered by the two censuses, morbidity is apparently quite high, with some places having more than half of the inhabitants suffering some serious illness such as malaria, tuberculosis, hepatitis and intestinal parasites (cf. Holmes and Scorza 1993). For example, Saimadodyi, a village of 320 people, has a high rate of morbidity with slightly more than half of the population affected by some illness (see Table 3.1). With 48 cases (15 percent), it has the highest rate of tuberculosis in Venezuela (Juan Scorza, pers. comm. in 1994). Half of the Barí population in Saimadodyi had one to seven types of parasites, and one-third had diarrhea with blood. They also had many viral illnesses (see Table 3.1).

TABLE 3.1: FREQUENCY AND RATE OF MORBIDITY IN TWO BARÍ VILLAGES (FROM HOLMES AND SCORZA 1992:65)

Illness	Campo Rosario		Saimadodyi	
	No.	per 1000	No.	per 1000
Malaria	27	141.14	51	152.2
Intestinal Parasites	22	115.2	196	585.0
Hepatitis A	12	62.8	23	68.7
Hepatitis B	61	319.4	56	175.0
Chicken pox	5	26.2	11	32.8
Tuberculosis	3	15.7	16	47.8
Bronchial Asthma	3	15.7	1	3.0
Diarrhea with blood	2	10.5	114	340
Measles	-	-	4	11.9
Pneumonia	-	-	2	6

Also, the same medical team found 61 cases of active viral hepatitis B infection in Campo Rosario and 56 in Saimadodyi (Holmes and Scorza 1992:118). With all this introduced illness, it is understandable that the Barí are indeed quite dependent on western medicine and their traditional medicine could not be effective. The introduction of western illnesses and medicines is definitely affecting the traditional ways of developing and maintaining the Barí medicinal knowledge. This situation is possibly the main reason there are not many medicinal plants known and used by the whole Barí population. All these illnesses do not seem to prevent the Barí from having many children, however.

SUMMARY

Ethnohistorical data suggest that the Barí might not have been in Perijá for more than four hundreds years (Alcácer 1962, Beckerman 1978). Although the Barí had a brief period of contact with European populations between 1772 and 1818, they returned to a state of isolation and self-sufficiency, and maintained a traditional pattern of subsistence (Beckerman 1978). This subsistence pattern did not change much until they were contacted in 1960, being very similar to the subsistence and settlement pattern observed in the first peaceful contact in 1772 (Beckerman 1978, Guillén 1772, cited in Lizarralde

1991). As a result, people who were adults at the time of contact are likely to have a pre-contact cultural knowledge of their environment. Moreover, while their original territory was mostly in the lowlands, now they are located in relatively marginal areas that they used only seasonally in the past (see Maps 3 and 7). Thus, their current territory is not typical of the territory they occupied in the recent past, in terms of the natural ecosystem. These changes could affect the depth of their knowledge and use of their forest.

Moreover, the rapid changes that the Barí have experienced were not all to their advantage. They lost a great proportion of their land and resources. The changes in subsistence and introduction of western formal education for the Barí younger generation has diminished the maintenance of their traditional knowledge of their environment. They have been able to integrate into the national market and formal educational system but are still at a disadvantage in many ways. They cannot transport their merchandise effectively nor do they have the language and cultural skills to market them advantageously. They tend not to do well in formal education because they are not raised speaking Spanish, but rather Barí. These younger Barí have their feet in two cultural worlds (western and Barí), trying to master both of them, and succeeding at both in a marginal way. Their state of health is very poor, although there is no way to compare this picture to the period before contact. All these changes do raise some questions about the Barí ethnobotanical knowledge, but also offer a rather good example of a partly acculturated and environmentally relocated indigenous society.

CHAPTER 4: THEORY AND METHODOLOGY OF THE RESEARCH

> In the case of folk botany, ... a local system of plant classification cannot be described accurately by attempting to obtain only vernacular "equivalents"...This well-established and perhaps obvious semantic principle is sometimes forgotten where the assumed absolute nature (in a cross-linguistic sense) of "scientific" names or of other long-established traditional distinctions in certain Western languages is involved. (Conklin 1964:46)

> ...[T]he observed...regularities found among systems of ethnobiological classification of traditional peoples from many different parts of the world can be best explained in terms of human beings' similar perceptual and largely unconscious appreciation of the natural affinities among groupings of plants and animals in their environment—groupings that are recognized and named quite independently of their actual or potential usefulness or symbolic significance to humans. (Berlin 1992:xi)

As Conklin points out above, the study of other cultural views of nature cannot be accomplished without a multi-disciplinary approach. It is quite easy to assume that people speaking another language share many elements of our culture, but they do not necessarily share them. To understand the relationship of indigenous societies to their environment, their names have to be matched to an object (e.g., plant voucher) that can be recognized and understood. This study of other societies' biological knowledge is complex and requires a rigorous methodology in order to provide a more complete understanding. This can only be achieved through a multidisciplinary approach: botany, linguistics and anthropology in this case.

Berlin also observes that perception of the natural world goes beyond its economic or religious importance, a common assumption of Western social scientists. In the last thirty years, the field of ethnobiology has gone through a major revolution with careful redefinition of the concepts and methods set forward by a group of pioneers (Atran 1990, Balée 1994, Berlin 1992, Brown 1986, Conklin 1964, Dougherty 1978, Ellen 1986, Hays 1976, Kay 1971, Lévi-Strauss 1966, Martin 1995, Toledo 1992). In this chapter, I explore the concepts and methodology used in this work.

DEFINITIONS OF ETHNOBIOLOGY

Ethnobiology, in the sense of the study of human uses of plants and animals, has existed at least since the XVIth century in the west, although it was not called by that name. From the XVIth century, European scholars have always been interested in the uses of plants and animals by primitive people. European explorers, government officials, missionaries, naturalists, botanists, physicians, and ethnographers made important observations on the uses of plants and animals worldwide in the last five centuries. Later, more specialized scientific publications appeared, such as the one by a botanist, John Bartram, in 1751 on the plants used in North America (Ford 1978:34). The XIXth century experienced a sharp development of ethnobiology, especially through the work of de Candolle in 1885 with his study of the origin of cultivable plants (Candolle 1959).

The first use of "ethno-" as a prefix was in Stearns' 1889 "Ethno-Conchology: a Study of Primitive Money" (in Ford 1978:40). Not long after, this prefix was applied to botany for the first time in 1895 by Harshberger, a botanist (Ford 1978:33). Harshberger defined ethnobotany as the discipline that studies the "plants used by primitive and aboriginal people" (Ford 1978:33). By Harshberger's time, one hundred and fifty-two studies in ethnobiology had been published, although it had not yet been defined as such.

The traditional definition of ethnobiology is the study of the uses of biological resources and primitive peoples' concepts of these taxa (Harshberger 1896, Robbins, et al. 1916). At same time, the work of Fewkes brought ethnobiology a step further by not only focusing on the utilitarian aspects of plants but also on "plant names and their etymology" (Ford 1978:42). A further step in the definition of ethnobotany was taken by Hough (1898:127), who called it "the study of plants in relation to human cultures." Hough's definition showed a broadened approach to ethnobotany.

Volney H. Jones (1941:220) defined ethnobotany as "the study of the interrelations of primitive man and plants." Ford (1978:43) wrote that Jones' "definition anticipated and accommodated the ecological and linguistic studies." The concepts of ethnoscience and folk taxonomy were also recognized by Jones.

In the 1950s, Conklin showed the importance of folk classifications in ethnobotany, a subject that had been neglected in the past. By understanding the classification system of the pre-literate Hanunóo people of Philippines, Conklin (1954) empirically demonstrated that the Hanunóo named more plants than the Western scientist does. His work was a major contribution because it was the first study to provide an ethnographically and botanically sophisticated description of a full ethnobotanical system of classification for a nonliterate society. His research was impressive in its wide geographical coverage, extensive botanical collection and detailed information on the Hanunóo flora. His major contribution lay in stressing the importance of discovering both the native categories for plants and their conception of the complex system of people-plant relationships.

Claude Lévi-Strauss' *Savage Mind* (1966) presented a extensive analysis of the human mind's relation to the natural environment, drawing data and examples from many ethnobiological ethnographies, especially Conklin's (1954) work with the Hanunóo. Lévi-Strauss' work was ground-breaking in its examination of the natural cognition of pre-literate or prehistoric peoples and the process of classification and nomenclature. He cited in detail cases from all over the world to argue that classification, ethnoscience and the naming process are not unique to one region but rather quite universal in mankind, because all classification systems share many common characteristics.

Frake (1962) made major methodological and theoretical contributions to understanding the cognitive systems or mental configurations of the universe of an ethnolinguistic group of people. He pointed out that the analysis of terminological systems can be used as a tool to uncover a specific cultural universe (which can be quite different from ours). Frake dealt with several key issues for ethnographic research and analysis of cognitive systems. He pointed out that many ethnographic works had been deficient in gathering information on "how people construe their world of experience from the way they talk about it" because "many people do not see 'things' quite the way we do" (Frake 1962:29). He wrote that "instead of *getting words for things*, [we need to find] the 'things' that go with the words" (Frake 1962:28). His argument was that many natives do not perceive their environment in the same way that we do (1962:29). He pointed out that few fields of study in anthropology, especially kinship, had successfully recorded the culturally significant cognitive features since Morgan's time. Therefore, his major contribution was to stress that determining how people construe their world of experience based on the way they talk about it is a crucial ethnographic task. This task is done by analyzing the terminological systems so as to reveal the conceptual principles that generate a complex perception and categorization of nature.

The first complete botanical ethnography of a folk system was carried out by Berlin, Breedlove and Raven (1966, 1973, 1974). They presented a complex relationship and interaction between the Tzeltal Maya and their native flora. Using material from herbarium vouchers, they emphasized systematic interdisciplinary methods of research, never done before. Berlin *et al.* revealed in great detail the general principles of the Tzeltal folk system of classification, nomenclature and principles of cognition. Previous research had stressed the cultural significance of plants, but Berlin *et al.* stressed local plant identification, classification and nomenclature with exhaustive systematic and ethnolinguistic data on the thoroughly-collected local Tzeltal flora. They provided an extensive analysis of the ethnobiological semantics of Tzeltal plant knowledge based on the local categorization and morphological differentiation in plants. Berlin *et al.* provided a solid ground for the expansion of ethnobiological theory through the publications of various authors on issues discussed below.

Getting beyond the utilitarian importance of the plants and animals known by non-literate societies has been another major theme of Berlin, who defined a new branch of ecological anthropology as the following:

> ethnobiology as a discipline combines the intuitions, skills and biases of both the anthropologist and the biologist, often in quite unequal mixtures. There is no generally accepted definition of the field, although most practicing ethnobiologists would probably agree that the field is devoted to the study, in the broadest possible sense, of the complex set of relationships of plants and animals to present and past human societies. (Berlin 1992:3)

Hunn also pointed out that there is a confusion between folk botany and ethnobotany depending on which level we are examining. Ethnobotany "traditionally refers to a specialty within the field of botany concerned with discovering useful products by investigating how non-European peoples utilize their local floras" (Hunn 1977:3). Most ethnobiologists would agree that they study "a system of knowledge conditioned simultaneously by physical reality and by the human mind perceiving that reality" (Hunn 1977:3). In essence, ethnobiology looks at the knowledge of a particular society, its perception, cultural and cognitive construction, interpretation and interaction with a definite biota. These are my objectives in this study.

PRINCIPLES OF ETHNOGRAPHIC SEMANTICS AND NOMENCLATURE

The study of the semantic components in the understanding of the ethnobiology of non-Western societies has its roots in the work of Goodenough, who writes that culture "does not consist of things, people, behavior or emotions" but rather the semantic structure of these things shared by the population of a given culture (Goodenough 1957:167). Frake's (1962) and Conklin's (1964) perspectives are ground-breaking contributions on this issue.

Frake (1962) points out that the days of ethnographers who just collected the names for the equivalent conceptual items of our culture are and should be in the past. His main critique of previous ethnobiological works is that we cannot just translate words literally into our biological categories but rather must get a more complete understanding of the cognitive system of the people we are studying. He outlines a basic methodology for "the determination of the set of contrasting responses appropriate to a given, culturally valid, eliciting context" and argues that this method "should ultimately be applicable to the 'semantic' analysis of any culturally meaningful behavior" (1962:30-31).

Frake defines four important constituents of semantic structures significant for the analysis of culturally meaningful behavior. These are segregates, contrast sets, taxonomies and attributes. His segregates are a terminologically distinguished group of "things" (Frake 1962:31). He states that "[t]he segmentation of speech into the grammatically functioning units revealed by linguistic analysis is a necessary, but not sufficient, condition for terminological analysis" (1962:31). The task is to search for the meaning of morphemes, which are the minimal grammatical unit. For example, *hot dog* is not only a label for a kind of *sandwich* but it contains two meaningful morphemes.

Frake's contrast set is the situation where a person makes a decision in giving a contrasting verbal label to a "thing" of the same kind. Contrast sets result when there is a cultural cognitive decision on the categorical organization of things. As Frake (1962:33) points out: "*hamburger*, *hot dog* and *rainbow* are mutually exclusive in membership." The two first terms have something in common in the sense that they are something to eat while the third term can be said to be a contrast.

The third concept that Frake writes about is the taxonomy of objects and how things are related or segregated. Frake's taxonomic system is the hierarchical inclusion and exclusion of objects in contrast sets that can be arranged by levels when the "things" are identified. Some things are a subset of other things but others are not despite the structure of the term. For example, *Eskimo pie* is not a kind of *pie*, but a kind of *ice cream*, and this fact is culturally self-explanatory for the speaker. The same phenomenon occurs in other cultures.

For Frake, these taxonomies are expressed on the basis of attributes that are culturally defined into these things or objects. Ethnolinguistic groups associate or segregate objects on the basis of two or more contrasting values. The characteristics of a specific object (e.g., a hamburger) might change, but its contrasting values will define its attributes in a specific taxonomic system. For example, Frake (1962:36) writes that "to define 'hamburger' one must know, not just what objects it includes, but with what it contrasts." For him, it is critical and significant which attributes are perceived by the informant with careful eliciting methods and to which stimulus the members of a culture react to the "thing" (Frake 1962:36-37).

Conklin's (1964) work is very important in regard to the importance of linguistic analysis for the treatment of folk taxonomies. He points out that "accurate knowledge of both the grammar and lexicon of the local spoken language constitutes a minimum requirement" for the reason that folk classifications "deserve more rigorous lexicographic attention than they have typically received" (Conklin 1964:41). For Conklin (1964:43), the "knowledge of the linguistic structure... is essential for the understanding of the principles of folk nomenclature." The patterns and construction of lexemes can be a powerful tool for understanding the complex interaction between a culture and its environment. For example, Balée's (1989) study of the "Nomenclatural Patterns in Ka'apor Ethnobotany" is able to reconstruct the kind of horticultural habits the Ka'apor had in the recent past.

Kay (1971:866) presents a formal definition of taxonomy as "any system of classification and naming, regardless of its structure." Kay's "taxonomic structure is a relational structure that has two components[:] ...a finite set T of taxa... [with a] relation... STRICT-INCLUSION-OF-SETS restricted to the members of T ['T' is the set of taxa included in a taxonomic structure]" (Kay 1971:868). The properties of his taxonomic structure are a) "the set of all taxa immediately preceded by the same taxon constitutes a contrast set;" b) "a terminal taxon is one that strictly includes no other taxon;" c) "the level of a taxon is defined as follows: ... unique beginner is 0, at level 1;" d) "the depth of a taxonomic structure is the greatest (deepest) level attained by any taxon in the structure;" e) "every contrast set is a proper subset" of the set of the taxa; f) "if two distinct taxa have any members in common, then one of them strictly includes the other;" g) "it contains at least one taxon at each level from zero to n inclusive;" h) "the terminal taxa constitute a partition of the unique beginner;" i) "each taxon other than the unique beginner belongs to exactly one contrast set" (Kay 1971: 869-871). This taxonomic system is developed further by Berlin et al. (1973, 1974), touched on below.

NATURE OF CLASSIFICATION

In our daily as well as our scholarly life, we seem to need to arrange things in groups not only for mnemonic purposes but also to communicate in special codes our interactions with individual things, groups of things, kinds of things and groups of kinds of things (Higbee 1977, Lévi-Strauss 1966). In Western science, classification is defined as "the ordering or arrangement of objects into groups or sets on the basis of their relationships" (Sokal 1974:1116). One of the most recent definitions of classification in the natural sciences is the following one:

> [Classification] (as a process) is the production of a logical system of categories, each containing any number of organisms, which allows easier reference to its components (kinds of organisms). Classification (as an object) is the system itself, of which there are many sorts. (Stace 1989:5)

In ethnobiology, classification is seen not as the 'production' of categories, but rather their perception in the environment. Berlin (1992:8) states "human beings... do not construct order, they discern it." This is the way the Barí organize the plant world.

By looking at external forms, many cultures will tend to agree on the organization of organisms (e.g., the term 'trees' is found in most if not all languages). There is a cultural need to group objects into categories and concepts. The same process occurs with the biological sciences. Taxonomy is not a cultural construction of natural order but, an innate capacity "of recognizing many distinct patterns in nature's structure in general" (Berlin 1992:9). How is this mode of perception transmitted and from where does it come? In our society, we have learned the classification of nature and the language to mediate it from the Greeks.

The Greek botanist, Theophrastus (c.370-285 BC) used local criteria to describe the flora (Stace 1989:18). Later, an Italian scientist, Caesalpino (1519-1603), was possibly the first to produce a taxonomy that "classified about 1500 species mainly on the basis of growth-habit and fruit and seed form, but it also utilized a whole series of floral and vegetative characters" (Stace 1989:19).

After Caesalpino, the classification and science of botany became more complex, using a more refined system of organizing the natural world of the plants. This step happened with Carolus Linnaeus (1707-1778), who came to be considered the father of modern taxonomy due to his ground-breaking work with the system of nomenclature that we still employ today. His first edition of *Species Plantarum* covered about 7,700 species in 1,105 genera (Stace 1989:22).

In essence, botany is rooted in the basic structure of folk taxonomy. But what is taxonomy and why we do need it? According to Stace (1989:5), the definition of taxonomy is:

> The study and description of the variation of organisms, the investigation of the causes and consequences of this variation, and the manipulation of the data obtained to produce a system of classification.

This concept of taxonomy describes social phenomena that occur in the 'primitive' societies of the world as the work of Lévi-Strauss (1966), Berlin (1973, 1992), Diamond (1966) and others have documented, as well as among the Barí. The taxonomy of 'primitive' peoples is called 'folk taxonomy,' which has been defined by Conklin (1964: 49) as "a system of monolexemically-labeled folk segregates related by hierarchic inclusion; segregates included in such a classification are known as folk taxa."

The structure of folk taxonomy is a very powerful tool to uncover how indigenous people interact with and know about their physical environment (Posey 1988). By knowing their folk taxonomy, we are creating a connection to our 'scientific' categorization. Atran (1990) Balée (1994), Berlin (1992), Brown (1986), and Bulmer (1974b), among many others have demonstrated this connection.

The concept of the taxon has been used in ethnobiology in the same way that the biological sciences use it. For example, Stace writes that

> taxon (pl. taxa) is any taxonomic grouping, such as a phylum, a family or a species. It is a useful general term, and can be used to indicate the rank of a group as well as the organism contained within that group (Stace 1989:5).

These taxonomic groups are arranged in a hierarchy: an ascending series of successively larger and broader categories in the same way that Berlin *et al.* (1973, 1974), Kay (1971) and others have proposed. These ascending categories are arranged in levels. There is in principle no limit to the number of levels contained in a hierarchy.

For the principles of this system in ethnobiology, Berlin proposes (1972, 1992, Berlin, et al. 1973, 1974) that traditional societies have general rules that create a hierarchical system of biological classification from highest to lowest: 1) unique beginner (a category that groups forms of life that share the same major characteristics, such as plant or animal; this level of category is quite common in traditional societies and rarely exists with a label), 2) life-form (such as tree, vine, and bush), 3) generic (such as oak, maple, walnut), 4) specific (such as white oak, sugar maple, black walnut), 5) varietal (such as a particular kind of sugar maple) and 6) a sixth intermediate rank that falls between the previous ranks (see Figure 4.1).

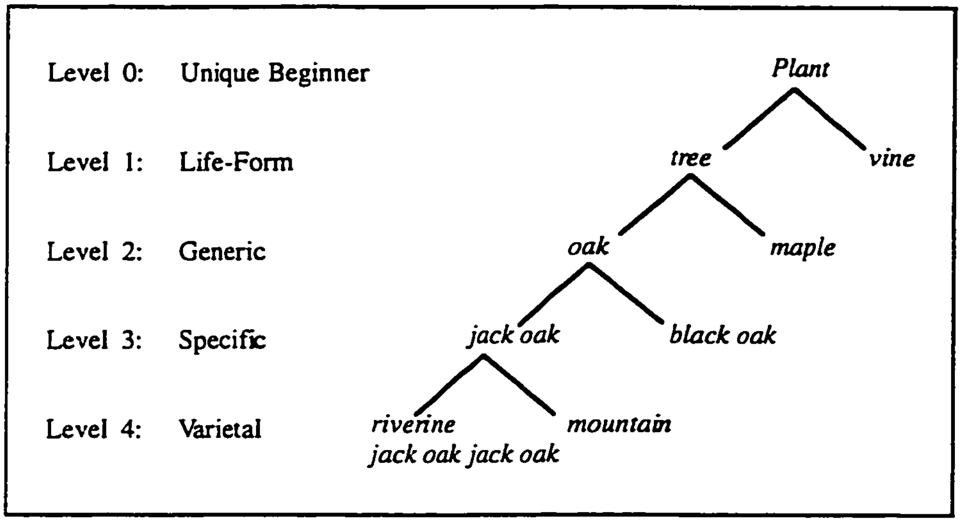


FIGURE 4.1. BERLIN'S FIVE UNIVERSAL ETHNOBIOLOGICAL TAXONOMIC CATEGORIES AND THEIR RELATIVE HIERARCHIC LEVELS WITH AN EXAMPLE FOR AMERICAN ENGLISH (AFTER BERLIN *ET AL.* 1974:26)

This taxonomic structure can also be applied to the Barí taxonomic categories. They arrange the plant world in the same way, presumably because they also discern it from nature in this way. In the highest level, unique beginner, is the category 'plants,' which is unnamed. In the second level, life-form, the Barí have 'trees' (as ***kaa***). The trees are divided into different kinds of generics, specifics and varietals, as seen in many cultures compared by Berlin (1992). This taxonomic structure is quite universal and most societies have it. Additionally, the Barí seems to also have a sixth intermediate rank that falls between the between unique beginner and life-form ranks for palms and Strelitziaceae (see Chapter 4 on classification of Plants).

THE CORRESPONDENCE OF THE WESTERN AND FOLK CLASSIFICATIONS

> The efficacy of the indigenous tradition is empirically tested. It appears that indigenous traditions and science are epistemologically closer to each other than Westerners might assume. The contexts of trials performed by Western scientists and by Shipibo Indians or Tahitian healers are obviously very different, but the empiricism in both is of interest. The field of study that analyzes the results of indigenous manipulations of plant materials together with the cultural context in which the plants are used is called ethnobotany. (Balick and Cox 1996:3)

As Balick and Cox state above, there is no doubt that non-westernized societies hold a great wealth of ethnobiological knowledge that needs to be studied. Many ethnobotanical studies have demonstrated a close correspondence of Western scientific species to folk species all over the world (Alcorn 1984, Balée 1995, Balick and Cox 1996, Berlin 1992, Berlin, et al. 1981, Boom 1989, Conklin 1964, De Avila 1989, Descola 1986, Diamond 1966, 1979, Gould and Lewontin 1979, Gragson and Tillett 1995, Hunn 1977, Majnep and Bulmer 1977, Milliken and Albert 1996, Milliken, et al. 1992, Paz y Niño, et al. 1995, Posey 1996). For example, Diamond (1966:1102) points out that 90 percent of 182 taxa were named by the Fore people of the New Guinea Highlands in regions. Berlin *et al.* (1981) compare the Western biological taxonomy of woodpeckers to that of the Awaruna taxonomy, to find that it is quite similar. Majnep and Bulmer's (1977) work shows that more than seventy percent of the Kalam's names have a one-to-one correspondence with Western species. Moreover, "sometimes, the Kalam do better than we. They recognize, as *kasj* and *wyt*, two species that had been lumped incorrectly under the single Western name *Hyla becki*" (Gould 1979:20). Berlin *et al.* (1974:101) demonstrated in a systematic and careful study that the Tzeltal plant names stand 61 percent in one-to-one correspondence with the Western scientific names. Conklin (1964:50) also observed that the Hanunóo described "more than 1800 mutually exclusive folk taxa, while botanists divide the same flora... into less than 1300 scientific taxa." Therefore, there is no doubt that the correspondence of Western scientific taxa to folk taxa is very high.

VARIATIONS IN CULTURAL KNOWLEDGE

This variation occurs among different individuals of a culture or society and is due to variation in age, sex, expertise, intellectual motivation and capabilities, kinship affiliation, education, and subsistence patterns, as well as less important factors. Even though intracultural variation is well known within and outside of the anthropological literature, it has been largely ignored in most ethnographic and ethnobiological studies (Berlin 1992, Boster 1981, Ellen 1979, Gal 1973, Hays 1974, Phillips and Gentry 1993b). Variation in cultural knowledge is not new in anthropology. A famous statement by Dorsey (1993b): "Two Crows denies this" (in Berlin 1992:199 and Hays 1974:1) provides a excellent 'cliché' of the variability of knowledge.

Anthropological interest in the variability of cultural knowledge has its origins in the historical debate over the reliability and authenticity of ethnographic research, a debate provoked periodically by anthropologists' differing perceptions of the same culture. Scholars have presented various hypotheses to explain this variability. Werner (1969) argues that knowledge varies with the intelligence, interest and social position of informants. Sankoff (1971) points that cultural variation must be explained not only by quantitative differences in informant expertise but also by qualitative differences in individual cognitive models.

On the same issue, Ellen (1979:338) also raises a relevant point:

> However, little quantitative information has been presented on the distribution of response variability in interpretations between informants according to such normally important variables as geography, age, gender, kinship affiliation, ideology, degree of literacy, and so on (Hunn 1975:1618, 21; Manning & Fabrega 1976:41-43). Two notable exceptions are found in the work of Gardner (1976) and Hays (1974, 1976).

Despite the evidence of early interest in cultural variation (e.g., Dorsey 1884), Kroeber (1920) observed the great need for ethnobotanical studies to become more quantitative (Prance et al. 1987:287). Despite his comments, few empirical ethnobiological studies have addressed this issue until recently. Berlin *et al.*'s (1974) monographic treatment of Tzeltal plant taxonomy mentions the question of variation among informants' classification of plants. Hay's (1974) doctoral dissertation extensively described Ndumba inter-informant variation in ethnobotanical knowledge based on local and individual variation. Alcorn (1984) measured the variation in individual patterns of management of the natural environment as well as naming, recognition and use of plants by the Huastec Maya. Several important statistical studies have been published on inter- and intra-informant variation. Boster (1984) demonstrated the basis of intra-cultural variability in Awaruna manioc classification. Weller (1984) addressed the intra-cultural and cross-cultural variability of disease perception in American and Guatemalan societies.

Knowledge variation has two dimensions: cognitive and lexical. Ellen (1979) also points out that social context, ecological zones and subsistence techniques may produce variation in ethnobiological knowledge. These are forms of cognitive variation, too. The first dimension of variation, cognitive, is the one that most anthropologists are most aware of. Two informants tend not always to agree on a piece of information (e.g., best kind of ice cream in town) because it has been transmitted from different sources that have defined it in accordance with the informants' age, gender, lineage, experience, ideology, education, and basic intelligence (Berlin 1992, Boster 1981, Ellen 1979, Hays 1974, Zent 1994). Another angle to the explanation of cognitive variation is the one taken by some cultural anthropologists, such as Keesing (1987:161), who states that "cultures as texts... are differently read, differently construed, by men and women, young and old, experts and non-experts, even in the least complex societies." Therefore, the characteristics and lives of the informants define their knowledge in particular ways.

Further, anthropologists, in the process of seeking understanding of a given culture, tend to interview experts in the given subject (religion, art, ecology, etc.) to get the most complete picture. The expert is generally the most knowledgeable person in her/his culture. However, there are no omniscient individuals in any culture (Ellen 1979, Hays 1974, Hunn 1975). As Gal (1973:205) states: "cultural knowledge is not shared by all individual members of a society." Ellen (1979) questions the validity of the 'omniscient informant', the idea that the taxonomies of knowledgeable informants reflect the folk knowledge of the entire population. However, this 'omniscient informant' tend to be the best synthesizer on many issues in her/his society. Ellen (1979:346-348) also suggests that knowledge varies depending on the gender, age, status, kinship position, linguistic competence, ability, and special skills of the informants.

Recent work has shown that there is a great variation in knowledge (Berlin 1992, Boster 1981, Caballero 1994, Ellen 1979, Irvine 1989, Zent 1994), addressing the nature of this variation. For example, Berlin address this variation on Awaruna bird knowledge (1992), Boster on Awaruna manioc knowledge (1981), Berlin (1992) on Awaruna faunal and floral knowledge, Irvine (1989) on the Kechua Runa of Ecuador and Zent on Piaroa men's knowledge of the forest (1994). For example, Irvine states that "[i]ndividual knowledge of the vast array of forest resources varies in part with age, sex and social position" (1989:229). Irvine also noticed that old people know more and that "men tend to recognize mature forest species better than women" and "women... know more about plants used specifically in the female realm" as for "menstruation and birth" (Irvine 1989:230). The same observations are made by Balée (1994:50)

> Although it would be inaccurate to claim that separate domains of men's and women's plants exist, there are significant differences in the ways in which men and women apportion their time: as a result, one observes significant differences in the ways in which men and women handle and work with plants. These gender-related differences are evident especially in hunting, gardening, food preparation, manufacture and repair of tools and weapons, eating, and child care.

Another dimension of the knowledge variation is "lexical" (Berlin 1992, Ellen 1979). Lexical variation is quite complex and explored largely by Berlin, Boster and Hays. Berlin (1992:204) states that "lexical variation, either strictly phonological or lexical, have not been fully explored." Some names may sound different but mean the same thing. In non-literate societies, where learning is transmitted orally, there tend to be a wider range of variability in names because hearing and speaking ability is also variable. Some sounds will be omitted (e.g., in Barí ***ishkúbabá*** and ***shkúbabá*** for *Brownea coccinea* Jacq.) or sounds may be abbreviated (e.g., in Barí ***bichirabu*** and ***bitrabu*** are the same tree, *Duguetia* sp. 1). I have many cases that illustrate a great lexical and phonetic variation. However, some variants are intentional from our linguistic view. For example,

daabá (*Ochroma pyramidale*) and ***dáiba*** (*Cedrela odorata*) are two very different trees, as well as ***lurugbaa*** (*Ficus* sp. 5) and ***lurugboo*** (*Ficus* sp. 6, see Appendixes C and D for identifications). These are basically the two knowledge variations that an ethnobiological study needs to approach and understand.

METHODOLOGY

> Ethnoecologists must often labor alone, trespassing the boundaries of many academic disciplines in their quest to attain a holistic vision of local ecological knowledge. Because of some romanticized accounts, there persists a popular image of ethnoecologists as loners who venture into unexplored virgin forests to contact isolated groups of indigenous people and to make lists of the medicinal and hallucinogenic plants of which only shamans and witch doctors know the secrets. (Martin 1995:XX)

As Martin states above, the work of an ethnobiologist is not a simple one but one of taking many roles or involving many people to produce a valuable study. Although ethnobotanical research is sometimes mistaken for just the simple collection of plant names, it goes beyond that. It is a procedure involving a systematic collection of ethnographic and botanical data.

The first step for most ethnobiologists is to collect a large set of botanical or zoological voucher specimens (Alexiades 1996b, Balick 1996, Bye 1986, Martin 1995). A voucher specimen is defined as an organism or sample "which physically and permanently documents data in an archival report by: (1) verifying the identity of the organism(s) used in the study; and (2) by doing so, ensures that a study which otherwise could not be repeated can be accurately reviewed or reassessed" (Bye 1986:1, Lee, et al. 1982:5). The requirements of an acceptable voucher specimen are "(1) have recognized diagnostic characters that are appropriate to the level of identification in the report. Specific life stages or body parts may be required. (2) Be preserved in good condition by the investigator/collector according to acceptable practice. (3) Be thoroughly documented with field and or other relevant reports. (4) Be maintained in good condition and be readily accessible in a suitable repository institution" (Lee *et al.* 1982:7).

While collecting the specimens, the researcher collects the native names given at the site by native field assistants or collectors (Berlin 1984). It is necessary to cross-check these names with other informants, preferably with ten or more informants (Berlin 1981). Berlin et al. (1981) give further details on the practice and justifications for naming experiments and measurements. In order to be able to reconstruct the folk-taxonomic classification of these organisms, it is important to follow a method in order to establish the membership of covert complexes. These methods have been outlined in Berlin *et al.* (Alexiades 1996a, Berlin 1981, Berlin 1992, Berlin, et al. 1966, Berlin, et al. 1968, Berlin, et al. 1974, Boster 1981, Hays 1974, Hunn 1977, Martin 1995).

Boster (1981, 1984) uses both quantitative and qualitative methods for assessing the knowledge of manioc varieties and informant agreement, with structured interviews and quantified and categorized data. Following his example, I also interviewed a number of informants to verify agreement in each taxon. Given the nature of the Barí way to name trees, with nomenclatural as well as individual variation, the analysis of the data draws concepts and methods from the work of Boster (1981, 1984), Berlin (1992), Berlin *et al.* (1974) and Hays (1974, 1976).

Ethnographic Methods

Participant observation was used to learn about the Barí's relation to their plant world, taking note of relevant information. Whenever I had free time from collecting botanical vouchers and making forest plots, I would walk around the village and see what people were doing with plants. I interviewed several people in their houses and accompanied them on their subsistence forays in the forest, to see how they related to plants there. I observed what forest resources people had in their houses and asked where they collected them. When houses were built, I asked their owners where they were collecting the raw material and what kind of trees they were using.

Selecting the right informants was not an easy task for many reasons. The selection of male informants was not difficult at all, because I had money and I was a man. To interview Barí women was difficult, because they believe a man and a woman go to the forest to make love. I solved this problem by taking other Barí as company. As a result of these constraints, I was not always able to choose the optimal female informants, but had to accept those who were willing to be interviewed for the pay. (All informants who agreed to participate in the project on a voluntary basis were paid a nominal sum for their cooperation.)

For the ethnobotanical data, I first went to the forest with the potentially most 'knowledgeable' people. My Barí friends in Saimadodyi originally pointed to one wise man (Older Man 2). But he turned out to be not so reliable even though he was the most knowledgeable on forest plants. I later discovered his information was not consistent and he invented names or gave the name for more common trees to trees that were less common. My Barí field assistant told me once that this older man was not identifying the trees properly. When I took another wise man (Older Man 1), a little younger, he turned out to be quite knowledgeable and much faster at identifying trees. In essence, it is not easy to find 'knowledgeable' indigenous informants, because they might not be necessarily knowledgeable, but rather politically powerful and socially respected. Older Man 2 was reputed to be a good story teller but, after a while, other elders told me he liked to make up too many details that are not in the 'true' version.

I divided my informants into two age groups based on the time of contact because older Barí (40 years of age or older) were adults or teenagers at the time of the contact and were likely to be exposed to a greater range of traditional ethnobotanical knowledge than younger people (younger than forty years old). Also, at 40 years of age or older, Barí people are considered wise and old in the Barí cultural world view. Biologically, this reputation would make sense, too, because their children would have reached reproductive age and they tend to become grandparents in their forties.

I elicited Barí inventories of plant names from 3 knowledgeable informants but did not get too far because the Barí do not list plants as systematically as the Tzeltal (cf. Berlin, et al. 1974). The method of eliciting names of plants has been quite successful in many other cultures (Berlin, et al. 1974, Boster 1981, Hays 1974), but it did not work well with the Barí. Besides the participant observation technique, the walk-in-the-forest interviews and different forest plots yielded a relatively large list of 556 Barí plant folk-species.

Botanical Collection

Employing modern ethnobotanical field methods, based on extensive collection of fertile vascular plants accompanied by comprehensive ethnographic and ethnobotanical data on native identification and cultural significance (following the methodology of Balée 1994, Berlin 1984, Berlin, et al. 1974, Boom 1987, Bye 1986, Gentry 1993, Martin 1995, Prance, et al. 1987), I collected 394 fertile botanical specimens. Due to the low productivity of the forest most of the time I was there, it was difficult to gather an 'extensive collection' of fertile vouchers. I limited myself to fertile vouchers (with flower and/or fruit), because it was already difficult to preserve and transport them from the field site. All had to be carried on the back of mules and the number of mules was limited.

I originally planned to have Barí assistants collecting vouchers, but they did not do a good job due to their difficulty in writing all the information required. I had to do all the vouchers by myself. However, this necessity was quite helpful because I became familiar with the local flora and the Barí worldview on plants. For two months, I was fortunate enough to have a Venezuelan anthropology undergraduate, José Cañizales, a research assistant in the Herbario Ovalles, doing some collection with me while he was conducting his own ethnobotanical research on vines (which I was supervising).

Where possible, I collected five to six duplicates of each voucher. One set of botanical vouchers was deposited in the Herbario Nacional (required by law), one in the Herbario Dr. V. M. Ovalles (Facultad de Farmacia, Universidad Central de Venezuela), one in the regional herbarium in Maracaibo (Facultad de Agronomía en La Universidad del Zulia) and two sets were taken out of the country where they are now deposited in the

Herbarium of the University of California at Berkeley, and the Missouri Botanical Garden for determination.

Mapping of Forest Plots

My data set is constituted of 33 forest plots. Thirty-one of the forest plots are 30 m x 50 m, or 0.15 ha; and two are 30 x 30 m, or 0.09 ha. Two sets of 7 plots each form a continuous hectare of forest (6 30 x 50 m plots plus 1 30 x 30 m p lot). I chose the 30 x 50 m plot size because it fits on an 8.5 by 11 inch paper at the scale 1:200 and it can be mapped with preliminary identifications in one normal day of work, which includes one or two hours of walking to the plot. I used two measuring tapes (50 and 30 m), colored tape to mark each 10 m and a compass to keep the plot as square as possible. I recorded all the trees in the plots that were 10 cm DBH (diameter at breast height, 130 cm.), following the procedure of Prance et al. (1987). Each tree was given a number and identified on the spot by one or two knowledgeable informants. Each plot map worked as a questionnaire where each tree was the question. Therefore, I could look back at each forest plot map to check the agreement per tree that each informant had and also check the characteristics of the trees in my fieldnotes if needed. These plots were located on a map (see Map 2). The plots of forest were used to make inventories of Barí tree names.

Forest Plot Interviews

I performed walk-in-the-forest interviews, where the informants were placed in front of each tree and asked about its name. This method is quite effective because the informant views the tree in its natural form and is able to name it more easily. These interviews provided reliable data and a good understanding of the Barí worldview at least on the species plants collected or plotted.

In my pilot research, I got a very high agreement on seed and fruit identifications (95.26%, n=19 w/10 fruit and seed specimens) and a significant agreement on dry specimen identifications (60.22%, n=13 w/35 botanical voucher specimens). I was not convinced of the usefulness of either technique and wanted to do the interview in a more natural setting for the informants. Later on, I realized that walk-in-the-forest interviews would be the solution. I interviewed 20 Barí adults in the forest plots.

I decided not to interview all Barí informants on all plotted trees as I planned earlier because, as became obvious in the field, that would have been redundant and time-consuming. I managed to interview 13 Barí informants (3 older women and 2 younger women and 3 older men and 5 younger men) on 12 forest plots (Plots 7, 8, 9, 10, 15, 17, 18, 19, 20, 21, 22, and 23, covering 1.8 hectares, see Appendix A). These twelve plots have 957 trees with 10 cm dbh. Unfortunately, I would have had 17 Barí but had various problems getting them. One older woman could not continue the interviews for all trees due to health problems, even though she was reputed to be the most knowledgeable on trees. A couple of knowledgeable older men were not able to come to the forest due to several illnesses. One younger Barí woman did not want to continue because she felt she did not know enough and excused herself as having too much household work to do. Two older men and two younger men were the only informants in two plots in remote villages just to test forest variation away from the center of the research site (Plots No. 25 and 26). Further, I interviewed only three Barí informants in three plots (No. 1, 2, and 3) because these forest plots were cleared for a garden. I also interviewed only three Barí informants in three other plots (No. 4, 5, and 12) because they were too far and dispersed from the village. Plot 6 was a horrendous nightmare for interviews because of its large number of trees and the difficulty in identifying them due to their immature state. My main Barí field assistant identified all the trees in all the plots, except Plots 31 and 32, and was the only Barí interviewed in Plots 11, 16, 27 and 28. From all the interviews, I collected 16,795 naming events for 212 folk generic. (Folk "[g]eneric taxa are the basic building blocks of any folk taxonomy, are the most salient psychologically" [Berlin 1992:16-17] and "are among the first taxa learned by children as they acquire their society's system of biological classification" [Berlin 1992:24].)

I conducted the interviews by taking to the plot one Barí informant and asking her or him to name each tree in the plot, which I had numbered and could locate on a forest map I made (scale 1:200) and transcribed the plant terms phonetically in field notebooks. In the notebook, I also recorded botanical features the informants appeared to use and possible reasons for not identifying a particular tree (e.g., leaves are not visible, immature or unusual specimen or light was not adequate in sections of forest with heavy clouds).

Throughout my research, I was impressed by the Barí's ability to name trees with labels that were apparently not just descriptive terms. First, I had nine Barí informants out of 20 (or 45%) that named 99% to 100% of all the trees. After checking which names assigned each tree by each informant, I was able to determine which name was more likely the common name for their generic taxa tree, which correspond to our scientific genus. After deriving the most common name for each tree, I computed informant agreement. Most Barí were interviewed nearly a thousand trees each (see Table 6.1 in Chapter 6).

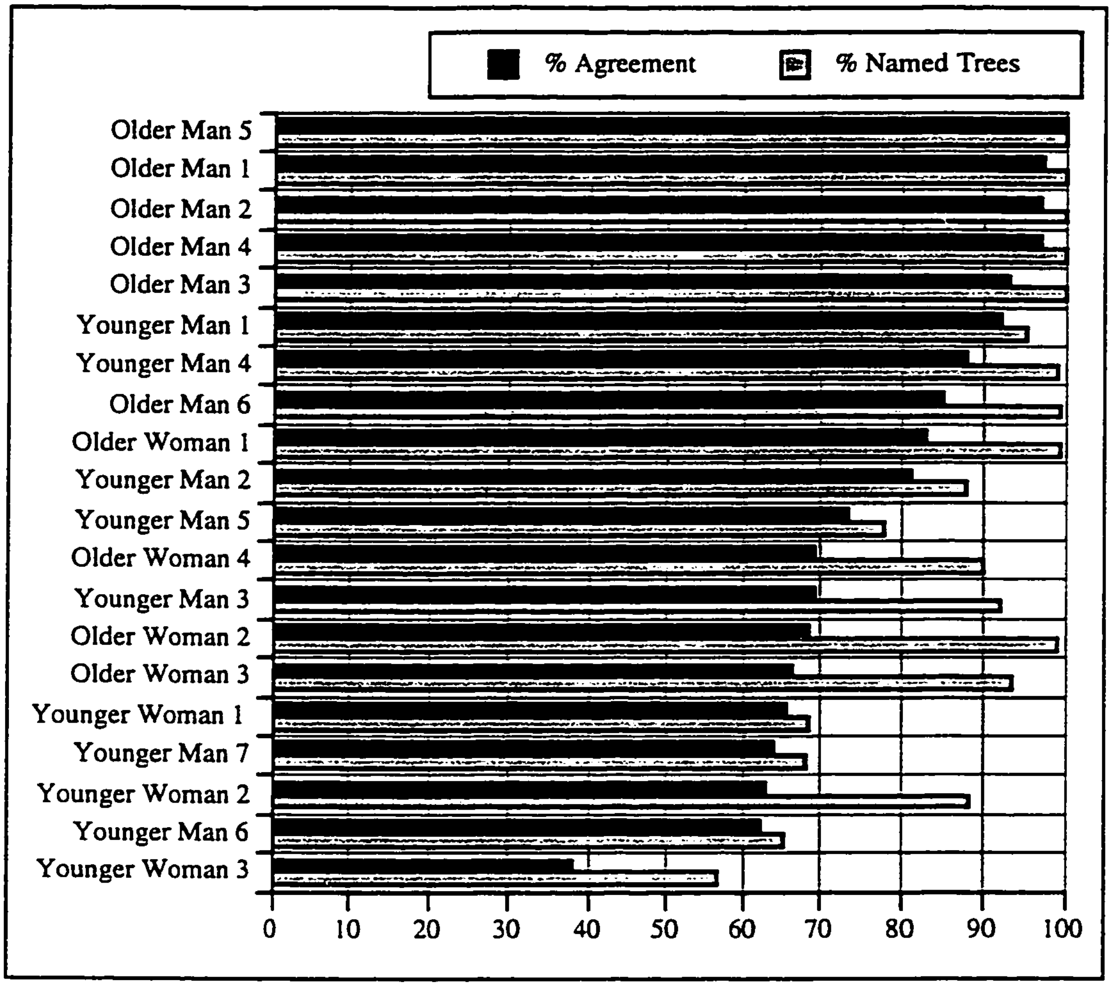


FIGURE 4.2 PERCENTAGE OF NAMED TREES AND AGREEMENT (N= 16,795) FOR 20 INFORMANTS.

The names recorded were generally labels for the folk generic. I sorted out all the lexical variation, which is very similar to the variation recorded by Berlin (1992) among the Awaruna or by Hays (1976) among the Ndumba. In order to get the proper name for each tree, I had to compare all the answers of the most knowledgeable people, and select the most agreed name. For some dubious trees about which no one agreed, I consulted on site with the most reliable informant if it were possible and questioned the criteria for these names. After getting the correct name for each tree in each plot, I was able to calculate the agreement for each informant in the interviews (see Figure 4.2).

In the database program, I entered the tree number and its plots number in one column, the name that the 'experts' agreed on in a second column. The name each of the informants gave me in the interviews was also entered in a specific column for each of them. Beside each tree name, I entered another column with a code for correct or incorrect identification of the tree at the folk-generic level. I added other columns for its saliency, uses (edible, fuel, game animals food tree, medicinal, construction and technological), one use versus two, three or more types of uses and so on. I used five different computer programs to analyze the data from this research (Delta Graph 2, Panorama, Stat View and Mac Draw Professional). These programs allowed me to compare many types of information to produce the inference and interpretation in the following chapters.

To be able to compare tree distribution in the area, I interviewed 3 Barí women and 6 men on the biogeography and ethnobiological characteristics of 211 folk generic trees assembled midway through my fieldwork. During this period, I also observed how the Barí related to the forest and asked many questions relevant for the research. By the end of the project, I interviewed two Barí informants about all the plant nomenclature that I collected in all previous months of fieldwork and recorded it with a very good tape recorder to verified and check its transcription.

CHAPTER 5: BARÍ PERCEPTION AND KNOWLEDGE OF THE RAINFOREST

> [E]thnobiological data... will lend support to the claim that, while human beings are capable of recognizing many distinct patterns in nature's structure in general, in any local flora or fauna a single pattern stands out from all the rest. This overall pattern has been referred to by systematic biologists as the *natural system*. (Berlin 1992:9)

> Biologists engaged in field studies in exotic places have not infrequently noted that local natives who are entirely ignorant of Western European Science, nevertheless demonstrate an intimate and empirically reliable knowledge of the local flora and fauna and share with the field worker an appreciation of the ordered complexity of the living world. (Hunn 1976:508)

As Berlin and Hunn state above, the extensive and detailed knowledge of indigenous people has been demonstrated repeatedly in the literature. For example, H. Conklin (1964:50) states that an indigenous society, the Hanunóo, knows more terminal taxa (1800) in their biota than botanists can describe (1300 species). Hunter/gatherers and agriculturists who still forage heavily in the tropical rainforest have a complex and extensive knowledge of the species living in their environment, which has the greatest diversity of species on earth (Alcorn 1984, Anderson 1990, Balée 1994, Balick and Cox 1996, Berlin 1984, Berlin 1992, Boster 1981, Clay 1988, Conklin 1954, Davis and Yost 1983, Denevan, et al. 1984, Irvine 1981, Milliken, et al. 1992, Toledo 1992, Zent 1994). Rainforest indigenous people's survival depends heavily on the proper use of this knowledge, because their resources are distributed thinly over a large area and involve a large number of different species of plants and animals in the rainforest. Without this extensive knowledge, they would perish quickly in this harsh environment, which ironically is often romanticized as a paradise.

One of the objectives of my research was to answer the following question: What proportion of the rainforest does this indigenous knowledge cover? While walking in the forest with the Barí, I was always impressed by their ability to identify and name all the taxa we encountered. Which species are found in their environment and which ones do the Barí know? Do they actually know all the species present in their ecosystem? If not, which ones don't the Barí know and why? These questions lead to many issues of the human perception of their environment raised by Berlin in his recent book (1992).

The other question is how this knowledge is learned, maintained and passed from one individual to another and from one generation to the next. Obviously, we learn many things from our parents, relatives, affines and friends. However, westernized urban people mostly learn the information that we use from schools, libraries, the media and more recently from electronic media. The Barí have the same basic form of verbal network that we have, but they do not have formal education, e-mail, libraries, books, newspapers and television. I expected the Barí to depend on the direct experience of a wise person for information that is not necessarily given freely. In almost all the interviews, when I asked a Barí who taught them the name and use of these trees, they replied that their parents taught them the name of these trees. However, they also pointed out that they learned from their relatives, affines and other Barí who accompanied them on fishing, hunting and gathering trips.

THE CONTROL AND DISTRIBUTION OF THE KNOWLEDGE

Barí knowledge, then, is not a body of information freely accessible to anyone willing to learn it, but constrained by social, political, and economic context. Only a few people will be able to manipulate a great proportion of it due to their political and economic ability to acquire it. Information about resources and medicines tends to be shared with kin and with Barí who belong to the local group. Therefore, there are social and generational constraints affecting how this information moves from one individual to another.

This pattern is observed in many cultures around the world. For example, Barley observed among the Dawayos people of North Cameroon:

> "In primitive society knowledge is seldom freely available; rather it belongs to people. A man owns his knowledge. He has paid for it and he would be a fool to

> give it away without payment to another, just as he wouldn't give away his daughters without brideprice." (1983:105)

I also observed the same phenomenon among the Barí. The information about trees was seldom offered to me at first. Before providing the information, the Barí would ask me if I had something to give them, such as a knife or a machete. They value this information as a valuable exchangeable resource.

If the distribution of and access to knowledge is the same as the distribution of other resources, maintained within the extended family, families should restrict it. I observed that each extended family has its own forest trails and forest patches for its own use. Moreover, they try to conceal the information or resources, and other people will try to ignore their existence, too.

Some Barí have more access to knowledge and resources than others. As I observed and was told, if a Barí is born to a family with extensive kin and fictive kin, is intelligent, sociable, not competing with other people for resources, living in a traditional population, practicing a traditional subsistence economy and has no problems with other Barí from the same village or other villages, this person has great access to Barí traditional knowledge. I believe these are the main reasons why my primary Barí field assistant knew so much at his age (31). He could easily ask the other elders about some information without being limited. Therefore, the information about rainforest resources is controlled as any other resource and shared more with close kin.

THE PERCEPTION OF THE RAINFOREST

When they look up at the trees in their rainforest, it seems that the Barí are able to distinguish a great deal more than the untrained observer. In contrast, when my assistant, a Venezuelan ethnobotany student, José Cañizales, came to the field, he just saw a green mass (he was not even able to distinguish the leaves) when I was discussing the differences between two trees with my Barí informants. He told me he could not distinguish the differences I was observing and discussing with my Barí colleague. This is the same way I felt at the beginning of my research. I could not see the leaves. By April 1994, after 18 months of fieldwork since 1988, I learned from the Barí to disect this "green mass" and recognize trees by the patterns of branches and leaf types. I then realized that what we see is not only the physical environment that is in front of our eyes, but that our culture and practice adjusts our perception. I estimate that the Barí recognize around 700 to 900 different types of trees (I am fairly confident based on names for 556 different plants I have recorded, see Appendix D). An interesting aspect of this knowledge is how the Barí recognize and categorize these trees with a complex and detailed system of classification.

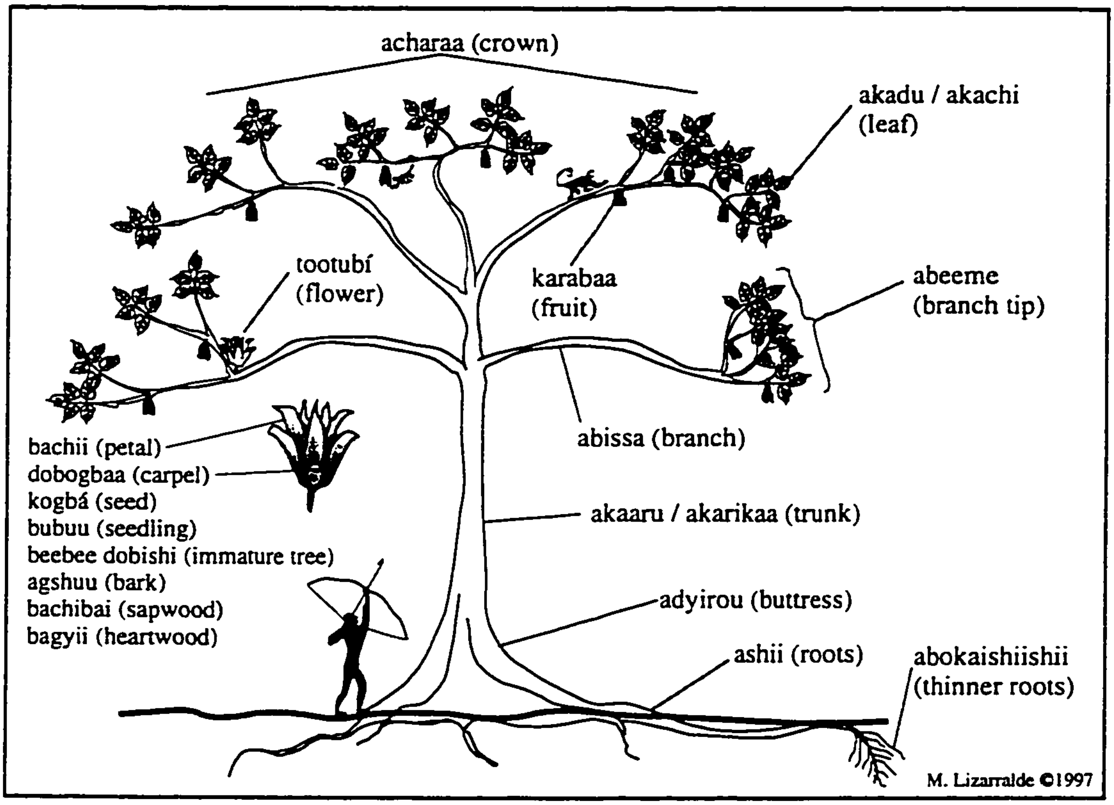


FIGURE 5.1: BARÍ NAMES FOR THE PARTS OF A TREE

The Barí perception of vegetation types is expressed in various terms. The most generic term is ***daroo***, which means 'vegetation' in Barí. The use of ***kanda***, ***kandashí*** or ***kandaroo*** is specifically for 'forest' or 'group of trees'. The terms ***shdrowkandaig*** or ***daïg kanda*** can be used to refer to primary forest. For secondary forest, the Barí use

aigdakashiobi mairoo, which in Spanish is 'barsal'. Abandoned pasture land, formerly used for cattle, is called ***beaaroo***. The forest types are classified by the dominance of specific trees. For example, ***baruu kanda*** is primary forest dominated by the folk genus of tall ***baruu*** trees. Forest will also be named for specific geographical regions, e.g., ***agdodaroo*** for primary forest in areas full of calcareous rock formations (***agdoo***).

