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CULTIVATING SOCIALITY: AESTHETIC FACTORS IN THE COMPOSITION AND FUNCTION OF PIAROA HOMEGARDENS

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ABSTRACT.—Anthropological analyses of settlement patterns minimize the importance of homegardens. Ethnobiological studies of homegardens usually focus on composition, ecological functioning or economic contribution. Because homegardens form part of the dwelling space, however, the factors that influence them and the functions they serve are as complex and dynamic as the lives of the people who create them. This paper, largely based on a comparison of homegarden maps of three Piaroa communities, explores their composition and economic utility, but also their temporal dynamics, spatial arrangement, symbolic values and aesthetic importance. Piaroa homegardens contribute to the quality of life and are site of sociality for the people who live in them: the pragmatic and aesthetic cannot be separated.

Key words: homegardens, Piaroa, agrobiodiversity, Amazon, Venezuela.

RESUMEN.—Los análisis antropológicos de los patrones de asentamiento tienden a minimizar la importancia de los huertos familiares. Los estudios etnobiológicos de los huertos familiares normalmente estudian su composición, función ecológica o contribución económica. Sin embargo, los huertos familiares forman parte del espacio de la vivienda, mientras que los factores que los influencian y las funciones que desempeñan son tan complejos y dinámicos como las vidas de las personas que los crearon. Esta investigación, basada en una extensa comparación de mapas de huertos familiares en tres comunidades Piaroa, explora su composición y utilidad económica, así como su dinámica temporal, disposición espacial, valor simbólico e importancia estética. Los huertos familiares de los Piaroa contribuyen a la calidad de vida y son un lugar de socialización para la gente que vive en ellos, en los que lo práctico y lo estético no pueden separarse.

RÉSUMÉ.—Les analyses anthropologiques de la structure des communautés minimisent l'importance des jardins domestiques. Les études ethnobiologiques des jardins domestiques se concentrent généralement sur la composition, les processus écologiques ou l'aspect économique. Étant donné que les jardins domestiques font partie de l'espace habité, les facteurs qui influent sur eux ainsi que les fonctions qu'ils desservent sont de ce fait aussi complexes et dynamiques que la vie même des gens qui les créent. Cette étude—basée largement sur la comparaison des cartes des jardins domestiques situé dans trois communautés Piaroa—examine leur utilité économique, leur composition, leur dynamique temporelle, leur disposition spatiale, leurs valeurs symboliques et leur importance esthétique. Chez les Piaroa, les jardins domestiques contribuent essentiellement à la qualité de vie et facilitent les rencontres sociales entre les gens qui y vivent, de sorte que l'on ne peut séparer l'esthétique du pragmatisme.

INTRODUCTION

Anthropological analyses of settlement patterns in nonindustrial societies tend to minimize the importance of homegardens or even to ignore them in carrying out structural analyses of houses and settlements (e.g., Guss 1989; Lévi-Strauss 1963:136–141; Waterson 1990). Studies that explicitly focus on homegardens usually focus on one or two physical characteristics, such as their economic utility (Drescher et al. 1999; Dury et al. 1996; High and Shackleton 2000; Michon and Mary 1994), agroecological functioning (Benjamin et al. 2001; De Clerck and Negreros-Castillo 2000; Fernandes and Nair 1986a; Gajaseni and Gajaseni 1999; Torquebiau 1992), diversity (Padoch and de Jong 1991; Soemarwoto and Conway 1991; Tchatat et al. 1996), or response to changing circumstances (Johnson and Grivetti 2002; Lamont et al. 1999). An emphasis on one or a few of these factors at the expense of the others draws an incomplete and sometimes inaccurate picture of the role of homegardens in the lives of those who cultivate them. Because homegardens form part of the dwelling space, the factors that influence them and the functions that they serve are as varied and complex as the homes that people create. This paper uses quantitative and qualitative data to demonstrate the complexity of Piaroa homegardens botanically and perceptually. I explore the economic utility of Piaroa homegardens, how they change over time, their spatial arrangement and the symbolic and aesthetic values that affect their composition. Finally, I combine these different layers of analysis to present a three dimensional image of a system that is both the result of and a reflection of the lives of the people who dwell in it.

The People.—The Piaroa[1] are a people of the middle Orinoco whose traditional territory is located in the northern part of Amazonas State, Venezuela. In many ways they are typical of Guianese ethnic groups as described by Rivière (1984). According to the ethnographic record, they live in small communities of around 12–60 people, generally organized along kinship lines (Anduze 1974; Boglár 1982; Overing and Kaplan 1988; Overing-Kaplan 1975; Zent 1992). The shaman/headman is responsible for the spiritual well-being and ritual productivity and is also usually the patriarch of the extended family that comprises the community. Communities generally move house site every one to ten years. This may happen because a prominent member has died, because the new gardens are too far from the house, or simply because they prefer to build in a new site. Although there is some idea of territory, the community is generally defined by the people who comprise it, rather than the physical location they occupy. In recent years, however, the Piaroa have increasingly settled in larger and more sedentary settlements, so that most occupy the same site for ten years or more (OCEI 1992). This was true in most of the ten communities that I visited, where I found prominent, complex and intensively managed homegardens.

Homegardens.—The ethnographic literature on the symbolic and cosmological significance of Amazonian homegardens is sparse. Descola (1994) gives one of the most complete descriptions of homegardens, in which he speaks of a central Achuar longhouse, surrounded "by a large yard carefully kept free of weeds and embellished with a scattering of small medicinal or narcotic shrubs, fruit trees and chonta palms (*Bactris gasipaes*)" (1994:110). Other Amazonian studies describe open plazas with a few plants or small "kitchen gardens" (Hugh-Jones 1979:43; Overing-Kaplan 1975:30–31, 34), but rarely focus on these spaces analytically or describe them with enough detail to clarify their roles. Indeed, in structural analyses of settlement patterns, the house is often carefully described, the swidden analyzed intensively, but the "plaza" may be considered to be largely a void space (e.g., Lévi-Strauss 1963:141) or not be mentioned at all (e.g., Guss 1989). An exception to this is the work done with the Barí by Beckerman (1983) and Lizarralde (1991), but they describe a system that is dominated by manioc and plantain, and intentionally or not, convey a sense of a static system. As discussed below, this system more closely fits the definition of a swidden than of a homegarden.

Ethnobiologists and agronomists have described homegarden systems in some detail and a body of literature has developed that describes functional similarities amongst diverse populations. Fernandes and Nair (1986a), in their seminal compilation of homegarden data from around the world, state that food production is the primary function of almost all tropical homegardens, with market bound products increasing in importance as market economies become more integral to domestic economies. They also say that "almost all homegarden systems have evolved over time under the influence of resource constraints (population pressure and consequent reduction in available land, capital and labour)" (Fernandes and Nair 1986a:31), suggesting that homegardens evolved to compensate for localized resource scarcity. They raise the issue of agrobiodiversity by pointing out that species composition is highest in remote communities, compensating for a lack of trade goods (Fernandes and Nair 1986b). A study in the Peruvian Amazon found that more diverse homegardens compensate for less diverse swiddens (Salick and Lundberg 1990). Lamont et al. (1999) focus on cultural change, concluding that species composition of homegardens in Peru was most impacted by access to tourist markets: species that were used to make souvenirs were located in homegardens. They also found, in contrast to Fernandes and Nair (1986b), that species diversity and richness were equally high in two communities with unequal access to markets (Lamont et al. 1999:316), but that young people in all communities are losing interest, thereby threatening homegarden diversity. Padoch and de Jong (1991), on the other hand, question the idea that complex homegardens are associated with traditional values. They document a continuing tradition of highly diverse homegardens amongst mestizo gardeners in the Peruvian Amazon. They point out that the number of species in these gardens was comparable to that of Javanese homegardens. The low population density in the research area calls into question Fernandes and Nair's finding that homegardens arise as a response to population pressure (1986a). These studies offer valuable insight into the complexity and importance of homegardens to domestic economies around the world, but the culture and aspirations of the people who grow them are largely absent from the analyses, thus the sociocultural motivations for, and implications of, the phenomenon remain essentially unexplored.

Contextualizing the Piaroa Homegarden.—As in Padoch and de Jong's study (1991), the Piaroa case calls into question the association of Amazonian homegardens with indigenousness. Indeed, if homegardens are traditional to indigenous Amazonians, why are they so little mentioned in the ethnographic literature? To answer this question it is necessary to understand the temporal dynamics of the Piaroa subsistence system. Even today, most Piaroa practice shifting cultivation, so that swiddens are cleared and planted with the explicit knowledge that they are a temporary site, to be farmed for two to four years before moving on to the next site. New swiddens are created each year. Meanwhile, the older swiddens develop from young fields dedicated almost exclusively to manioc and sometimes maize, to more diverse fallows with planted species as well as pioneer species that have been protected (see Denevan and Padoch 1988). In general, however, once the swidden is no longer producing large manioc crops, it becomes less important to the gardeners, who will focus much of their time and energy on younger swiddens.

