

Strategies of Agricultural Land Use Among Indigenous
Groups of the Upper Rio Negro Region of Venezuela

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Period and Places of Fieldwork

The actual amount of time spent in the field was approximately 2 months, from mid-April to mid-June, 1980. While a longer period would have enabled me to collect more data on energy inputs and caloric outputs of agricultural activities in indigenous communities, the time in the field was sufficient to study basic patterns of land use in two villages of contrasting ethnolinguistic

origins and to survey agricultural plots in two other villages. The first month in the field was mainly spent living in a community of Yeral-speakers located near the juncture of the Casiquiare and Negro Rivers. Approximately one week of time was devoted to a survey of agricultural plots and households in two villages of Curipaco-speakers located up the Casiquiare to the east. Most of the second month was spent in the Guaraqueña village of Guzman Blanco, a few miles south of Maroa on the Río Guainía.

The pattern of land use characterizing indigenous settlements along the Casiquiare is one in which farmers exploit areas of fertile soil that are closest to their village for a period of 4 to 5 years until they can no longer raise crops on these plots. They have no concept of leaving lands to fallow for future cultivation and seek to minimize inputs while maximizing outputs. While this strategy is advantageous in the short run, its long-term effects on forest and soil resources are maladaptive for local populations. Without taking measures to prevent overcultivation of fertile lands, local groups have to relocate periodically in search of large tracts of virgin forest. The three villages along the Casiquiare have all experienced a radical break with their traditional culture through conversion to Evangelical Protestantism. As I hope to demonstrate later, this form of acculturation is almost certainly the underlying reason for the maladaptive frontier-type pattern of agricultural land use found along the Casiquiare. The Guaraqueña village on the Río Guainía

offers a sharp contrast in that soil and forest resources are carefully left to fallow after two years so that they can be used a second time. The pattern of land use aims at minimizing the impact of agricultural activities and helping to accelerate processes of forest and soil regeneration. Guaraqueña farmers often discuss the dangers of overcultivation and erosion of soil qualities. Their strategy for maintaining a delicate ecological balance is firmly rooted in traditional Guaraqueña mythology and ritual. Since the Guaraqueña are nominally Catholic rather than Protestant, it is only logical to see this difference between them and the Yeral and Curipaco groups along the Casiquiare as a key factor in explaining why the former maintain an integrated pattern of land use (e.g., one that is closely adapted to the physical realities of the natural environment) whereas the latter practice a frontier-type of land use. Moreover, the conversion to Catholicism by the Guaraqueña has left a good portion of their traditional culture intact, whereas conversion to Protestantism among Yeral and Curipaco groups has led to a nearly complete disintegration of the traditional Arawakan culture. I suspect that Curipaco groups in the region that have not undergone conversion to Protestantism and the accompanying cultural disintegration are still practicing an integrated pattern of land use. This hypothesis will be explored in the field during the coming year when I will be conducting dissertation research on traditional Arawakan cultures of the region.

Introduction

This study will focus on technical, social, and cultural aspects of swidden agriculture among indigenous groups of the Upper Río Negro Region of Venezuela.¹ The groups include Yeral² and Curipaco villages along the Río Casiquiare and a predominantly Guaraqueña village on the Río Guáinía (Negro). By combining data based on direct observation and measurement of agricultural activities with cultural beliefs and attitudes elicited in interviews with indigenous farmers, the analysis will explore three questions of general importance to human ecology: 1) To what extent does native knowledge about variables relevant to the management of a shifting cultivation system conform to the physical realities of the natural environment? 2) How have indigenous knowledge of these variables and the articulation of such knowledge into strategies of resource management (e.g., patterns of land use) been altered in the course of social and cultural changes? 3) What are the ecological implications of these changing strategies of resource management for the humid tropical rain forest of the region?

Ecological Characteristics of the Region

In this section, I do not intend to review a wide range of facts that describe the blackwater ecosystem of the Upper Río Negro Region of Venezuela but merely to outline some variables of this ecosystem that have particular importance to agricultural activities.³ The discussion relies heavily on research conducted

at the San Carlos ecology project under the supervision of the Centro de Ecología of the Instituto Venezolano de Investigaciones Científicas (I.V.I.C.).