The Barí perceive the forest as having two basic layers. First, there is ***nunkundaa***, which includes all the leaves and plants growing between 0-2 m above the soil. However, ***nunkundaa*** also refers to a vegetation dominated by apparently all plants included in the Linnaean Commelinidae superorder. The term ***nunkundaa*** is derived from ***nunku*** (*Heliconia* sp. 4). Second, the canopy is called ***ashiaa***, and is where all the monkeys and large birds live. The recognition of these two layers of the forest is understandable due to the importance of the resources found in both.

As in many indigenous cultures (e.g., Balée 1994, Berlin, et al. 1974, Milliken, et al. 1992), the Barí also distinguish and name the parts of plants and trees. The trunk of a tree is called ***akaaru*** or ***akarikaa***. Its branches are called ***abissa***. The tip of the branch is labeled ***abeeme***. The top of the tree is named ***acharaa***. The buttress of a tree is labeled ***adyirou***. The roots are called ***ashii***. The thinner roots are named ***abokaishiishii***. The bark of a tree is called ***agshuu***, which literally means skin. The sapwood is ***bachibai***. The heartwood is ***bagyii***. The hairs of a plants are labeled ***akashiro adyie***. The leaves are called ***akadu*** or ***akachi***. The flower is ***tootubí***, which also means 'star' and 'firefly'. The Barí also use the term ***totubíkaa*** for flower, especially from trees. The petal is ***bachii***, which also means 'white'. They do not distinguish petals from sepals. Carpels are ***dobogbaa***. The fruit is labeled ***karabaa***. The seed is ***akogbá*** or ***kogbá***. When a little plant is growing out of a seed, it is labeled ***bubuu***, which also means "it is growing". An immature tree is referred to as ***beebee dobishi***, meaning it is not flowering yet. A full-grown tree is referred to as ***kaa*** or in the plural ***kaana***.

CLASSIFICATION OF PLANTS

The Barí recognize six major life forms in the plant kingdom. These life forms are: trees (***kaa***), palms (unlabelled directly, but there is a suffix referring to their leaves: ***tata***, e.g., ***kitata*** for ***keki*** or ***aruutata*** for ***aruu***), large herbs (***tagta***), epiphytes (***korokonda***), grasses/ferns (***chiaigshiaig***), vines (***ishdā***). These are terms that all Barí people use consistently to group plants or to name them when no generic or specific label is known (see Figure 5.1. below). My research focused on trees and palms.

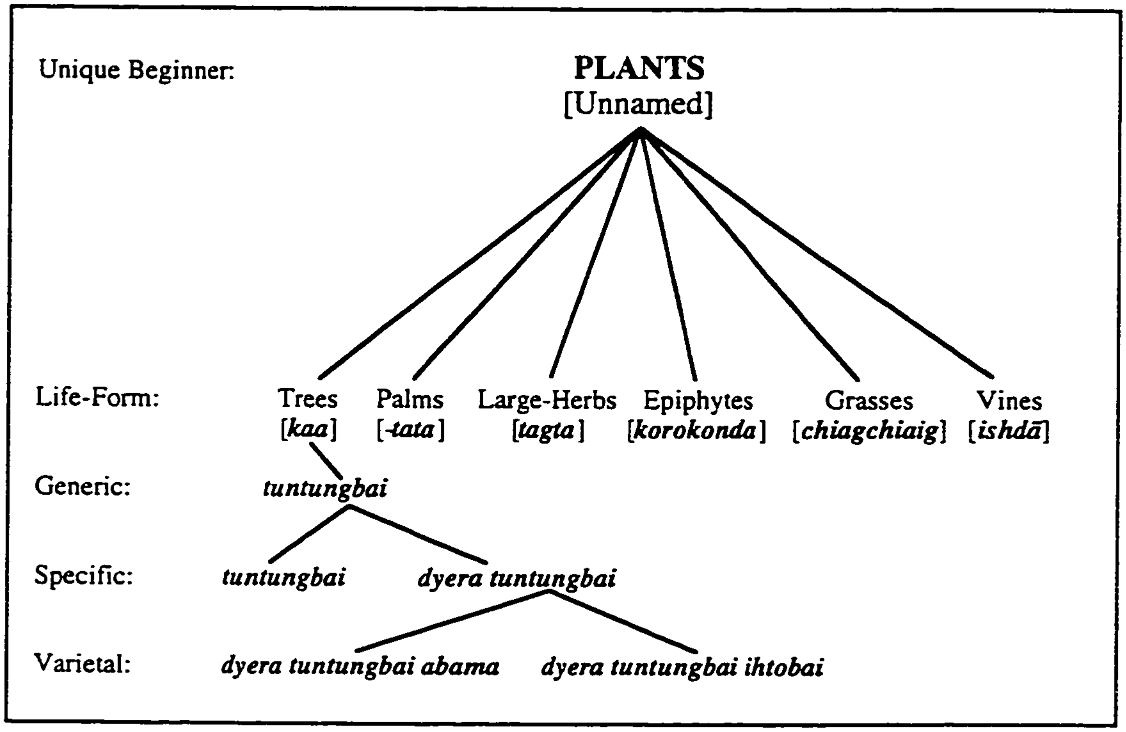


FIGURE 5.2: BARÍ CLASSIFICATION OF ALL PLANTS (***tuntungbai*** is papaya, *Carica papaya* and also *Carica* genus)

Barí people use nine basic diagnostic features to identify trees (***kaa***). These diagnostic techniques are shared by most Barí. The first diagnostic feature is shape of the trunk (e.g., thin or barrel-shaped, straight, twisted, with many folds, with buttresses [***agyirou***], etc.). The second feature is the texture and color of the bark. One older Barí man was able to identify 80% of the trees based on these two features. If fruits (***karaba*** or the suffix ***-ogba***) are available, they are the most important feature. Another important feature for identifying trees is the flowers, when they are available (***totubĩkaa***). The color of the petal (***shundu***) is important; if it is yellow is called ***karikaa shundu***. If fruits and flowers are not available, the fifth feature is the size and shape of the leaves (***akadu*** and ***akashi***). When there are two folk-species with the same name, but one has larger leaves, it is called by the suffix "abama" as in ***totubĩkaa*** and ***totubĩkaa abama*** (note that ***abama*** means 'mother'). The sixth feature is the shape of the crown of the tree, which is quite salient in many trees (such as ***asaa*** [*Ceiba pentandra*], which has an umbrella-like crown). The seventh feature is the type and color of sap (e.g., white latex is ***arigbái bachĩ*** or red latex is ***arigbái babai***, greenish sap, or transparent latex or sap is ***arigbái***), which is important when the other features are not quite diagnostic for a folk-generics (e.g., when two trees are confused, ***buruma*** (cf. *Pouteria* sp.) with white latex and ***tumma*** (*Astronium graveolens*) with red latex, because their external features are very alike: their trunk shape, leaves and bark texture and color are the same). The eighth feature is the shape of the root (underground, surface, cylindrical, fluted or buttress-like). The ninth and last feature is the smell and color of the inner bark sections of the tree (the secondary phloem and the vascular cambium), which I initially perceived as the most important diagnostic feature because my first main Barí informant used it two-thirds of the time to identify trees. (I learned later on a hunting trip that this collaborator did not have perfect vision and had to rely on secondary features, especially the smell, to be able to identify the tree.) These features also seem to be used more by peasants and 'materos' who are descendants of the indigenous population, as Gentry (1993) observed in Peru.

TABLE 5.1: BARÍ BASIC DIAGNOSTIC FEATURES TO IDENTIFY TREES IN ORDER OF IMPORTANCE:

	CHARACTERISTIC	BARÍ TERM
1.	Shape of the Trunk	***akaaru***
2.	Texture and Color of Bark	***agshuu***
3.	Texture, Color and Size of Fruit	***karaba***
4.	Color of Flower Petals	***totubĩkaa***
5.	Size and Shape of Leaves	***akadu*** and ***akashi***
6.	Shape of the Crown	***acharra***
7.	Type and Color of Sap	***arigbái***
8.	Shape of Roots	***ashii***
9.	Smell and Color of Inner Bark	***ihtooagshuu***

The palms have a different nomenclature so that the parts are named in a fashion unrelated to how tree parts are named. For example, the palm ***keki***'s (*Oenocarpus mapora*) fruits are called ***kiogboo***, instead of using "kekiogbaa." Its leaves are called ***kitata***, instead of using "kekiakadu." The trunk is ***keki***, instead of ***akaaru*** . The same goes for ***aruu*** (*Oenocarpus bataua* var. 2): leaves are ***arugtata***, trunk ***akaru***, fruit ***arikogba***, and the whole plant ***arugta***.

The term "***kitata***" (used for palms) is related to a term used for Strelitziaceae, which is ***tagtá***, a kind of Heliconiaceae. The ***tagtá*** (name for the leaves and plant of a kind of Strelitziaceae) is also used for all Strelitziaceae, if the informant do not know the folk-generic term. Here is a significant contrast, because for trees, its leaves are always name ***akadu*** or ***akashi***. However, what separates palms from *Heliconia* sp. (Strelitziaceae) is the suffix "***ogba***" for fruit, used for trees only for the fruit of trees and palms (e.g., ***karikõogba*** or ***araktogba***), but not for Strelitziaceae fruits. Even though the Barí do not name palms as a group, their nomenclature for their parts makes an association of all palms and they recognized them as a group. The same phenomena happens with Strelitziaceae. The naming process for recognizing their leaves (***-tata*** and ***tagtá***) links them, by implication placing Arecidae (to which palms belong) and Commelinidae (to which Zingiverales [Strelitziaceae] belong) next to each other. This is not surprising because a the Western evolutionary diagram shows a similar arrangement (cf. Plate III in Heywood 1985:13). The Barí also lump Arecidae and Commelinidae with Cyclanthaceae, Musaceae, Cannaceae and Maranthaceae, which is done by Western botanists as well because Commelinidae and Arecidae are closely related in evolutionary terms (see Figure 5.1).

Moreover, the criteria for grouping trees that the Barí use are quite similar to Western scientific plant classification. For example, the Barí consider that all plants under Piperaceae are related and form a group under the terms of ***ishiránki*** and ***obamakaa***. The same is observed for Orchidaceae, Cyperaceae, Poaceae and Bromeliaceae, lumped under the term ***korokonda***. For other families of trees, the Barí perceive them in a more inclusive way than Western botanists, where several families will be lumped together (e.g., Melastomataceae and Rubiaceae under the term ***totubĩkaa***). Their basic common diagnostic features may explain this grouping.

The differentiation between wild and domestic plants is absent among the Barí. There is no specific label for domestic plants, but wild vegetation is distinguished from a garden. Wild and domestic forms are called by the same gloss in most cases, unless I asked for a varietal term. For example, the domestic variety of papaya (*Carica papaya*) is called ***tuntunbai***, as is its wild relative. Its varietals are called ***dyera tuntunbai abama*** (big mountain papaya, *Carica* sp. 2) and ***dyera tuntunbai ihtobai*** (small mountain papaya, *Carica* sp. 3). In the case of arrow cane, the Barí have a large domestic species that is called ***chũkãã*** (*Gynerium sagittatum* subsp. 1), and a smaller wild variety called ***nichũkãã*** (*Gynerium sagittatum* subsp. 2). Both wild and domestic cacao (*Theobroma* spp.) are called ***daairukbá*** in Barí. There is a tree, *Inga spectabilis* (guamo in Spanish), that produces edible fruits called ***kããkarabá*** in Barí. The wild tree is also called ***kããkarabá***, and its domestic variety is called ***dabagdou kããkarabá***(meaning white people's guamo). All these examples appears to indicate that the Barí do not separate wild and domestic folk-generic plants in their glossary or classification.

NOMENCLATURE OF PLANTS

Of all the plants that the Barí name, I was able to record 556 different mutually exclusive terminal taxa, most of them folk-generic. If compared to the Linnaean system, 73 (13.1%) represent different varietals recognized by the Barí as independent units of plants; the Barí taxa include 77 scientific families, 197 scientific genera and 314 different scientific species for plants with determinations (see Appendix D for details). The number of scientific species and genera should be higher because not all the Barí taxa have been identified yet.

A large proportion of the plant folk-species (349 or 62.8%) are represented by a mononomial nomenclature (single gloss). The remaining plants (207 or 37.2%) have binomial specific nomenclature (two-word term). The Barí type of nomenclature is quite similar to other societies (Berlin 1992). For example, the term ***karikã*** (referring to the genus *Tabebuia*) is for its folk-generic ***karikã*** and also used for the species *Tabebuia chrysea*, while ***karikã abama*** is *Tabebuia pentaphylla*. The same process is observed with ***techi*** (the term for the genus *Bactris* and species *Bactris macana*) while ***techi abama*** is *Bactris gasipaes*. This is a pattern that is quite common throughout the Barí plant taxonomy.

One example of the refinement of the Barí plant classification is the case of ***baroo*** and ***íshiraberi***. The Barí recognize two scientific varieties of *Spondias mombin L.* (ANACARDIACEAE) as different folk-species. I thought there must be some mistake in labeling "the same tree" with two different mononomial terms. The fruits are very similar. Three knowledgeable Barí state that ***íshiraberi*** fruit are smaller than ***baroo***; the flower and the leaves are slightly smaller. However, twelve Barí out of fourteen interviewed on the single occurrence of the ***íshiraberi*** tree in the plots classified it as ***baroo***. Unfortunately, this specimen was 40-45 meters tall and its leaves were not visible from the ground where most informants tried to identify it, and it was next to two equally large ***baroo*** trees. Fortunately, a storm knocked down a branch and we were able to collect it and discuss its characteristics with several informants. When asked about the differences, most knowledgeable Barí agreed it was ***íshiraberi***. Several other ***íshiraberi*** specimens that I saw were all outside of the plots. The seeds that I managed to find on the ground appeared about half the size of ***baroo*** seeds. The word ***íshiraberi*** is well known among Barí and they all talk about their fruits.

PERCEPTIONS ASSOCIATED WITH SALIENT CHARACTERISTICS

The nature of taxonomic knowledge is that "[p]eople must be able to recognize, categorize, and identify examples of one species, group similar species together, differentiate them from others, and be capable of communicating this knowledge to others" (Berlin 1992:5). After plants are recognized, people will experiment and observe other animals' use of them to be able to transmit this knowledge. It is incorrect to assume that a tree is named and known only because it is used. Of course people will know a tree better if it is used. The problem here is that the cause (knowledge) is confused with the effect (use). The relationship of people to a useful tree is more intense than to one that is not used, giving it a greater cultural salience (this issue has been largely raised by Berlin 1990). Using my data, I elaborate on how informants' perceptions are modified by the salient biological features and the relationship of agreement and salient features to the use of such trees. In this section, I compare biologically and culturally salient folk-generic trees, which I found an interesting feature of this research.

According to Berlin (1992:21-24), "salience can be understood as a function of... taxonomic distinctiveness..., frequency of occurrence, and cultural importance." Therefore, organisms that have outstanding characteristics (e.g., large red flowers, large spikes or thorns, big smelly leaves or white milky sap), have a large number of individuals (such as palm ***keki***, represented by 276 individuals) and a cultural importance to the observers (such as ***bahku***, used for medicine, technology, food and game animal food) are quite likely to be recognized by almost all the members of a society that coexists with such organism.

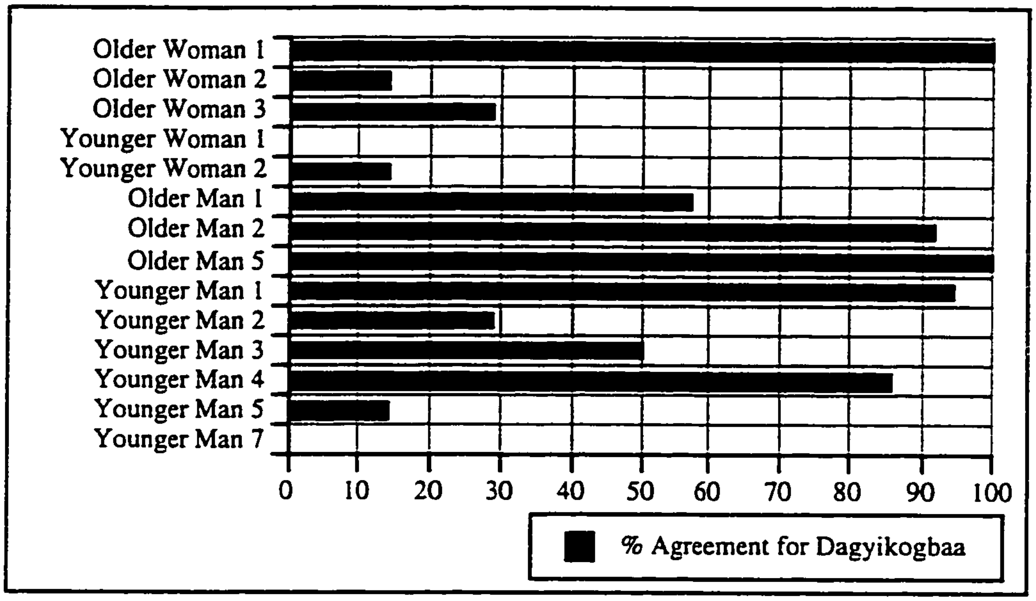


FIGURE 5.3: PERCENTAGE OF AGREEMENT FOR *DAGYIKOGBAA* (A NON-SALIENT, RELATIVELY USEFUL TREE, N=20)

During the interviews, I could observe that certain trees could not be recognized while others were recognized consistently. An example is ***dagyikogbaa*** (*Maquira guianensis*), which the Barí showed great variability in identifying (see Figure 5.2). All Barí knew the name of ***dagyikogbaa*** and had enjoyed its fruits, even though it has the most general characteristics. It has the most common type of trunk, leaf, and bark, with no particular scent. Of the twenty trees and 129 total identifications from fourteen Barí collaborators, 52 (40.3%) were correct with one older woman and one older man correctly identifying all nine (most Barí saw nine trees). However, 55 (59.7%) names were incorrect, with five people not giving more than one or two correct names and two none at all. The reason is that this tree is rather difficult to identify outside of the short fruiting season (2-3 weeks). During my field work, I could not identify it without the fruit, either.

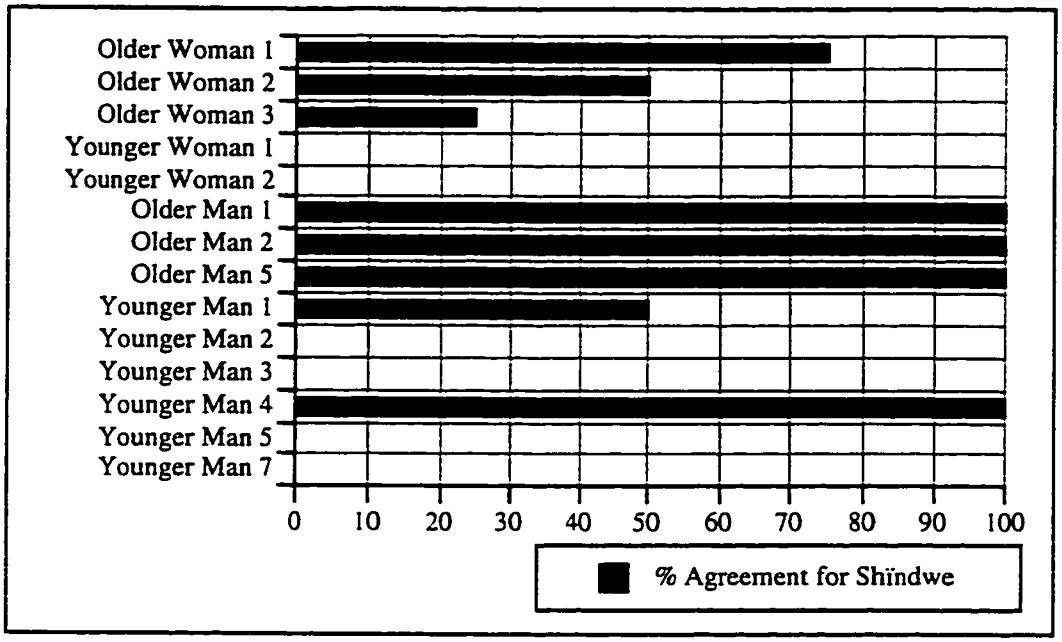


FIGURE 5.4: PERCENTAGE OF AGREEMENT FOR *SHÏDWE* (A NON-SALIENT, USEFUL TREE, N=27)

Being one of the most delicious fruits, it was surprising that people had difficulty identifying ***shïndwe*** (*Helicostylis tomentosa*) correctly (see Figure 5.3). People either know this non-salient tree or they don't. Those who do not know it well miss half or more of the trees. Only the people who know it well can identify it correctly every time they see it.

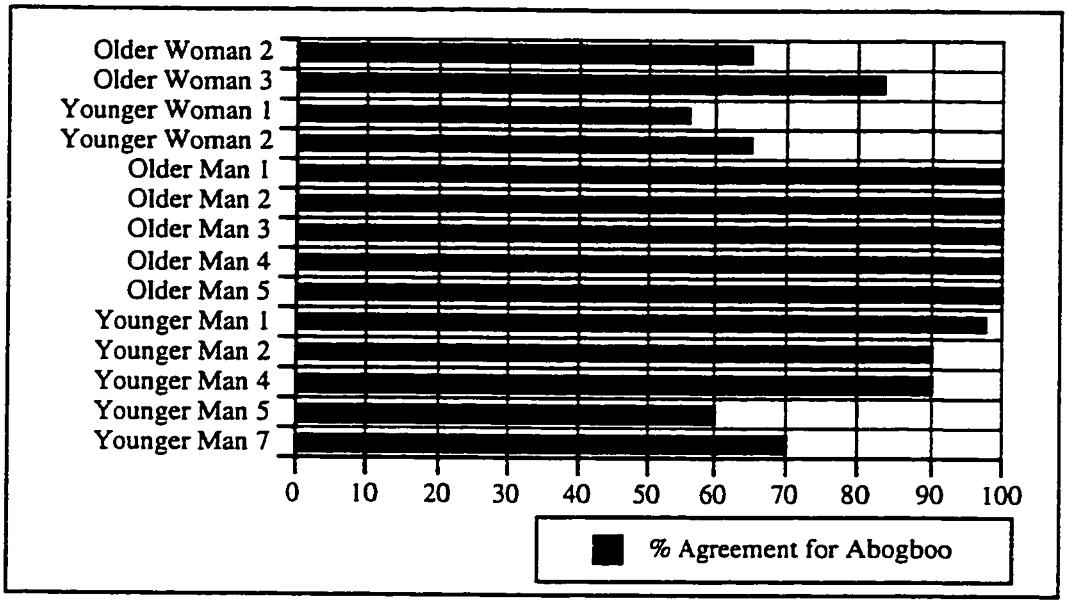


FIGURE 5.5: PERCENTAGE OF AGREEMENT FOR *ABOGBOO* (A SALIENT, USEFUL TREE, N=47)

Even though ***abogboo*** (*Pouteria anibaefolia*) is quite abundant and everyone stops under these big trees to enjoy their yellow-orange fruits, Barí cannot always identify it. This is because there were no fruits on the ground on the day of the interview. Its trunk and leaves are quite generic and can be confused with some *Ficus* spp. The general tendency is that when the informants saw an ***abogboo*** tree, they would generally look on the ground for its new or old fruits before giving the name. Barí men tend to know it better because it is quite an important game animal food tree, especially for all the ground and arboreal mammals.

The agreement in labeling the tree ***bahku*** is quite different. This tree is quite salient culturally and biologically. All the Barí except three could identify all the trees in the plot (see the Figure 5.5).

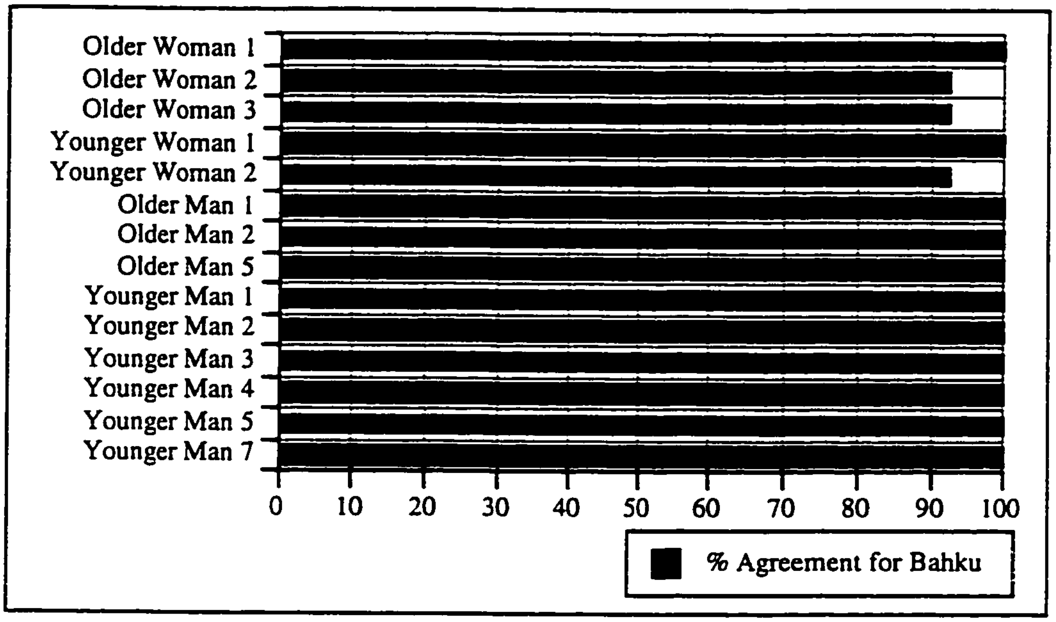


FIGURE 5.6: PERCENTAGE OF AGREEMENT FOR *BAHKU* (A VERY SALIENT, HIGHLY USEFUL TREE, N=32)

The rate of agreement for ***bahku*** has to do not only with its use but also with its biological saliency. Its use may help to increase the respondents' perception of this tree. If fact, the cases that were not identified were due to the lack of its salient feature, the mature bark. The percentage would have been higher if all the trees were of mature size. However, the best way to show how biologically salient features play an important role is to compare ***bahku*** with a tree that does not have any use but is equally salient. The same is observed with the folk-geneneric ***keki***, which had a 100% agreement for all informants.

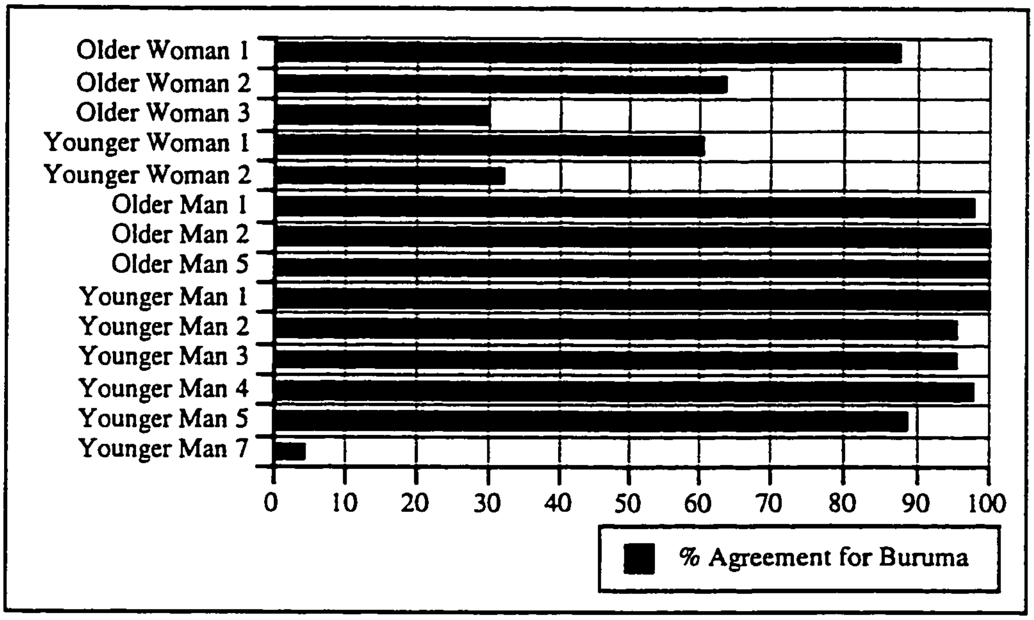


FIGURE 5.7: PERCENTAGE OF AGREEMENT FOR ***BURUMA*** (A RELATIVELY SALIENT, RELATIVELY NON-USEFUL TREE, N=83)

Unfortunately, I did not have a tree equally as salient as ***bahku*** or ***keki***, and extremely abundant that had no uses, but one came close. It is ***buruma*** (cf. *Pouteria* sp.), relatively easy to recognize if you know which feature is the key for this folk-species, the inner bark of the roots (see Figure 5.6). We get a difference in knowledge between genders and localities for two main reasons. The first one is that women do not know it well because they do not hunt. The second is that it is a fairly local folk-species that does not occur in Younger Man 7's territory. He could not identify it. Local men know it well because it is an important game animal food (especially for hunting agouti, paca and peccaries) that is quite abundant during a great part of the year. When a tree is salient, exposure will lead to easy recognition. The bark, trunk and leaves are quite generic but its roots have reddish bark. I was always able to recognize it as long as I found and examined the roots. If I suggested that the informants look at the root, they tended to recognize it quickly. I pointed it out to the older Barí women and they were able to tell me the name after trying to recall it.

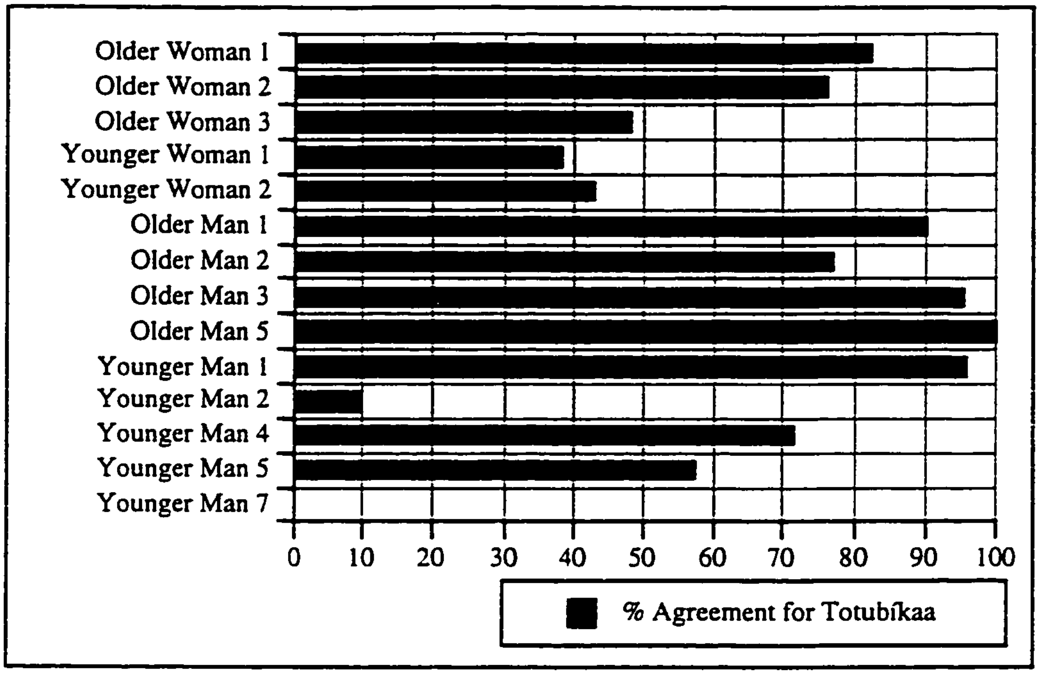


FIGURE 5.8: PERCENTAGE OF AGREEMENT FOR *TOTUBÍKAA* (A RELATIVELY SALIENT, NON-USEFUL TREE, N=51)

Totubíkaa (*Warscewiczia coccinea*) is a similar case, with high abundance, relatively salient (highly salient when its large red bracts are present), but little use (see Figure 5.7). As observed in Figure 5.7, some Barí informants had difficulty recognizing ***totubíkaa***, because it did not always have the salient characteristic of large red bracts on its branches. It is also confused with similar generic taxa or put in a generic category. However, the knowledgeable Barí did recognize it every time they were presented with one. Most children can name it without any problem also, as they could also name ***bahku***.

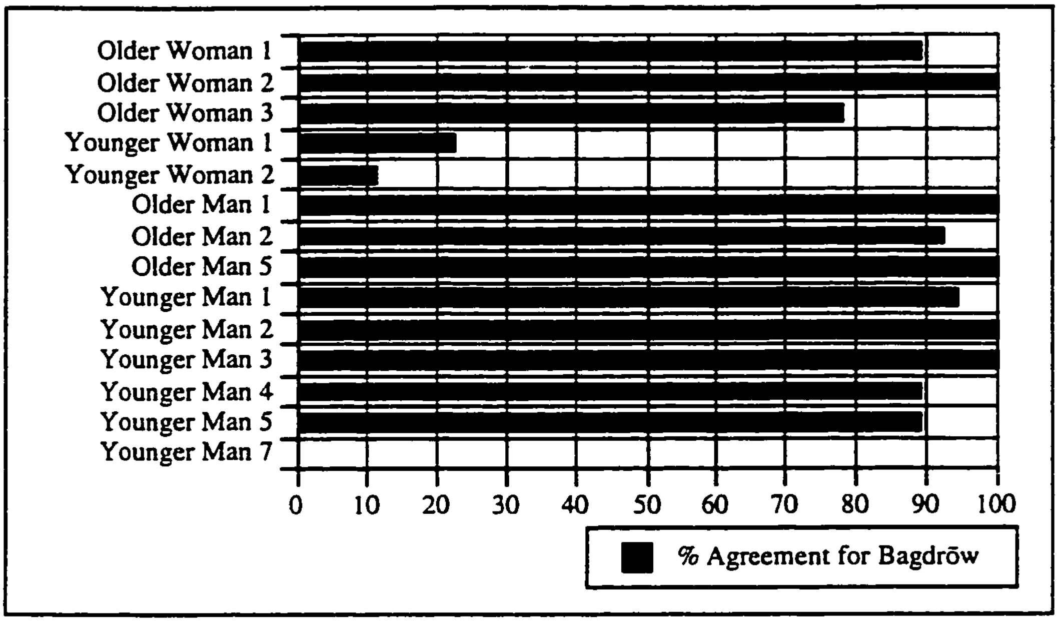


FIGURE 5.9: PERCENTAGE OF AGREEMENT FOR ***BAGDRŌW*** (A SLIGHTLY SALIENT, USEFUL TREE, N=51)

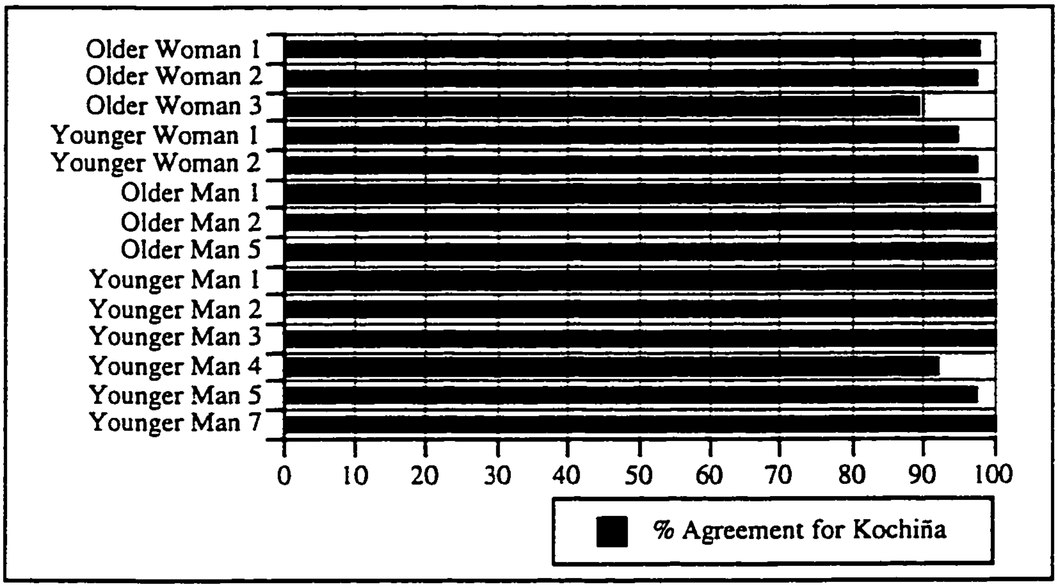


FIGURE 5.10: PERCENTAGE OF AGREEMENT FOR ***KOCHIÑA*** (A SALIENT, SLIGHTLY USEFUL TREE, N=72)

Bagdrōw (cf. *Micropholis* sp.) is a fairly easy-to-recognize tree and relatively abundant (N=51). Most people could name it correctly even though its fruit is not edible. Because it can be used as a source for firewood, house construction and as a game animal food (for hunting parrots, kinkajou, paca, agouti and peccary), Barí men tend to know it a bit better than women.

I could easily understand that it would be no problem to identify ***kochiña*** (*Sloneae zuliaensis*), a tree with salient characteristics in its bark and leaves. The most interesting aspect of this tree is its very high agreement, although it is also used for firewood, construction and technology. The examples of ***kochiña*** and ***bahku*** (Figure 5.4) show that the biological saliency and cultural value of these two trees both play a role in their perception.

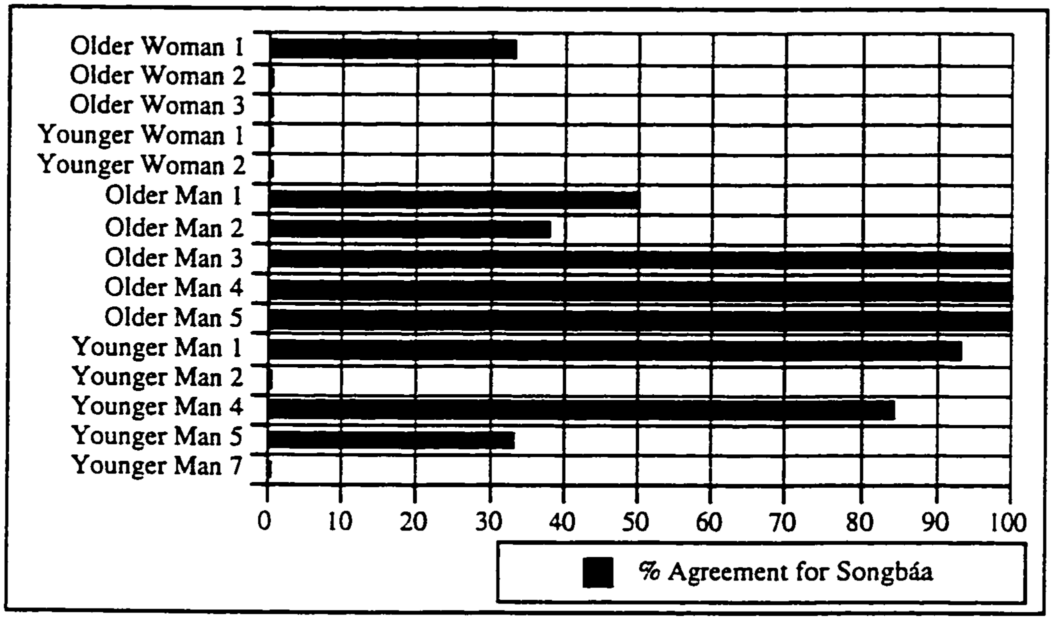


FIGURE 5.11: PERCENTAGE OF AGREEMENT FOR *SONGBÁA* (A SLIGHTLY SALIENT, NON-USEFUL TREE, N=27)

When a tree is neither salient nor does it have a use, like ***songbáa*** (*Terminalia amazonia*, COMBRETACEAE), it is unlikely to be labeled except by the knowledgeable people (see Figure 5.10). Barí men knew it because it is relatively important as game animal food tree for hunting many animals, including peccary, kinkajou, currasow, brocket deer, parrots and all monkeys.

Comparing the degree of perception with the abundance, biological salience and level of use or no use, one can see a pattern in how informants perceive each of these folk-species of trees. When a tree is biologically salient, its recognition and informant agreement is high (92.3% total agreement, N=1167) no matter what the degree of use (e.g., ***abogboo*** [81.8%, N=303], ***kochiña*** [97.2%, N=500] and ***bahku*** [98%, N=182]). If the tree is not biologically salient and it has some use, people are likely to identify it correctly about half of the time (e.g., ***dagyikogbaa*** [52.5%, N=99] and ***shïndwe*** [56.8%, N=88]).

CONCLUSION

In sum, the Barí have a refined perception of their rainforest vegetation. Their knowledge and the cultural importance of their forest allow them to perceive the smallest details. Their plants are classified in a way similar to what botanists and other indigenous people have done. They are able to label all the trees with a taxonomic term and recognize them as belonging to different groups of plants and trees. They also recognize the smallest units, folk-specifics and folk-varietals. By summing up all the identifications from all the walk-in-the-forest interviews, the twenty informants interviewed were able to name 91.4% (15,339) trees out of 16,795 naming events presented in front of 3,162 trees plotted in 4.83 hectares of forest, agree on the name for 79.6% (12,897) naming events and to identify 212 folk-generic (equivalent to scientific genus). The perception of the knowledgeable informants is much finer, naming all trees accurately and recalling the folk-species with a high correspondence to botanical species. The species of trees that are least known to most Barí are trees that are not biologically salient, represented by very few individuals (in most cases one individual in all plots) and having a restricted occurrence biogeographically. The Barí solve this problem by naming these trees either at a higher taxonomic level (family) or including them in one of the folk-genera that include many trees that share common biological characteristics. Overall, the most knowledgeable Barí (all the older men) were able to name all the trees they were presented with in the interviews.

CHAPTER 6: VARIATION OF KNOWLEDGE AMONG INDIVIDUALS

> [C]ultural knowledge is distributed throughout a population in ways related to a number of factors, associated at least with a person's sex and age, social status and role, kinship affiliation, personal experience, and basic intelligence. The manifestation of this knowledge in action is strongly constrained by social context. (Berlin 1992:199)

> Plant knowledge which is relevant to gardening tasks would seem more crucial for women than would knowledge of forest plants, since the major part of the forest is the province of men (and is, in fact, forbidden to the trespass of women), who gain intimate familiarity with it during their hunting and other exploitation of its products. Thus it would be reasonable to suppose that, given the variable experiential basis for learning and the variable "need to know," this aspect of culture at least would be variably distributed among the adult population. (Hays 1976:491)

Berlin's and Hays quotes present the complexity of the issues that I will address in this chapter. Variation in knowledge is not a new concept in anthropology, because it presents a major problem in the selection of the informants for any inquiry. Among the Barí people, this variation is clearly perceptible in the interviews. The anthropological literature agrees that this knowledge variation results from various socio-cultural characteristics of native speakers, as Berlin has pointed out above. In recent years, a number of anthropologists have focused on intracultural variation in cultural knowledge (Berlin 1992, Bulmer 1970, Hays 1974, 1976:491, Sapir 1938, Tyler 1969, Weller 1984). Many studies have focused on intracultural variation with a quantitative approach (Berlin 1992, Berlin and Berlin 1975, Berlin, et al. 1981, Boster 1981, Burton and Kirk 1979, Cancian 1963, Dougherty 1975, Ellen 1979, Furbee and Benfer 1983, Gal 1973, Garro 1986, Hage and Hawkes 1975, Hays 1974, 1976, Kempton 1981, Mathews 1983, Pelto and Pelto 1975, Phillips and Gentry 1993b, Sankoff 1971, Weller 1983, 1984, 1987, Young and Garro 1982, Zent 1994).

Boster (1981) has made an extensive quantitative study of Awaruna variation in knowledge of manioc (*Manihot esculenta*). He interviewed 217 women, 35 men, 15 girls and 15 boys from 9 Awaruna villages about the nomenclature of 11,857 manioc plants from 74 gardens, and elicited 700 distinct cultivar names, including synonyms (including synonyms, Boster 1981:17, 148, Boster 1984:42). He also interviewed a subset of informants about ninety tagged plants belonging to five plant life forms along a trail (Boster 1981:17). His analysis related variation in knowledge of varietals of manioc to kin group, village coresidence, gender role, individual expertise and personal idiosyncrasy. The largest difference is between genders: "Women know the manioc and the men do not" (Boster 1981:109). According to Boster, gender roles are crucial in the variation in ethnobiological knowledge among the Awaruna. Individual expertise related to intellectual and physical division of labor also is indicated by the increase in agreement with age. Older Awaruna women knew more varieties of manioc plants than younger women. Young women who lost their mothers at a young age knew the least. In general, adults, mature women, and close kin tended to have a higher agreement on different varieties of manioc among the Awaruna.

Hays (1976) conducted an extensive study of all plant taxa known to five female and five male Ndumba in Papua New Guinea, comparing knowledge variation measured by lexicon size. He compares the nomenclature and the nature of variation within informants. Hays (1974:91-97) states that the difference in knowledge between genders is caused by the distribution of labor, where each gender knows plants related to its activities better. He also observes that knowledge increases with age (Hays 1974:202).

In this chapter, I present quantitative data on knowledge variation among 20 informants based on agreement in the identification of forest trees. The variables used in the analysis are age, gender, length of residency, subsistence practice or forest use, bilingual ability and formal education. The last two variables are related to acculturation, which also clearly correlates with variation in ethnobotanical knowledge. My study combines the strong points of Hays' (extensive knowledge of plants with ten informants) and Boster's (large number of naming events on varieties of one species of plant [manioc, *Manihot esculenta*] and large number of people and naming events) studies. The particular strengths of my study are that these 20 informants were presented with the trees in a natural form in their forest ecosystem (rather than interviewing them about names of trees or asking about botanical specimens) and its large sample size (an average of 839 trees per informant of 223 mutually exclusive generic taxa).

The Barí themselves acknowledge this variation. When asked who is the most knowledgeable person, the Barí always say that an older man knows most about forest plants. They thus imply that men and older people know more. In addition, people who have lived in the area longer know more than people that have moved there relatively recently. People whose subsistence practices require more forest use (e.g., hunting versus working on ranches) know more. People with greater bilingual ability and more formal education know less. The one variable that did not explain the variation in knowledge was kinship affiliation, possibly due to the small size of the sample and the variety of informants. However, all the other variables clearly correlated with variation in the knowledge of forest trees.

In trying to maintain a balance between quantitative and qualitative data, this research includes some qualitative ethnographic data in the explanation of knowledge variation among the Barí. Although I like to quantify my observations, I would feel uneasy if I tried to address the problem only with numbers. The numbers do not always reflect the complexity behind each person's mind and actions. For this reason, I felt compelled to look at the background of each Barí individual who participated in my research. I noticed great variation in knowledge of the rainforest when I started to interview people. Some younger people of the same gender would know more than others (see Figure 6.1). It can generally be assumed that older people know more than younger ones; that based on a gendered division of labor, one gender will know more than the other about given spheres (e.g., women in agriculture and men in hunting) and that local people will know more than non-local ones.

TABLE 6.1: INFORMANTS' CHARACTERISTICS AND SUMMARY OF RAINFOREST INTERVIEW DATA

Barí Informants	Agreement (N trees)	Age	Gender[1]	Residency[2]	Bilingual[3] Ability	Subsistence[4] Activity	Formal[5] Education
1) Older Woman 1	83.0 (1009)	53	W	6	1	5	0
2) Older Woman 2	66.7 (957)	56	W	6	1	4	0
3) Older Woman 3	68.7 (957)	63	W	4	1	4	0
4) Older Woman 4	69.4 (137)	54	W	5	1	4	0
5) Younger Woman 1	65.8 (1025)	26	W	5	2	4	3
6) Younger Woman 2	62.9 (957)	38	W	3	2	4	0
7) Younger Woman 3	38.0 (256)	30	W	3	2	3	3
8) Older Man 1	97.4 (1017)	44	M	6	1	6	0
9) Older Man 2	96.8 (1489)	62	M	6	1	6	0
10) Older Man 3	93.1 (957)	53	M	6	1	6	0
11) Older Man 4	97.4 (158)	61	M	6	1	6	0
12) Older Man 5	100.0 (776)	56	M	6	1	6	0
13) Older Man 6	83.9 (957)	43	M	5	1	5	0
14) Younger Man 1	90.8 (2905)	31	M	6	2	6	6
15) Younger Man 2	81.3 (957)	24	M	5	3	4	10
16) Younger Man 3	69.1 (115)	16	M	5	2	4	7
17) Younger Man 4	87.9 (957)	30	M	5	2	6	1
18) Younger Man 5	73.5 (957)	30	M	5	2	3	3
19) Younger Man 6	62.1 (95)	31	M	2	3	3	12
20) Younger Man 7	67.2 (957)	37	M	3	2	4	3

1 "W" is for woman and "M" for man.

2 Residency is to indicate if the Barí respondent: 1 (moved there recently), 2 (moved there a few years ago), 3 (moved there many years ago or recently from a similar area), 4 (lived there for more than half of her/his life), 5 (moved there from a similar territory many years ago or older people who moved as a teenager and grew up in the area), and 6 (lived all her/his life in the area).

3 1 is for Barí monolingual people, 2 for people who speak Barí and some Spanish, 3 for people who are fluent in both languages.

4 1=no use, 2=little use, 3=little hunting, 4= moderate use, forest products, 5=some hunting, 6=heavy use, hunting.

5 Formal Venezuelan school education level: "0" for none, "1" for first grade, "3" for third grade of primary school, "6" for finishing primary school, "8" for second year of high school, "10" for fourth year of high school and "12" for finishing high school.

VARIATION ASSOCIATED WITH AGE

Comparing people between 16 and 63 years of age suggests an increase in knowledge with age. I divided my informants into two age groups based on the time of contact (see Chapter 4, in Ethnographic Methods). Older Barí people (40 years or more) seem to know more (meaning that they can on average identify 85.5% of the trees correctly, which I will call agreement) than younger Barí people (between ages 16 and 37, [69.9%]). Due to the process of acculturation, the generational difference in knowledge is accentuated. In traditional times, the difference would more likely have been from very young people (5 to 15 years old) knowing 30-75% to 90% in their 30s and around 95-100% in their 40-50s, since it has been observed that a 15-year-old should know as much as 70% of the cultural knowledge among the not very traditional Wótuha (Piaroa) Indians in Venezuela (Zent 1994). It is possible to give the age of the Barí informants in years, as estimated by Roberto Lizarralde (pers comm.) from data collected (with detailed genealogies) since 1960.

It is difficult to generalize from these data because there are many peculiar pieces of information that I need to point out. Each informant had particular characteristics. I am certain that the data I collected do not present a complete picture of Barí knowledge because of the innumerable factors that make various individuals imperfect examples of the groups they were intended to represent. For example, two of the older women (2 and 3) that I interviewed had some vision problems: they were nearsighted and had difficulty seeing the leaves of the tall trees. Another older woman's (4) vision was not good because she suffered from high blood pressure and she did not feel very well, but she wanted to be interviewed that day anyway. I believed this Older Woman 4 did not know trees well. Later, I was told that Older Woman 4 did know trees well. (I tried twice to interview her later but was unable, because she had first a lymphatic infection of her knee and then a kidney stone.) One of the other major problems was that not all trees used for the interviews were adequate for identification because some were too young to develop some of the essential features to be recognized; some did not have the basic diagnostic features such as normal bark, flowers, and fruit; and sometimes some trees did not have leaves. Therefore, the interview conditions were not ideal, but much better than using dried, discolored botanical vouchers (which I tried earlier).

