

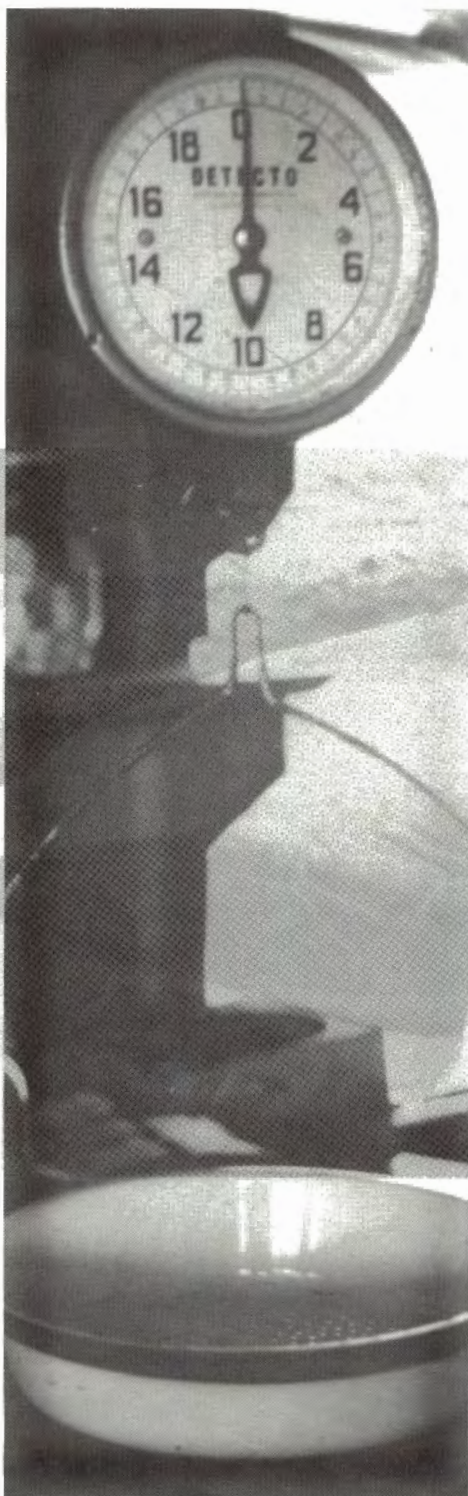
Selling a Subsistence System

by Brian Weiss

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GEORGE H. BALAZS

A user's guide to the film "The Turtle People"

With film producer's comments by
James Ward



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B & C FILMS



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4-6-76

Dear Prof. Balazs:

Barney Nietschmann has forwarded your recent letter inquiring about my film "The Turtle People." A partner and I are "B&C Films." I regret the difficulty you had in locating us. My partner changed addresses, and the post office refused to forward mail for more than a few months. I believe Barney sent you a brochure with our current address.

I am enclosing a copy of "Selling a Subsistence System," the written accompaniment to the film. You might find it useful background for discussing the film or perhaps would consider having those who will attend your lectures acquire it beforehand.

I look forward to hearing from you.

Sincerely,
Brian Weiss

Brian Weiss
Asst. Prof.

Paradox; Village Organization; Changing Times; Decline of the Turtle; Adaptation; The Alternatives

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INTRODUCTION

"The turtle him — that's all we got." With more than a little doubt, I looked from the sun-dried face of an old Miskito Indian woman to the lush tropical habitat surrounding us. With coconuts, manioc, deer and dasheen, it seemed most unlikely that the Miskito of eastern Nicaragua were really that dependent on the green sea turtle.

Two-and-a-half years later, I had completed a detailed study of Miskito subsistence and nutrition; it confirmed the old woman's statement. For the Miskito, the green sea turtle (*Chelonia mydas*) is essential to the maintenance of social and subsistence systems. Commercial turtling, however, is making the turtle a rare commodity, and the result of increased exploitation is a diet lacking in both calories and protein.

Yet it is the Miskito themselves who are selling the turtles, in ever-increasing quantities, to outside companies. ~~This paper is an accompaniment to~~ The film *The Turtle People*, which presents the historical, economic and ecological factors that are leading the Miskito to sell their subsistence system.

The film is a study of ecological adaptation and economic maladaptation, illustrating how the ecological and social results of economic changes can turn what appears to be progress into peril. This case shows some of the complexities and subtleties involved when an indigenous population is integrated into a national and international economy. Although the details are specific to the Miskito, the processes are being repeated throughout the world, wherever large and small cultures meet.

The Miskito are selling and depleting a subsistence resource. By selling their subsistence system, they make an irrevocable decision to abandon a way of life that has sustained them for over 350 years. Yet it is a decision not really "made" by the Miskito, but rather by a combination of historical circumstances and outside entrepreneurs. Historical circumstances don't know, outside entrepreneurs don't care, and the Miskito can't see that their position is rapidly becoming untenable. Without turtles, the Miskito cannot live as they always have. Yet as a minority population, lacking education and a command of the national language, they are unlikely to make a successful transition to the cities of Nicaragua — nor do they have much interest in making such a transition.

The film and ~~this paper~~ present the background and detail of how the Miskito come to be in this position, where there are no good answers. It is a situation in which an ever-increasing number of indigenous populations find themselves as their natural resources become items of international commerce. Some groups, deprived of their land, wither after transfer to territories ecologically and physically different from their own. Others have been killed more directly, while governments looked the other way — or participated. For still others, such as the Miskito, the process is more subtle, although ultimately no less threatening.

The Turtle People is not a visual ethnography of the Miskito Indians. ~~This monograph and numerous available publications (see the bibliography) provide detail on the lifeways of the group.~~ The film is intended as a statement of conclusions about a situation — conclusions arrived at after 13 months of fieldwork, utilizing the available method and theory of anthropology. I disagree with

those who wish anthropology to be neutral, collecting data but having no point of view, and I disagree with those who see the same role for ethnographic film.

Many people feel that "The ethnographic film maker is not writing a novel or expressing a personal agony" but is simply "interpreting what somebody else is 'saying'" (~~Goldschmidt 1972:1~~). There is certainly a role for such exposition, which attempts to present to viewers a world as seen by another culture. There is a more urgent need, however, for anthropologists to utilize their perspective to analyze and reach conclusions, and to use the unique capacity of film to present those conclusions to as wide an audience as possible. To do otherwise denies both our capability and our responsibility as anthropologists.

RESEARCH AND FILMING

The project was, first and foremost, a field study designed to gather data on the nutritional consequences of economic change. I wanted to find out if more money was buying the Miskito Indians more food, or if "economic development" was a nutritional deficit. The validity of the conclusions shown in the film ultimately rests on the data that were collected, as in any anthropological field study.

After a preliminary reconaissance in 1971, I began fieldwork in the village of Little Sandy Bay in March, 1972. I selected this village because of its relative isolation from port cities. This minimized the difficulties involved in keeping track of the movement of foodstuffs, a task central to the success of the research.

Measuring food consumption at the household level was an equally-important part of the research. I was capably aided in this by Dorothy Jean Cattle, a University of New Mexico graduate student. The Miskito were always pleased to have a visit from "Miss Cat" and this rapport considerably smoothed a task upon which many a nutritional survey has foundered.

Our Miskito assistant, Clarence Wilson, gave us constant aid and comfort. He explained the Miskito world to us, and explained us to the Miskito, both undertakings of particular difficulty and sensitivity.

I filmed sporadically throughout the 13 months of fieldwork, when weather and other research efforts permitted. Shooting began quite slowly, since I wanted to gain a degree of rapport with the people before thrusting a motion picture camera between us. The tempo of filming increased as my familiarity with the Miskito and the details of their life grew. For those interested in the trials of an anthropologist-cum-filmmaker, a later section of this paper contains information about the film's production.

Fieldwork was funded by a grant from the National Institutes of Mental Health. Computer analysis was made possible by grants from the Department of Anthropology and the Horace H. Rackham School of Graduate Studies at the University of Michigan.

All of Little Sandy Bay's residents were involved in the project, and cheerfully withstood the many inconveniences it occasioned for them. The voices heard in the film are those of villagers, taped in interviews conducted over a period of months. In the field, there was never a script for either filming or sound. What occurs on both film and soundtrack is spontaneous.

even part
Turtle
Miskito

USING THIS GUIDE

To be most effective, this guide and **The Turtle People** will be used together, since each supplies information not contained in the other. Reading the guide before viewing the film not only establishes the outlines of the story clearly, but it also provides many details of data that will enhance understanding of what is seen.

The viewer will find it particularly helpful to read through the soundtrack transcript once or twice before seeing the film. The Miskito speak Creole English, a result of contact with British and Americans for over 300 years. Once the rhythm and accent become familiar, most people readily understand what is being said. "Previewing" the soundtrack by reading it facilitates this understanding considerably.

IN THE BEGINNING

Nicaragua's eastern coast is a 200 mile arc of white beach and coconut palms, facing to the Caribbean sea. It extends from the Rio Coco border with Honduras in the north to the Rio San Juan separating it from Costa Rica in the south (Fig. 1). Between those boundaries there are approximately 35,000 Miskito Indians, of whom 15,000 live by and depend on the sea for their livelihood. For these people, distributed in villages along two-thirds of the coast, the green sea turtle is the focal point of a provisioning system that has endured for over 350 years.

The Miskito name and language reflects the variegated history of the coast. There is no agreement as to the origin of the term, "Miskito". Various authors attribute it to the French (a corruption of the term for "musket bearing"), the British (referring to the malarial mosquito found in abundance inland), and the Spanish (from the term "indios mixtos"). On thin linguistic evidence, the Miskito language has been assigned to the Chibchan group of South America (Greenberg 1960; Stone 1966). The Creole English spoken in varying degrees by most coastal Miskito reflects the predominantly English-language contact with the British and Americans that has prevailed for hundreds of years.

To understand the current dilemma, it is necessary to follow the history of contact that has increasingly drawn the Miskito into the world marketplace. It is historical factors that place the Miskito in their current position, and ecological ones that keep them there.

The first sustained European contact with the coast came through the French buccaneers, in the late 16th century. Their brief descriptions tell of a series of small, semi-nomadic, linguistically-related tribes that were later referred to collectively as Sumu.

In 1633, the Providence Island Trading Company made British presence felt by sending an expedition to the region of Cape Gracias. The Miskito soon became traders, bartering fustic (dye-wood), sarsaparilla and "tortoise shell"¹ for "fish-hooks, small glass beads, Dutch looking-glasses, salt, and other articles which, except to them, were of very trifling value" (Roberts 1965:34 orig. 1827).

The Miskito were bartering non-subsistence resources and providing increased quantities of items they had previously gathered in smaller quantities for their own use. This early trade had little ecological impact, but the intensification of an already-established

pattern of exploitation is a process that was to be repeated at a later time, but with a very different ecological result.

During this period, the Miskito gained ascendancy over neighboring Sumu tribes through force of arms; one of the items obtained from the buccaneers and traders was guns, and the Miskito were soon raiding and plundering from Honduras to Panama. Other groups fled, were absorbed, or were sold into slavery².

Throughout this time period, the Miskito subsistence system remained unchanged. Although many of the men were absent from the villages for long periods of time, bartering, raiding or seeking turtle shell, agricultural pursuits were carried out by women and children. As on many other occasions, when all else failed, the local ecosystem still provided food to eat.

Throughout the 17th century, the Miskito mixed trade with buccaneers and pirates and raids on neighboring tribes and Spanish settlements.

The Miskito "acquired" a "King" in 1687. England, seeking to legitimize a claim to New World territory, created the façade of a Miskito King, through whom they were "invited" to the Coast to trade. There is little evidence that this had any effect on Miskito political organization, which was and is egalitarian and unstratified. What the King did was to supply an excuse for incursions upon other groups; "tribute" was now being collected for the King. This tribute, conveniently enough, was always in the form of those local resources which were being sought by the British traders. "In a word, the Miskito became middlemen, living off the 'profits' of directed exchange between coastal traders and interior groups" (Helms n.d. :9).

SELLING LABOR

The next phase of evolution was the influx of large, foreign-owned companies after the coast became a part of Nicaragua in 1894. Wage labor replaced barter as a series of economic boom-and-bust cycles began. Rubber, mining, bananas and lumber each had their day.

The most immediate effect of boom-and-bust economic cycles on Miskito life was to provide a range of job opportunities for Miskito men who, for example, could contract as laborers in the mines or with mahogany gangs, work in the bush tapping rubber, or hire out as boatmen for foreigners traveling the rivers (Helms 1971:28).

The Miskito now took on aspects of what Helms calls a "Purchase Society":

The definitive characteristic of any purchase society is the articulation of local society with the wider complex world through economic channels of trade and wage labor, while political autonomy and a stable social organization are maintained (Helms 1971:7).

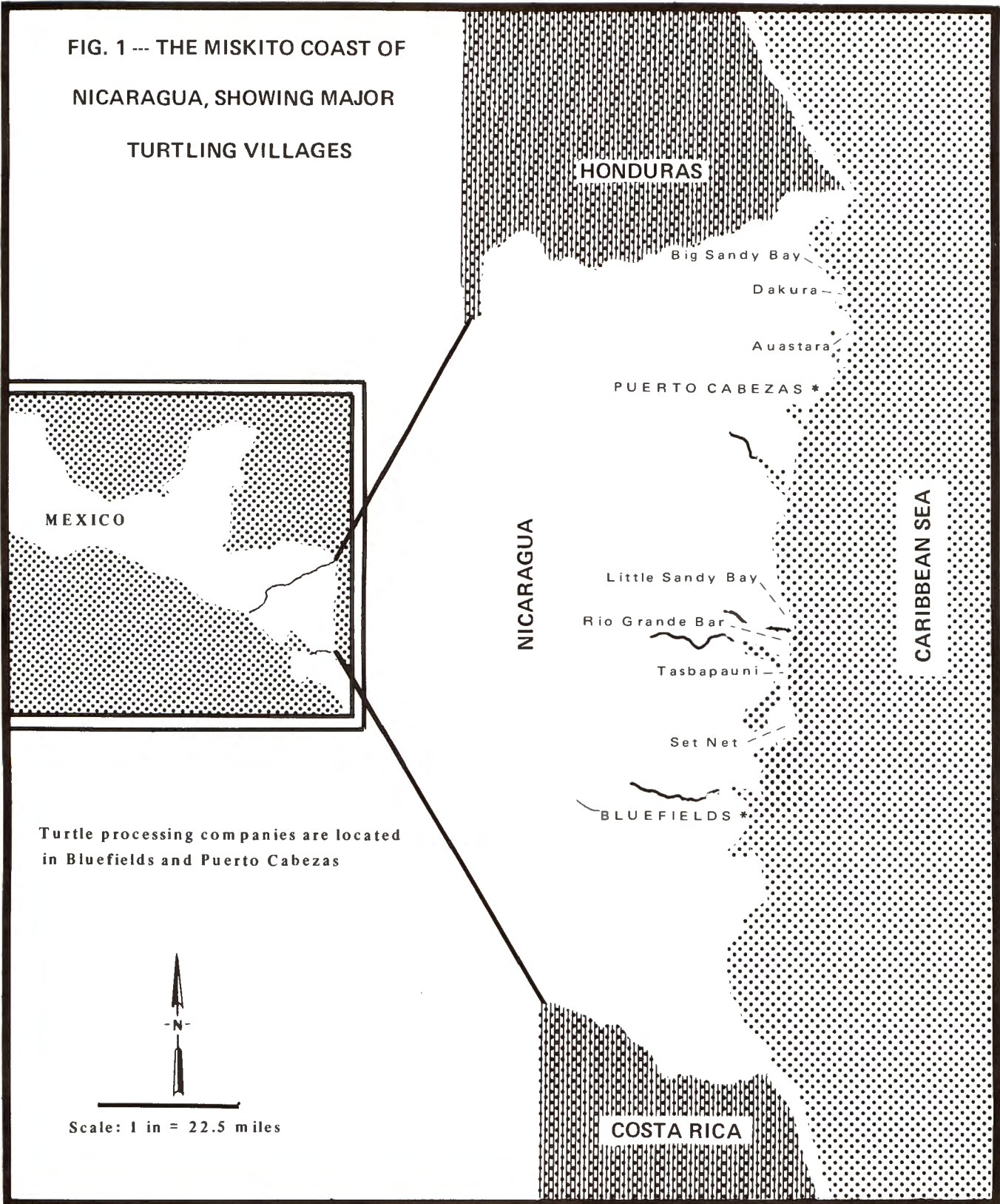
In a purchase society, acquisition becomes a cultural necessity:

The term 'purchase society' is suggested

¹ Shell of the Hawksbill turtle, *Eretmochelys imbricata*.