Since 1974, I.V.I.C. has coordinated an interdisciplinary study of the ecology of the tropical rain forests in the vicinity of San Carlos de Río Negro and the effects of human activities on these forests. Initial results of the San Carlos project show that the forest has developed highly efficient nutrient cycling mechanisms in response to soils that are poor in nutrients and low in retention capacity. For example, a dense root mat covers the forest floor, allowing only a fraction of a percentage of the nutrients available from leaf litter, rainfall, and other sources to escape into the soils (Herrera et al. 1978). The total amounts of nutrients stored in the living parts of the forest and its debris per unit of area are among the lowest reported for comparable forests in the tropics or elsewhere (Herrera et al. 1980), and yet these small quantities of nutrients comprise over 92 percent of the total nutrient supply found in soils and plants taken together. Tropical forests growing on soils derived from more recent sediments or volcanic soils show exactly the opposite proportions with up to nine times the amount of nutrients found in soils as in the living parts of the forest (Herrera et al. 1980). On the other hand, forests growing on the old soils near San Carlos are more dependent on nutrients from rainfall and the cycling of nutrients within the living parts of the forest than on the supply of nutrients from the soil.

When portions of the forest are cleared for agriculture or other human purposes, the mechanisms for absorbing and recycling of nutrients are destroyed. In cultivated forest plots that have been cleared using traditional slash-and-burn methods, calcium and phosphorus levels increase for two to three years and do not fall below the levels for undisturbed forest until about four years. Nitrate-nitrogen and potassium, however, decrease slightly from the undisturbed forest levels and remain fairly constant for eight to ten years. "This difference can be ascribed to the solubility of nitrate-nitrogen and potassium after disturbance" (Herrera et al. 1980: 12). The impoverished, sandy soils of the Upper Río Negro Region have a very low capacity for the retention of soluble mineral nutrients through bondage with insoluble organic compounds. Thus, when most of the root mat and all of the forest canopy in a given area have been removed through cutting and burning, many of the most important mineral nutrients are washed out of the soil by the unmediated action of the area's 3600mm annual rainfall. The quantity of mineral nutrients that is irretrievably lost for successional vegetation controls the rate of recovery of the forest. "The development of a root network needed to capture these [calcium and potassium] and possibly other elements before they are lost to runoff is considered an important factor in controlling the rate of recovery" (Herrera et al. 1980: 11). This development is in turn dependent on human strategies for managing agricultural resources such as the number of years a plot is cultivated and the length of the fallow period before cultivating

a plot for the second time. In San Carlos, plots are cultivated for an average of 3-4 years and then abandoned for an indefinite number of years. This strategy makes maximum use of the period of four years after clearing and burning when the amounts of nutrients remain higher than the amounts found in undisturbed forest sites. In one case, researchers found a plot that had been continuously cultivated for at least eight years (Herrera et al. 1980), a practice which undoubtedly retards the growth of a new root mat and other forest structures through fallow by allowing soils to fall to very low nutrient levels.

Ethnography of the Region

The Arawakan groups living along the Casiquiare and Guainía Rivers in Venezuela form part of a widespread and fairly uniform region of riverine cultures called the Northwest Amazon (Steward and Faron 1959). Several recent studies have brought considerable new depth to the understanding of social organization and ecological adaptation among the Tukano-speaking groups of the Brazilian and Colombian Northwest Amazon. Goldman's monograph (1963) on the Cubeo of the Cuduyarí River was the first intensive analysis of the segmentary patrilineal clan structures that characterize riverine societies throughout the region. In particular, he documented the ongoing process of social fission in which small groups of kinsmen split off from a parent clan to form satellite communities. The effect of such lineage segmentation is to maintain the number of persons who form the working domestic units of a given territory at a very low level. Reichel-Dolmatoff (1971: 14) estimates this

number at thirty-three persons per village for the Desana, a Tukano-speaking group of the Colombian and Brazilian Vaupés. This figure is roughly equivalent to the number of persons making up the working domestic units of Arawakan groups along the Casiquiare (Hill 1980, fieldnotes) and the Guainía (Marquez and Perez 1978, fieldnotes) in Venezuela.

Early ethnographers noted that nearly all indigenous groups of the Northwest Amazon devoted themselves to a combination of horticulture, fishing, and hunting (Koch-Gruenberg 1909; Silva 1962) but failed to realize what Reichel-Dolmatoff has called "the fact of a selective adaptation of hunters-fishermen-horticulturalists" (1971: 9). Different social groups are not differentiated on the basis of linguistic affiliation and dialect alone but also through a cultural orientation to one of the three basic economic activities. Goldman (1963) demonstrated that the Cubeo thought of themselves primarily as fishermen and that this identity led to a distinct relationship between man and the environment. And Reichel-Dolmatoff shows that the Desana emphatically consider themselves as hunters, even though "the product of the hunt forms perhaps only 25 percent of the total of their daily food supply, the rest coming equally from fishing and horticulture" (1971: 11). The Desana view all other Tukano groups as fishermen and the Arawakan groups as horticulturalists.