The works of Boglar (1982), Overing (1975), Overing and Kaplan (1988) and Zent (1992, 1995) describe how the Piaroa, when they move to a new home site, build a house in the middle of a recently cleared and planted manioc swidden. After a few years, the land no longer supports intensive manioc farming and new swiddens are established increasingly far from the house. Zent (1992:372), who carried out his fieldwork with the Piaroa in the mid-1980s, describes the development of the homegarden: "If active residence is maintained in the house beyond a couple of years, the manioc gardens are cut at progressively greater distances while the housegarden takes on a more polycultivated and arboricultural appearance, dominated by medicinal-magical plants and slower maturing (usually tree) cultigens." He notes, however, that most home sites move within ten years of establishment, thus truncating the development of an intensively managed perennial garden. Instead, the old homesite garden, which may not be visited for many years from fear of lingering malignant spirits (Zent 1995), goes to fallow.

I, however, worked in an area that had been significantly impacted by government attempts to sedentarize the population and by an active Piaroa engagement with the national culture. In the case of the 10–30-year-old communities that I visited, the plots surrounding the home continued to be intensively managed as long as residence was maintained, but the floristic composition, the purpose and the symbolic value of the plots changed as they passed beyond the manioc producing stage. With the Piaroa, then, the act of sedentarization, which is a reflection of the shifting regional political climate (Mansutti 1988), is the most important factor in the development of complex homegarden systems with multiple floristic strata. In other words, rather than being threatened by recent cultural change, Piaroa homegardens are an immediate result of it.

It can be argued that the distinction between a swidden and a homegarden is not clear cut. However, emically, ecologically, and ethnobotanically there is a separation between the manioc swidden and the succeeding ecological stages. Eyzaguirre and Linares (2001:30) offer a description of homegardens in which floristic composition and diversity is an important component. However, the most important feature is that homegardens are part of the gardeners' dwelling space. Indeed, as Overing-Kaplan states (1975:31), the Piaroa term for house, ***iso'de***, includes the house and clearing surrounding the house.[2] It also includes the plants that are part of this clearing. For the Piaroa, then, homegardens are an integral part of their home. They are a significant component of a symbolically structured and socially experienced pattern of settlement space. The swidden, on the other hand, is part of the agroecosystem that can and often does shift away from the house over a period of years, depending on how long the house remains on the same site. As new swiddens are cleared farther away from the home, the homegarden continues to be intensively managed.

Is it true then that cultural change decreases the diversity of homegardens? Although sedentarization increases homegarden development, it is also associated with increased involvement in the market economy and increased contact with other ethnic groups, including nonindigenous groups. How do these variables affect homegardens? And what is the purpose and symbolic value of homegardens? To answer these questions, I carried out a comparative survey of the homegardens of three Piaroa communities in which the central method was hand-drawn maps of each homegarden with accompanying gardener interviews.

METHODS

The Study Setting.—Between September 1998 and September 1999, I mapped the homegardens of three Piaroa communities in the Manapiare Valley, Estado Amazonas, a riverine area to the east of the state capital of Puerto Ayacucho and the highlands that form the traditional Piaroa homeland (Mansutti 1990, Figure 1). Piaroa presence on this navigable river system is largely the result of a descent from these highlands in order to have greater contact with trade networks and the benefits of government programs such as schools and medical facilities. Thus, these communities arguably represent a shift from the traditional lifestyle associated with the highlands and described in the ethnographic record. Nevertheless, some Piaroa communities along the major rivers are only peripherally connected to the market, have little contact with nonindigenous populations and, in many ways, closely match earlier published descriptions. Even these more isolated riverine communities, however, maintain residence at a single site for upwards of ten years.

Study Communities.—The three study communities were chosen to reflect different levels of interaction with mestizo culture: Caño Seje, with limited contact; Guara, with formalized and intentional contact; and San Juan de Manapiare, with daily, casual and formal contact. The community of Caño Seje is relatively isolated (some 30 km upriver from the regional hub of San Juan) and ethnically unmixed with a population of approximately 30 people organized along traditional kinship lines. Only three inmarrying members of the community speak Spanish with any degree of competency. This community, all of one family, does not live in a single roundhouse as described in the ethnographic literature, but their four huts are clustered together and they cook, eat, hunt, garden and rest together. In this sense, the social organization of Caño Seje more accurately reflects Piaroa "tradition" than the other two study communities. Although a small amount of cacao (*Theobroma cacao*) is traded via the regional agricultural cooperative, involvement with any aspect of mestizo society is minimal. Moreover, there is no land pressure and no direct encouragement to remain sedentarized. In this regard, Caño Seje maintains a relatively traditional social structure and economy. Therefore, its home-

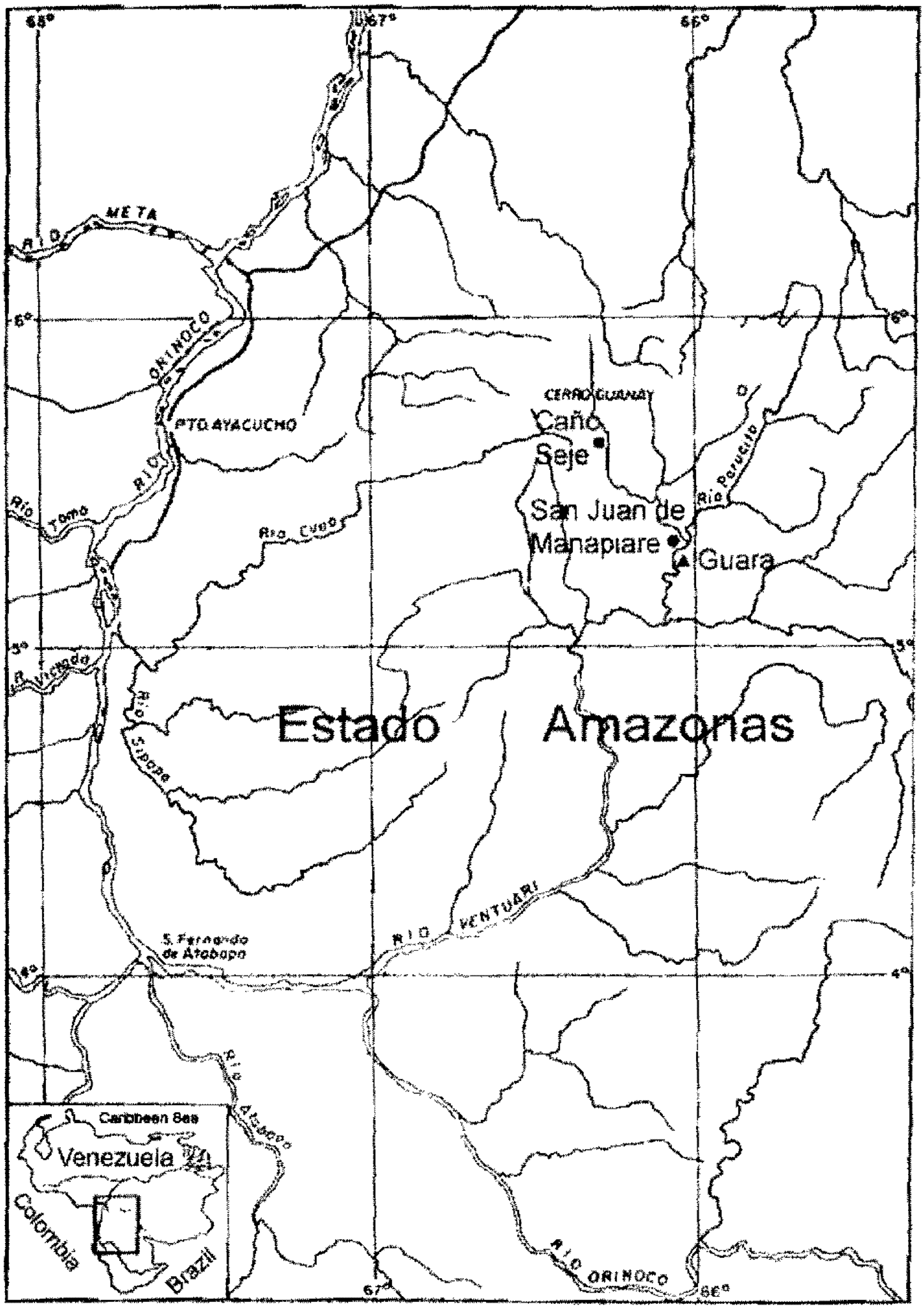

FIGURE 1.—Piaroa territorial occupation in 1960 and in 1995. The study sites are located along the Río Manapiare near the 66° meridian. (Source: Zent 1998: 254).

garden can be seen as a contemporary example of a traditional garden with which the other gardens may be compared. Nevertheless, the current residential site has been occupied for at least ten years, so that the homegarden is a developed, multistratum system.

Guara numbers approximately 75 Piaroa residents and is located 7 km downriver from the town of San Juan. It was established in the 1970s by the construction of 20 concrete block, zinc-roofed houses in two rows surrounding a central clearing. It has a primary school and frequent contact with government and development agents. Approximately 30% of the community speak Spanish. It is heavily involved with the agricultural cooperative that markets cacao, manioc products (*Manihot esculenta*), plantains (*Musa* x *paradisiaca*), and honey in exchange for manufactured goods such as pots, soap, brooms, and clothing. The proceeds from the cooperative have also allowed the community to buy a diesel generator and several outboard motors. The community is divided into six extended family groups that work together in much the same way that the entire community of Caño Seje works together. Nevertheless, through their community-wide business and political representation, they have an added layer of political, social and economic organization that is reflected in the organization of their homegarden, which has been under intensive management for the history of the settlement.