² The Miskito sold slaves to Jamaicans for plantation work.

FIG. 1 --- THE MISKITO COAST OF
NICARAGUA, SHOWING MAJOR
TURLING VILLAGES



HONDURAS

Big Sandy Bay

Dakura

Auastara

PUERTO CABEZAS *

NICARAGUA

Little Sandy Bay

Rio Grande Bar

Tasbapauni

Set Net

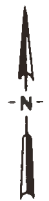
BLUEFIELDS *

CARIBBEAN SEA

COSTA RICA

MEXICO

Turtle processing companies are located
in Bluefields and Puerto Cabezas



Scale: 1 in = 22.5 miles

because it emphasizes both the economic referent in general, and the specific aspect of that referent which appears most important from the point of view of the local society, and towards which local adaptations will be directed, i.e. the need to obtain, to "purchase" through one means or another, foreign manufactured goods which have acquired the status of cultural necessities. To be sure, something must be exchanged or sold in order to acquire these goods, but to the local population, that which is sold is merely a means to the all important end of purchasing (Helms 1971:7).

The Miskito were now purchasers in earnest; most traditional subsistence pursuits were abandoned in favor of purchased commissary goods. Yet, as each boom faltered, the Miskito returned to their local ecosystem for subsistence, while awaiting another chance to purchase. Each time, the ecosystem continued to provide subsistence. In fact,

the very recurrence of economic cycles which has at times led to insecurity, restricted sociability, and economic depression is perhaps also responsible for the maintenance of the Miskito subsistence economy and, by extension, a certain amount of self-sufficiency which permits cultural identity to continue (Helms 1971:233).

Although their subsistence system was intact, severe ecological degradation took place during this period. Lumber companies stripped away vast stands of mahogany, and later, pine. Huge tracts of land were cleared and put in bananas, later to be rendered useless by disease³; Cayman Islanders, having depleted their own fishing grounds, came to the Coast in 1837 (Parsons 1962:30) and began the first significant intensification of turtle exploitation by an outside population.

As each boom ended, it left the Miskito "their subsistence system together with an overburden of desires for luxury and foreign goods as a result of contact (Nietschmann 1970:56).

Now, however,

foreign objects and luxury food obtainable through participation in the market economy are no longer available. Hence life is not completely satisfying. A feeling of want and of isolation has become dominant (Helms 1967:235).

There is ample evidence of this "ethic of poverty" in Little Sandy Bay. Located on the coast, four miles north of the mouth of the Rio Grande River (see Fig. 1), this village has felt the full effect of each major boom. The Rio Grande River was one of the major banana-producing areas (Parsons 1955:60). Karawala, a few miles upriver, was the site of a major pine lumbering venture (Parsons 1955:57).

Most of Little Sandy Bay's residents recall both of these booms, and they always recall them happily. Work was plentiful, and goods

were cheap. The currency was U.S. "gold money, not this Nicaragua monkey money." Things were "well fix up" then, with plenty of goods "from out" to purchase and plenty of money to purchase them with.

When the lumber operations halted in 1959, the village was left in economic shock, with memories of canned goods and imported beef meat: "Them times good man. Now? Now nothing got"

Yet, the Miskito are not poor — they just lack money. When the lumber boom ended, the Miskito once again found their subsistence system intact:

it is important to note that during difficult periods people do not lack the means for survival, even for a fairly comfortable life, from the point of view of an outside observer.

Traditional skills of hunting, fishing, gathering and agriculture have been maintained to a large degree, serving as a cushion to ease the jolt when foreign companies folded, and providing subsistence and material necessities until commercial jobs are available once more. However, in the opinion of informants, this is at best a stopgap measure regardless of how much there is to eat, and life will not be psychologically satisfying until cash and well-stocked commissaries return (Helms 1971:111).

The Miskito now had the desires of purchasers, on a subsistence economy. They were not satisfied, and when a new opportunity for selling — and purchasing — presented itself, the Miskito were once again ready and eager to participate.

SELLING A SUBSISTENCE SYSTEM

In 1969, two commercial companies established factories to procure and process green turtles for the American and European markets. The major commercial interest was in the calipee, a gelatinous material from between the shell plates that is used in the manufacture of turtle soup for the gourmet market. Soup production is centered in London. A 300-pound turtle yields six to eight pounds of calipee. The 125-150 pounds of meat is frozen and shipped primarily to the United States, where it becomes either high-priced turtle steaks in better restaurants, or pet food. The outer shell, which is shown being removed with hot water in one scene of *The Turtle People*, is exported to Japan and used as furniture veneer. Unlike the Miskito, commercial companies make no use of the guts, blood or head.

The Miskito were pre-adapted to such an industry. They had been oriented towards marine resources in general, and the turtle in particular, for hundreds of years. Once again they were invited into the economic marketplace, and once again they entered, willingly and happily.

The result was rapid and radical. From less than 1000 in 1968, exports of turtle rose to an estimated 10,000 in 1972.

The Miskito are very efficient in their pursuit. Traditionally,

³ Panama and Sigatoka diseases virtually ended banana operations by 1940 (Parsons 1955:60).

turtles were sought one at a time, with staff and point. Now, net replaced harpoons. The increase in exploitative efficiency was geometric; not only could a man now be in more than one place at a time, but the relatively less-skilled job of net setting was available to many who would not otherwise have been turtlemen.

The Miskito are once again selling a local resource to an outside population, but this time there is a significant difference; they are selling a resource that is an integral and irreplaceable part of their subsistence system, and they are exploiting it at a rate that makes its demise inevitable.

Archie Carr, a zoologist who has spent most of his career studying sea turtles, predicted 20 years ago that "the pathetic remnant of the once-teeming hordes" of green turtles "will be pursued with harpoon and stop net, and the centers of activity will invade ever more remote waters until the animal is backed against the wall" (Carr 1952:353).

Today, on the Miskito Coast, his vision is becoming fact. Both the turtles and a human population that is "probably the most specialized turtle culture in the world" (Carr 1972:29) are at an evolutionary crossroads. To see how a subsistence society can sell itself into trouble, it is necessary to understand the role of the green turtle in Miskito subsistence ecology and culture.

TURTLE AS A SUBSISTENCE RESOURCE

The turtle occupies center stage in the Miskito subsistence system. The Miskito are indeed "the most specialized turtle culture in the world." During the study period, the village of Little Sandy Bay derived over 30 percent of its protein from turtle, which comprised over 85 percent of the meat utilized in the village (see Fig. 2).

The turtle is an herbivore. The important and highly specialized role of turtle in Miskito subsistence ecology stems from its unique ability to convert into protein the vast undersea carpets of *Thalassia* and *Zostera* grasses, thus making them an available food for the human population. Turtle are "not only good to eat but virtually the only edible vertebrate able to harvest the vast crops of submarine vegetation that spread in shallow, warm, protected water" (Carr 1972:26).

The high productivity of these grasses is shown in Fig. 3. With the exception of extremely specialized agricultural systems that require the application of auxiliary sources of energy, turtle grasses are the most productive converters of sunlight to matter. The turtle is an ecological link through which a human population is joined to a highly productive resource that occurs over a large area. This resource provides not only energy, but high-quality protein.

Protein is a critical resource. While a good deal of attention has been paid to the energy resources available to human populations, the role of protein has been shunted aside. Yet protein is probably more often the limiting resource for subsistence populations than is energy (see Carneiro 1957, 1960; Denevan 1966). Protein is available from fewer sources than calories, which are obtained from any consumable material.

Another factor often overlooked is that human populations are at the hunting-and-gathering stage in terms of protein resources long after they are able to deliberately cultivate calories. The much-touted "agricultural revolution" would have (and on several occa-

Fig. 2 — Meat resources utilized, Little Sandy Bay, April 1972 - April 1973

| Resource | Number | Pounds | Percent |
|-----------|--------|--------|---------|
| turtle | 170 | 16,218 | 85.8 |
| beef | 8 | 1,080 | 5.7 |
| hog | 25 | 906 | 4.8 |
| deer | 15 | 534 | 2.8 |
| armadillo | 13 | 66 | 0.9 |
| givenot * | 5 | 52 | |
| fowl | 9 | 25 | |
| agouti ** | 4 | 20 | |

* The paca, *Cuniculus paca*

** A small mammal, *Dasprocta punctata*

sions probably did) failed had protein been unavailable in quantities sufficient to complement the increased caloric resources. Even the most modern industrial populations remain partially "hunter-and-gatherer" in terms of their protein resources. Protein is the least available, most costly, and least dependable resource that human populations require.

The demography of the Miskito is closely related to turtles and turtling. The distribution of coastal villages (see Fig. 1) is such that each turtling village has access to one set of cays (offshore islands) and the surrounding shoals for turtling activities. Ranges rarely overlap, except when the cay-shoal area is very extensive.

The mean population of coastal turtling villages is more than twice the population of those that get their protein from lagoons or rivers (739 vs. 296). On the basis of carrying capacity calculations for agricultural villages, population sizes such as 2200 (Big Sandy Bay) and 1000 (Tasbapauni) would not be predicted for the coast.

Fig. 3 — Net primary productivity

| Environment | kcal/m ² /day | Source |
|------------------|--------------------------|---------------|
| Turtle grass | 103.0 | Ryther 1958 |
| Sugar cane | 190.0 | Montieth 1965 |
| Open ocean | 1.3 | Ryther 1969 |
| Deserts | 0.3 | Lieth 1963 |
| Tropical forests | 16.4 | Lieth 1963 |

The coastal Miskito, in fact, operate with a very poor land base. Nothing has improved since Roberts wrote in 1827 that, "The soil in the neighborhood (of Cape Gracias) is extremely bad; and with the exception of a few spots on which there are small patches of cassava, is incapable of producing anything better than a coarse rank grass" (1965:150).

Large villages clearly exist because of the availability of sea turtles, and the calories and energy that they supply. Yet neither land nor sea resources are adequate by themselves. To understand how land and sea complement each other, providing protein and calories throughout the year, it is necessary to understand the ecology of the coast.

ECOLOGY

Like most subsistence populations, the Miskito are adapted not to whole environmental zones and "may not even be adapted to the 'micro-environments' within a zone, but rather to a small series of plant and animal genera whose ranges cross-cut several environments" (Flannery 1968:7)

Turtle is one of the myriad resources utilized by the Miskito, who reside at the focus of an ecological kaleidoscope. The lacunae created by a lacework of lagoons and rivers, the rainbow-hued walkways of undersea coral, the cathedral-like gallery forest — each of these zones offers its unique association of flora and fauna. Every resource, land and sea, has a time and a place. Although some variation can be tolerated, maintenance of the population demands a fairly regular throughput of energy, protein and other nutrients. The seasonal patterns of availability and dependability must mesh in such a way that this requirement is met. Using land and sea, the traditional Miskito subsistence system orchestrates these ever-shifting patterns of times and place into the constant flow of matter and energy necessary to sustain the population. Time and place are the constant concern of the Miskito, for as one old woman explained, "everything has its time, and when it's done, it's done, it's *done*."

PLACE

The major resource zones that the Little Sandy Bay Miskito utilize are shown in Fig. 4. Starting at sea, one encounters:

Marine Shelf — Were the Caribbean Sea to be drained, Nicaragua's coastal shelf would be seen to extend out, like a vast lip, for up to 95 miles before dropping away sharply. Walking about, one would encounter extensive pastures of undersea grasses — *Zostera* and *Thalassia*. These grasses, like their above-water counterparts, convert sunlight into organic matter, available to those animals physiologically equipped to utilize it. Man is not so equipped, and for the Miskito this undersea garden would be a sterile zone were it not for sea turtles.

Unlike the adjacent land, this undersea territory shows considerable relief; mountains and molehills rise from its floor, some thrusting above the sea to form the coral cays on which turtlemen shelter; others cover themselves with three to eight fathoms of water, and in turn shelter the turtles which return to such shoals after a day's foraging on the grass banks.

Nicaragua has the largest such turtle habitat in the Western Caribbean. Over 50 percent of the Caribbean green turtles are estimated to reside there (Nietschmann 1972b:1).

This zone also yields some fish and an occasional crustacean to the Miskito, but they seek only the turtle with any regularity. The Miskito lack the technology and knowledge needed for successful deep-water fishing, and fish are not highly regarded by the Miskito as a foodstuff. Turtle, deer and other animals shown in Fig. 3 are considered to be meat, while fish is not.

Strand Line — Pulling a *dori* ashore after being at sea, it is frequently necessary to stand for a moment in the intertidal (strand) zone, looking for a high wave to aid in carrying the heavy boat onto the waiting bamboo rollers. A few wriggles of one's toes in the soft sand may well produce a thumbnail-size *aji*, a clam (*Donex sp.*) that is an important emergency ration for the Miskito. When there's no meat to be purchased, or no money to buy it with, and other resources are unavailable, a woman or child sets out for the beach with bucket, tub or calabash, to stalk the tame *aji*. Several hours of effort will be required to gather the hundreds needed for a meal, boil them, remove each minute bit of meat from the steamed shells, and wash it free of sand. The clicking of shell-on-shell makes a littany as a woman evacuates the meat, allowing the vacant hulls to drop in a mound at her feet.

The Miskito also obtain a large proportion of their material possessions from the strand line. A veritable marine Macy's, the strand offers the practical (nylon line, rope, plastic floats, hard hats), the interesting-but-usually-useless (acetylene gas, light bulbs), the entertaining (bottle letters, set adrift by preachers, sailors and even an occasional scientist) and sometimes the deadly (deteriorated medicines and adulterated alcohol), all cast off by passing ships.

Beach Ridge — Stepping across a few meters of beach, one encounters a gradually-rising ridge that rarely exceeds one or two meters in elevation. This is one of the most variable resource zones. Often a rise or fall of a meter in elevation turns potential plantation ground⁴ into unusable swamp.

