ANTROPOLOGICA
81, 1994-1996; 51-66

Manicaria saccifera and the Warao in the Orinoco Delta: A biogeography

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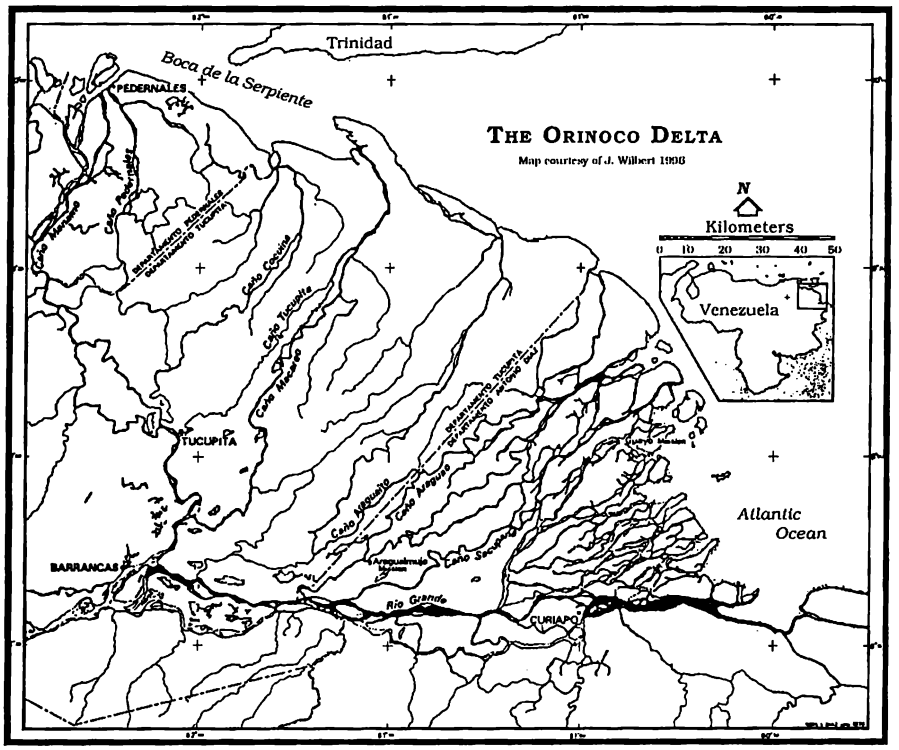
Key words: *Manicaria saccifera*, Warao Indians, Wetlands, Biogeography, Venezuela.

Introduction

In this paper I document a recently observed correlation between the geographical dispersion of the temiche palm (*Manicaria saccifera* Gaertn.) and the distribution of Warao settlements in the Orinoco Delta in northeastern Venezuela (lat. 8°25'10°N, long. 60°40'62°30 W; see map 1). I began research for this paper when, in the course of an ongoing ethnoecological project, a sixty-year-old Warao man insisted that the endosperm (meat) of the temiche fruit constituted the "daily bread" of his people in preagricultural times. His assertion was surprising, because it is, according to Warao scholarship, the sago or stem starch of the moriche palm which has been, since time immemorial, the mainstay of these wetland foragers. Even present-day agricultural Warao contend that their preferred daily fare would be moriche sago combined with morocoto fish (*Piaractus brachypomus*) rather than the fruit or the sago of the temiche. Sago obtained from moriche is both, quantitatively and qualitatively, far superior to temiche sago, which was sought mainly in times of scarcity (Wilbert J. 1976: 319; Heinen and Ruddle

Author's note: The larger part of this research project was funded by a grant from the Edward John Noble Foundation, administered by Dr. Michael J. Balick, director of the Institute of Economic Botany of the New York Botanical Garden. I owe special thanks to Pedro Rivero from Morichito in the Orinoco Delta for challenging me to develop this topic, and to Lda. Verónica Ponte for her input as an ecologist and Ldo. Giuseppe Colonnello and Fabian Cuneo for their aid in the distribution study between the Macareo and Manamo rivers.



MAP 1
THE ORINOCO DELTA

1974). Accordingly, the discrepancy between the testimony of the Warao elder and the ethnographic record raises a number of challenging questions: (1) If morocoto and moriche sago were the "meat and potatoes" of the Warao, why would a competent Warao informant insist on ranking temiche fruit over moriche sago? (2) Was the informant's remark simply a figure of speech the native assistant had picked up from Creoles or at the mission? (3) How critical were periods of food scarcity for nonagricultural Warao, and how would a year-round nutritional "standby" like temiche be valued in times of hunger? (4) How common was the consumption of temiche fruit by the Warao? (5) How does the distribution of temiche compare with the location of Warao settlements?