San Juan de Manapiare is the economic and political hub for the region with about 1000 people from at least 13 different ethnic groups (CAICET 1997). It has a Catholic school, a small hospital, shops, electricity, running water and daily flights to the state capital. Most of the Piaroa residents of San Juan live in the same neighborhood (*barrio* Piaroa) which was probably established no later than the 1950s. Most live in concrete block houses, but some have more recent homesteads. Nevertheless, I only clearly identified two homesteads whose homegardens were in formation, rather than already established. The Piaroa of San Juan mix daily with mestizos and Venezuelans through their jobs as wage laborers, in school, in the shops or in the health clinics. As of 2001, a resident of barrio Piaroa was mayor of the town. At least 50% of the residents speak Spanish and almost all of the children attend school. Despite an informal and opportunistic involvement in the market economy, most residents rely upon their subsistence crops for basic nourishment. Two kilograms of rice in the town shops cost an entire day's wage labor, so that subsistence agriculture remains an important part of the economy. The Piaroa residents of San Juan, as in the other two communities, form economic units based upon kinship ties, but unlike Caño Seje, these units are not geographically separated from other units, and, unlike Guara, they have not been able to form a cohesive economic entity, with a functional community-wide organization. Concerted attempts have been made, but infighting has prevented both a formalized involvement in the agricultural cooperative and a stable system of leadership with a universally acknowledged headman and prefect. Again, this disjointed system of economically distinct units is reflected in the homegardens.

Homegarden Maps.—The majority of the data was collected by drawing maps of the homegardens in the various communities accompanied by residents who told me, in a semistructured manner, about names, uses, and purposes of the plants and whether or not they were market bound. I often returned to these homesteads for further, unstructured discussions about maintenance and development of the garden. The maps are hand drawn diagrams of house clearings, including all buildings, water sources and plants. The results of these maps, combined with the economic and ecological considerations of the residents, allow for a detailed investigation of how homegardens respond to and reflect changing lifestyles.

When I first entered the community of San Juan (SJM), I assigned numbers to each house within the community. I later learned that some families slept in several different houses, but still operated as a single economic unit, so that several of the numbers originally assigned were no longer used. Because changing numbers of gardens would risk confusion and even loss of data, I have simply abandoned the use of several numbers. For example, the absence of SJM10 does not mean that I have not included this garden in my analysis, but rather that it has been absorbed as part of SJM17.

In Guara, on the other hand, I found it difficult to distinguish which plants belonged to which house. The area immediately surrounding the house and extending behind it was usually planted exclusively by the residents of that house. However, the central clearing and the large, cleared areas on either end of the two rows of houses were treated as communal space where people planted more or less as they desired. Therefore, I mapped the garden in Guara as a community garden, rather than as individual homegardens.

I sorted the species into six use categories: food—any plant that has edible parts; medicinal—plants that are used as herbal remedies to treat symptoms of illnes or injury; magical—plants that are used to treat causes of illness, to aid in hunting or to keep people, gardens and homes safe from bad spirits (*mæræ*); "technical"—plants with parts that are used in construction or to make tools, dyes, textiles, dishes or packaging and fish poisons; miscellaneous—largely consists of ornamentals for which nobody knew any other use. In the case that a single species had more than one use, it was counted in each of the relevant use categories.

The number of plants and species in each garden was then collated into a spreadsheet. For composition of gardens, a matrix was constructed scoring all species as present (1) or absent (0). A similarity matrix was calculated from this matrix using Anthropac 4.0 (Borgatti 1996). The multidimensional scaling tool in Anthropac then generated a series of coordinates representing the similarity or difference of species composition between the gardens. Figure 2 is an abstract representation of the similarity of gardens based upon their species composition. Those gardens with more similar compositions will appear closer together on the graph. Because the graph is a spatial abstraction of a complex situation, the axes do not reflect a single factor, so that it is not possible to label the axes. Moreover, the program must sometimes distort, or stress, the relationships in order to fit them into the parameters of the test. The stress value, then, represents the distortion of the data. A stress of over 0.15 is high enough that the results are invalidated (Borgatti 1996). Nevertheless, when I ran a three-dimensional test, rather than a two-dimensional one, the stress was lower and the configuration of the gardens was much the same. I have, therefore, included a two-dimensional graph with high stress for ease of viewing.

To understand more nuanced differences between the homegardens, I have

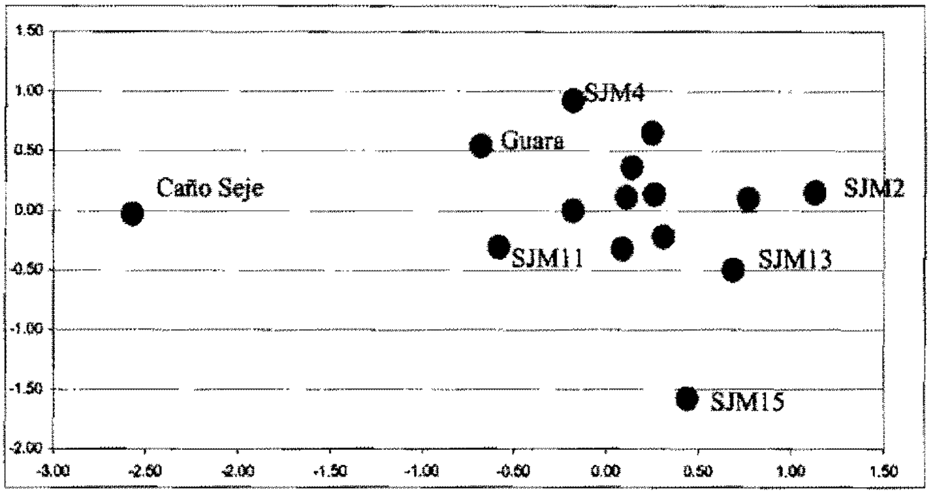

FIGURE 2.—Nonmetric multidimensional scaling of homegarden composition. All species were entered as present (1) or absent (0) and a similarity matrix was generated. The stress is 0.153.

used linear regression. Given that I have multiple gardens from only one community (San Juan), I have used those gardens to establish a correlation between factors. In all cases presented here, the high correlation in San Juan has allowed the calculation of an expected number for the other two communities. Where there is a high difference between the expected number and the actual number, it is then assumed that this difference is worth noting. It would, however, require testing more communities to establish testable means for the different types of communities.

The graphs, averages, standard deviations, linear equations and R^2 values were calculated using Microsoft Excel 97.

In assigning uses and market value to plants, I used information elicited from the gardeners and information gained from the markets, both in San Juan and Puerto Ayacucho, which was the nearest formalized market and export center. In the Manapiare Valley and particularly in San Juan, Piaroa involvement in the market is often informal and opportunistic. Therefore, I counted plants as having market value if that species was sold in the market rather than if it was explicitly planted for the market. In some homegardens, plants that I counted as having market value will not be sold and were not planted for the market.

RESULTS AND DISCUSSION

All of the gardens found in the three study communities, comprising fourteen homegardens and one community garden, were mapped. A total of 2286 individual plants from approximately 106 scientific species representing 113 folk taxa covering a surface area of approximately 10 hectares were identified. The general results are compiled in Table 1. The floristic inventory is summarized in Appendix 1.

TABLE 1.—The results of the homegarden maps.

Garden	Folk taxa	Total plants	Garden area (approx ha)	Adults
a. Summary.				
Caño Seje	54	170	0.75	6
Guara	45	478	~3.00[2]	39[2]
San Juan de Manapiare (total)	77	1636	9.15	60
Total	113	2286	13.15	105
b. San Juan de Manapiare (SJM) gardens.				
SJM1	11	126	0.50	6
SJM2	11	40	0.25	7
SJM3	24	90	0.50	3
SJM4	26	78	0.25[1]	3
SJM5	16	114	0.25[1]	4
SJM6	25	128	0.50	4
SJM7	21	136	0.75	5
SJM8	16	153	1.00	5
SJM11	8	22	0.15[1]	5
SJM12	24	150	0.75	4
SJM13	13	26	1.00	2
SJM15	36	299	1.50	6
SJM17	36	276	2.00	6
SJM avg	20.5	126	0.72	4.6
SJM stdev	9.1	84.6	0.54	1.5

[1] All of the land surrounding these houses was in cultivation.
[2] For reasons discussed in the text, the Guara garden was mapped as a single community garden, rather than a series of individual homegardens.

Homegarden Composition.—A primary purpose of this paper is to understand the factors that influence homegarden composition. Figure 2 shows a two-dimensional analysis of homegarden composition. From this abstract representation of similarities, it can be seen that Caño Seje's homegarden is significantly different from all of the others. Guara, while a slight outlier, is not significantly different from the San Juan gardens, although the high stress makes it difficult to draw conclusions based on such slight differences. In a three-dimensional analysis (stress 0.102), which I have not included due to graphic complexity, Caño Seje and Guara both come out as outliers. Other outliers include SJM15 and, to a lesser extent, SJM4. Thus, the three communities differ significantly in composition, but how do they differ and what does this tell us about the people who grow these gardens? By carrying out linear regression of the San Juan gardens, I am able to answer some of these questions.