Preliminary fieldwork with the Arawakan Guaraqueña of the Rio Guainía in Venezuela has shown them to have a cultural orientation toward horticultural activities that is deeply rooted in the

symbolic interpretation of nature. According to Guaraqueña myth, the creator of the universe ordered his son-in-law to search for the "Tree of Life" (manioc and all the other cultivated plants) and to cut it down, thereby filling the universe with domesticated plants. After this task was completed, the creator ordered his son-in-law to cut down a second tree, the "Tree of Patricians", and, in so doing, to populate the universe with human beings from all the different clans (Hill 1980, fieldnotes). In other words, the creation of the universe in Guaraqueña myth is based on a metaphor taken directly from horticultural activities: the cutting of a slash-and-burn garden. The Guaraqueña maintain this cultural attitude in spite of the fact that they are also hunters and fishermen like the Desana and other indigenous groups of the region.⁴

Traditional Agricultural Strategies

The Guaraqueña offer what is perhaps the clearest picture of how indigenous groups traditionally conceptualized and practiced swidden agriculture in the Upper Río Negro Region of Venezuela.⁵ They live in a large village of over 130 people near the mouth of the Caño San Miguel, a few miles south of Maroa, on the Río Guainía. Most of their agricultural plots are located about two hours by motorboat up the Caño San Miguel, the area where they have held initiation rituals and other traditional ceremonies since at least the time of the arrival of the Catholic Missions in the 1740's (Gonzalez 1974). The Guaraqueña took refuge up the Caño San Miguel in periods of warfare and when merchants sought forced Indian labor for rubber gathering. They still maintain separate households there during periods of agricultural and ritual acti-

vities. Thus, the Guaraqueña demonstrate a dual settlement pattern with two poles. In the Caño San Miguel, they live in small village settlements that are common in the rest of the Upper Río Negro Region, and these small groups come together to form a larger community on the Rio Guainía for brief periods of time.

While the social organization of agricultural labor has changed among the Guaraqueña, many features of current land use are logical outcomes of their traditional culture and its strong emphasis on agriculture. In the current system of land use, each nuclear family cultivates a new plot each year. The new site is cut when the crops are ready in the one-year-old plot and manioc tubers are still being harvested from the two-year-old plot. Thus, at any given time, each family has three plots under cultivation, a total area of three to four hectares. New plots are cut from virgin forest and planted for two years in succession until about twelve plots have been used. Then a family returns to cultivate the first plot for a second time, and the cycle is repeated with only one main planting in each plot (see Figure 1). After two cycles, the land is left to fallow for an indefinite period.

Informants spoke of a traditional system of land use in which a group of patrilineal kinsmen (clan or sib) and their wives owned and worked agricultural lands collectively. A large field was cleared and worked consecutively for three years. Then a second and third plot were cultivated in like fashion, making a total of nine years before the cycle was repeated. Upon returning to the first plot, the clansmen enlarged the original clearing by