Environment and subsistence

To place the discussion of these issues within an ethnoecological context it is necessary to provide environmental and sociocultural

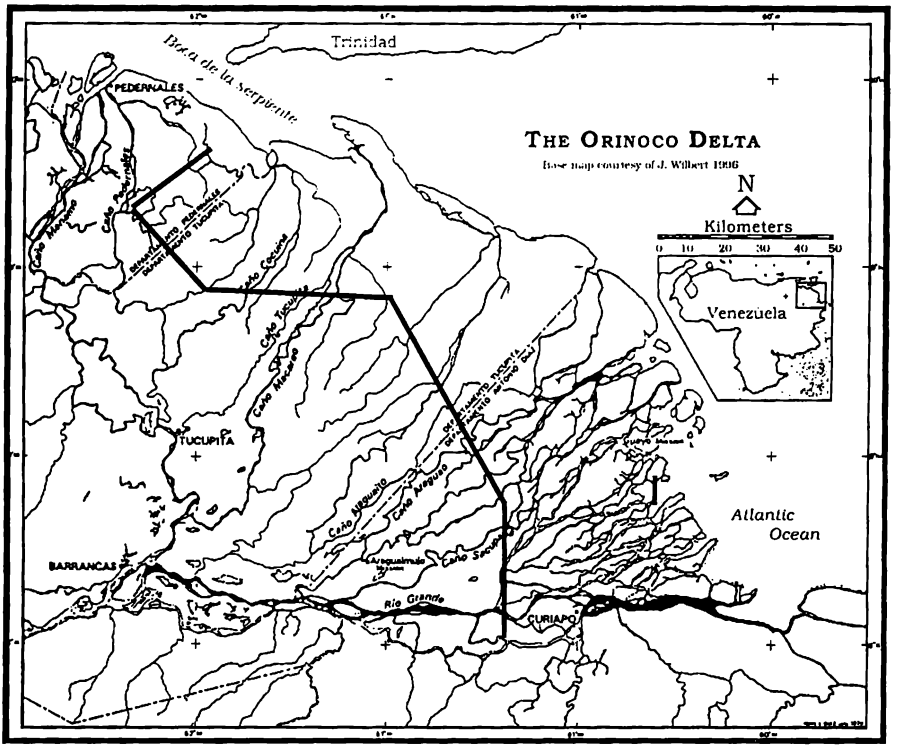
background data, with special reference to traditional subsistence activities in general and to palmfood procurement in particular.

Environment

The Orinoco Delta is flanked on the west by the foothills of the Cordillera de la Costa and on the south by the Sierra Imataca of the Guiana Shield formation. Oriented in a northeasterly direction, the 23,700 km^2 alluvial floodplain extends approximately 180-200 km from its apex to the Atlantic Ocean (Heinen *et al.* 1995: 313; Wilbert, J. 1980: 3). With a maximum elevation of 10 m above sea level, the region is drained by nine major distributaries with an overall slope of less than 0.07 percent (Vásquez and Wilbert 1992).

The climatological cycle of the delta is marked by two dry and two rainy periods. The principal dry season begins in January and usually continues through the third or fourth week of April. In the next four months, May through August, there are torrential rainstorms, followed by two drier months, September and October. The second rainy period comes in November and December. Annual precipitation is highest in the eastern delta (2,220 mm) and decreases in the western sector to approximately 1,550 mm; the relative humidity fluctuates between 60-80%, and the moderate but relatively constant velocity of the northeasterly trade winds maintains a mean ambient temperature of 26°C.