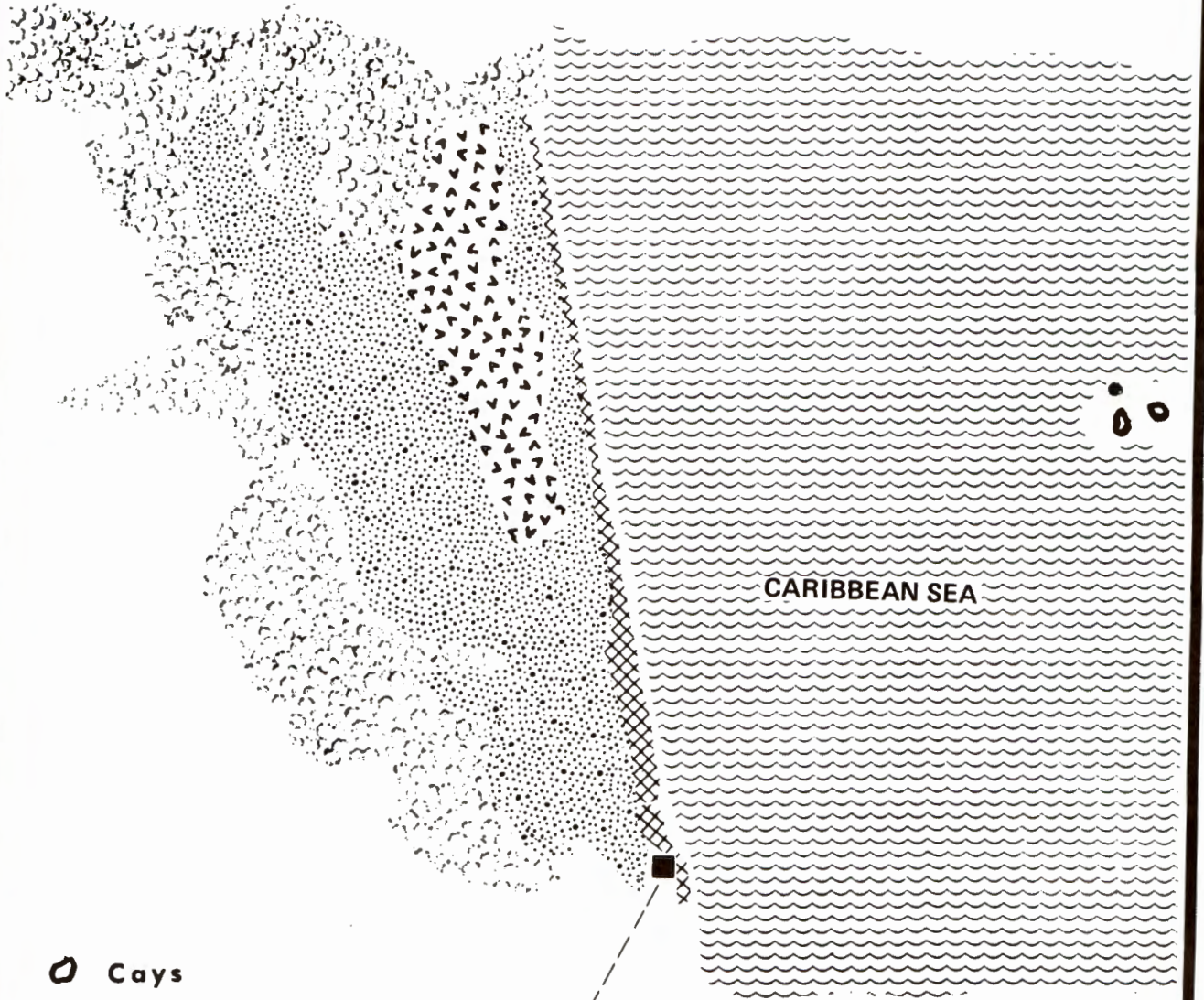
One of the most important food resources, the coconut (*Cocos nucifera*) occurs in this zone. Throughout the Miskito Coast, a curtain of coconuts backdrops the beach ridge zone. The sound of coconut fronds is a constant accompaniment to the washing of the surf.

Rarely is a Miskito meal prepared without a coconut being involved somewhere. The ubiquitous nut provides "cream" in which a variety of foods are prepared, oil for frying and "trash" (coconut meat with the cream extracted) for feeding to hogs and chickens.

To the north of the village, the beach ridge zone currently supports no agriculture. Its proximity to the village made this highly-sought agricultural land, all of which is now fallow. As secondary growth renews the fertility of the soil, villagers are again preparing to "make plantation" in this area. Many feel, however, that it is too narrow (often only 50-100 meters in width) and thus

⁴ The Miskito refer to their agricultural plots by the Creole term "plantation."

FIG. 4 --- RESOURCE ZONES, LITTLE SANDY BAY



- Cays
- 🌳 Forest
- Savanna
- ⊗ Beach Ridge
- ⚡ Swamp

Little Sandy Bay

CARIBBEAN SEA

won't permit several fields to be placed adjacent to one another to effect a savings in labor⁵.

The beach ridge south of the village, as far as Rio Grande Bar, is likewise not in use. This area once supported considerable rice cultivation, but in spite of fencing, the predations of the few cattle from both Little Sandy Bay and Rio Grande Bar have made this a high-risk proposition, and most people will not farm here.

The beach ridge offers a number of gathered fruits that are a significant part of the Miskito diet in certain seasons. These include cocoplum (*Chrysobalanus icaco*), seagrape (*Cocoloba uvifera*), and nance (*Byrsonima crassifolia*).

As one treads a ribbon-like path through the enveloping secondary growth, there is a point at which it is possible to stop and hear, simultaneously, the pounding of the surf and the whispering of grass, for you stand between sea and savanna.

Savanna — The searing tropical sun heats from two sides on the savanna, burning once on its way down, and then being reflected upwards again from the refractory, sand-covered ground below. The sea breeze rarely penetrates beyond the coconut palms that line the beach ridge.

The Miskito pine savannas are something of an ecological and geographic mystery. Although primarily low grass spiked with an occasional papta palm (*Acoelorrhapha wrightii*), the savanna also houses the southernmost stand of pine (*Pinus caribaea*) in the New World (Parsons 1955:36). Coming from an area where *Pinus* is associated with high altitude, low temperature and moderate rainfall, it is a bit disorienting to stand three meters above sea level on a steaming savanna that absorbs over 4000 mm (160 inches) of rain a year, and look up to see a pine tree!

There is no doubt that the pine trees are there; there is a great deal of disagreement as to why both the savanna and the pine trees are present. Man and fire are the agents most frequently mentioned (Taylor 1963:48; Parsons 1955:44) although Radley (1960:177) argues that the savanna is a product of specific soil and weather conditions peculiar to the area.

The quartz sand-soils of the savanna are severely weathered from their exposure to the tropical sun and rain; leached and bleached, they are today virtually sterile. As degradation of the original soil cover took place, an impermeable clay layer formed: "The breakdown of silicate to clays is accelerated and the clay particles, which under forest conditions would tend to be flocculated by humus, are free to move downward and to accumulate in the subsoil. ."(Parsons 1955:45)

Detained in its downward movement, water quickly accumulates on the surface during the rainy season, and the savanna is covered by a sheet of water during three months of the year, impeding access to the agricultural grounds that lie beyond.

The savanna provides little of value to the Miskito, other than a path to plantation. It is devoid of most macrofauna, and only an

occasional nance tree offers fruit, which is made into a drink. A few cattle graze on this grassland, "although stock-raising has never been of any real importance on the Miskito savannas" (Parsons 1955:51).

Gallery Forest — Languid creeks pursue a curvaceous course through the savanna, wearing a brief belt of gallery forest on their banks. It is here that the Miskito make their plantations.

As one steps off the savanna into the cool protection of the gallery forest, the blazing sunlight is attenuated to friendly specks that seem to alight ever so gently. A resilient litter carpet replaces the unyielding savanna sand, and you once again stand below rather than above the surrounding vegetation. Fingerlets of clear water arise from nowhere and flow towards everywhere, their tinkle reflected from the mirrors of leaves that lie above.

The Miskito partake of agriculture, but cannot be said to pursue it. They have been incorrectly judged "averse by temperament to agricultural labor" (Floyd 1967:64). It is more a matter of a subsistence regime in which agriculture is not the dominant. The explanation of this subsistence mix lies with ecology and demography rather than with psychology.

The Miskito practice "slash-and-burn" agriculture; a piece of ground is cleared, burned over, crops are planted for two years, and the area is abandoned, to return to forest.

The major subsistence crops are roots and tubers such as manioc (*Manihot utilissima*), dasheen (*Colocasia esculenta*), duswa (*Xanthosoma sp.*), or plantain (*Musa paradisiaca*) and numerous varieties of banana (*Musa cavendishii ssp.*). They also plant small amounts of yam (*Dioscorea sp.*), sweet potato (*Ipomoea batatas*) and sugar cane (*Saccharum officinarum*) as well as an occasional pineapple (*Ananas comosus*), pumpkin (*Cucurbita pepo*) or papaya (*Carica papaya*).

Little Sandy Bay has legal title to 2000 hectares (4,940 acres) of fertile gallery forest some 20 miles up the Rio Grande river. Little of this is currently in use, however; people consider the distance too far to travel, and the riverine climate is not to their liking.

In addition to the above crops, upriver plantations yield rice (*Oryza sativa*), beans (*Phaseolus vulgaris*), pejiballe (*Guiljelma utilis*) and corn (*Zea mays*).

In the past, many seaside villages turned to distant agricultural grounds for subsistence. Roberts (1965:150 orig. 1827) said that

The principle provision ground of the Governor's people is distant, at a place called the Hills, from which circumstances they are known, all over the coast, by the name of hill people. . . the land there, and to the westward, is extremely rich, and well cultivated, supplying the people at Sandy Bay, Cape Gracias á Dios and other places on the coast, with the greater part of their provisions, such as bananas, plantains, etc. Being too distant from the coast to combine the advantages of agriculture with those of fishing and trading, no strangers have yet settled on this high ground.

Today, a few villagers from Little Sandy Bay use the same solution to the problem. Approximately 10 tas⁶ are under cultivation

⁵ All plantations are fenced to reduce encroachments by wild animals, as well as by domesticated cows and pigs from the village. Fencing requires a large amount of labor. As Rappaport reported for the Tsembaga, "It is little wonder that they tend to cluster their gardens; clustering reduces the length of fence required per unit of area" (Rappaport 1971:119).

⁶ A tas is a unit of land 50 meters square; two tas contain 52,812 square feet, which is equal to approximately 1.2 acres.

at a site known as (h)ill pauni (red hill), about seven miles inland from the village.

The results of soil tests (Fig. 5) show that the gallery forest currently under cultivation is a less-than-hospitable site. There are very low levels of all the major nutrients. Of even greater significance is the very high level of aluminum found in deep subsurface layers. When the forest cover is cleared, aluminum oxide quickly forms and is leached downward. It is trapped, however, by the impermeable clay base underlying the area. This is the first step of laterization, a complex geochemical event that can eventually convert such oxides to a hard, rock-like material that sufficed for construction of the ancient Cambodian city of Angkor Wat (see McNeil 1964).

Fig. 5 — Soil test results, Little Sandy Bay

| Sample description | pH | P (ppm) | K (ppm) | Ca/Mg (me/100g) | Al (me/100g) |
|-----------------------------|-----|------------|------------|--------------------|-----------------|
| New plantation, 0-15 cm. | 4.8 | 2 | 66 | 2.4 | 0.60 |
| Uncut bush, 0-15 cm. | 4.8 | 1 | 38 | 1.9 | 0.50 |
| Second year field, 0-15 cm. | 5.0 | 1 | 66 | 2.5 | 0.50 |
| New plantation, 0-15 cm. | 5.0 | 2 | 114 | 2.9 | 0.40 |
| Uncut bush, 0-15 cm. | 4.9 | 2 | 44 | 1.8 | 0.50 |
| New plantation, 40 cm. | 4.5 | 1 | 34 | 1.8 | 1.00 |

All samples taken within one month after fields were burned
 A minimum of 20 cores were taken and mixed for each sample.
 Sampling procedure according to Shickluna, 1971.

The low nutrient levels result from a number of factors. There is no alluvial deposition from the minor creeks, so regeneration is completely dependent on nutrient cycling by the forest cover. An increasing population on a small and fixed land base is resulting in a reduction of the fallow cycle; less and less time is allowed for the soil to regenerate, both chemically and mechanically.

* * *

These are the major zones from which the Miskito draw their subsistence. Each zone, in turn, presents an ever-changing pattern or resource availability throughout the year. Every resource has its place and every place has its time.

TIME

*When you rain time, every damn thing bad;
 When you sun, everything good.*

— a villager

Alice had been looking over his shoulder with some curiosity. "What a funny watch!" she remarked.

"It tells the day of the month, and doesn't tell what o'clock it is"

"Why should it?" muttered the Hatter. "Does your watch tell you what year it is?"

"Of course not," Alice replied very readily: "but that's because it stays the same year for such a long time together."

—Alice in Wonderland

For the Miskito Indians, it never stays the same time for long. For each place, there is a different time; seasons change, rains come and go, fruits ripen then disappear, animals become plentiful, then scarce. Resources undergo both absolute and relative changes in availability; *aji* is rarely considered until there is no other meat in the village. At that time, it is the most plentiful protein resource, and is elevated to a position of respect.

A resource must, first of all, be present in the ecosystem at any given moment. For certain wild fruits, the "window" during which they are present is small. Each resource must then be weighed against the others present at that time, integrating factors of cultural desirability, subsistence risk, yield and in some cases, monetary return. The resulting equation, when solved, yields subsistence behavior.

The months when major subsistence resources were used in Little Sandy Bay are shown in Fig. 6. For certain fruits and nuts, these limits are quite definite; for plantation crops, they indicate when crops first became available and when the existing supply was depleted. Obviously, the latter limit is an approximation that varies a good deal between individuals and villages. Most cultigens and gathered materials become available somewhat before the time indicated and continue until somewhat after, depending on the rate of utilization and minor shifts in weather or other ecological variables.

Certain broad patterns are evident. May and June are the time when many wild fruits ripen, particularly in the beach ridge zone. At the same time, turtle are at a minimum, much of the herd having migrated to the nesting ground in Costa Rica⁷. July and August are "hungry months;" not only are the available resources at a minimum, but those available are often not accessible due to wind, rain or ocean currents. Cash is also at a minimum during this time, since no commercial sale of turtle is permitted between 15 May and 15 July⁸.

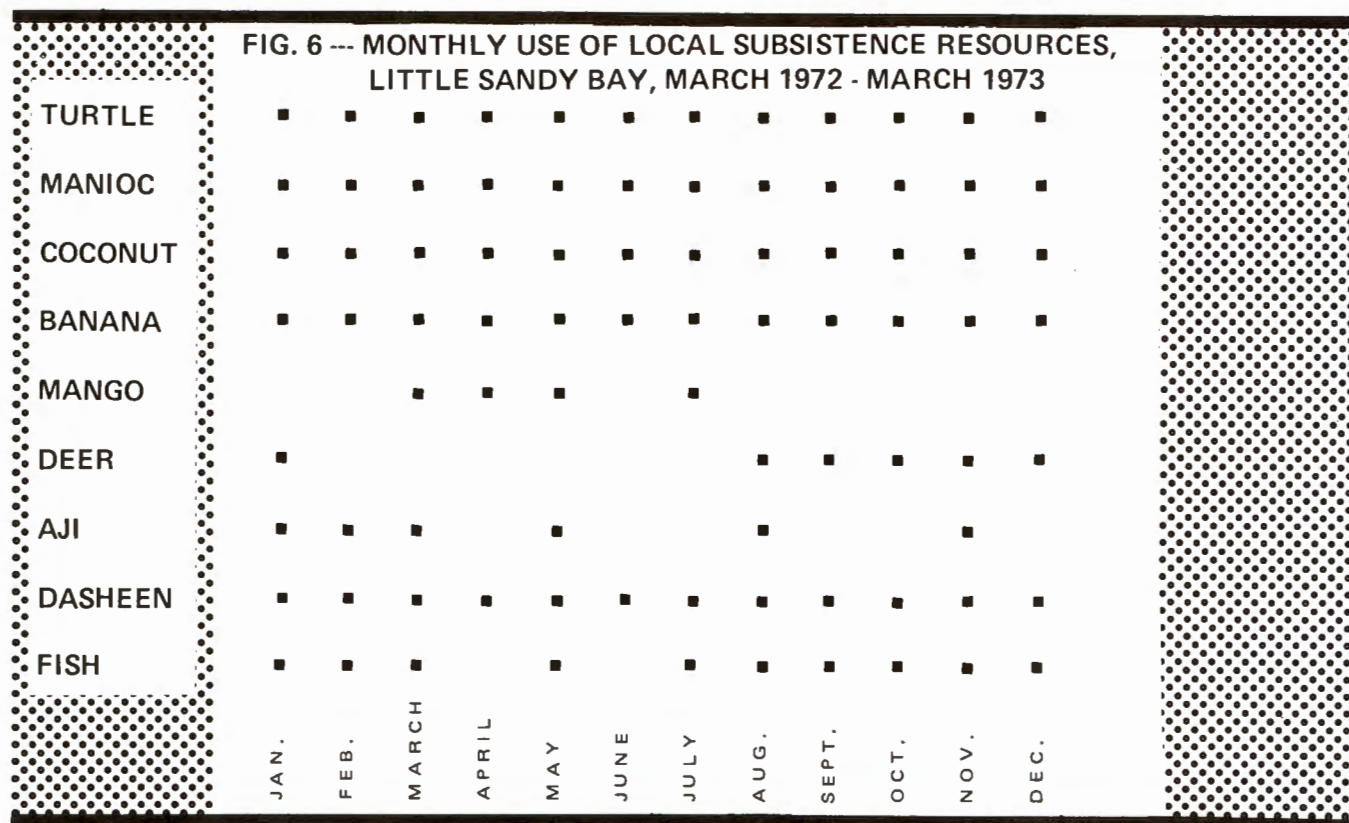
Coconuts, turtles and bananas form the core of Miskito subsistence; they are among the few resources that are present during the entire year, and Miskito cultural food preferences are directed heavily at these items. Meat is considered essential for a meal, and turtle meat, "that's the one." Yet meat without "breadkind"⁹

⁷ The nesting beach located at Tortuguero, Costa Rica, is the last major nesting area for the green turtle in the Western Caribbean (Carr 1972; Nietschmann 1972b).