If a simple regression analysis is performed with all the informants, we get the following scatter plot:

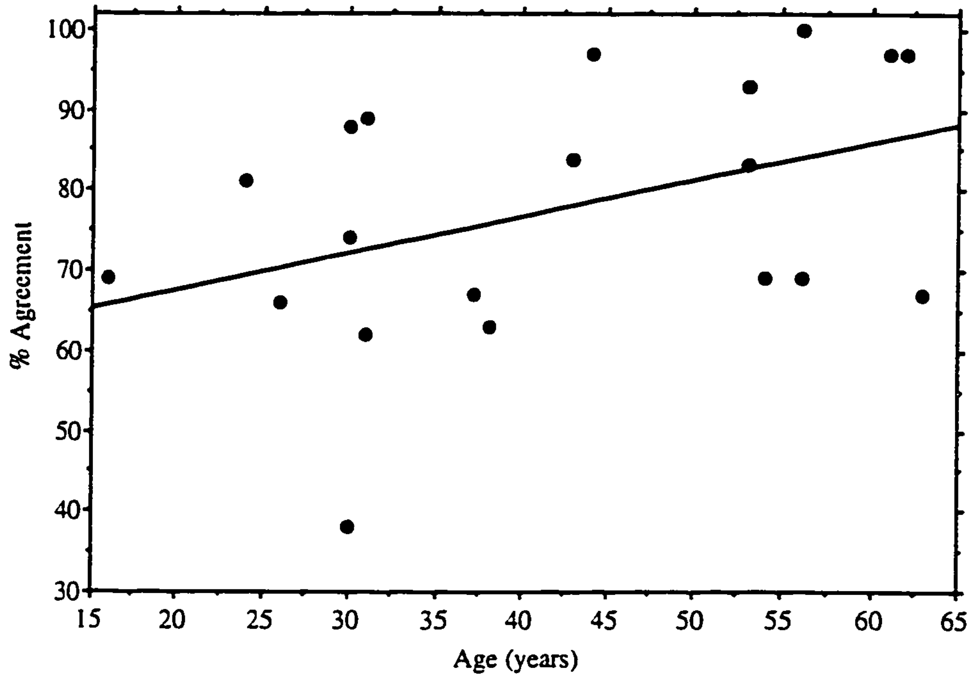


FIGURE 6.1A: SCATTER PLOT OF AGE AND AGREEMENT FOR ALL BARÍ PEOPLE INTERVIEWED IN ALL FOREST PLOTS (N=20)

In Figure 6.1a, the relation of knowledge to age gradually increases as people get older, but with considerable variation among Barí of the same age due to the fact that the characteristics of the individual informants make this group quite heterogeneous. The regression line (N=20, Adj. R-squared: .124, F-test: p = .071) indicates that the relation of these two variables is quite weak. The reason is that other variables are also important. If we exclude the outlying case of the younger woman who is 30 years old and knows 38% of the trees (I want to acknowledge that she generously volunteered, aware of her ignorance in the ethnobotanical world, but providing us with a quantifiable case that would otherwise have been rather impossible to get), we get the following scatter plot (see Figure 6.1b):

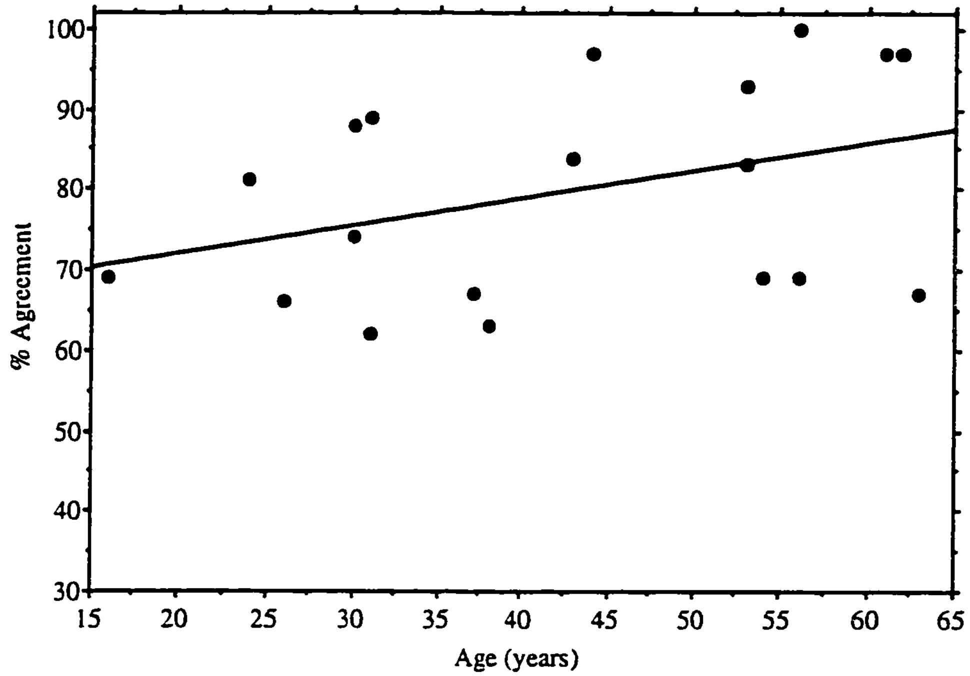


FIGURE 6.1B: SCATTER PLOT OF AGE AND AGREEMENT FOR ALL BARÍ PEOPLE INTERVIEWED IN ALL FOREST PLOTS (N=19)

The characteristics of this scatter plot are the following: n=19; R-squared= 0.141; F-test p = .1133. These data do not show a strong relation between agreement and age, because there are other variables that play an important role (e.g., gender, residency, subsistence practice, bilingual ability, formal education and kinship affiliation) that will be explored in the next five sections in this chapter.

If we examine the data as a bar graph (Figure 6.2), the knowledge of Barí people in relation to age is still clear. For example, if we compare all the interviews, the ability of older people to name trees is quite clear (with the exception of the ones with bad vision), while younger people could not name all the trees because they did not know them (see Figure 6.2).

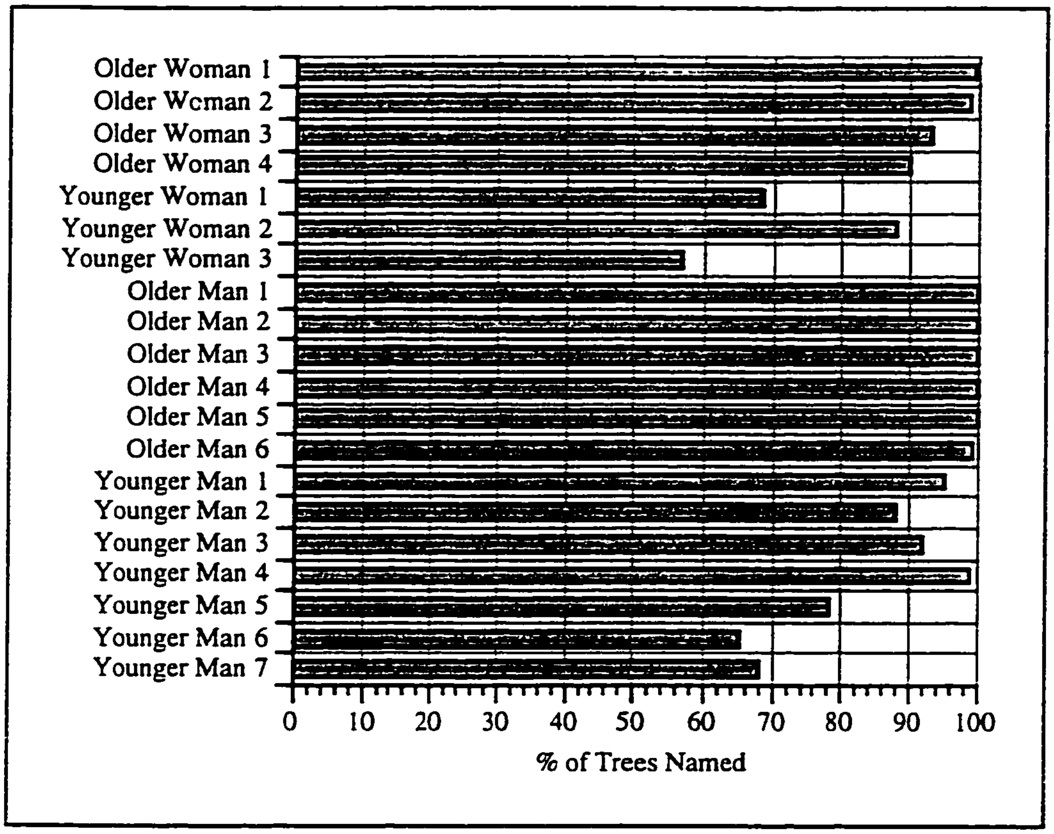


FIGURE 6.2: PERCENTAGES OF TREES NAMED FOR ALL PEOPLE INTERVIEWED IN ALL THE PLOTS (N=15339)

The Barí, as a group, named all the trees in the plots. The ability to name trees varied among Barí of different age and gender groups. Five of the older men named all the trees (100%), while two older women named 100% and 98% of the trees, an older man named 98%, and two younger men named 99% and 98% of all trees. At the other end of the range, a younger Barí woman was only able to name 56% of all trees and a younger Barí man (from another region, a non-local) named 65% of all trees. If we use the older Barí generation as an indication of Barí cultural knowledge of the forest, they have a label for all the trees in their ecosystem.

The percentage of agreement, or naming correctly, does decrease significantly in comparison to Figure 6.2, but is relatively high if compared to the Piaroa indigenous people in Venezuela (Zent 1994). Women and younger people tend more to both disagreement and not naming than older men. (Let me point out here that Younger Man 1 has a higher percentage of agreement {95.6%} for all plots but I will use his agreement in the first six plots {88.80%} before he became more knowledgeable through participation in this study and reduced the relationship with other informants and the variables used for comparison.)

It is important to point out the differences between the patterns for not giving names and disagreement. Women tend to make more mistakes, and younger men tend to state that they do not know the tree. Older men who are non-local seem to make more mistakes. Older women who are local seem to perform in the same way as older men who are not local (see Older Woman 1 and Older Man 6). Older local men take pride in naming all the trees and will try to name all the trees if they do not know them.

Some informants consistently agree with each other for some trees. Some disagreement resulted from characteristics of the tree. Some trees were quite difficult to identify because either their crowns disappeared into the canopy and were not visible, or two or three trees' trunks were tangled together, making the crown difficult to separate. Others were difficult to identify because they were young and in a few cases trees did not have leaves because it was the peak of the dry season. All the percentages of agreement were lower than the percentages of naming. Barí agreement in naming trees is as follows: 80% for the most knowledgeable older woman, 100% for the most knowledgeable older man, 89% for the most knowledgeable younger man (although he increased his knowledge from 89 to 96% in five years as the main field assistant of this project) and 62% for the most knowledgeable younger woman.

VARIATION ASSOCIATED WITH GENDER

The gender difference in knowledge of forest trees is clearly perceptible in the interviews. These differences are in both naming and agreement. It is an important variable in the explanation of knowledge, especially when, like the Barí, a culture has clearly defined roles for women and men. The forest is predominantly but not entirely an environment for male activities: hunting, gathering and collecting material for house construction. Women do enter the forest to gather and to collect honey, usually with their husbands. Therefore, considering age without separating out gender produces the weak relation seen in Figure 6.1. To find a stronger relation of agreement to age, the data have to be separated into women and men (see Figure 6.3).

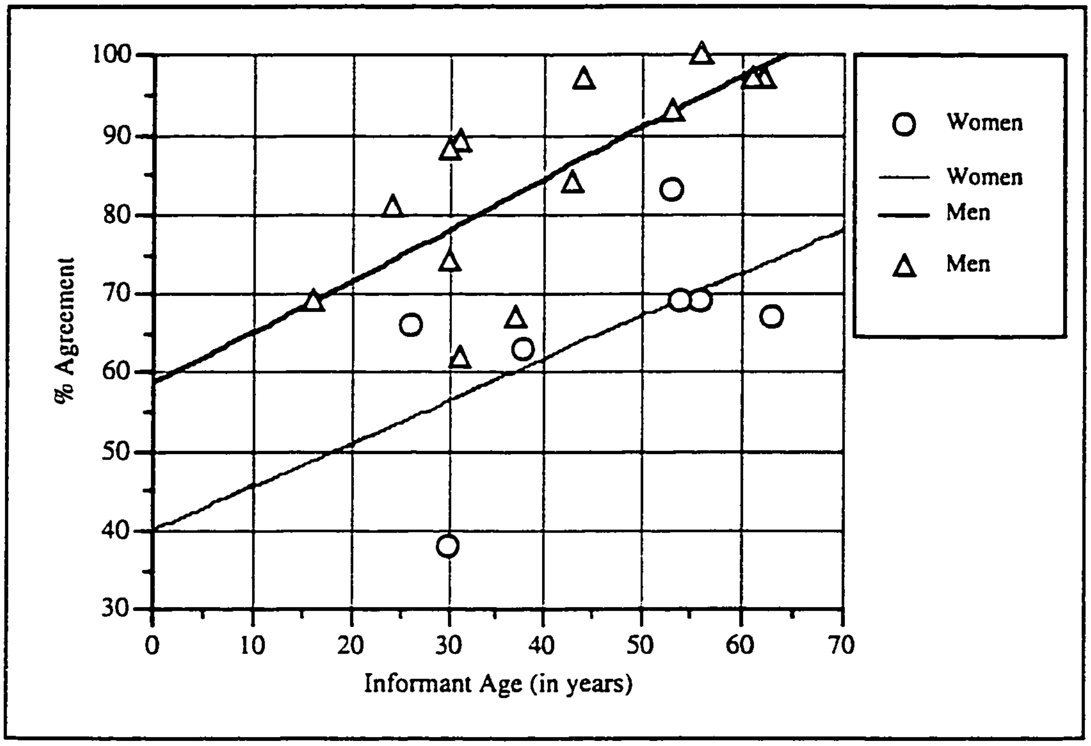


FIGURE 6.3: SCATTER PLOT OF AGE AND AGREEMENT FOR WOMEN (N=7) AND MEN (N=13)

The relation of age to agreement for women is weak because of the lack of increase in agreement in the older age range is due to the loss of accurate vision by two older women, especially the oldest one (N=7, Adj. R-squared: .191, F-test: p = .1806). In men, the relation of age to agreement is clearer. This gender variation in knowledge was also observed by Boster (1981) among the Awaruna of Peru and by Ellen (1979) among the Nuaulu of Eastern Indonesia. Ellen (1979:353) states "women have a greater knowledge of freshwater fish because fishing and collecting along inland waterways is preeminently female work." Similar to the emic and etic interpretations for the Barí, Ellen

(1979:353) also observes that "adult men have a far better knowledge of mature forest fauna than women, due to the opportunities provided by hunting and trapping." Figure 6.3 shows the quantitative difference in a linear relation of agreement with age. Barí men show 20 percent more agreement in identifying trees than women. (This is not because women use a different set of names for trees. The different names used by women were not associated with particular taxa, but rather used randomly due to lack of competence [e.g., ***irankaa***, which means "that tree," was used 10 times for 9 different generic taxa by a woman and no other informant].)

For men (N=13, Adj. R-squared: .494, F-test: p = .0044), age explains more of the variation in knowledge (49% of these cases can be explained by age with 99% confidence). It is thus clear that other variables, as described below, play a role, too. Therefore, I will treat the respondents as four groups (older women, older men, younger women and younger men) to understand the difference in agreement.

Older Barí Women's Knowledge

Based on the interview data of these four older women, older Barí women can identify correctly 71% of the trees and 85% of the specific taxa, and the most knowledgeable of them can identify 83% of the trees, even though many of these specific taxa are not directly linked to the gender role women take in the use of forest products. The older Barí women know less about rainforest trees than older men (94.6%) and younger men (76.7%), and more than younger Barí women (54.2%). I explore the reasons for this difference.

My father and I have observed a culturally-related gender difference in the classroom of the school in Saimadodyi over the last twenty years. The Barí women and girls take a more passive role than Western women and girls. They do not participate as much nor pay as much attention to the teacher as the boys. In the fall of 1991, I taught English three hours a week to the equivalent of seventh graders and I observed the same pattern. However, there are Barí women who are quite active as teachers (5), political activists (3), college graduate student (1) and one very aggressive headwoman. Moreover, I should point out that forest trees are more salient culturally in the life of Barí men than would be the case for Barí women.

Younger Barí Women's Knowledge

In general, younger Barí women can correctly identify 54.2% of the trees. By observing carefully the data of these three younger women, I suspect that the real average knowledge of younger women is somewhat higher, perhaps between 70% and 75% for expert younger women in traditional conditions where they would practice more gathering of forest products, because Younger Woman 3 is too westernized and lacks intelligence and Younger Woman 2 was out of the Barí territory for ten years recently. I believe that the three women I interviewed are good examples of Barí younger women in the present. However, the knowledge loss is likely an effect of acculturation and Westernization. In traditional times, the younger Barí women's knowledge could have been higher and possibly nearly the same as the older Barí women's.

Older Barí Men's Knowledge

The group of older Barí men showed more knowledge than younger men and women. This is logical because forest resources are encountered more often by men and with time (age) an inhabitant will eventually know them better. The older men were able to name all the trees. Their agreement was 96.8% with a range of 100% to 93.1% for the four local older men (excluding a non-local man with agreement of 83.5%). As I said earlier, not all the trees were easy to identify. I interviewed five older men and all felt confident and were anxious to identify trees correctly, even though sometimes they were making an effort to recall the correct name. I noticed that knowledge was an area of competition among them and I had to avoid interviewing them together. (All informants were interviewed alone while the others waited far enough away to keep them from hearing each other's elicited names.) Moreover, older men ridicule younger men if they misidentify a tree. Therefore, knowledge of forest trees is a source of pride of great importance among this age and gender group.

My most knowledgeable informant was Older Man 5. He is 56 years old and was born and grew up in the region where he was interviewed, Bachichida, which is one of the larger villages of the northeast Barí territory. This Barí man was able to identify 100% of all trees and told me the basic differences or characteristics of trees that my other informants could not recognize. I am fairly confident of his reliability because Younger Man 1 had 94% agreement with him on the names of the same trees and he explained his disagreement for the labels of some trees with precision. For example, Younger Man 1 was not able to identify one particular tree generic taxon, but recognized three trees belonging to an unknown specific taxon, which were all labeled by Older Man 5 by the same name (***tratra***, *Cassipourea* sp., RHIZOPHORACEAE). He was able to identify trees quite quickly, and we were able to check 776 trees in four hours exploring the ecology, use and diagnostic features of many of these trees.

The average agreement for the older men is 94%. Dropping one older man whose residency in the area was short, it is 97% on average. In general, the older men had 10 to 20% more agreement than younger men or older women and 40% more than younger women. They are the receptacles of all forest tree knowledge. This group did not fail to name any trees, except for Older Man 6 who is not from the area where he was interviewed.

Younger Barí Men's Knowledge

I was able to interview 7 younger Barí men. They are mostly in their thirties, except for two who are 16 and 24 years old. Four of them are local, one is local and non-local in different plots, and three are non-local Barí. There is a greater range of acculturation and exposure to formal Venezuelan education in this group, but all except one are moderately bilingual. One of them finished high school and hopes to be a teacher. There are two sets of brothers: Younger Men 1 and 2 (who are also sons of Older

Woman 4), and Younger Men 5 and 6 (sons of Older Woman 3 and Older Man 3). In general, in this group there is a great deal of variation (see Table 6.1). This is partly due to the uneven process of acculturation experienced by the younger Barí.

This group of 7 younger men could be used as an example of how knowledge increases with age, keeping in mind how education and locality modify it. Knowledge seems to increase from 60% for mid-teenagers to 75% for men in their twenties to 90% when they are in their early 30s. A younger local man will know 20 to 30% more than the non-local Barí, who know as much as the local teenagers.

VARIATION ASSOCIATED WITH LENGTH OF RESIDENCY

One variable that I have observed to play an important role in agreement is the length of residency of the informant in a specific Barí territorial group. Most people were interviewed in the territorial group 3, centered on Saimadodyi. Others come from territorial groups 2 (centered on the village of Bachichida) or 4 (centered on the village of Bokshí). The period of their life in the territory where they moved is represented by 1 (recently), 2 (few years), 3 (many years or recently to an area that has similar trees to ancestral residential area), 4 (more than half of their life), 5 (from a similar territory many years ago or older people who moved as a teenager and grew up in the area), and 6 (all their life). There is a clear relationship between these two variables (see Figure 6.4).

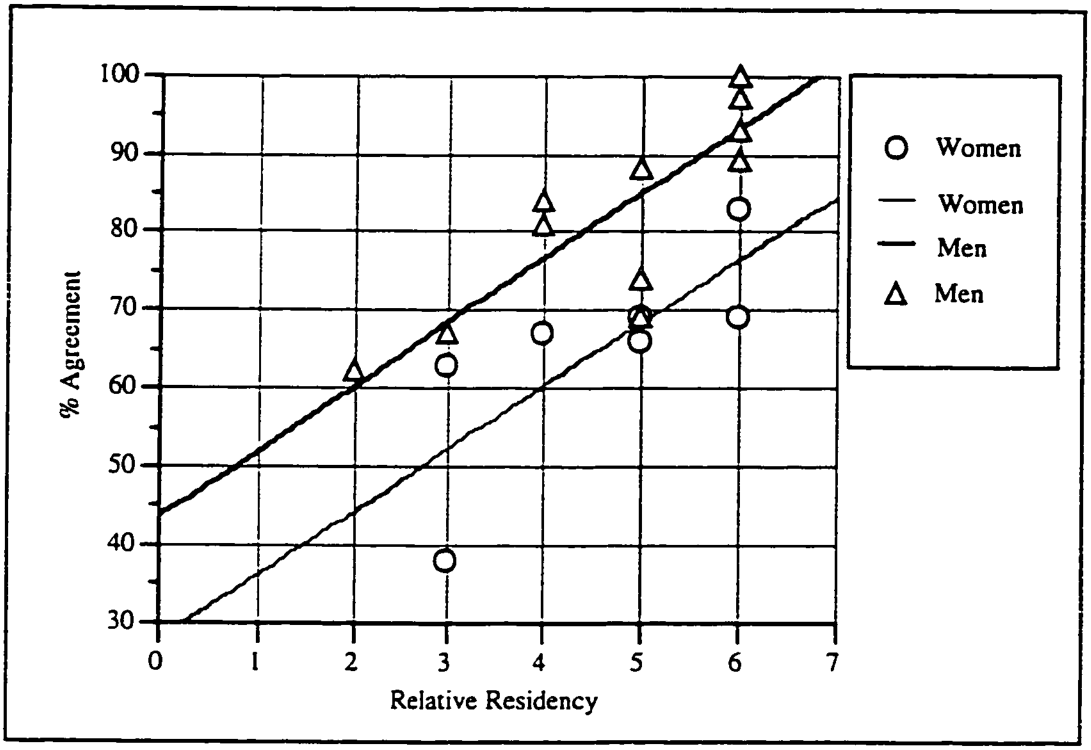


FIGURE 6.4: SCATTER PLOT OF RELATIVE RESIDENCY AND AGREEMENT FOR WOMEN (N=7) AND MEN (N=13)

This scatter plot (Figure 6.4) shows that there is a clear increase in agreement when the informants have lived all their adult lives within the area. Again, as I have pointed out above, the relationship of the variables would be tighter if it were not for the heterogeneity of the informants' characteristics.

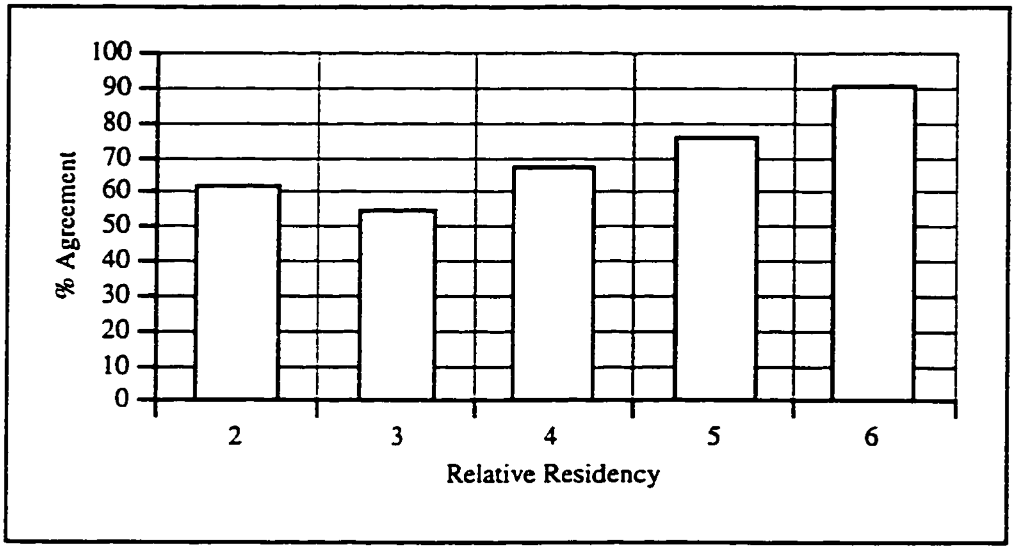


FIGURE 6.5: BAR GRAPH OF RELATIVE RESIDENCY AND MEAN AGREEMENT AMONG ALL BARÍ (N=20)

In this bar graph of the mean agreement in relation to relative residency, we can see agreement is partially explained by relative time of residency in a particular territory. It is clear that the Barí who have lived all their lives in the residential territory will have a higher percentage of agreement (92%) than if they moved to a given area a few years ago (62%, in this case it is high because there was one highly intelligent informant), many years ago (56%), for more than half of their life (68%) or from a similar territory (76%). Statistically, the relationship between these two variables, agreement and relative residency, is strong. It gets even stronger if data on women and men are treated separately, particularly for the men. For example, the following bar graph shows agreement by relative residency with the genders separated:

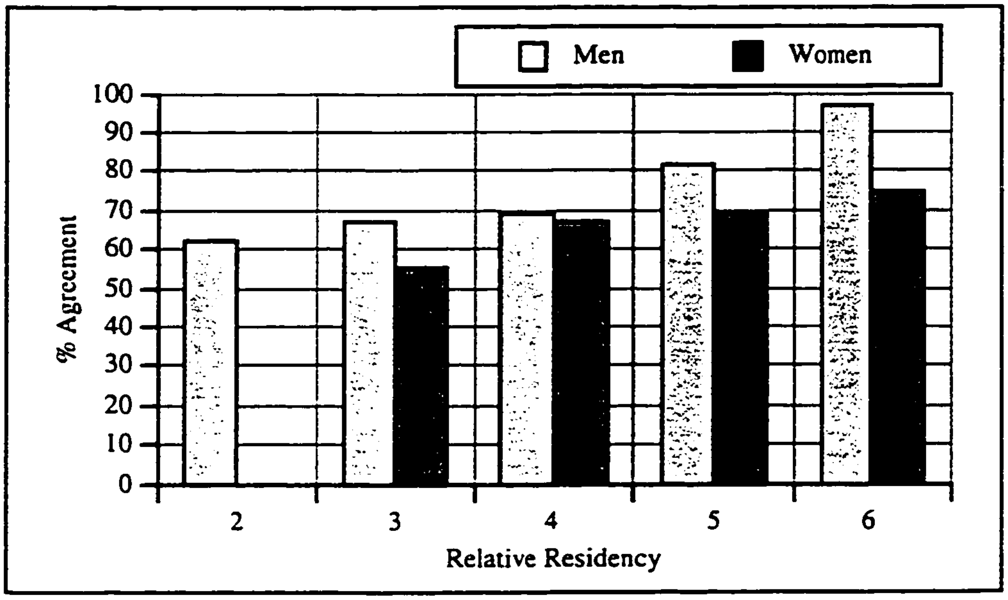


FIGURE 6.6: BAR GRAPH OF RELATIVE RESIDENCY AND MEAN AGREEMENT FOR WOMEN AND MEN

This result shows that the gender differences in knowledge play an important role. The relationship between relative residency and agreement for women is a bit higher than seen in Figure 6.6 but not as strong as that for men. The reason for this slightly weaker relationship has to do with the great variation within younger women and the weak vision of two older women.

VARIATION ASSOCIATED WITH SUBSISTENCE PRACTICE

The more a Barí person uses the forest and practices hunting, the more she or he has to know the forest trees. The Barí informants provided this explanation when asked why some people know more than others about forest trees. They say that people who spend more time in the forest and hunt more tend to know trees better. They have to know all the fruit the game animals eat and thus where they are more likely to be found. In order to navigate in the forest and to be able to hunt animals, a Barí also needs to know all the trees as reference points to follow instructions from other hunters about the location of certain animals seen recently. To test this emic view, I made a bar graph of the average agreement against uses of the forest (see Figure 6.7).

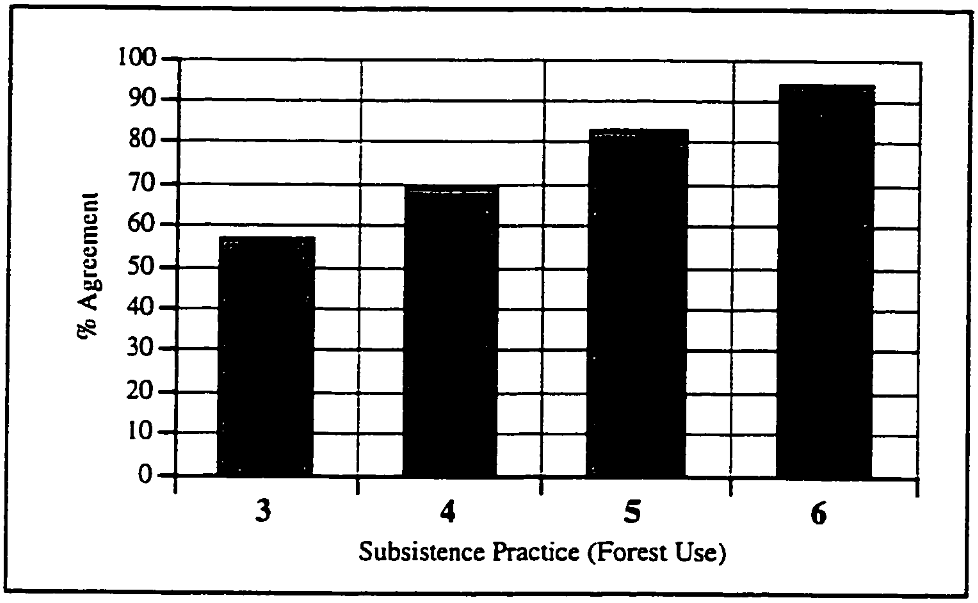


FIGURE 6.7: BAR GRAPH OF SUBSISTENCE PRACTICE (FOREST USE) AND AGREEMENT AMONG ALL BARÍ (N=20)

In this figure, the categories were defined for each person based on type of subsistence pattern related to use of the forest as follows :1 = no use, 2 = little use, 3 = little hunting, 4 = moderate use, forest products, 5 = some hunting, 6 = heavy use, hunting. The relation of subsistence pattern (forest use) and agreement among all Barí suggests that this use intensity is indeed an important factor in knowledge of trees.

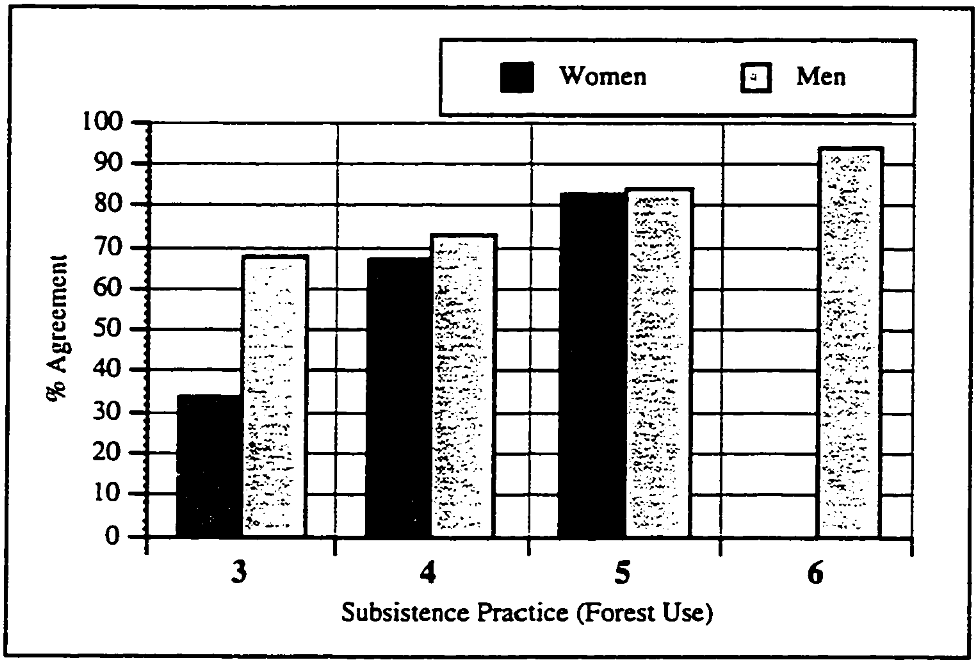


FIGURE 6.8: BAR GRAPH OF SUBSISTENCE PRACTICE (FOREST USE) AND MEAN AGREEMENT AMONG ALL BARÍ WOMEN (N=7) AND MEN (N=13)

This bar graph shows that women use the forest less than men and that acculturation is causing a change in subsistence pattern for both women and men. There is an obvious increase in agreement with increasing forest use for both women and men. Even for the same level (or approximately) of use, men know more than women because of the intensity of their use and because knowledge of these trees is important for their success in acquiring forest resources (mainly their ability to hunt animals successfully). The Barí gendered subsistence practice requires that men in the Barí traditional culture have a higher intensity of forest use (#6 in Figure 6.8) than traditional Barí women (which would be considered #5 in Figure 6.8). The main factor that makes Barí men know more about forest trees is that 98% of the forest trees and 95% of the species (in all plots, N=3,162, see Table 7.5) are providers of game animal food. Knowing these trees is critical for Barí men to be able to hunt these animals successfully. Because Barí women generally do not hunt, they do not need to learn these game animal food trees. Boster

(1981), Hays (1976:491) and Ellen (1979:353) observed the same phenomenon with the people they studied.

VARIATION ASSOCIATED WITH BILINGUAL ABILITY

One factor that has been observed to decrease the knowledge of forest trees (agreement) is the ability to speak Spanish as well as Barí (98.3% of the Barí speak their language, Venezuela 1993). The relationship between agreement and bilingual ability is clear but not very strong. The reason is that two very intelligent Barí decreased the difference. The brightest Barí seem to learn Spanish faster and try to do their best to learn it. Thus, bilingual ability is a measure of linguistic ability as well as acculturation and decrease of knowledge of trees.

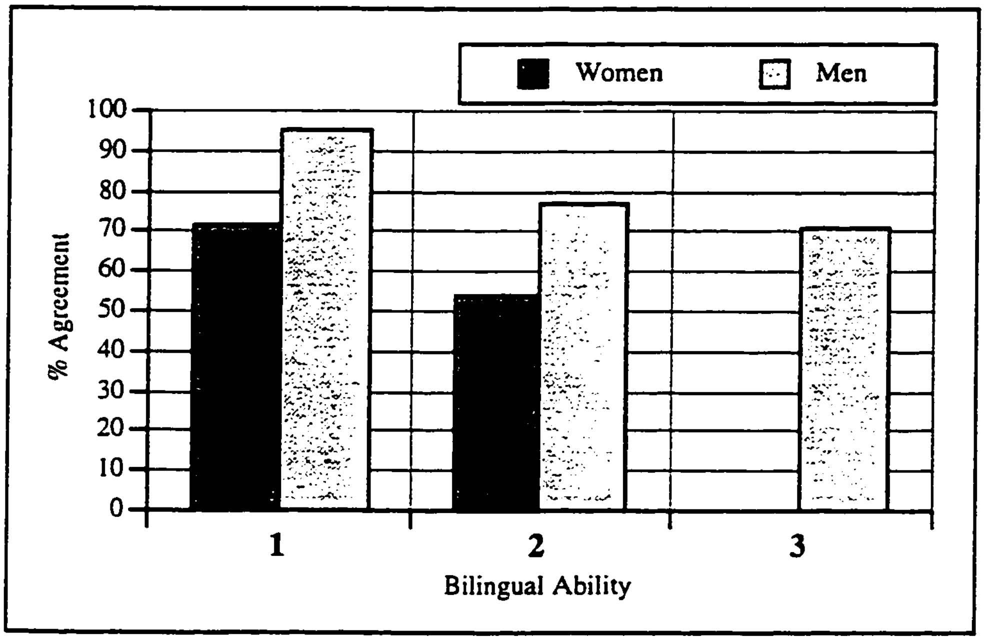


FIGURE 6.9: BAR GRAPH OF BILINGUAL ABILITY AND AGREEMENT AMONG ALL BARÍ WOMEN AND MEN (N=20)

To some degree, speaking Spanish is correlated with a decrease in knowledge of rainforest trees (1 is for Barí monolingual people, 2 for people who speak Barí and some Spanish, 3 for people who are fluent in both languages). The relationship between these two variables is a weak negative one. The Barí who know almost no Spanish have a higher agreement in naming trees (72% agreement for women and 95% for men) than those who speak Spanish fluently (71% agreement for men). The difference would be greater, but one younger man who is fluent in Spanish knows plants quite well.

If a scatter plot is done with just the 13 men (Figure 6.10), the relationship between bilingual ability and agreement among all Barí men is quite strong, and negative. Increasing bilingual ability is associated with the loss of knowledge (decreased rate of agreement).

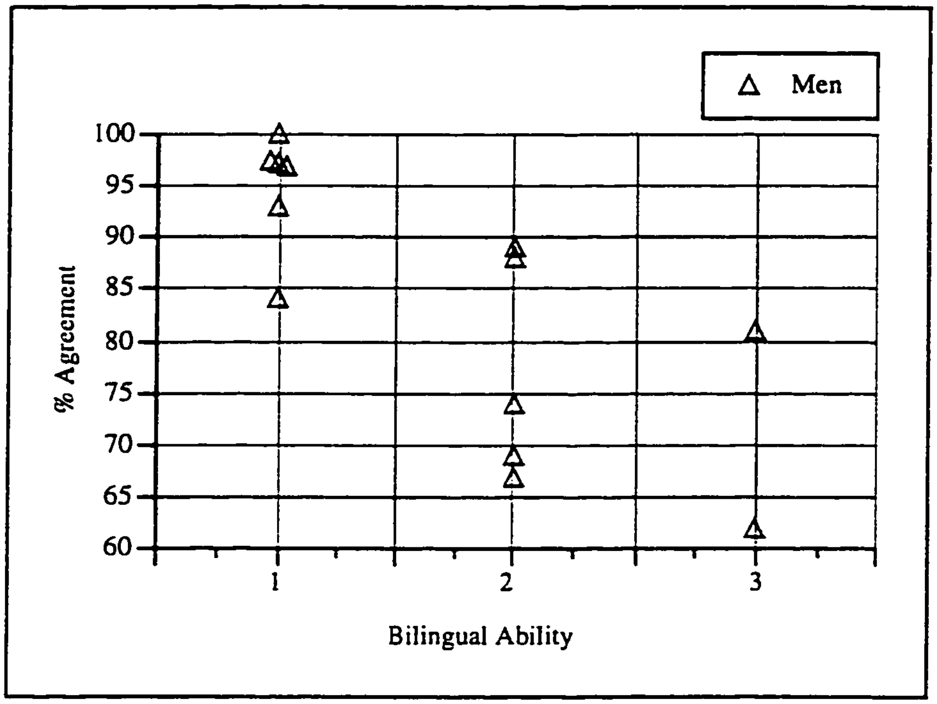


FIGURE 6.10: SCATTER PLOT OF BILINGUAL ABILITY AND AGREEMENT AMONG ALL BARÍ MEN (N=13)

Another important factor is that three younger Barí men in the group are highly intelligent, creating a larger range of agreement within the same bilingual ability (2 and 3). These data show a good relation that suggests that bilingual ability plays an important role in ethnobotanical knowledge for Barí men. The same relation is also observed among Barí women.

The relationship between bilingual ability and agreement among all Barí women is also negative, meaning that there is a lower agreement rate with more bilingual ability (72% and 54%). The relationship is the same, which demonstrates decreasing knowledge with greater bilingual ability. If I had older women with good vision as informants, the relationship between these two variables would have been stronger.

This bar graph (Figure 6.9) is similar to the age figure but in reverse. There could be a confounding factor in that the older people tend to be monolingual while the younger ones are bilingual. To get a purer comparison, I would need people of the same age but differing bilingual ability to be able to test the relationship of these two variables.

VARIATION ASSOCIATED WITH FORMAL EDUCATION

It is well known that exposure to Western education is a factor that decreases the cultural knowledge of a given population (Boster 1984:40, Zent 1994). The more time a younger person spends studying the material of the formal education, the less time she or he has to learn the traditional knowledge. If young people go to a boarding school or university, not only are they removed from the source of traditional knowledge, they may learn another cognitive-ideological system that does not value traditional knowledge. From interviews and talking with the Barí, I observed that the more educated Barí did not know the trees as well as the ones who had less formal education. The data I collected, however, shows only a weak negative relationship between formal education in years and percentage of agreement if the variable of gender is not separated. When Barí men and women are separated, the relation seems to be stronger (see Figure 6.11). However, the relation of these two variables would probably be the same for women and for men if I had interviewed more Barí women and some with more years of formal education.

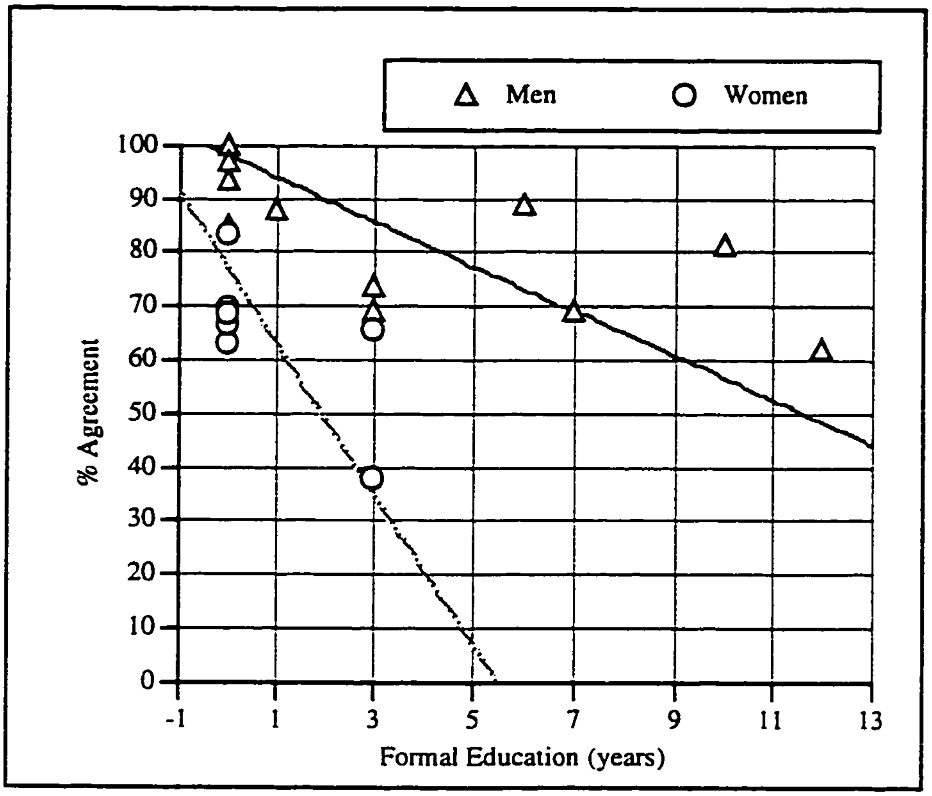


FIGURE 6.11: SCATTER PLOT OF FORMAL EDUCATION AND AGREEMENT AMONG ALL BARÍ (N=20)

The association between formal education and agreement among all men is not strong. This weak relation is due to the fact that two younger men with 6 and 10 years of formal education are obviously quite intelligent and can excel at both Barí ethnobotanical knowledge and formal education. In fact, most of the Barí men with many years of formal education are quite intelligent, too, and tend to be involved as primary or secondary headmen (e.g., Saimadodyi, Bokshí and Bachichida). The correlation of increasing formal education with decreasing ethnobotanical knowledge (rate of agreement) is more likely due to its relation to age and changes in subsistence pattern.

For the women, the association of these two variables is not that reliable statistically because the number of informants is low and I should have included more educated Barí women. However, the more educated Barí women did not want to be interviewed because they were clearly aware of their lack of ethnobotanical knowledge.

The relationship of formal education to agreement among women is also stronger than that among men, again because of the poor visual ability of two women, and one young woman lacked the intelligence of the others. If the three older women had all had the same ability as Older Woman 1, the relationship would have been very strong with a great proportion of the cases explained by formal education. My basic problem here is again a shortage of informants and the great variability among them.

VARIATION ASSOCIATED WITH KINSHIP AFFILIATION

The variation associated with kinship affiliation is perceptible qualitatively, but there are not enough data to establish its quantitative nature. In order to demonstrate statistically the variation in knowledge, I would need a higher number of pairs of informants. My main problem is the individual variability of the informants, so that sibling and parent-child associations are blurred because of differences in other types of variables. Due to the rapid transition after contact, the generational differences are too high to prove a link between the five parent-child sets I interviewed. In one case, the most knowledgeable older woman (1) is the mother of the least knowledgeable Younger Woman 3 (see Figure 6.2). Further, Older Woman 4 was the mother of Younger Men 1 and 2. Older Woman 3 was the mother of Younger Men 5 and 6 (their father was Older Man 3). These two sets of brothers have differing bilingual ability and formal education.

My qualitative data suggests that knowledge transmission is partially restricted by kinship affiliation. In interviews, the Barí stated that they initially learned plants/trees from their parents. Among the Awaruna, Boster (1981) observed that agreement in identifying types of manioc was similar within people of the same kin groups. The relationship can be seen between Younger Man 1 and his brother Younger Man 2, and Younger Man 5 and his brother Younger Man 6 (see Figure 6.2 and Table 6.1). The difference between these two sets of brothers is that one of them is more bilingual and has more formal education. Moreover, Younger Man 6 is also living in another residential territory.

However, the Barí also stated that they learned from people with whom they went to the forest to hunt and gather products. In sum, my sample does not provide a good test for associating kinship with knowledge variation.

Combining all the variables, I come to the conclusion that it is difficult to find a statistical relationship because each case is different from the others along many dimensions, making the aggregate not so useful for a good regression. However, we can also see that the variables are all quite interrelated, and they are not the only ones that produce the variation in knowledge. There are other variables, such as "personal experience, and basic intelligence," (Berlin 1992:99) that have also been explored in this research.

THE VARIATION OF ONE INFORMANT IN DIFFERENT TIMES AND PLACES

Younger Man 1 was my main field assistant and native plant collector. I worked with him almost every day during my fieldwork and he discussed our findings with me. Younger Man 1 is a 31-year-old man, son of Older Woman 4 and husband of Younger Woman 1. Younger Man 1 is a local Barí with some formal education. He completed the primary school in Saimadodyi and speaks Spanish almost fluently. Younger Man 1 is quite a good hunter and knows the forest resources like the palm of his hand, although he has worked as an employee on cattle ranches on and off in the last fifteen years. He is also a highly intelligent individual with a sharp perception for details (e.g., he could correct the naming of a tree after naming several hundred other trees). Younger Man 1 is the only Barí that I interviewed on 31 forest plots, scoring 95.6% of agreement. His knowledge was quite impressive (see Figure 6.12).

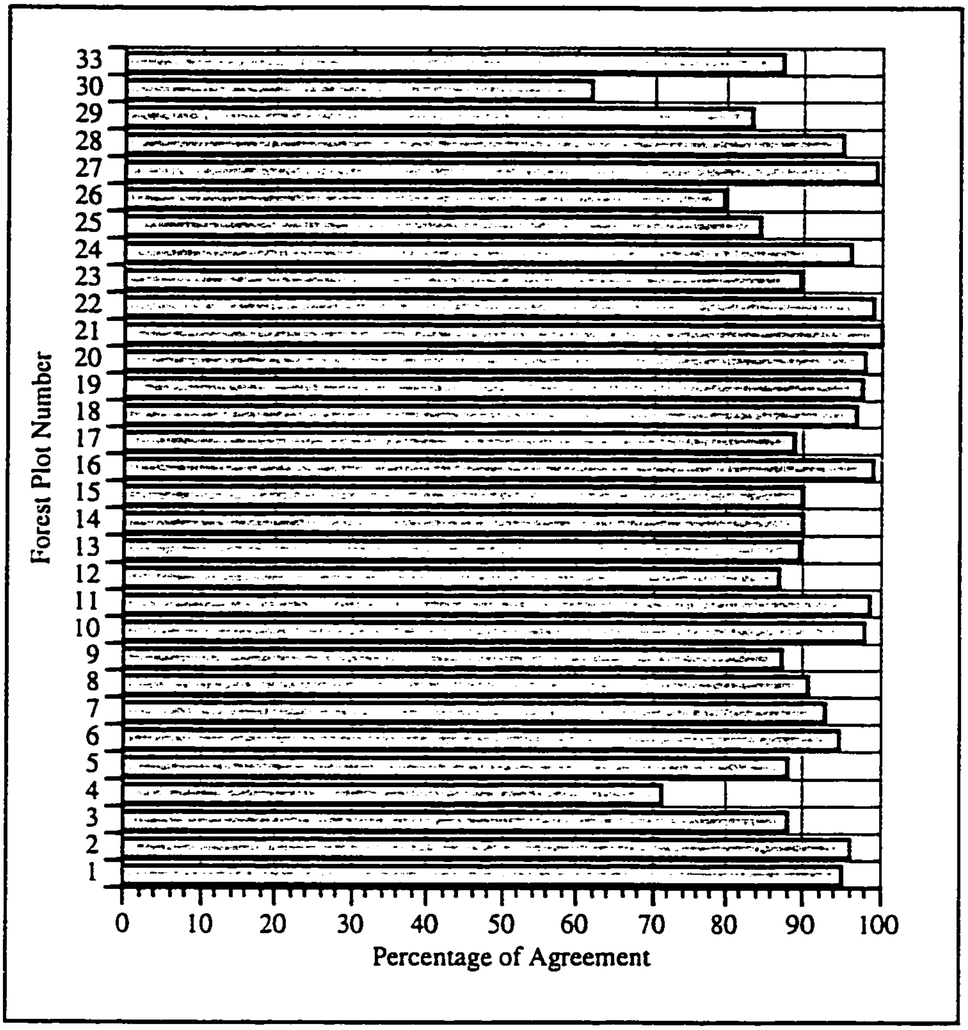


FIGURE 6.12: PERCENTAGE OF TREES IDENTIFIED CORRECTLY ON THE DIFFERENT PLOTS BY MY MAIN BARÍ INFORMANT AND FIELD ASSISTANT

There is clearly considerable variation in Younger Man 1's scores, due to various factors. I have divided Younger Man 1's data into four groups: the plots where he was the only Barí interviewed, where he was the non-local informant, and where he was interviewed earlier versus later in the research (see Figure 6.13). Because Younger Man 1 was the only Barí I interviewed on 6 plots (No. 2, 6, 11, 16, 27 and 28), scoring 97.3% of agreement, I have to ignore these data partially because I do not have control of other informants' names for these 6 plots, although he was not reluctant to tell me if he did not know the trees. There are two plots that were outside of Younger Man 1's territory, thus he is a non-local for them.

Younger Man 1 can act as a control test for all the other interviews of people who are non-local or live only a short period of time in a forested area. On forest plots 25 and 26, in the village of Kumangda, where he was a non-local, Younger Man 1 scored 81% agreement. His agreement in that area is similar to Older Man 6 (83.5%) or Younger Man 2 (81.3%). Therefore, it seems valid to state that residency plays an important role in knowledge.

In the remaining 23 plots where Younger Man 1 was interviewed as well as other Barí in his own territory, he scored 93.4% agreement. I observed that Younger Man 1 got better at identifying trees as time passed. He agreed that his Barí plant taxonomic knowledge improved in the course of the research. When I asked him why, he told me that when he started to find trees that he did not know in the forest, he asked knowledgeable Barí about their names when they were hunting with him. Five earlier plots can be used as controls to measure how much he learned by the 14 later plots. In the first five plots, Younger Man 1 scored 88.8% agreement. On the later 14 plots, Younger Man 1 scored 95.1% agreement. The data show that he improved 6% on the agreements. Therefore, he can provide insight into how knowledgeable younger Barí men could have been in pre-contact times in comparison to what men of his age know in the present. If Younger Man 1 had not gotten involved in the project, his percentage of agreement would possibly have been 88% instead of 95%. His agreement score for the five first plots is higher than other younger Barí but not as high as his later scores.

The best way to assess how my primary field assistant improved is to group the forest plots chronologically by seasons of research and separate all the plots outside his residential territory (see Figure 6.13).

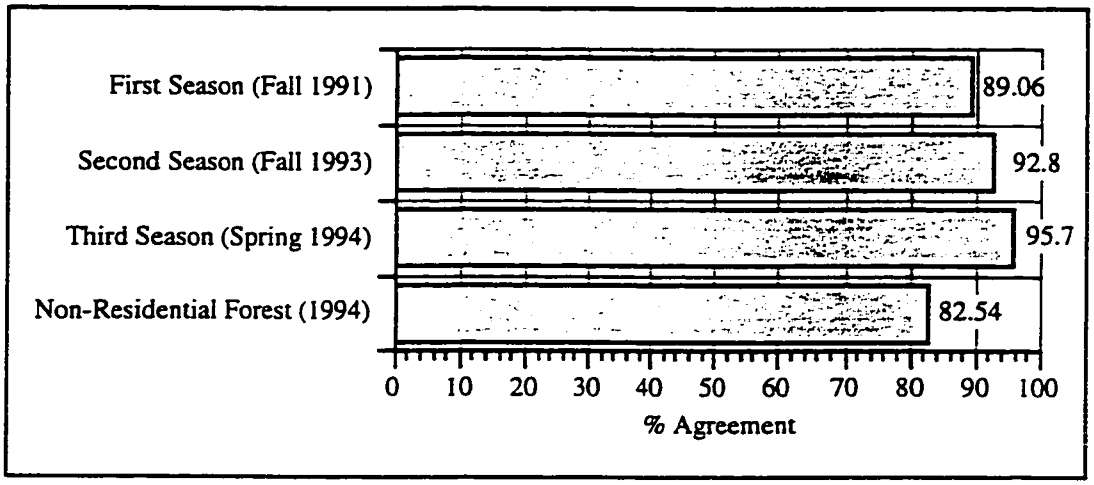


FIGURE 6.13: MAIN BARÍ FIELD ASSISTANT'S IMPROVEMENT IN IDENTIFYING TREES CORRECTLY DURING THE THREE MAIN FIELDWORK SEASONS (N=2791)

A consistent improvement of three percent per season in the identification of trees is perceptible. The other element that is clear is the disadvantage a Barí has when she or he is out of her/his territory, knowing less (-10-15%) than the local knowledgeable Barí.

BARÍ KNOWLEDGE OF THEIR RAINFOREST

In sum, the Barí know almost all the trees present based on all the interviews. They do not know well a few trees that are rare and from non-salient taxa. (There is not enough botanical data on these trees to be able to be more specific.) Of all the informants, the most knowledgeable were older men, one of whom, Older Man 5, identified properly 100% of the 776 trees on which he was interviewed: plots 13, 14 and 29-33, which is the hectare of forest near Bachichida (see Figure 6.14). However, not all the trees in the interviews were mature salient trees in the prime state for being identified. Combining all the older men as a group, excluding one non-long-term resident, they identified 96.8% of all trees (with 100% as the highest rate of correct identification) versus 81.5% for younger men (with one scoring 95.6% as an exceptionally high rate of agreement). The older women identified 71.9% (although it might be more accurate to say 80% if we compensate for the health limitations confronting my informants, with 83% as the highest rate of agreement).