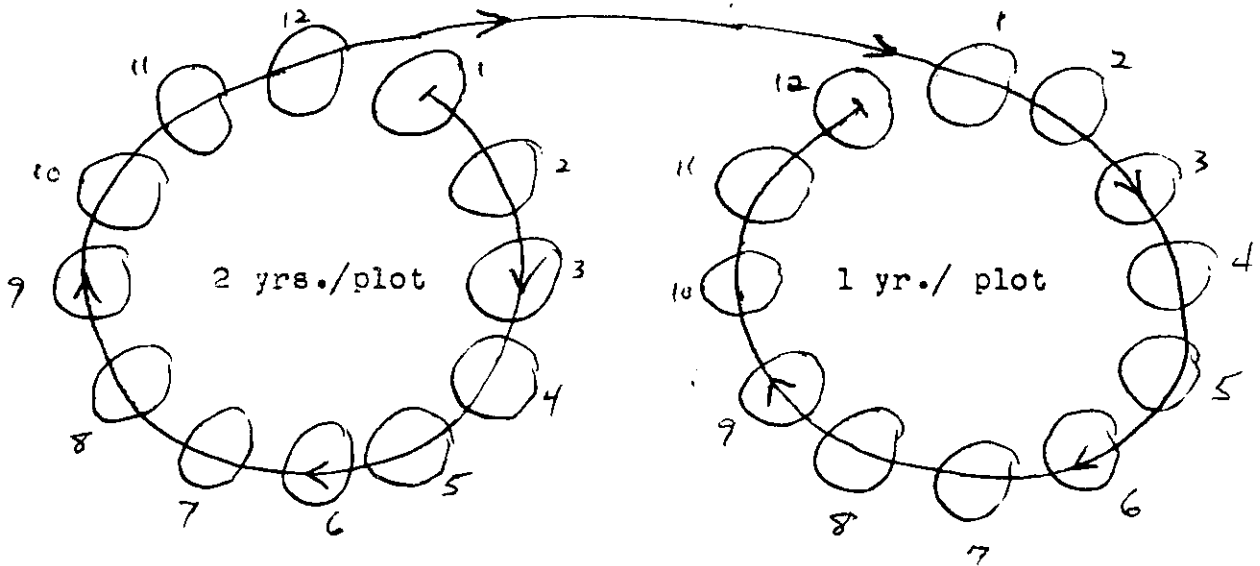


Figure 1. The current system of land use among the Guaraqueña; each plot is planted for two years in succession, left to fallow for twelve years, and then planted once more.