Considering the difference in number of gardeners (Figure 3) and number of individual plants in the two communities (Figure 4), Caño Seje shows a much higher diversity than Guara. Applying the linear equation derived from the San Juan gardens, Caño Seje has twice the expected number of species (54 observed vs. 24 expected), while Guara has slightly fewer than expected (44 observed vs. 51 expected). Indeed, the species diversity of the Guara homegarden may be artificially increased due to the inclusion of six different homesteads (Figure 3),

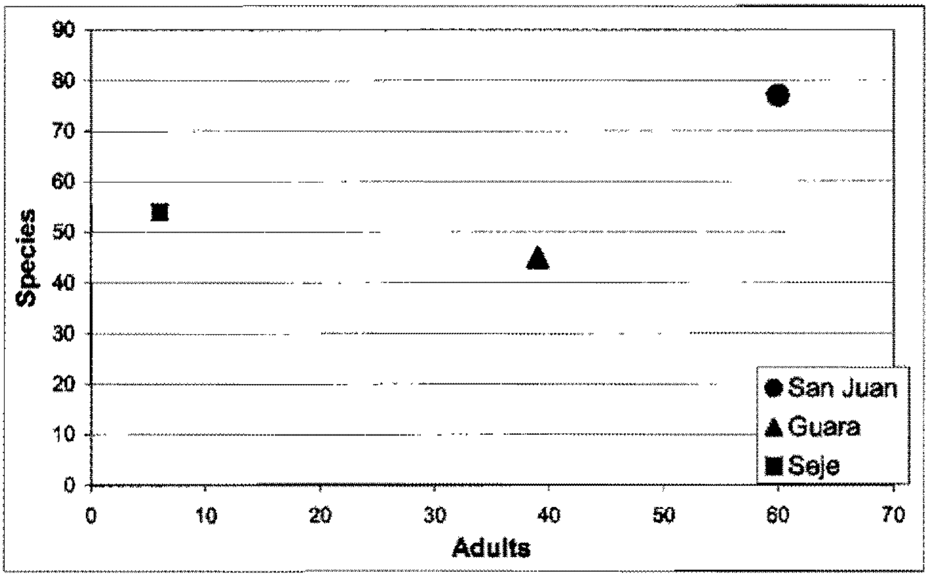

FIGURE 3.—A comparison of the number of adults vs. number of species between the three communities. Caño Seje has a high number of species for the relatively few adults who cultivate it.

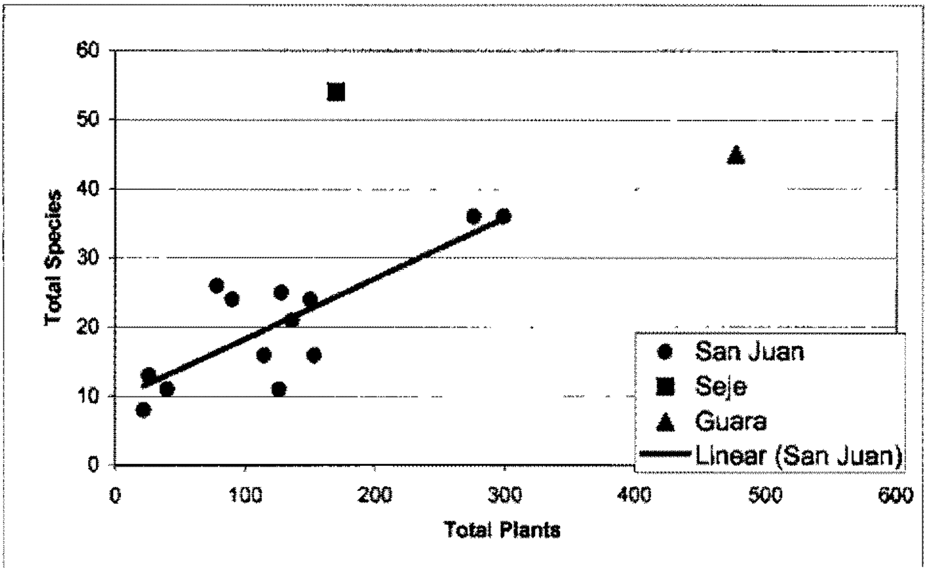

FIGURE 4.—Total plants vs. total species. $R^2 = 0.6653$; $y = 0.0876x + 9.5031$. Caño Seje has more species than expected for the number of individual plants. Guara is as expected.

TABLE 2.—A comparison of the uses of homegarden individual plants and species in Guara vs. Caño Seje. Because many species have more than one use, the usage columns add up to more than 100%.

	Guara		Caño Seje	
	Individuals (%) (N = 478)	Species (%) (N = 45)	Individuals (%) (N = 170)	Species (%) (N = 54)
Food	90	75	75	67
Medicine	18	23	34	17
Technical	13	16	22	30
Miscellaneous	2	7	1	4

which makes the high diversity of the Caño Seje garden that much more remarkable. In fact, the Caño Seje garden (54 species) is much more diverse than any other homegarden in the study, thereby supporting Fernandes and Nair's (1986a) findings that homegarden diversity decreases with market involvement. But is this in response to lower availability of manufactured goods in Caño Seje? Are homegardens compensating for resource scarcity of other sorts?

To understand the economic utility of Piaroa homegardens, the species and individuals of the Caño Seje and Guara homegardens are separated by use (Table 2). Of the six use categories, three were numerous enough to be helpful in a comparative study; food, technical and medicinal. I identified only one homegarden species whose sole use was ornamental. It may be argued that Piaroa homegardens are different from European or North American gardens because the species planted all may be used as food, medicine, for magic or for technical uses. However, simply because a plant can be used for food or medicine does not mean that this is the main reason it has been planted. The most common response when I asked why a particular plant had been chosen was that it was useful, but another frequent response was that the plant was nice, pretty or good (*adiwa*[3]). Perhaps the inflorescence would be pointed out as particularly attractive (e.g., *Oenocarpus* spp., *Syzygium malaccense*), the shade was valued (*Mangifera indica* or *Pourouma cecropiifolia*), or the plant reminded the gardener of the forest. The fact that the gardener knew other uses for the plant did not detract from, but rather enhanced, its value as an ornamental.

In both communities, food plants represent the majority of both number of species and number of plants. However, a higher proportion of plants are dedicated to medicinal and technical uses in Caño Seje. In fact, Caño Seje (16 species) has more than twice as many technical species as Guara (7 species). Interestingly, more medicinal species (but fewer individuals) were grown in Guara than in Caño Seje (10 vs. 9).

This analysis supports Fernandes and Nair's findings that food production is the primary function of homegardens. It also tentatively supports their findings that communities farther from markets will grow more technical plants to compensate for not having access to trade goods. However, there are some important caveats that may invalidate this conclusion. Although Caño Seje cultivates more technical plants, many of the species are available in the forest immediately surrounding the community. Moreover, Guara has easier access to western medicines, but its residents still grow more medicinal species. Finally, the technical species that *can* be used for thatching roofs, basketry or making blowgun darts were often not used in this way. Many species—particularly palms—had several uses, so that an individual palm may be classed as technical even though it is more generally used as food.

Based primarily on the fact that Caño Seje grows technical plants that are available in the immediate vicinity, I argue that factors other than localized resource scarcity influence the composition of Piaroa homegardens. One factor that has been mentioned in other studies is also significant here: market agriculture.

Market Agriculture.—SJM5, SJM6, SJM8, SJM15 and Guara homegardens had large plots explicitly dedicated to market agriculture. At 16, 25, 16, 36 and 45 species respectively they are not more or less diverse than the other gardens (the average of all gardens is 24 with a standard deviation of 13). This suggests that the market does not markedly decrease homegarden diversity. In fact, market agriculture encourages some types of innovation and experimentation in homegardens. Piaroa gardeners experiment with growing a new species before entering into full blown cultivation of that species. In several homegardens, men planted one or two individuals of *Theobroma cacao, Citrus* spp. or *Musa* spp. experimentally. They would use these first individuals to test the suitability of the soil, humidity and precipitation, and the growth rate and ecology of these species that they have never before cultivated in this area. If they are successful, they then plant more individuals and establish an orchard, whose fruit is destined for the market. The market encourages the Piaroa to cultivate new crops and the homegarden gives them an area under constant supervision where these experiments can be monitored several times a day.

Another impact of the local market is increased theft, a prevalent problem in San Juan. The swiddens are usually far from the house, but often visited by people from other families and ethnic groups. Given that a single papaya can be immediately sold for enough money for a full meal or several beers in town, valuable fruits often disappear. Growing them in the homegarden diminishes, but does not entirely eliminate, the risk.

San Juan and Guara also differ in land availability. The much higher population of San Juan (~1000 including all ethnic groups) has led to a marked scarcity of suitable land for expansion into cash cropping. In some cases, including SJM15 and SJM8, where families wish to enter into formal marketing of large crops, they establish them in home gardens.[4] Whereas Guara locates such crops, with one exception, in cleared plots in secondary forest. Therefore, it is possible that, as postulated by Salick and Lundberg (1991), the diversity of homegardens increase as that of swiddens decreases and that homegardens are more resistant to agrobiodiversity loss than swiddens. However, this factor is only one of many that impacts homegarden composition and these hypotheses do not hold in explaining the high diversity in Caño Seje's homegarden, which not only boasts the most diverse homegarden, despite no threat of theft and no land scarcity, but also the most diverse swiddens.