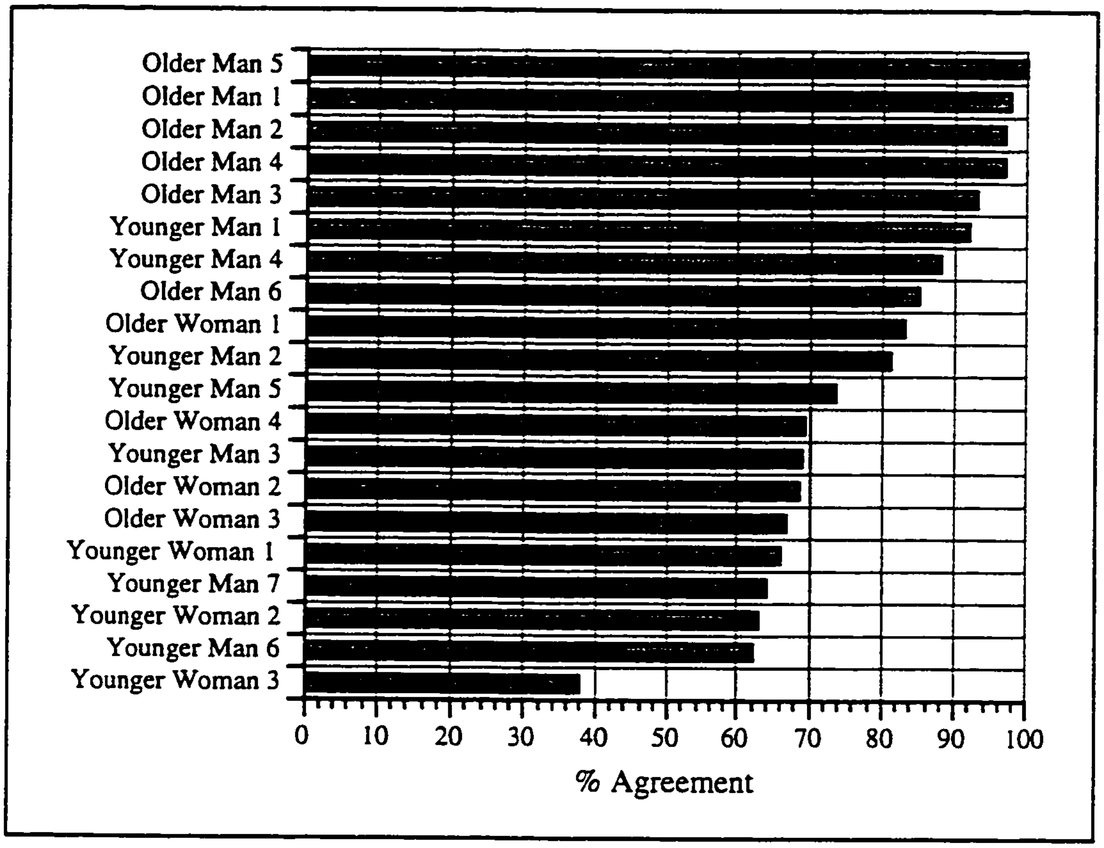


FIGURE 6.14: PERCENTAGES OF AGREEMENT (TREES NAMED CORRECTLY) FOR ALL PEOPLE INTERVIEWED IN ALL THE PLOTS (N=15339)

The younger women knew 54.2% of the trees (with 65.8% as the highest rate of agreement). All these informants' knowledge are parts of a whole like pieces of a puzzle. Of the 3162 trees plotted, 3146 (99.5%) got a label or name. The trees that did not get a name would have been practically impossible for a botanist to identify because they lacked leaves, the crowns were not visible or they were immature. It is not unreasonable to state that the Barí know 100% of their rainforest trees (16 were not identified by knowledgeable elder Barí, but not all elders were interviewed). This lacuna is not surprising; after all, Paul Kay (1977:30) wrote "members collectively control a body of knowledge beyond that which any one speaker can control."

In the Barí case of knowledge of rainforest trees, the data collected show that people older than 40 years know more than younger people (80.5% instead 63.0%), men know more than women (83.0% versus 60.5%) and local people know more than non-locals (85.76% versus 69.80%, for men only because there is not enough data for women). Therefore, if I generalize from these data, older people know 17.5% more than younger people, men know 23% more than women and local people know 16% more than non-locals.

There is a need to stress that it is not only age that causes the increase in agreement but that there is a complicating factor, which is the effect of contact. Since the time of contact (1960), it is clear that there has been a loss of traditional knowledge in the younger generation, so that the young Barí at the time of the interview are not an example of the young Barí in pre-contact times. It is obvious that the younger Barí, especially between 25 and 35 years of age, must have known plants as much as or nearly as much as older people. My evidence for this assertion is the case of Younger Man 1 (compare Figures 7.13 and 7.14). Therefore, it is not inaccurate to state that there has be a 30-50% loss of traditional ethnobotanical knowledge among the Barí from one generation (people who were adults or teenagers at the time of the contact) to the next generation (Barí people who were born after the contact). This decline is clearly observed in the shift of subsistence pattern, and the increase in bilingual ability and formal education. All these three variables increase in the younger generations and can be used as measurements of cultural knowledge loss.

Moreover, it is also clear that locality and gender play important roles in the distribution of knowledge, specifically ethnobotanical knowledge. Knowledge varies not only due to the age, gender and residency of the informant but also due to acculturation, shift of subsistence, bilingual ability and exposure to formal education. Due to the genderization of subsistence activities, men know more about rainforest trees than women (20-25% more). Barí people who are local residents tend to have greater knowledge (20%

more) than Barí who are similar but have come from another region. The shift of subsistence pattern from practicing hunting regularly to selling their labor to cattle ranchers and not using the forest also causes loss of knowledge (25%). The role of bilingual ability is complex, causing dramatic loss of knowledge for those who are not highly intelligent (35%), but having less effect on individuals who are highly intelligent (10-20%). The exposure to formal education is related to change in knowledge (22% per every 5 years of formal education). In order to be able rigorously to test statistically the role of all these variables on agreement (knowledge), a larger sample of informants, 50 to 100, is needed in order to define the role of each of them in the proportion of agreement.

CHAPTER 7: BARÍ USE OF RAINFOREST RESOURCES

> The Ka'apor employ hundreds of different species of plants in their routine activities. ...Ka'apor men and women are constantly using plants, in one way or another, in their daily activities (Balée 1994:49)

> [Siriono] knowledge of plants and animals is most extensive. When the plants flower, when they bear their fruit, which ones are good to eat, etc., are known by every child of ten. (cited by Berlin 1992:6, Holmberg 1969:120-121)

As Balée and Holmberg have observed, many other South American indigenous peoples, like the Barí, have the remarkable ability to know and use many products from the rainforest. My first stunning impression of the Barí use of the forest is that they could quickly pick up without examination all sorts of food items, twigs to decrease hunger and thirst, saps for glues or antiseptic ointments and barks or vines to tie things. Every time I tried to pick a plant for a snack that I thought was ***irabai akaing*** ("the right plant"), they would tell me that ***irabai akashi atrakari*** ("I got the wrong type of plant"). Over and over, my Barí friends would tell me the one I picked was not the taxon I labeled it, but one quite similar (***aboraing*** in Barí). I had obviously not mastered their refined skill for recognizing small differences.

One case is a plant I saw frequently in the forest, ***ishiranki abama*** (*Piper* sp. 2, PIPERACEAE), that looks very like ***ishiranki*** (*Piper darienense* C. DC., PIPERACEAE). Even though they are both in the same Linnaean genus (but different species), the Barí separate them without difficulty. The Barí, children or adults, know it very well and are constantly picking its twigs in the forest for snacks. I could not tell them apart despite an elementary knowledge of botany. One informant explained to me that ***ishiranki*** has a petiole slightly shorter and lighter in color than that of ***ishiranki abama***. These details might be minor for a layman naturalist, but not for the expert botanist or for Barí people. As Holmberg (1969) experienced with the Siriono of Bolivia, their children showed the same pattern of knowledge.

For the Barí people, going to the forest is like going to a shopping mall for a Westerner: there is food all over (honey, fruit, nuts, seeds, roots and young tender edible shoots), medicinal plants (saps, barks, leaf and fruit saps for antibiotics and antifungals) and technological material readily available to use (palm leaves for baskets, packs and backpacks; *Heliconia* leaves for packing things; inner barks for belts; vine roots for strings and ropes; and twigs for toilet paper). For example, on one day that I conducted an interview in the forest (14 April 1994), three Barí and I were able to eat three types of fruits (***drabiña*** [*Ardisia guianensis*, MYRSINACEAE], ***ishkugbaa*** [*Protium* sp. 4, BURSERACEAE], and ***kwizakdarigbaa*** [indeterminate]) and three types of shoots (***darun aktugbee*** [*Maranta or Calathea*, MARANTACEAE], ***begbeg aktugbee*** [*Stromanthe lutea*, MARANTACEAE] and ***taktaa aktugbee*** [indeterminate, HELICONIACEAE]). The products of the four types of plants were plentiful enough to satisfy our hunger for snacks and lunch. The Barí have a remarkable knowledge of forest resources that can easily be compared to that of a Western economic botanist.

Much research has demonstrated that indigenous people possess an extensive and detailed knowledge of their environment (Alcorn 1984, Ans 1972, Arenas 1987, Atran 1990, Balée 1994, Benz, et al. 1994, Berlin 1984, 1992, Boom 1987, Boster 1981, Brown 1986, Bulmer 1974a, Carneiro 1978, Coe and Anderson 1996, Conklin 1954, Descola 1986, Franquemont 1988, Fuentes 1980, Grenand 1980, Hunn 1989, Irvine 1981, Johnston and Colquhoun 1996, Lepofsky 1992, Levitt 1981, Milliken, et al. 1992, Milton 1992, Paz y Niño, et al. 1995, Phillips and Gentry 1993b, 1996, Posey 1988, Prance and Kallunki 1984, Toledo 1987, Turner 1974, Vickers and Plowman 1984, Wilbert 1987, Zent 1992, 1994). My research among the Barí confirms that they do have this extensive knowledge of plants and use this knowledge regularly.

COMPARATIVE USE OF TREES BY NEOTROPICAL SOCIETIES

After the analysis of all the data I collected, my initial observations of high forest use by the Barí were supported, by showing a considerable percentage of rainforest trees used (82.7% in Hectare 1 and 85.8% in No. 2, see Tables 7.2 and 7.3) and folk-generics used (most corresponding to genera, 55.9% in Hectare 1 and 61.8% in No. 2, see Table 7.2 and 7.3). If we compare to other Amazonian indigenous groups in the lowland South American Neotropical rainforest (Waimiri-Atroari in Milliken 1992:119 and Ka'apor, Tembeé, Chácobo and Panare in Balée and Boom 1986; all as cited in Prance et al. 1987:309), the Barí use of the forest is about average, even though mine includes only folk-generics while their figures represent species (see Table 7.1). If we exclude firewood, as was done by Prance et al. (1987:296), the Barí use of the forest is below average. All the data are based on inventories of one-hectare forests plots counting trees that are 10 cm dbh or greater, with the exception of the information for the Piaroa, which is based on trees that are taller than two meters over 1260 m^2 of an advanced secondary forest (Zent 1993:20). The percentages are presented in Table 1 below:

TABLE 7.1: PERCENTAGE OF FOREST TREES USED BY AMAZONIAN AND MARACAIBO BASIN INDIGENOUS PEOPLE

Indigenous Group:** **Type of Utilization**	**Wa**	**Ka**	**Te**	**Ch**	**Pa**	**Pi**	**Barí**** **H1**	 **H2**
Number of Species	200	99	119	94	70	249	**93**	**102**
Utilization (%)	79	77	61	79	49	84	**56**	**62**
Edible (%)	27	34	22	40	34	28	**30**	**32**
Medicinal (%)	15	21	11	35	11	17	**3**	**3**
[Fuel (%)	-	-	-	-	-	6	**52**	**50**]
Construction (%)	32	20	30	17	3	22	**34**	**31**
Technology/Other (%)	31	27	25	19	4	48	**17**	**16**
[Game animal food trees	-	-	-	-	-	82	**85**	**89**]
Commercial Timber (%)	0	2	5	1	4	-	**4**	**4**

* **Wa**: Waimiri and Atroari, **Ka**: Ka'apor, **Te**: Tembé, **Ch**: Chacobo, **Pa**: Panare, **Pi**: Piaroa.
** In case of the Barí, the figures are Barí folk-generics that correspond in most cases to genus.

I have added two categories of use to Table 1: firewood and game animal food. These were included because they are culturally important according to the Barí, as a discerned category. Prance et al. (1987:296) state "we do not discuss plants that supply only fuel and/ or attract game animals, upon which indigenous diets depend, not because these are not a priori useful, but rather because the vast majority of trees fall into one or both of these categories anyway." I understand the motivation for removing fuel trees and trees that attract game animals, although I include these data in the tables and figures presented in this chapter.

The Barí forest seems to have fewer taxa (possibly more species) per hectare than the forest analyzed in comparable studies of five indigenous groups in South American rainforest. The Barí use a relatively high percentage in direct uses: edible, medicinal, technology, house construction and commercial timber (species with known commercial use). It is interesting to observe that the Barí use of the forest is quite similar to that of the Waimiri-Atroari, Ka'apor and Chacobo, but slightly below because I could not get all the information for several taxa growing in the plots. I also discovered that some names included more than one species. For example, the taxa designated by the simple terms

ahkaa (*Sagotia racemosa*, EUPHORBIACEAE) and ***chirabu*** (*Oxandra venezuelensis*, ANNONACEAE) are each divided into two different complex names as ***ahkaa bachï*** and ***ahkaa babai***, and ***chirabu bachï*** and ***chirabu babai***. Another example of a folk-generic that includes several folk-specifics (equivalent of species) is ***dairugbaa*** (both domestic and wild *Theobroma cacao*, STERCULIACEAE), which includes four Barí specifics (***dairugbaa bokimai*** (red ***dairugbaa,*** wild *Theobroma* sp. 2), ***dairugbaa karikanshundu*** (yellow ***dairugbaa,*** wild *Theobroma* sp. 3), ***dairugbaa bachïi*** (white ***dairugbaa,*** wild *Theobroma* sp. 1), and ***dairugbaa tagtasha ankoraí*** (green ***dairugbaa,*** wild *Theobroma* sp. 4)). Other names refer to multiple taxonomic levels of the plant world. For example, ***totubïkaa*** (*Warscewiczia coccinea* [RUBIACEAE], but also *Miconia* sp. 4 [MELASTOMATACEAE] and *Palicourea* sp. 2 [RUBIACEAE]). These represent a few cases of the many that I learned by the end of my fieldwork. (In further research, I will need to expand in this issue and clarified it) Therefore, I believe there are more Linnaean species per hectare than indicated, because most of the Barí names represent folk-generic taxa rather than folk-specifics or Western species. Adding all the complete names and correcting others might increase the percentages of trees used by the Barí. This modification would also increase the number of species per hectare in the Barí territory.

Barí Use of Trees in Two Different Hectares of Rainforest

Comparing the two hectare forest plots (No. 1 near Saimadodyi and No. 2 near Bachichida), there are similarities in percentages for each type of use (see Tables 7.2 and 7.3). The percentages of trees and folk-generics used directly are slightly higher in Bachichida except for medicinal trees.

TABLE 7.2: BARÍ TREE USE IN FOREST HECTARE PLOT No. 1 (SAIMADODYI)

Type of Use*	Trees	%	FG	%	MU	%	MUFG	%
EDIBLE	227	**38.2**	28	**30.0**	179	30.1	23	24.7
FUEL	438	**73.6**	48	**51.6**	405	68.1	36	38.7
MEDICINAL	82	**13.8**	3	**3.2**	82	13.8	2	2.2
CONSTRUCTION	380	**63.9**	32	**34.4**	376	63.2	28	30.1
TECHNOLOGY (material culture use)	279	**46.9**	16	**17.2**	277	46.6	15	16.1
COMMERCIAL TIMBER	34	**5.7**	4	**4.3**	34	5.7	4	4.3
DIRECT USE (all the categories above)	492	**82.7**	52	**55.9**	444	74.6	33	35.5
GAME ANIMAL FOOD	578	**97.2**	79	**85.0**	491	82.5	53	57.0
INDIRECT USE (only game animal food)	87	**14.6**	34	**36.6**	0	0	0	0
Total	**595**	**-**	**93**	**-**	**445**	**74.8**	**46**	**49.5**

* FG is folk-generic, MU is for trees that have multiple uses and MUFG is for the multiple use folk-generics.

The motive behind having a second hectare plot was to check if the first hectare plot was typical. Therefore, in the summer of 1995, I took the opportunity to complete a second plot that I started in 1994 (see Table 7.3).

TABLE 7.3: BARÍ TREE USE IN FOREST HECTARE PLOT No. 2 (BACHICHIDA)

Type of Use*	Trees	%	FG	%	MU	%	MUFG	%
EDIBLE	331	**42.7**	33	**32.4**	296	38.1	26	25.5
FUEL	579	**74.6**	51	**50.0**	534	68.8	36	35.3
MEDICINAL	83	**10.7**	3	**2.9**	83	10.7	3	2.9
CONSTRUCTION	514	**66.2**	32	**31.4**	511	65.9	30	29.4
TECHNOLOGY (material culture use)	330	**42.5**	16	**15.7**	329	42.4	15	14.7
COMMERCIAL TIMBER	31	**4.0**	4	**3.9**	31	4.0	4	3.9
DIRECT USE (all the categories above)	666	**85.8**	63	**61.8**	583	75.1	41	40.2
GAME ANIMAL FOOD	741	**95.5**	91	**89.2**	575	74.1	63	61.8
INDIRECT USE (only game animal food)	91	**11.8**	28	**27.5**	0	0	0	0
TOTAL	**776**	**100**	**102**	**100**	**601**	**77.5**	**63**	**61.8**

* FS is folk-generic, MU is for trees that have multiple uses and MUFS is for the multiple use folk-generic.

This second plot is quite similar to the first one in the pattern of usage, with some minor differences: the second one has a higher proportion of indirectly and directly used trees and folk-generics. Moreover, the two plots have a slightly different flora, due to their different locations, as was apparent to my main field assistant. For example, the use of trees for food is 38% in the first hectare and 42.7% in the second. For firewood, it is 73.6% in the first hectare and 74.6% in the second. The only major difference is in number of trees. However, I believe both these forest areas have been heavily used. The effects of recent sedentism, increased population density and extended overuse of forest resources diminish the number of folk-generics occurring in a hectare plot. This effect is explored further in the section on fuel trees below.

Barí Use of All Plotted Forest Trees

One of the motives for making many small forest plots in different regions, aside from getting a greater number of folk-generics of trees, was to provide an understanding of the regional variability by comparing these two one-hectare plots to all the plotted areas. Even though all the plots cover a large area of 20 by 35 kilometers including different ecosystems, the figures on types of uses are quite similar. This result indicates that the hectare plot is a sufficient data set to estimate the ethnobotanical use of a forest by a given society, at least for the Barí.

Of all the trees plotted, 81.9% (2591) are used directly for food, medicine, fuel, construction material, technology and commercial timber. 212 folk-generics were plotted, but use information was not collected for all of them. Information was not available for all the trees registered in the plots because many variants, abbreviations and modified names were recorded, but the main collaborator did not recognize many of these names and was not sure to which specific type of tree they referred. Percentages are calculated from these 171 folk-generics with information. On this basis, the Barí use 70.2% (120) folk-generics (see Figures 7.1 and 7.2).

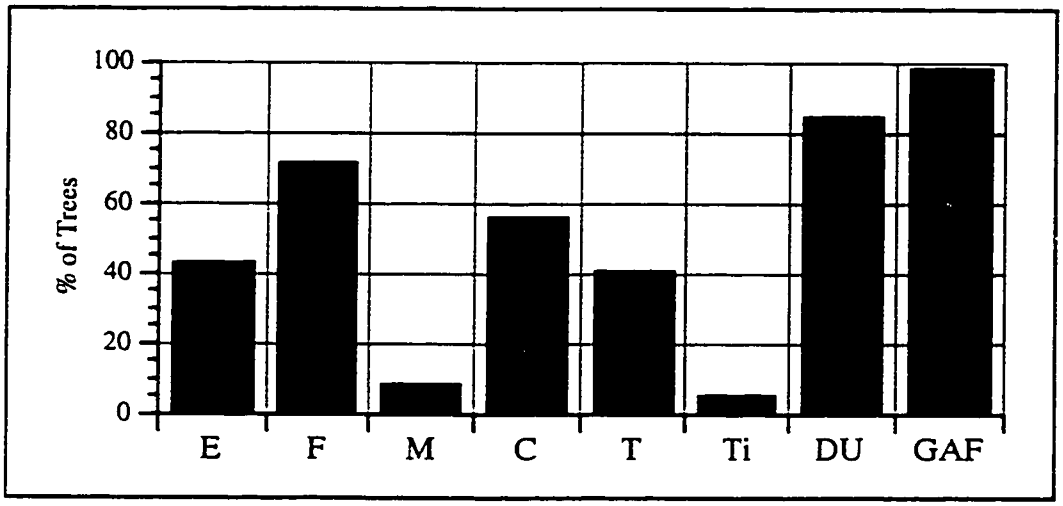


FIGURE 7.1: PERCENTAGES OF ALL TREES PLOTTED WITH TYPE OF BARÍ USES (E—EDIBLE; F—FUEL; M—MEDICINAL; C—CONSTRUCTION; T—TECHNOLOGICAL; TI—COMMERCIAL TIMBER; DU—DIRECT USE; GAF—GAME ANIMAL FOOD)

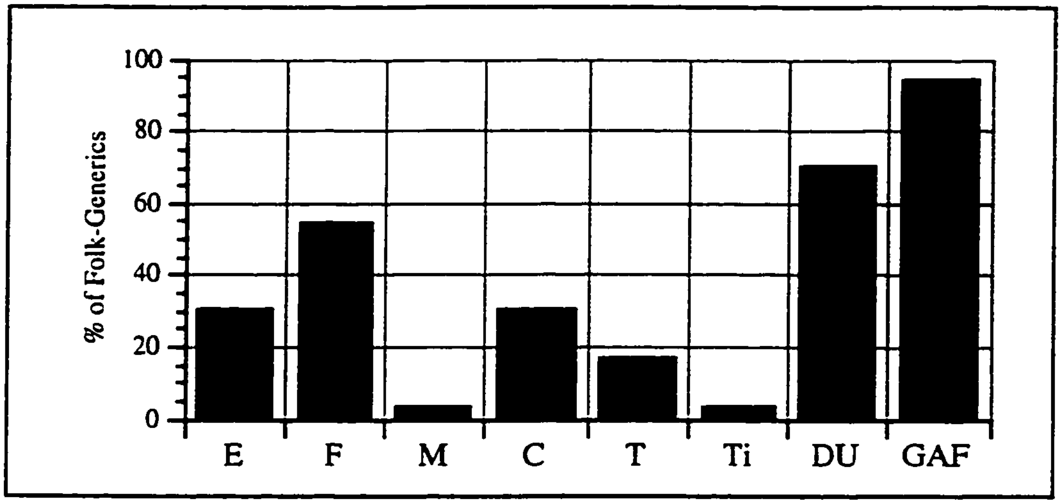


FIGURE 7.2: PERCENTAGES OF FOLK-GENERICS OF TREES PLOTTED WITH TYPE OF BARÍ USES (E—EDIBLE; F—FUEL; M—MEDICINAL; C—CONSTRUCTION; T—TECHNOLOGICAL; TI—COMMERCIAL TIMBER; DU—DIRECT USE; GAF—GAME ANIMAL FOOD; N=171)

An interesting point raised by Prance et al. (1987) is that the overlapping use of trees makes forest use a complex issue, and we must consider whether to exclude from analysis trees falling in multiple categories of uses. The best I can do with my data is to present the nature of multiple use. Only 29.2% (50) of the folk-generics and 15.9% (486) of the trees have only one use (not including indirect use, if the tree is a game animal food tree). Of these, 14.6% (25) of the folk-generics and 10.6% (324) of the trees are used only as fuel. This finding indicates that fuel trees play an equally important role in relation to other uses, because fuel trees represent 66.9% of all trees with only one use. The other uses have a large proportion of overlap.

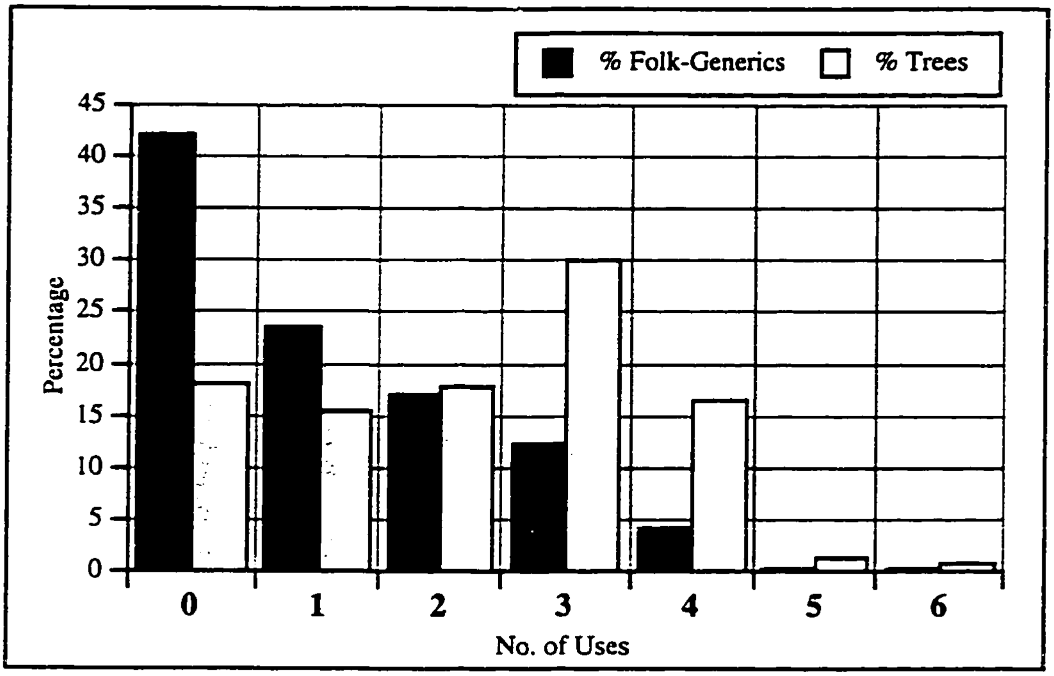


FIGURE 7.3: PERCENTAGE OF FOLK-GENERICS (N=212) PER NUMBER OF USES FROM THE SIX CATEGORIES (EDIBLE, FUEL, MEDICINE, CONSTRUCTION, TECHNOLOGY AND COMMERCIAL TIMBER) FOR ALL TREES (N=3162)

The number of multiple use trees is small if one counts the number of taxa but it is remarkably high in terms of the total number of trees. The reason is that the trees that are numerous and widely abundant also have more uses. For example, trees that have only one use represent 23.6% of the folk-generics but 15.4% of individuals. There is quite a different picture when we compare folk-generics and individual trees with more than one use. While trees with more than one use represent only 34.4% of the folk-generics, they represent 66.6% of individuals.

The use of tree folk-generics is related to their salient elements, as described in detail by Berlin (1990, 1992). My preliminary observations are that when a tree is more common, it will be more likely to be recognized and then used. For example, of the 26 most common tree folk-generics (see Figure 2.1 in Chapter 2), 69.2% (or 93.7% of individuals) have more than one use and only 7.7% (2 species) have none. An example can be clearly observed in the cases of ***keki*** with four uses and ***bahku*** with six, where the agreement for most informants was quite high and the name consistent.

TABLE 7.4: BARÍ USE OF ALL THE TREES INCLUDED IN ALL FOREST PLOTS (4.83 HECTARE)

TYPE OF USE	TREES	%	% -n.i.*	FG	%	%**	MUG	%
EDIBLE	1347	42.6	**42.7**	52	24.5	**30.4**	36	17.1
FIREWOOD	2191	69.2	**71.4**	93	43.9	**54.4**	61	28.8
MEDICINAL	250	7.9	**8.2**	6	2.8	**3.5**	5	2.4
CONSTRUCTION	1713	54.2	**55.8**	52	24.5	**30.4**	48	22.6
TECHNOLOGY	1241	39.2	**40.5**	29	13.7	**17.0**	25	11.8
COMMERCIAL TIMBER	171	5.4	**5.5**	7	3.3	**4.1**	6	2.8
DIRECT USE (all above)	2591	81.9	**84.0**	120	56.6	**70.2**	69	32.5
GAME ANIMAL FOOD	3013	95.3	**98.2**	162	76.4	**94.7**	-	-
INDIRECT USE (only Game Animal Food)	464	14.7	**15.1**	42	19.8	**24.6**	-	-
TOTAL	**3162**	-	**96.9**	**212**	-	-	-	-

* "-n.i." means that these figures do not include tree folk-generics without information. FG is folk-generics and MUG is for the multiple use folk-generics.
** While the previous % is based on 212 fork-generics, this % is based on 171 folk-generics with information.

The use of all trees combined is higher than that of the hectare 1 and 2 plots. This apparent anomaly has to do with the fact that we are talking about different forest types and will be addressed in the next section. Some forest plots have a higher number of useful trees and folk-generics. Also, in all plots, 70.2% of the trees and 32.5% of the folk-generics have multiple uses.

Regional Variation in Useful Trees

Even though all areas are relatively similar, the difference can provide interesting insights. I split the data into five different units (see Table 7.5). The first hectare unit is identified as "H1" in Table 7.5. It is located 3.5 km southwest of Saimadodyi in what looks like a young primary forest (see Map 2). The second type is the hectare forest plot (given as "H2") 2 km east of Bachichida village. This forest plot also appears to be young primary forest. The third unit, given as "G" because it was used for group interviews, is six different plots around Saimadodyi (Plots 7, 8, 9, 10, 15 and 17, all on Map 2) that cover 0.9 hectares of forest. The G plots have quite similar characteristics to the previous two. The fourth unit is two plots (0.3 hectares) 7 km south of Kumangda that have a very distinctive type of forest called ***asharo kanda***, which is lowland flooded primary forest. Their use types are mildly different but still quite close to the three previous forest units. The fifth unit is two forest plots (0.3 hectares) on land where there were longhouse gardens 32 years ago (one is on the site of Kairibagdakaig and the other on Otakaa, both abandoned in 1961 and 1962). One would expect their figures to be different, with fruit trees more abundant. The difference is not huge but is noticeable for food and game animal food trees. This difference is understandable because the Barí bring back many fruits and dead game full of seeds that are tossed outside the longhouse, thus increasing the numbers of those two types of trees.

TABLE 7.5: USES OF FOREST UNITS

	Plot*	E	F	M	C	T	G	DU	IU
1. Folk-Generic (N=89, 5 w/ni)	H1	27	46	2	30	15	82	57	26
Percentage of Folk-Generic	H1	32.1	54.8	2.4	35.7	17.9	97.6	67.9	31
No. of Trees (N=595, 9 w/ni)	H1	227	438	82	376	275	577	492	86
Percentage of Trees	H1	38.9	75.0	14.0	64.4	47.1	98.8	84.3	14.7
2. Folk-Generic (N=102, 6 w/ni)	H2	33	52	2	31	15	88	67	27
Percentage of Folk-Generic	H2	35.5	55.9	2.2	33.3	16.1	94.6	72	29
No. of Trees (N=775, 11 w/ni)	H2	324	578	83	514	329	730	665	81
Percentage of Trees	H2	42.4	75.7	10.7	67.3	43.1	95.6	87.0	10.6
3. Folk-Generic (N=97, 5 w/ni)	G	32	49	3	32	21	89	62	29
Percentage of Folk-Generic	G	35.2	53.9	3.3	35.2	23.1	97.8	68.1	31.9
No. of Trees (N=414, 11 w/ni)	G	161	255	7	191	151	401	297	106
Percentage of Trees	G	40.0	63.3	1.7	47.4	37.5	99.5	73.7	26.3
4. Folk-Generic (N=42, 7 w/ni)	K	11	15	0	9	7	31	19	14
Percentage of Folk-Generic	K	33.3	45.5	0	27.3	21.2	93.9	57.6	42.4
No. of Trees (N=158, 13 w/ni)	K	74	67	0	68	71	127	106	26
Percentage of Trees	K	51.0	46.2	0	46.9	49.0	87.6	73.1	17.9
5. Folk-Generic (N=49, 4 w/ni)	LH	19	28	1	15	9	42	35	8
Percentage of Folk-Generic	LH	44.2	65.1	2.3	34.9	20.9	97.7	81.4	16.6
No. of Trees (N=327, 13 w/ni)	LH	164	226	1	109	73	313	293	21
Percentage of Trees	LH	52.2	72.0	0.3	34.7	23.3	99.7	93.3	6.7

* Plot G for #7, 8, 9, 10, 15 & 17 plots around Saimadodyi, H1 as for Hectare "1" 3.5 km west of Saimadodyi (primary forest), H2 is for Hectare "2" 2 km east of Bachichida, K for primary forest near Kumangda, and LH for 30-year-old secondary forest on the site of a longhouse. E—edible trees, F—fuel trees, M—medicinal trees, C—construction trees, T—technology source trees, G—game animal food trees, DU—direct use trees, ID—indirect use trees which means only as G but not E, M, F, C and T. "w/ni" are tree folk-generics and individual without any information collected about their Barí uses.

There are differences between each of the areas where the forest was plotted. The greatest differences are in the old longhouse sites and in Kumangda, which is the more traditional territory for the Venezuelan Barí. These two areas are quite different. The first one is a 32 year-old secondary forest, while Kumangda has a flooded primary forest. Both have higher percentages (51-52%) of edible trees. The longhouose (LH) secondary forest is largely anthropogenic in that fruits of edible trees were brought to the site and the seeds discarded. For example, the trees that I noticed were quite common in those longhouse plots, were ***baroo*** (26 out of 42 recorded in all plots), ***akuru*** (*Persea americana*, 11 out of 11) and ***arúu*** (*Oenocarpus bataua*, 27 out of 101). If we combine the data for these three trees, 41.6% of these trees are found in these two plots representing 5.2% of the total plotted area. For ***baroo*** and ***akuru***, the percentage is quite high (69.8%), because the seeds are discarded alive, while for ***arúu*** the seed is not viable since the fruit is boiled in most cases. However, the Kumangda forest is naturally higher in number of fruit trees, many of them brought by floods from other regions.

On the one hand, to explore the other differences, I need to collect more information about these two areas, because the data set is still too incomplete to provide a better understanding of these two types of forest. The use of the Kumangda forest could be higher, but I was not able to collect information for 9 folk-generics and 13 individual trees. On the other hand, the general characteristics of the Barí forest are fairly similar.

EDIBLE TREES

The Barí use 52 folk-generics (30.4%) for food in the 4.83 hectares studied. Palms (as trees and as a family) are the most important source of trees foods the Barí in frequency and bulk, especially ***arikogbaa*** (the plant is known as ***arúu***, *Oenocarpus bataua* var. 2), ***mitchiri*** (***keki***, *Oenocarpus mapora*), and ***araktogbaa*** (***araktá***, *Attalea butyracea*). They use 11 specific taxa to extract fruits and hearts. Many palm fruits are available all year around and great quantities of them are consumed in Barí households. The other most commonly encountered fruits are ***abogboo*** (*Pouteria anibaefolia*, SAPOTACEAE), ***baroo*** (*Spondias mombin* L., ANACARDIACEAE), ***ishkugbaa*** and many *Inga* spp. Of the 3162 trees plotted, the Barí informed me that 1347 trees provide food.

Therefore, 42.6 percent of all the trees can be used as food at some season (or 42.7% of all trees with information).

Almost all the food these trees produce is in the form of edible fruits. These vary from fruits that are available all year around to fruits that are produced in a very short season, two to sixteen weeks. Studies like the one carried out by K. Milton (1988:286) show that ripe fruit is available for 0.8 months per annum per tree species on average in the rainforest of Central America. The most common fruits in the Barí diet are ***arikogbaa*** and ***aragtogbaa***. The Barí collect them in the jungle and on the sites of old longhouses, where they are much more abundant than in the primary forest. Therefore, their distribution is quite anthropogenic.

The next most noticeable forest tree fruit is the domesticated avocado (***akuruu*** or ***kwakwachi***, two Barí dialectal names for *Persea americana*, LAURACEAE), available from April to June. They are found in mature-to-abandoned swidden gardens or in 20- to 40-year-old fallow. Besides avocado, ***baroo*** (in Spanish jobo) appears in early April and can be found until late August. This ***baroo*** is like a small juicy sour plum. Another fruit, extremely delicious, is like a yellowish-white strawberry: ***shïndwë*** (*Helicostylis tomentosa*, MORACEAE, charo macho in Spanish). This fruit was the one that I found most delicious of those I tasted in Perijá. (Although my perceptions may have been biased because I was very hungry, deprived of sweet food, and this rich and tasty fruit was hard to come across.) Although I heard many times about ***shïndwë*** and that the forest produced much of it, I only encountered it once in all my fieldwork. I saw many trees but none of them were producing ripe fruits.

Another short season fruit is ***dagyikogbaa*** (*Maquira guianensis*, MORACEAE). It is in season for no longer than two or three weeks around the second half of March. Its fruits are quite strange because they are bright red, but have a white milky sap. However, they are quite delicious and one person can gather about a kilogram in ten minutes. On the few occasions we came across ***dagyikogbaa***, its fruits were plentiful and we ate until we were satiated. I consider this fruit the second most delicious fruit in the Barí territory.

Apparently, the Barí are making some anthropogenic modifications to their forest. I have observed the occurrence of groves of certain species of trees, such as ***akuruu***, ***baroo*** and ***baruu*** (*Brosimum* sp., MORACEAE). For example, by observing the location of all the ***baroo*** and ***akuruu*** trees, I came to the conclusion that they do not occur naturally in Perijá. I observed that ***baroo*** was found on the main trails, in secondary forest on old longhouse sites, and by the rivers. ***Akuruu*** only occurred in the secondary forest where there used to be a longhouse or in managed forest where undergrowth is cleared once or twice a year. As to how the dispersal of ***baroo*** fruit might occur, the Barí toss the ***baroo*** pit by the longhouses and it floats down the river until it gets stuck in the roots of other trees. I have recorded 42 ***baroo*** trees in 10 plots. Twenty-seven ***baroo*** trees (64.29%) grow on a very important old longhouse site (Karigbagdakaig, see Map 2) where there is a 32-year-old secondary forest. Of the remaining, 12 (26.6%) were right along important trails, in groups of 2 to 4 trees, at places where people would wait for other Barí to catch up, drinking water and eating fruits while waiting (at trail intersections or by creeks). Only 3 ***baroo*** trees (7%) occurred away from trails, possibly dispersed by frugivores. ***Baroo*** fruits are available 4 to 5 months per year, thus making them more likely to be scattered wherever the Barí go. ***Baroo*** trees may be an indication of the anthropogenic modification of this rainforest.

To compare with the anthropogenic distribution of ***baroo***, I looked at the distribution of ***dagyikogbaa***, another of the most favored fruits among the Barí. In all my plots, I have only 20 trees in 13 plots. ***Dagyikogbaa*** was found equally along and away from trails. It is obvious that humans disperse the seeds, but they are not the only ones. The seeds are the size of a coffee bean and easily dispersed by many large and medium-sized animals, unlike the ***baroo*** with seeds of the size of a large grape. This comparison convinces me that ***baroo***'s distribution is anthropogenic, because 92.9% of the ***baroo*** trees grow on areas used by the Barí.

The Barí recognize another variety of *Spondias mombin* (ANACARDIACEAE) as a separate taxon by the name of ***íshiraberi***. The fruits are very similar to ***baroo***. The fruits of ***íshiraberi*** are yellow, smaller and smell different from ***baroo***. Their flower is similar in size (5 mm.), with white petals. The ***íshiraberi*** flowers come after the flowers of ***baroo*** (April-May to July-August). Several other ***íshiraberi*** specimens that I saw were all outside of the plots. The word ***íshiraberi*** is well known among Barí. Its fruit is appreciated by all Barí and collected when in season, from May to July. However, without the fruit or flower, ***íshiraberi*** was often confused with ***baroo***. For example, an ***íshiraberi*** was labeled ***baroo*** 12 times out of 14 and one ***baroo*** was taken for ***íshiraberi***.

The palm ***arakta*** (*Attalea butyracea*; corozo de coruba in Spanish) is mainly used to produce ***kugdu*** (an edible larva of the palm weevil, *Rhynchophorus palmarum*) found all over (Beckerman 1977:153). Its fruits are edible and eaten November to January. To procure ***kugdu***, the Barí also use ***kugda arúu*** (*Copernicia tectorum*, Palma llanera in Spanish) and ***keki***, according to one knowledgeable informant.

To conclude on food trees, the qualitative as well as the quantitative data show that the Barí forest offers a great number of foods. Compared to other groups in South America, listed in Table 1, the food capacity of the Barí forest is in the same range as for the Waimiri-Atroari (Milliken, et al. 1992:119), Ka'apor, Tembé, Chacobo and Panare (Prance, et al. 1987:309). The Barí rainforest produces many fruits and a knowledgeable person could find plenty to eat from the trees.

FUEL TREES

Trees used as firewood were included in the analysis as a type of utilization because the Barí themselves considered it important, and they pointed it out to me frequently. Living in the wettest rainforest in Venezuela, firewood knowledge is essential to provide heat, light at night, to scare mosquitoes and dangerous animals, and to process food. For the Barí, 2189 out of the 3162 trees (69.3%) have the potential for use as firewood. The number of folk-generics useful for firewood is 52 (30.4%).

Firewood tree species are more abundant among the Bora of Peru (Unruh and Flores Paitán 1987:71). In 20- and 35-year-old forest, they have 55.8% and 71.9% of species respectively available for firewood. The Bora old fallow forest has a higher number of firewood species because it has been managed.

Not all wood is worth using, either because it absorbs too much humidity or it does not produce enough heat in proportion to its weight. The local hardwoods such as one called cañaguato in Spanish (***karikã*** *Tabebuia chrysea*, BIGNONIACEAE), and other very hard kinds of woods (***burunbukaa*** [*Luehea seemanni*, TILIACEAE], ***burii*** [*Acacia glomerosa*, MIMOSOIDEAE], ***ogchiri*** [*Dialium guianense*, CAESALPINIOIDEAE] and ***tumma*** [*Astronium graveolens*, ANACARDIACEAE]) are not always used because they are too heavy to carry and too hard to split, even though they produce good and fast heat in wet conditions. These woods are used in small pieces when they are found near the campfires. Recently, I observed that these hardwoods are used as firewood now that the Barí can use a power chainsaw and a tractor to transport the wood to the village. The Barí prefer ***ahkaa*** because it is light (a third of the weight of ***karikã*** or ***tumma***). ***Ahkaa*** is also easy to split, burns quickly and produces an excellent heat for cooking. ***Ahkaa*** is the third most abundant tree and represents 6.6% of all the trees plotted (209 out of 3162 trees). A second choice for firewood is ***chirabu***, mostly because is very easy to split, even though it is a bit heavier than ***ahkaa***. ***Chirabu*** is the fourteenth most abundant tree and it represents 1.5% of all the trees plotted (47 out of 3162 trees). The Barí of Saimadodyi use 45 folk-generic taxa (38%) for firewood.

Even though about 70% of the trees can be used as firewood, the Barí use of a sector of forest for fuel eventually decreases the number of these folk-generics. There must be a remarkable decrease for a sedentary population, such as Saimadodyi or

Bachichida, because the Barí have cut down all the good firewood trees that are 10 to 25 cm diameter at breast height that are along trails up to 1 km from the villages. All the forest plots that were near the villages had felled trees that were left to dry, some of which had been forgotten. For example, I observed that in my first three plots (500 m from the village of Saimadodyi), there were only four ***ahkaa***, while in similar forest types there would be between 10 to 25 ***ahkaa*** trees per 30x50 m plot. I observed that the use of ***ahkaa*** as firewood has decreased the number of standing ***ahkaa*** trees around the village of Saimadodyi and that all the ***ahkaa*** and ***chirabu*** trees have been cut down within 20 meters of the trails up to 3 km around Saimadodyi. These two trees are generally abundant in the forest away from the trails. Three plots (0.45 hectare), one near the other, 4 km west of Saimadodyi, had 65 ***ahkaa*** trees. Referring to these plots, a Barí said that this place was great for firewood trees and that he was planning to come there and harvest them for his kitchen. This remark was an indication of the scarcity of their preferred firewood, but also of its importance and value. The value of firewood trees has therefore probably increased with sedentism. In the Barí traditional semi-sedentary pattern of settlement, the number of "good" firewood trees (specifically ***ahkaa*** and ***chirabu***) was probably higher in their forest than what I have recorded.

MEDICINAL PLANTS AND TREES

Medicinal plants among the Barí seem to be mostly vines, herbs and hemiepiphytic plants. The number of medicinal trees used is quite low in relation to other South American Indians. The Barí have only seven folk-generic taxa of medicinal trees that I was able to learn of: ***ainogbaa*** (*Couma macrocarpa*, APOCYNACEAE), ***báahdã*** (*Copaifera langsdorffii*, CAESAPINIOIDEAE, in Spanish cabima, copaiba), ***bahku***, ***ahkaa***, ***shiow*** (*Clusia* sp. 1, GUTTIFERAE) and ***karaña*** (*Protium* sp., BURSERACEAE), ***kóba*** (*Couroupita guianensis*, LECYTHIDACEAE, in Spanish coco de mono). There are more medicinal trees but the Barí do not like to reveal their uses even among themselves. I observed that the Barí forest has many trees that are used medicinally by other lowland South American peoples. For example, ***dijku*** (*Himatanthus sucuuba*, APOCYNACEAE) is used by the Kuna, Tikuna, Karijona, Waorani and Matshiguenga for many illnesses, including to get rid of stomach parasites (Duke and Vasquez 1994:89, Ventocilla, et al. 1995). The distribution of these medicinal trees is, with the exception of ***ahkaa***, quite sparse, and they are represented by few individuals. However, ***ahkaa*** is quite abundant and is also the preferred firewood tree. In all 33 forest plots and 3162 trees, ***ahkaa*** is found in 20 out of 33 forest plots and is represented by 209 trees (only surpassed by one other species of tree and one palm). In the forest plots, there are 250 medicinal trees represented by 6 (3.5%) folk-generics, forming 7.9% of all trees. Of these, 209 individuals are ***ahkaa*** and 32 ***bahku***.

The other main medicinal tree is ***bahku***. ***Bahku*** is less abundant. Although the Barí claim it is abundant and found everywhere, I recorded only 32 ***bahku*** out of 3162 trees, and it is found in 19 of 33 plots. In fact, ***bahku*** is found all over the forest around Saimadodyi, and other villages to the north and south of Saimadodyi. It is not found in the forest of plots 25 and 26 because the ***bahku*** trees were cut down for timber by the cattle ranchers of the region and in all the forest outside the Barí Indigenous Reserve and Park (Parque Nacional Sierra de Perijá). It is a good timber known as *bacu* in Venezuela and internationally as *Colombian Mahogany*, and is substituted for South American Mahogany (*Swetenia macrophylla*, MELIACEAE) in the market (Mabberley 1990, Pittier 1971). The Spanish word *bacu* is probably derived from the Barí ***bahku*** and has been known in the Venezuelan botanical literature since the early 1920s (Pittier 1948).

The general Barí population apparently makes very little use of medicinal plants. It appears that the Barí have lost a great deal of ethnomedicinal knowledge due to several factors. At first, as the other ethnographers who have conducted research among the Barí have observed (R. Lizarralde, pers. comm. 1993), there was no indication of use of medicinal plants with the exception powdered tobacco, ***ahkaa*** and ***karaña*** sap. Then, I started to get hints that there were "other" plants. However, some of the "other" plants are newly introduced ones such as cashew and lemon.

My inference is that traditional medicinal plant knowledge was possibly lost partially due to the high mortality rate from massacres and Western illnesses (Lizarralde and Beckerman 1982). With the high mortality caused by newly introduced Western illnesses, Barí shamans may have lost power and credibility due to the fact that they could not combat these illnesses effectively. The aggressive introduction of Western biomedicine has also disrupted their trust in their own ways of dealing with their sicknesses. As in other parts of lowland South America (Schultes and Reis 1995), these shamans did not regain the prestige and power they had in the past. This situation probably led to a lack of motivation to maintain this knowledge. This rejection becomes obvious because the Barí elders hold some resentment toward the young Barí who speak Spanish and have knowledge of the Western ways of medicine. In many instances, the Barí elders stated that they would not pass down this knowledge to them. Further, many Barí adults have mentioned to me that the ***Saimadodyi*** (ancient Barí) used to know many more medicinal plants than they do. In my research so far, the only medicinal plants are listed in the table below:

TABLE 7.6: MEDICINAL PLANTS WITH THE ILLNESS TREATED

Family	Genus & Species	Barí Plant Name	Medicinal use
Apocynaceae	*Couma macrocarpa*	ainogbáa	chicken pox
Bixaceae	*Bixa orellana*	túkdaa	heat rash
Burseraceae	*Protium* sp. 2	karaña	fever
Caesalpiniaceae	*Copaifera langsdorffii*	báahdā	skin fungus
Euphorbiaceae	*Sagotia racemosa*	ahkaa	verruca vulgaris
Guttiferae	*Clusia* sp. 1	shiow	skin infections
Guttiferae	*Clusia* sp. 2	dyera shiow	skin infections
Lecythidaceae	*Cariniana pyriformis*	bahku	erusio interdigitale
Lecythidaceae	*Cariniana pyriformis*	bahku	throat infections
Leguminosae	*Tephrosia sinapou*	báhki	tinea corporis
Leguminosae	*Tephrosia sinapou*	báhki	tinea versicolor
Piperaceae	*Piper darienense*	ishiránki	oral thrush
Piperaceae	*Piper darienense*	ishiránki	tooth ache

With all these medicinal plants available, although they are few in comparison to medicinal plants used by other Amerindians, the Barí still use them on only a few occasions. While these plants are easy to learn and abundant, not all the Barí knew them. On one occasion, I was walking on the hills of Abusanki (the ridges east of Saimadodyi) and asked four teenagers between 16 and 18 years of age if they knew a specific tree I pointed at. The tree was ***bahku*** (*Cariniana pyriformis*) but it had a hemiepiphytic tree on the top called ***shiow***, both medicinal plants. The young men all said they knew ***bahku*** but did not know ***shiow***. It was difficult to understand why they did not know ***shiow*** because it has remarkable diagnostic features that are easily recognized by any non-expert.

Thus it is not surprising that Schultes (1963:97-98) once wrote:

> Civilization is on the march in many, if not most, primitive regions. It has long been on the advance, but its pace is now accelerated as the result of world wars, extended commercial interests, increased missionary activity, widened tourism. The rapid divorcement of primitive peoples from dependence upon their immediate environment for the necessities and amenities of life has been set in motion, and nothing will check it now. One of the first aspects of primitive culture to fall before the onslaught of civilization is knowledge and use of plants for medicines. The rapidity of this disintegration is frightening.

Access to medico-ethnobotanical data is difficult not only due to the level of acculturation and westernization observed, as Schultes points out above, but also due to a complex set of several factors related to indigenous communities' struggles for power and prestige. Most outsiders do not get access to medicinal plant information due to a cultural taboo that prevents the Barí from sharing all their knowledge freely with non-Barí. Barí elders do not tell all their knowledge even to their children, relatives or other Barí when they feel they are not socially responsible enough to handle this information and possibly they thereby hold some power and prestige over other community members, especially the younger ones. According to their traditional lore, the Barí learned this knowledge from ***Sabaseba*** ("soft breeze," their creator) in ancestral times, and the good forest spirits (***Ichikbarí***) also provide this information from the forest. The Barí spiritual world is very important to them and a way to explain phenomena within their universe. I have also observed that even the most acculturated Barí still follow the spiritual rules closely for many things and seek the assistance of elders for these matters. It is for this reason that I saw few medicinal plants and trees being used and that the young people lack knowledge about them.

In order to be able to learn about their medicinal plants, my sister, Anne Lizarralde, who is a medical doctor, and I conducted a study of Barí responses to illness and their cultural conceptualizations for causes, explanations and treatments in two Barí villages (Saimadodyi and Bachichida). The traditional Barí response is that the wise Barí people, generally elder men, use very specific spells, as Buddhists use mantras, with the help of powdered tobacco stored in a small bottle gourd (4-5 cm diameter size). They need the special magical tobacco powder as a medium to make the spells powerful enough to eliminate illness. There are very few Barí elders who are the holders of these spells and they are very careful not to share these spells with anyone who is not cautious and responsible in their use. Some adult Barí men in their forties claim that nowadays the elders do not give away this knowledge at all because the Barí youth are not responsible enough to have this knowledge. The Barí also say that these youths do not have the capacity to concentrate their minds to make these spells effective.

In the 35 interviews, two people were named as the best healers. One was from Bachichida, who refused to give the names, causes and cures for illness. He acted very coolly and distantly to non-Barí even though he was a good friend of our father. The other knowledgeable healer was the grandfather of the headman's mother-in-law, who died without passing on his knowledge of medicinal plants and treatment of illnesses. Three other knowledgeable persons were later acknowledged from several villages. Our inquiries yielded the following information about death cases and disease prevalence and treatment during 1993-1994:

TABLE 7.7: DEATH CASES IN 1993-1994 FOR SAIMADODYI

Most common causes of death	Indigenous name of disease	age	sex	Botanical treatment
1. Pulmonary tuberculosis	Irokba	36	F	Loai*-tobacco
2. Hepatitis	Bukda	18	M	Loai-tobacco
3. Diarrhea with blood	Abi-shibo	1	M	Loai-tobacco
"	"	1 mo.	M	Loai-tobacco
4. Complications of pregnancy	Nabaja shirabaa	17	F	Loai-tobacco
5. Snake bite (*Bothrops asper*)	Sebakamba-shideajba	65	F	Loai-tobacco

* ***Loai*** is ***Protium*** sp. 4 (Burseraceae), used to hold tobacco powder on the skin and provide a good scent that scares the bad spirits (***dabidoú***).

TABLE 7.8: DISEASE PREVALENCE IN 1993-1994 FOR SAIMADODYI

Most common non-fatal illnesses	Indigenous name of disease	Botanical treatment*
1. Intestinal Parasitosis	Shirabaa	Tobacco
2. Viral respiratory infection	Irokbaa	Tobacco
3. Cutaneous Infection	Lajshi	Bishindu ishdā, ajkaa, báhki and sabóu
4. Fever	Sara	Tokwanshí
5. Diarrhea	Shiboo	Tobacco

* See Appendix D for botanical identification.

The Barí are well equipped to treat traditional diseases with their local plants. However, they are not able to treat newly introduced illnesses even though they seem physically quite strong to face them. For example, in Saimadodyi, a village of 320 people with a very high rate of morbidity, less than half the population has no apparent illness. With 48 cases (15 percent), it has the highest rate of tuberculosis in Venezuela (Dr. Juan Scorza, personal communication, 1994). Half of the Barí population in Saimadodyi have one to seven types of parasites and one-third have diarrhea with blood (Holmes and Scorza 1993:65). They also have many viral illnesses (Holmes and Scorza 1993).

With all this introduced illness, it is understandable that the Barí are indeed quite dependent on Western medicine and their traditional medicine could not be effective. The introduction of Western illnesses and medicines is definitely causing loss of the Barí traditional medicinal knowledge. This novel array of diseases may be the main reason there are not many medicinal plants being used by the whole Barí population.