The Orinoco Delta has been studied by scholars from the social, life and physical sciences. As might be expect, each discipline subdivides the region according to different criteria, thus creating a multiplicity of analytical templates. For example, anthropogenic environmental impact studies use the apex as a common reference point to divide the delta into four pie-shaped sections, differentiating among a western, a central, a southcentral and a southeastern delta. On these sections they superimpose three latitudinal divisions, identified as Upper, Middle and Lower Delta (Heinen *et al.* 1995). Geographical studies tend to transect the delta longitudinally, creating three areas: western, central and southeastern (OCEI 1993: 280). Hydrological, botanical and cultural studies usually maintain the three aforementioned latitudinal divisions of Upper, Middle and Lower Delta, largely defined by such hydrological criteria as water quality, flow rates, pulsing, and pluvial, fluvial and/or marine flooding (Van Andel 1967; Wilbert, J. 1979; Vásquez and Wilbert 1992). Finally, geological studies, tend to divide the delta latitudinally into two subparallel areas based on soil types: the entisols primarily in the Upper Delta; and histosols common in the Lower Delta (Comerma 1979). My biogeographical study applies this geological taxonomy because it corresponds closely to the Indians' own criteria of territorial classification (Map 2).



MAP 2
SUBDIVISION OF THE ORINOCO DELTA ACCORDING TO GEOLOGICAL AND ETHNOSCIENTIFIC CRITERIA

Traditional Subsistence Activities

Relatively little is known about the prehistoric life-style of the Warao because culture-specific archaeological sites are difficult to locate in the Orinoco Delta. Nevertheless, drawing on radiocarbon dates from western, eastern, and offshore Venezuela, as well as from Panama, prehistoric archaeologists have suggested a date of at least 7,000 B.P. for the presence of Warao-like people in the vicinity of the Orinoco estuary. They consider the contemporary Warao as survivors of the Meso-Indian era in this coastal region (Rouse and Cruxent 1963: 53, 111, 143).

Significant time indicators are also embedded in oral lore, language affiliation, subsistence pattern, cultural adaptation and general water-orientedness of the Warao. Thus Warao mythology recounts events that coincide with early Holocene conditions, "a time when the mainland

was still connected with, or at least in close proximity to, the island of Trinidad" (Wilbert 1979:). Those who subscribe to this theory believe that the ancestors of these people lived near the mouth of the Orinoco River 8,500-9,000 years ago (Wilbert 1995: 336). Linguistically, the Warao are not related to the predominant phyla of agriculturalists in Greater Guiana. Traits like their tribal autodenomination, meaning "canoe people" people, their maritime orientation, including seaworthy canoes and the capability of star navigation, and their seminomadic wetland adaptation based on fishing and sago recovery all suggest that since prehistoric times people ancestral to the Warao have figured among the littoral foragers of northern South America, sharply differentiated in overall culture from nearby Amazonian farmers of Arawakan and Cariban affiliation (Wilbert, J. 1972: 65 115, 1979; Greenberg 1987).

Local Warao groups tend to be small bands of 50 to 100 individuals, with four or five bands constituting a subtribal unit. Larger aggregates are not recognized as cohering polities. Although the Warao's material culture is rudimentary, it is well adapted, enabling the Indians to forage effectively across a variety of microhabitats, including savannas, insular levees, flood forests and riparian and littoral (marine) environments.

Of marked significance to the subsistence of nonagricultural Warao is a unique ecological classification that governs the relationship between humans and the biotic resources of their environment. Hunting strategies, for example, are subject to a unique biotic code that classifies the environment or eight vertical levels: aquatic, subterranean, ground level, tree trunk height, lower forest canopy, middle canopy, upper canopy and emergent trees. Within this tiered world the diverse species of animals are associated with particular levels according to "where they sleep," resulting in the creation of such ecological concepts as econiches and faunalogical communities.

As humans sleep on the ground, they belong to the community of animals that do likewise. And because members of a given community, rather than victimizing one another, may hunt only members of communities other than their own, animals like deer, tapir, peccary and jaguar are eschewed by Warao hunters. In accordance with the same rules, fish, burrowing rodents and birds are considered fair game (Wilbert 1995: 463-366). Even so, interlevel over-exploitation of a given species is checked by the supernatural Masters of Animals who keep a watchful eye on their charges, threatening to abandon a violator's region if their wards are subjected to excessive predation.

The botanical world is organized in a similar fashion. All major tree species are considered daughters of Dau arani, the Mother of the Forest. She interprets any wasteful forest activity as an abuse of her off-

spring, provoking her to retaliate by curbing fruit production, inactivating phytotherapeutic properties and inflicting epidemic sickness. Botanical species exempted from this taboo are those constituting the forest understory and the palmetum. Palms are exempt because the Warao do not classify them as trees because their "trunks are not of wood."