⁸ One buyer in the village purchases turtle during this time and keeps them alive in a pen until the season reopens; he offers a greatly reduced price, however, and such activity circumvents the intent of the law, which is to protect gravid females on their way to the nesting beach in Costa Rica.

⁹ "Breadkind" is a Creole word used to refer to bulky, starchy foods such as manioc, dasheen, plantain and banana.

FIG. 6 --- MONTHLY USE OF LOCAL SUBSISTENCE RESOURCES,
LITTLE SANDY BAY, MARCH 1972 - MARCH 1973



is considered virtually inedible. The coconut, as previously stated, appears at almost every meal, mostly in the form of the oil-rich "cream" in which many foods are prepared.

To be available and to be accessible are different things. A resource that is equally present on two different days may vary tremendously in its availability as wind, rain and ocean currents shift.

Rain and wind are major determinants of Miskito subsistence behavior. The coast is in the Humid Tropics life zone of Holdridge (1967) and receives at least 100 inches of rain everywhere. The village of Little Sandy Bay received a total of 171 inches of rain in a 12-month period.

Rain is necessary for the crops to grow, but it also floods the major rivers, occasionally inundating upriver plantations, and creating strong south-setting littoral currents that make turtling impossible¹⁰.

If there is a hard rain when turtlemen are preparing to go out, they will remain at home; once underway, however, rain is no deterrent. Likewise, people will rarely start for plantation in a rain, but once embarked they will shrug off rivulets of water and keep on walking.

Wind is a major factor in subsistence decisions, particularly turtling. Turtlemen "study down" the wind constantly, watching its direction and temper for a clue to its intentions. While there is little variation in mean monthly velocities, the maximum wind differs considerably from month to month, as does the pattern of winds.

Turtlemen will not go out to sea in a high wind; the scene in **The Turtle People** of boats returning in a storm shows why this decision makes sense. As winds begin to rise, turtlemen gather in small knots to exchange doubts. I was frequently consulted as

¹⁰ In a strong current, nets are driven to the surface and cannot ensnare passing turtles.

to what my "weather glass" said, but the small range of barometric pressures for the coast made that an ineffective indicator. The almanac is frequently invoked; Bristol's is much-trusted on the Coast, and its predictions of hurricanes for Nicaragua kept dories in their sheds even when the breeze would have done little more than fill the flour-sack sails.

Although hurricanes strike the coast infrequently, fear of them is great. Stories of the destruction wrought at Cape Gracias by a hurricane in 1971, coupled with memories and stories of the "old heads", make the men cautious.

Although any combination of rain and wind may be found in any season, it is possible to identify times of the year when certain combinations appear with greater frequency.

February through May is the dry season (*mani*). During *mani*, the azure sky is rarely marked by clouds. A continuous flow of sunlight begins with the dawn and is unimpeded until dusk. This is "good weather time" when plantation ground will be cut, burned and planted. The turtles will move from the distant cays to the area just offshore, reaching their greatest concentration and requiring the least labor to procure. Prevailing winds will be from the northeast, but of moderate force. Rivers are at low ebb, minimizing the freshwater current that otherwise forces the turtles farther to sea.

As May becomes June, the proportion of sun and rain slowly, almost imperceptibly, shifts. It is not so much a matter of the rains beginning as it is the sun being less frequent. Stragglers will hurry to finish planting, while access to plantations is still unimpeded.

July and August leave no doubt of their intentions. The rains have come. In 1972, it rained on 58 of the 62 days in July and August, including one period of 41 consecutive days. The rivers become engorged, and rush to sea where the unaccustomed bur-

den is discharged. This creates strong south-setting currents that drive the turtle out to the cays, and makes net setting difficult or impossible. Combined with frequent high winds that bring an angry froth to the ocean top, turtling activity is greatly reduced, and often halted. Plantations, at the same time, become almost inaccessible, as the savanna gathers a sheet of water over its clay coat.

Conditions abate somewhat in September and October; in many years, there is a September calm that recalls the dry season, with the ocean surface becoming a still looking-glass. Under such conditions, shrimp gather in large numbers, and turtling improves, although strong currents are still a major impediment.

While rain is never absent, it is wind that commands the stage in these months. September is sometimes called *prari kati* — hurricane month — and no turtleman is without a vivid story of being out on the cays during a windstorm. At this time of year, even a suggestion of rising wind finds the dories in their sheds and the turtlemen in their hammocks. November, too, is a wind month — *ya^hbra kati*, north wind month. This is considered the most dangerous time, for the north wind is strong and unpredictable.

From December onward, conditions ameliorate; the balance of sun and rain again shifts, as the sun begins its return to the equinox.

While the sea is often inaccessible at this time, plantations begin to yield. Weeding starts as soon as the torrential rains ease in September, and by November, bags and bundles of manioc and dasheen begin to accompany the people returning from plantation.

Within these major patterns, a number of minor variations serve to determine the precise order of day-to-day subsistence activities. The pattern of rainfall on a particular day may determine whether or not a man goes turtling, or to plantation. If there are strong winds for the first two days of the week, it will usually mean no turtling for the entire week, since it is not considered worthwhile to paddle 12 miles to the cays for only three nights of fishing¹¹

Time and place, then, are the first in an ordered hierarchy of factors that determine what the Miskito get to eat. To be a potential resource, a food must be available and accessible. These are necessary but not sufficient conditions. It is the interaction of culture and ecology that serves to orchestrate the subsistence round.

TURTLE AS AN ECONOMIC RESOURCE

"Kaisa, kaisa — Let's go!!!" In the warm moistness of a Caribbean pre-dawn, dories splash into the sea. As men scramble aboard, paddles begin to quickly tread water. A bowman counts incoming waves as they buffet the boat; five, six, seven. . . . "Kaisa, Kaisa!!!" White lips of foam curl back from the bow as the dori dashes from surf to sea — the Miskito are again "looking turtle".

Once a subsistence resource, gathered for food, the turtle today is also an economic commodity, sought for sale. Once the food needs

¹¹ Due to the influence of the church, Sunday is now considered unavailable for work, and all turtlemen return to the village on Saturday.

of the local population determined when turtlemen went out and how many turtle they brought back. The demand was finite, and within limits that the turtle herd could sustain.

Today, turtle are sought not only for food, but for money. The Miskito are purchasers, and the turtle are what they have to sell. Now, the demands of the U.S. and European gourmet turtle soup market are the determinants of turtle exploitation. The demand is infinite, the turtle population too small. The Western Caribbean green turtles are "on the verge of disappearing as economic assets" (Carr 1969:74).

Once again, as when the first traders came to the coast, the Miskito are simply providing more of a resource that they were already practiced at extracting. This time, however, it is a subsistence resource that is an integral part of a delicately-constructed strategy for acquiring matter and energy. The turtle's demise will simultaneously deprive the Miskito of money and of their subsistence system.

The Miskito pursue the turtle because it can be converted to money, with which to purchase. The presence of a commercial outlet for turtle has intensified demand on this resource. Ecologically, the effect is to mimic population growth, while bypassing the cultural and ecological regulators that would have limited such growth.

The degree of this intensification is shown in Fig. 7. In 12 months, 913 turtle were taken in Little Sandy Bay. Of these, only 170 (18.6 percent) were utilized for subsistence. The remainder were sold.

This village in one year took sufficient turtle to provide their subsistence needs for five years, at the current rate of utilization. This contradicts the claim of a turtle company owner that local populations simply kill what they need to eat, and that the helpful manufacturer "is using a by-product which would otherwise most probably be wasted" (Lusty 1971:93).

Purchasers presumably sell in order to purchase foreign, manufactured foods. Yet the Miskito in many cases cannot even purchase the food that they are no longer producing because of an increased time investment in turtling. The reason for this lies in the economics of turtling.

SELLING FOOD TO GET MONEY TO BUY FOOD

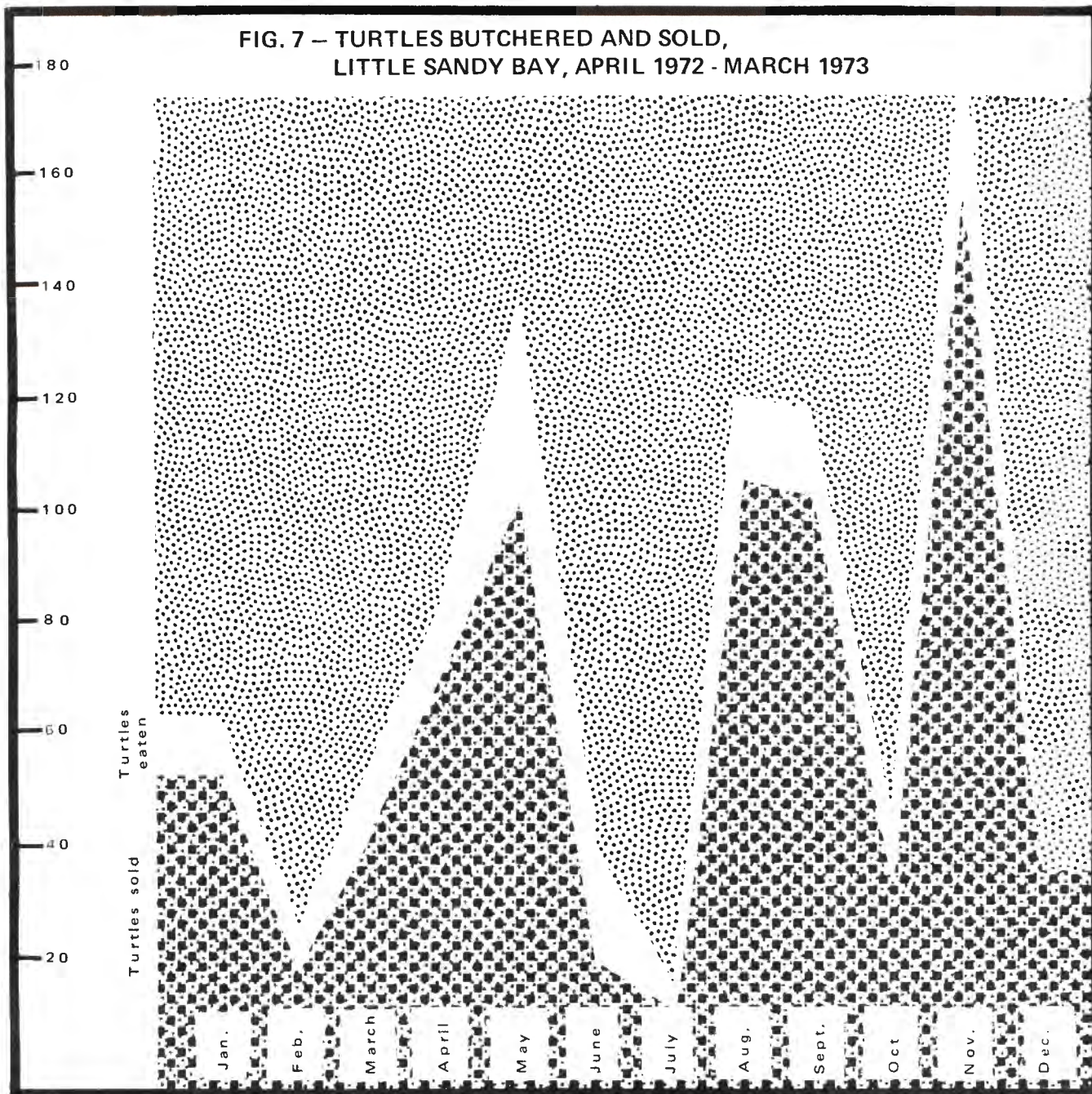
Now the Miskito are taking home a little cash instead of meat, and with it buying an inadequate diet to replace the good one provided for ages by the turtle colony with which their society had evolved (Carr 1972:29).

Now, every damn thing money business. No money, no eat. First time, not so.

— a villager

The Miskito pursue the turtle because of the possibility of getting money, which they want, so they can be purchasers. Yet the economics of turtling are such that most people are nutritionally less well off now than when they had no money.

FIG. 7 – TURTLES BUTCHERED AND SOLD,
LITTLE SANDY BAY, APRIL 1972 - MARCH 1973



Turtles are hunted on the shoal areas near offshore cays. The turtling week runs from Tuesday to Saturday. If the weather is good and he can get food to take with him, a turtleman will leave the village before dawn on Tuesday morning. If there is a land wind, he may sail to the cays in a couple of hours; otherwise, several hours of paddling await him.

Nets are set when the sun is high, so that shoals may be more easily found. The opening scenes of *The Turtle People* shows two men using a lead weight to check the depth of a shoal. A dori will carry three to five men, each of whom sets from five to ten nets. Each morning, the nets are checked, entangled turtles are carried to a pen (*clar*) at the cay, the nets are untangled and later reset. On Saturday morning, the men will pick up their nets and return to the village.

There are thus four turtling nights available each week. It requires an average of 5.8 man-nights to catch one turtle. Many men will catch nothing during a given week.

For most men, the situation is even less encouraging. Luck and skill play their part in turtling, and while 115 men caught at least one turtle during a year, only eight men managed to average 0.5 turtle per week or more (see Fig. 8).

Fig. 8 – Distribution of turtle catch totals,
Little Sandy Bay, April 1972 - March 1973

| Number of turtles | Men |
|-------------------|-----|
| 35+ | 3 |
| 30 - 34 | 3 |
| 25 - 29 | 3 |
| 20 - 24 | 4 |
| 15 - 19 | 9 |
| 10 - 14 | 8 |
| 5 - 9 | 24 |
| 1 - 4 | 47 |

A turtle sells to the company for 70 *cordobas*, about \$10 in U.S. currency.¹² If a man is not using his own dori, he must pay 10 *cordobas* to the dori owner; if he borrows nets, he pays another 10 *cordobas*. His food for the time he is out will cost 7-10 *cordobas*. Thus, even "successful" turtlemen are averaging only 20-30 *cordobas* (U.S. \$2.40 - 4.20) per week.