CONSTRUCTION MATERIAL TREES

The Barí use 54.2% (1713) of the trees in the plots for house construction. There are 52 different folk-generics used that represent 30.4% of all folk-generics registered in the plots. There is variation in the trees used in different regions. In the first hectare of forest near Saimadodyi the potential use is 63.9% of trees (34.4% of folk-generics, see Map 1 and 2). In the region near Bachichida the second hectare plot yielded a potential use of 66.2% of trees (31.4% of folk-generics). In six plots near Saimadodyi the potential use was 47.4% of trees (35.2% of folk-generics); it is low because it has been used heavily and potential trees are missing. The two plots in Kumangda have a potential use of 46.9% of trees (27.3% of folk-generics); this figure is low because they are next to trails at the end of the forest where the Barí have used and depleted these trees heavily. The percentage of these trees in 32-year-old secondary forest on the site of old longhouses is quite low: 34.7% of trees (34.9% of folk-generics). The reason is that old longhouse sites are not the greatest source of house construction trees because the Barí do not bring the seeds or fruits of many of these trees back to the longhouse/village. The two hectares are characteristic of forest mildly used for house construction material. Therefore, in traditional times, the proportion of useful trees might have been higher because of the lower density of a less sedentary Barí population.

The first part of a house, which seems to be quite time-consuming to make, is the main posts made preferably out of ***karikaa*** ("cañaguato" in Spanish), because it lasts up to 20 years under the roughest conditions. It is known to provide "excellent timbers... [and is] possibly the most durable American wood" (Mabberley 1990:567). Mabberley (1990:567) states that some "400 year old beams in Panama [are] still in excellent condition." Therefore, it is not surprising that the Barí use it. The Barí spend considerable time splitting the heart of an old fallen tree. The ***karikaa*** sap wood rots away after ten or twenty years on the ground. These trees are very dense and hard to split: it requires steel tools and several days of work. Nowadays, they hire another Barí who has a power chainsaw and cut 12 posts that are 15x15 cm and 2 m long (each weighing about 40 kg). They cost about $12 of labor and oil to the house owner, for a house of 5 by 10 m for 6 to 8 people. ***Karikaa*** posts can be reused in at least two houses, if not more, and each house lasts about 10 to 12 years. On the 3161 trees in all my plots, only 10 ***karikaa*** were registered. In the flowering season during February and March 1993, I observed 150 to 200 ***karikaa*** within 5 km of Saimadodyi.

If they cannot find a proper ***karikaa***, the Barí will use two other timbers for main pillars: ***burubakaa*** (*Bulnesia arborea*, ZYGOPHYLLACEAE) and ***ogchiri*** (*Dialium guianense*, CAESALPINIOIDEAE). They are not as good as ***karikaa*** but they can last about 10 to 12 years. ***Burubakaa*** is the second choice, but it is difficult to find. I have not registered any ***burubakaa*** occurrences in my plots, although I have seen it in the forest. ***Ogchiri*** is used when the two previous trees are not found. Its numbers are relatively low. In all the plots, 14 ***ogchiri*** were found. Other trees that can be used as house pillars are ***agdodakaa*** (the names imply "as hard as stone", indeterminate), ***maama*** (*Vitex divaricata*, VERBENACEAE), ***lagshikaa*** (indeterminate), ***tratra*** (cf. *Cassipourea* sp., RHIZOPHORACEAE, heartwood like ***karikaa***), ***bradakaa*** (indeterminate, heartwood like ***karikaa***), ***shdakaa*** (indeterminate), and ***tumma***.

The Barí do not use all the potentially good timbers for posts because of various particular problems. For example, a very hard and non-rooting timber called ***bokshí*** (*Peltogyne purpurea*, CAESALPINIACEAE, known as purple heart in English) is not used because it is very difficult to split and quite heavy.

After the selection of the main house pillars, the Barí seek and collect in the forest the roof beams that will hold the palm-leaf thatch. Some parts of the roof require a very specialized type of tree, like ***twingbai*** (*Rinorea lindeniana*, VIOLACEAE), exclusively used for holding the highest ridge poles of the roof. Another important part of the house is the long, straight and thin beam (10-12 m long and 15 cm in diameter) that is placed parallel to the side walls and upper ridge of the roof. For this element of the house, the Barí prefer to use ***asogbogbaa*** (*Licania* sp. 1, CHYRSOBALANACEAE) and ***shkubabaa abama*** (*Brownea coccinea*, CAESALPINIOIDEAE). The secondary beams that act like ribs in the roof structure require less specialized tree trunks: ***agdodakaa*** (indeterminate), ***ahkaa*** (*Sagotia racemosa*, EUPHORBIACEAE), ***asagboo*** (*Chrysobalanus* sp., CHRYSOBALANACEAE), ***bagdrōw*** (*Micropholis* sp.?, SAPOTACEAE), ***bachinshiboroko*** (indeterminate), ***bichirabu*** (*Duguetia sp.*, ANNONACEAE), ***birinkaru*** (indeterminate), ***birokbogbaa*** (*Hirtella* sp.), ***bohkākaa*** (*Lindackeria paludosa*, FLACOURTIACEAE), ***bue*** (*Byrsonima spicata*, MALPIGHIACEAE), ***chirabubabai*** (*Oxandra* sp., ANNONACEAE), ***chirabu***, ***ishkubabaa*** (*Brownea coccinea* [small variety], LEG./CAESALPINIOIDEAE), ***keki***, ***kantaibi*** (indeterminate), ***kochínya*** (*Sloneae zuliaensis*, ELAEOCARPACEAE), ***kwi*** (*Sarcaulus* sp., SAPOTACEAE), ***lagshikaa*** (indeterminate), ***logsou*** (*Socratea exorrhiza*, ARECACEAE), ***lurii*** (*Ampelocera* cf. *edentula*, ULMACEAE), ***shiborokoo*** (indeterminate), ***shiboroko abama*** (indeterminate), ***shkubabaa abama*** (*Brownea coccinea* [big variety], LEG./CAESALPINIOIDEAE), ***shootogbaa*** (*Bellucia* sp., MELASTOMATACEAE), ***tarōkaa*** (*Eugenia* sp., MYRTACEAE), ***truntrunkaru*** (indeterminate), ***tumma*** and ***twingbai*** (*Rinorea lindeniana*). The general characteristic that they must have is to be resistant to rooting and termites. All these trees are found in the plots (see Appendix D for their abundance).

Over the second layer of roof beams, the Barí place a third layer of long segments (10 m by 3-4 cm wide and 1.5 cm thick) of palm trunk (especially ***keki***) parallel to the first roof beams, about 10-12 cm apart to hold the ***swai*** palm leaves. All the roof structure is held with many rolls of ***menda*** roots (*Asplundia sp.*, CYCLANTHACEAE). Then, the Barí bring big loads of ***swai*** leaves (*Geonoma stricta* var. *stricta*, ARECACEAE) to make the final layer of roof thatch on the houses. A regular Barí house in the present needs approximately 135-140,000 ***swai*** leaves (my estimates are similar to those of Beckerman, 1977:146). On the ridge of the roof, the Barí place leaves of ***bububuu*** (cf. *Chamaedorea pauciflora*). If ***swai*** is not abundant, they use ***arakta***.

Palms are the most important family of plants for Barí house construction. Also, all the fishing, hunting and agricultural implements are made from palms. All the roof thatching material is palm fronds and some of the structure is made of long palm trunks. All the wall materials are also split palm trunks. From an overall visual survey of all villages, it seems that more than half of the construction material of houses and other cultural material comes from palms.

The number of palms in the forest plots is quite high. I plotted 653 individuals of 9 folk-generics, representing 20.66% of all individuals in the plotted areas. The Barí recognize 30 different palm folk-generics, 16 of which do not occur in the plotted sectors of forest. Five other folk-generics occurred in the plots but were not counted because they were below the size of the trees plotted. They are all used directly as food, house construction material, technological raw material and firewood. One that is not registered in the plots because it was smaller than 10 cm in diameter at breast height is ***swai***, found almost everywhere and quite abundant in most plots. ***Swai*** provides the most important palm leaves for thatching houses and was the main leaf used when the Barí used to make longhouses. In the following table, I list all the known palms with identification and different types of uses for house construction:

TABLE 7.9: ALL KNOWN PALMS AND THEIR POTENTIAL USES IN HOUSE CONSTRUCTION

FOLK-GENERICS	W*	RS	R	# in P
1. Agdou (indeterminate)	-	-	s	4
2. Agdouda burubuu (cf. *Chamaedorea pinnatifrons*)	-	-	s	-
3. Arakta (*Attalea butyracea*)	-	-	s	83
4. Arihbæ (*Euterpe oleracea*)	-	s	s	44
5. Arihbæ bïï (*Euterper karsteniana*)	-	s	s	-
6. Arúu (*Oenocarpus bataua* var. 2)	s	s	s	101
7. Bosoobo téchi (cf. *Bactris* sp.)	s	-	s	
8. Burubuu (cf. *Chamaedorea pauciflora*)	-	-	p	6
9. Burubuu abama (cf. *Chamaedorea* sp.)	-	-	s	+
10. Burubuu apí (cf. *Hyospathe elegans*)	-	-	s	
11. Burubuu ito (cf. *Chamaedorea* sp.)	-	-	s	+
12. Dagda araktá (*Schelea macrolepis*)				
13. Dagyñ (cf. *Calyptrogyne ghiesbreghtiana)*	-	-	p	+
14. Darogbaa (*Bactris major* var. 2)	s	-	-	
15. Dyera Burubuu (cf. *Chamaedorea* sp.)	-	-	s	
16. Dyera Karigbái (*Bactris major* var. 3)	s	-	-	
17. Dyera Swai (*Geonoma* sp.)	-	-	s	+
18. Karigbái (*Bactris major var. major*)	s	-	-	102
19. Karigbái abama (cf. *Bactris* sp.)	s	-	-	-
20. Keki (*Oenocarpus mapora* Karst.)	p	p	-	276
21. Kiokbó (cf. *Oenocarpus mapora* {corozo})	s	s	-	-
22. Kúg'da (*Copernicia tectorum* [H.B.K.] Mart.)	s	-	s	-
23. Lagyísoi (*Wendlandiella* sp.)	-	-	s	-
24. Logsó (*Socratea exorrhiza*)	s	-	-	8
25. Logsó abama (*Socratea* sp.)	s	-	-	-
26. Swaí (*Geonoma stricta* Mart. var. *stricta*)	-	-	p	(many 1000s)
27. Tahtabaa (*Bactris major* var. 2*)*	s	-	-	-
28. Téchi (*Bactris macana*)	p	p	-	29
29. Téchi abama (*Astrocaryum standleyanum*)	p	p	-	-
30. Waibaaruu (*Oenocarpus bataua* var. 3)	-	-	s	-

* "W" is for material for walls; "RS" is for roof structure; "R" is for leaves used as roof thatch; "p" means primary use, "s" means secondary use. "# in P" is number of individuals registered in the sample plots (being equal to 10 cm or more in diameter at breast height of the chest); a "+" means that the folk-generics grows in the forest plots (but were too small to register).

Palms play an important role in providing material for houses not only among the Barí but also many other South American cultures, in this case reported for the Ka'apor, Chácobo, Panare and Tembé (Prance, et al. 1987:307-308). Their uses should be documented not only qualitatively but also quantitatively in the way done here. (The number of folk-generics of palms used can also be used as a control case to estimate how many folk-generics total the Barí know. If in my plots only 9 of the 30 known palm folk-generics occur, this ratio could be extrapolated to say that my research only accounts for approximately 30 percent of all the trees the Barí know. This extrapolation agrees with what one of the Barí elders said about my list of folk-generics that occurred in my plots, about "half to a third.") The number of trees used for house construction is quite similar to the Waimiri-Atroari of Brazil (Milliken, et al. 1992:119) or Tembe and higher than the Ka'apor, Panare or Chacobo (Prance, et al. 1987:309). For the Barí, constructing a good house is a ten-year investment and it has to be done well in order to maximize the time and effort invested in the hope that the house will last up to fifteen years as seen in many cases.

TECHNOLOGICAL USES OF PLANTS AND TREES

For the Barí, the forest is an essential ecosystem for the resources for all their material culture. In the forest plots, there are 1241 (39.2%) trees potentially useful for technology, represented by 29 (17%) folk-generics. The importance of trees or plants among the Barí is exemplified by two wild folk-generics, which also correspond to gender role divisions in Barí society and are used in every essential activity such as gathering, gardening, fishing, hunting, cooking or weaving. First, the most important folk-generics is ***menda*** (*Asplundia* sp., CYCLANTHACEAE), a vine. It is used for all the baskets and binding and tying materials. Second, the most important palm folk-generics is ***téchi*** (*Bactris macana*, ARECACEAE). It provides material for all bows, arrow tips, cooking utensils, weaving tools, fishing spears and digging/gardening tools. I could literally say that if the Barí did not have access to these two folk-generics, we would see people with a totally different material culture.

The baskets (***ĩhdã*** and ***dojsháida***) are quite an important cultural item among the Barí. Baskets are made only by women. They are containers for storage of food and other items and are used to carry things from one place to another. The primary basket material plant is ***menda***. It is found almost everywhere in Barí territory and is quite abundant. When the Barí are packing things in the forest, they generally use ***menda*** to tie things or packages. Then, they also collect two 4-meter-long pieces and about 12 three-meter-long pieces for making one large or more medium baskets. Their baskets are typical of lowland South America, with a single layer of diagonally split ***menda*** vine roots with the bark peeled off. This is the woven style of basket, called ***ĩhdã***, and is the common type.

With the baskets, the Barí use ***bahku*** fibers that are 5 cm wide and 150-180 cm long to make a belt/handle. They make a good loop to carry the baskets on the back with the ***bahku*** belt over their foreheads. The ***bahku*** fibers last quite a long time in humid conditions but become brittle when dried. All the baskets that are carried by women over the forehead or that are hung on the houses have ***bahku*** belts.

The Barí have a second type of basket that requires more intensive labor. It is also made out of ***menda***. The fibers are placed spirally, leaving no gaps, and woven tightly. This basket, called ***dojsháida***, is not common and making it is quite tiring for the hands because one needs to tighten the fibers at every movement. Once I had a Barí old woman make me one. While she was making it, she told me these baskets make the hands ache and that is why they do not make them often. The ***dojsháida*** basket is used to keep small things such as animal teeth for necklaces or seeds. I did not see this type of basket in most households.

In the forest, the Barí women manufacture a quick basket out of the leaves of ***keki***. They normally select one young tender leaf of ***keki*** and can make a small (30 cm wide by 40 cm tall) basket in 5 to 8 minutes. It is also called ***ĩhdã*** (which is a generic term for baskets).

The other two plants the Barí use as containers are bottle gourd (*Lagenaria siceraria*, CURCUBITACEAE), called ***doksoa***, and tree gourd (*Crescentia cujete* L., BIGNONIACEAE), called ***shiima***. The bottle gourd container is becoming rare, because the Barí lost the cultigen and no Barí have it in their garden. It is a small variety with a fruit 3-

4 cm in diameter. A few old men have this small vine gourd, but they are being buried with it or it is simply abandoned in old houses. The ***doksoa*** is used for keeping tobacco powder. The tobacco powder is quite important in healing events and these bottle gourds are valuable among traditional Barí.

The tree gourd, ***shiima***, is abundant and found in every village. Almost every house has one or two tree-gourd trees around it, each producing a couple of dozen gourds. The gourds vary from orange-size to coconut-size, rarely bigger. They were traditionally used as water containers to bring water to the longhouse. Today, the Barí use them keep seeds of different cultigens. They are rarely used in present times except as a cup.

The Barí traditional attire was a skirt for the women (still worn by some women today) and a loincloth for the men (no longer worn), which is still socially important as an exchange item. For skirts and loincloths, the Barí use cotton (*Gossypium hirsutum* L., MALVACEAE), called ***karãã*** in Barí. It is a cultivated plant. This cotton is normally grown in the garden next to their houses. A Barí woman had about four to five 2 m tall bushes. They yield 20-30 liters of cotton per season, which is dried on the soil under the hot sun. Then they spin it into a one-millimeter-thick string and make three or four 20-cm-diameter balls that weigh 700-750 grams. They need one ball of cotton to make a cylindrical skirt that measures 55 cm long by 45 cm wide (if cut open and laid flat it would be 90 cm wide). Most skirts weigh approximately 750 grams. The material is twice as thick as a heavy denim. The loincloth is quite small, around 12 cm wide and 30 cm long. The Barí men wear it folded over a string attached around the waist. The skirt (***dukduu***) and the loincloth (***tarikbaa***) were first worn when the girl became a woman with her first period or the boy became a youth and "too old" to walk naked (***atdakuu***). Traditionally made by the mother, the skirt was always given by the mother and the loincloth often by another man (an affines, ***ogdyũba***) chosen by the father (Beckeman pers. comm. 1997).

Each household with a woman in her late thirties generally has a loom for making ***dukdura*** (skirts) and sometimes one for making ***tarikbaa*** (loincloths). For making the skirts and loincloths, the Barí make a loom with four 5-cm-diameter tree trunks of a wood that is durable and light, such as ***asogbogbaa*** (*Licania* sp. 1, CHRYSOBALANACEAE), ***birokbogbaa*** (indeterminate, SAPOTACEAE), ***bohkããkaa*** (*Lindackeria paludosa*, FLACOURTIACEAE), ***karigbai*** (*Bactris major* var. *major*, ARECACEAE), ***kochínya*** (*Sloneae zuliaensis*, ELAEOCARPACEAE), ***kúii*** (*Sarcaulus* sp., SAPOTACEAE), ***lurii*** (*Ampelocera* cf. *edentula*, ULMACEAE), ***maama*** (*Vitex divaricata*, VERBENACEAE), ***shiborokoo*** (indeterminate), ***shkubabaa abama*** (*Brownea coccinea*, CAESALPINIOIDEAE), ***shóotugbaa***(*Bellucia* sp., MELASTOMATACEAE), or any wood that is also used for the skeleton structure of the hut's roof. They often use pieces of wood from old houses (Beckerman pers. comm., 1997). For the horizontal part of the loom structure, ***karigbai*** or any light 5-cm-diameter branch is good. They are attached with the roots of ***menda*** (*Asplundia* sp.).

With the loom for weaving, the Barí also use three types of tools. The first is a short bone awl (20 cm long), generally made out of the ulna of a spider monkey or sometimes the fibula, used to batten the fibers. They also make a longer flat, pointed palm-wood spatula and two or three long flat sticks to hold the textile fibers in place. The Barí used a pointed thin flat spatula made out of ***téchi*** (*Bactris macana*, ARECACEAE) to push together the cotton strings to make a tight weave. It is normally a bit wider than the woven skirt (45 cm) or the width of the loincloth (12 cm).

For cleaning the house, the Barí make a broom out of the leaves of a palm, preferably ***arúu***. Normally, they pull out the leaves that are not open yet, so their fibers are soft enough for molding into the shape they want. They usually select palms that are a few feet tall, so it is easy to get the selected leaves. There are generally one or two in that stage in most of the forest plots. This type of brooms were likely to be borrowed from Spanish speaking peasants. Beckerman saw in the houses brooms that were made from old fire fans made out of guan feathers (pers. comm., 1997).

Traditionally, the Barí use two types of bows. One is a longbow called "***karii,***" meaning "bow," in Barí, made out ***techi*** palm wood. The other bow is a short flat type generally used for shooting fish and small birds, called ***atakarii***. For use with the ***atakarii*** bow, especially for hunting birds, the Barí use simple straight stick arrows called ***shinshii***. The longbow string is made from a plant called ***bii*** (cf. *Pitcairnia* sp., BROMELIACEAE). The Barí use the inner fibers, which are quite long and easily removed from fresh leaves. The ***bii*** plant is restricted to specific forest patches or cultivated in the slash-and-burn gardens. If ***bii*** is not available, two other plants can be used for longbow strings. The Barí in Saimadodyi told me that ***karigkogbai*** (cf. *Bromelia* sp., BROMELIACEAE) can be used and it is quite abundant along the trail leading toward the southwest from Saimadodyi. A second plant, a palm called ***téchi abama*** (*Astrocaryum standleyanum*), possibly the one reported by Beckerman (1977:147), has fibers that can be used as bow strings that are extracted from the young leaves.

The Barí make five main types of arrows for hunting (***chii***, ***sangbaa***, ***dohkwe***, ***karakdongsaa*** and ***shinshii***). The first arrow, ***chii***, is made with a barbed point of ***téchi*** wood. The second arrow, ***sangbaa***, is for birds. It has a flat tip to stun the birds. The "point" is made of ***téchi*** palm wood. The third arrow, ***dohkwe***, is a harpoon type of arrow with a foreshaft of ***chirabu*** wood. A 180 cm long (sixteen strands of 1mm thick strings) string made of the fibers of ***bii*** is used to attach the foreshaft to the base of the metal point, called ***oran***. The glue used to keep the string, metal point and other woods together is ***loai*** (*Protium* sp. 4, BURSERACEAE). The main shaft is arrow grass, called ***chíikãã***, made from the flower of a very large grass also called ***chíikãã*** (*Gynerium sagittatum* subsp. 1, POACEAE). ***Chíikãã*** does not grow wild but is cultivated. Each village has at least one ***chíikãã*** field shared by most men. However, an alternative shaft material is collected from the stem of ***darun*** (cf. *Maranta* or *Calathea* sp., MARANTACEAE) that is found everywhere in the forest. For quickly-made disposable arrows, called ***shinshii***, they use three types of palm leaves: ***arakta***, ***arúu***, and ***logsou*** (*Socratea exorrhiza*).

For hunting, the Barí make blinds that look like little igloos 150 cm tall and 2 meters wide at the base called ***numbii***. They are made of the leaves of ***keki***, ***arakta***, ***arúu***, and ***kugdaa*** (*Copernicia tectorum*). The reason for using ***keki*** leaves is that agoutis (***kua***) eat the fruit of ***keki*** (called ***kiogbo***). The ***keki*** fruit is available mostly in October, although it is available in small amounts in other months.

For fishing, the Barí use a 3-5 meter long spear that is 7-8 mm thick with the point being the sharpened shaft of ***téchi*** palm (*Bactris macana*). They manufacture several at a time and normally take two of them on a fishing trip. It is easy to make for an expert, and they are very good at straightening it with their teeth when it is still green and with heat over the fire. The Barí culture would not be the same without this fishing spear, called ***shugdaa***, because it is the main tool to obtain 30 to 50 percent of the consumed protein in the present and 75% in the past (Beckerman 1980, 1983b, 1983). As an auxiliary tool, the Barí use the smaller bow described above to shoot shorter ***shugdaa*** (150-220 cm).

To make the ***shugdaa***, bows, and arrow tips, the Barí use a knife or machete blade hafted perpendicularly to a 30-35 cm long and 2.5 cm wide handle. This handle, called ***tagbaaba***, is made out of a piece of stem of ***karãã*** (*Gossypium barbadense*), ***aruugta*** (petiole of the lower part of the ***arúu*** leaves, *Oenocarpus bataua* var. 2), stem or petiole of ***karigbai*** (*Bactris major* var. *major*) and petiole of ***arakta***. It is an implement that every household has.

On some fishing expeditions, especially in small creeks where there are many big boulders, the Barí use a type of fishing poison, called ***bahkii*** (*Tephrosia sinapou*, PAPILIONOIDEAE). This poison is known to be quite destructive because it kills all the living organisms in the sections of the creeks where ***bahkii*** sap was spread. The Barí normally have about one or two dozen ***bahkii*** bushes growing by their house or gardens, ready to be used when needed.

Hammocks, called ***boo*** or ***booshoró*** in Barí, were quite important in the past but few people have or make them in the present. Before the Barí had access to commercially made hammocks, they made their hammocks with the fibers of a semi-domesticated bromeliad plant called ***karikobai*** in Barí (*Bromelia* sp.?, BROMELIACEAE). Another plant used for fibers for hammocks is ***bü*** (*Pitcairnia* sp., BROMELIACEAE). Both plants do not seem to occur naturally in the wild, but are managed in patches in specific areas of the forest, near the sites of old longhouses. The fibers of these plants are extracted from the leaves and left to dry. Then, they are spun into a 3 mm thick rope. The Barí hammocks are not attractive and look rather rustic, but they last many years and are quite strong. Nowadays, very few people make them, as it is considered too much work. They prefer to buy hammocks, even though they are quite expensive for the Barí.

For quick hammocks or jungle hammocks, the Barí also use the inner bark of ***bahku***. ***Bahku*** bark sections of 3 meters length and 2-3 cm wide are peeled and woven in the same way as they do for the mats (crossed perpendicularly).

Another important item of material culture among the Barí is the mat (***shidaa***) used to sit or lie on to rest or take a nap on hot afternoons. It is made with two materials. One is the inner bark fibers of ***bahku***. The Barí cut sections of the root or trunk bark that peels off in long sections up to four or five meters and three or four centimeters in width. The other material is sections of the petiole of a palm leaf, ***keki***. (The Barí call the ***keki*** leaves ***kitata***.) It seems that ***waibaaruu*** (*Oenocarpus bataua* var. 3) leaves are also used for mats (Beckerman 1977:147).

Cooking hardware made from plants is mostly spatulas and skewers for picking up food. Traditionally, they made spatulas and spoons from tree bark. For a kitchen utensil, the Barí also use the bark of ***ainogbaa***, still attached to the wood, as a grater called ***tungtungbaa***. It is still used for grating sweet manioc. The tender leaves of a palm called ***keki*** or a small Heliconia called ***tagtaa*** (*Heliconia* sp.) are used to wrap a mixture of mashed bananas and manioc for cooking. ***Tagtaa*** leaves are also used as dishes and to wrap many food items. For the fire, besides the ***rurugsaa***, which is a fan made out of feathers, they use another fan made out of the leaves of ***ohbaï*** (*Carludovica* sp., CYCLANTHACEAE). From the leaves of ***ohbaï***, the Barí extract fibers that they weave into a band that goes around the head to keep the hair off the forehead. These headbands, called ***someme***, are used by men when they work at home on their arrows.

For decoration, the fruits of ***mamayõgba*** (*Genipa americana* L., RUBIACEAE) were used traditionally as a dye to paint the body. ***Mamayõgba*** is found in most parts of Barí territory except the high part of Abusanki (in Venezuelan maps as Abusanqui, a Barí word for 'ridge') and on the Sierra de Perijá. In the present, they do not use this fruit as a body dye any more. A couple of old men remember when they used to paint their bodies with ***mamayõgba*** fruits, sometimes drawing lines on the torso, arms and legs.

Before contact when Western types of soap were not available, the Barí used the pulp of the fruit of ***kóba*** as soap. It is smelly but, according to my informants, it cleans the skin well. Nowadays, no one uses it and most young people do not know about it.

One last interesting item of the Barí technological kit is the tools to make fire, the fire sticks, called ***birog'shi***. They seem to keep a set of sticks to make fire in the house, even though they have matches, just in case of need. It is made of the stems of the vine ***bishima*** (indeterminate). They also use the stem of a little tree called ***shinko*** (*Theobroma* sp. 5, STERCULIACEAE). These sticks are two centimeters in diameter and 60 cm long. To make fire, they vigorously spin one stick with their hands on the other, making tiny coals in 10-15 minutes. These coals are collected and put in a bunch of dry palm leaves (any kind), to make the fire. Nowadays, not many people know how to make them or where to find the vines needed for it.

TREES FOR THE MARKET

There are several trees used by the Barí as a source of cash. In the forest plots, there are 170 (5.5%) trees potentially useful as commercial timber, represented by 7

(4.1%) species. These are ***daiba*** (*Cedrela odorata*, MELIACEAE), ***báahdã***, ***buyógbaa*** (*Swietenia odorata*, MELIACEAE), ***chirabu***, ***karikã***, ***tumma*** and ***bahku***. There are two more trees not found in the plots but relatively abundant in the forest which are ***karikã abama*** (*Tabebuia pentaphylla*, BIGNONIACEAE) and ***bwai bojkbá***. Two of these species, ***daiba*** and ***bahku***, are heavily used as timber and are quite abundant. Unfortunately, they are being depleted in some parts of the Barí territory and all have been eliminated in the former Barí territory. ***Bahku*** and ***daiba*** trees are absent in villages inside or between ranches because Venezuelan ranchers have cut them all. As a result Barí in these areas do not have the material culture that requires the bark of ***bahku***.

In the southern part of the Sierra de Perijá park, where ***bahku*** trees can be carried down river from Dyera village (20 kilometers south of Saimadodyi) to Bokshí (on the Colombian side of the Rio de Oro), the Colombian traders are buying this wood from the Barí at the price of 2 million Colombian pesos (US $2500@800 per dollar) per canoe or truck load. The Colombian traders are also buying 1 meter pieces of ***bahku*** roots for 1000 pesos ($1.25). The roots have a strong bitter compound in their bark that is desired as a medicine in Colombia. The Barí village of Orokorí managed to sell 1500 2 m pieces of ***bahku*** roots at $2.50 each for US $3750 in early 1994. They tried to sell another load of ***bahku***, but the Barí territorial headman of Bokshí stopped them and forbade them and any other Barí to sell ***bahku*** roots, because it is depleting the ***bahku*** tree population in the area. The temptation to sell these trees is very high because it provides a huge amount of money for them, while it takes a full day of hard work to earn just one dollar on a ranch. Peasants are also trying to sell as much ***bahku*** root as possible on the forest lands southeast of the Perijá park. ***Bahku*** is becoming the green gold, but this could be quite destructive to the survival of this beautiful tree, which has multiple uses for the Barí and other people (medicine, technology, handicrafts and lumber). Otherwise, the normal peasant work provides a minimal amount of money in this quite economically deprived environment.

In the villages that still have natural rainforest, the Barí are also cutting down ***daiba*** (*Cedrela odorata* L., MELIACEAE) to obtain cash. For example, in March of 1994, a man cut one tree, 35-40 meters tall and 140 cm of diameter, and sold 15 cubic meters in 240 boards for $6,666 (Bs800,000 @ 120 per $1). The most typical reply I have been getting from these Barí is that they need the cash to pay for the boarding schools their children go to at the missions, for medicines and lastly for food and Western goods. Due to the high cost of mission boarding schools and medicine, the Barí do not have any choice other than cutting these trees to subsidize the success and survival of their family members.

The good news is that the Barí leaders and organizations are aware of the danger of cutting down all these commercially important trees. They know something needs to be done for posterity. Both the Venezuelan and the Colombian Barí federations have policies with the goal of protecting these trees. The question is whether they will be able to protect these two trees in time before they become extinct in the region (which would be total extinction for ***bahku***).

GAME ANIMAL FOOD TREES

Even though it is not so apparent, the trees that provide food for the animals that are hunted, called game animal food trees, are quite important and well known. When the Barí walk in the forest in groups, all of them get exposed to remarks about what game is visiting these trees. Women, girls and boys hear the men's observations as to where they are going to ambush a paca (*Agouti paca*) or agouti (*Dasyprocta punctata*) that evening. Trees like ***logsorologsoro*** (cf. *Gustavia* sp., LECYTHIDACEAE) are well known even though they do not have any particular cultural use. These trees are of considerable cultural significance to the Barí. Their combination of salience and importance as a food source for the major animals hunted makes these trees an important component of their environment and subsistence.

Of all the forest trees that I analyzed, the Barí consider about 98% (3013) representing 162 (94.7%) folk-generics, to be potential food for the game they hunt. Almost all the trees are eaten by three species of Amazon parrots and two species of peccaries, according to the Barí. On the two hectare plots, I recorded 97 and 96 percent of trees as game animal food trees. This figures is not so different from the 82 percent recorded by Zent (1995) among the Piaroa of the Venezuelan Amazon. I have not gathered concrete evidence, but I believe there is an unintentional modification of the forest. The Barí prefer to hunt along traditional trails that are still used for hunting only. These trails appear to have a great number of fruit trees for both human and animal consumption. I believe that the high occurrence of these trees along trails is due to unintentional planting in the same way that *Spondias mombin* is distributed (see p. 141). This phenomenon has been observed by Zent (n.d.) among the Piaroa, who modify the forest, increasing the number of trees that produce more food for the game animals. Among the Barí, it is possible that they modified the forest before contact to increase the food source of their preferred game animals.

CONCLUSION

The Barí do show a detailed knowledge of the use of their forest. This knowledge has not been fully explored quantitatively. If we exclude the tree folk-generics lacking information about use, which tend to be the ones with unclear identity and seldom recognized with a specific label, the general use of both hectare plots (H1 and H2) increases to 68-72% for folk-generics and 84-87% for all trees. Therefore, the level of Barí use of the forest (percentage of species) is quite similar to the other Amazonian societies that I referred to above. There is evidence of the anthropogenic modification and composition of this forest, e.g., the distribution of groves of certain folk-generics of trees, such as ***baroo***. Firewood is the most frequent and complex use in terms of numbers of trees and folk-generics. The medicinal tree knowledge is quite low in terms of numbers of trees and folk-generics. The detailed knowledge of animal food trees is outstanding, 155 taxa and 95.2% of forest trees, but there are no comparable data from elsewhere because these trees do not get enough attention in other studies, with the exception of Zent's (n.d.). Due to a noticeable transition in their subsistence pattern, the Barí are gathering and hunting less in the forest and cultivating cash crops or selling their labor more often. This labor shift, in turn, is causing a loss of 40 to 60% of this knowledge in a single generation. The indigenous blueprint for forest use is rapidly disappearing and has not been recorded.

CHAPTER 8: CONCLUSION

> Man is, by nature, a classifying animal. His continued existence depends, in fact, on his ability to recognize similarities and differences among objects and events in his physical universe and to mark these similarities and differences linguistically. (Berlin, et al. 1974)

Classification is part of the process of the human mind's perception of nature, just as many other animals distinguish and relate to other organisms differently. In order to relate to the environment, human populations need to assign categories of different levels, arranging objects in groups and labeling these groups. To be able to lump objects into groups and distinguish one group from others, the human mind has to assess similarities and contrasting characteristics. After these processes, humans can start using concepts and names consistently and communicate their impressions of the surrounding objects, plants and animals to other humans. Then, they can begin the complex task of discovering the uses of the objects because they can distinguish the 'thing' and associate this discovery with 'thing 1.' As part of taking care of each others as social beings, the discovery of 'thing 1, 2, 3, x' is transmitted to other humans. This process, which took 250,000-200,000 years, is discussed in the work by Berlin (1990, 1992), Conklin (1964), Kay (Kay 1971), Donald (1991) and Lévi-Strauss (Lévi-Strauss 1966). Berlin, Conklin and Kay set forward the theory of the process of human perception, naming and classification of the environment. The next question is: Do people have a name for all the species present in their ecosystem? Which things (species) live in their environment and which ones do they know? If not all things are known, why not? How is this different from one person to another? One of the objectives of my research was to answer these questions for the Barí people and rainforest trees.

BARÍ ETHNOBOTANICAL KNOWLEDGE

The Barí have a refined perception of their rainforest vegetation. Their knowledge and the cultural importance of their forest allow them to perceive the smallest details. Their plants are classified in a way similar to what botanists and other indigenous people have done. They are able to label all the trees with a taxonomic term and recognize them as belonging to different groups of plants and trees. Twenty informants interviewed were able to name 91.4% (15,339) trees out of 16,795 naming events presented in front of 3,162 trees plotted in 4.83 hectares of forest, to agree on the name for 79.6% (12,897) naming events and to identify 212 folk-generics.

My research suggests that individual Barí informants are able to know the name of all the trees by taxa if not by folk-generics or varietals. I estimate that the Barí recognize around 700 to 900 different types of trees (I am fairly confident based on names for 556 different plants I have recorded, see Appendix D). It is important to learn how this knowledge is used by the Barí, how it is communicated to others, and how it is represented cognitively. The Barí individuals learn this ethnobotanical knowledge from their extended kin and from people who share subsistence practices, normally kin and affines.

The Barí perception of vegetation types is expressed in various terms: ***daroo***, meaning 'vegetation;' ***kanda***, meaning 'forest;' ***daïg kanda***, meaning primary forest; ***aigdakashiobi mairoo***, meaning 'secondary forest'. The Barí perceive the forest as having two basic layers: ***nunkundaa***, plants growing between 0-2 m above the soil; and the canopy is called ***ashiaa***, where all the monkeys and large birds live. Most of the basic plant and tree parts are named as Western people do. Barí people use nine basic diagnostic features to identify trees: shape of the trunk, color and shape of the bark, fruits, flowers, size and shape of the leaves, shape of the crown of the tree, type and color of sap, shape of the root, smell and color of the inner bark. In the plant kingdom, the Barí recognize six major life forms: trees (***kaa***), palms (unnamed directly, but there is a suffix referring to their leaves: ***tata***, e.g., ***kitata*** for ***keki*** or ***aruutata*** for ***aruu***), large herbs (***tagta***), epiphytes (***korokonda***), grasses/ferns (***chiaigshiaig***), vines (***ishdā***). The differentiation between wild and domestic plants is absent among the Barí.

Of all the plants that the Barí name, I was able to record 556 different mutually exclusive terminal taxa, most of them folk-generics: 73 (13.1%) are varietals treated by the Barí as independent units of taxa; 197 are genera and 314 are species (see Appendix D for details). The Barí flora, at the moment, includes 77 botanical families. The number of scientific species and genera should be higher because not all the Barí taxa have been identified yet. Barí plant folk-generics are represented by a mononomial nomenclature (single gloss, 349 or 62.8%) and binomial specific nomenclature (two-word term, 207 or 37.2%). The Barí classification is highly sophisticated in that they recognize two scientific varieties of *Spondias mombin L.* (ANACARDIACEAE) as two totally different folk-genera.

The species of trees that are least known to most Barí are trees that are not biologically salient, represented by very few individuals (in most cases one individual in all plots) and have a restricted occurrence biogeographically. The Barí solve this problem by naming these trees either at a higher taxonomic level (family) or including them in one of the folk-genera that contains trees that share common biological characteristics. Overall, the most knowledgeable Barí (all the older men) were able to name all the trees they were presented with in the interviews, but not all were able to name all of them correctly, nor would a knowledgeable Western botanist specializing in the area.

Do the Barí know all the species in their environment? Berlin (1992) has pointed out that an organism that is perceptible (with the naked eye) and distinctive is likely to be named. Those organisms that are not visible or unrecognizable are unlikely to be named at all. In terms of trees, the Barí were able to name trees that were perceptible and distinctive with no problem. Some of the names were 'grab bag' categories for unknown or poorly known taxa, generally at the taxonomic level of folk-genera rather than folk-family. Therefore, the Barí are able to name and categorize all folk-generics that are perceptible (at least for trees as well as for ants or mosquitoes).

BARÍ VARIATION IN KNOWLEDGE

The variation in Barí knowledge of rainforest trees was perceptible and the data collected show it. People older than 40 years know more than younger people (80.5% instead 63.0%), men know more than women (83.0% versus 60.5%) and local people know more than non-locals (85.76% versus 69.80%, for men only because there are not enough data for women). Therefore, if we generalize from these data, I can state that older people know 17.5% more than younger people, men know 23% more than women and local people know 16% more than non-locals.

There is a need to stress that it is not only age that causes the increase in agreement but that there is a complicating factor, which is the effect of contact. Since the time of contact (1960), it is clear that there has been a loss of traditional knowledge in the younger generation, so that the young Barí at the time of the interview are not an example of the young Barí in pre-contact times. It is obvious that the younger Barí, especially between 25 and 35 years of age, must have known plants nearly as much as older people. My evidence is the case of Younger Man 1 (compare Figures 7.13 and 7.14). Therefore, it is not inaccurate to state that there is a 30-50% loss of traditional ethnobotanical knowledge among the Barí from one generation (people who were adults or teenagers at the time of the contact) to the next generation (Barí people who were born after the contact). This change is clearly observed in the shift of subsistence pattern, and the increase in bilingual ability and formal education. All these three variables increase in the younger generations and can be used as measurements of cultural knowledge loss.

Moreover, it is also clear that locality and gender play important roles in the distribution of knowledge, specifically ethnobotanical knowledge. Due to the genderization of subsistence activities, men know more about rainforest trees than women (20-25% more). Barí people who are local residents tend to have greater knowledge (20% more) than Barí who are similar but have come from an adjacent region.

Knowledge varies not only due to the age, gender and residency of the informant but also due to acculturation, shift of subsistence, bilingual ability and exposure to formal education. The shift of subsistence pattern from practicing hunting regularly to selling their labor to cattle ranchers and not using the forest also causes loss of knowledge (25%). The role of bilingual ability is complex, causing loss of knowledge for those who are not highly intelligent (35%), but having a lesser effect on individuals who are highly intelligent (10-20%). The exposure to formal education is related to change in knowledge (22% per every 5 years of formal education). These last three variables (shift of subsistence, bilingual ability and formal education) produce a greater reduction of agreement within age groups. It is possible that in pre-contact times (before 1960), younger people in their 20s and 30s knew about 85-95% of the trees for men and 75-85% for women if informants Younger Man 1 and Older Woman 1 are used as examples.

In order rigorously to test statistically the roles of all these variables on agreement (knowledge), a larger sample of informants, 50 to 100, is needed. One thing that is clear is that due to a noticeable transition in their subsistence pattern, the Barí are gathering and hunting less in the forest and cultivating cash crops or selling their labor more often. This subsistence shift in turn is causing a loss of 40 to 60% of this knowledge in a single generation. The indigenous blueprint for forest use is rapidly disappearing and has not been recorded in detail until now

BARÍ USE OF THE RAINFOREST

The Barí do show a detailed knowledge of the use of their forest. This knowledge has not been fully explored quantitatively. If we exclude the tree folk-generics lacking information about use, which tend to be the ones with unclear identity and seldom recognized with a specific label, the general use of both hectare plots (H1 and H2) increases to 68-72% for folk-generics and 84-87% for all trees. The Barí use of the forest (percentage of species) is quite similar to that of the other Amazonian societies that I referred to above (Chapter 7, p. 132).

Of all the plotted folk-generics, the Barí use directly (for food, fuel, medicine, construction, technology and timber) 120 (70.2%) of them. There is evidence for the anthropogenic modification and composition of this forest. Firewood is the most frequent and complex use in terms of numbers of trees and folk-generics. Medicinal tree knowledge is quite low in terms of numbers of trees and folk-generics. Detailed knowledge of game animal food trees is outstanding, 162 taxa (76.4%, or 94.7% for all taxa with information) of forest trees. On the one hand, the Barí seem to use the forest less than some other indigenous people in South America (e.g., Chacobo) in terms of number of species, if the number of folk-generic (similar to Western Genus) is not higher than the number of species. On the other hand, their use of the forest is quite high if tree percentages are taken as the measure of forest use.

In all forest plots, there are 1347 (42.6%) trees that provide food represented by 52 (24.5%) folk-generics; 2191 (69.2%) have the potential for use as firewood represented by 93 (43.9%) folk-generics; 250 (7.9%) are medicinal trees represented by 6 (2.8%) folk-generics; 1713 (54.2%) of the trees in the plots are used for house construction represented by 52 (24.5%) folk-generics; 1241 (39.2%) trees are potentially useful for technology represented by 29 (13.7%) folk-generics; and 171 (5.4%) trees are potentially useful as commercial timber, represented by 7 (3.3%) species. Of all the trees plotted, 81.9% (2591) are used directly for food, medicine, fuel, construction material, technology and commercial timber. (If these figures are computed on the total of trees with a complete set of information, the percentage of use is higher: trees 84% and folk-generics 70.2%).

RELEVANCE OF ETHNOBOTANY FOR THE FUTURE OF BIODIVERSITY

Most scientists nowadays are aware of the loss of forest and the loss of knowledge of organisms not known by Western science (Wilson 1992). Geographers, ecologists, and botanists, among other scientists, are concerned about this issue. The rate of destruction of the rainforest is "142,000 square kilometers a year, or 1.8%" (Wilson 1992:275). Along with the destruction of biodiversity goes the destruction of cultures that are intimately linked to this natural world.

South America alone has only 476 indigenous groups of the 1,200-1,500 languages that existed 500 years ago (Loukotka 1968, M. Lizarralde 1993). The spoken languages of only one third of these 476 groups will survive in the next ten to twenty years (M. Lizarralde in prep.). Only forty-two of these groups have been studied ethnobotanically, not all of them intensively (based on all the references I am able to locate). Therefore, only about 3% of these indigenous groups that existed in South America have been studied ethnobotanically. The situation in South America is typical of what is happening and has happened to indigenous people and their knowledge throughout the world.

Because their knowledge has not been valued and recognized, young people in all these groups do have any reason for learning it. It is known that valuing this knowledge and empowering the indigenous people living in these forests, would have great results for the protection of the forest and maintenance of this ethnobotanical knowledge (Gómez-

Pompa 1996, Gómez-Pompa and Del Amo R. 1994). Projects like the ones in the Maya regions provides good examples(Alcorn 1995, Atran 1993, Oldfield and Alcorn 1987, Posey and Balée 1989).

More research is needed to assist governments in solving ecological, social and environmental problems (e.g. finding plants and cultigens potentially useful in drought) and in preventing the destruction of the natural environment that could provide potential plant resources. (This problem is far more complex that I can cover in these pages.) Knowing what plants are in each ecosystem, how they are used by local people and their ecological importance could solve some of the current economic problems indigenous people and farmers are facing currently in all tropical regions. Otherwise, in trying to modernize and westernize, they seek to meet their needs by converting forest lands into cash crop fields or cattle pasture. In this process, valuable ethnobotanical knowledge is being lost with the death of elders, while young people are learning new things. They will not be able to bring this knowledge back from the grave but could get it from ethnobotanical studies, if the information is accessible to them (which is another problem).

THE BARÍ'S PERSPECTIVE ON THE RESEARCH

When I arrived in the Barí village of Saimadodyi in the summer of 1988, I was told that the death of the eldest knowledgeable man, Akaragdou, occurred days earlier. I was sad because I knew this man well and I felt an empty space in my heart. The younger Barí men were also perturbed by it and his message. They also wondered what was bringing me to their villages. When I told them about my research, they immediately told me that the old man said to "learn and maintain the ancient ways." They asked me to write down everything I heard, so they can read it in the future if they did not learn their ways. This is my task, to try to record the Barí ways, especially their ethnobotanical knowledge.

Without this knowledge of the value and importance of their trees, the Barí did not seem to see any reason to refrain from cutting them down and converting or 'improving' their land into cash crop fields and cattle pasture. They are aware that Barí elders do hold a great body of information about uses of rainforest trees. However, this knowledge is being lost very fast because it does not have any use in the acculturated life of the young people. They are also aware of the need for this knowledge to be recorded for them, for the preservation of their environment and for coming generations. If we lose this information, it would be a great loss for humanists and scientists because we lose a cultural and biological heritage. For the Barí, losing this knowledge is a disaster socially, ecologically and economically. Their wealth and survival is not in the land but in their forest. They are aware of it now and the objective of the Barí federations in Venezuela and Colombia is to protect their forest. The Barí are enthusiastic and supportive of this project as long as I produce material that will help them directly.

CONTRIBUTIONS TO THE BARÍ AND ANTHROPOLOGY

I am planning to return this information in written form (in simple Spanish) for them to use. However, I feel that I am just touching the tip of an iceberg and need to complete more research on their ethnobotanical knowledge.

Their documented knowledge can be used as legal material to claim and maintain property rights to their land, according to Venezuelan lawyers. If permitted and in a non-destructive manner, some of their forest products can be sold in the market. I have density information for the trees in the plots and the identifications of most of them. I will be able to check the potential of the resources that are on their land, for them to use.

My contribution to anthropology is to explore the perception, knowledge and use of the forest, specifically trees, with qualitative and quantitative information. I also investigated the knowledge variation and explore potential causes for it, stated above (see

Chapter 6). The data show acculturation and shifts in the traditional ways of life have affected their knowledge, causing knowledge loss. With the involvement of twenty informants, I am able to present data on variation in knowledge with the variables of age, gender and residence in an environment that they know. By mapping the trees and plots, I could also explore the spatial perspective of the knowledge, with the distribution and number of trees within the same kind and looking a large number of kinds at the same time. The number and characteristics of the trees were recorded in such a way that they could be integrated in to the analysis of forest tree perception and use. This research provides an interdisciplinary perspective on the indigenous perception of nature by using anthropological, botanical, forestry, and geographical approaches.

FURTHER RESEARCH ON ETHNOBOTANY AND THE BARÍ

At the moment, there is a great explosion of ethnobotanical research and scientists pouring everywhere to study peoples' knowledge of plants. There is a need to become more systematic and quantitative, in order to produce data that can be compared from one study to others, as Prance et al. (1987), Boom (1987), Balée (1994), and Phillips and Gentry (1993). The other approach is to study the plants extensively (e.g., Berlin et al. 1974, Wilbert 1986 and Hay 1974). To complete both approaches with every indigenous people would be best. Even better is to train indigenous people to carry out their own studies and work with them (Berlin et al. 1989, Ventocilla 1995). However, as I pointed out above, many groups are losing this ethnobotanical lore before being studied.

We are also facing a complex problem as stated below:

> The survival of Amazonia and indigenes are intimately interdependent. One of the keys to the future of Amazonia is to recognize the ecological knowledge, understanding, wisdom, practices, and rights of the original people of Amazonia as well as the fact that they have their own modes of economic development which in contrast to the Western modes are usually sustainable rather than destructive. (Sponsel 1992:245)

The Western world has made many mistakes in using other environments with the expectation that they will respond in the same way as their land. These other lands belong to other people who have their ways to use them and have tested their uses for many generations. It is time to mend mistakes, such as importing a cattle industry or cash crops to unsuitable lands, and find optimal solutions for a sustainable use of the environment. The Barí were induced into making this mistake with cattle raising, losing money from it for many reasons and cutting down the forest. The Barí realize that this in not profitable, but are not aware of the long-term ecological consequences of importing economies and technologies. They are also not aware of the economic potential of their ethnobotanical knowledge due to lack of information about national and international markets. It is very important that they get this information transmitted with the assistance of specialists who do not cause additional problems.

My research to date with the Barí people is just a fraction of what I need to do. Making more plots in other areas and near different villages is necessary as well as collecting more plant vouchers in order to make a complete inventory of their plant biota. At the moment, I am not sure what proportion of the plant biota was included in my research in the area around Saimadodyi. This area is part of one of the four territorial groups. Another aspect that my research did not touch deeply enough is the women's knowledge of the forest as well as the medicinal knowledge of plants. Their forest has more resources that I have covered, including vines, other plants and all the fauna. These other organisms need to be explored in detail.

Their knowledge, as well as the knowledge of many Amazonian peoples, is a rich resource for them as well as for us. To learn how to apply the uses of these plant resources is a challenge. The Barí are interested in other uses for the plants that they have. They also want to know how they can continue to live as they do now partially accustomed to Western goods and living in their forested areas without cutting down the forest. These are challenges that we need to face. The world, including indigenous people, is gaining an appetite for consuming Western goods that in turn increases demands on nature. It is a moment to wonder what direction we need to take with a world population that has surpassed by three times what can be supported with our type of living standards (Ponting 1991, Southwick 1996). This is the reason it is so important to try to preserve and appreciate the discoveries that many indigenous peoples have made in their environments.

The cultural diversity of many nations offers a vast arrays of otherwise forgotten alternatives for the sustainable use of diverse resources. As Anderson (Anderson 1996:175) states:

> No group has yet come up with a perfect plan for managing the environment. However, all societies have something to teach. The great benefit of anthropology is that it can bring together the combined wisdom of people from all times and places. Today, we need all the wisdom we can get, and only by pooling a wide range of human experiences can we survive.

I hope my work serves this purpose and helps bring about an improved future for the Barí and the human species.

REFERENCES CITED:

Abramovitz, Janet N.
1996 Sustaining Freshwater Ecosystems. In *State of the World: A Worldwatch Institute Report of Progress Toward a Sustainable Society*. L. R. Brown, ed. New York: Norton and Company.

Alcácer, Antonio de
1962 *El Indio Motilón y su Historia*. Bogotá: Paz y Bien.
1964 *Los Barí: Cultura del Pueblo Motilón*. Bogotá: Procer.
1965 *En la Sierra de Motilones: Sudores, Sangre y ... Paz*. Valencia: Domenech.

Alcorn, Janis B.
1984 *Huastec Mayan Ethnobotany*. Austin: University of Texas Press.
1995 The Scope and Aims of Ethnobotany in a Developing World. In *Ethnobotany: evolution of a discipline*. R. E. Schultes and S. von Reis, eds. Pp. 23-39. Portland: Dioscorides.

Alexiades, Miguel N., ed.
1996a *Selected Guidelines for Ethnobotanical Research: A Field Manual*. New York: New York Botanical Garden.

Alexiades, Miguel N.
1996b Standard Techniques for Collecting and Preparing Herbarium Specimens. In *Selected Guidelines for Ethnobotanical Research: A Field Manual*. M. N. Alexiades, ed. Pp. 99-126. New York: New York Botanical Garden.

Anderson, Anthony B., ed.
1990 *Alternatives to Deforestation: Steps Toward Sustainable Use of the Amazon Rain Forest*. New York: Columbia University Press.

Anderson, Eugene N
1996 *Ecologies of the Heart: emotion, belief, and the environment*. New York: Oxford University Press.

Anderson, James N.
1974 Ecological anthropology and anthropological ecology. In *Handbook of Social and Cultural Anthropology*. J. J. Honigmann, ed. Pp. 179-239. Chicago: Rand McNally.

Ans, André Marcel D´
1972 *Repertorios Etnobotánico y Etnozoológico Amahuaca (Pano)*. Lima: Universidad Nacional Mayor de San Marcos.

Arenas, Pastor
1981 *Etnobotánica Lengua-Maskoy*. Buenos Aires: Fundación para la Educación, la Ciencia y la Cultura.

1987 La etnobotánica en el Gran Chaco. IV Congreso Latinoamericano de Botánica: Simposio de Etnobotánica, Bogotá, 1987, pp. 35-52. Instituto Colombiano para el Fomento de la Educación Superior (ICFES).

Armellada, Cesáreo de
1948 Geografia y demografia: viajes de Perijá. *Venezuela Misionera* 10(113):164-169.

Arvelo, Lilliam M.
1987 Un Modelo de Poblamiento Prehispanico para La Cuenca del Lago de Maracaibo. Trabajo de Grado presentado como requisito parcial para optar al Titulo de Magister Scientiarum en Biologia mención Antropologia, Instituto Venezolano de Investigaciones Cientificas.

Atran, Scott
1990 *Cognitive Foundations of Natural History: Towards an Anthropology of Science*. Cambridge: Cambridge University Press.
1993 Itza Maya Tropical Agro-Forestry. *Current Anthropology* 34(5):633-700.

Balée, William L.
1989 Nomenclatural patterns in Ka'apor ethnobotany. *Journal of Ethnobiology* 9(1):1-24.
1994 *Footprints of the Forest: Ka'apor Ethnobotany —The Historical Ecology of Plant Utilization by an Amazonian People*. New York: Columbia University Press.
1995 Historical Ecology of Amazonia. In *Indigenous Peoples and the Future of Amazonia: an ecological anthropology of an endangered world*. L. E. Sponsel, ed. Pp. 97-110. Tucson: University of Arizona Press.

Balée, William L., and Anne Gély
1989 Managed Forest Succession in Amazonia: The Ka'apor Case. In *Resource Management in Amazonia: Indigenous and Folk Strategies*. D. A. Posey and W. Balée, eds. Pp. 159-173: Advances in Economic Botany 7.