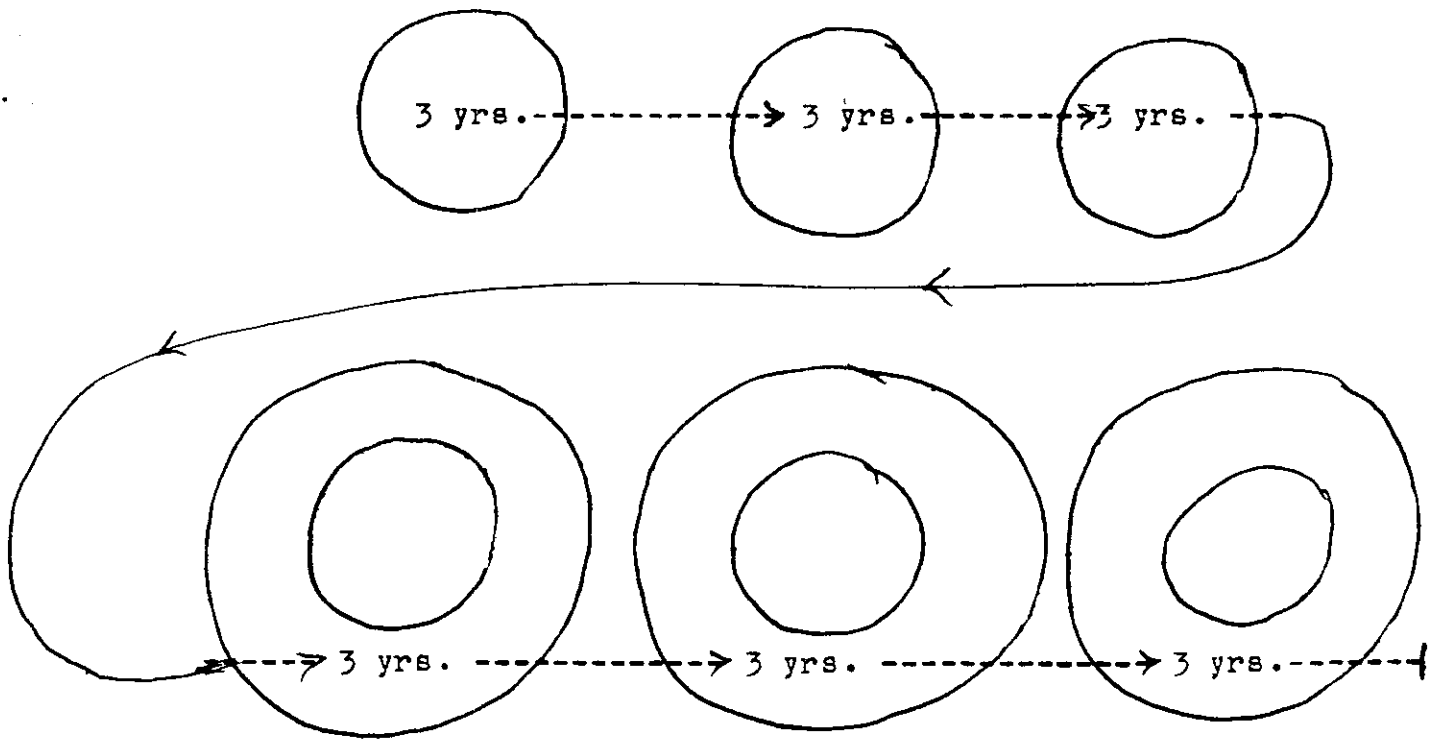


Figure 2. The traditional system of land use among the Guaraqueña; at the end of nine years, a concentric ring of forest is cleared to expand the original plot.

cutting down a concentric ring of forest at its perimeter (see Figure 2). The Guaraqueña informant who related the details of this system to me, Sr. Julio Yavina of the Karibe (Piranha fish) clan, explained that this method of expanding plots in a pattern of concentric rings was designed to help restore the central area to its original fertility. Specifically, he asserted that the fertility ('strength') of the surrounding new area was diffused into the older central area through drainage. At the completion of two cycles of land use spanning an eighteen-year period, lands were left to fallow for as long as possible. If it became necessary to use the same lands again, the length of cultivation was reduced to one or two years per plot instead of three.

Now that the traditional system of collective land use has long been replaced by a different pattern, it is no longer possible to directly measure and observe the effects of cutting new plots in concentric rings on nutrient flow and forest regeneration. However, the current system of plot rotation does offer some insights into how the traditional system might have operated. The Guaraqueña are still using drainage to control the direction of nutrient flow, but without employing labor-intensive techniques. In deciding where to cut a new plot, one of the major concerns is to position the new plot in such a way that excess water will drain in the direction of adjacent land that has been left to fallow.⁶ For example, a new plot is cleared on land that is adjacent to two plots lying fallow, one five years old and the other ten years, that are planned for future recultivation. All three plots are

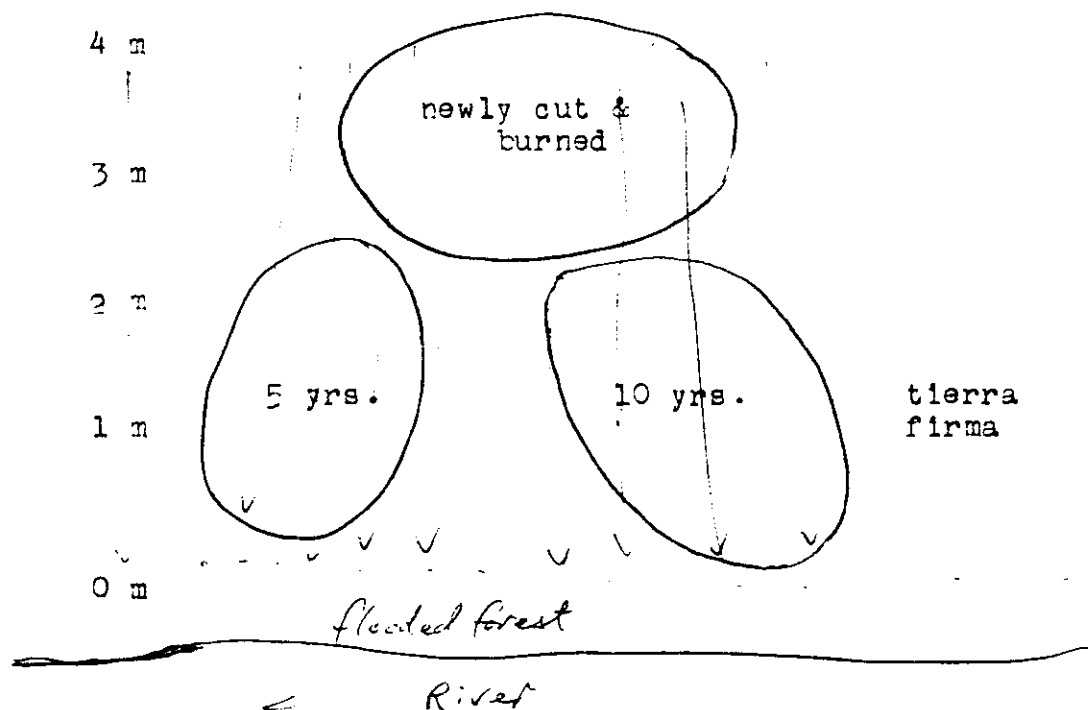


Figure 3. The technique of placing new gardens on higher ground so that runoff of water and nutrients flows into fallow plots, helping them to recover.

located on a gently-sloping ridge near the river, but the new plot is placed uphill of the two older ones so that excess water will drain into the latter (see Figure 3). The specific reason given for this practice is that it helps the old lands to regain their 'strength' for future cultivation.