Origin of Homegarden Species.—To understand why Caño Seje residents cultivate such a diverse homegarden, it is necessary to understand more about Piaroa perceptions of and relationships with their homegardens. To do so, I analyse the gardens by a new criterion: origin of propagative material. I assigned homegarden species and individuals to one of three categories based upon their origin (Table 3). I used the *Flora of the Venezuelan Guayana* (Steyermark et al. 1995–2004) to confirm the ecological origin of species. One notable aspect of Table 3 is that the proportion of wild species in gardens is higher than the proportion of wild individuals, while the opposite is true for introduced individuals. In other words, people plant many individuals of a relatively few introduced species while they plant a few individuals of a wide variety of wild species. The high number of introduced individuals may be partially explained by the percentage of these species that have market value (86%). Similarly, relatively few wild plants have market value (15%), but those that do are planted in far higher numbers than those that do not.

Traditional Plants.—Plants are defined as traditional if they have been domesticated (as opposed to simply cultivated) by Amazonians and whose introduction to the Piaroa occurred before living memory. Traditional plants consist of 20–30% of all categories. Most of these species are not valuable in the market because they are too common to fetch a good price; they are the main focus of swiddens so that the vast majority of residents in the Manapiare region grow them for subsistence; they are considered low prestige by those with enough money to buy food; or a combination of all of these factors. Exceptions to this are pineapple (*Ananas comosus*) and papaya (*Carica papaya*), both of which are valuable, fetching about US$1 per fruit in 1999. Pineapple particularly affects the composition of SJM15, where many individuals are grown for the market.

By using the equation derived from linear regression of San Juan gardens, I compare the Caño Seje garden with that of Guara (Figure 5). There are fewer traditional species in Caño Seje homegardens than might be expected (10 observed vs. 15 expected) while the number of traditional species in Guara is virtually as expected (15 observed vs. 13 expected).

Introduced Plants.—Introduced species are those that have been introduced to the Piaroa within living memory. There are far more introduced species in Guara (15 observed vs. 14 expected) than in Caño Seje (8 observed vs. 17 expected) (Figure 6), which apparently confirms the hypothesis that the market encourages the cultivation of introduced species. However, although it seems that the high proportion of introduced plants in Guara reflects a turning toward the market economy, there are several introduced species grown in homegardens that are not destined for the market, including mangos and medicinal plants.

Mangos.—Previous ethnographic accounts either do not list mango (*Mangifera indica*) at all (Monod 1987; Overing and Kaplan 1988; Overing-Kaplan 1975), or list it in floral inventories, but make no special mention of it (Zent 1992). Nevertheless, the mango has been grown by the Piaroa for at least 20 or 30 years, and is now the most widespread and influential species in Manapiare homegardens. Whereas Anduze (1974) mentions that an old homestead can be identified by a peach palm (*Bactris gasipaes*) grove, many old homesteads in the Manapiare Valley

TABLE 3.—The origin of species and individuals cultivated in homegardens.

Category	Definition	Species		Individuals % of all plants (N = 2286)
		No. of folk species	% of all species	
Wild plants	Plants which are found wild in forest and savannah exploited by the Piaroa	61	54	21
Introduced plants	Plants introduced to Piaroa from Old World or other parts of the New World within living memory	22	19	49
Traditional plants	Plants that were domesticated before living memory	30	27	30
Total		113	100	100

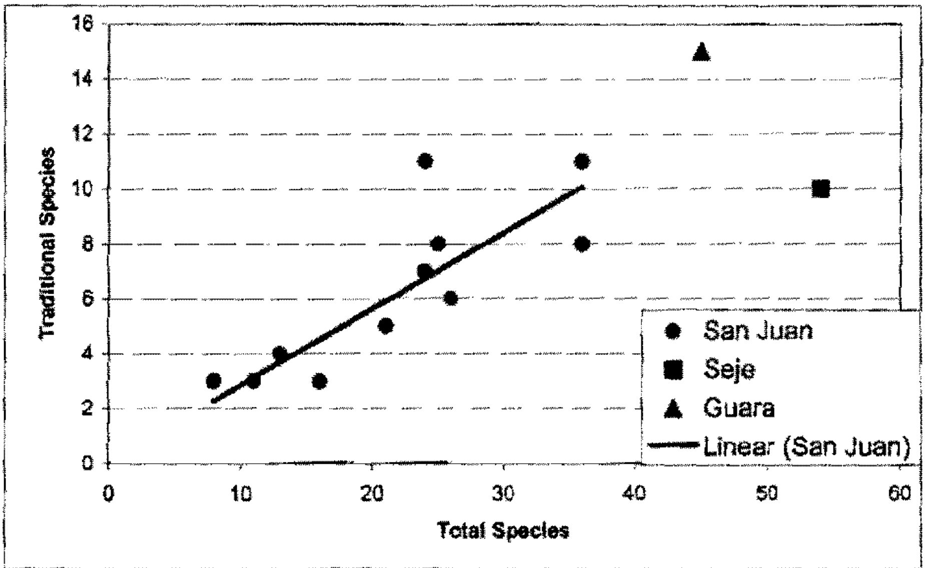

FIGURE 5.—Total species vs. traditional species. $R^2 = 0.7039$; $y = 0.2776x + 0.0677$. Caño Seje has fewer traditional species than expected. Guara has slightly more traditional species than expected.

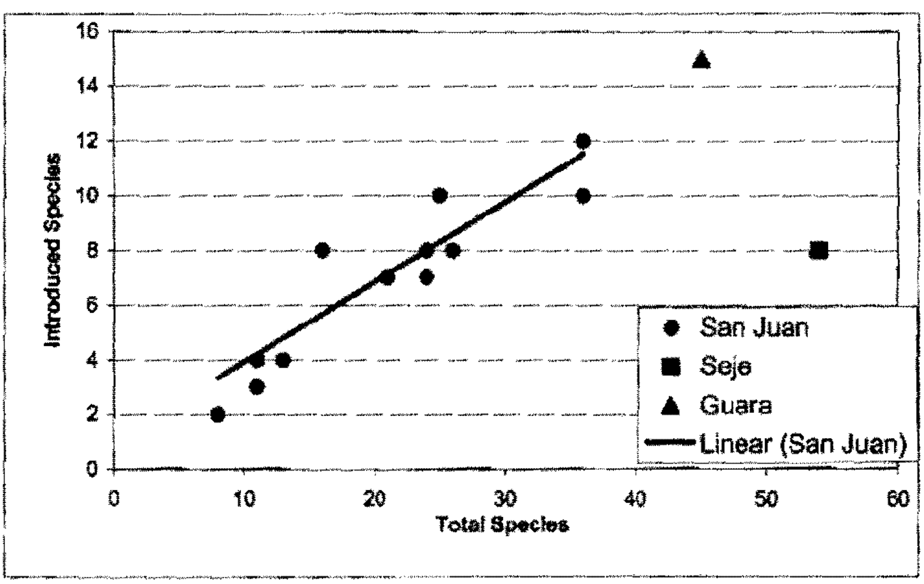

FIGURE 6.—Total species vs. introduced species. $R^2 = 0.7965$; $y = 0.2921x + 0.9998$. Caño Seje has fewer introduced species than expected. Guara has slightly more introduced species than expected.

are marked by a mango grove. Thus mangos represent a recent shift in the basic profile of homegardens and in the regional landscape ecology.

The popularity of mangos also explains an apparent contradiction in the data. Eighty-six percent of introduced species have market value and yet those species only make up 58% of the individuals planted (cf. 47% of wild individuals have market value). If, as postulated above, the market encourages the cultivation of many individuals of few species, we would expect to see a much higher proportion of individuals with market value. However, a great many introduced individuals are mangos (382). Although mango is loved for its shade, its fruit, and the relative absence of weedy growth underneath, it is so common in Venezuelan Amazon communities that the fruits literally rot in the streets. Therefore, it has no market value for the Piaroa. If mango is removed from the calculations, the percentage of introduced individuals with market value increases to 88% which correlates with the number of introduced species planted and supports the hypothesis.

Adoption of Mestizo Medicinals.—Several homegardens in San Juan and Guara included a number of medicinal species in small plots within the larger garden. Many of these plants were species such as *Pereskia guamacho, Kalanchoe* spp., *Justicia secunda,* and lemons (*Citrus aurantifolia*) that have no Piaroa name and have been introduced by mestizo neighbors or by Roman Catholic nuns who live within the community. I saw very few examples of traditional Piaroa remedies being grown in San Juan homegardens. Where traditional remedies were used, they were normally harvested from wild populations, the nearest of which may be several days' journey away. The phenomenon of adopted medicinal plants is so complex and important to the lives of the Piaroa that it is beyond the scope of this paper to address (see, however, Heckler n.d.). Nevertheless it is worth noting this important source of new species in homegardens that somewhat compensates for the lower number of wild species as compared to the Caño Seje garden.

Wild Plants.—Wild plants are those that have been reported (e.g., Melnyk 1995; Zent 1992) or that I witnessed growing wild in the forest surrounding Piaroa settlements. The garden in Caño Seje is characterized by a high number of wild species (observed 36 vs. expected 22, cf. Guara observed 15 vs. expected 18) (Figure 7), many of which I found or were pointed out to me growing within an hour's walk of the community (see Heckler 2001, 2002). This factor alone accounts for the exceptionally high diversity of the Caño Seje garden.