Balick, Michael J.
1996 Collecting Palm Specimens. In *Selected Guidelines for Ethnobotanical Research: A Field Manual*. M. N. Alexiades, ed. Pp. 127-133. New York: New York Botanical Garden.

Balick, Michael J., and Paul Alan Cox
1996 *Plants, People, and Culture: The Science of Ethnobotany*. New York: Scientific American Library.

Barley, Nigel
1983 *The Innocent Anthropologist: notes from a mud hut*. London: Penguin.

Beckerman, Stephen

1976 Los Barí: sus reacciones frente a la contracción de sus tierras. In *Tierra, Tradición y Poder en Colombia*. N. S. Friedemann, ed. Pp. 65-83. Bogotá: Instituto Colombiano de Cultura.

1977 The Use of Palms by the Barí Indians of the Maracaibo Basin. *Principes* 21(4):143-154.

1978 Datos etnohistóricos acerca de los Barí (Motilones). *Montalbán* 8:255-327.

1980 Fishing and Hunting by the Barí of Colombia. *Working Papers on South American Indians* 2:67-109.

1983a Barí swidden gardens: crop segregation patterns. *Human Ecology* 2(1):85-101.

1983b Carpe diem: an optimal foraging approach to Barí fishing and hunting. In *Adaptive Responses of Native Amazonians*. R. B. Hames and W. Vickers, eds. Pp. 269-299. New York: Academic Press.

1983c Does the swidden ape the jungle? *Human Ecology* 2(1):1-12.

1987 Swidden in Amazonia and the Amazon Rim. In *Comparative Farming Systems*. B. L. Turner and S. B. Brush, eds. Pp. 55-94. New York: The Guilford Press.

1991a Barí spear fishing: advantages to group formation? 19(4):529-554.

1991b The equations of war. 32:636-640.

1994a Barí. In *South America*. J. Wilbert, ed. Pp. 82-85. Encyclopedia of World Cultures, Vol. VII. Boston: G.K. Hall & Co.

1994b Homege to San Sebastian: or, Why do the Barí have so many different kinds of arrows? *Boletin Museo Arqueologico de Quibor* 3:37.

Beckerman, Stephen, and Roberto Lizarralde

1995 State-tribal warfare and male-biased casualties among the Barí. 36(3):497-500.

Beckerman, Stephen, and W. Sussenbach

1983 A quantitative assessment of the dietary contribution of game species to the subsistence of South American tropical forest peoples. In *Animals and Archaeology I: Hunters and their Prey*. J. Clutton-Brock and C. Grigson, eds. Oxford (England): British Archaeological Report.

Behrens, Clifford A.

1991 Applications of satellite image processing to the analysis of Amazonian cultural ecology. In *Applications of Space-Age Technology in Anthropology*. C. A. Behrens and J. C. Stennis, eds. Pp. 9-33. NASA, Science and Technology Laboratory, John C. Stennis Space Center, Mississippi: National Aeronautics and Space Administration.

Behrens, Clifford A., Michael G. Baksh, and Michel Mothes

1994 A regional analysis of Barí land use intensification and its impact on landscape heterogeneity. *Human Ecology* 22(3):279-316.

Bennett, Ian M.

1991 Barí Loricarid collection and the value of information: an application of optimal foraging theory. *Human Ecology* 19(4):517-527.

Benz, Bruce F. , Francisco Santana M., Rosario Pineda L., Judith Cevallos E., Luis Robles H., and Domitila de Niz L.
1994 Characterization of mestizo plant use in the Sierra de Manantlan, Jalisco-Colima, Mexico. *Journal of Ethnobiology* 14(1):23-41.

Berlin, Brent
1972 Speculations on the growth of ethnobotanical nomenclature. *Journal of Language in Society* 1:51-86.
1973 Folk systematics in relation to biological classification and nomenclature. *Annual Review of Ecology and Systematics* 4:259-271.
1981 The concept of rank in ethnobiological classification: some evidence from Aguaruna folk botany. In *Language, Culture and Cognition*. R. Carson, ed. Pp. 92-113. New York: Macmillan.
1984 Contributions of Native American collectors to the ethnobotany of the Neotropics. *Advances in Economic Botany* 1:24-33.
1990 The chicken and the egg-head revisited: further evidence for the intellectualist bases of ethnobiological classification. In *Ethnobiology: Implications and Applications: Proceedings of the First International Congress of Ethnobiology*. D. A. Posey, W. L. Overal, Charles R. Clement, M. J. Plotkin, E. Elizabetsky, C. N. d. Mota, and J. F. P. d. Barros, eds. Pp. 19-33, Vol. 1. Belém: Museu Paraense Emílio Goeldi.
1992 *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies*. Princeton: Princeton University Press.

Berlin, Brent, and Eloise Ann Berlin
1975 Aguaruna color categories. American Ethnologist 2 (Special Issue on Intra-Cultural Variation):61-87.

Berlin, Brent, Elois Ann Berlin, Thomas Duncan, Dennis E. Breedlove, Victor Jara Astorga, and Robert M. Laughlin
1989 Recent findings in Tzeltal-Tzotzil medical ethnobotany. 12th Annual Conference of the Society of Ethnobiology, University of California, Riverside, California, 1989.

Berlin, Brent, James Shilts Boster, and John P. O'Neil
1981 The perceptual bases of ethnobiological classification: evidence from Aguaruna Jívaro ornithology. *Journal of Ethnobiology* 1(1):95-108.

Berlin, Brent, Dennis E. Breedlove, and Peter H. Raven
1966 Folk taxonomies and biological classification. *Science* 154:273-275.
1968 Covert categories and folk taxonomies. *American Anthropologist* 70:290-299.
1974 *Principles of Tzeltal Plant Classification: An Introduction to the Botanical Ethnography of a Mayan Speaking Community in Highland Chiapas*. New York: Academic Press.

Boom, Brian M.
1987 Ethnobotany of the Chácobo Indians, Beni, Bolivia. *Advances in Economic Botany* 4:1-68.

1989 Use of plant resources by the Chácobo. In *Resource Management in Amazonia: Indigenous and Folk Strategies.* D. A. Posey and W. Balée, eds. Advances in Economic Botany 7: 78-96.

Boster, James S.
1981 How the Exceptions Prove the Rule: An Analysis of Informant Disagreement in Aguaruna Manioc Identification. Ph. D. Dissertation, University of California, Berkeley.
1984 Classification, cultivation, and selection of Aguaruna cultivars of *Manihot esculenta* (Euphorbiaceae). *Advances in Economic Botany* 1:34-47.

Brown, Cecil H.
1986 The growth of ethnobiological nomenclature. *Current Anthropology* 27(1):1-19.

Bulmer, Ralph
1970 Which came first, the chicken or the egg-head? In *Echanges et Communications: mélanges offerts à Claude Lévi-Strauss à l'occasion de son 60ème anniversaire.* J. Pouillon and P. Maranda, eds. Pp. 1069-1091, Vol. 2.The Hague: Mouton.
1974a Folk biology in the New Guinea Highlands. *Social Science Information* 13(4/5):9-28.
1974b Memoirs of a small game hunter: on the track of unknown animal categories in New Guinea. *Journal D'Agriculture et de Botanique Appliquée* 21:79-99.

Burton, M, and L. Kirk
1979 Sex differences in Masai cognition of personality and social identity. *American Anthropologist* 81:841-873.

Bye, Robert A., Jr.
1986 The use of voucher specimens in ethnobotanical studies and publications. *Journal of Ethnobiology* 6(1):1-8.

Cain, S. A., G. M. de Oliveira Casro, J. Murça Pires, and N. Tomâs da Silva
1956 Application of some phytosociological techniques to Brazilian Rain Forest. *American Journal of Botany* 43(10).

Cañada, Cruz, L.
1965 Los bosques pantanosos en la zona de San Lorenzo, Ecuador. *Turrialba* 15(3).

Cancian, F.
1963 Informant error and native prestige ranking in Zinacantan. *American Anthropologist* 65:1068-1075.

Candolle, Alphonse de
1959 *Origin of Cultivated Plants.* Second edition. Translated from the 1886 edition. New York and London: Hafner.

Carneiro, Robert L.
1978 The knowledge and use of rain forest trees by the Kuikuru Indians of Central Brazil. In *The Nature and Status of Ethnobotany*. R. I. Ford, ed. Ann Arbor: University of Michigan Press.
1983 Cultivation of manioc among the Kuikuru. In *Adaptive Responses of Native Amazonians*. R. Hames and W. Vickers, eds. Pp. 65-111. New York: Academic Press.

Castillo Caballero, Dionisio
1981 *Los Barí: su mundo social y religioso*. Salamanca: Naturaleza y Gracia.

Caulfield, C.
1982 *Tropical moist forests: the resource, the people, the threat*. London: International Institute for Environment and Development.

Clay, Jason W.
1988 *Indigenous Peoples and Tropical Forest: models of land use and management from Latin America*. Cambridge: Cultural Survival.
1990 Indigenous peoples: The miner's canary for the Twentieth Century. In *Lessons of the Rainforest*. S. Head and R. Heinzman, eds. Pp. 106-117. San Francisco: Sierra Club Books.

Coe, Felix G., and Gregory J. Anderson
1996 Ethnobotany of the Garífuna of Eastern Nicaragua. *Economic Botany* 50(1):71-107.

Conklin, Beth A., and Laura R. Graham
1995 The shifting middle ground: Amazonian Indians and eco-politics. *American Anthropologist* 97(4):695-710.

Conklin, Harold C.
1954 The Relation of Hanunóo Culture to the Plant World. Ph. D. Dissertation, Yale University.
1964 The lexicographical treatment of folk taxonomies. *International Journal of American Linguistics* 28:41-59.

Davis, E. Wade, and J. A. Yost
1983 The ethnobotany of the Waorani of eastern Ecuador. *Botanical Museum Leaflets* 29(3):273-297.

Davis, Kingsley, and Mikhail S. Bernstam, eds.
1991 *Resources, Environment, and Population: Present Knowledge, Future Options*. Oxford: Oxford University Press.

De Avila, Alejandro
1989 Herbs, flowers, quelites and woods: Mixtec plant nomenclature. XII Annual Conference of the Society of Ethnobiology, Riverside, 1989. University of California.

Denevan, William M., J. M. Treacy, J. B. Alcorn, C. Padoch, J. Denslow, and S. Flores Paitan
1984 Indigenous agroforestry in the Peruvian Amazon: Bora Indian management of swidden fallows. *Interciencia* 9:346-357.

Denslow, Julie S., and Christine Padoch, eds.
1988 *People of the Tropical Rain Forest*. Berkeley: University of California Press.

Descola, Philippe
1986 *La Nature Domestique: Symbolisme et Praxis dans l'Écologie des Achuar*. Paris: La Maison des Sciences de l'Homme.

Diamond, Jared M.
1966 Zoological classification system of a primitive people. *Science* 151:1102-1104.

Donald, Merlin
1991 *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (Massachusetts): Harvard University Press.

Dorsey, J. O.
1984 *Omaha Sociology*. Washington, D.C.: Smithsonian Institution Press.

Dougherty, J. W.
1975 A Universalist Analysis of Variation and Change in Color Semantics. Ph.D. Diss., University of California.
1978 Salience and relativity in classification. *American Ethnologist* 5:66-80.

Dove, Michael R.
1996 Center, periphery, and biodiversity: A paradox of governance and a develomental challenge. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. S. B. Brush and D. Stabinsky, eds. Pp. 41-67. Washington D.C.: Island Press.

Duke, James Alan, and Rodolfo Vasquez
1994 *Amazonian Ethnobotanical Dictionary*. Boca Raton: CRC Press.

Ellen, Roy
1986 Ethnobiology, cognition, and the structure of prehension: some general theoretical notes. *Journal of Ethnobiology* 6:83-98.
1979 Omniscience and ignorance: variation in Nuala knowledge, identification and classification of animals. *Language and Society* 8:337-364.

Emmons, Louise
1990 *Neotropical Rainforest Mammals: a field guide*. Chicago: University of Chicago Press.

Ford, Richard I., ed.
1978 *The Nature and Status of Ethnobotany*. Ann Arbor: University of Michigan.

Förster, M.
1972 Einige Beobachtungen über die Zusammenhänge zwischen Standort und Vegetation in einem tropischen Regenwaldgebiet Kolumbiens. *Allgemeine Forst- und Jagdzeitung* 143(1):76-98.
1973 Strukturanalyse eines tropischen Regenwalds in Kolumbiens. *Allgemeine Forst- und Jagdzeitung* 144(1).

Frake, Charles O.
1962 Cultural ecology and ethnography. *American Anthropologist* 64:53-59.

Franquemont, Christine R.
1988 Chichero Plant Categories: An Andean Logic of Observation. Ph. D. dissertation, Cornell University.

Fuentes, Emilio
1980 Los Yanomami y las plantas silvestres. *Antropológica* 54:3-138.

Furbee, Louanna, and Robert A. Benfer
1983 Cognitive and geographic maps: study of individual variation among Tojolabal Mayans. *American Anthropologist* 85:305-334.

Gal, Susan
1973 Inter-informant variability in an ethnozoological taxonomy. *Anthropological Linguistics* 15(4):203-219.

Garro, L.
1986 Intracultural variation in medical knowledge: a comparison between curers and non-curers. *American Anthropologist* (88):351-370.

Gentry, Alwyn H.
1988 Changes in plant community diversity and floristic composition on environmental and geographical gradients. *Annals of the Missouri Botanical Garden* 75:1-34.
1990 Speciation in tropical forests. In *Tropical Forests: botanical dynamics, speciation and diversity*. L. B. Holm-Nielsen, I. C. Nielsen, and H. Balslev, ed. London: Academic Press.
1993 *A Field Guide to the Families and Genera of Woody Plants of Northwest South America*. Washington: Conservation International.

Gines, Hermano, and Ernesto Foldats
1953 Aspecto geobotanicos de la Región. In *La Región de Perijá y sus Habitates*. H. Gines, ed. Pp. 327-340. Caracas: Sociedad de Ciencias Naturales La Salle.

Gines, Hermano, and Pedro Jam
1953 El medio geografico. In *La Región de Perijá y sus Habitates*. H. Gines, ed. Pp. 15-22. Caracas: Sociedad de Ciencias Naturales La Salle.

Glenboski, Linda Leigh
1975 Ethnobotany of the Tukuna Indians. Ph. D. Dissertation in Anthropology, University of Alabama. Ann Arbor: The University Microfilms International.

Gómez-Pompa, Arturo
1996 Three levels of conservation by local people. In *Biodiversity, Science and Development: Towards a New Partnership*. F. D. Castri and T. Younès, eds. Paris: CAB International and International Union of Biological Sciences.

Gómez-Pompa, Arturo, and Silvia Del Amo R.
1994 Sostenibilidad y participación campesina: un mecanismo para establecer un programa a largo plazo, en el trópico. In *Agroforestería en Desarrollo: Educación, Investigación y Extensión*. L. Krishnamurthy and J. A. Leos-Rodríguez, eds. Chapingo (México): Universidad Autónoma Chapingo.

Goodenough, Ward H.
1957 Cultural Anthropology and Linguistics. In *Georgetown University Monograph Series on Language and Linguistics 9*. P. Garvin, ed. Pp. 167-173. Georgetown: Georgetown University.

Goodland, R. J. A., and H. S. Irwin
1975 *Amazon Jungle: Green Hell to Red Desert? An Ecological Discussion of the Environmental Impact of the Highway Construction Program in the Amazon Basin*. Amsterdam: Elsevier.

Gould, Stephen Jay
1979 A quahog is a quahog. *Natural History* 88(7):18-26.

Gould, S. J., and R. C. Lewontin
1979 The spandrels of San Marco and the panglossian paradigm: A critique of the adaptationist programme. *Proceedings of the Royal Society of London, Series B* 205:581-598.

Gragson, Ted L., and Stephen Tillett
1995 Aportes a la etnobotánica de Venezuela. 2. Ehobotánica de los Pumé. *Ernstia* 5(3):89-120.

Grenand, Pierre
1980 *Introduction à l'Étude de l'Univers Wayãpi: Ethnoécologie des Indiens du Haut-Oyapock (Guyane Française)*. Paris: SELAF.

Grosvenor, Gilbert M., Barry C. Bishop, Anthony R. de Souza, and Mac Chapin
1992 *The Coexistence of Indigenous Peoples and the Natural Environment in Central America*. Washington D.C.: National Geographic Society.

Guillén, Sebastian Jose
1772 Unpublished Letters, Vol. 121. Bogota: Archivo Histórico Nacional de Colombia, Milicia y Marina.

Hage, P., and K. Hawkes
1975 Binumarien color categories. *Ethnologist* 14(287-300).

Harshberger, John W.
1896 Purposes of ethnobotany. *Botanical Gazette* 21(3):146-154.

Hays, Terence E.
1974 Mauna: Explorations in Ndumba Ethnobotany. Ph. D. Dissertation, University of Washington.
1976 An empirical method for the identification of covert categories in ethnobiology. *American Ethnologist* 3:489-507.

Head, Suzanne, and Robert Heinzman, eds.
1990 *Lessons of the Rainforest.* San Francisco: Sierra Club Books.

Hecht, Susanna , and Alexander Cockburn
1990 *The Fate of the Forest: developers, destroyers and defenders of the Amazon.* New York: Harper Perennial.

Heywood, V. H., ed.
1985 *Flowering Plants of the World.* London and Sydney: Cromm Helm.

Higbee, Kenneth L.
1977 *Your Memory: how it works and how to improve it.* New Jersey: Prentice-Hall.

Holmberg, Allan R.
1969 *Nomads of the Long Bow: The Siriono of Eastern Bolivia.* New York: Natural History Press.

Holmes, Rebecca, and Juan Scorza
1993 *Estado de Salud Indigena: Los Barí.* Maracaibo: Fundación Zumaque (MARAVEN).

Hough, Walter
1898 Houses built of fossil trees. *Plant World* 1(1):35-36.

Huber, Otto, and Clara Alarcon
1988 *Mapa de Vegetación de Venezuela.* Caracas: Editorial Arte.

Huber, Otto, and Dawn Frame
1989 Venezuela: tropical forest inventory to 1986. In *Floristic Inventory of Tropical Countries.* D. G. Campbell and M. A. Hammond, eds. New York: New York Botanical Garden Publications.

Hueck, K., and P. Seibert
1981 *Vegetationskarte von Südamerika (Vegetationsmonographien der einzelnen Grossräume 2a).* Second edition. Stuttgart: Fischer.

Hunn, Eugene S.
1975 Cognitive processes in folk ornithology: the identification of gulls. In *Working Paper 42. Language Beharior Research Laboratory*. Berkeley: University of California.
1976 Toward a perceptual model of folk biological classification. *American Ethnologist* 3:508-524.
1977 *Tzeltal Folk Zoology*. New York: Academic Press.
1989 Plants and animals as semantic points of reference in Sahaptin ethnoecology. XII Annual Conference of the Society of Ethobiology, Riverside, 1989. University of California.

Irvine, Dominique
1981 Rain forest adaptation: patch management through succession. Paper presented at the 80th Annual Meeting of the American Anthropological Association, Los Angeles, 1981.
1989 Succession Mangement and Resource Distribution in an Amazonian Rain Forest. In *Resource Management in Amazonia: Indigenous and Folk Strategies*. D. A. Posey and W. Balée, eds. Advances in Economic Botany 7: 223-237.

Jaulin, Robert
1966a La maison Barí II. *Journal de la Société des Américanistes* 55:111-153.
1966b Les Barí III. *Journal de la Société des Américanistes* 55:563-640.

Jiménez Madrigal, Quírico
1993 *Arboles Maderables en Peligro de Extinción en Costa Rica*. San José (Costa Rica): Incafo.

Johnston, Mark, and Araminta Colquhoun
1996 Preliminary ethnobotanical survey of Kurupukari: an Amerindian settlement of central Guyana. *Economic Botany* 50(2):182-194.

Jones, Volney H.
1941 The Nature and Scope of Ethnobotany. *Chronica Botanica* 6(10):219-221.

Jordan, C. F.
1985 *Nutrient Cycling in Tropical Forest Ecosystems*. Chichester: John Wiley.

Kay, Paul
1971 Taxonomy and semantic contrast. *Language* 47(4):866-887.
1977 Language evolution and speech style. In *Sociocultural Dimensions of Language Change*. B. G. Blount and M. Sanches, eds. Pp. 21-33. New York: Academic Press.

Keesing, Roger M.
1987 Anthropology as interpretive quest. *Current Anthropology* 28(2):161-176.

Kempton, W.
1981 *The Folk Classification of Ceramics: A Study of Cognitive Prototypes.* New York: Academic Press.

Korning, J., and H. Balslev
1994 Growth and mortality of trees in Amazonian tropical rain forest in Ecuador. *Journal of Vegetation Science* 4:77-86.

Korombara, Nubia C. (Biiktú Shaa)
1995 *Saaiimayí Iibaëëdãriin: Los Ancianos Cuentan.* Maracaibo: Fundación Zumaque.

Kroeber, Alfred L.
1920 Review of uses of plants by the Indians of the Missouri River region, by Melvin Randolph Gilmore. *American Anthropologist* 22:384-385.

Lamprecht, Hans
1990 *Silvicultura en los Trópicos: Los ecosistemas forestales en los bosques tropicales y sus especies arbóreas —posibilidades y métodos para un aprovechamiento sostenido—.* Rossdorf: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.

Lee, W. L., B. M. Bell, and J. F. Sutton, eds.
1982 *Guidelines for Acquisition and Management of Biological Specimens.* Lawrence (Kansas): Association of Systematics Collections.

Lepofsky, Dana
1992 Arboriculture in the Massau Islands, Bismarck Archipelago. *Economic Botany* 46(2):192-211.

Lizano, J.
1966 Estudio florístico-estructural de parcelas representativas de banco y de bajío en el Bosque Universitario "El Caimital," Estado Barinas. Trabajo especial de grado, Facultad de Ciendias Forestal de la Universidad de los Andes en Mérida.

Lizarralde, Manuel
1992 500 Years of Invasion: Eco-Colonialism in Indigenous Venezuela. *Kroeber Anthropological Society Papers* 75-76:62-79.
1993a *Indice y Mapa de Grupos Etnolingüisticos Autoctonos de America del Sur.* Antropológica, Suplemento No.5, Caracas: Fundación La Salle de Ciencias Naturales.
in prep. Biodiversity and the Loss of Indigenous languages and knowledge in South America. In *Endangered Languages, Endangered Knowledge and Endangered Environments.* L. Maffi, ed.

Lizarralde, Manuel, and Roberto Lizarralde
1991 Barí exogamy among their territorial groups: choice and/or necessity. *Human Ecology* 19(4): 453-467.

Lizarralde, Manuel, Glenn Shepard, and Douglas Yu
in prep. Knowledge Variation of Rainforest Trees among the Matsiguenga of the Peruvian Amazon.

Lizarralde, Roberto
1979 Vocabulario Barí. *Boletín Bibliográfico de Antropología Americana*/38(47):207-215.
1982 *Censo Barí. Censo Indigena de Venezuela 1982*. Caracas: Oficina Central de Estadística e Informática.
1991 Barí settlement patterns. *Human Ecology* 19(4): 428-452.
1992 La población Indigena en los parques nacionales. Paper presented at the meetings of the IV Congreso Mundial de Parques Nacionales y Areas Protegidas, Caracas.
1993b Población Indígena en el Parque Nacional "Perijá". Caracas: OCEI.
ms. El Habitat de los Indios Barí. Maracaibo: Universidad del Zulia.

Lizarralde, Roberto, and Stephen Beckerman
1982 Historia contemporánea de los Barí. *Antropológica* 58:3-51.
1986 Historia contemporánea de los Barí. *Boletin Antropológico* 10:77-109.

Lizarralde, Roberto , Stephen Beckerman, and Peter Elsass
1987 *Indigenous Survival Among the Barí and Arhuaco: Strategies and Perspectives*. Volume No. 60. Copenhagen: International Work Group for Indigenous Affairs.

Mabberley, D. J.
1990 *The Plant-Book: A Portable Dictionary of the Higher Plants*. Cambridge and New York: Cambridge University Press.

Majnep, Ian Saem, and Ralph N. H. Bulmer
1977 *Birds of my Kalam Country*. Auckland: Auckland University Press.

Marmillod, D
1982 Methodik und Ergebnisse von Untersuchungen über Zusammensetzung und Aufbau eines Terrassenwaldes im peruanischen Amazonien. Dissertation, Göttingen University.

MARNR, Ministerio del Ambiente y de Recursos Naturales no Renovables
1982a Región Natural No. 4: Sierra de Perijá. Projecto Ven/79/001.
1982b Región Natural No. 5: Depresión Aluvial Reciente del Lago de Maracaibo. Projecto Ven/79/001.
1982c Región Natural No. 6: Piedemonte Colinoso Sur de Perijá. Projecto Ven/79/001.
1997 Región Hidrologico No. 1: Datos Mensuales y Anuales de Precipitaciones de Perijá. Dirección de Hidrologia y Meteorologia. Sistemas Nacional de Información Hidrologica y Meteorologica. Caracas: MARNR.

Martin, Gary J.
1995 *Ethnobotany: A Methods Manual.* London: Chapman & Hall.

Mathews, H.
1983 Context specific variation in humoral classification. *American Anthropologist* 85:826-846.

McDade, Lucinda A., Kamaljit S. Bawa, Henry A. Hespenheide, and Gary S. Hartshorn, eds.
1994 *La Selva: ecology and natural history of a neotropical rain forest.* Chicago: University of Chicago Press.

Mendelsohn, Robert, and Michael J. Balick
1995 The value of undiscovered pharmaceuticals in tropical forests. *Economic Botany* 49(2):223-228.

Milliken, William, and Bruce Albert
1996 The use of medicinal plants by the Yanomami Indians of Brazil. *Economic Botany* 50(1):10-25.

Milliken, William, Robert P. Miller, Sharon R. Pollard, and Elisa V. Wandelli
1992 *The Ethnobotany of the Waimiri Atroari Indians of Brazil.* Kew: Royal Botanic Gardens.

Milton, Katharine
1988 Foraging behavior and the evolution of primate intelligence. In *Machiavellian Intelligence.* R. Byrne and A. Whiten, eds. Pp. 285-305. New York: Claredon Press.
1991 Comparative aspects of diet in Amazonian forest-dwellers. *Philosophical Transactions of the Royal Society of London*/B(334):253-263.
1992 Civilization and its discontents: Amazonian Indians experience the thin wedge of materialism. *Natural History* 3:36-45.

MOP, Ministorio de Obras Publicas
1973 Distrito Hidrologico 1: Isoyetas 1973. Caracas: Republica de Venezuela, Ministorio de Obras Publicas, Division de Hidrologia.

Myers, Norman
1988 Tropical forests and their species going, going...? In *Biodiversity.* E. O. Wilson, ed. Pp. 28-35. Washington: National Academy Press.
1989 *Deforestation Rates in Tropical Forests and their Climatic Implications.* London: Friends of the Earth.

Nations, James D.
1988 *Tropical Rainforests: endangered environment.* New York: Franklin Watts.

Nectário, María Hno.
1959 *Los Orígenes de Maracaibo.* Monografia No. 2. Maracaibo: Universidad del Zulia.

Oldfield, M. L., and J. B. Alcorn
1987 Conservation of traditional agroecosystems. *Bioscience* 37(3):199-208.

Paolisso, Michael
1985 Subsistence and Coffee Cultivation among the Irapa-Yukpa of Venezuela: A Cultural Ecological Investigation. Ph.D dissertation, Department of Anthropology, University of California at Los Angeles.

Paz y Niño, Guillermo, Henrik Balslev, and Renato Valencia
1995 Useful lianas of the Siona-Secoya Indians from Amazonian Ecuador. *Economic Botany* 49(3):269-275.

Pelto, P. J., and G. H. Pelto
1975 Intra-cultural diversity: some theoretical issues. *American Ethnologist* 2:1-18.

Peluso, Nancy Lee, and Christine Padoch
1991 Changing Resource Rights in Managed Forests of West Kalimantan. For the Conference "Interactions Between People and Forests of Kalimantan" June 21-23. Paper presented at the meetings of the Energy and Resources Group, Building T-4, Room 100, Univerisity of California, Bekeley, CA 94720

Phillips, Oliver, and Alwyn H. Gentry
1993a The useful plants of Tambopata, Peru: I. statistical hypotheses tests with a new quantitative technique. *Economic Botany* 47(1):15-32.
1993b The useful plants of Tambopata, Peru: II. additional hypotheses testing in quantitative ethnobotany. *Economic Botany* 47(1):33-43.

Phillips, Oliver L.
1996 Some quantitative methods for analyzing ethnobotanical knowledge. In *Selected Guidelines for Ethnobotanical Research: A Field Manual*. M. N. Alexiades, ed. Pp. 171-197. New York: New York Botanical Garden.

Pinton, Solange
1965 Les Barí. *Journal de la Société des Américanistes* 54(2):247-333.
1972 La maison Barí et son territoire. *Journal de la Société des Américanistes* 61(1):31-44.

Pittier, Henri
1948 *Trabajos Escogidos*. Caracas: Ministerio de Agricultura y Cria.
1971 *Manual de las Plantas Usuales de Venezuela y su Suplemento*. Caracas: Fundación Eugenio Mendoza.

Plotkin, Mark J.
1995 The importance of ethnobotany for tropical forest conservation. In *Ethnobotany: evolution of a discipline*. R. E. Schultes and S. von Reis, eds. Pp. 147-156. Portland: Dioscorides.

Ponting, Clive
1991 *A Green History of the World: The Environment and the Collapse of Great Civilizations*. New York: Penguin Books.

Posey, Darrell A.
1990 Intellectual property rights: what is the position of ethnobiology? *Journal of Ethnobiology* 10(1):93-98.

Posey, Darrell A. , and William Balée, eds.
1989 *Resource Management in Amazônia: Indigenous and Folk Strategies*. New York: New York Botanical Garden.

Prance, Ghillean T.
1995 Ethnobotany today and in the future. In *Ethnobotany: evolution of a discipline*. R. E. Schultes and S. von Reis, eds. Pp. 60-68. Portland: Dioscorides.

Prance, G. T., W. Balée, B. M. Boom, and R. L. Carneiro
1987 Quantitative ethnobotany and the case for conservation in Amazonia. *Conservation Biology* 1(4):296-310.

Raven, Peter H.
1988 Our diminishing tropical forests. In *Biodiversity*. E. O. Wilson, ed. Pp. 119-122. Washington: National Academy Press.

Reichel-Dolmatoff, Gerardo
1990 A view from the headwaters: a Colombian anthropologist looks at the Amazon and beyond. In *Ethnobiology: Implications and Applications: Proceedings of the First International Congress of Ethnobiology*. D. A. Posey, W. L. Overal, Charles R. Clement, M. J. Plotkin, E. Elizabetsky, C. N. d. Mota, and J. F. P. d. Barros, eds. Pp. 9-17, Vol. 1. Belém: Museu Paraense Emílio Goeldi.

Richards, Paul W.
1996 *The Tropical Rain Forest: An Ecological Study*. Cambridge: Cambridge University Press.

Robbins, Wilfred W., John Peabody Harrington, and Barbara Freire-Marreco
1916 *Ethnobotany of the Tewa Indians*. Volume 55. Washington D.C.: U.S. Government Printing Office.

Ruddle, Kenneth
1974 *Yukpa Cultivation System: a study of shifting cultivation and ancillary activities in Colombia and Venezuela*. Berkeley: University of California Press.

Salzano, Francisco M., and Sidia Callegari-Jacques
1988 *South American Indians: A Case Study in Evolution*. Oxford: Clarendon Press.

Sankoff, G.
1971 Quantitative analysis of sharing and variability in a cognitive model. *Ethnology* 4:389-408.

Sanoja, Mario
1969 *La Fase Zancudo: investigaciones arqueológicas en el lago Maracaibo.* Caracas: Instituto de Investigaciones Economicas y Sociales.
1972 La fase Caño Grande y sus relaciones con el norte de Colombia. *Atti del XI Congresso Internacionale degli Americanisti* 1:255-260.

Sapir, Edward
1938 Why anthropology needs the psychiatrist. *Psychiatry* 1:712.

Schultes, Richard Evans
1963 The widening panorama in medical botany. *Rhodora* 67(762):97-120.

Schultes, Richard Evans, and Siri von Reis, eds.
1995 *Ethnobotany: Evolution of a Discipline.* Portland (Oregon): Dioscorides Press.

Serrão, Emanuel A., and Jose M. Toledo
1990 The search for sustainability in Amazonian pastures. In *Alternatives to Deforestation: steps toward sustainable use of the Amazon Rain Forest.* A. B. Anderson, ed. Pp. 195-214. New York: Columbia University Press.

Smith, C. Earle
1995 A near and distant star. In *Ethnobotany: evolution of a discipline.* R. E. Schultes and S. von Reis, eds. Pp. 175-180. Portland: Dioscorides Press.

Sokal, Robert R.
1974 Classification: purposes, principles, progress, prospects. *Science* 185(4157):1115-1123.

Southwick, Charles H.
1996 *Global Ecology in Human Perspective.* New York: Oxford University Press.

Sponsel, Leslie E.
1992 The environmental history of Amazonia: natural and human disturbances, and the ecological transition. In *Changing Tropical Forests: historical perspectives on today's challenges in Central and South America.* H. K. Steen and R. P. Tucker, eds. Pp. 233-251. Durham (N.C.): Forest History Society.
1995 *Indigenous Peoples and the Future of Amazonia: an ecological anthropology of an endangered world.* Tucson: The University of Arizona Press.

Steyermark, J. A. , and F. Delascio
1985 Contribuciones a la flora de la Cordillera de Perijá, Estado Zulia-Venezuela. *Boletin de la Sociedad Venezolana de Ciencias Naturales* 40(143):153-325.

Toledo, Victor Manuel
1982 La etnobotánica hoy: reversión del conocimiento, lucha Indígena y proyecto nacional. *Biótica* 7(2):141-150.
1987 La etnobotánica en Latinoamérica: vicisitudes, contextos y desafíos. IV Congreso Latinoamericano de Botánica: Simposio de Etnobotánica, Bogotá, 1987, pp. 13-34. Instituto Colombiano para el Fomento de la Educación Superior (ICFES).
1988 *The Floristic Richness of Latin America and the Caribbean as Indicated by the Botanical Inventories*. Washington and Mexico: The Nature Conservancy and Universidad Nacional Autónoma de México.
1992 What is ethnoecology?: origins, scope, and implications of a rising discipline. *Etnoecología* 1(1):5-21.

Turner, Nancy Jean
1974 Plant taxonomic systems and ethnobotany of three contemporary Indian groups of the Pacific Northwest (Haida, Bella Coola, and Lilloet). *Syesis* 7 (suppl. 1).

Tyler, Stephen A., ed.
1969 *Cognitive Anthropology*. New York: Holt, Rinehart and Winston.

Unruh, Jon, and Salvador Flores Paitán
1987 Relative abundance of the useful component in old managed fallows at Brillo Nuevo. In *Swidden-Fallow Agroforestry in the Peruvian Amazon*. W. M. Denevan and C. Padoch, eds. Pp. 67-73. New York: The New York Botanical Garden.

Venezuela, República de
1990 Manuscrito del Grupo de Trabajo de Venezuela. Taller Binacional Sobre Areas, Flora y Fauna Especialmente Protegidas para dar Cumplimiento a lo acordado en la Sexta Reunión, Sector Medio Ambiente. Valledupar, Colombia: Comisión Presidencial para Asusntos Fronterizos Colombo-Venezolanos de la República de Venezuela y de la Comisión Presidencial de Integración Fronteriza Colombo-Venezolana de la República de Colombia.

Venezuela, Oficina Central de Estadística e Informática
1985 *Censo Indígena de Venezuela 1982*. Caracas: Oficina Central de Estadística e Informática.
1993 *Censo Indígena de Venezuela 1992*. Caracas: Oficina Central de Estadística e Informática.

Ventocilla, Jorge, Heraclio Herrera, and Valerio Núñez
1995 *Plants and Animals in the Life of the Kuna*. Austin: The University of Texas Press.

Vickers, W. T., and T. Plowman
1984 Useful plants of the Siona and Secoya Indians of eastern Ecuador. *Fieldiana Botany (New Series)* 15:1-63.

Wagner, Erika
1980 *Los Pobladores Palafiticos de la Cuenca de Maracaibo*. Caracas: Cuadernos Lagoven.
1992 Diversidad cultural y ambiental en el occidente de Venezuela. In *Archaeology and Environment in Latin America*. O. Ortiz-Troncoso and T. Van Der Hammen, eds. Pp. 207-221. Amsterdam: Universiteit Van Amsterdam.

Weller, Susan C.
1983 Data on intra-cultural variation: the hot-cold concept. *Human Organization* 42:249-257.
1984 Consistency and consensus among informants: disease concepts in a rural Mexican village. *American Anthropologist* 86:341-351.

Werner, O.
1969 The basic assumptions of ethnoscience. *Semiotica* 1:329-338.

Wilbert, Johannes
1987 *Tobacco and Shamanism in South America*. New Haven: Yale University Press.

Wilbert, Werner
1986 Warao herbal medicine: a pneumatic theory of illness and healing. Ph.D. dissertation., University of California, Los Angeles.

Wilcox, Bruce A., and Kristin N. Duin
1995 Indigenous Cultural Diversity and Biological Utility in Latin America. *Cultural Survival Quarterly* 18(4):49-53.

Wilson, Edward O.
1988 The Current State of Biological Diversity. In *Biodiversity*. E.O. Wilson, ed. Pp. 3-20. Washington: National Academy Press.
1992 *The Diversity of Life*. New York: W. W. Norton.

Zent, Stanford
1992 Historical and Ethnographic Ecology of the Upper Cuao River Wothiha: Clues for an Interpretation of Native Guianese Social Organization. Ph D, Columbia University.
1993 Clasificación, explotación y composición de bosques secundarios en el Alto Rio Cuao, Estado Amazonas, Venezuela. Taller Internacional El Hombre en el Ecosistema Tropical, Caracas, 1993. Instituto Venezolano de Investigaciones Científicas.
1994 The quandary of conserving ethnoecological knowledge: a Piaroa example. 93rd annual meeting of the American Anthropological Association, Atlanta, Georgia, December 1-4, 1994.
1995 Clasificación, explotación, y composición de bosques secundarios en el Alto Río Cuao, Estado Amazonas, Venezuela. In *Naturaleza y Ecología Humana en el Neotrópico*. H. D. Heinen, J. San José, and H. Caballero, eds. Pp. 199-239. Caracas: Scientia Guaianae 5.

n.d. *Piaroa and the Cracidae: Game Management under Shifting Cultivation.* Caracas: Departamento de Antropología, Instituto Venezolano de Investigaciones Científicas (IVIC).

APPENDIX A: BARÍ FOREST PLOTS INFORMATION:

Plot #	Lat.	Long.	Site	Alt. in m.	Forest type	Size (Ha.)	No. trees	No. Sp.
1	9°36'47"	72°54'15"	Saimadodyi	175	Primary (Valley)	0.15	81	30
2	9°36'47"	72°54'12"	Saimadodyi	175	Primary (Valley)	0.15	100	32
3	9°36'47"	72°54'11"	Saimadodyi	175	Primary (Valley)	0.15	92	33
4	9°34'20"	72°53'47"	Abusanki	470	Primary (Hill)	0.15	104	38
5	9°34'35"	72°54'25"	Abusanki	320	Primary (Hill)	0.15	115	40
6	9°37'10"	72°55'35"	Arikbakakabo	250	Secondary (6 Yrs.)	0.15	166	41
7	9°37'30"	72°53'38"	Abudanki	300	Primary (Hill)	0.15	56	25
8	9°37'15"	72°54'15"	Agdabaoktuka	180	Primary (flooded)	0.15	53	29
9	9°37'52"	72°53'40"	Agdabaoktuka	180	Primary (flooded)	0.15	55	27
10	9°37'36"	72°53'25"	Abusanki	340	Primary (Hill)	0.15	91	47
11	9°37'47"	72°52'32"	Abusanki	540	Primary (Hill)	0.15	80	24
12	9°35'57"	72°57'21"	Gabrielkaa	310	Primary (Hill)	0.15	68	26
13	9°41'05"	72°53'35"	Bachichida	220	Primary (Valley)	0.15	87	18
14	9°41'05"	72°53'33"	Bachichida	220	Primary (Valley)	0.15	99	38
15	9°36'25"	72°55'45"	Karikogbai	180	Primary (Valley)	0.15	69	38
16	9°36'49"	72°58'50"	Karikogbai	380	Primary (Valley)	0.15	87	24
17	9°37'02"	72°57'03"	Karikogbai	180	Primary (Valley)	0.15	90	35
18	9°36'42"	72°56'56"	Karikogbai	190	Primary (Valley)	0.15	95	39
19	9°36'42"	72°56'57"	Karikogbai	190	Primary (Valley)	0.15	85	35
20	9°36'42"	72°56'59"	Karikogbai	190	Primary (Valley)	0.15	87	38
21	9°36'42"	72°57'01"	Karikogbai	190	Primary (Valley)	0.15	90	24
22	9°36'42"	72°57'02"	Karikogbai	190	Primary (Valley)	0.15	109	32
23	9°36'43"	72°57'02"	Karikogbai	190	Primary (Valley)	0.15	77	36
24	9°36'43"	72°57'04"	Karikogbai	190	Primary (Valley)	0.09	52	20
25	9°33'30"	72°42'45"	Kumangda	50	Tall Primary (flooded)	0.15	64	19
26	9°33'30"	72°42'45"	Kumangda	50	Primary (flooded)	0.15	94	35
27	9°34'44"	72°57'35"	Karigbagdakaig	180	Secondary (33 Yrs.)	0.15	152	30
28	9°34'11"	72°59'15"	Otakaa	700	Secondary (35 Yrs.)	0.15	175	30
29	9°41'05"	72°53'31"	Bachichida	220	Primary (Valley)	0.15	143	53
30	9°41'05"	72°53'29"	Bachichida	220	Primary (Valley)	0.15	110	40
31	9°41'05"	72°53'27"	Bachichida	220	Primary (Valley)	0.15	119	43
32	9°41'05"	72°53'25"	Bachichida	220	Primary (Valley)	0.15	138	40
33	9°41'05"	72°53'23"	Bachichida	220	Primary (Valley)	0.09	79	27
TOTAL						4.83	3162	212

APPENDIX B: FAMILIES OF PLANT KNOWN TO THE BARI:

FAMILY	GENUS & SPECIES	BARÍ NAME	VOUCHER NO.
Acanthaceae	*Mendoncia* sp.	ishdā ishdā	ML055
Acanthaceae	*Trichanthera gigantea* (H. &. B.) Nees	ishiba ihtobai	ML306
Agavaceae	*Furcraea humboldtiana* Trel.	ashikba (cocuiza)	-
Amaranthaceae	Indeterminate	angatiliobai	ML050
Anacardiaceae	*Anacardium excelsum* (Bert. & Balb.) Skeels	lidúu*	ML253
Anacardiaceae	*Anacardium occidentale*	kahui (merey)	-
Anacardiaceae	*Anacardium* sp. 2	dyera lurumama	-
Anacardiaceae	*Anacardium* sp. 3	lurumama	ML363
Anacardiaceae	*Astronium graveolens* Jacq.	tumma*	ML151
Anacardiaceae	*Spondias mombin* L. (big fr. variety)	baróo*	ML155
Anacardiaceae	*Spondias mombin* L. (small fr. variety)	íshiraberi	ML307
Anacardiaceae	*Spondias* sp.	rugbaa (ciruelo de monte)	-
Annonaceae	*Annona muricata* L.	miida skókba (guanabano)	-
Annonaceae	*Duguetia* sp. 1	bichirabú*	ML201
Annonaceae	*Guatteria cardoniana* R. E. Fr.	tairuu*	ML229
Annonaceae	*Oxandra* sp.	chirabu babai (yaya)	-
Annonaceae	*Oxandra venezuelensis* R. E. Fr.	chirabu*	ML219
Annonaceae	*Rollinia pittieri*	dabaikaa*	ML179
Annonaceae	*Xylopia frutenscens* Aubl.	asharobi orko*	ML062
Apocynaceae	*Aspidosperma rigidum*	dyiroaibakāá babai	ML314
Apocynaceae	*Couma macrocarpa* Barb.	ainogbáa*	ML188
Apocynaceae	*Himatanthus sucuuba*	dijkú (also kogshibakaa)*	ML231
Apocynaceae	*Stemmadenia* sp. (cf.)	agdogdakaa bogki	ML368
Apocynaceae	*Stemmadenia* sp.	agdohdakaa*	ML202
Araceae	*Abrus precatorius* L.	birik'báa (bejuco de peonía)	-
Araceae	*Colocasia esculenta*	dáig (taro o malanga)	-
Araceae	*Dieffenbachia maculata.* (Lodd.) G. Don	atchikí (picatón)	-
Araceae	*Dracontium aracuaisense*	bashindoubogyi*	ML293
Araceae	Indeterminate	aabi korokonda	ML002
Araceae	Indeterminate	dyera korokonda*	ML007
Araceae	Indeterminate	korokonda abama	ML376
Araceae	Indeterminate	ishugbaa abama	ML359
Araceae	*Monstera* sp. 1	korokonda abama	ML345
Araceae	*Philodendron hederaceum* (Jacq.) Schott	ale baishdā	ML315
Araceae	*Spathiphyllum canniaefolium* Schott	bogyi shkomba	ML305
Araceae	*Xanthosoma sagittifolium*	dáig (ocumo)	-
Araceae	*Xanthosoma* sp. 2	sākí amashú (peccary manioc)	-
Araceae	*Xanthosoma* sp. 3	korokomda ishubaa	ML369
Araliaceae	*Didymopanax morototoni* (cf. *glabratus)*	ogboo* (yagrumo macho)	ML207
Arecaceae	*Attalea butyracea*	araktá (aragtogbaa)	-
Arecaceae	*Bactris gasipaes*	téchi abama	-
Arecaceae	*Bactris macana*	téchi (macanilla)	ML090
Arecaceae	*Bactris major* var. 2	tahtabaa	ML130
Arecaceae	*Bactris major* var. 3	dyera karigbai	-
Arecaceae	*Bactris major* var. 4	darogbaa	-
Arecaceae	*Bactris major* var. *major*	karigbai	ML128
Arecaceae	*Bactris* sp. (cf.)	bosoobo techí	-
Arecaceae	*Bactris* sp.(cf.)	karigbái abama	-
Arecaceae	*Calyptrogyne ghiesbreghtiana* (cf.)	dagyíi	ML398
Arecaceae	cf. *Chamaedorea pauciflora*	burubüü*	ML322
Arecaceae	cf. *Oenocarpus mapora*	kiokbó (corozo)	-
Arecaceae	*Chamaedorea pinnatifrons* (cf.)	agdoda burubuu	ML251
Arecaceae	*Chamaedorea* sp.(cf.)	burubuu abama	-
Arecaceae	*Chamaedorea* sp.(cf.)	burubuu ito	-

Arecaceae	*Chamaedorea* sp.(cf.)	dyera burubuu	-
Arecaceae	*Copernicia tectorum* (H.B.K.) Mart.	kúg'da (palma llanera)	-
Arecaceae	*Euterpe oleracea*	arihbæ	ML319
Arecaceae	*Euterper karsteniana*	arihbæ biï	-
Arecaceae	*Geonoma sp.*	dyera swai*	ML028
Arecaceae	*Geonoma stricta* Mart. var. *stricta*	swai*	ML023
Arecaceae	*Hyospathe elegans* (cf.)	burubuu apí	-
Arecaceae	Indeterminate	agdou	-
Arecaceae	*Oenocarpus bataua* var. 2	arúu (arikogbaa)	ML326
Arecaceae	*Oenocarpus bataua* var. 3	waibaaruu	-
Arecaceae	*Oenocarpus mapora* Karst.	keki	ML320
Arecaceae	*Schelea macrolepis*	dagda araktá (araktogba)	-
Arecaceae	*Socratea exorrhiza*	logsó	ML325
Arecaceae	*Socratea* sp. 2	logsó abama	-
Arecaceae	*Wendlandiella* sp.	lagyísoi	ML178
Bignoniaceae	*Crescentia cujeta* L.	daarikba akain (totumo pequeño)	-
Bignoniaceae	*Crescentia cujete* L.	shiima (totumo)	-
Bignoniaceae	*Cressentia cujete* L.	shiima akaina (totumo)	-
Bignoniaceae	*Cressentia* sp. (wild variety)	dorikba [small wild tree gourd]	-
Bignoniaceae	*Jacaranda copaia* subsp. spectabilis	shirigbaa*	ML266
Bignoniaceae	*Tabebuia chrysea* Blake	karikā* (cañaguato)	ML011
Bignoniaceae	*Tabebuia pentaphylla*	karikā abama (apamate)	-
Bixaceae	*Bixa orellana*	túkdaa	ML044
Bombacaceae	*Ceiba pentandra* Gaertn.	asaa	ML331
Bombacaceae	*Ochroma pyramidale* (Cav. ex Lam.) Urb.	daabá*	ML208
Boraginaceae	*Cordia bicolor* A. DC.	nunkugbóo*	ML263
Boraginaceae	*Cordia* sp.	nunkugboo abama	-
Bromeliaceae	*Ananas comosus*	bóoran nánkatdú (piña colorada)	-
Bromeliaceae	*Ananas comosus*	karigbai nánkatdu (con espinas)	-
Bromeliaceae	*Ananas comosus*	nánkatdu (piña amarilla)	-
Bromeliaceae	*Bromelia* sp. (cf.)	karikogbai	ML218
Bromeliaceae	Indeterminate	dáabi korokonda (bromelia)	-
Bromeliaceae	Indeterminate	korokonda abibai	-
Bromeliaceae	*Pitcairnia* sp. (cf.)	bii	-
Bromeliaceae	*Tillandsia* sp. (cf.)	dyera korokonda*	ML017
Burseraceae	*Dacryodes* sp.(cf.)	tootogbáa*	ML084
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	loai shkugbá*	ML198
Burseraceae	*Protium* sp. 1	karaña	ML187
Burseraceae	*Protium* sp. 2	bintugbaa karaña	-
Burseraceae	*Protium* sp. 3	ishkugbaa*	ML101
Burseraceae	*Protium* sp. 4	loai* (tacamahaco)	ML260
Cannaceae	*Canna indica* L.	taingbōō	ML118
Caricaceae	*Carica papaya*	tuntunbai (lechoso, papaya)	
Caricaceae	*Carica* sp. 2	dyera tuntunbai abama*	ML281
Caricaceae	*Carica* sp. 3	dyera tuntunbai ihtobai*	ML280
Cecropiaceae	*Cecropia* sp. 1	asharo tugbaa (yagrumo)	-
Cecropiaceae	*Cecropia* sp. 2	tugbaa (de barsal1/3)*	ML180
Cecropiaceae	*Cecropia* sp. 3	totugbaa (yagrumo)	-
Cecropiaceae	*Coussapoa* sp. 1	durugba abama*	ML271
Cecropiaceae	*Coussapoa* sp. 2	durugba	-
Chrysobalanaceae	*Chrysobalanus icaco*	asaj'bōōgba (icaco)	-
Chrysobalanaceae	*Chrysobalanus* sp.	asangboo	-
Chrysobalanaceae	*Hirtella* cf. *glandulosa* Spreng.	birogbógbaa abama*	ML295
Chrysobalanaceae	*Hirtella* sp. 2	dyerakaā karaba	ML296
Chrysobalanaceae	*Licania* sp. 1	asogbogbaa*	ML267
Chrysobalanaceae	*Licania* sp. 2	asogbogbaa obama	ML334
Cochlospermaceae	*Cochlospermum orinocense* Steud.	ishigbororō*	ML212
Combretaceae	*Terminalia amazonia* Exell in Pulle	songbáa*	ML285

Combretaceae	*Terminalia oblonga* (R. & P.) Stand.	kagdoo	ML237
Combretaceae	*Terminalia* sp. 2	kumabatúgboo	-
Combretaceae	*Terminalia* sp.	aisugsee kagdo	-
Compositae	*Clibadium* sp.	barëna (or barï, barbasco)	-
Convolvulaceae	*Ipomoea batatas*	bee (batata blanca)	-
Convolvulaceae	*Ipomoea batatas*	sosora (batata colorada)	-
Convolvulaceae	*Ipomoea batatas*	tagtábæ (batata colorada)	-
Cucurbitaceae	*Cucurbita maxima*	kíribai (calabazo, auyamita)	-
Curcubitaceae	*Cucurbita maxima*	shankshí (auyama)	-
Curcubitaceae	*Cucurbita pepo* L.	sāksiakara (calabaza)	-
Curcubitaceae	*Lagenaria siceraria*	doksoa [var. extinct]	-
Cyclanthaceae	*Asplundia* sp.	menda*	ML162
Cyclanthaceae	*Carludovica* sp.	ohbaï	ML247
Cyperaceae	Indeterminate	korokonda bogyi	ML051
Cyperaceae	Indeterminate	korokonda bogyi abi	ML052
Cyperaceae	Indeterminate	durinkaduu*	ML022
Cyperaceae	*Scleria* sp.	atiriabi*	ML004
Dioscoreaceae	*Dioscorea alata*	aowá (ñame)	-
Dioscoreaceae	*Dioscorea alata*	daig (ñame [yam])	-
Elaeocarpaceae	*Sloanea* sp.	bachïn	ML209
Elaeocarpaceae	*Sloneae zuliaensis*	kochiña	ML214
Euphorbiaceae	*Acalypha diversifolia* Jacq.	ihdagíí*	ML255
Euphorbiaceae	*Acalypha* sp. 1	bachigdai*	ML014
Euphorbiaceae	*Alchornea* sp. 2	dabáa oba*	ML287
Euphorbiaceae	*Alchornea* sp. 3	mamitrogba abí*	ML184
Euphorbiaceae	*Alchornea triplinervia* M. Arg. in DC.	mamichirogbakaa*	ML261
Euphorbiaceae	cf. *Senefeldera* sp.	bángyi*	ML294
Euphorbiaceae	*Hyeronima alchorneoides* Allemão	yiog	ML308
Euphorbiaceae	*Mabea* sp.	ogsaaijtibabakāa	ML239
Euphorbiaceae	*Manihot esculenta*	baachí máashun (dulce blanca)	-
Euphorbiaceae	*Manihot esculenta*	ishkána (yuca dulce)	-
Euphorbiaceae	*Manihot esculenta*	mashú (yuca dulce)	-
Euphorbiaceae	*Manihot esculenta*	mashú yúma (yuca grande)	-
Euphorbiaceae	*Manihot esculenta*	mashú yúmamai (yuca dulce)	-
Euphorbiaceae	*Manihot esculenta*	muey máashun (dulce morada)	-
Euphorbiaceae	*Pera* sp.	dyera bokonkaa	ML269
Euphorbiaceae	*Pera* sp.	dyerabahkō	-
Euphorbiaceae	*Pera* sp.	eragbahkonkaa	-
Euphorbiaceae	*Sagotia racemosa* Baillon	ahkaa*	ML228
Euphorbiaceae	*Sagotia* sp.	ahkaa bïï	-
Filicinae	cf. Filices sp.	dyera abainchi*	ML016
Flacourtiaceae	*Laetia procera* (P. & E.) Eichler	shirokaru*	ML275
Flacourtiaceae	*Lindackeria paludosa* (Benth.) Gilg	bohkāā kaa*	ML252
Flacourtiaceae	*Lindackeria* sp.	agdouda bokāākaa	-
Flacourtiaceae	*Zuelania guidonia* (Sw.) Britt	dyerakaa daviobai]*	ML283
Guttiferae	*Clusia* sp. 1	shiow*	ML194
Guttiferae	*Clusia* sp. 2	dyera shiow*	ML282
Guttiferae	*Vismia* sp.	birikba	ML067
Haemodoraceae	*Xiphidium* sp.	dyera lolobai abanchi*	ML030
Heliconiaceae	cf. *Heliconia* sp.	dyera shkombaa	ML303
Heliconiaceae	*Heliconia psittacorum*	dyera chiachia*	ML020
Heliconiaceae	*Heliconia* sp. 1	boro'bachíri	ML006
Heliconiaceae	*Heliconia* sp. 2	tagtá (bijao)	ML343
Heliconiaceae	Indeterminate	bigbira (bijao-hoja-pequeña)	-
Heliconiaceae	Indeterminate	tagtá aktugbee	-
Indeterminate	Indeterminate	adogdakaa abama	ML350
Indeterminate	Indeterminate	adugmokomo ishdā	ML358
Indeterminate	Indeterminate	agbaishi abama	ML390