The Guaraqueña decide that a previously used plot is ready for cultivation again by examining the extent to which the root mat covers the soil. If the network of roots from secondary vegetation and surrounding forest does not grow evenly throughout the plot, it is not considered to be ready for cultivation and will be left for another year. This manner of deciding how long to fallow plots converges with the results of ecological experiments in San Carlos which point to the importance of the development of

a root mat as a controlling factor in the rate of forest recovery (Herrera et al. 1980).

The effects of erosion and overcultivation on soil quality are frequently discussed among the Guaraqueña. In their discussions, Guaraqueña farmers often speak of the importance of avoiding techniques that take away the 'strength' of soils without helping to renew it. One informant made an analogy between soils used for agriculture and coffee made by pouring hot water through a filter. "A crop drains the soil like a cup of hot water drains the flavor of coffee grounds in a filter. The second cup is weaker and the third is no good at all."

The Guaraqueña are well aware that soils in their territory will rapidly lose the capacity for agriculture if not managed carefully. Their pattern of land use is based on a strategy for minimizing the impact of agricultural activities on the soil and forest resources while at the same time producing enough for subsistence needs. The strategy is explicitly designed to prevent over-utilization that could lead to irretrievable losses in soil quality and to help accelerate the processes of soil and forest recovery. By leaving lands to fallow after only two years, they are able to take advantage of the initial increase in soil nutrients after burning. But at the same time, they leave the soils to fallow before the amounts of nutrients begin to decrease in the third and fourth years and can return to cultivate the same plot for a second time after twelve years, taking a total of three crops from each plot.

Sociocultural Change and the New Strategy

The Arawakan Yeral and Curipaco groups living along the lower Casiquiare River provide an excellent opportunity to study interrelations between processes of social and cultural change and, on the other hand, the conceptualization and practice of swidden agriculture in the Upper Río Negro Region. Aside from the military outpost at Solano, the lower Casiquiare contains only three villages with an average population of just over 30 persons. Seven Yeral and two Curipaco families have inhabited a relatively large village of over 50 persons near the juncture of the Casiquiare and Negro Rivers for the past eight years. A few minutes upstream, three Curipaco families founded a small village with only 16 residents about four years ago. And some 30 km beyond Solano, five Curipaco families totalling around 26 individuals are still in the process of settling a village that is only two years old. Thus, all three groups have recently migrated into the Casiquiare and show, in sequential development, the pattern of land use in a newly colonized area.

In addition, the three groups have all been converted to a fundamentalist Evangelical religion by North American missionaries of the Summer Institute of Linguistics (Wycliffe Bible Translators) and the New Tribes Mission.⁷ The missionaries succeeded in eliminating the traditional culture to such an extent that any remnants of ritual, music, dance, shamanism, and mythology that have not already vanished are actively repressed by the indigenous people themselves. This auto-denigration of native values and customs has led to the emergence of a new cultural definition of the relation-

ship between man and the environment. A new ideal of men as producers who exploit natural resources for consumption and profit has gained ascendancy over the traditional cultural ideal, firmly rooted in mythology and ritual symbolism, of men as the protectors of a delicate social and ecological equilibrium.⁸

The new cultural ideal among Evangelized Yeral and Curipaco groups of the lower Casiquiare is evident in the way that they explain their choice of a particular soil or agricultural technique. When asked why they chose black soils (jípai itádali, Curipaco) for cultivation rather than brownish or yellowish ones, they answered that these black soils were better because they produced greater crop yields. The same question was answered very differently by Guaraqueña farmers who explained that black soils had the most 'strength' and could thus support cultivation without permanent damage to the forest and soil. Perhaps the most revealing statement came from a Yeral farmer who explained (rather forlornly) that his family had no alternative but to continue the old techniques of swidden agriculture because "The Indian has no salary" ("El Indio no tiene sueldo") (Hill 1980, fieldnotes). Such words have a nearly prophetic quality in showing the direction of social change in future generations. Children who are raised on a belief that agriculture is a burden to be endured or suffered are hardly likely to follow in their parents' footsteps and will probably leave the region in search of employment in urban areas as soon as they reach adulthood. The conspicuous absence of any explanations making reference to the need for preserving soil and

forest resources for future agricultural use is also symptomatic of the new cultural ideal. In all likelihood, this absence is not simply a case of forgotten knowledge or beliefs but a logical result of the systematic repression of any thoughts or attitudes that might trigger a revitalization of the traditional culture.