If the purported consequences of challenging the environmental code seem harsh, they do reveal two ecologically sound strategies of resource management. First, the natural order of the environment does not prohibit the exploitation of available resources, only their overexploitation. Second, exploitative activities focus on wetland species of high reproductive capacity, short gestation and prolific reproduction, such as fish from the aquatic level, rodents from the subterranean level, birds from the forest canopy and the "nonarboreal" palms. Of course, these environmental rules remain effective only so long as individuals are enculturated according to the traditional ethnoecological code. Western influence is increasingly eroding traditional norms.

Although much remains to be learned about the Warao's traditional strategies of sustainable resource management, preliminary indications are that over a protracted period of time the impact of the Indians on the wetlands of the delta has been negligible. Scholars like Heinen *et al.* (1995) have begun to evaluate changes in the Orinoco Delta caused by human occupation. Among those observed is the local displacement of mangroves by moriche palms. The authors explain this phenomenon by the practice of carrying moriche fruit from the morichals (where they were consumed in preagricultural times) to riverine settlements (of modern swidden farmers) where they germinated in situ. This sort of environmental change, however, was observed to be temporary as mangroves tend to reclaim "lost" territory.

Little is known about the Warao's impact on shrubland savannas. What has been observed thus far, is that large tracts of savanna are sometimes intentionally burned by the Warao to facilitate access to the morichals. Also the proliferation of ferns in the savannas was recognized as an indication of human presence (Ortega 1993). These preliminary observations, however, do not suggest any final conclusions. The Warao who have participated in our studies over the past 20 years were unable to say whether savannas were invading the forest surrounding them or whether the forest was invaded by the savannas.

Palm Food

Warao economy used to depend heavily on the exploitation of seven species of palm which provided food, medicine and raw materials. Table 1 lists the palms in alphabetical order according to their scientific and

vernacular designation in Spanish (Sp.) and Warao (W.), and it also indicates their economic usefulness to Warao society.

Because in this paper focuses on *M. saccifera* and its supposedly inferior ranking to *M. flexuosa* as a food source, it is necessary to list first some of the basic characteristics of moriche.

TABLE 1
ENDEMIC PALMS EXPLOITED BY THE WARAO

Species	Use
1. *Desmoncus* cf. *polyacanthos* Mart.	
Sp.: ?; W.: Hiorohi	Medicine
2. *Euterpe oleraceae* Mart.	
Sp.: Palmito; W.: Anare	Palm heart, fruit, medicine, construction material
3. *Euterpe* cf. *precatoria*	
Sp.: Manaca grande; W.: Winamoru)	Medicine, cigar wrappers
4. *Euterpe* sp.	
Sp.: Manaca; W.: Abua	Hardwood implements
5. *Jessenia bataua*	
Sp.: Seje; W.: Muhi	Fruit, medicine
6. *Manicaria saccifera* Gaertn.	
Sp.: Temiche; W.: Yaha	Sago, palm heart, fruit, water, medicine, toys, thatch, fishing weirs, sails
7. *Mauritia flexuosa* L.	
Sp.:Moriche; W.:Ohidu	Sago, fruit, beverage, medicine, fishing tackle, cordage, hammocks

According to the Warao, stem starch (sago) is the "energy" moriches need to flower. That is why florescence reduces the recoverable sago to negligible amounts. That is also why the preagricultural Warao considered moriche sago their staple, though its availability was certain for only the four months of the primary dry season (January to April) and, to a much lesser degree, for the two months of the secondary dry season (September to October). During the primary rainy sea-

son (May to August), stem starch was altogether lacking, and during the secondary rainy season (November to December) it was obtainable at best in small amounts.

A critical degree of unpredictability about this vital seasonal staple is based on the occurrence in the Orinoco Delta of fast moving local storms whose heavy rains are likely to precipi tate the flowering of moriche palms. Such events threaten local groups with a total lack of sago. Local food scarcities are therefore not uncommon in the delta, and the Indians speak of deltawide sago shortages and of famines that occur at fiveyear intervals (Heinen and Ruddle 1974). Thus, on an annual basis and under favorable circumstances, the Warao could count on four months of abundance, four months of scarcity and four months of hunger. Although sago provisions stored in the primary dry season amelio rated seasonal hunger in some local groups, periodic rainstorms in the dry seasons could also extend acute food shortages. Because the major game animals of the delta could not be hunted and because fishing during the rainy seasons becomes unproductive, food shortages were not only protracted but also acute.