Indeterminate	Indeterminate	agdodakaa	ML041
Indeterminate	Indeterminate	agdukaru	ML355
Indeterminate	Indeterminate	akarabai ihtotabay	ML074
Indeterminate	Indeterminate	akegbaëgshí	ML135
Indeterminate	Indeterminate	arebaishdã	ML348
Indeterminate	Indeterminate	arigbai ishdã	ML391
Indeterminate	Indeterminate	atilioangbai	ML078
Indeterminate	Indeterminate	atilioangbai	ML079
Indeterminate	Indeterminate	bagkroshí	ML374
Indeterminate	Indeterminate	bagshí	ML362
Indeterminate	Indeterminate	bairoishdã	ML349
Indeterminate	Indeterminate	baraïg	ML126
Indeterminate	Indeterminate	báreig	ML206
Indeterminate	Indeterminate	baronavíshi	ML133
Indeterminate	Indeterminate	bashkëakbaraba	ML096
Indeterminate	Indeterminate	batugbó*	ML160
Indeterminate	Indeterminate	berok	ML073
Indeterminate	Indeterminate	beroko	ML125
Indeterminate	Indeterminate	bikogshi ishda	ML393
Indeterminate	Indeterminate	biraikareeishdã	ML338
Indeterminate	Indeterminate	birichbóo*	ML069
Indeterminate	Indeterminate	birigbakaa	ML367
Indeterminate	Indeterminate	birimashunki ishdã	ML357
Indeterminate	Indeterminate	birinkaru	ML351
Indeterminate	Indeterminate	bogbaa	ML258
Indeterminate	Indeterminate	brima shunki ishdã	ML385
Indeterminate	Indeterminate	brimashunki ishdã	ML371
Indeterminate	Indeterminate	brimashunki ishdã	ML382
Indeterminate	Indeterminate	burugkaa	ML365
Indeterminate	Indeterminate	dabaigbúgchii	ML337
Indeterminate	Indeterminate	dagkogdomai kaa	ML380
Indeterminate	Indeterminate	dagshibu shdã	ML379
Indeterminate	Indeterminate	dankashirenogbaa ishdã	ML370
Indeterminate	Indeterminate	dragbiña abama	ML364
Indeterminate	Indeterminate	dyera karigbaakaa	ML360
Indeterminate	Indeterminate	dyerakaa*	ML156
Indeterminate	Indeterminate	eskobashi	ML119
Indeterminate	Indeterminate	igtobaba ishdã	ML347
Indeterminate	Indeterminate	ishdã	ML076
Indeterminate	Indeterminate	kantugbaa	ML342
Indeterminate	Indeterminate	karigbai ishdã	ML387
Indeterminate	Indeterminate	koben ogbaa*	ML169
Indeterminate	Indeterminate	kogdoi	ML083
Indeterminate	Indeterminate	koran ishdã	ML383
Indeterminate	Indeterminate	krokonda abama	ML389
Indeterminate	Indeterminate	kwinzagdarigbaa igtoo	ML373
Indeterminate	Indeterminate	kwisangdarikbáa	ML310
Indeterminate	Indeterminate	logbaka dugdukarigbaishda	ML336
Indeterminate	Indeterminate	muiñã	ML108
Indeterminate	Indeterminate	ogbara	ML333
Indeterminate	Indeterminate	saëgsaëshi	ML124
Indeterminate	Indeterminate	shibo abama	ML361
Indeterminate	Indeterminate	shiborokó	ML086
Indeterminate	Indeterminate	shibúkugdu	ML122
Indeterminate	Indeterminate	shidakaa	ML114
Indeterminate	Indeterminate	shidashí	ML134
Indeterminate	Indeterminate	shigbi sagbaa karabaishdã	ML386
Indeterminate	Indeterminate	shilodorogbaa	ML375

Indeterminate	Indeterminate	shindwe ishdā	ML102
Indeterminate	Indeterminate	shinkó*	ML186
Indeterminate	Indeterminate	shirānshi	ML127
Indeterminate	Indeterminate	shirogdarogbaa ishdā	ML378
Indeterminate	Indeterminate	shirogkobi ishdā	ML392
Indeterminate	Indeterminate	shumigdaí abusanki*	ML177
Indeterminate	Indeterminate	shumigdaig*	ML167
Indeterminate	Indeterminate	shumki abama ishdā	ML384
Indeterminate	Indeterminate	sorogsorog	ML097
Indeterminate	Indeterminate	tantanbishiowa	ML340
Indeterminate	Indeterminate	tógboo*	ML182
Indeterminate	Indeterminate	totuubikaa	ML175
Indeterminate	Indeterminate	totuubikaa	ML339
Indeterminate	Indeterminate	tubitrogbóo	ML189*
Indeterminate	Indeterminate	tubitrogbóo	ML199
Indeterminate	Indeterminate	tuubigtróogboo	ML093
Indeterminate	Indeterminate	yiba ishdā	ML388
Indeterminate	Indeterminate	yibáishdā	ML344
Indeterminate	Indeterminate	agshubogboo	-
Indeterminate	Indeterminate	agshugbasheshshekaa	-
Indeterminate	Indeterminate	agsobaikaa	-
Indeterminate	Indeterminate	agtugbakāā	-
Indeterminate	Indeterminate	áigtugbaa	-
Indeterminate	Indeterminate	aksá bóogba	-
Indeterminate	Indeterminate	arā	-
Indeterminate	Indeterminate	ashubogbó	-
Indeterminate	Indeterminate	atratrakaa abi	-
Indeterminate	Indeterminate	bachiichibokaa	-
Indeterminate	Indeterminate	bachiishda	-
Indeterminate	Indeterminate	bachinkaa	-
Indeterminate	Indeterminate	bachinshiboroko	-
Indeterminate	Indeterminate	bara (a tree)	-
Indeterminate	Indeterminate	bayro shíima (bejuco de agua)	-
Indeterminate	Indeterminate	beregshi (arbol peq.)	-
Indeterminate	Indeterminate	birinkaru abama	-
Indeterminate	Indeterminate	birogshii [=bishima]	-
Indeterminate	Indeterminate	bishima	-
Indeterminate	Indeterminate	bogbaikaa	-
Indeterminate	Indeterminate	bogyiramika	-
Indeterminate	Indeterminate	bookankaaru	-
Indeterminate	Indeterminate	bookankaaru abama	-
Indeterminate	Indeterminate	boraïg	-
Indeterminate	Indeterminate	brādāhkaa	-
Indeterminate	Indeterminate	brumabachikaá	-
Indeterminate	Indeterminate	buiña [a big tree]	-
Indeterminate	Indeterminate	chirohkaru	-
Indeterminate	Indeterminate	dabaigbúgcha abama	-
Indeterminate	Indeterminate	daigda [a tree]	-
Indeterminate	Indeterminate	dandobohbakaa	-
Indeterminate	Indeterminate	dobáa'kiróu karibiu	-
Indeterminate	Indeterminate	dobaoishdaa (bejuco de agua)	-
Indeterminate	Indeterminate	dyera agdoudakaa	-
Indeterminate	Indeterminate	dyeralobikaa	-
Indeterminate	Indeterminate	dyibaishdāā	-
Indeterminate	Indeterminate	dyiroaibaka	-
Indeterminate	Indeterminate	dyiroaikaa	-
Indeterminate	Indeterminate	dyirobaigkaa	-
Indeterminate	Indeterminate	dyirobaikaa baamai	-

Indeterminate	Indeterminate	dyirobakaa	-
Indeterminate	Indeterminate	dyirobakaa babai	-
Indeterminate	Indeterminate	ibáa (pa'leña)	-
Indeterminate	Indeterminate	ibashki	-
Indeterminate	Indeterminate	ihdye (corazon rojo)	-
Indeterminate	Indeterminate	ijtokwai ishkombai	-
Indeterminate	Indeterminate	irokokoba [vine]	-
Indeterminate	Indeterminate	ishchurukdú	-
Indeterminate	Indeterminate	ishdá shíima (bejuco de agua)	-
Indeterminate	Indeterminate	ishdākaa [tree with thorns]	ML354
Indeterminate	Indeterminate	itdyïra (arbol...)	-
Indeterminate	Indeterminate	kaikaa	-
Indeterminate	Indeterminate	kakabo abama	-
Indeterminate	Indeterminate	kantaibi	-
Indeterminate	Indeterminate	karora (árbol...)	-
Indeterminate	Indeterminate	kiokbo (fruta silvestre)	-
Indeterminate	Indeterminate	kobaakaruu	-
Indeterminate	Indeterminate	kobëë	-
Indeterminate	Indeterminate	kohto bogboo (arbol...)	-
Indeterminate	Indeterminate	kojkooma	-
Indeterminate	Indeterminate	korokakaabu	-
Indeterminate	Indeterminate	kumabiogbogbaal	-
Indeterminate	Indeterminate	lagshíkaa	-
Indeterminate	Indeterminate	maa	-
Indeterminate	Indeterminate	moeshdakaa	-
Indeterminate	Indeterminate	ogdobogbaa	-
Indeterminate	Indeterminate	ohbadaku	-
Indeterminate	Indeterminate	orohkoo	-
Indeterminate	Indeterminate	shabërira [edible fruit]	-
Indeterminate	Indeterminate	shiborokoo abama	-
Indeterminate	Indeterminate	shigbaa (arbol...)	-
Indeterminate	Indeterminate	shihdakaa	-
Indeterminate	Indeterminate	shikoba (arbol...)	-
Indeterminate	Indeterminate	shirānshdāā (bejuco fuego)	-
Indeterminate	Indeterminate	shumigdaeg abama	-
Indeterminate	Indeterminate	tabuhshdana (liana)	-
Indeterminate	Indeterminate	tokwanshí	-
Indeterminate	Indeterminate	truntrunkaru	-
Indeterminate	Indeterminate	tuchirogboo (arbol...)	-
Indeterminate	Indeterminate	tugtugboo	-
Indeterminate	Indeterminate	tuhtuhbai (planta...)	-
Indeterminate	Indeterminate	twíshdaa [medicinal tree]	-
Lauraceae	Indeterminate	chirugchirugkaa	ML328
Lauraceae	Indeterminate	chirugchirug abama	-
Lauraceae	*Licaria* sp.	shigbóo	ML157*
Lauraceae	*Persea americana*	abi kwokwáchi	-
Lauraceae	*Persea americana*	abukwokwáchi	-
Lauraceae	*Persea americana*	akurú (aguacate)	-
Lauraceae	*Persea americana*	kwokwáchi	-
Lauraceae	*Pleurothyrium trianae* (Mez) Ruhwer	sóngbaa*	ML226
Lecythidaceae	*Cariniana pyriformis* Miers.	bahku	ML330
Lecythidaceae	*Couroupita guianensis* Aubl.	kóba *	ML292
Lecythidaceae	*Eschweilera* sp. (cf.)	sogbogboo	ML341
Lecythidaceae	*Gustavia* sp. 1	logsorobogboo (chupon)	-
Lecythidaceae	*Gustavia* sp. 2	logsorologsoro abama*	ML297
Lecythidaceae	*Gustavia speciosa* (H. B. K.) D. C.	logsorologsoro	ML210
Lecythidaceae	*Lecythis corrugata* Poiteau	lugshuu*	ML257
LEG./Caesalpinioideae	*Brownea coccinea* Jacq. var. 1	shkubaba abama	ML215

LEG./Caesalpinioideae	*Brownea coccinea* Jacq. var. 2	shkubabá	ML104
LEG./Caesalpinioideae	*Cassia rasemosa*	boaibogbá (cañafístula)	-
LEG./Caesalpinioideae	*Copaifera langsdorffii*	báahdã	ML115
LEG./Caesalpinioideae	*Dialium guianense*	ogchiri*	ML223
LEG./Caesalpinioideae	*Dialium* sp.	logchiri (cacho)	-
LEG./Caesalpinioideae	*Hymeneae courbaril* L.	bwai bojkbá*	ML195
LEG./Caesalpinioideae	Indeterminate	shuunki	-
LEG./Caesalpinioideae	*Peltogyne purpurea* Pittier	bokshi (nazareno, zapatero)	-
LEG./Caesalpinioideae	*Sweetia fruticosa* Sprengel	burúk'baka (vera de agua)	-
LEG./Mimosoideae	*Acacia glomerosa* Benth.	burí*	ML262
LEG./Mimosoideae	*Entada gigas* (L.)	kohshímboo ishãã	ML131
LEG./Mimosoideae	*Inga cocleensis*	kamashkorou nondyiruku	ML327
LEG./Mimosoideae	*Inga quaternata* Poepp.	birichboo abama	ML238
LEG./Mimosoideae	*Inga scabriuscula* Benth.	nondyíruku*	ML248
LEG./Mimosoideae	*Inga semialata* (Vell.) Mart.	birichíboo*	ML249
LEG./Mimosoideae	*Inga* sp. 1	dyerakããkarabaa (guamo)	-
LEG./Mimosoideae	*Inga* sp. 2	ichiorowbaa (guamo)	-
LEG./Mimosoideae	*Inga* sp. 3	ichiow (guamo)	-
LEG./Mimosoideae	*Inga* sp. 4	ichorogbáa (a large tree)	ML082
LEG./Mimosoideae	*Inga* sp. 5	shdóo akarabá (guamo)	RL003
LEG./Mimosoideae	*Inga* sp. 6	bogyira kankaraba	ML087
LEG./Mimosoideae	*Inga* sp. 7	ijshobara	ML063
LEG./Mimosoideae	*Inga* sp. 8	kamiogba (=nondyiruku)	ML054
LEG./Mimosoideae	*Inga* sp. 9 (= *Inga spectabilis*)	kããkarabá (guamo)	-
LEG./Mimosoideae	*Inga spectabilis*	kããkarabá dabagdou	RL004
LEG./Mimosoideae	*Inga vera* Willd.	shinshdów*	ML273
LEG./Mimosoideae	*Parkia pendula* (Willd.) Benth. ex Walp.	kõgdaig	ML225
LEG./Mimosoideae	*Parkia* sp. 2	kõgdaig abama	-
LEG./Mimosoideae	*Parkia* sp. 3	kõgdaig shiowshiow	-
LEG./Mimosoideae	*Parkia* sp. 4	bachikõgdaig (=kõgdaig abama)	-
LEG./Mimosoideae	*Siparuna* sp.	ijtõkwaikankaraba*	ML009
LEG./Mimosoideae	*Zygia latifolia* (cf.)	bogyira kankarabaa*	ML243
LEG./Papilionoideae	*Dalbergia* sp.	labiagduu	ML075
LEG./Papilionoideae	*Desmodium* sp.	segsei	ML053
LEG./Papilionoideae	*Erythrina mitis* Jacq.	borógba (≠borogbá)*	ML242
LEG./Papilionoideae	*Lonchocarpus* sp.	kumbirikba	ML274
LEG./Papilionoideae	*Phaseolus vulgaris* L.	shikokdóo (caraota, frijol negro)	-
LEG./Papilionoideae	*Platypodium* sp. cf. *polystachum*	loo (roble blanco)	-
LEG./Papilionoideae	*Platyposium elagans* Vogel	dyiroaibakãã bãshï	ML313
LEG./Papilionoideae	*Platyposium* sp.	dyiroaibakãã bãshï abama	-
LEG./Papilionoideae	*Tephrosia sinapou* (Bushz.) A. Chev.	báhki*	ML245
Leguminosae	Indeterminate	kogbogshibogbaa	-
Loranthaceae	*Oryctanthus* sp. (cf.)	bekoekaraba*	ML185
Loranthaceae	*Phtrirusa* sp. (cf.)	chidari shdãa	ML061
Malpighiaceae	*Byrsonima spicata* (Cav.) DC.	bue	ML329
Malvaceae	*Abelmoschus moschatus* Medik.	sãã oruktrú*	ML137
Malvaceae	*Gossypium barbadense*	karãã (algodón)	-
Malvaceae	*Gossypium hirsutum*	kalã shíshi (algodón)	-
Malvaceae	Indeterminate	atiliangobai	ML059
Malvaceae	Indeterminate	karããshi	ML113
Malvaceae	Indeterminate	karããshi	ML120
Malvaceae	Indeterminate	shkobashi	ML058
Marantaceae	*Calathea lutea* Aubl. F.N.F.	núnku (bijao cara blanca)	-
Marantaceae	*Maranta or Calathea* (cf.)	darún atohbe	ML132
Marantaceae	*Stromanthe lutea*	bégbeg (platanillo)	ML332
Marantaceae	*Stromanthe* sp. 2	bégbeg aktugbee(platanillo)	-
Melastomataceae	*Bellucia* sp.	shóotugbaa	ML196
Melastomataceae	*Graffenriendia* sp.	daborokba	ML205

Melastomataceae	Indeterminate	asharon dandōborokba	ML042
Melastomataceae	Indeterminate	dandoborogbáa	ML056
Melastomataceae	Indeterminate	dandoborokba abama	ML203
Melastomataceae	Indeterminate	kumbirikbah	ML088
Melastomataceae	Indeterminate	totuubikaa	ML318
Melastomataceae	*Miconia* sp. 1	bogyi danborokbáa*	ML031
Melastomataceae	*Miconia* sp. 2	chirogdóo*	ML230
Melastomataceae	*Miconia* sp. 3	dandoborogbáa*	ML027
Melastomataceae	*Miconia* sp. 4	tootubikaa babai	ML299
Meliaceae	*Cedrela odorata* L	dáiba* (cedro)	ML095
Meliaceae	*Swietenia candollei* Pittier.	shóo abama (caobo)	-
Meliaceae	*Swietenia odorata*	buyógbaa* (caobo)	ML039
Meliaceae	*Trichilia* sp. 1	agdóukaa*	ML246
Meliaceae	*Trichilia* sp. 2	barōōkaa	-
Meliaceae	*Trichilia* sp. 3	barōōkaa abama*	ML277
Meliaceae	*Trichilia trinitensis* Juss.	ojshirók'ba (maís tostado)	-
Menispermaceae	*Anomospermum reticulatum* subsp. *glabrens*	bichiowa ishdā	ML317
Menispermaceae	*Cissampelos* cf. *andromorpha* DC.	bedaro ishdā	ML324
Monimiaceae	Indeterminate	danborokbáa*	ML032
Moraceae	*Brosimum lactescens* (S. Moore) Berg	kogdoai*	ML265
Moraceae	*Brosimum* sp.	barúu*	ML158
Moraceae	*Ficus prinoides* (cf.)	ishibaugbou*	ML034
Moraceae	*Ficus* sp. 2	beroo*	ML396
Moraceae	*Ficus* sp. 3	ishibaa*	ML197
Moraceae	*Ficus* sp. 4	ishibaa abama (higuerote)	-
Moraceae	*Ficus* sp. 5	lurugbaa (mapapalo)	-
Moraceae	*Ficus* sp. 6	lurugboo [≠ lurugbaa]	ML323
Moraceae	*Ficus* sp. 7	rurugbá abama	ML204
Moraceae	*Ficus* sp. 8	moeshiba*	ML150
Moraceae	*Ficus* sp. 9	moeshiba abama	ML172
Moraceae	*Helicostylis tomentosa* (P. & E.) Macbride	shíndwe*	ML234
Moraceae	Indeterminate	tagbaa ishdā*	ML200
Moraceae	*Maquira guianensis* Subl.	dagyikogbaa*	ML286
Moraceae	*Pourouma cecropiifolia* Mart.	chigbidāa*	ML232
Musaceae	*Musa balbisiana* X *acuminata*	aagdá (cambur topocho)	-
Musaceae	*Musa balbisiana* X *acuminata*	abukubái atogbé (guineo)	-
Musaceae	*Musa balbisiana* X *acuminata*	atogbé (guineo)	-
Musaceae	*Musa balbisiana* X *acuminata*	bachákda (cambur topocho)	-
Musaceae	*Musa balbisiana* X *acuminata*	badchiró (cambur 500)	-
Musaceae	*Musa balbisiana* X *acuminata*	baktráura (cambur 500)	-
Musaceae	*Musa balbisiana* X *acuminata*	borokbá (plátano)	-
Musaceae	*Musa balbisiana* X *acuminata*	chi (cambur bocadillo)	-
Musaceae	*Musa balbisiana* X *acuminata*	chí:ri (cambur bocadillo)	-
Musaceae	*Musa balbisiana* X *acuminata*	dabara (cambur gde. pinta tigre)	-
Musaceae	*Musa balbisiana* X *acuminata*	káashirukú (cambur 500 delgado)	-
Musaceae	*Musa balbisiana* X *acuminata*	kairugbe (cambur morado)	-
Musaceae	*Musa balbisiana* X *acuminata*	kan'chirukú (racimo, guineo)	-
Musaceae	*Musa balbisiana* X *acuminata*	lábatdo'borokba (500 gde.)	-
Musaceae	*Musa balbisiana* X *acuminata*	nun'borokbá (plátano grande)	-
Musaceae	*Musa balbisiana* X *acuminata*	sabóu (cambur manzano)	-
Musaceae	*Musa balbisiana* X *acuminata*	sabóu widabai (manzano gde)	-
Musaceae	*Musa balbisiana* X *acuminata*	sabúun káin (c500 muy gde.)	-
Musaceae	*Musa balbisiana* X *acuminata*	saimayáasa (cambur grande)	-
Musaceae	*Musa balbisiana* X *acuminata*	shúkorōrōn (cambur grande)	-
Musaceae	*Musa balbisiana* X *acuminata*	túriba (cambur verde)	-
Myristicaceae	*Virola* cf. *sebifera* Aubl.	labibú*	ML233
Myrsinaceae	*Ardisia guianensis* (Aubl.) Mez	drā'biña*	ML276
Myrsinaceae	*Cybianthus* sp. (cf.)	drābiña abama	ML311

Myrtaceae	*Eugenia* sp.	tarōkāa (=dagjikogbaa)*	ML259
Myrtaceae	*Psidium guayaba*	dabagdou kat'do (guayabo)	-
Myrtaceae	*Psidium* sp.	kat'do (guayabo de monte)	-
Orchidaceae	*Cattleya* sp.(cf.)	dak´gyí [orquídea hoja gde.]	-
Orchidaceae	Indeterminate	dobaida korokonda	ML036
Orchidaceae	Indeterminate	dyera korokonda	ML035
Orchidaceae	Indeterminate	korokonda (obai!)*	ML037
Orchidaceae	Indeterminate	korokonda abukungdai	-
Orchidaceae	Indeterminate	tuituista	-
Orchidaceae	*Vanilla* sp.	dyera korokonda	ML068
Orchidaceae	*Vanilla* sp.	dyera lolobai	ML046
Passifloraceae	*Passiflora edulis*	labagdou atororori	ML312
Passifloraceae	*Passiflora* sp. 1	shki-rabá (parchita)	-
Passifloraceae	*Passiflora* sp. 2	atororori (naransrenogba)	ML098
Passifloraceae	*Passiflora* sp. 3	rogdōngbáshkiridí (parchita)	-
Passifloraceae	*Passiflora vitifolia* HBK.	ishdākaraba	ML256
Piperaceae	*Piper darienense* C. DC.	ishiránki*	ML103
Piperaceae	*Piper* sp. 1	bishindu ishdā	ML224
Piperaceae	*Piper* sp. 2	ishiranki abama	ML048
Piperaceae	*Piper* sp. 3	ishiranki abama*	ML013
Piperaceae	*Piper* sp. 4	kuma obamaka	ML049
Piperaceae	*Pothomorphe* sp. 1	obamakaa	-
Piperaceae	*Pothomorphe* sp. 2	dyera obamaka*	ML012
Poaceae	*Bambusa* sp. (cf.)	motúbii ogsan*	ML060
Poaceae	*Bambusa* sp. 1	motugbĩi (bambú)	-
Poaceae	*Bambusa* sp. 3	orrō (bambú)	-
Poaceae	*Coix lacryma-jobi* L.	taingbōō bachin	-
Poaceae	*Guadua latifolia* H.B.K.	birokdó (guasdua, bambú)	-
Poaceae	*Gynerium sagittatum* subsp. 1	chíikāā (caña amarga)	-
Poaceae	*Gynerium sagittatum* subsp. 2	nichíikāā (de monte)	-
Poaceae	Indeterminate	chiaichiaig	ML112
Poaceae	*Saccarum officinarum*	bagchibá (caña de azúcar)	-
Poaceae	*Saccarum officinarum*	bai 'chikbá (amarilla)	-
Poaceae	*Saccarum officinarum*	sai'bikádu (colorada)	-
Poaceae	*Zea mays* L.	yóogba (maíz)	-
Polygonaceae	*Coccoloba* sp.	agdoudakaa babai*	ML254
Polygonaceae	*Triplaris caracasana* Chamisso	chirahbáakaa*	ML279
Rhizophoraceae	cf. *Cassipourea* sp.	trātrā*	ML278
Rubiaceae	*Coussarea paniculata* Vahl	trātrā abama	ML290
Rubiaceae	*Genipa americana* L.	mamañiogbaa* (caruto)	ML240
Rubiaceae	Indeterminate	agdoudakaa kaakaraba*	ML025
Rubiaceae	Indeterminate	asharobi totubí	ML064
Rubiaceae	Indeterminate	boyira mika*	ML033
Rubiaceae	*Palicourea buntingii* Steyerm.	totubí karika shundu	ML301
Rubiaceae	*Palicourea* sp. 2	totubíkaa*	ML003
Rubiaceae	*Posoqueria latifolia* (Rudge) Roem. & Schult.	kogdobogbáa	ML264
Rubiaceae	*Psychotria caerulea* Ruiz & Pavon	totubí "azul"	ML302
Rubiaceae	*Psychotria marginata* Sw.	dyera totubí	ML304
Rubiaceae	*Psychotria* sp. 1	asháto totubí*	ML024
Rubiaceae	*Psychotria* sp. 2	doborokba obama*	ML021
Rubiaceae	*Psychotria* sp. 3	totubíasharoba*	ML010
Rubiaceae	*Psychotria* sp. 4	tubikaa/drābiya*	ML026
Rubiaceae	*Warscewiczia coccinea*	totuubikaa	ML043
Rubiaceae	*Warscewiczia* sp.	totubíkaa abama	-
Sapindaceae	*Dilodendron costaricense*	kandya*	ML152
Sapotaceae	Indeterminate	birokbogba*	ML038
Sapotaceae	Indeterminate	lorogbá*	ML190
Sapotaceae	Indeterminate	lorogbá abama	-

Sapotaceae	*Micropholis* sp. (cf.)	bagdrōw (arikbakaraba)*	ML174
Sapotaceae	*Pouteria anibaefolia*	abogboo*	ML153
Sapotaceae	*Pouteria* sp. (cf.)	buruma*	ML270
Sapotaceae	*Sarcaulus* sp.	kúii*	ML213
Schizeaceae	*Lygodium* sp.	oraña	-
Simaroubaceae	*Quassia amara* L.	akichebagkaa	ML236
Smilacaceae	*Smilax* sp.	kogbakaribai akaraba	ML045
Solanaceae	*Capsicum annuum* var. *annuum*	loré sasou (ají dulce)	-
Solanaceae	*Capsicum frutencens* var. 1	dodji (ají)	-
Solanaceae	*Capsicum frutescens* var. 2	bai loré (ají, ají bueno)	-
Solanaceae	*Capsicum frutescens* var. 3	loré (ají)	-
Solanaceae	*Capsicum frutescens* var. 4	loré asaá (ají picante)	-
Solanaceae	*Cestrum* aff. *megalophyllum* Dunal	agdoudakaa ankorai*	ML291
Solanaceae	*Cyphomandra batacea* (cf.)	ihtōkwaikaa*	ML165
Solanaceae	Indeterminate	barikoksáa	ML121
Solanaceae	Indeterminate	berokaribai	ML123
Solanaceae	Indeterminate	bero karibai [=barikoksáa]	-
Solanaceae	Indeterminate	beroko karibai [=barikoksáa]	-
Solanaceae	*Nicotiana tabacum* L.	daba (tabaco)	-
Solanaceae	*Nicotiana tabacum* L.	dabá'okbá (tabaco)	-
Solanaceae	*Nicotiana tabacum* L.	dabakadú (tabaco)	-
Solanaceae	*Nicotiana tabacum* L.	insáisaibai (tabaco)	-
Solanaceae	*Solanum* sp.	arebágchi*	ML029
Solanaceae	*Solanum* sp.	bari'kokgsá*	ML005
Sterculiaceae	*Herrania sp.*	birónkwākwā*	ML019
Sterculiaceae	*Pterygota* sp.	bogsorogbaa	ML235
Sterculiaceae	*Theobroma cacao* L.	daairukbá (cacao)	-
Sterculiaceae	*Theobroma* sp. 1 (wild cacao)	daairukbá bashï	ML321
Sterculiaceae	*Theobroma* sp. 2 (wild cacao)	daairukbá bokimai	-
Sterculiaceae	*Theobroma* sp. 3 (wild cacao)	daairukbá karikanshundu	-
Sterculiaceae	*Theobroma* sp. 4 (wild cacao)	daairukbá tagtabaankorai	-
Sterculiaceae	*Theobroma sp.* 5	shinkó*	ML186
Strelitziaceae	Indeterminate	abukdu dando borokba	ML072
Strelitziaceae	Indeterminate	tuktú (bijao)	-
Tiliaceae	*Luehea seemanni* Tr. & Planch.	burunbunkaa*	ML241
Tiliaceae	*Luehea* sp.	burunbunkaa abama	-
Ulmaceae	*Ampelocera* cf. *edentula* Kuhlm.	lurïi*	ML268
Ulmaceae	Indeterminate	loogabagdu	ML057
Ulmaceae	*Trema* sp.	bagchbashïdaig	ML040
Ulmaceae	*Trema* sp.	bashidaig	ML065
Umbelliferae	*Arracacia xanthorrhiza*	bai dande (apio bueno)	-
Umbelliferae	*Arracacia xanthorrhiza*	dánde (apio)	-
Umbelliferae	*Arracacia xanthorrhiza*	dánde sa (apio propio)	-
Urticaceae	*Urera baccifera*	notchí/*	ML091
Urticaceae	*Urera caracasana* (Jacq.) Steud.	bachi notchí	ML298
Verbenaceae	*Vitex divaricata* Sw.	maama	ML381
Violaceae	*Rinorea lindeniana* (Tul.) O. Kuntze	twingbái*	ML171
Zingiberaceae	*Costus scaber* R & P.	bisairogba abama*	ML015*
Zingiberaceae	*Costus* sp. 2	bisag-ogbaa	ML352
Zingiberaceae	*Renealmia alpinia* (Rottb.) Mass.	mashoóri (conopio)	RL006
Zingiberaceae	*Renealmia* sp. 2	bahkoo (conopio grande)	-
Zygophyllaceae	*Bulnesia arborea*	burubaakaa (vera)	-
[Pilicopsida]	Indeterminate	bogyi abibanchi	ML071
[Pilicopsida]	Indeterminate	dyera abainchi*	ML016
[Pilicopsida]	Indeterminate	obáamashí	-
[Pilicopsida]	Indeterminate	okbai abama	-

* 40% Voucher or plant photographed (155 specimens) 394 vouchers

APPENDIX C: LIST OF GENERA AND SPECIES:

Genus & Species	Family	Barí Name	Voucher No.
Abelmoschus moschatus Medik.	Malvaceae	sãã oruktrú*	ML137
Abrus precatorius L.	Araceae	birik'báa (bejuco de peonía)	-
Acacia glomerosa Benth.	Mimosoideae	burí*	ML262
Acalypha diversifolia Jacq.	Euphorbiaceae	ihdagíi*	ML255
Acalypha sp. 1	Euphorbiaceae	bachigdai*	ML014
Alchornea sp. 2	Euphorbiaceae	dabáa oba*	ML287
Alchornea sp. 3	Euphorbiaceae	mamitrogba abí*	ML184
Alchornea triplinervia M. Arg. in DC.	Euphorbiaceae	mamichirogbakaa*	ML261
Ampelocera cf. *edentula* Kuhlm.	Ulmaceae	luríi*	ML268
Anacardium excelsum (Bert. & Balb.) Skeels	Anacardiaceae	lidúu*	ML253
Anacardium occidentale	Anacardiaceae	kahui (merey)	-
Anacardium sp. 2	Anacardiaceae	dyera lurumama	-
Anacardium sp. 3	Anacardiaceae	lurumama	ML363
Ananas comosus	Bromeliaceae	bóoran nánkatdú (piña colorada)	-
Ananas comosus	Bromeliaceae	karigbai nánkatdu (con espinas)	-
Ananas comosus	Bromeliaceae	nánkatdu (piña amarilla)	-
Annona muricata L.	Annonaceae	miida skókba (guanabano)	-
Anomospermum reticulatum subsp. *glabrens*	Menispermaceae	bichiowa ishdã	ML317
Ardisia guianensis (Aubl.) Mez	Myrsinaceae	drã'biña*	ML276
Arracacia xanthorrhiza	Umbelliferae	bai dande (apio bueno)	-
Arracacia xanthorrhiza	Umbelliferae	dánde (apio)	-
Arracacia xanthorrhiza	Umbelliferae	dánde sa (apio propio)	-
Aspidosperma rigidum	Apocynaceae	dyiroaibakãá babai	ML314
Asplundia sp.	Cyclanthaceae	menda*	ML162
Astronium graveolens Jacq.	Anacardiaceae	tumma*	ML151
Attalea butyracea	Arecaceae	araktá (aragtogbaa)	-
Bactris gasipaes	Arecaceae	téchi abama	-
Bactris macana	Arecaceae	téchi (macanilla)	ML090
Bactris major var. 2	Arecaceae	tahtabaa	ML130
Bactris major var. 3	Arecaceae	dyera karigbai	-
Bactris major var. 4	Arecaceae	darogbaa	-
Bactris major var. *major*	Arecaceae	karigbai	ML128
Bactris sp. (cf.)	Arecaceae	bosoobo techí	-
Bactris sp.(cf.)	Arecaceae	karigbái abama	-
Bambusa sp. (cf.)	Poaceae	motúbii ogsan*	ML060
Bambusa sp. 1	Poaceae	motugbĩi (bambú)	-
Bambusa sp. 3	Poaceae	orrõ (bambú)	-
Bellucia sp.	Melastomataceae	shóotugbaa	ML196
Bixa orellana	Bixaceae	túkdaa	ML044
Bromelia sp. (cf.)	Bromeliaceae	karikogbai	ML218
Brosimum lactescens (S. Moore) Berg	Moraceae	kogdoai*	ML265
Brosimum sp.	Moraceae	barúu*	ML158
Brownea coccinea Jacq. var. 1	Caesalpinioideae	shkubaba abama	ML215
Brownea coccinea Jacq. var. 2	Caesalpinioideae	shkubabá	ML104
Bulnesia arborea	Zygophyllaceae	burubaakaa (vera)	-
Byrsonima spicata (Cav.) DC.	Malpighiaceae	bue	ML329
Calathea lutea Aubl. F.N.F.	Marantaceae	núnku (bijao cara blanca)	-
Calyptrogyne ghiesbreghtiana (cf.)	Arecaceae	dagyíi	ML398
Canna indica L.	Cannaceae	taingbõõ	ML118
Capsicum annuum var. *annuum*	Solanaceae	loré sasou (ají dulce)	-
Capsicum frutencens var. 1	Solanaceae	dodji (ají)	-
Capsicum frutescens var. 2	Solanaceae	bai loré (ají, ají bueno)	-
Capsicum frutescens var. 3	Solanaceae	loré (ají)	-

Capsicum frutescens var. 4	Solanaceae	loré asaá (ají picante)	-
Carica papaya	Caricaceae	tuntunbai (lechoso, papaya)	
Carica sp. 2	Caricaceae	dyera tuntunbai abama*	ML281
Carica sp. 3	Caricaceae	dyera tuntunbai ihtobai*	ML280
Cariniana pyriformis Miers.	Lecythidaceae	bahku	ML330
Carludovica sp.	Cyclanthaceae	ohbaĩ	ML247
Cassia rasemosa	Caesalpinioideae	boaibogbá (cañafístula)	-
Cattleya sp.(cf.)	Orchidaceae	dak'gyí [orquídea hoja gde.]	-
Cecropia sp. 1	Cecropiaceae	asharo tugbaa (yagrumo)	-
Cecropia sp. 2	Cecropiaceae	tugbaa (de barsal1/3)*	ML180
Cecropia sp. 3	Cecropiaceae	totugbaa (yagrumo)	-
Cedrela odorata L	Meliaceae	dáiba* (cedro)	ML095
Ceiba pentandra Gaertn.	Bombacaceae	asaa	ML331
Cestrum aff. *megalophyllum* Dunal	Solanaceae	agdoudakaa ankorai*	ML291
cf. *Cassipourea* sp.	Rhizophoraceae	trãtrã*	ML278
cf. *Chamaedorea pauciflora*	Arecaceae	burubüü*	ML322
cf. Filices sp.	Filicinae	dyera abainchi*	ML016
cf. *Heliconia* sp.	Heliconiaceae	dyera shkombaa	ML303
cf. *Oenocarpus mapora*	Arecaceae	kiokbó (corozo)	-
cf. *Senefeldera* sp.	Euphorbiaceae	bángyi*	ML294
Chamaedorea pinnatifrons (cf.)	Arecaceae	agdoda burubuu	ML251
Chamaedorea sp.(cf.)	Arecaceae	burubuu abama	-
Chamaedorea sp.(cf.)	Arecaceae	burubuu ito	-
Chamaedorea sp.(cf.)	Arecaceae	dyera burubuu	-
Chrysobalanus icaco	Chrysobalanaceae	asaj'bõõgba (icaco)	-
Chrysobalanus sp.	Chrysobalanaceae	asangboo	-
Cissampelos cf. *andromorpha* DC.	Menispermaceae	bedaro ishdã	ML324
Clibadium sp.	Compositae	barëna (or barï, barbasco)	-
Clusia sp. 1	Guttiferae	shiow*	ML194
Clusia sp. 2	Guttiferae	dyera shiow*	ML282
Coccoloba sp.	Polygonaceae	agdoudakaa babai*	ML254
Cochlospermum orinocense Steud.	Cochlospermaceae	ishigbororõ*	ML212
Coix lacryma-jobi L.	Poaceae	taingbõõ bachin	-
Colocasia esculenta	Araceae	dáig (taro o malanga)	-
Copaifera langsdorffii	Caesalpinioideae	báahdã	ML115
Copernicia tectorum (H.B.K.) Mart.	Arecaceae	kúg'da (palma llanera)	-
Cordia bicolor A. DC.	Boraginaceae	nunkugbóo*	ML263
Cordia sp.	Boraginaceae	nunkugboo abama	-
Costus scaber R & P.	Zingiberaceae	bisairogba abama*	ML015*
Costus sp. 2	Zingiberaceae	bisag-ogbaa	ML352
Couma macrocarpa Barb.	Apocynaceae	ainogbáa*	ML188
Couroupita guianensis Aubl.	Lecythidaceae	kóba *	ML292
Coussapoa sp. 1	Cecropiaceae	durugba abama*	ML271
Coussapoa sp. 2	Cecropiaceae	durugba	-
Coussarea paniculata Vahl	Rubiaceae	trãtrã abama	ML290
Crescentia cujeta L.	Bignoniaceae	daarikba akain (totumo pequeño)	-
Crescentia cujete L.	Bignoniaceae	shiima (totumo)	-
Cressentia cujete L.	Bignoniaceae	shiima akaina (totumo)	-
Cressentia sp. (wild variety)	Bignoniaceae	dorikba [small wild tree gourd]	-
Cucurbita maxima	Cucurbitaceae	kíribai (calabazo, auyamita)	-
Cucurbita maxima	Curcubitaceae	shankshí (auyama)	-
Cucurbita pepo L.	Curcubitaceae	sãksiakara (calabaza)	-
Cybianthus sp. (cf.)	Myrsinaceae	drãbiña abama	ML311
Cyphomandra batacea (cf.)	Solanaceae	ihtõkwaikaa*	ML165
Dacryodes sp.(cf.)	Burseraceae	tootogbáa*	ML084
Dalbergia sp.	Papilionoideae	labiagduu	ML075
Desmodium sp.	Papilionoideae	segsei	ML053
Dialium guianense	Caesalpinioideae	ogchiri*	ML223

Dialium sp.	Caesalpinioideae	logchiri (cacho)	-
Didymopanax morototoni (cf. *glabratus*)	Araliaceae	ogboo* (yagrumo macho)	ML207
Dieffenbachia maculata. (Lodd.) G. Don	Araceae	atchikí (picatón)	-
Dilodendron costaricense (Radlk.) Gentry & Steyerm.	Sapindaceae	kandya*	ML152
Dioscorea alata	Dioscoreaceae	aowá (ñame)	-
Dioscorea alata	Dioscoreaceae	daig (ñame [yam])	-
Dracontium aracuaisense	Araceae	bashindoubogyi*	ML293
Duguetia sp. 1	Annonaceae	bichirabú*	ML201
Entada gigas (L.)	Mimosoideae	kohshímboo ishãã	ML131
Erythrina mitis Jacq.	Papilionoideae	borógba (≠borogbá)*	ML242
Eschweilera sp. (cf.)	Lecythidaceae	sogbogboo	ML341
Eugenia sp.	Myrtaceae	tarõkãa (=dagjikogbaa)*	ML259
Euterpe oleracea	Arecaceae	arihbæ	ML319
Euterper karsteniana	Arecaceae	arihbæ bĩĩ	-
Ficus prinoides (cf.)	Moraceae	ishibaugbou*	ML034
Ficus sp. 2	Moraceae	beroo*	ML396
Ficus sp. 3	Moraceae	ishibaa*	ML197
Ficus sp. 4	Moraceae	ishibaa abama (higuerote)	-
Ficus sp. 5	Moraceae	lurugbaa (mapapalo)	-
Ficus sp. 6	Moraceae	lurugboo [≠ lurugbaa]	ML323
Ficus sp. 7	Moraceae	rurugbá abama	ML204
Ficus sp. 8	Moraceae	moeshiba*	ML150
Ficus sp. 9	Moraceae	moeshiba abama	ML172
Furcraea humboldtiana Trel.	Agavaceae	ashikba (cocuiza)	-
Genipa americana L.	Rubiaceae	mamañiogbaa* (caruto)	ML240
Geonoma sp.	Arecaceae	dyera swai*	ML028
Geonoma stricta Mart. var. *stricta*	Arecaceae	swai*	ML023
Gossypium barbadense	Malvaceae	karãã (algodón)	-
Gossypium hirsutum	Malvaceae	kalã shíshi (algodón)	-
Graffenriendia sp.	Melastomataceae	daborokba	ML205
Guadua latifolia H.B.K.	Poaceae	birokdó (guasdua, bambú)	-
Guatteria cardoniana R. E. Fr.	Annonaceae	tairuu*	ML229
Gustavia sp. 1	Lecythidaceae	logsorobogboo (chupon)	-
Gustavia sp. 2	Lecythidaceae	logsorologsoro abama*	ML297
Gustavia speciosa (H. B. K.) D. C.	Lecythidaceae	logsorologsoro	ML210
Gynerium sagittatum subsp. 1	Poaceae	chíikãã (caña amarga)	-
Gynerium sagittatum subsp. 2	Poaceae	nichíikãã (de monte)	-
Heliconia psittacorum	Heliconiaceae	dyera chiachia*	ML020
Heliconia sp. 1	Heliconiaceae	boro'bachíri	ML006
Heliconia sp. 2	Heliconiaceae	tagtá (bijao)	ML343
Helicostylis tomentosa (P. & E.) Macbride	Moraceae	shíndwe*	ML234
Herrania sp.	Sterculiaceae	birónkwãkwã*	ML019
Himatanthus sucuuba	Apocynaceae	dijkú (also kogshibakaa)*	ML231
Hirtella cf. *glandulosa* Spreng.	Chrysobalanaceae	birogbógbaa abama*	ML295
Hirtella sp. 2	Chrysobalanaceae	dyerakaã karaba	ML296
Hyeronima alchorneoides Allemão	Euphorbiaceae	yiog	ML308
Hymeneae courbaril L.	Caesalpinioideae	bwai bojkbá*	ML195
Hyospathe elegans (cf.)	Arecaceae	burubuu apí	-
Inga cocleensis	Mimosoideae	kamashkorou nondyiruku	ML327
Inga quaternata Poepp.	Mimosoideae	birichboo abama	ML238
Inga scabriuscula Benth.	Mimosoideae	nondyíruku*	ML248
Inga semialata (Vell.) Mart.	Mimosoideae	birichíboo*	ML249
Inga sp. 1	Mimosoideae	dyerakããkarabaa (guamo)	-
Inga sp. 2	Mimosoideae	ichiorowbaa (guamo)	-
Inga sp. 3	Mimosoideae	ichiow (guamo)	-
Inga sp. 4	Mimosoideae	ichorogbáa (a large tree)	ML082
Inga sp. 5	Mimosoideae	shdóo akarabá (guamo)	RL003
Inga sp. 6	Mimosoideae	bogyira kankaraba	ML087

Inga sp. 7	Mimosoideae	ijshobara	ML063
Inga sp. 8	Mimosoideae	kamiogba (=nondyiruku)	ML054
Inga sp. 9 (= *Inga spectabilis*)	Mimosoideae	kããkarabá (guamo)	-
Inga spectabilis	Mimosoideae	kããkarabá dabagdou	RL004
Inga vera Willd.	Mimosoideae	shinshdów*	ML273
Ipomoea batatas	Convolvulaceae	bee (batata blanca)	-
Ipomoea batatas	Convolvulaceae	sosora (batata colorada)	-
Ipomoea batatas	Convolvulaceae	tagtábæ (batata colorada)	-
Jacaranda copaia subsp. spectabilis	Bignoniaceae	shirigbaa*	ML266
Laetia procera (P. & E.) Eichler	Flacourtiaceae	shirokaru*	ML275
Lagenaria siceraria	Curcubitaceae	doksoa [var. extinct]	-
Lecythis corrugata Poiteau	Lecythidaceae	lugshuu*	ML257
Licania sp. 1	Chrysobalanaceae	asogbogbaa*	ML267
Licania sp. 2	Chrysobalanaceae	asogbogbaa obama	ML334
Licaria sp.	Lauraceae	shigbóo	ML157*
Lindackeria paludosa (Benth.) Gilg	Flacourtiaceae	bohkãã kaa*	ML252
Lindackeria sp.	Flacourtiaceae	agdouda bokããkaa	-
Lonchocarpus sp.	Papilionoideae	kumbirikba	ML274
Luehea seemanni Tr. & Planch.	Tiliaceae	burunbunkaa*	ML241
Luehea sp.	Tiliaceae	burunbunkaa abama	-
Lygodium sp.	Schizeaceae	oraña	-
Mabea sp.	Euphorbiaceae	ogsaaijtibabakãa	ML239
Manihot esculenta	Euphorbiaceae	baachí máashun (dulce blanca)	-
Manihot esculenta	Euphorbiaceae	ishkána (yuca dulce)	-
Manihot esculenta	Euphorbiaceae	mashú (yuca dulce)	-
Manihot esculenta	Euphorbiaceae	mashú yúma (yuca grande)	-
Manihot esculenta	Euphorbiaceae	mashú yúmamai (yuca dulce)	-
Manihot esculenta	Euphorbiaceae	muey máashun (dulce morada)	-
Maquira guianensis Subl.	Moraceae	dagyikogbaa*	ML286
Maranta or Calathea (cf.)	Marantaceae	darún atohbe	ML132
Mendoncia sp.	Acanthaceae	ishdã ishdã	ML055
Miconia sp. 1	Melastomataceae	bogyi danborokbáa*	ML031
Miconia sp. 2	Melastomataceae	chirogdóo*	ML230
Miconia sp. 3	Melastomataceae	dandoborogbáa*	ML027
Miconia sp. 4	Melastomataceae	tootubikaa babai	ML299
Micropholis sp. (cf.)	Sapotaceae	bagdrõw (arikbakaraba)*	ML174
Monstera sp. 1	Araceae	korokonda abama	ML345
Musa balbisiana X *acuminata*	Musaceae	aagdá (cambur topocho)	-
Musa balbisiana X *acuminata*	Musaceae	abukubái atogbé (guineo)	-
Musa balbisiana X *acuminata*	Musaceae	atogbé (guineo)	-
Musa balbisiana X *acuminata*	Musaceae	bachákda (cambur topocho)	-
Musa balbisiana X *acuminata*	Musaceae	badchiró (cambur 500)	-
Musa balbisiana X *acuminata*	Musaceae	baktráura (cambur 500)	-
Musa balbisiana X *acuminata*	Musaceae	borokbá (plátano)	-
Musa balbisiana X *acuminata*	Musaceae	chi (cambur bocadillo)	-
Musa balbisiana X *acuminata*	Musaceae	chí:ri (cambur bocadillo)	-
Musa balbisiana X *acuminata*	Musaceae	dabara (cambur gde. pinta tigre)	-
Musa balbisiana X *acuminata*	Musaceae	káashirukú (c 500 delgado)	-
Musa balbisiana X *acuminata*	Musaceae	kairugbe (cambur morado)	-
Musa balbisiana X *acuminata*	Musaceae	kan'chirukú (racimo, guineo)	-
Musa balbisiana X *acuminata*	Musaceae	lábatdo'borokba (500 gde.)	-
Musa balbisiana X *acuminata*	Musaceae	nun'borokbá (plátano grande)	-
Musa balbisiana X *acuminata*	Musaceae	sabóu (cambur manzano)	-
Musa balbisiana X *acuminata*	Musaceae	sabóu widabai (manzano gde)	-
Musa balbisiana X *acuminata*	Musaceae	sabúun káin (c500 muy gde.)	-
Musa balbisiana X *acuminata*	Musaceae	saimayáasa (cambur grande)	-
Musa balbisiana X *acuminata*	Musaceae	shúkorõrõn (cambur grande)	-
Musa balbisiana X *acuminata*	Musaceae	túriba (cambur verde)	-

Nicotiana tabacum L.	Solanaceae	daba (tabaco)	-
Nicotiana tabacum L.	Solanaceae	dabá'okbá (tabaco)	-
Nicotiana tabacum L.	Solanaceae	dabakadú (tabaco)	-
Nicotiana tabacum L.	Solanaceae	insáisaibai (tabaco)	-
Ochroma pyramidale (Cav. ex Lam.) Urb.	Bombacaceae	daabá*	ML208
Oenocarpus bataua var. 2	Arecaceae	arúu (arikogbaa)	ML326
Oenocarpus bataua var. 3	Arecaceae	waibaaruu	-
Oenocarpus mapora Karst.	Arecaceae	keki	ML320
Oryctanthus sp. (cf.)	Loranthaceae	bekoekaraba*	ML185
Oxandra sp.	Annonaceae	chirabu babai (yaya)	-
Oxandra venezuelensis R. E. Fr.	Annonaceae	chirabu*	ML219
Palicourea buntingii Steyerm.	Rubiaceae	totubí karika shundu	ML301
Palicourea sp. 2	Rubiaceae	totubíkaa*	ML003
Parkia pendula (Willd.) Benth. ex Walp.	Mimosoideae	kōgdaig	ML225
Parkia sp. 2	Mimosoideae	kōgdaig abama	-
Parkia sp. 3	Mimosoideae	kōgdaig shiowshiow	-
Parkia sp. 4	Mimosoideae	bachikōgdaig (≈kōgdaig abama)	-
Passiflora edulis	Passifloraceae	labagdou atororori	ML312
Passiflora sp. 1	Passifloraceae	shki-rabá (parchita)	-
Passiflora sp. 2	Passifloraceae	atororori (naransrenogba)	ML098
Passiflora sp. 3	Passifloraceae	rogdōngbáshkiridí (parchita)	-
Passiflora vitifolia HBK.	Passifloraceae	ishdākaraba	ML256
Peltogyne purpurea Pittier	Caesalpinioideae	bokshi (nazareno, zapatero)	-
Pera sp.	Euphorbiaceae	dyera bokonkaa	ML269
Pera sp.	Euphorbiaceae	dyerabahkō	-
Pera sp.	Euphorbiaceae	eragbahkonkaa	-
Persea americana	Lauraceae	abi kwokwáchi	-
Persea americana	Lauraceae	abukwokwáchi	-
Persea americana	Lauraceae	akurú (aguacate)	-
Persea americana	Lauraceae	kwokwáchi	-
Phaseolus vulgaris L.	Papilionoideae	shikokdóo (caraota, frijol negro)	-
Philodendron hederaceum (Jacq.) Schott	Araceae	ale baishdā	ML315
Phtrirusa sp. (cf.)	Loranthaceae	chidari shdāa	ML061
Piper darienense C. DC.	Piperaceae	ishiránki*	ML103
Piper sp. 1	Piperaceae	bishindu ishdā	ML224
Piper sp. 2	Piperaceae	ishiranki abama	ML048
Piper sp. 3	Piperaceae	ishiranki abama*	ML013
Piper sp. 4	Piperaceae	kuma obamaka	ML049
Pitcairnia sp. (cf.)	Bromeliaceae	bii	-
Platypodium sp. cf. *polystachum*	Papilionoideae	loo (roble blanco)	-
Platyposium elagans Vogel	Papilionoideae	dyiroaibakāá bāshï	ML313
Platyposium sp.	Papilionoideae	dyiroaibakāá bāshï abama	-
Pleurothyrium trianae (Mez) Ruhwer	Lauraceae	sóngbaa*	ML226
Posoqueria latifolia (Rudge) Roem. & Schult.	Rubiaceae	kogdobogbáa	ML264
Pothomorphe sp. 1	Piperaceae	obamakaa	-
Pothomorphe sp. 2	Piperaceae	dyera obamaka*	ML012
Pourouma cecropiifolia Mart.	Moraceae	chigbidāa*	ML232
Pouteria anibaefolia	Sapotaceae	abogboo*	ML153
Pouteria sp. (cf.)	Sapotaceae	buruma*	ML270
Protium heptaphyllum (Aubl.) Marchand	Burseraceae	loai shkugbá*	ML198
Protium sp. 1	Burseraceae	karaña	ML187
Protium sp. 2	Burseraceae	bintugbaa karaña	-
Protium sp. 3	Burseraceae	ishkugbaa*	ML101
Protium sp. 4	Burseraceae	loai* (tacamahaco)	ML260
Psidium guayaba	Myrtaceae	dabagdou kat'do (guayabo)	-
Psidium sp.	Myrtaceae	kat'do (guayabo de monte)	-
Psychotria caerulea Ruiz & Pavon	Rubiaceae	totubí "azul"	ML302
Psychotria marginata Sw.	Rubiaceae	dyera totubí	ML304