Just how recently these species have been incorporated into homegardens, such as SJM6 with 7 wild species, SJM4 with 12 wild species, and Caño Seje with 36 wild species, is illustrated by comparing cultivated species of wild origin with a list of utilized wild species compiled by Zent in the mid-1980s (1992:226–229, 231–233). Twenty-one species that were reported only as wild in his study have been brought into cultivation by Piaroa living in Manapiare Valley. Particularly the palm species that are found in most homegardens in San Juan are considered only wild as recently as Melnyk's work in the early 1990s (Melnyk 1995). Anduze (1974:41) states that the only palm that the Piaroa consider cultivatable is peach palm (*Bactris gasipaes*), whereas I catalogue 12 cultivated palm species (Appendix 1). The Piaroa are therefore incorporating many new species into their gardens.

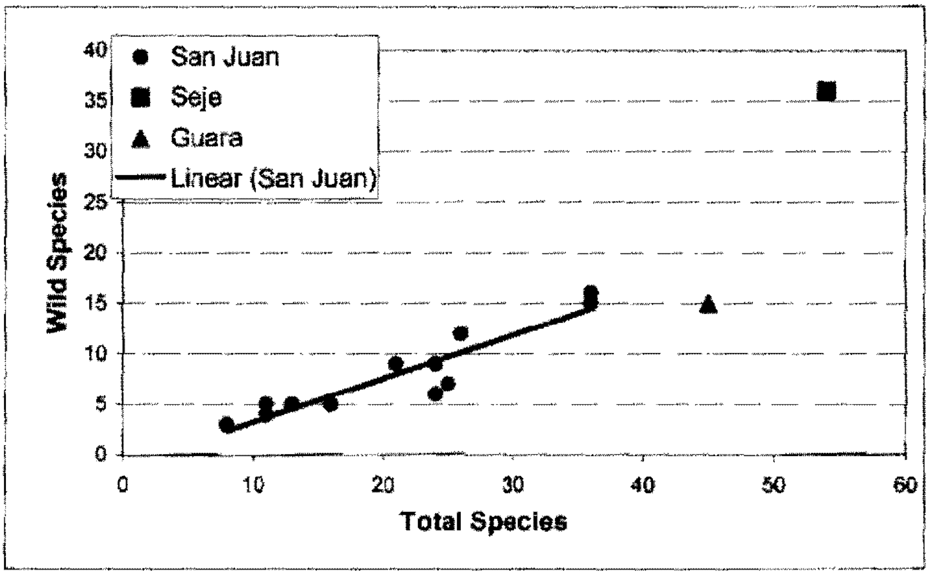

FIGURE 7.—Total species vs. wild species. The correlation of San Juan gardens is high ($R^2 = 0.8625$; $y = 0.4302–1.0674$). Caño Seje has a much higher number of wild species than expected. Guara has a slightly lower number of wild species than expected.

The high number of locally abundant wild species, however, indicates that Caño Seje gardeners are not compensating for lack of access to these plants. Therefore, we must look elsewhere to explain the cultivation of previously wild species. To better understand this phenomenon, I turn to the ethnographic record.

The culture/nature dichotomy, as associated with other dichotomies, e.g., domestic/wild, sacred/profane, central/peripheral, male/female has been a basic analytical theme in studies of settlement structure (Descola 1994:110–130; Ellen 1986; Hugh-Jones 1979; Lévi-Strauss 1963). According to these studies, the settlement and clearing represent a domestic[5] space that is carved out of the surrounding wilderness. While the applicability of Cartesian dichotomies to other cultures is now called into question (e.g., Ingold 2000), the Piaroa do separate cultivated and wild plants. Not only is this difference linguistically encoded (*kunæwæ* 'planted' vs. *de'a hawæ* 'forest plant' or in original, *mæyæsï hawæ* 'savanna plant'), but Piaroa origin myths generally describe the creation of cultivated plants as separate from the creation of wild plants (Overing and Kaplan 1988). Whereas *Kuemoi* is the father of "cultivated plants" (Overing and Kaplan 1988:398), "wild fruits" were created in the stomach of *Wahari* from the cellulose of hallucinogenic plants (Overing and Kaplan 1988:400). Oddly, *Ohwoda'æ* (male) is the "mother of plants" (Overing and Kaplan 1988:400), but maize, manioc and other staples are created separately. Similarly, the important hallucinogens are attributed to various minor characters in Piaroa mythology. Therefore, the shift to cultivation of wild species must be accompanied by a shift in cosmological perceptions which may, in turn, reflect a larger shift in Piaroa conceptions of the degree of influence they may exert over their surroundings.[6] The shift in what anthropologists formerly viewed as the rigid structural underpinnings of perception is seen elsewhere in studies of cultural change. For instance, Ellen (1999) writes how Nuaulu (Seram, Indonesia) perceptions of the environment are highly adaptive in the face of changing political climates and external pressures. Therefore the structural analysis, in which fundamental oppositions and metaphorical images are reflected in community organization, generation after generation, may be an inaccurate way of representing indigenous conceptual relationships with the forest.

My data suggest that rather than being encoded in cultural perceptions and cosmology, the choice of which plants to cultivate reflects the different goals of individual cultivators. Wild plants are generally plants of the forest that are associated with foraging and other forest activities. When a person chooses to plant a wild seedling in her garden, she is bringing a bit of forest into her environs, behaving in a way that is not necessarily in keeping with traditional cosmological ideas, but indicating that she values and still wishes to be connected with the forest in some way. It is interesting that despite recognized need, very few traditionally wild medicinals have been brought into cultivation. Those that have been are not the powerful and potentially dangerous remedies used only by shamans (but see *Anadenanthera peregrina* in Caño Seje), but spiritually unproblematic herbal remedies used mainly on children.

Indigenous peoples, whether intentionally or unintentionally, have affected the ecology and species composition of the forest (Balée 1989, 1993; Posey 1985; Rival 1998). Through planting along commonly used trails, manipulating species that indicate past residential sites, and managing enriched fallows they have left their footprints in the forest, as it were (Balée 1994). Bringing wild plants into the domestic space can be seen as an inversion of this process—the footprint of the forest is stamped in the cultural space. This may be the first step in the domestication of the species as suggested by Casas et al. (2001), but the continued process of domestication, transplantation, and escape of cultivars makes for an ongoing dialectic between the house clearing and the surrounding forest. Not only the biological concepts of domesticated, cultivated, and wild, but also the social concept of the culture/nature dichotomy, are blurred in the homegardens of the Piaroa.

Temporal Development.—Piaroa homegardens are not simply fallows in the vicinity of the house. They are a result of years of intensive management of the domestic space. In some situations, they evolve from a swidden. In others, the homegarden is established in a new clearing, but it does not immediately become a full grown, multistratum system. Most of the gardens had already matured at the time of my study, but one garden was notable for its young age. SJM13 with 13 species but only 26 individuals (Table 1) was part of a new homestead, cleared by a young couple at the edge of the existing settlement. The relatively high number of species suggests the beginning of a complex homegarden, but their garden was marked by the absence of the mature fruit trees, particularly mangos, that were common in almost every other San Juan garden. The trees that had been planted were small and immature.

Another garden with few individuals is SJM11 with only 8 species and 22 individuals. This garden was maintained by an elderly woman who had come to San Juan when her daughter married into one of the families one or two years earlier. Her house was squeezed onto a small piece of land between several larger and more prominent households. Her recent move to the community, her advanced age and the limited amount of space available are the main factors contributing to her sparse homegarden.

In a mature garden, such as SJM15, new plantings took place every year so that new strata were continually being added to the ecological profile of the garden. In fact, in SJM15, there was a small nursery with seedlings in starter trays. The primary gardeners, two sisters, often asked people for seeds from different types of fruits and planted them experimentally before transferring them to the homegarden. Before one of my journeys to Caracas, they asked me to bring back grape seeds, since they had heard that grapes were nice and wanted to try to grow some. They clearly enjoyed gardening for the sake of gardening. It became clear throughout my field work that some women maintained highly diverse homegardens out of love for the products of their labor, rather than out of any necessity for extra food or medicinal crops. This interest is reflected in their swiddens (Heckler 2004) and their knowledge of wild plants (Heckler 2001:253–254), but also in their homegardens. They garden to maintain a home environment that they enjoy and that reflects their knowledge and interest. In some cases, this interest is manifested in experimentation with plant species that they have adopted from their mestizo neighbors (SJM15 with 10 introduced species and SJM17 with 12 introduced species) or in the planting of wild plants in the homegardens. In this way, small portions of cultural and genetic diversity are maintained in the short term. In the long term, however, it means that the composition of the homegarden is constantly in flux and often reflects values other than economic utility or resource conservation, namely sociality, conviviality, and general quality of life (McCallum 2001; Overing and Passes 2000).

Spatial Arrangement.—The Piaroa have obtained and continue to obtain the propagative materials and ideas of what plants they would like to have near their home from their immediate surroundings, whether those surroundings be forest or other ethnic groups. In Caño Seje, the social and domestic environment is dominated by social and cosmological relationships with the forest; in Guara, it is dominated by a development project that enables it to enter into cash cropping; and in San Juan, it is dominated by people representing a wide variety of ethnic groups. The socioeconomic changes being experienced by the different communities are reflected in changing community and homegarden organization.

In Caño Seje, the family spends much more time in the forest than members of the other communities and primary forest is significantly closer to the community. This is demonstrated in part by a greater knowledge of wild forest plants than in the other two communities (Heckler 2002). This relationship with the forest is reflected in the presence of many wild species in the domestic space.