Not once in any of the three villages along the Casiquiare did I hear mention of a method for leaving lands to fallow so that they could be used for a second time. Yet the need for such a method has become increasingly obvious in the largest of the three villages where the most accessible, suitable lands for agriculture are growing scarce. To the west of this village, the low-lying forest is based on sandy podsolis that are totally unsuited for cultivation since they are annually flooded at the height of the wet season in July. Thus, all gardens are located either on the ridge of tierra firme behind the village itself or on ridges that are farther upstream to the east. An area of about 15 hectares was cleared from the forest behind the village at the time of settlement eight years ago. Two elderly women in the village are still harvesting the last crops from two hectares of this clearing that have been under cultivation for the past five years, while the rest of the area is covered with low secondary vegetation that supplies firewood for cooking. About five years ago, another cluster of gardens was cleared from forests located ten to twenty minutes upstream by canoe. All but two of these plots are now fallow. This year, four families have cleared new gardens that are over an hour away by canoe. Three other families have cut new gardens on lands

that are closer to the village but somewhat less desirable than those located farther upstream. They are on uneven, steeply-sloping terrain that contains yellowish soils with a high clay content and are covered with an exceedingly thick root mat that did not burn well in spite of this year's excellent February-March dry season. In addition, the plots were cut from low forest or high caatinga rather than high forest so that the amounts of nutrients released from the living parts of the forest after cutting and burning are lower than in other plots. Since over 90 percent of the available nutrients are stored in the living parts of the forest and its debris (Herrera et al. 1980), this difference could significantly lower crop yields and, in the long run, the ability of the forest and soil to recover.

The overall pattern of land use that has developed over the eight years since the village was settled is one in which lands are cultivated for four to five years in succession and then abandoned for an indefinite period. Except for two families who are still planting or harvesting crops from three and four-year-old gardens, the village has completed two cycles of this four-year pattern of land use and has just embarked on a third cycle. This time, individual families have had to choose between more fertile plots located a considerable distance upstream and less fertile ones that are closer to home. There are small measurable differences in the amounts of nutrients found in soil samples from the new plots cut in areas of high forest upstream and those cut in low forests closer to the village (see Figure 4), and a larger

<u>location</u>	<u>length of cultivation</u>	<u>phosphorus (parts/million in the soil)</u>	<u>magnesium</u>
village (n=1)	five years	less than 12	less than 12
10-20 min. upstream (n=2)	three years	less than 12	12
10-20 min. upstream (n=3)	one month	less than 12	21
far upstream (n=2)	one month	20	25

Figure 4. Phosphorus and magnesium levels in swidden plots grouped by approximate location and age

difference is likely to develop over time as wood and other organic matter decomposes and releases nutrients. The results of soil analyses also demonstrate a progressive loss over time in the amounts of phosphorus and magnesium found in samples taken from plots of different age. When combined with the results of ecological experiments in San Carlos which show a decrease in nutrient levels during the third and fourth years of cultivation, these results suggest that the use of lands for four to five years in succession is based on a strategy for making maximum use of soil nutrients and minimizing human energy inputs into agriculture, regardless of the long-term impact on soil and forest recovery.

The same pattern of land use is unfolding in the two more recent villages of Curipaco that are located up the Casiquiare to the east. In the 5-year-old village, the oldest gardens are on a low ridge of tierra firme directly across the river, a five

minute trip by canoe. To reach newer gardens, however, requires a thirty minute walk through low-lying, swampy forests to a second ridge of tierra firme. I predict that the next set of gardens will be even farther away from the village, unless one or more families decides to cultivate less fertile lands that are closer to their village. In the village farthest upstream, the settlers cut their first gardens three years ago, one year before making a rough clearing for their new village and constructing houses. In this way, they made sure that there would be crops ready for harvest before moving to such a remote site.