Those fortunate enough to have money must now go to the store and buy food. With increasingly large time inputs into turtling, less plantation ground is being planted, and most families are not able to obtain more than a small percentage of their subsistence needs from their plantations. Since the months when plantations are prepared and planted are also the best turtling months, an investment of time in one is a reduction in the other. Most men are choosing turtling, planting only small pieces of ground, and hoping to purchase the difference at the store.

At the store, people pay a 20 percent profit to the storekeeper, on top of the high base price that results from the isolated position of Nicaragua's east coast. Rice, flour and sugar cost one *cordoba* per pound, beans 75 cents (100 cents to the *cordoba*), coffee 25 cents an ounce. When there is turtle meat available, it costs 50 cents a pound. It costs most families one *cordoba* a day just to provide a cup of watered-down, sweetened coffee for each person morning and evening.

It is one of the cruel ironies of the current situation that there is rarely turtle meat available in the village. Forty-nine of the 170 turtles butchered were killed during the closed turtle season, when there was little or no way to exchange them for money. During the other 10 months, 121 turtles were butchered, or an average of less than three head per week. That is about a two-day supply of meat, and in fact a familiar pattern is repeated almost every week. On Saturday when the turtlemen return, two or three turtles are dispatched. This provides meat for a mid-day meal and for Sunday. By Monday, there is no meat in the village, and there is likely to be none until the following Saturday. The turtle people, "the most specialized turtle culture in the world," are eating rice and flour most of the time!

That is, those who have money eat rice and flour. For the men who are averaging less than 20 *cordobas* per week, even these commodities are a luxury. They will drink a cup of coffee in the morning — "you drink coffee, no feel hungry" — and perhaps turn to a relative for some breadkind.

MEASURING THE NUTRITIONAL IMPACT

Measuring the exact impact of these economic changes in nutritional terms was a major goal of this study. Many studies (Rappaport 1968; Nietschmann 1973; Gross and Underwood 1971) had reported what a few people ate for a little while, but samples were either too small, nonrandom or taken over too brief a time period to permit generalizations about a community's yearly intake of food.

Yet such an assessment is essential in order to understand if economic change is nutritional progress. Proponents of economic development often assume that more money means more and

better food. The results of this study cast serious doubt on that assumption, and suggest a need to re-evaluate the criteria for defining economic "development."

Information on food consumption in Little Sandy Bay was collected daily from a random 10 percent sample of village households. A new sample was drawn weekly. Each day, late in the afternoon, women were asked to recall the food they had used that day. This recall technique was quite accurate for the Miskito, since a large proportion of their food is purchased in measured units from village stores. Women recall, sometimes with painful clarity, how much (or little) they have to spend at the store on a given day, and what it went for.

In the case of foods gathered or harvested from the fields, I estimated amounts by asking the number of tubers or bananas or other appropriate units consumed, and converting this using an average weight derived from previous measurements of that foodstuff.

Each person eating in the household that day was recorded as belonging to one of six age/sex categories: adult male/female; teenage male/female; child; infant.

With these data in hand, it was possible (with the aid of a computer) to determine from a table of food values the quantity of protein, calories, fats and carbohydrates consumed in each household each day, and the average amount consumed per adult male or equivalent in other consumers. Because the data are from a random sample of acceptable size, the results are valid as a generalization about consumption in the entire village.

One of the factors that has made input-output studies of this sort suspect is the inability to independently determine the accuracy of the data, or to check for error. In an effort to establish the validity of projecting village consumption from a household survey done through random sampling, I sought independent verification of the caloric input. This was possible for four of the five sources of calories. The sources, and the means for determining their contribution, were as follows:

Stores — During the field study, an inventory was maintained for each store in the village. All deliveries to the stores were recorded from the bills of lading. Store owners were asked weekly about possible purchases of small lots of rice, beans, etc. Total caloric income from this source was 81,892,000.

Turtling — I maintained records of all the turtle caught, and their eventual fate. Of the 830 turtles caught by villagers during the 11 months of the food survey, 158 were consumed in the village, along with an additional 42 obtained from passing shrimp boats (turtles occasionally become entangled in the shrimp nets). These 200 turtles provided 10,033,000 calories.

Hunting — Each animal killed during the year (including domestic animals) was recorded, and its weight determined by direct measurement, by the amount of meat sold or by estimate of the hunter, as feasible. The percentage of edible meat for major animal resources was determined by weighing animals before and after butchering. Total caloric income: 1,875,000.

Agriculture — Yield estimates were made by counting the number of "holes" of root and tuber crops in 25 square meter sample plots, and weighing the yield from a number of such plantings.

¹² One cordoba = U.S. \$0.14. The price was recently raised to 80 cordobas.

An infestation of caterpillars consumed an estimated 50 percent of the manioc crop, reducing the yield by approximately eight million calories. Total caloric income: 40,800,000.

Local resources — There was no way of independently verifying most of the data for this category, which included foods the Miskito gathered or caught such as coconuts, breadfruit and fish. Total caloric income: 23,517,000.

Total — The total for these five categories is 158,117,000. By extending the figures from the household consumption survey, I arrived at a consumption of 156,277,000 calories for the same 335-day period. This is a discrepancy of slightly over one percent. Considering that we are discussing the entire energy budget of a community for almost a year, the agreement is noteworthy, and provides confirmation that the sampling procedure used was an accurate means for estimating food intake.

NUTRITION SURVEY — RESULTS

There is no one measure of nutritional intake that suffices by itself, but the one most nutritionists turn to first is caloric intake.

Calories (the energy contained in food) are essential for the functioning of all bodily systems. Minor and temporary deficiencies can be made up by drawing calories stored in the body as fat. Chronic, severe shortages can lead to illness and death.

Caloric intake in Little Sandy Bay was 1500 calories per adult male (or equivalent in other age-sex category) per day. This level is approximately 45 percent below that recommended by the Food and Agriculture Organization of the United Nations (1973).

Most of the village's calories previously came from their fields. Today, 65 percent of the calories are purchased from one of the small stores in the village. Flour provides 24 percent of the calo-

ries, 23 percent comes from rice and 17 percent comes from sugar.

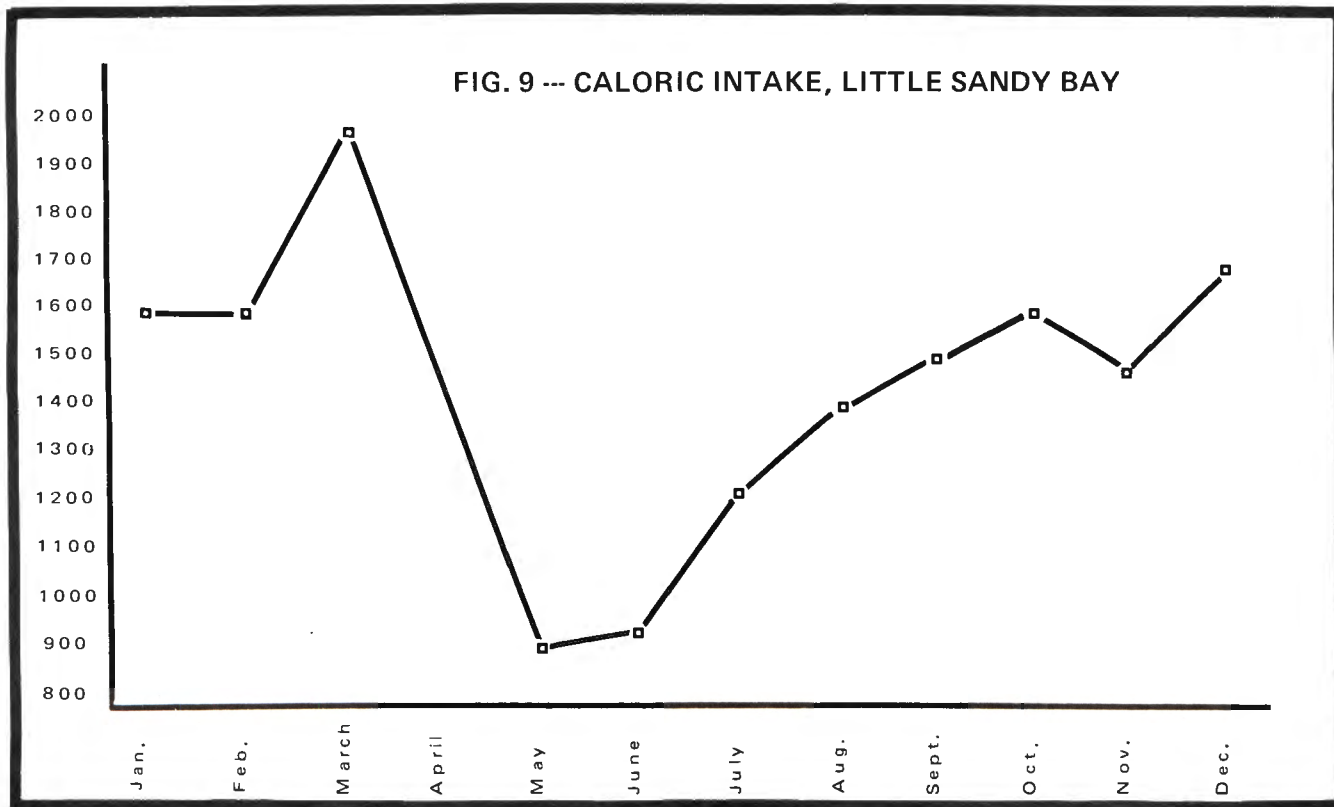
There are some significant monthly variations from these figures (which are the averages over the period of a year). In two months, May and June, turtle contributed close to 17 percent of the caloric total. It is during these months that commercial turtling is banned, and any turtle the Miskito catch they must consume. When it is not an economic resource, turtle once again becomes a subsistence resource, making a significant contribution of not only protein, but calories.

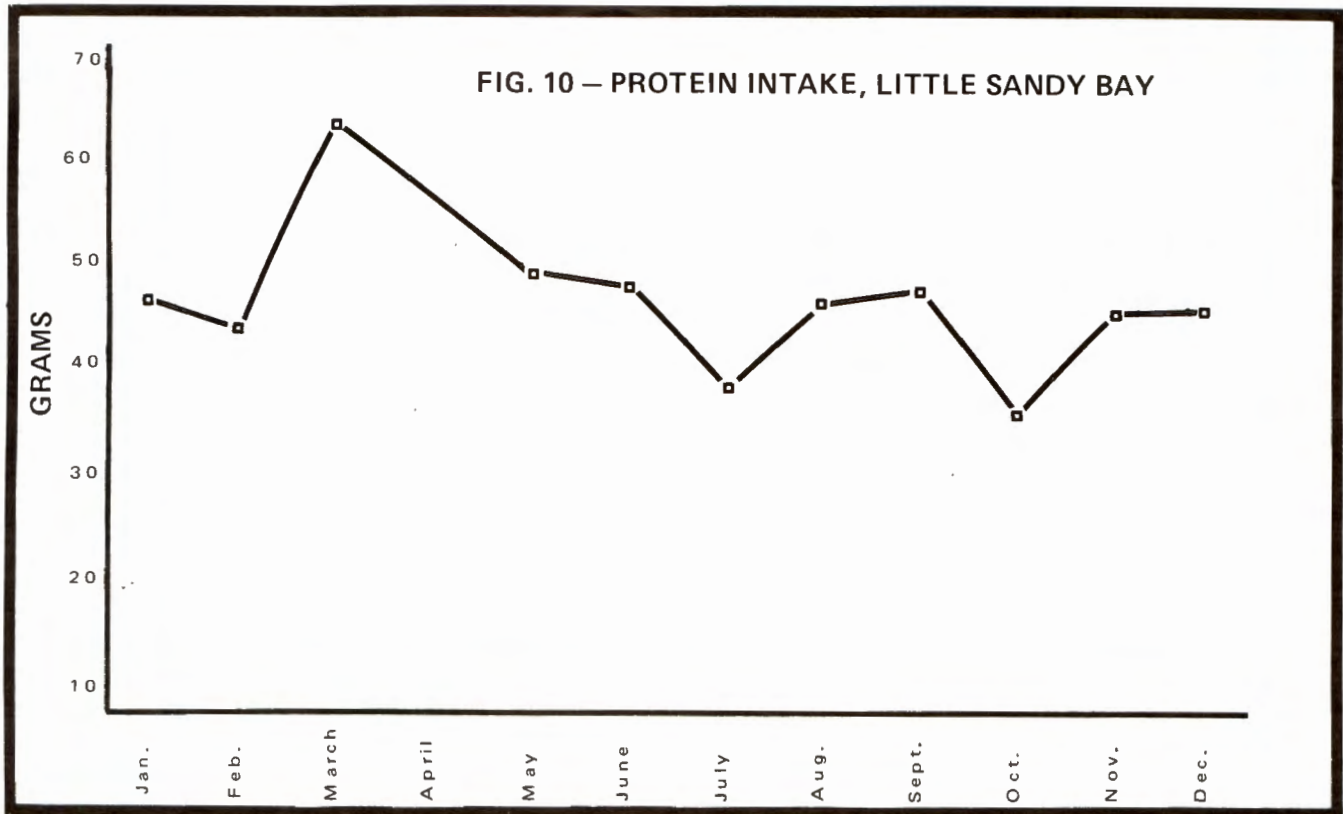
Other local resources are utilized when available. In August and September, breadfruit accounted for almost 25 percent of the village's calories. Breadfruit are harvested from trees planted up-river many years ago. They require no investment of time that might otherwise be spent turtling, since these months are a period of inclement weather when dories rarely venture out.

The Miskito now depend on the store for calories, and on the turtle for money to go to the store. As a result, average monthly caloric intake varies tremendously as weather and other conditions oscillate (see Fig. 9). On a monthly basis, weather is a major determinant, although weekly variations often reflected whether or not a company boat made it to the village to purchase turtles. From the first of the year through April, the weather was good, and 20 percent of the year's catch was made in this period.

From May 15 to July 15, turtles could not be sold to the company. Average daily intake dropped as low as 895 calories per adult male equivalent in May. Consumption rose slowly until August, when improving weather and the reopened turtle season opened the cash spigot again. September usually brings a "little dry season" and, although it was not as pronounced as usual in 1972, the weather was good enough for almost 16 percent of the entire year's turtle catch to have been made in that one month. There was a corresponding increase in caloric consumption.

This improvement continued for the remainder of the year. The





only exception was in November when a large number of turtle were caught, but no supply ships came to Little Sandy Bay. One by one the major staples were exhausted, and people began walking the 10-mile round trip to Rio Grande Bar to obtain an ounce of coffee and a few spoons of sugar.

There were similar supply gaps — of varying durations — throughout the year, since boats serviced Little Sandy Bay at their own convenience. The trip to and from Bluefields is an arduous one that tests both the crew and the leaking hulks with which they face the unpredictable Caribbean sea.

Calories are now bought, not made, in this village, and the ability to buy them is directly related to the availability of turtle.

PROTEIN

If calories are the most obvious measure of nutritional status, protein may well be the most important. Protein, composed of chains of amino acids, is the material from which body tissue is made. It is also critical to the operation of many vital chemical systems within the body; as hormones, proteins regulate a host of bodily processes, and as neurotransmitters, proteins carry the messages that move muscles and think thoughts.

Protein is a critical resource, particularly for children, whose mental and physical systems are in the process of building. Most authorities agree that there is a definite connection between childhood protein insufficiency and impaired mental functioning in adulthood (Food and Nutrition Board, 1973; Montagu 1972).