It is precisely during these long periods of scarcity or absence of moriche sago, fish and game that the temiche palm became of vital nutritional importance. In this light the reference to its fruit as the "daily bread" acquires factual relevance. Rather than ranking the importance of one palm over another, it was meant to draw attention to the role temiche fruit played as a food supple ment and emergency food.[1]

Wessels Boer (1965: 21) describes Manicaria saccifera as:

> "trunk solitary, up to 6 m. tall, about 3 dm. in diameter, in the upper part covered with dead leafbases, at base with promi nent leafscars. About 10 contemporaneous suberect leaves; dead leaves persistent for some time and hanging down on the trunk; sheath with fibrous ventral part enclosing young leaves about 7 dm. long; petiole stout, about 12 dm. long and 8 cm. in diamenter, grooved, leafblades very large, simple or irregularly pinnatisect through the action of the wind, also in leaves of juvenile plants up to 7.5 m. long and 23 dm. wide, bifid at apex, margin serrate; about 120 primary veins, 34 cm. distant at the middle of the blade, secondary veins inconspicuous; petiole, costa, and the lower surface of the blade at first more or less browntomentose, soon glabrescent.

[1] The comment was also meant to be taken literally rather than figuratively which could have suggested mission influence. As it turned out, the informant was born and raised in morichals of Atoibo on the island of Tobejuba (Caño Araguao). On one occasion his parents had saved him from being taken to the mission school by escaping to a then remote morichal of Soborojo on the Mariusa island (Caño Winikina).

Spadices almost erect, about 17 dm. long, with 2 spathes; outer spathe about 7 dm. long, flattened, invisible between leafs-heaths, inner spathe about 11 dm. long, fusiform, mucronate, consisting of densely interwoven fibers without any suture, enclosing the inflorescence completely till long after anthesis; peduncle about 10 dem. long, rachis about 6 dm. long with up to 45 simple rachillas or rarely a few rachillas bifurcate, several large bracts along the peduncle within the inner spathe, smaller bracts at the base of the rachillas. Male flowers densely crowded in the upper part of the rachill as (and 2 laterally adjacent to each female flower), sunken in small pits and subtended by bracts 712 mm. long; sepals ovate, imbricate, 34 mm. long, petals lanceolate, valvate, ligneousincrassate, 67 mm. long; stamens many (20-34), densely congested, filaments about 1.5 mm. long, anthers 3 mm. long, the central ones usually misshapen. Female flowers few, near the base of the rachillas between 2 male flowers, subtended by bracts; sepals ovate, imbricate, 7 mm long. 8 mm. wide, petals ovate, valvate, acute at apex, ligneous incrass ate, 10 mm. long, 6 mm. wide; pistil globose, 4 mm in diameter, stigma 3fid, sessile, erect, 34 mm. long, strongly papillose. Fruit depressedglobose, echinate, tubercles rather hard and not easily rubbed off; seed globose, about 4 cm. in diameter; embryo basal."

Much has been published in recent decades on *M. saccifera* and the palm's economic importance to the Warao, including nutritional detail about its sago (see Wilbert J. 1976, 1980, 1980a; Wilbert 1986). As a result of the present investigation the nutritional values for temiche endosperm and fruit fluid may now be added to the list (table 2a, b ,c).

The main reasons for *M. saccifera* producing less sago than *M. flexuosa* are its inferior physical size and its year round production of fruit. The endosperm is edible, however, and the fruit water is potable. Temiche palms grow as dispersed individuals or in dense groves, depending in part on topography. Dense stands are typically found in the flood forests of the Lower Delta. Entering the levee systems are mostly smaller numbers of scattered distribution. Temiche does not grow in morichals.

Although the edible products of the temiche palm (sago, fruit, fruit water, seedlings) are not among the Indians' most "desired" food, they do offer several advantages: (1) They provide food and drink throughout the year;[2] (2) The fruit water is appreciated particularly during the months of the primary dry season when river water turns brackish; (3)

[2] Temiche palms have no specific fruiting season.