In Guara, the community, as a unit, is involved in an agricultural cooperative in which all the men of the community take part and from which all the families benefit with material goods. Guara's communal social arrangement is physically reflected in the homegardens where boundaries between homes are indistinct at best. At the time of my study, one man maintained an orange orchard (*Citrus* *sinensis*) in the central clearing, from which he harvested fruit to send to market. Despite his openly acknowledged ownership of the orange trees, children of the community were quite free with the fruits and I was often presented with his oranges as gifts from other families' children. When these oranges were sold to the cooperative, the compensation was in the form of goods and equipment that benefited the community as a whole, rather than the individual or his immediate family. As a further reflection of the communal nature of Guara's garden, there is a collection of plants used in minor hunting rituals planted at one end of the community clearing that belonged jointly to several of the older men (*Caladium* spp. and *Renealmia* sp.).[7]

In San Juan, on the other hand, families have come to the community from different regions, for different reasons, and at different times. They work independently at manual labor for mestizo or white residents of the community and they struggle amongst each other for political control of the community. Indeed, despite several attempts during the past 20 years and despite the fact that the cooperative's regional operations are based in San Juan, the agricultural cooperative has failed to establish community-wide production. A few community members grow small amounts of produce which they then send on the cooperative boat, but conflict between families has impeded any large-scale efforts to grow cacao, *Citrus* spp. or plantains. In San Juan, families live in clusters of buildings arranged on clearings that are adjacent to, but clearly separated from those of their neighbors by boundaries, often marked by rows of trees or a strip of weedy vegetation. The great variability of the San Juan homegardens represents the eclectic backgrounds and aspirations of San Juan Piaroa. For some, entering the market is of great importance and they have a great many market bound plants. While for others, their homegardens are places where they can reaffirm their connections to the forest and the lifestyle that they were born into, so they surround themselves with forest plants. While for others, their ties with different ethnic groups encourage them to grow introduced plants. This is seen in SJM2, where one of the gardeners is employed as a gardener at the Salesian Mission and has planted various species on the instigation of the nuns, including *Coix lacryma-jobi* (Job's tears).[8] The nuns had asked their employee to grow Job's tears in order to make a necklace to present to a visiting bishop. Another example is the gardeners of SJM15 who, related by marriage to a Yabarana medicinal expert and her mestizo husband, cultivated several introduced medicinals that they had obtained from the Yabarana healer.

Homegardens as Living Spaces.—The most neglected aspect of homegarden studies is their role as a dwelling space. Just as homes evolve and take form as people live in them, reflecting the life histories of their residents (Ingold 2000:186), so homegardens evolve with the lives of their gardeners. Several homegardens in the study clearly demonstrated this phenomenon. SJM2 was remarkable for having a well-groomed lawn of soft, green grass. It was the only incidence of a ground cover in any of the homegardens. The women of the household spent hours each evening weeding and trimming the grass with machetes while the rest of the family sat on the lawn, chatted, ate, and relaxed. This particularly pleasant venue was a regular destination for many members of the community (including myself) who enjoyed the cool of the evening and the sunset in the company of this hospitable family. Other households had benches or mats woven of palm (various species) that they set out for the same purpose and the household members spent a great deal of leisure and social time in their homegardens (especially SJM6 and SJM15).

The species composition of the homegarden is explicitly manipulated to encourage and serve as a backdrop for the social activities of the family. In fact, the homegarden is the most important site of sociality and conviviality, used freely by men, women, children, and visitors for a great variety of activities. Men have conferences and weave baskets, women chat, prepare food and string bead necklaces, visitors are offered food and beverages, children play, boys practice their blowgun skills, soccer games arise, people get drunk, and shamans smoke tobacco and sometimes chant. Nor do gender-based divisions of labor show themselves as starkly as in other spaces: both men and women cultivate plants in homegardens. They may plant different species—men will more often plant cash crops and magical plants, women plant herbal remedies, annatto (*Bixa orellana*) and cotton (*Gossypium barbadense*)—but they do so in overlapping spaces and with relative freedom. Even in the highly structured domestic spaces described by ethnographers throughout Amazonia, the homegarden is a conjunctive space par excellence (see Descola 1994:131–132). If homegardens are considered only as practical contributors to household economy, perhaps the most important of their roles, that of a setting for the crucial business of "living well," is overlooked (see Belaunde 2001; Gow 2000:52; Londoño-Sulkin 2000:170; Overing and Passes 2000: 2).

CONCLUSIONS

Due to the sheer complexity of homegarden systems and the factors that affect them, I have resorted to exploring various conceptual layers of homegarden utility and meaning: the economic, the utilitarian, the structural, the temporal, and the aesthetic, one at a time. In the end, however, it is misleading to suggest that these layers exist superimposed upon each other to be independently peeled back. Rather they exist together, only artificially separated for the purpose of analysis. In this sense, presenting them sequentially in this paper does not accurately represent this dynamic, living space in which Piaroa life histories unfold.

The best way of thinking about a Piaroa homegarden is as a multivalent contribution to quality of life. Although homegardens contribute to all sectors of Piaroa economy—food, building materials, medicinals, market crops, and hunting magic—this is not necessarily their primary purpose. They are the sites of social activity with shade plants, ornamentals, favorite snacks, experimental seedlings and, to a lesser extent, charms for luck and medicinals for minor health problems. They also serve as a source of pride, creative expression and a reflection of the gardener's self esteem. They are a creative work for some members of the society and for others they are the results of the owners' perspective on which plants are valuable and which need to be protected from theft. They are the sites of much the agricultural experimentation that accompanies the first stage of cultivation or even plant domestication (see also Casas et. al. 1996). But more than anything else, homegardens are a living space for the Piaroa, one which evolves with and reflects their lifestyles and goals.

NOTES

[1] The term "Piaroa" is exogenous, probably derived from the word ***de'aruwa*** meaning master of the forest. The Piaroa chose the autodenomination ***Uhuottüjä*** at a political conference in 1992. This term has since been transcribed at least five different ways (e.g., Melnyk 1995; Oldham 1996; Zent 1992), making it extremely difficult to find in indexed literature searches. Unlike other exogenous names, "Piaroa" has no negative connotations and the Piaroa use it in their daily conversations with non-Piaroa. For these reasons, I continue to use the term "Piaroa."

[2] Zent (1995) uses the term ***isode pætʰæ*** (literally house swidden) to refer to the homegarden, which is also the term that I used in discussing homegardens with the Piaroa. However, the term *pætʰæ* mostly refers to the swidden phase dominated by manioc, so that there is some ambiguity about the appropriateness of this term for post-manioc homegardens. It was generally used only when the plants needed to be distinguished from the house and the clearing.

[3] The orthography used is IPA. It is also the same as that used by Zent (1992). Nasalization is marked by a cedilla under the corresponding letter.

[4] In contrast, most homegarden crops sold in San Juan are small harvests that are opportunistically sold to neighbors from wheelbarrows.

[5] Note that the terms "domestic" and "domesticated" are used in two distinctive ways in this paper. The first refers to the perceived distinction between "human space" and "non-human space"; the second is a specific agricultural term referring to plant species that have been permanently genetically altered by human intervention.

[6] Stanford Zent, personal communication (March 2003).

[7] While shamans maintain what Boglár (1971:335) called "model gardens," they are hidden and separate from the public homegarden. Because the relationship between the shaman and his plants is personal and sacred, I will not discuss these gardens further without explicit permission from each shaman involved.

[8] Although *Coix lacryma-jobi* is associated in the public consciousness with indigenous artifacts, and some groups do indeed wear *C. lacryma-jobi* (e.g., the Hoti, Zent pers. comm.), I never saw the Piaroa wearing them and they only used them for making necklaces to sell. The literature of the introduction of *C. lacryma-jobi* to South America is sparse, but the introduction probably occurred between 1925 and 1938 (Vallaeys 1948).

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APPENDIX 1.—The complete inventory of plants found in the homegardens of the three study communities. # 1: food; 2: medicinal; 3: magical or religious; 4: technical; 5: *barbasco* (fish poison); 6: miscellaneous. * I: introduced plant; W: plant that is found growing wild in the forest; T: plant that is traditionally cultivated by the Piaroa.