The Miskito of Little Sandy Bay obtained a daily average of 45 grams of protein per adult male equivalent, about 30 percent below the amount recommended in international standards.

The shortage was not only one of quantity, but also of quality. There are eight amino acids that cannot be synthesized

by the human body and must be supplied in the food. Each protein contains different amounts of these essential amino acids, and the more closely the proportions conform to those we require, the greater the percentage of the protein that can actually be used.

The Miskito are obtaining over one-third of their protein from rice and flour, both of which are very low in the amino acid methionine. Since there are no other foods correspondingly high in methionine, this protein is not completely available. The Miskito are selling a food with a high content of a high-quality protein (turtle) and using the money to purchase a food with a low quantity of a low-quality protein (rice and flour).

Only 36 percent of the protein is purchased, and this is reflected in the much more consistent monthly pattern of intake (Fig. 10). The Miskito obtain 30 percent of their protein from turtle meat, and another 13 percent from fish. Although hunting contributed very little (slightly over one percent) of Little Sandy Bay's protein, Nietschmann (1973:165) found that it made a significant contribution to nutrition in the village of Tasbapauni. The difference is largely one of ecology. The men of Little Sandy Bay do not have the same access by water to the game-rich tropical forest as do Tasbapanui's hunters.

Unlike caloric intake, protein is available in spite of prevailing weather conditions, reflecting the more localized and diversified resources from which it is obtained. In only one month (July) did protein consumption fall below 40 grams.

Almost 60 percent of the protein was derived from eight resources within the Miskito ecosystem, with an additional four percent from a scattering of seasonal items. By contrast, 64 percent of the calories were purchased from outside the ecosystem in the form of just three resources — flour, sugar and rice. Other purchased foods contributed another one percent of the calories.

The Miskito remain autonomous in protein productivity, but

are dependent on the turtle and the marketplace for calories. There is an interaction between the two, however; lacking calories, the body will utilize incoming protein to provide for its energy needs first (protein, when broken down in the body, provides an average of four calories per gram of protein). Caloric insufficiency thus aggravates a marginal protein deficiency, producing a nutritional status that can hardly be described as good.

FATS AND CARBOHYDRATES

The remaining two categories of foodstuffs are mainly providers of calories, and their availability is reflected in the section on calorie intake. The major source of fat (60 percent of the total) is coconuts, which are ubiquitous, appearing in one form or another at almost every meal. Only 13 percent of the fats utilized are purchased, whereas 73 percent of the carbohydrates come from the store.

THE DEVELOPMENT PARADOX

The Miskito diet has undergone a sudden and drastic alteration, and the result is a subsistence regimen that is insufficient and uncertain. Nutritional adequacy has become directly related to monetary sufficiency. The pursuit of turtles for sale requires a major re-ordering of subsistence efforts, and leaves the Miskito much more subject to the vagaries of national and international markets, weather and other factors about which they have little understanding and over which they have no control.

Turtles are seasonal, and a man's luck is ephemeral. Having reduced the time he invests in cultivating land in order to spend more time turtling, a man and his family may find themselves empty handed nutritionally if the weather, or luck, are bad.

There emerges what might be called "The Development Paradox", a situation in which a population shows an *increase* in monetary income and a decrease in nutritional status. Monetary development becomes nutritional underdevelopment because income is either too low or too sporadic to provide for the purchase of calories and protein in the same pattern that prevailed indigenously.

Compounding the problem are the simultaneous transitions in the social system that often eliminate mechanisms for coping with irregular food availability. To see how social and economic change interact, it is necessary to examine village organization as it is today and as it once was.

VILLAGE ORGANIZATION

Economic acts and social acts were once inseparable for the Miskito, and the recent cleavage of the economic from the social has left them unsettled and unhappy.

The major identifiable unit of social organization today is the nuclear family. Like all Miskito villages, Little Sandy Bay encompasses most of the possible living arrangements from individuals to extended families, but the dominant form is the nuclear family: husband, wife and children living under one roof.

The 377 people of Little Sandy Bay occupy 67 houses. This is

an average of 5.6 persons per household, with a range from one to 12.

Descent is reckoned through the males, and people with the same surname are members of a *kiamp*, tracing kinship to an elder male usually no more than three generations back. *Kiamp* members often reside in a cluster within the village, where spatial proximity serves as a reminder and a reinforcer of the social bond linking *kiamp* members.

Traditionally, there were strongly-felt sets of obligations among all *kiamp* members, and this was exemplified and emphasized through the giving of turtle meat. The Miskito subsistence system was once intimately tied to this kin-based distribution network. Turtle meat, and other provisions, were freely provided to other *kiamp* members, and they would in turn freely provide on another day.

This smoothed irregularities of supply for the individual family units and made the most efficient use of available resources. The prevailing rule was, "If anybody has, everybody has."

Today, men complain that their wives' families are too large and want too much. Many men will not bother to butcher a turtle because their wives (who have the responsibility for meat distribution) "too much give."

The kin network continues to play a substantial role in village subsistence. Detailed records kept on the distribution of butchered meat showed that 78 percent of the meat was either used in the household or given away as gifts (gifts 35 percent, household use 43 percent). The competition between meat for sale and meat for food is strong, however, and as a result subsistence is a little less certain for the individual Miskito. There is simply less meat available to distribute, and as a result the amounts given are declining and distant relatives are often not provided for as they once would have been.

The economics of turtling thus enter into social calculations. *Kiamp* ties are weakening, and the nuclear family is increasingly an independent economic unit in a system where "every man for himself" substitutes for an ethic that emphasized sharing with everyone.

If kinship is a declining force in intra-village cohesiveness, the church and what might loosely be called government, are nearly invisible.

The Moravian Church, a German Protestant group, began missionary activity on the Miskito Coast in 1849, and it is the dominant religious group today. The Miskito seem to have readily accepted Moravianism when it was offered. The Christian idea of God was not at serious odds with extant Miskito beliefs, and the missionaries did seem to have access to an assortment of material items that could be acquired with a bit of judicious church-going.

Neither the acquisition of a King or of a God ever brought the Miskito the goods they sought. Although the King is gone, the church remains, and most Miskito remain at least nominal members, attending services sporadically. The women are more consistent than the men in church attendance, although on religious holidays almost everyone goes to services. Although many people are not firm believers, no one wants to face the presumed consequences of having miscalculated.

The Church was at one time a major organizational force in

Miskito society. Those Miskito holding positions of responsibility in the congregation were respected, and their advice and counsel was sought and followed.

A great deal of the Church's prestige came from the presence of North American missionaries. Their word was respected. A program of indigenization has left the village congregations in the hands of Miskito pastors who are most often distrusted, since they always come from another village, and from the Miskito point of view their own people lack the cachet that attaches to North Americans.

Today, the Church functions largely as a meeting place for the young people, who use choir practice as a pretext for socializing. The moral teachings and preachings of the Church are widely verbalized, and rarely followed. The Church tells people how they should act, they listen attentively, and then proceed to do as they wish. There is some question as to who has converted whom, since the Church seems to have learned to live with at least as many Miskito exceptions to its rules as the number of teachings it has implemented.

If the Miskito have little religion, they have even less formal government, and what they do have functions almost entirely as an interface with the outside world.

"The Committee" consists of the village *sindico* (a Spanish term, approximately equivalent to mayor), treasurer, secretary and two policemen. This form is a response to the Nicaraguan government's insistence on evidence of a functioning democracy in each village. Approximately once a year, the Nicaraguan *jefe politico* (administrator) in Bluefields informs the *sindico* that it is time to submit the names of a new committee. An election is presumably held, and the results are forwarded to Bluefields. During my stay in Little Sandy Bay, there never was an election, but at some point the *sindico* declared himself re-elected and sent names for the other positions to the *jefe politico*.

There was a brief period of grumbling, occasioned more by the report that the community cash box was empty than by the *sindico's* manner of re-election. This reflects the village's feeling about the Committee, which they see as a means for carrying out the sporadic contacts that are necessary with the national government.

The *sindico* travels to Bluefields several times each year, either when summoned by the *jefe politico* or in order to petition for a Nicaraguan school teacher for the following year. He is also responsible for contacts with the Nicaraguan policeman who intermittently mans a post at Rio Grande Bar.

Law enforcement offers an excellent example of how The Committee functions. Disputes in the village are almost always settled between the parties involved, without the intervention of anyone. On rare occasions, always when money was involved, one of the participants would appeal to the *sindico*, who would issue a judgment.

The execution of this judgment relied largely on the force of public opinion, and the *sindico* was careful to sample public opinion thoroughly before deciding anything. Although the policemen could, in theory, be dispatched to enforce a ruling, I never saw this done to an adult. In several cases, juvenile offenders were put to "public work" such as repairing the landing dock, and this was overseen by one of the policemen.

Only the most extenuating of circumstances results in a case going outside the village to the Nicaraguan policeman. People are in

complete agreement that the Miskito need to settle their own disagreements, an attitude made more emphatic by their tremendous dislike and distrust of anything Nicaraguan.

In government, as in many other things, the Miskito have a hierarchical structure imposed by others built on the foundation of their egalitarian organization. The result appears to be of little use in facing the changes confronting the Miskito today.

Most of the foreign additions to Miskito culture are proving to be maladaptive. The Church, for example, tells turtlemen that their catches are decreasing because God is punishing them for drinking or not coming to pray. This obscures the ecological consequences of overexploitation, and delays recognition by the Miskito of their own role in the situation.

CHANGING TIMES

Today, the Miskito complain, "Everything money business." While meat can be shared, money is not, and the Miskito feel the discrepancy.

Money represents a conflict for the Miskito; money is to accumulate, to differentiate, yet all Miskito tradition emphasizes giving and equality of material means. Meat is to give, money is to get. There is no easy resolution of this conflict in values.

People are a bit embarrassed about money; one can stand at a turtle butchering for an hour and scarcely see a *cordoba* change hands. Money is rolled into tight little packets and quickly pressed to the hand of the receiver. It is impossible to locate anyone in the village who will admit to having so much as a *cordoba* on hand, even right after a big load of turtles has been sold.

Money is awkward to have. To spend it for material possessions would be to try and set oneself apart, and this is "proud" behavior, disliked by the Miskito. The only visible sign of material wealth in the village is a zinc roof, of which there are three — all on the houses of storekeepers. These people are at social odds with the community, being considered as parasites on "we poor people." Their refusal to grant more and more credit to those with unpaid bills is considered unjust, since they are seen as making large amounts of money "all these years."

Faced with the prospect of money in hand, and unable to spend it in any materially-visible way, many of the Miskito men turn to drink. Chicha (fermented manioc) and rum — at five *cordobas* a gallon and 10 *cordobas* a pint, respectively — absorb a good deal of the weekly turtle income. By drinking, one can have a good time, recall the "good old days," spread the wealth around to a few friends who didn't catch turtle, and get rid of the money. By Monday, those who caught and those who didn't are indistinguishable monetarily. Both are seeking their week's turtling provisions on credit.

Helms (1971:141) echoes the observation of many who have visited the area in saying that the "Miskito simply have never had to learn to economize" due to the presence of a dependable subsistence system. I would argue that, when it comes to money, the Miskito fail to behave "economically" for cultural reasons, not for lack of knowledge. The monetary system has been superimposed on the cultural system, but the latter remains the primary determinant of behavior.

Money, of course, is not a recent phenomenon on the Miskito Coast, and these are not the much-romanticized pristine people, corrupted by the evil dollar. What makes the current situation qualitatively different from previous booms is that a *subsistence* resource is for sale — a resource that has a critical role in maintaining social relations.

As exchange becomes less frequent, social relations falter. Acrimony has replaced accord as the prevailing mode of operation. Suspicion is rife in the village, and complaints about people cheating in economic transactions are a constant refrain. Everyone believes that all the storekeepers cheat; the storekeepers complain that all their customers owe bills. Women complain indignantly of the paltry manioc roots they paid 50 cents for, while turtlemen accuse each other of stealing turtles.

Distrust has spread, and social and economic units have contracted. It is little wonder that the nuclear family is the prevailing force today; there is safety in minimizing numbers.

Beyond the bounds of the village, this distrust increases considerably. People (no matter what village they come from) always claim that cheating and stealing is worse in everyone else's village. People view others in their village with suspicion, but then see their village as significantly better than all the others. There is a prevailing preference for that which is close to home, and thus most familiar.

This has meant a change in Miskito marriage patterns. At one time, matrilocality (the husband moving to the wife's village after marriage) prevailed, possibly as an adaptation to a situation in which the men were periodically gone from the village.

Now, men prefer to select a wife from their own village, arguing that they will know her better — and, of course, will not have to move to a place where they would be an outsider.

The degree to which a person remains an outsider after moving to a new village became evident one day when my assistant, who had resided with his wife in Little Sandy Bay for about 20 years, told me: "You know, these are not my people, and this is not my place, Mr. Brian; I'm from a next place." He was emphasizing that in a dispute, everyone would side with his wife.

If skepticism prevails in relations with other villages, outright dislike characterizes contact with the Nicaraguan world. The enmity is partially historical; for a major portion of their history, the Miskito were pursued by a Catholic world that sought to "pacify" the territory through an alliance of the cross and the gun. The priests and soldiers often substituted force of arms for force of conviction, and the Miskito responded with violence and a dislike for the Nicaraguans that continues today.

Never secured during the Conquest, the Miskito Coast today is under the most nominal of government control. The region remains inaccessible; there is still no road connecting the east coast with the populous western half of the country. Government presence is largely confined to the two port cities of Bluefields and Puerto Cabezas, although a reluctant policeman is often stationed at or near one or two of the larger villages.

This independence, however, seems largely predicated on the absence of any resources valuable enough to warrant an investment in the area. Should oil be found, there is little reason to doubt that Miskito autonomy would end, forthwith.

As relations continue to change among the Miskito, and between the Indian and non-Indian world, more and more Miskito talk about how things were "first time," or perhaps even in the "old Miskito time" recounted by the aging *damas* and *kukas*. Yet old Miskito time is gone. Social change is not reversible, and as turtles continue to decline, the rate of change accelerates. Both the cultural and ecological systems are under stress, and both are in jeopardy.

DECLINE OF THE TURTLE

The turtle are under severe pressure, and their numbers are steadily declining:

it is now very clear that the present day dilute stocks of Chelonia do not constitute a marine resource that will withstand efficient harvesting for an export market. Like manatees, groupers and most other products of the marine littoral, they cannot keep pace with the power of people to consume (Carr 1969: 16).

Parsons (1962:1) calls the green turtle "the world's most valuable reptile". Inhabiting tropical waters within the 20°C isotherm, green turtles have for centuries provided a major source of protein for both indigenous populations and the crews of boats that came in search of other forms of wealth.

A ponderous reminder of life as it was on earth 200 million years ago, the turtle is one of the most evolutionarily conservative of living species: "Down through the faraway Permian they sat in their shells and meditated as great events took shape" (Carr 1952:4).

The intricate life cycle of the turtle makes it vulnerable to depletion through overexploitation. The female lays a clutch of around 100 eggs during each of three to six visits to the beach in one nesting period. She then retires, not to return for three years¹³

When the hatchlings emerge, 58 days later, they are subject to extensive predation during a perilous dash to the sea. Once there, their small size places them at the mercy of marine predators that leave the adult forms unmolested.

Only one major nesting beach remains in the Western Caribbean, at Tortuguero, Costa Rica. Where the hatchlings go is unknown. The mature turtles return to feeding grounds in Nicaragua, Honduras, and as far north as the Yucatan of Mexico (Parsons 1962: endleaf). Their relatively predictable behavior makes the mature turtles easy to harvest, particularly with stop nets, and Parsons (1962:94) was prescient when he wrote 10 years ago that "growing populations, faster ships, and better refrigeration will pose grave threats to the green turtle's survival".