TABLE 2A
COMPOSITION OF TEMICHE SAGO[1]

pH (sol. 2%)	5.75
Humidity	63.51%
Fat*	0.55%
Dextrose*	5.07%
Protein*	1.62%
Starch*	4.57%
Fiber**	24.68%

* Calculation based on dry material

** By balance

[1] After Wilbert, J. 1976:318

TABLE 2B
COMPOSITION OF TEMICHE ENDOSPERM

Protein (%w/w)	0.25	COVENIN N° 1195-80
Humidity (%w/w)	93.19	COVENIN N° 1553-80
Ash (%w/w)	0.62	COVENIN N° 1783-80
Iron (mg/100gr)	4.13	COVENIN N° 1170-83
Calcium (mg/100gr)	296.98	COVENIN N° 1158-82
Fats (%w/w)	0.40	COVENIN N° 1785-81
Raw fiber (%w/w)	0.71	COVENIN N° 1789-81
Carbohydrates (%w/w)	1.66	*

Conversion factor of nitrogen to proteins 6.25

* Antrona method

TABLE 2C
COMPOSITION OF TEMICHE FRUIT FLUID

Alkalinity (mg $CaCO_3$/L) at pH 4.6	740.00	COVENIN N° 2188-84
Calcium (mg/L)	1055.47	COVENIN N° 2408-86
Magnesium (mg/L)	317.65	COVENIN N° 2408-86
Chlorines (mg Cl^-/L)	1784.02	COVENIN N° 2138-84
Total solids (mg $CaCo_3$/L)	3935.25	COVENIN N° 2408-86
pH (29°C)	5.89	*
Salinity (°/00) 29°C	5.50	*
Iron (mg/L)	3.21	COVENIN N° 2120.84

*Standard Methods for the Examination of Water and Wastewater 1989

PLATE 1

THE FRUIT OF *MANICARIA SACCIFERA* AS FOUND GROWING ON THE PALM

Because temiche has a rather short trunk its fruit clusters are easily accessible, even to children; (4) Opening the fruit requires little strength and no implements whatsoever. Even seedlings are harvested once they reach approximately 30 cm in height. Their hard shells are cracked open with a stick to expose a white spongy haustorium of "a mildly sweet taste, and as many as 20 can be consumed without fear of digestive complications" (Wilbert J. 1976: 303).

In order to determine to what extent the consumption of temiche fruit had been a common practice among moriche sago-dependent Warao, I found it necessary to travel to the various delta regions and to consult with local residents concerning *Manicaria* distribution. At this point it became intriguing to speculate that temichals are optimally coterminous with the habitat of the traditional Warao in the Orinoco Delta.

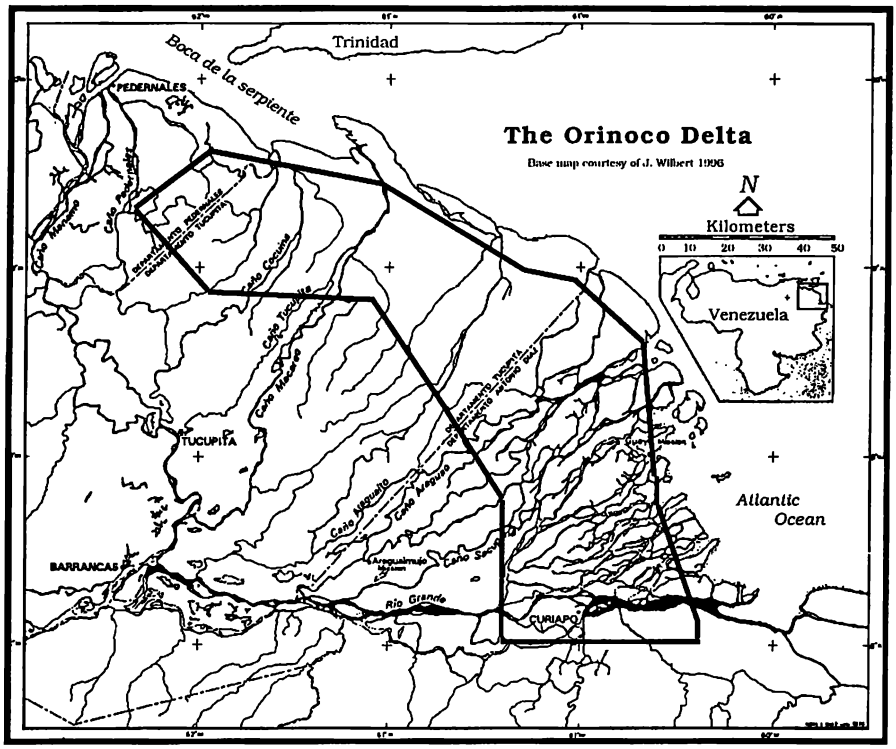
In January and February of 1995, I traveled across the delta in order to establish the perimeter of temiche distribution. The expedition headed first for the mouths of the major distributaries like the Winikina, Arawaibisi, Araguao, Sacupana, Osibu kahunoko, Sakupana, Merejina and the Rio Grande where resident Indians were questioned about the maximum downriver or external extension of temiche. They were also asked whether they ate temiche fruit on a regular basis.