Family	Plant name	Piaroa name	Use#	Origin*	Total	Comments
Acanthaceae	*Justicia secunda* Thunb.	No name	2	I	23	medicinal
Agavaceae	*Sansevieria* sp.	No name	3	I	3	*mapanare*
Anacardiaceae	*Anacardium occidentale* L.	***æræræ***	1	T	51	cashew
	Mangifera indica L.	***mąkų***	1	I	382	mango
	Spondias mombin L.	***rųbį, ruwi***	1, 2	W	16	hobo, *jobo*
Annonaceae	*Annona muricata* L.	***wanawana***	1	T	12	*guanabana*
	Anaxagorea sp.	***kæpʰæ, mereti***	4	W	1	
	Anaxagorea sp.	***kæpʰæ, reru***	4	W	1	
Apocynaceae	*Couma macrocarpa* Barb. Rodr.	***upʰæ***	1	W	1	
	Thevetia peruviana K. Schum.	No name	2, 6	I	7	
Araceae	*Caladium* spp.	***yærukyæ***	3	W	10	
Arecaceae	*Astrocaryum chambira* Burret	***yæri***	1, 4	W	5	
	Astrocaryum sp.	Not known	1	W	1	
	Attalea butyracea (Spruce) Burret	***kuruwa***	1	W	71	*coroba*
	Attalea maripa (Aubl.) Mart.	***wæ'chæ***	1, 4	W	38	*cucurito*
	Attalea sp.	***mapai***	1	W	6	
	Attalea sp.	Not known	1	W	2	wild transplant
	Bactris gasipaes H.B.K.	***pæhæri***	1, 4	T	82	peach palm, *pejiguao*; sold
Arecaceae	*Cocos nucifera* L.	***coco***	1	I	25	coconut; sold
	Euterpe precatoria Mart.	***nenea***	1, 4	W	1	*manaca*
	Mauritia flexuosa L.f.	***wari***	1, 4	W	2	*moriche*
	Oenocarpus bacaba Mart.	***pʰou pi 'ori***	1, 4	W	26	*seje pequeño*; sold
	Oenocarpus bataua Mart.	***bare pi 'ori***	1, 2, 4	W	3	*seje grande*; sold
	Indet.	—	1, 4	W	9	unidentified pinnate palm seedlings: *Attalea*, *Oenocarpus* or *Euterpe*
Asteraceae	Indet.	—	2	T	2	medicinal
Bignoniaceae	*Crescentia cujete* L.	***dara***	4	T	35	*totuma*
Bixaceae	*Bixa orellana* L.	***mųyų***	4	T	11	annatto, *onoto*
Bromeliaceae	*Ananas comosus* (L.) Merr.	***kænæ***	1	T	105	pineapple, *piña*; sold
Cactaceae	*Pereskia guamacho* F.A.C. Weber	No name	2	I	3	*guamacho*

APPENDIX 1.—Continued.

Family	Plant name	Piaroa name	Use#	Origin*	Total	Comments
Caricaceae	*Carica papaya* L.	***mapaya***	1, 2	T	43	papaya; sold
Cecropiaceae	*Pourouma cecropiifolia* Mart.	***nai***	1	T	14	Amazon grape, *uvilla, cucura*; sold
	Pourouma sp.	***t^{h}æt^{h}æ***	1	W	1	
Chrysobalanaceae	*Licania pyrifolia* Griseb.	***weru, bare***	1	I	28	*merecure*
Clusiaceae	*Rheedia madruno* Planck & Triana	***mup^{h}i***	1	W	6	*tupire*
	Vismia sp.	***uræri***	2	W	4	
	Indet.	***duduku***	1	W	1	
Cochlospermaceae	*Cochlospermum* sp.	***reru***	4, 6	W	4	
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	***wiriyæ***	1	T	35	sweet potato, *batata*
Costaceae	*Costus* spp.	***i'et^{h}a***	2	W	13	*caña de india*
Crassulaceae	*Kalanchoe pinnata* (Lam.) Pers.	***hura hawapi***	2	I	16	
Cucurbitaceae	*Citrullus vulgaris* Schrad. ex. Eckl. & Zeyh.	***patiya***	1	I	6	watermelon, *patilla*; sold
	Cucurbita pepo L. *maxima* Duch	***kawiya***	1	T	1	squash
	Lagenaria siceraria (Mol.) Standl	***mori'ki***	4	T	0	gourd vine
Dioscoreaceae	*Dioscorea alata* L.	***w^{h}ære***	1	T	2	yam, *ñame*
Euphorbiaceae	*Croton* sp.	No name	3	T	1	*carcanapire*
	Jatropha gossypifolia L.	No name	2	I	2	*tuatua*
	Manihot esculenta Crantz.	***ire***	1	T	201	manioc, yuca
	Phyllanthus sp.	***ræme***	5	T	1	*barbasco*
	Indet.	Not known	2	T	1	tree with medicinal use
Fabaceae	*Anadenanthera peregrina* (L.) Benth.	***yų'æ***	3	W	1	*yopo*
	Arachis hypogaea L.	***masi***	1	T	1	groudnut, peanut
	Hymenaea courbaril L.	***wǫ'į 'tæ***	4	W	6	*algarrobo*
	Inga sp.	***ruwæ, kuyuwi i'are***	1	W	1	*guamo*
	Inga sp.	***ruwæ, tei***	1	W	1	
	Inga sp.	***ruwæ, wipo***	1	W	1	
	Inga sp.	***ruwæ,*** misc.	1	W	83	sold
	Lonchocarpus utilis A.C. Sm.	***wodu***	5	W	13	*barbasco*
	Sclerolobium cf. *guianense*	***mukwæ***	4	W	1	
	Swartzia macrocarpa Spruce ex. Benth.	***chænæchæchæ***	4	W	1	
	Tamarindus indica L.	***tamarindo***	1	I	1	tamarind
Lauraceae	*Persea americana* L.	***æp^{h}æ***	1	I	3	avocado

APPENDIX 1.—Continued.

Family	Plant name	Piaroa name	Use#	Origin*	Total	Comments
Malvaceae	*Gossypium barbadense* L.	***pyhą***	4	T	3	cotton, *algodón*
Malpighiaceae	*Malpighia glabra* L.	Not known	1	T	4	acerola, *cereza*
Marantaceae	Indet.	—	2	T	6	
Moraceae	*Artocarpus altilis* (Parkinson) Fosberg	Not known	1	I	3	breadfruit
	Brosimum foetida Ducke	***æp^hi***	1	W	1	
	Brosimum sp.	***turi***	1	W	2	
	Cecropia sp.	***mæ'chæ***	4	W	42	
	Ficus sp.	***p^haratæ***	1	W	3	strangler fig, *matapalo*
Musaceae	*Musa* spp.	***pæruru***	1	I	121	plantain, *plátano*; sold
	Musa spp.	***sanatɨ pæruru***	1	T	5	banana, *cambur*
Myristicaceae	Indet.	—	1	W	2	
Myrsinaceae	*Stylogyne longifolia* (Mart. ex Miq.) Mezl.	***kwamani***	1	W	2	
Myrtaceae	*Myrcia* sp.	—	1	W	2	
	Psidium guajava L.	***wayaba***	1	I	75	guava
	Syzygium malaccense (L.) Merr & Perry	***pomaga***	1	I	14	*pomalaca*
	Indet.	***kasari***	1	W	3	
	Indet.	***yuku***	1	W	1	
Piperaceae	*Piper* sp.	***æ'ypą***	2	W	13	
Poaceae	*Coix lacryma-jobi* L.	***yąmɨ rau***	4	I	1	Job's tears; sold
	Cymbopogon citratus (D.C.) Stapl.	Not known	2	I	14	lemon grass
	Saccharum officinarum L.	***naha***	1	I	6	sugarcane, *caña*; sold
	Zea mays L.	***yąmɨ***	1	T	4	maize
Polygonaceae	*Coccoloba* sp.	***æнавkwalpo'æ dau***	1	W	2	
Rutaceae	*Citrus aurantifolia* Swingle	***rimoni***	1, 2, 4	I	64	lemon, *limon*
	Citrus paradisi Macfad.	***naranha***	1	I	3	grapefruit
	Citrus reticulata Blanco	***madarina***	1	I	21	mandarine; sold
	Citrus sinensis Pers.	***naranha***	1	I	281	orange, *naranja*; sold
Sapotaceae	*Pouteria caimito* (Ruiz & Pavon) Radlk.	***humari***	1	T	34	*caimito, temare*; sold
Solanceae	*Pradosia* or *Elaeoluma*	***mara***	1	W	16	
Simaroubeaceae	*Simaba cedron* Planch.	***ikiu hawapɨ***	2	W	1	
Solanaceae	*Capsicum annuum* L.	***ræ'te***	1	T	7	chili, *ají*

APPENDIX 1.—Continued.

Family	Plant name	Piaroa name	Use#	Origin*	Total	Comments
	Capsicum annuum L.	***ræ'te, de'a***	1	W	1	wild, permitted regrowth
	Solanum sessiliflorum Dunae	***nu'a***	1	W	1	*topiro, tupiro*
Sterculiaceae	*Guazuma ulmifolia* Lamarck.	***chæmiri***	4	W	4	*cabeza de negro*
	Theobroma cacao L.	***kakao***	1	T	23	*cacao;* sold
	Theobroma grandiflorum (Willd. Ex Spreng.) K. Schum	***barewa***	1	W	1	*cupuaçu*
Theophrastaceae	*Clavija lancifolia* Desf.	***wi'æ ukwąpą dau***	1, 4	W	1	*arbolita de ardilla*
Tiliaceae	*Apeiba tibourbou* Aublet.	***wi'iri***	2	W	8	
	Triumfetta semitriloba Jacq.	***æwiri ohiya***	2	W	5	
Vitaceae	*Vitex* sp.	***ahæ dau***	1	W	3	
Zingiberaceae	*Renealmia* sp.	***u'at'ɨ sa'uru***	2, 3	W	12	ginger, *gengibre*
Indet.	—	Not known	?	W	1	large-leaved herbaceous (*Gunnera*-like)
Indet.	—	Not known	2	W	14	medicinal
Indet.	—	***cilantro***	2	I	8	not *Coriandrum sativum*
Indet.	—	***kiyuwe dau***	4	W	1	
Indet.	—	***mæra***	1	T	1	creeping vine
Indet.	—	***mærisiri***	2	W	2	
Indet.	—	***mereti ohiya***	2	W	1	
Indet.	—	***wayari iwiri dau***	3	W	1	
Indet.	—	***yu'a***	1	W	3	not *A. peregrina*
Indet.	—	Not known	6	T	12	purple ornamental
Indet.	—	***yæru***	1	W	1	sour fruit