Both zoological research and turtlemen's impressions tell of the decline of the green turtles. Carr (1969:75) reports a large decline in the return of green turtles to the Tortuguero nesting beach on the third year after intensive commercial exploitation began in Costa Rica. The 1974 nesting totals were very low, and Carr (personal communication) feels this reflects the increased harvesting of the Nicaraguan area.

¹³ The remigration cycle may be shortened to two or extended to four or more years as ecological conditions vary (Carr and Carr, 1970).

Miskito turtlemen also report a decline, although they explain that the turtle aren't really gone, they're only "hiding" because of all the dories that now pursue them. Informants relate that it was once possible to leave in the morning, harpoon a boatload of turtle and return home in the afternoon, often without losing sight of the village. Now, it requires over a week of intensive fishing, setting many nets over a large territory, in order to yield one turtle. Turtlemen are ranging farther and farther, and getting less and less, as the turtle population declines.

Exploitation has increased along many fronts simultaneously, and the effect is synergistic. More men now hunt turtle, using new technology (nets), and for longer periods of time. Old turtlemen state that turtling was once solely a dry season (February to May) activity. Plenty of turtle were taken during this time and preserved by salting or smoking. Now, there is no month when dories are not out fishing turtle.

The Miskito information system is poorly adapted for sensing and reporting that turtles are on the decline. The ocean has always given, and it will continue to do so, the Miskito reason. To suggest otherwise is to imply that the Miskito are being "punished" by God, and this is understandably not a conclusion many villagers arrive at.

Culture systems often respond slowly to sudden changes in their environment. In many circumstances this adaptation has positive selective value. In the case of environmental degradation such as this, however, it is deleterious. There are few if any mechanisms for detecting what is happening, the information system lacks critical data, and there are few extant channels for response.

As a result, the Miskito continue to pursue a declining resource. I asked one old man what would happen if all the turtle were to "finish".

"Finish? Turtle can't finish." In the Miskito ethnview, turtle have always been there and will always be there. Those who study turtles think otherwise:

There simply are not enough green turtles to support such excessive exploitation (Nietschman 1972b:1).

If things are left as they are, the commercial sea turtle industry seems certain to go on cynically mining to exhaustion its sources of supply (Carr 1972:34).

there can be no doubt that the depleted herds are in serious trouble and will be unable to withstand the current rate of market exploitation (Nietschmann 1972a:65).

HOG IS HOG – ADAPTATION

*Well, hog is hog, and dog is dog, Mr. Brian.
Can't change.*

– a villager

Cultural systems can, and do, change. The nature of change, the processes underlying it, remain poorly understood. We know

that under altered circumstances, some cultures respond by establishing a new and viable set of relationships – that is, they adapt. Other cultures cannot re-establish themselves. They perish.

Autonomous cultural systems and autonomous ecological systems share the property of self-regulation. Critical variables are maintained within a range that is not destructive to the system.

When we examine cultural systems as functioning units within an ecological system, we find that cultural mechanisms are one of the ways that ecological relationships are governed.

The primary adaptation that every human population must make is energy acquisition. Autonomous cultural systems must "arrange" to acquire the matter and energy needed to sustain them without degradation of the ecosystem. To do otherwise is ultimately self-destructive.

No populations utilizes all of the matter and energy that is potentially available. In fact, there is a consistently low rate of utilization. This is apparently necessary in order to prevent environmental degradation and to retain the structural integrity of the ecosystem.

It appears that populations

evolve toward regulating their density at a level well below the . . . carrying capacity that could be attained if all energy and space resources were fully utilized. In this manner, natural selection operates to maximize the quality of the individual's environment and to reduce the probability of extinction of the population (Odum 1971:197).

Recent studies (Lee 1965, 1968; Carneiro 1957; Rappaort 1968) show that human systems are in fact regulated far below any approximation of carrying capacity. Regulation is not by exhaustion of food supply, because

population density must at all costs be prevented from rising to the level where food shortage begins to take a toll of the numbers – an effect that could not be felt until long after the optimum density had been exceeded. It would be bound to result in chronic over-exploitation and a spiral of diminishing returns (Wynne-Edwards 1962:11).

By compressing into a couple of years an event that mimics the population growth that would normally occur over hundreds of years, commercialization of a Miskito subsistence resource has bypassed the controls that normally would have been activated to prevent "chronic over-exploitation and a spiral of diminishing returns." The Miskito subsistence system has been appropriated and annexed by an outside system, and "with the regulation of the local ecosystem coming from outside, the system's normal self-corrective capacity is diminished and eventually destroyed" (Rappaport 1971:132).

When big and little systems come into juxtaposition, there are discontinuities that operate to the adaptive disadvantage of the smaller system. When two dissimilar systems come into articulation, "There is some energy exchange between the two subsystems in the sense that the less-organized subsystem gives energy to the more organized, and in the process of exchange some information in the less organized is destroyed and some information gained by the already more-organized" (Margaleff 1968:16).

This is a cybernetic description of the situation in which the rich get richer and the poor get poorer. Such a process seems inevitable when a population begins to sell a subsistence resource. There is no feedback to the larger system about the values of critical ecological factors in the subsystem, nor would there necessarily be any adaptive value to the larger system in responding should such a signal be detected. It is more efficient to simply utilize a system at full rate until it is exhausted of the desired resource, and then to seek another population to appropriate. Subsistence societies thus become disposable subsystems for larger populations that are seeking a source of matter and/or energy. What is adaptive for the big system is maladaptive for the subsystem, just as what is selectively advantageous to the population may be deleterious to the individual.

If the Miskito are unaware of their dilemma, those who utilize their resources are at best unconcerned— and, occasionally, rather proud: "Have you considered the contribution it is making to the welfare of those people, who have very little else to sell from their remote and generally barren islands and coasts and who also depend on the turtle for their meat?" (Lusty 1971:93).

For the Miskito, the sale of turtle and its continuation as a subsistence resource are mutually exclusive events. As a subsistence resource, turtles can provide a dependable protein resource in a mixed subsistence economy. As a market commodity, they will provide perhaps five years of illusory economic well being.

Rationally and cooperatively managed throughout the range of each nesting population, Chelonia can be kept on a permanent basis as a stable source of protein food for the people of the seaside tropics. Left to the tender mercies of the industry, however, it will everywhere disappear, as in the Caribbean it is disappearing now (Carr 1969:16).

THE ALTERNATIVES

Any proposed solution to the current dilemma must reconcile an apparently contradictory set of facts:

- (1) The Miskito want cash to purchase things,
- (2) Selling a subsistence resource leads to The Development Paradox: more cash but less food.
- (3) There is nothing else left to sell in their ecosystem,
- (4) They lack the education and inclination to be integrated into the Nicaraguan economy.

The alternatives are really very few in number. The cattle and pigs that roam the village are emergency "banks," sold for cash when a family needs money quickly. There is no opportunity for raising sufficient numbers of animals to support the village; there is no food to feed them, and the cost of transportation to distant markets makes husbandry a financial risk that not even a computer-equipped businessman would dare to take.

There seems a similarly small chance that the Miskito can successfully live off of other marine resources. The reasons are ecological, economic and cultural.

Ecologically, there are few marine resources that occur in sufficient quantity to feed the village, and that are available through

out the year. Any alternate resource must duplicate the turtle by being both ubiquitous and plentiful.

Fishing appears an obvious alternative, but in proposing it people often forget that a huge capital investment would be required for the kind of equipment necessary to catch fish from the deep sea in village-sized quantities. In addition, the Miskito would have to acquire the knowledge of productive fishing grounds that they have accumulated culturally for hundreds of years about turtling areas.

Finally, there is the factor of culture. Food preferences are strongly ingrained in every culture; few North Americans regularly dine on squid or snail, although these are delicacies in other parts of the world. The Miskito eat fish, but express little enthusiasm for it. Furthermore, fishing would require the cooperation of large groups of people, a prospect that grows dimmer as social relations worsen. New means would have to evolve for dividing a catch that belonged to many people, instead of to the owner of a net in which a turtle is ensnared.

Finding subsistence within an ecosystem depleted of its turtle population thus lies somewhere between precarious and impossible. Yet the prospects for outside employment are even poorer. There is already chronic unemployment in Nicaragua's major cities, and as an uneducated minority population, the Miskito have little chance of migrating and surviving in the urban milieu.

There are no obvious solutions in this situation — and there are quite possibly no good solutions at all.

One fact *is* quite obvious: if the Miskito are to have a chance at viability as a population, they need time. Time to adapt, time to make the social and psychological adjustments being demanded, time to educate themselves. This time can only be bought with a conservation effort that will maintain green turtle populations at a level that makes local subsistence possible.

There must be a drastic reduction in the number of turtles taken, through an international agreement that is rigidly enforced. A determination should be made by qualified zoologists of the number of turtles that can be harvested annually without depleting the breeding population. The price of turtle should be increased so that the Miskito receive at least their current income in return for whatever level of harvest is safe.

Without these changes, the Miskito stand a greatly reduced chance of survival. The old woman was right — the turtle him, that's all they've got.



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FILMING "THE TURTLE PEOPLE"

I am not a filmmaker. This is not a disclaimer, but rather a word of encouragement to those who find film an exciting way to present material and consider themselves incapable of such an undertaking. Before making **The Turtle People** I had never held a movie camera, and I thought cutaways were shortened jeans that you wore to the beach.

As Jim Ward describes in the next section, we sort of drifted into a decision to make this film. He had the experience and background, but I was going to the field. Our alternatives were effectively non-existent, so equipped with an ancient Bell and Howell DL-70 camera and 5000 feet of Ektachrome 7252 film left for Nicaragua. Before my departure, Jim obligingly showed me how to load the camera, and which button made it go. Previous experience as a still photographer made f/stops less of a mystery, and I soon figured out that the exposure time was fixed, unlike a still camera.

To me, the camera was simply another means for reporting what I saw and learned; my "style" was influenced more by a previous stint as a newspaper reporter than by the great names of filmmaking. Who, what, where, when, why and how had to be re-

corded on film so that the story could be told accurately and interestingly.

Shooting proceeded very slowly at first. I knew only the outlines of the story. Details were filled in constantly throughout more than a year of fieldwork. Both filming and my understanding of the Miskito system increased as time went on.

What is recorded on both film and soundtrack is spontaneous. I utilized an increasing knowledge of the Miskito culture to predict when, where and how events would occur. This often meant a wait of weeks, or months, to film something. That was the case with the sequences of turtling at sea, which Jim must have felt would never appear. I first arrived in the village towards the end of the dry season, and it was far too early in my stay to attempt the filming of something that would make such an extensive demand on the cooperation and patience of the turtlemen involved. It was a year later before the weather and the turtles were in juxtaposition for an attempt.

This kind of filming, of course, is considerably different than working from a script. There are, inevitably, gaps — one-time events that never re-occur, or things that you simply don't think of

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while in the field. You discover these omissions in the editing room, when the editor turns to you and says, "Don't you have a shot of"

The technical problems were a never-ending source of thoughts for idle periods, like at night when I might otherwise have been sleeping. The high temperature and high humidity of the tropics are destructive of both film and equipment. The remedies available are related to budget, of which I had none. One roll of film, mistakenly left in the camera overnight, was next known to me as a puddle of gummy emulsion that had to be peeled from the film gate.

The day before departing to shoot the critical turtling scenes, a rather important-looking part separated itself from the inside of the camera. I quickly learned to be a camera repairman.

Problems tend to increase as the complexity of the equipment increases, and although the limitations of my simple camera were often a curse, its ruggedness was an indisputable virtue. Simple equipment, photographic or otherwise, is always a wise choice for the tropics. If you can't fix it, don't take it.

The possible exception to this rule is sound equipment, where even simple is complicated. All sound for *The Turtle People* was taken on a standard Sony TC 110A cassette tape recorder. I invited villagers to come to my house, and engaged them in open-ended discussions that were recorded (with their knowledge). I invited them, by my questions, to discuss their village, their lives and the changes taking place in both. From 17 hours of such interviews, Jim and I eventually selected the dialogue heard in the film. The voices are those of the Miskito, as originally recorded. We made the decision to sacrifice some aural clarity to the Miskito's Creole English, in return for the sense it conveys about the Miskito as people and as individuals. There seemed to us no satisfactory substitute for people speaking for themselves.

I cannot emphasize too strongly the degree to which this film was dependent on the close and productive interaction between Jim Ward and myself. Editing is a technically and aesthetically complex task that does require experience. It also requires sensitivity and understanding of what is to be said. Jim's knowledge of anthropology and the Miskito grew from the time the production began, and enabled us to work as a single unit to present the story we had both come to see.

A personal friendship of several year's duration carried us through a number of difficult decisions, from the initial one to make the film (involving a commitment of personal funds, time and energy) to later ones involving editing. Without Jim's participation as producer and editor, and without his encouragement while shooting was in progress, the Miskito story would remain unfiled.

EDITING "THE TURTLE PEOPLE" by James Ward

During conversations with Brian about anthropology, ethnographic film came up several times. When he told me he was going to do fieldwork among the Miskito Indians in Nicaragua, the idea of a film, although vague, immediately came to mind. We talked all around the subject many times without specifically discussing

whether or not a film could be made out of his work there. Finally one of us, I do not remember which, broached the idea and we began discussing the possibility more seriously.

I was still not sure we should attempt a film. I knew nothing about ethnographic film beyond what Brian had said in our discussions, and I had come to the conclusion that most anthropologists were suspicious of both film and filmmakers, so I remained dubious. At that time I could not judge Brian's attitude. From previous collaboration with him on journalistic projects I knew we could be a "good mix". In addition, we had been close friends for several years, which could be expected to get us through many of the difficulties of collaboration on an unfamiliar project.

Ultimately, the decision to make a film was more or less assumed. From what Brian had told me about the Miskito, I felt that a film could be made about them, although I admit that at first I was disappointed that they did not look like Indians — they wore too many clothes and they spoke English, albeit a Creole (that the Creole was colorful was some compensation). These attitudes were stereotypes that I rapidly abandoned, thanks to Brian and the experience of making this film.

In time, it became clear to Brian that those fears felt by some anthropologists — namely, that filmic considerations would come before accuracy or clarity — need not concern him. On my side, I had no anxiety that Brian would understand and accept basic cinematic considerations, such as the need to establish scenes or creating visual interest and emphasis by an unconventional progression of shots within a scene.

Some troubling considerations remained. Brian had never held a motion picture camera, much less made a film alone in a remote area. I was familiar with his work with a still camera, which was very good, but whether or not he could transfer this to cinematography would depend on a combination of innate skill and luck. Would he understand the need for variety in camera angles? why cutaways were necessary — even what they were?; that pans must be slow?; that shots must not be cut too soon?; that shots of people doing things must include extreme closeups of hands and faces, not just a set shot of the action? Complicating this was the fact that we had insufficient money to equip him with anything but the cheapest used camera. Using such a camera is asking a lot of a beginner. The best I could do was show him how to operate the camera and try to convey a feel for basic cinematic conventions.

Money was a prime consideration. Here I was about to invest what for me was a substantial amount of money on a kind of film that I little understood. I make films for television — they have little in common with an ethnographic film beyond the technology. (My film work is all in the field of conventional information films. I work primarily with scientists and educators writing, producing and directing films about their work for use on television news and public service broadcasts).

Still, it seemed a worthwhile project, and who knew, I might even learn something.

Being several thousand miles away from the anthropologist and cameraman with whom one is collaborating creates unusual difficulties for a producer/editor, particularly when film shipments and mail take up to three months to arrive. I received film in small

batches of 200 to 500 feet. It was developed and a workprint made, which I screened immediately, reporting to Brian on triumphs and disasters. My letters would take another few weeks to reach him in Little Sandy Bay.