At the time, radar maps of the delta were not available to investigators, and most other available maps proved too imprecise for the task at hand. The Indians participating in the study were therefore asked to identify settlements or other commonly known strategic reference points to determine the outer boundary of temiche distribution. The most accurate cartographical tool available for the plotting of these reference points was the Venezuelan census map which places settlements and their locations with relative accuracy. To verify the upriver or internal extension of the temiche perimeter, the expedition traveled the rivers inland from Merejina.

Our exploration was facilitated by the fact that previous field experience had taught me that the Warao do not apply the same name to more than one species. Furthermore, temiche is known to all Warao and is identified throughout the delta by the same term, *yaha*. Botanically the palm is a distinct and easily recognized plant; unlikely to be confused with any other species.

All Warao individuals whom we questioned admitted without hesitation that temiche fruit is part of their diet. Even today, when taro has supplanted sago, the fruit represents a common food item for members of all generations, not just for elderly people who, having been foragers earlier in their lives, would have grown accustomed to doing so. Map 3 shows the verified perimeter of temiche distribution.

The comparison of our findings with 1995 national census data shows that a significant percentage (77%) of present-day Warao settle-



MAP 3
PERIMETER OF TEMICHE DISTRIBUTION IN THE ORINOCO DELTA.

ments are located within the temiche distribution area (OCEI 1995: 220-226). Of the 23 percent that fall outside the boundary most are either mission villages, small homesteads of cattle herders or, as in the case of the western delta, Warao who were forced to migrate up-river due to the construction of a dike on the Manamo River which allowed sea water to penetrate deep into most of the most of the rivers fed by the same. We obtained corroborating evidence for the coterminous distribution of temiche and Warao settlements by comparing the results of the temiche survey with a map of Warao distribution based on 1932-33 aerial photography. Notwithstanding a small western region for which no photographs are available, the areas of temiche and settlement distribution overlap almost 100 percent.

An interesting native method of determining the boundary of temiche distribution was described by a Warao participant in the survey. According to him, temiche requires the soft, moist soil of the Lower Delta; it will not grow on the hard, sandy soil of the Upper Delta. When

asked how he could distinguish between the two soils separating temiche territory from non-temiche land, he answered that he could feel the difference on his bare feet when walking across the boundary. "Lower Delta soil does not hurt the feet; Upper Delta soil does."

To summarize, I am seeking to shed new light on the importance of *Manicaria saccifera* as a guaranteed nutritional standby of the native inhabitants of the Orinoco Delta. Upon the insistence of a Warao assistant, who had been born and raised in morichals, the project was conducted to demonstrate that temiche is what he called the "daily bread" of his people in preagricultural times, providing food on a yearround basis to all Warao living inside the bound aries of its distribution. A reconnaissance of the temichals produced evidence for a very close correlation between the *Manicaria saccifera* dispersion and Warao settlement distribution in the delta. This observation is supported by a map of aerial photography of 1932-1934 as well as by a map accompanying the 1995 census of indigenous peoples of Venezuela. It is noteworthy, however, that although about half the Warao population on the former map and the entire native population on the latter were registered after the switch from a preagricultural (sago) to agricultural (taro) food economy had occurred, the Lower Delta continues to be the region of strongest Warao concentration. Thus, though taro agriculture has certainly brought a measure of nutritional security to modern farmers, most Warao cling to the temichal as the safest hedge against seasonal hunger, and Manicaria saccifera constitutes an important indicator of indigenous population distribution in the Orinoco Delta.

Abstract

In this paper I show that the distribution of Warao settlements is coterminous with the geographic distribution of the temiche palm (Manicaria saccifera Gaertn.) on the Orinoco Delta.

Resumen

Se propone que la distribucion de los asentamientos permanentes Warao en el Delta del Orinoco coincide con la distribucion de la palma temiche (Manicaria saccifera Gaertn.) en el Delta del Orinoco.

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