Psychotria sp. 1	Rubiaceae	asháto totubí*	ML024
Psychotria sp. 2	Rubiaceae	doborokba obama*	ML021
Psychotria sp. 3	Rubiaceae	totubíasharoba*	ML010
Psychotria sp. 4	Rubiaceae	tubikaa/drābiya*	ML026
Pterygota sp.	Sterculiaceae	bogsorogbaa	ML235
Quassia amara L.	Simaroubaceae	akichebagkaa	ML236
Renealmia alpinia (Rottb.) Mass.	Zingiberaceae	mashoóri (conopio)	RL006
Renealmia sp. 2	Zingiberaceae	bahkoo (conopio grande)	-
Rinorea lindeniana (Tul.) O. Kuntze	Violaceae	twingbái*	ML171
Rollinia pittieri	Annonaceae	dabaikaa*	ML179
Saccarum officinarum	Poaceae	bagchibá (caña de azúcar)	-
Saccarum officinarum	Poaceae	bai 'chikbá (amarilla)	-
Saccarum officinarum	Poaceae	sai'bikádu (colorada)	-
Sagotia racemosa Baillon	Euphorbiaceae	ahkaa*	ML228
Sagotia sp.	Euphorbiaceae	ahkaa bïï	-
Sarcaulus sp.	Sapotaceae	kúii*	ML213
Schelea macrolepis	Arecaceae	dagda araktá (araktogba)	-
Scleria sp.	Cyperaceae	atiriabi*	ML004
Siparuna sp.	Mimosoideae	ijtōkwaikankaraba*	ML009
Sloanea sp.	Elaeocarpaceae	bachïn	ML209
Sloneae zuliaensis	Elaeocarpaceae	kochiña	ML214
Smilax sp.	Smilacaceae	kogbakaribai akaraba	ML045
Socratea exorrhiza	Arecaceae	logsó	ML325
Socratea sp. 2	Arecaceae	logsó abama	-
Solanum sp.	Solanaceae	arebágchi*	ML029
Solanum sp.	Solanaceae	bari'kokgsá*	ML005
Spathiphyllum canniaefolium Schott	Araceae	bogyi shkomba	ML305
Spondias mombin L. (big fr. variety)	Anacardiaceae	baróo*	ML155
Spondias mombin L. (small fr. variety)	Anacardiaceae	íshiraberi	ML307
Spondias sp.	Anacardiaceae	rugbaa (ciruelo de monte)	-
Stemmadenia sp. (cf.)	Apocynaceae	agdogdakaa bogki	ML368
Stemmadenia sp.	Apocynaceae	agdohdakaa*	ML202
Stromanthe lutea	Marantaceae	bégbeg (platanillo)	ML332
Stromanthe sp. 2	Marantaceae	bégbeg aktugbee(platanillo)	-
Sweetia fruticosa Sprengel	Caesalpinioideae	burúk'baka (vera de agua)	-
Swietenia candollei Pittier.	Meliaceae	shóo abama (caobo)	-
Swietenia odorata	Meliaceae	buyógbaa* (caobo)	ML039
Tabebuia chrysea Blake	Bignoniaceae	karikā* (cañaguato)	ML011
Tabebuia pentaphylla	Bignoniaceae	karikā abama (apamate)	-
Tephrosia sinapou (Bushz.) A. Chev.	Papilionoideae	báhki*	ML245
Terminalia amazonia Exell in Pulle	Combretaceae	songbáa*	ML285
Terminalia oblonga (R. & P.) Stand.	Combretaceae	kagdoo	ML237
Terminalia sp. 2	Combretaceae	kumabatúgboo	-
Terminalia sp.	Combretaceae	aisugsee kagdo	-
Theobroma cacao L.	Sterculiaceae	daairukbá (cacao)	-
Theobroma sp. 1 (wild cacao)	Sterculiaceae	daairukbá bashï	ML321
Theobroma sp. 2 (wild cacao)	Sterculiaceae	daairukbá bokimai	-
Theobroma sp. 3 (wild cacao)	Sterculiaceae	daairukbá karikanshundu	-
Theobroma sp. 4 (wild cacao)	Sterculiaceae	daairukbá tagtabaankorai	-
Theobroma sp. 5	Sterculiaceae	shinkó*	ML186
Tillandsia sp. (cf.)	Bromeliaceae	dyera korokonda*	ML017
Trema sp.	Ulmaceae	bagchbashïdaig	ML040
Trema sp.	Ulmaceae	bashidaig	ML065
Trichanthera gigantea (H. &. B.) Nees	Acanthaceae	ishiba ihtobai	ML306
Trichilia sp. 1	Meliaceae	agdóukaa*	ML246
Trichilia sp. 2	Meliaceae	barōōkaa	-
Trichilia sp. 3	Meliaceae	barōōkaa abama*	ML277
Trichilia trinitensis Juss.	Meliaceae	ojshirók'ba (maís tostado)	-

Triplaris caracasana Chamisso	Polygonaceae	chirahbáakaa*	ML279
Urera baccifera	Urticaceae	notchí/*	ML091
Urera caracasana (Jacq.) Steud.	Urticaceae	bachi notchí	ML298
Vanilla sp.	Orchidaceae	dyera korokonda	ML068
Vanilla sp.	Orchidaceae	dyera lolobai	ML046
Virola cf. *sebifera* Aubl.	Myristicaceae	labibú*	ML233
Vismia sp.	Guttiferae	birikba	ML067
Vitex divaricata Sw.	Verbenaceae	maama	ML381
Warscewiczia coccinea	Rubiaceae	totuubikaa	ML043
Warscewiczia sp.	Rubiaceae	totubíkaa abama	-
Wendlandiella sp.	Arecaceae	lagyísoi	ML178
Xanthosoma sagittifolium	Araceae	dáig (ocumo)	-
Xanthosoma sp. 2	Araceae	sākí amashú (peccary manioc)	-
Xanthosoma sp. 3	Araceae	korokomda ishubaa	ML369
Xiphidium sp.	Haemodoraceae	dyera lolobai abanchi*	ML030
Xylopia frutenscens Aubl.	Annonaceae	asharobi orko*	ML062
Zea mays L.	Poaceae	yóogba (maíz)	-
Zuelania guidonia (Sw.) Britt	Flacourtiaceae	dyerakaa daviobai]*	ML283
Zygia latifolia (cf.)	Mimosoideae	bogyira kankarabaa*	ML243

* Voucher photographed

APPENDIX D: BARÍ PLANT TAXA AND ITS OCCURRENCE IN PLOTS:

Barí Taxa (Spanish name)	Family	Genus and Species	#Ind. in plots	Vo.#
aabi korokonda	Araceae	Indeterminate		ML002
aagdá (cambur topocho)	Musaceae	*Musa balbisiana* X *acuminata*		-
abi kwokwáchi [aguacate grande., 20 cm.)	Lauraceae	*Persea americana*		-
abogboo*	Sapotaceae	*Pouteria anibaefolia*	46	ML153
abukdu dando borokba	Strelitziaceae	Indeterminate		ML072
abukubái atogbé (guineo)	Musaceae	*Musa balbisiana* X *acuminata*		-
abukwokwáchi (aguacate pequeño, 6 cm.)	Lauraceae	*Persea americana*		-
adogdakaa abama	Indeterminate	Indeterminate		ML350
adugmokomo ishdã	Indeterminate	Indeterminate		ML358
agbaishi abama	Indeterminate	Indeterminate		ML390
agdou	Arecaceae	Indeterminate	4	-
agdouda bokããkaa	Flacourtiaceae	*Lindackeria* sp.	1	-
agdouda burubuu	Arecaceae	*Chamaedorea pinnatifrons(cf.)*		ML251
agdoudakaa [aborai]	Indeterminate	Indeterminate	32	ML041
agdoudakaa ankorai [daviobai]*	Solanaceae	*Cestrum* aff. *megalophyllum* Dunal		ML291
agdoudakaa babai* [≈ shigboo]	Polygonaceae	*Coccoloba* sp.	1	ML254
agdoudakaa bogki	Apocynaceae	*Stemmadenia* sp. (cf.)		ML368
agdoudakaa kaakaraba*	Rubiaceae	Indeterminate		ML025
agdoudakaa*	Apocynaceae	*Stemmadenia* sp.		ML202
agdoukaa*	Meliaceae	*Trichilia* sp. 1		ML246
agdoukaru	Indeterminate	Indeterminate	20	ML355
agshubogboo	Indeterminate	Indeterminate	1	-
agshugbasheshshekaa	Indeterminate	Indeterminate	2	-
agsobaikaa	Indeterminate	Indeterminate	1	-
agtugbakãã	Indeterminate	Indeterminate	2	-
ahkaa bïï	Euphorbiaceae	*Sagotia* sp.		-
ahkaa* bachï	Euphorbiaceae	*Sagotia racemosa* Baillon	209	ML228
áigtugbaa	Indeterminate	Indeterminate	1	-
ainogbáa*	Apocynaceae	*Couma macrocarpa* Barb.	1	ML188
aisugsee kagdo	Indeterminate	Indeterminate		-
akarabai ihtotabay	Indeterminate	Indeterminate		ML074
akegbaëgshí	Indeterminate	Indeterminate		ML135
akichebagkaa (cuasia)	Simaroubaceae	*Quassia amara* L.		ML236
aksá bóogba (fruta silvestre)	Indeterminate	Indeterminate		-
akurú (aguacate)	Lauraceae	*Persea americana*		-

ale baishdã	Araceae	*Philodendron hederaceum* (Jacq.) Schott		ML315
aowá (ñame)	Dioscoreaceae	*Dioscorea alata*		-
arã (planta...)	Indeterminate	Indeterminate		-
araktá (aragtogbaa, corozo de coruba)	Arecaceae	*Attalea butyracea*	83	-
arebágchi*	Solanaceae	*Solanum* sp.		ML029
arebaishdã	Indeterminate	Indeterminate		ML348
arigbai ishdã	Indeterminate	Indeterminate		ML391
arihbæ	Arecaceae	*Euterpe oleracea*	44	ML319
arihbæ bïï	Arecaceae	*Euterper karsteniana*		-
aroogba	Rutaceae	*Citrus Limon* (L.) Burm.		-
arúu [arikogbaa] (mapora)	Arecaceae	*Oenocarpus bataua* var. 2	101	ML326
asaa (ceiba)	Bombacaceae	*Ceiba pentandra* Gaertn.	14	ML331
asaj'bõõgba (icaco)	Chrysobalanaceae	*Chrysobalanus icaco*		-
asangboo	Chrysobalanaceae	*Chrysobalanus* sp.	1	-
asharo tugbaa (yagrumo)	Cecropiaceae	*Cecropia* sp. 1	1	-
asháro totubí*	Rubiaceae	*Psychotria* sp.		ML024
asharobi orko* (malagueta)	Annonaceae	*Xylopia frutenscens* Aubl.		ML062
asharobi totubí	Rubiaceae	Indeterminate		ML064
asharon dandõborokba	Melastomataceae	Indeterminate		ML042
ashikba (cocuiza)	Agavaceae	*Furcraea humboldtiana* Trel.		-
ashubogbó	Indeterminate	Indeterminate	1	-
asogbogbaa obama	Chrysobalanaceae	*Licania* sp. 2		ML334
asogbogbaa*	Chrysobalanaceae	*Licania* sp. 1	6	ML267
atchikí (picatón)	Araceae	*Dieffenbachia maculata.* (Lodd.) G. Don		-
atiriabi*	Cyperaceae	*Scleria* sp.		ML004
atogbé (guineo)	Musaceae	*Musa balbisiana* X *acuminata*		-
atorororí (parchita [naransrenogba])	Passifloraceae	*Passiflora* sp. 2		ML098
atratrakaa abi	Indeterminate	Indeterminate	1	-
baachí máashun (yuca dulce blanca)	Euphorbiaceae	*Manihot esculenta*		-
báahdã (cabima, copaiba)	LEG./Caesalpinioideae	*Copaifera langsdorffii*	2	ML115
bachákda (cambur topocho)	Musaceae	*Musa balbisiana* X *acuminata*		-
bachi notchí (guaritoto)	Urticaceae	*Urera caracasana* (Jacq.) Steud.		ML298
bachigdai*	Euphorbiaceae	*Acalypha* sp. 1	3	ML014
bachiichibokaa	Indeterminate	Indeterminate		-
bachiishda	Indeterminate	Indeterminate		-
bachikõgdaig (≈kõgdaig abama)	LEG./Mimosoideae	*Parkia* sp. 4		-
bachïn (espina de erizo)	Elaeocarpaceae	*Sloanea* sp.	1	ML209
bachinkaa	Indeterminate	Indeterminate	3	-

bachinshiboroko	Indeterminate	Indeterminate		-
badchiró (cambur 500)	Musaceae	*Musa balbisiana* X *acuminata*		-
bagchbashïdaig	Ulmaceae	*Trema* sp.		ML040
bagchibá (caña de azúcar)	Poaceae	*Saccarum officinarum*		-
bagdrōw [also arikbakaraba]*	Sapotaceae	*Micropholis* sp. (cf.)	51	ML174
bagkroshí	Indeterminate	Indeterminate		ML374
bagshí	Indeterminate	Indeterminate		ML362
báhki* (barbasco)	LEG./Papilionoideae	*Tephrosia sinapou* (Bushz.) A. Chev.		ML245
bahkoo (conopio grande)	Zingiberaceae	*Renealmia* sp. 2		-
bahku (bacu)	Lecythidaceae	*Cariniana pyriformis* Miers.	32	ML089
bai 'chikbá (caña de azúcar amarilla)	Poaceae	*Saccarum officinarum*		-
bai dande (apio bueno)	Umbelliferae	*Arracacia xanthorrhiza*		-
bai loré (ají, ají bueno)	Solanaceae	*Capsicum frutescens*		-
bairoishdã	Indeterminate	Indeterminate		ML349
baktráura (cambur 500)	Musaceae	*Musa balbisiana* X *acuminata*		-
bángñi*	Euphorbiaceae	*Senefeldera* sp. (cf.)	1	ML294
bara [a tree]	Indeterminate	Indeterminate		-
báreig	Indeterminate	Indeterminate		ML206
barëna (or barï, barbasco)	Compositae	*Clibadium* sp.		-
bari'kokgsá*	Solanaceae	*Solanum* sp.		ML005
barikoksáa	Solanaceae	Indeterminate		ML121
baronavíshi	Indeterminate	Indeterminate		ML133
baróo* (jobo)	Anacardiaceae	*Spondias mombin* L. (big fr. variety)	42	ML155
barõõkaa	Meliaceae	*Trichilia* sp. 2	4	-
barõõkaa abama*	Meliaceae	*Trichilia* sp. 3	3	ML277
barúu*	Moraceae	*Brosimum* sp.	17	ML158
bashidaig	Ulmaceae	*Trema* sp.		ML065
bashindoubogyi* (changuango)	Araceae	*Dracontium aracuaisense*		ML293
bashkëakbaraba	Indeterminate	Indeterminate		ML096
batugbó*	Indeterminate	Indeterminate	7	ML160
bayro shíma (bejuco de agua)	Indeterminate	Indeterminate		-
bedaro ishdã	Menispermaceae	*Cissampelos* cf. *andromorpha* DC.		ML324
bee (batata blanca)	Convolvulaceae	*Ipomoea batatas*		-
bégbeg (platanillo)	Marantaceae	*Stromanthe lutea*		ML332
bégbeg aktugbee(platanillo)	Marantaceae	*Stromanthe* sp. 2		-
bekoekaraba*	Loranthaceae	*Oryctanthus* sp. (cf.)		ML185
beregshi (arbol peq.)	Indeterminate	Indeterminate		-
bero karibai [≈barikoksáa]	Solanaceae	Indeterminate		-

beroko	Solanaceae	Indeterminate		ML125
beroko karibai [≈barikoksáa]	Solanaceae	Indeterminate		-
beroo* (mapapalo)	Moraceae	*Ficus* sp. 2		ML396
bichiowa ishdã	Menispermaceae	*Anomospermum reticulatum* subsp. *glabrens*		ML317
bichirabú* (yaya)	Annonaceae	*Duguetia* sp. 1	2	ML201
bigbira (bijao de hoja pequeña)	Heliconiaceae	Indeterminate		-
bii	Bromeliaceae	*Pitcairnia* sp. (cf.)		-
bikogshi ishda	Indeterminate	Indeterminate		ML393
bintugbaa karaña (tacamahaco)	Burseraceae	*Protium* sp. 2		-
biraikareeishdã	Indeterminate	Indeterminate		ML338
birichbóo*	LEG./Mimosoideae	cf. *Inga* sp.		ML069
birichíboo abama (guamo)	LEG./Mimosoideae	*Inga quaternata* Poepp.	1	ML238
birichíboo* (guamo)	LEG./Mimosoideae	*Inga semialata* (Vell.) Mart.	6	ML249
birigbakaa	Indeterminate	Indeterminate		ML367
birihba (corazon rojo)	Guttiferae	*Vismia* sp.	2	ML067
birik'báa (bejuco de peonía)	Araceae	*Abrus precatorius* L.		-
birimashunki ishdã	Indeterminate	Indeterminate		ML357
birinkaru	Indeterminate	Indeterminate	4	ML351
birinkaru abama	Indeterminate	Indeterminate	1	-
birikba abama	LEG./Papilionoideae	*Lonchocarpus* sp.		-
birogshii [≈bishima]	Indeterminate	Indeterminate		-
birokbógbaa abaama*	Chrysobalanaceae	*Hirtella* cf. *glandulosa* Spreng.	4	ML295
birokbogbaa*	Sapotaceae	Indeterminate	3	ML038
birokdó (guasdua, bambú)	Poaceae	*Guadua latifolia* H.B.K.	1	-
birónkwãkwã* (cacao de monte)	Sterculiaceae	*Herrania* sp.	5	ML019
bisag-ogbaa (caña de la India)	Zingiberaceae	*Costus* sp. 2		ML352
bisairogba abama* (caña de la India)	Zingiberaceae	*Costus scaber* R & P.		ML015
bishima	Indeterminate	Indeterminate		-
bishindu ishdã	Piperaceae	*Piper* sp. 1		ML224
boaibogbá (cañafístola)	LEG./Caesalpinioideae	*Cassia rasemosa*		-
bogbaa	Indeterminate	Indeterminate	4	ML258
bogbaikaa	Indeterminate	Indeterminate	1	-
bogsorogbaa*	Sterculiaceae	*Pterygota* sp.	7	ML235
bogyi danborokbáa*	Melastomataceae	*Miconia* sp. 1		ML031
bogyi shkomba	Araceae	*Spathiphyllum canniaefolium* (Dryander) Schott		ML305
bogyira abi banchi (helecho de río)	[Pilicopsida]	Indeterminate		ML071
bogyira kankaraba	LEG./Mimosoideae	*Inga* sp. 6		ML087
bogyira kankarabaa* (guamo macho)	LEG./Mimosoideae	*Zygia latifolia* (cf.)		ML243

bogyiramika	Indeterminate	Indeterminate	2	-
bohkãã kaa*	Flacourtiaceae	*Lindackeria paludosa* (Benth.) Gilg	15	ML252
bokshi (nazareno, zapatero, musculo de hierro)	LEG./Caesalpinioideae	*Peltogyne purpurea*	3	-
bookankaaru	Indeterminate	Indeterminate	1	-
bookankaaru abama	Indeterminate	Indeterminate	1	-
bóoran nánkatdú (piña colorada)	Bromeliaceae	*Ananas comosus*		-
boraïg	Indeterminate	Indeterminate	2	-
boro'bachíri (platanillo)	Heliconiaceae	*Heliconia* sp. 1	1	ML006
borógba* (bucare peonia [≠borogbá])	LEG./Papilionoideae	*Erythrina mitis* Jacq.		ML242
borokbá (plátano)	Musaceae	*Musa balbisiana* X *acuminata*		-
bosoobo techí	Arecaceae	*Bactris* sp. (cf.)		-
boyira mika*	Rubiaceae	Indeterminate		ML033
brãdãhkaa	Indeterminate	Indeterminate	8	-
brimashunki ishdã	Indeterminate	Indeterminate		ML382
brumabachikaá	Indeterminate	Indeterminate	1	-
buc, bucogbáa* (chaparro)	Malpighiaceae	*Byrsonima spicata* (Cav.) DC.	1	ML329
buiña [a big tree]	Indeterminate	Indeterminate		-
burí* (tiamo)	LEG./Mimosoideae	*Acacia glomerosa* Benth.	4	ML262
burubaakaa (vera)	Zygophyllaceae	*Bulnesia arborea*		-
burubuu abama	Arecaceae	*Chamaedorea* sp.(cf.)		-
burubuu apí	Arecaceae	*Hyospathe elegans* (cf.)		-
burubuu ito	Arecaceae	*Chamaedorea* sp.(cf.)		-
burubüü*	Arecaceae	cf. *Chamaedorea pauciflora*	6	ML008
burugkaa	Indeterminate	Indeterminate		ML365
burúk'baka (vera de agua)	LEG./Caesalpinioideae	*Sweetia fruticosa* Sprengel		-
burúma*	Sapotaceae	*Pouteria* sp.(cf.)	83	ML270
burunbunkaa abama	Tiliaceae	*Luehea* sp.	1	-
burunbunkaa*	Tiliaceae	*Luehea seemanni* Tr. & Planch.	19	ML241
buyógbaa* (caobo)	Meliaceae	*Swietenia odorata*	15	ML159
bwai bojkbá* (algarrobo)	LEG./Caesalpinioideae	*Hymeneae courbaril* L.		ML195
chi (cambur bocadillo)	Musaceae	*Musa balbisiana* X *acuminata*		-
chí:ri (cambur bocadillo)	Musaceae	*Musa balbisiana* X *acuminata*		-
chiaigchiaig	Poaceae	Indeterminate		ML112
chidari shdãa	Loranthaceae	*Phtrirusa* sp. (cf.)		ML061
chigbidãa* (yagrumo)	Moraceae	*Pourouma cecropiifolia* Mart.	15	ML232
chíkãã (caña amarga)	Poaceae	*Gynerium sagittatum* subsp. 1		-
chirabu babai (yaya)	Annonaceae	*Oxandra* sp.	2	-
chirabu* (yaya)	Annonaceae	*Oxandra venezuelensis* R. E. Fr.	47	ML219

chirahbáakaa* (palo de Maria)	Polygonaceae	*Triplaris caracasana* Chamisso	6	ML279
chirogdóokaa* [≈chirugchirug]	Melastomataceae	*Miconia* sp. 2	35	ML230
chirohkaru	Indeterminate	Indeterminate	1	-
chirugchirug abama	Lauraceae	Indeterminate	1	-
chirugchirugkaa	Lauraceae	Indeterminate	2	ML328
daabá* (balso)	Bombacaceae	*Ochroma pyramidale* (Cav. ex Lam.) Urb.	2	ML208
dáabi korokóongda (bromelia)	Bromeliaceae	Indeterminate		-
daairukbá (cacao)	Sterculiaceae	*Theobroma cacao* L.		-
daairukbá bashï [wild, white flower]	Sterculiaceae	*Theobroma* sp. 1 (wild cacao)	2	ML321
daairukbá bokimai [wild, red flower.]	Sterculiaceae	*Theobroma* sp. 2 (wild cacao)		-
daairukbá karikanshundu [wild, yellow fl.]	Sterculiaceae	*Theobroma* sp. 3 (wild cacao)		-
daairukbá tagtabaankorai [wild, green fl.]	Sterculiaceae	*Theobroma* sp. 4 (wild cacao)		-
daarikba akain (totumo pequeño)	Bignoniaceae	*Crescentia cujeta* L.		-
daba (tabaco)	Solanaceae	*Nicotiana tabacum* L.		-
dabá'okbá (tabaco)	Solanaceae	*Nicotiana tabacum*		-
dabáa oba*	Euphorbiaceae	*Alchornea* sp. 2	8	ML287
dabagdou kat'do (guayabo)	Myrtaceae	*Psidium guayaba*		-
dabaigbúgcha abama	Indeterminate	Indeterminate		-
dabaigbúgchii	Indeterminate	Indeterminate	8	ML337
dabaikaa* (anoncillo)	Annonaceae	*Rollinia pittieri*	3	ML179
dabakadú (tabaco)	Solanaceae	*Nicotiana tabacum*		-
dabara (cambur gde. pinta tigre)	Musaceae	*Musa balbisiana* X *acuminata*		-
daborokba (tapa taparo)	Melastomataceae	*Graffenriendia* sp.		ML047
dagda araktá [araktogba]	Arecaceae	*Schelea macrolepis*		-
dagkogdomai kaa	Indeterminate	Indeterminate		ML380
dagshibu shdã	Indeterminate	Indeterminate		ML379
dagyíi	Arecaceae	*Calyptrogyne ghiesbreghtiana* (cf.)		ML398
dagyikogbaa*	Moraceae	*Maquira guianensis* Subl.	20	ML286
dáiba* (cedro)	Meliaceae	*Cedrela odorata* L	2	ML244
daig (ñame [yam])	Dioscoreaceae	*Dioscorea alata*		-
dáig (ocumo)	Araceae	*Xanthosoma sagittifolium*		-
dáig (taro o malanga)	Araceae	*Colocasia esculenta*		-
daigda [a tree]	Indeterminate	Indeterminate		-
dak´gyí [orquídea de hoja gde.]	Orchidaceae	*Cattleya* sp.(cf.)		-
danborokbáa*	Monimiaceae	Indeterminate		ML032
dánde (apio)	Umbelliferae	*Arracacia xanthorrhiza*		-
dánde sa (apio propio)	Umbelliferae	*Arracacia xanthorrhiza*		-
dandobohbakaa	Indeterminate	Indeterminate	2	-

dandoborogbáa*	Melastomataceae	*Miconia* sp. 3	30	ML027
dandoborokba abama	Melastomataceae	Indeterminate	3	ML203
dandorogba	Melastomataceae	Indeterminate		ML056
dankashirenogbaa ishdã	Indeterminate	Indeterminate		ML370
darogbaa	Arecaceae	*Bactris major* var. 4		-
darún aktugbee	Marantaceae	*Maranta or Calathea* (cf.)		ML132
dihkaiakiikaa [aleobagdaobai]*	Flacourtiaceae	*Zuelania guidonia* (Sw.) Britt		ML283
dijkú* (amapola [also kogshibakaa])	Apocynaceae	*Himatanthus sucuuba*	19	ML231
dobáa'kiróu karibiu	Indeterminate	Indeterminate		-
dobaida korokonda	Orchidaceae	Indeterminate		ML036
dobaoishdaa (bejuco de agua)	Indeterminate	Indeterminate		-
doborokba obama*	Rubiaceae	*Psychotria* sp.		ML021
dodji (ají)	Solanaceae	*Capsicum frutencens*		-
doksoa [extinct variety]	Curcubitaceae	*Lagenaria siceraria*		-
dorikba [small wild tree gourd]	Bignoniaceae	*Cressentia* sp. (wild variety)		-
drã'biña*	Myrsinaceae	*Ardisia guianensis* (Aubl.) Mez	4	ML276
drãbiña abama	Myrsinaceae	*Cybianthus* sp. (cf.)		ML311
durinkaduu*	Cyperaceae	Indeterminate		ML022
durugba	Cecropiaceae	*Coussapoa* sp. 2		-
durugba abama*	Cecropiaceae	*Coussapoa* sp. 1		ML271
dyera abainchi*	[Pilicopsida]	Indeterminate		ML016
dyera agdoudakaa	Indeterminate	Indeterminate		-
dyera bakonkaa	Euphorbiaceae	*Pera* sp.		ML269
dyera burubuu	Arecaceae	*Chamaedorea* sp.(cf.)		-
dyera chiachia*	Heliconiaceae	*Heliconia psittacorum*		ML020
dyera karigbaakaa	Indeterminate	Indeterminate		ML360
dyera karigbai	Arecaceae	*Bactris major* var. 3		-
dyera korokonda	Orchidaceae	Indeterminate		ML035
dyera korokonda	Orchidaceae	*Vanilla* sp.		ML068
dyera korokonda*	Araceae	Indeterminate		ML007
dyera korokonda*	Bromeliaceae	*Tillandsia* sp. (cf.)		ML017
dyera lolobai	Orchidaceae	*Vanilla* sp.	3	ML046
dyera lolobai abanchi*	Haemodoraceae	*Xiphidium* sp.		ML030
dyera lurumama	Anacardiaceae	*Anacardium* sp. 2	2	-
dyera obamaka*	Piperaceae	*Pothomorphe* sp. 2		ML012
dyera shiow*	Guttiferae	*Clusia* sp. 2		ML282
dyera shkombaa	Heliconiaceae	*Heliconia* sp. (cf.)		ML303
dyera swai*	Arecaceae	*Geonoma* sp.		ML028

dyera totubí	Rubiaceae	*Psychotria marginata* Sw.		ML304
dyera tuntunbai abama*	Caricaceae	*Carica* sp. 2		ML281
dyera tuntunbai ihtobai*	Caricaceae	*Carica* sp. 3		ML280
dyerabahkõ	Euphorbiaceae	*Pera* sp.	2	-
dyerakaã karaba	Chrysobalanaceae	*Hirtella* sp. 2		ML296
dyerakaa*	Indeterminate	Indeterminate	29	ML156
dyerakããkarabaa (guamo)	LEG./Mimosoideae	*Inga* sp. 1	1	-
dyeralobikaa	Indeterminate	Indeterminate	3	-
dyibaishdãã	Indeterminate	Indeterminate	2	-
dyiroaibaka	Indeterminate	Indeterminate	1	-
dyiroaibakãá babai	Apocynaceae	*Aspidosperma rigidum*	2	ML314
dyiroaibakãá bãshï (draque)	LEG./Papilionoideae	*Platyposium elagans* Vogel	10	ML313
dyiroaibakãá bãshï abama	LEG./Papilionoideae	*Platyposium* sp.	1	-
dyiroaikaa	Indeterminate	Indeterminate	6	-
dyirobaigkaa	Indeterminate	Indeterminate	0	-
dyirobaikaa baamai	Indeterminate	Indeterminate		-
dyirobakaa	Indeterminate	Indeterminate	1	-
dyirobakaa babai [85 dbh 40 m. tall tree]	Indeterminate	Indeterminate	0	-
eragbahkonkaa	Euphorbiaceae	*Pera* sp.	4	-
eskobashi	Indeterminate	Indeterminate		ML119
ibáa (pa'leña)	Indeterminate	Indeterminate		-
ibashki	Indeterminate	Indeterminate	1	-
ichiorowbaa (guamo)	LEG./Mimosoideae	*Inga* sp. 2	15	-
ichiow (guamo)	LEG./Mimosoideae	*Inga* sp. 3	4	-
ichorogbáa (guamo [a large tree])	LEG./Mimosoideae	*Inga* sp. 4		ML082
igtobaba ishdã	Indeterminate	Indeterminate		ML347
ihdagí*	Euphorbiaceae	*Acalypha diversifolia* Jacq.	3	ML255
ihdye (corazon rojo)	Indeterminate	Indeterminate		-
ihtõkwaikaa* (tomate francés)	Solanaceae	*Cyphomandra batacea* (cf.)		ML165
ijshobara (guamo)	LEG./Mimosoideae	*Inga* sp. 7		ML063
ijtokwai ishkombai [small medicinal plant]	Indeterminate	Indeterminate		-
ijtõkwaikankaraba*	LEG./Mimosoideae	*Siparuna* sp.		ML009
insáisaibai (tabaco)	Solanaceae	*Nicotiana tabacum*		-
irokokoba [vine use for climbing]	Indeterminate	Indeterminate	0	-
ishchurukdú [small tree, fl. announce rain]	Indeterminate	Indeterminate		-
ishdá shíma (bejuco de agua)	Indeterminate	Indeterminate		-
ishdã	Indeterminate	Indeterminate		ML076
ishdã ishdã	Acanthaceae	*Mendoncia* sp.		ML055

ishdākaa [tree with thorns]	Indeterminate	Indeterminate	23	ML354
ishdākaraba (parchita verde)	Passifloraceae	*Passiflora vitifolia* HBK.		ML256
ishiba ihtobai (naranjillo)	Acanthaceae	*Trichanthera gigantea* (H. &. B.) Nees		ML306
ishibaa abama (higuerote)	Moraceae	*Ficus* sp. 4	3	-
ishibaa* (higuerote)	Moraceae	*Ficus* sp. 3	9	ML197
ishibaugbou* (mapapalo)	Moraceae	*Ficus prinoides*(cf.)		ML034
ishigbororõ* (bototo)	Cochlospermaceae	*Cochlospermum orinocense* (Kunth.) Steud.	2	ML212
íshiraberi (jobo)	Anacardiaceae	*Spondias mombin* L. (small fr. variety)	1	ML307
ishiranki abama*	Piperaceae	*Piper* sp. 2		ML013
ishiránki*	Piperaceae	*Piper darienense* C. DC.		ML103
ishkána (yuca dulce)	Euphorbiaceae	*Manihot esculenta*		-
ishkugbaa* (tacamahaco)	Burseraceae	*Protium* sp. 3	105	ML101
ishugbaa abama	Araceae	Indeterminate		ML359
itdyïra (arbol...)	Indeterminate	Indeterminate		-
kāākarabá (guamo)	LEG./Mimosoideae	*Inga* sp. 9 (≈ *Inga spectabilis*)	16	-
kāākarabá dabagdou (guamo machete)	LEG./Mimosoideae	*Inga spectabilis*		RL004
káashirukú (cambur 500 delgado)	Musaceae	*Musa balbisiana* X *acuminata*		-
kagdoo	Combretaceae	*Terminalia oblonga* (R. & P.) Stand.	16	ML237
kahui (merey [cashew])	Anacardiaceae	*Anacardium occidentale*		-
kaikaa	Indeterminate	Indeterminate		-
kairugbe (cambur morado)	Musaceae	*Musa balbisiana* X *acuminata*		-
kakabo abama	Indeterminate	Indeterminate	1	-
kalā shíshi (algodón)	Malvaceae	*Gossypium hirsutum*		-
kamashkorou nondyiruku (guamo)	LEG./Mimosoideae	*Inga cocleensis* Pittier subsp. megantha (T.S. Elias) M. Sousa		ML327
kamiogba [≈nondyiruku]	LEG./Mimosoideae	*Inga* sp. 8	1	ML054
kan'chirukú (racimo, guineo)	Musaceae	*Musa balbisiana* X *acuminata*		-
kandya*	Sapindaceae	*Dilodendron costaricense* (Radlk.) Gentry & Steyerm.	5	ML152
kantaibi	Indeterminate	Indeterminate		-
kantugbaa	Indeterminate	Indeterminate		ML342
karāā (algodón)	Malvaceae	*Gossypium barbadense*		-
karāāshi	Malvaceae	Indeterminate		ML120
karaña* [or antugbaa karaña] (tacamahaco)	Burseraceae	*Protium* sp. 1	2	ML187
karigbai	Arecaceae	*Bactris major* var. *major*	102	ML128
karigbai ishdā	Indeterminate	Indeterminate		ML387
karigbai nánkatdu (con espinas)	Bromeliaceae	*Ananas comosus*		-
karigbái abama	Arecaceae	*Bactris* sp.(cf.)		-
karikā abama (apamate)	Bignoniaceae	*Tabebuia pentaphylla*		-
karikā* (cañaguato, cañada)	Bignoniaceae	*Tabebuia chrysea* Blake	10	ML011

karikogbai	Bromeliaceae	*Bromelia* sp. (cf.)		ML218
karora [a tree]	Indeterminate	Indeterminate		-
kat'do (guayabo de monte)	Myrtaceae	*Psidium* sp.		-
keki (mapora)	Arecaceae	*Oenocarpus mapora* Karst.	276	ML320
kiokbó (corozo)	Arecaceae	cf. *Oenocarpus mapora*		-
kíribai (calabazo, auyamita)	Cucurbitaceae	*Cucurbita maxima*		-
kóba* (coco de mono)	Lecythidaceae	*Couroupita guianensis* Aubl.	1	ML292
kobaakaruu	Indeterminate	Indeterminate	10	-
kobëë	Indeterminate	Indeterminate	7	-
kochiña	Elaeocarpaceae	*Sloneae zuliaensis*	71	ML106
kogbakaribai akaraba	Smilacaceae	*Smilax* sp.		ML045
kogbogshibogbaa	Leguminosae	Indeterminate		-
kõgdaig abama	LEG./Mimosoideae	*Parkia* sp. 2		-
kõgdaig shiowshiow	LEG./Mimosoideae	*Parkia* sp. 3		-
kõgdaig* (zarcillo, tamarindo gigante)	LEG./Mimosoideae	*Parkia pendula* (Willd.) Benth. ex Walp.	4	ML018
kogdoai*	Moraceae	*Brosimum lactescens* (S. Moore) Berg	28	ML265
kogdobogbáa (manzanillo)	Rubiaceae	*Posoqueria latifolia* (Rudge) Roem. & Schult.		ML264
kogdoi	Indeterminate	Indeterminate		ML083
kohshímboo ishãã (habilla gigante)	LEG./Mimosoideae	*Entada gigas* (L.)		ML131
kohlto bogboo [a tree]	Indeterminate	Indeterminate		-
kojkooma	Indeterminate	Indeterminate		-
koran ishdã	Indeterminate	Indeterminate		ML383
korokakaabu	Indeterminate	Indeterminate		-
korokomba ishubaa	Araceae	*Xanthosoma* sp. 3		ML369
korokonda*	Orchidaceae	Indeterminate		ML037
korokonda abama	Araceae	*Monstera* sp. 1		ML345
korokonda abibai	Bromeliaceae	Indeterminate		-
korokonda abidabai	Bromeliaceae	Indeterminate		-
korokonda abukungdai	Orchidaceae	Indeterminate		
korokonda bogyi	Cyperaceae	Indeterminate		ML051
korokonda bogyi abi	Cyperaceae	Indeterminate		ML052
kúg'da (palma llanera)	Arecaceae	*Copernicia tectorum* (H.B.K.) Mart.		-
kúii*	Sapotaceae	*Sarcaulus* sp.	12	ML213
kuma obamaka	Piperaceae	*Pothomorphe* sp. 3		ML049
kumabatúgboo	Combretaceae	*Terminalia* sp. 2		-
kumabiogbogbaa	Indeterminate	Indeterminate	1	-
kumbirikba* [also birikba abama]	LEG./Papilionoideae	*Lonchocarpus* sp.		ML274
kumbirikbah*	Melastomataceae	Indeterminate	1	ML191

kwinzagdarigbaa igtoo	Indeterminate	Indeterminate		ML373
kwisangdarikbáa	Indeterminate	Indeterminate	1	ML310
kwokwáchi (aguacate mediano, 10-15 cm.)	Lauraceae	*Persea americana*	11	-
labagdou atororori (maracuyano)	Passifloraceae	*Passiflora edulis*		ML312
lábatdo'borokba (cambur 500 gde.)	Musaceae	*Musa balbisiana* X *acuminata*		-
labiagduu [a common vine]	LEG./Papilionoideae	*Dalbergia* sp.		ML075
labibúu* (camaricaro)	Myristicaceae	*Virola* cf. *sebifera* Aubl.	24	ML233
lagshíkaa	Indeterminate	Indeterminate	8	-
lagyísoi	Arecaceae	*Wendlandiella* sp.		ML178
lidúu (caracoli)*	Anacardiaceae	*Anacardium excelsum* (Bert. & Balb.) Skeels	7	ML253
loai shkugbá* (tacamahaco)	Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	29	ML198
loai* (tacamahaco)	Burseraceae	*Protium* sp. 4		ML288
logbaka dugdukarigbaaishda	Indeterminate	Indeterminate		ML336
logchiri (cacho)	LEG./Caesalpinioideae	*Dialium* sp.	1	-
logsó (palma de cacho)	Arecaceae	*Socratea exorrhiza*	8	ML325
logsó abama	Arecaceae	*Socratea* sp. 2		-
logsorobogboo (chupon)	Lecythidaceae	*Gustavia* sp. 1	2	-
logsorologsoro abama* (chupon)	Lecythidaceae	*Gustavia* sp. 2	1	ML297
logsorologsoro* (chupon)	Lecythidaceae	*Gustavia speciosa* (H. B. K.) D. C.	8	ML154
loo (roble blanco)	LEG./Papilionoideae	*Platypodium* sp. cf. *polystachum*	9	-
loogabagdu	Ulmaceae	Indeterminate		ML057
loré (ají)	Solanaceae	*Capsicum frutescens*		-
loré asaá (ají picante)	Solanaceae	*Capsicum frutescens*		-
loré sasou (ají dulce)	Solanaceae	*Capsicum annuum* var. *annuum*		-
lorogbá abama	Sapotaceae	Indeterminate	1	-
lorogbá*	Sapotaceae	Indeterminate	45	ML190
lugshuu*	Lecythidaceae	*Lecythis corrugata* Poiteau	22	ML257
lurii*	Ulmaceae	*Ampelocera* cf. *edentula* Kuhlm.	35	ML268
lurugbaa (mapapalo)	Moraceae	*Ficus* sp. 5	2	-
lurugboo [≠ lurugbaa]	Moraceae	*Ficus* sp. 6	2	ML323
lurumama	Anacardiaceae	*Anacardium* sp. 3	3	ML363
maa	Indeterminate	Indeterminate	8	-
maama (totumillo)	Verbenaceae	*Vitex divaricata* Sw.	9	ML381
mamañiogbaa* (caruto)	Rubiaceae	*Genipa americana* L.	3	ML240
mamichirogbakaa*	Euphorbiaceae	*Alchornea triplinervia* (Spreng.) M. Arg. in DC.		ML261
mamitrogba abí*	Euphorbiaceae	*Alchornea* sp. 3	18	ML184
mashoóri (conopio)	Zingiberaceae	*Renealmia alpinia* (Rottb.) Mass.	1	RL006
mashú (yuca dulce)	Euphorbiaceae	*Manihot esculenta*		-

mashú yúma (yuca grande)	Euphorbiaceae	*Manihot esculenta*		-
mashú yúmamai (yuca dulce)	Euphorbiaceae	*Manihot esculenta*		-
menda*	Cyclanthaceae	*Asplundia* sp.		ML176
miida skókba (guanabano)	Annonaceae	*Annona muricata* L.		-
moeshdakaa	Indeterminate	Indeterminate	1	-
moeshiba abama (mapapalo)	Moraceae	*Ficus* sp. 9		ML172
moeshiba* (mapapalo)	Moraceae	*Ficus* sp. 8	5	ML150
motugbîi (bambú)	Poaceae	*Bambusa* sp. 1		-
motugbîi ogsan* (bambú)	Poaceae	*Bambusa* sp. 2	1	ML060
muey máashun (yuca dulce morada)	Euphorbiaceae	*Manihot esculenta*		-
muiñã [a large tree]	Indeterminate	Indeterminate		ML108
nánkatdu (piña amarilla)	Bromeliaceae	*Ananas comosus*		-
nichíkããa (caña amarga de monte)	Poaceae	*Gynerium sagittatum* subsp. 2		-
nondyíruku* (guamo chivo)	LEG./Mimosoideae	*Inga scabriuscula* Benth.	42	ML248
notchí/* (pringamoza)	Urticaceae	*Urera baccifera*		ML091
nun'borokbá (plátano grande)	Musaceae	*Musa balbisiana* X *acuminata*		-
núnku (bijao cara blanca)	Marantaceae	*Calathea lutea* Aubl. F.N.F.		-
nunkugboo abama	Boraginaceae	*Cordia* sp.	1	-
nunkugbóo* (caujaro blando)	Boraginaceae	*Cordia bicolor* A. DC.	12	ML263
obáamashí	[Pilicopsida]	Indeterminate		-
obamakaa	Piperaceae	*Pothomorphe* sp. 1	13	-
ogbara	Indeterminate	Indeterminate		ML333
ogboo* (yagrumo macho)	Araliaceae	*Didymopanax morototoni (or glabratus)*	6	ML181
ogchiri* (cacho)	LEG./Caesalpinioideae	*Dialium guianense* (Aubl.) Sandw. ex A.C. Smith	14	ML223
ogdobogbaa [a tree]	Indeterminate	Indeterminate		-
ogsaaijtibabakãa	Euphorbiaceae	*Mabea* sp.	2	ML239
ohbadaku [plant with thorns]	Indeterminate	Indeterminate		-
ojbáï	Cyclanthaceae	*Carludovica* sp.		ML247
ojshirók'ba (maís tostado)	Meliaceae	*Trichilia trinitensis* Juss.		-
okbai abama	[Pilicopsida]	Indeterminate		-
oraña	Schizeaceae	*Lygodium* sp.		-
orohkoo (arbol de montaña)	Indeterminate	Indeterminate		-
orrõ (bambú)	Poaceae	*Bambusa* sp. 3		-
rogdõngbáshkiridí (parchita)	Passifloraceae	*Passiflora* sp. 3		-
rugbaa (ciruelo de monte)	Anacardiaceae	*Spondias* sp.		-
rurugbá abama	Moraceae	*Ficus* sp. 7		ML204
sãã oruktrú*	Malvaceae	*Abelmoschus moschatus* Medik.		ML137
sabóu (cambur manzano)	Musaceae	*Musa balbisiana* X *acuminata*		-

sabóu widabai (cambur manzano gde)	Musaceae	*Musa balbisiana* X *acuminata*		-
sabúun káin (cambur 500 muy gde.)	Musaceae	*Musa balbisiana* X *acuminata*		-
saëgsaëshi	Indeterminate	Indeterminate		ML124
sai'bikádu ((caña de azúcar colorada)	Poaceae	*Saccarum officinarum*		-
saimayáasa (cambur grande)	Musaceae	*Musa balbisiana* X *acuminata*		-
sãkí amashú (yuca de vaquiro)	Araceae	*Xanthosoma* sp. 2		-
sãksiakara (calabaza)	Curcubitaceae	*Cucurbita pepo* L.		-
segsei (pegapega)	LEG./Papilionoideae	*Desmodium* sp.		ML053
shabërira [edible fruit]	Indeterminate	Indeterminate		-
shankshí (auyama)	Curcubitaceae	*Cucurbita maxima*		-
shdóo akarabá (guamo)	LEG./Mimosoideae	*Inga* sp. 5		RL003
shibo abama	Indeterminate	Indeterminate		ML361
shiborokoo	Indeterminate	Indeterminate		ML086
shiborokoo abama	Indeterminate	Indeterminate		-
shibúkugdu	Indeterminate	Indeterminate		ML122
shidakaa	Indeterminate	Indeterminate		ML114
shidashí	Indeterminate	Indeterminate		ML134
shigbaa [a tree]	Indeterminate	Indeterminate		-
shigbi sagbaa karaba ishdã	Indeterminate	Indeterminate		ML386
shigbóo*	Lauraceae	*Licaria* sp.	21	ML157
shihdakaa	Indeterminate	Indeterminate	1	-
shiima (totumo)	Bignoniaceae	*Crescentia cujete* L.		-
shikoba [a tree]	Indeterminate	Indeterminate		-
shikokdóo (caraota, frijol negro)	LEG./Papilionoideae	*Phaseolus vulgaris* L.		-
shilodorogbaa	Indeterminate	Indeterminate		ML375
shima akaina (totumo)	Bignoniaceae	*Cressentia cujete* L.		-
shindwe ishdã	Indeterminate	Indeterminate		ML102
shíndwe* (charo macho)	Moraceae	*Helicostylis tomentosa* (P. & E.) Macbride	27	ML234
shinkó*	Sterculiaceae	*Theobroma* sp. 5	1	ML186
shinshdów* (guamo)	LEG./Mimosoideae	*Inga vera* Willd.		ML273
shiow*	Guttiferae	*Clusia* sp. 1	4	ML193
shirãnshdãã (bejuco fuego)	Indeterminate	Indeterminate		-
shirãnshi	Indeterminate	Indeterminate		ML127
shirigbaa* [a secondary forest tree]	Bignoniaceae	*Jacaranda copaia* (Aubl.) D. Don subsp. spectabilis C. Mart. ex DC.	82	ML266
shirogdarogbaa ishdã	Indeterminate	Indeterminate		ML378
shirogkobi ishdã	Indeterminate	Indeterminate		ML392
shirokaru* (jobo macho)	Flacourtiaceae	*Laetia procera* (P. & E.) Eichler	3	ML275
shki-rabá (parchita)	Passifloraceae	*Passiflora* sp. 1		-

shkobashi	Malvaceae	Indeterminate		ML058
shkubaba abama (rosa de monte)	LEG./Caesalpinioideae	*Brownea coccinea* Jacq.	20	ML215
shkúbabá* (rosa de monte, palo de cruz)	LEG./Caesalpinioideae	*Brownea coccinea* Jacq.	228	ML170
shóo abama (caobo)	Meliaceae	*Swietenia candollei* Pittier.		-
shóotugbaa*	Melastomataceae	*Bellucia* sp.	22	ML196
shúkorõrõn (cambur grande)	Musaceae	*Musa balbisiana* X *acuminata*		-
shumigdaeg abama	Indeterminate	Indeterminate	3	-
shumigdaí abusanki*	Indeterminate	Indeterminate		ML177
shumigdaig*	Indeterminate	Indeterminate	9	ML167
shumki abama ishdã	Indeterminate	Indeterminate		ML384
shuunki [vine with purple fl.]	LEG./Caesalpinioideae	Indeterminate		-
sobogboo*	Lecythidaceae	*Eschweilera* sp. (cf.)	47	ML168
songbáa* (palo amarillo)	Combretaceae	*Terminalia amazonia* (J. F. Gmel.) Excll in Pulle	27	ML285
sorogsorog	Indeterminate	Indeterminate		ML097
sosora (batata colorada)	Convolvulaceae	*Ipomoea batatas*		-
swai* (caña de la India)	Arecaceae	*Geonoma stricta* Mart. var. *stricta*		ML023
swai abama	Arecaceae	*Geonoma stricta*		-
tabuhshdana (liana)	Indeterminate	Indeterminate		-
tagbaa ishdã*	Moraceae	Indeterminate		ML200
tagtá (bijao)	Heliconiaceae	*Heliconia* sp. 2		ML343
tagtá aktugbee	Heliconiaceae	Indeterminate		-
tagtábæ (batata colorada)	Convolvulaceae	*Ipomoea batatas*		-
tahtabaa	Arecaceae	*Bactris major* var. 2		ML130
taingbõõ (capacho)	Cannaceae	*Canna indica* L.		ML118
taingbõõ bachin (lágrimas de San Pedro)	Poaceae	*Coix lacryma-jobi* L.		-
tairuu*	Annonaceae	*Guatteria cardoniana* R. E. Fr.	22	ML229
tantanbishiowa	Indeterminate	Indeterminate		ML340
tarõkaa [=dagjikogbaa]*	Myrtaceae	*Eugenia* sp.	13	ML259
téchi (macanilla)	Arecaceae	*Bactris macana*	29	ML090
téchi abama	Arecaceae	*Bactris gasipaes*		-
tógboo*	Indeterminate	Indeterminate	9	ML182
tokwanshí	Indeterminate	Indeterminate		-
tootogbáa* (urá)	Burseraceae	*Dacryodes* sp. (cf.)	20	ML084
totubí "azul"	Rubiaceae	*Psychotria caerulea* Ruiz & Pavon		ML302
totubí karika shundu	Rubiaceae	*Palicourea buntingii* Steyerm.	2	ML301
totubíasharoba*	Rubiaceae	*Psychotria* sp.		ML010
totubíkaa	Melastomataceae	Indeterminate		ML318
totubíkaa (barba de pavo)	Rubiaceae	*Warscewiczia coccinea*	46	ML043

totubíkaa abama	Rubiaceae	*Warscewiczia* sp.	1	-
totubíkaa babai	Melastomataceae	*Miconia* sp. 4	2	ML299
totubíkaa*	Rubiaceae	*Palicourea* sp. 2		ML003
totugbaa (yagrumo)	Cecropiaceae	*Cecropia* sp. 3		-
trãtrã abama (cenicero)	Rubiaceae	*Coussarea paniculata* Vahl	12	ML290
trãtrã*	Rhizophoraceae	cf. *Cassipourea* sp.	11	ML278
truntrunkaru	Indeterminate	Indeterminate	1	-
tubikaa/drãbiya*	Rubiaceae	*Psychotria* sp.		ML026
tubitrogbóo*	Indeterminate	Indeterminate	9	ML199
tuchirogboo [a tree]	Indeterminate	Indeterminate		-
tugbaa (yagrumo de barsal,1 of 3)*	Cecropiaceae	*Cecropia* sp. 2	27	ML180
tugtugboo	Indeterminate	Indeterminate	7	-
tuhtuhbai [a plant, fleshi leaves]	Indeterminate	Indeterminate		-
tuituista	Orchidaceae	Indeterminate		-
túkdaa (onoto, achiote)	Bixaceae	*Bixa orellana*		ML044
tuktú (bijao)	Strelitziaceae	Indeterminate		-
tumma* (gateado)	Anacardiaceae	*Astronium graveolens* Jacq.	63	ML151
tuntunbai (lechoso, papaya)	Caricaceae	*Carica papaya*		
túriba (cambur verde)	Musaceae	*Musa balbisiana* X *acuminata*		-
tuubigtróogboo	Indeterminate	Indeterminate		ML093
twingbái* (luvara, pata de grulla)	Violaceae	*Rinorea lindeniana* (Tul.) O. Kuntze	49	ML171
twíshdaa [medicinal tree]	Indeterminate	Indeterminate		-
waibaaruu [itohdo arúu] (mapora pequeño)	Arecaceae	*Oenocarpus bataua* var. 3		-
yibáishdã	Indeterminate	Indeterminate		ML344
yiog	Euphorbiaceae	*Hyeronima alchorneoides* Allemão	5	ML289
yóogba (maíz)	Poaceae	*Zea mays* L.		-
556 TAXA (almost all folk-generic or specific)	77 Families	197 Genera, 314 SPP., 73 varieties	Trees in plots: 3162*	394

IMAGE EVALUATION TEST TARGET (QA-3)

150mm

6"

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