Conclusions

Whereas the Arawakan Guaraqueña have retained their traditional ethnic identification as horticulturalists, other Arawakan groups of the Upper Río Negro Region have lost that sense of identity through conversion to Evangelical Protestantism. This cultural difference has had a profound effect on the way that members of the different groups conceptualize and carry out their traditional agricultural activities. The Guaraqueña pattern of land use is designed to maintain a balance between human needs for soil and forest resources and the impact of human activities on these resources. While Guaraqueña farmers are eager to learn about ecology and modern agricultural science, they want to assimilate this new knowledge to their traditional methods of cultivation in much the same way that they perform Catholic patron saints festivals within the context of their traditional rites and ceremonies. The Evangelized Arawakan groups of the region have undergone a more radical

process of cultural change that has placed them in the role of producers who must suffer through the hard labor of agriculture. Evangelization has led to the abandonment of the traditional Arawakan pattern of land use in favor of a strategy that is more practical and efficient in its short-term advantages but more destructive in its long-term impact on soil and forest resources.

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FOOTNOTES

- 1.) Conklin's Study of Shifting Cultivation (1963, Pan American Union) served as an organizing scheme for data on swidden agriculture collected in this project. I do not wish to claim that Conklin's methodology is a recipe for indentifying systematic features in any ethnographic setting, but simply to acknowledge that his outline of shifting cultivation is an excellent device for helping to frame questions and construct accounts in an anthropologically acceptable form.
- 2.) Yeral, or lingua geral, is a Tupí-derived language with some Portuguese vocabulary that was spread by Jesuit missionaries in the Brazilian interior as a way of creating a common language among indigenous groups of diverse linguistic affiliation and dialect. The Yeral-speakers discussed in this study come from the Ro Isana in Brazil, the home territory of the Baniwa, a large Arawakan-speaking group. Gonzalez (1974) notes that the Yeral villages of the Upper Ro Negro Region in Venezuela speak an Arawakan dialect of Tupí-Geral. Thus, I include the Yeral village of the lower Casiquiare River along with other Arawakan groups of the area even though the precise ethnic origins of these people is unknown.

3) See Janzen (1974) for a comparative theoretical approach to blackwater ecosystems.

4.) I am excluding any discussion of the hunter-gatherer groups living in the interfluvial forests of the Brazilian and Colombian Vaupés. Such groups as the Maku are primarily collectors of wild food and, although they do not have their own agriculture, they occasionally perform agricultural labor for Tukano-speaking groups (Reichel-Dolmatoff 1971: 19). However, this symbiotic relationship between hunter-gatherers and more sedentary riverine groups has not developed with the agriculturally-oriented Arawakan groups.

5.) The Baré, an Arawakan group inhabiting the area around San Carlos de Río Negro when the first explorers arrived, have all but disappeared. Research on the Baré has uncovered less than ten speakers of the Baré language and very little data on their social and economic organization (Perez 1980).

6.) The Guaraqueña also have a specific method for choosing appropriate soils for cultivation. First, they dig holes in the black topsoil to determine its depth. If it is more than the length of a man's forearm throughout the area to be cleared, then it is considered to be of sufficient depth. In addition, they dig down to see if the base beneath the topsoil is red clay or white sand. A base of red clay is preferred because it allows the topsoil to retain more water than a white sand base. After these soil conditions have been checked, they taste a handful of the topsoil to see if it is bitter (acidic) or sweet. Only sweet or semi-sweet topsoils are considered suitable for cultivation.

7) As of 1965, almost one-third of the indigenous population of the Comisarias of the Vaupés and Guainía in Colombia were nominally Protestant (Reichel-Dolmatoff 1971: 7). At the present time, about one-half of the indigenous communities in the Upper Río Negro Region of Venezuela are Protestant.

8.) I do not mean to imply that non-Evangelical Arawakan groups of the region have no interest in or knowledge of production for consumption and economic profit. All indigenous groups of the region have had some contact with the national market economies of Brazil, Colombia, and Venezuela since at least the time of the rubber boom in the late 19th Century. The difference with non-Evangelical groups lies in their ability to assimilate elements of a monetary economy to their traditional cultural identity as horticulturalists. Evangelical Arawakan groups, on the other hand, have lost this traditional attitude.

9.) In general, soils along the lower Casiquiare are so low in potassium that they will not support the cultivation of plaintains. One Curipaco farmer lamented this fact and noted that plaintains grew well in the Upper Guainía of Colombia but not at all in his new gardens along the Casiquiare.