Of the first three rolls of film Brian sent back, two were a disaster (neither the lab nor I know how he filmed an orange phantom ship on a green-black sea). Focus and exposure were miles off. It must have been a fluke, because the next two batches of film were quite acceptable. With the fourth I was convinced he was a professional. He gave me slow pans, closeups, establishment shots, ample cutaways and he obviously felt at ease with the camera. Exposure remained a problem until he finally received one of my complaining letters and began to distrust his light meter.

For me, the next several months meant waiting and looking at workprint. I confess to many periods of doubt that all this could be made into a film that would be useful. It was the plight of the Miskito that clinched my enthusiasm for the project. The knowledge that a lot more of our money was going to be needed to complete the film did not dissuade me.

With Brian's letters and the growing footage it became clear to me what this film would be about, and I became quite excited. The story of the Miskito was the story of the past and probably future of nearly all of us: a disregard for our ecosystems resulting in a disastrous exploitation of our resources. That is how I saw it then. I learned later from Brian, during the final editing when we worked together, that it was not that simple. He began making at least a freshman anthropologist out of me.

I also learned later that many of the colloquial phrases I had written into the original narration were "loaded" from an anthropologist's point of view. For example, I described Miskito houses as "hardly more than shacks". As compared to what? I came to realize that some of my descriptions (and supporting picture) were ethnocentric — the Miskito were not residents of Los Angeles.

A final example (there are others): I made a "common sense" judgment that selling turtle to the company at the cays was assumed by the Miskito turtlemen — of course they sold their catch when the company boat came, because they could make more money. It was not that simple. Brian taught me that deciding to sell or take turtle to the village for butchering was a very difficult decision, with tremendous cultural pressure on the Miskito men to return with meat to feed the village rather than selling to the company, in spite of the money they wanted so urgently.

I finally received what I thought was to be a final shipment of 1500 feet of film. With 6300 feet of film in hand, I began to edit a silent rough cut, completing a 1200 foot version in about two months, working part-time.

I approached this first cut feeling that the result would be reasonably acceptable to Brian anthropologically. I had read references he recommended and all of his own work on the Miskito, including his research reports. We had also discussed the research at length before he went to the field. Although slow in coming, his letters concerning the progress of his fieldwork, what he was discovering, his interpretations and conclusions, were extensive. With all this, I felt I had a reasonably clear idea of what the film was to be about and was to say. I am certain that our long and close friendship also enabled me to see the footage we had with his eyes — in all this time Brian had not seen a single frame of picture.

I was discouraged that some essential things were not covered. Bad weather had prevented Brian from filming a solid turtling sequence. I was forced to cut around this missing element. There was some badly exposed footage that had to be used, and some that had been badly damaged by humidity both before and after being exposed.

After I completed the rough cut, we had a stroke of luck. Brian was to return to the country for a few days for some professional meetings. This enabled him to see the rough cut, and us to have a lengthy discussion by phone concerning what still needed to be filmed. When he went back to Nicaragua with 1200 feet of additional film, we both knew what we needed, what we wanted to do and how to do it.

I received the final 1200 feet of film and all of the field recordings in April 1973. Brian joined me in Los Angeles in May, and we spent the next three months (mostly part time) editing a final version of the film.

Probably the most arduous task at this stage was selecting, re-recording, transferring and cutting the dialogue of the Miskito informants. All 17 hours of the taped interviews were examined several times to arrive at the 15 minutes of dialogue that best told the Miskito story from their point of view.

We then began the second cut. This second cut retained the essential elements of the rough cut. There was some structural re-ordering and replacement in incorporating the new footage, which had given better coverage of some activities and coverage of previously missing elements. The film was greatly shortened, and the Miskito dialogue and the narration were incorporated.

Brian then left to resume his school work in Michigan. I began building the sound effects tracks. Brian had made extensive wild (unsynchronized) recordings at the same time as activities were filmed. Since there was a great deal of this material that could be post-synchronized to match picture, it seemed obvious to build an effects track making use of the wild sound. About 90 percent of the sound effects used in the film came from such field tapes. Having created the expectation of sync sound by this choice, it was logical to fill out the sound with library effects for which there were no field recordings. Most of these are water and machine sounds. A few were made especially for certain scenes, such as banging pans, chopping coconut, the rope-making sequence and a few others.

Three separate, overlapping tracks were required to cover all the essential sound effects. Synchronizing these to the picture was pure drudgery. For example, matching the chopping sounds recorded wild to the picture in the tree cutting sequence took several hours for the couple of minutes of film and sound. The cracking and tearing of the falling tree was made from three separate recordings of different trees falling. Scores of similar examples could be given: paddling, hoeing, etc. These three tracks were mixed, and this mixed effects track was in turn mixed with the two narration tracks (divided between the voices of the Miskito and the narrator).

A final fine cut was made, and **The Turtle People** was completed!

My judgment of the film rests on how it has been used since its release in November 1973. In the first year, over 100 schools viewed **The Turtle People**, in a wide range of classes from beginning anthropology to advanced ecology. The film tells a story that I feel urgently needs telling, about the burden of "development" on the underdeveloped.

Soundtrack Transcript, with Scene Descriptions and Ethnographic Notes

Following is a list of the scenes in *The Turtle People*, ethnographic comments on what is shown and a transcript of the narration or dialogue. All dialogue is from taped field interviews with the following Miskito: Agrafina Young (A.Y.), Ramos Young (R.Y.), Lloyd Hooker (L.H.), Rodrigo Garcia (R.G.) and Rojelio Spellman (R.S.). The narrator (NARR.) is James Ward.

The footages shown in parentheses are given as the number of feet, before the decimal mark, and the number of frames, following. There are 40 frames per foot, and 36 feet of film equals one minute of screen time.

Scene description and ethnographic notes

Narration and dialogue

(0.1) A turtle swims in shallow water.

(6.20) Two Miskito turtlemen in a dori paddle out to set their nets.

(17.18) A turtleman casts a lead weight to locate a shoal, then throws in the callig, followed by the net.

Each net is about 50 feet long and 14 feet deep. The men set an average of five nets each. Each net is anchored to the shoal with a callig, a heavy piece of metal, attached to one end of the net. There are floats along the top edge of the net, and the second end is unsecured, thus creating a "swinging door" that aligns itself with the current.

(33.29) A net floats in the water, with a turtle entangled in it.

Once caught in the net, the thrashing turtle is quickly enmeshed. The net and the weight of the callig keep him from swimming off, although the turtle is able to rise to the surface periodically for air. Turtles must be taken from the nets promptly as dawn breaks, or sharks will often kill them.

(43.24) Men pull a turtle into the dori.

Dories are usually made from a single hollowed-out log. They are keel-less, with a length of about 22 feet, and a three to four foot beam.

(49.23) An aerial view of Little Sandy Bay.

(55.7) The village of Little Sandy Bay; rows of houses seen from the savanna; a dori landing on the beach is met by children playing in the surf; the beach in front of the village; a man returns from fishing; inside the village.

Houses are built of hand-sawn wood, and covered with thatch, usually of the papta palm. There are 67 houses in Little Sandy Bay, and a population of 377. Pigs, chickens and cows all roam the village freely, foraging for food. These animals are few in number, and are kept by most people as a source of cash in an emergency, or sometimes for consumption on a holiday. Houses are grouped in clumps, reflecting groupings of related people.

A.Y. Them looking for the turtle. If them go out to cay, don't catch turtle, we don't got nothin'.

R.Y. Place is no have no work, and we livin' off turtle, and turtle is scarce now. We no catch no turtle, is no money.

L.H. Only the turtle business we have a help here, this Little Sandy Bay. Only the turtle. And the turtle them goin' down, goin' down, and the company come and buy it. Every year, goin' down.

A.Y. The turtle in trouble now.

NARR. The coastal Miskito Indians of Eastern Nicaragua inhabit one of the least traveled regions left in Central America. With few exceptions, they have been the sole residents of these humid lowlands for hundreds of years.

The exceptions are outsiders who have come to trade and exploit the area's natural resources. When pirates and English traders traveled the coast in the 16th century, the Miskito bartered dyewood, food and animal skins for fishhooks and rum.

In the late 19th century, they began working for foreign companies gathering the area's native rubber resources. This was the beginning of a series of boom and bust cycles, and of the Miskito's increasing involvement in wage labor and a market economy.

The village is located approximately 80 miles from both of the port towns (Bluefields and Puerto Cabezas) on Nicaragua's east coast.

93.32) A Miskito woman washes clothes with her child watching.

(102.11) A woman carries a load of firewood.

Cooking is done on open cooking platforms, called a kubus in Miskito. Both men and women are constantly hauling firewood.

(105.35) A man building a boat.

(110.39) A woman and child walk to church.

The Moravian Church, a German Protestant sect, established a mission on the Miskito Coast in 1849, and is the dominant group today. Most Miskito are Moravian.

(117.6) A man carves floats for a turtle net.

(121.32) A turtleman carries his sail and turtling gear home after a week at sea.

(126.5) Village activity: a man removes turtle shell; a man and a young boy make rope; a boy chops firewood; a man pounds hone seed for pig feed.

The thin, translucent outer plates are separated from the supporting turtle shell with hot water. These plates are sold, eventually becoming decorative veneer for music boxes, tables, etc.

Rope is made by twisting together strands of line that wash up on the beach. The beach provides a large number of items for the Miskito, including iron pots, hard hats and plastic containers.

(145.18) A man fells a tree to be used in building a house.

The Miskito obtain all the lumber they use by felling the trees and sawing the logs with a large two-man saw. The log is placed on a tapesco, a raised platform, with one man above and one man below.

Each of these economic booms ended as the resources gave out or the market for them failed. Between booms, the Miskito returned to their traditional subsistence system, the hunting of the green sea turtle and the cultivation of tuber crops.

But each boom temporarily brought money, and the shops and commissaries in which to spend it. Life at the subsistence level was no longer satisfying. The Miskito felt poor.

A.Y. I did want to let you all know how we making life here. We Miskito people is poor. We don't got money for buy a little coffee or little things. Woman and man same way hard working here.

When we go to church we have to find the little clothes for clean it and go. We walkin' barefoot here, we no use no shoes much. We no use pretty things here no much. Only we is living poor.

How Nicaragua Miskito people is so poor like that?

NARR. What the Miskito lacked was money to buy things. The power to purchase, rather than food to eat, was in short supply.

To acquire money, the Miskito have now begun to sell their last remaining resource, the turtles.

The desire to remain in the marketplace has brought many changes to the village of Little Sandy Bay, but many aspects of traditional village life go on. The Miskito must still look to their immediate environment for food and material to shelter them.

R.G. You want to build a house, we got to rip a lumber with two-man saw, and that's a hard job. Who that he can afford to rip a lumber, go to a savanna and fall down a log with a ax and make a tapesco. Put up that log on the tapesco, and then you rip it.

(159.23) Men on a tapesco saw a log.

This is an arduous task. A week of dawn-to-dusk labor yields around 10 finished boards, usually eight inches wide by about 15 feet in length. Each man takes half the finished product. At one time, both lumber and labor were contributed when a family member wanted to build a house. Today, men often have to hire someone to work a saw with them.

(178.11) Men build a house.

Pana-Pana means, literally, "hand-to-hand". Certain tasks require a large amount of labor in a concentrated period of time. It is impossible for a person to thatch a house or plant a field alone. Pana-pana provides for these major labor inputs. Pana-pana, like food sharing, once bound the entire village together, but volunteer labor is less frequent today, and is confined to a few critical tasks.

(183.25) Women prepare the thatch while men on the roof tie it on.

Two or three leaves of the papta palm are bound together, and this bundle is tied to a framework of poles that forms the roof. It takes about 10,000 leaves to cover a house. These leaves are cut and carried from the savanna, two to four miles from the village. A roof will need re-thatching in about five years.

(215.2) People eat during thatching.

In exchange for their labor, participants are fed coffee and bread before work begins, and a mid-day meal of rice and beans and occasionally meat.

(226.10) Villagers begin planting.

Fields are prepared in the gallery forest located about five miles from the village. The Miskito practice swidden ("slash-and-burn") agriculture, in which a plot of land is cleared, burned and planted for two years. It is then abandoned, allowing the forest to regrow and the soil to replenish itself, a process that takes 10 years or more.

Most fields are prepared by a man working alone or assisted by his sons. Planting, however, must be done on one day, and communal labor is essential. A one tas field (50 meters square) requires 50-75 people for planting. A man or a member of his immediate family is obligated to provide labor to each of the families present when they do their planting.

(234.23) A woman prepares a meal of turtle meat for those who are working.

Planting a field begins shortly after sunrise, when the participants are fed coffee and bread. At mid-morning they are provided mishla (manioc or other tubers fermented

NARR. Traditional Miskito society emphasized the need to share both labor and food, ensuring that the entire village would always be fed and housed.

Although village cooperation is not as extensive as in the past, essential tasks are still carried out through a system of reciprocal obligations, called *pana pana* by the Miskito.

By providing the day's meals, a man can obtain all the labor he needs to thatch or plant crops. In return, he is obligated to assist each of these people when they need labor.

R.G. We does go a savanna and cut the leaf, then the people them come and help we for thatch the leaf. Maybe you start from seven o'clock, you finish about two o'clock. So you got to use plenty men up on the top and use plenty woman to put the string on the leaf.

So the owner of the house got to feed 'em. We got to buy a coffee and flour, rice and beans and make a big cookin', and then the people them come and help we for thatch the leaf.

L.H. They ready to plant it. One person, plant it one day. Well the people them go an help the people them. And then next person when he get ready to plant is same thing again.

Sometime the people them carryin' to the plantation whole turtle and cut up there and then they cook there and then, well, they feed the people them.

overnight). *The mid-day meal is the major one, and is considered incomplete without turtle meat, although occasionally someone will serve only rice and beans either for lack of money to purchase turtle meat or because there was none to be bought.*

While the pana-pana system means that no wages are paid, there is still a heavy financial demand for providing the food, most of which must be purchased from the store. Some people must delay planting for lack of funds, and some people now feel it is so expensive to feed everyone that they are better off spending the time turtling. Others reduce the amount of land they plant, thus needing fewer people.

(249.4) The men prepare for the planting of various tuber crops.

Most cultigens used by the Miskito are starchy roots and tubers, such as manioc and dasheen. These plants reproduce vegetatively through cuttings from the tuber (dasheen) or from the above-ground portion of the stem growth (manioc). The Miskito refer to manioc as "cassava", a term usually applied to a flat cake made from manioc that is widely used in lowland South America.

(258.24) Women prepare and plant manioc.

A stem is stripped of leaves and cut into short pieces about a foot in length. These are planted, three at a time, in small mounds of dirt that the men have prepared with a hoe.

(272.30) A growing field of manioc; a man pulls up a tuber; a woman prepares a tuber for boiling.

(286.28) A woman prepares and cooks turtle meat.

Turtle meat is usually boiled either in water or in the cream expressed from coconut meat. Turtle is a highly desired part of every mid-day meal, and after several meatless days some women refuse to prepare meals.

(308.21) A turtle is killed and butchered.

(342.25) A man sells meat.

The sale of meat involves a constant set of calculations on the part of the turtleman. As he looks around the circle of people clamoring for meat, he sees relatives, friends and other turtlemen. Who he sells to and how much he sells them is a complex social and economic

R.G. We all have no money, so that's the way we workin'. We Indians call it *pana pana*. That is, well, hand go an' hand come, that's the way.

One plantation is maybe about 20 men and 15 woman for dig the hole with hoe or *makanna* and the woman them plant the cassava. 'N that we call *pana pana*. That is hand go and hand come.

NARR. Root crops, such as manioc, and the turtle taken from the sea, make up the major part of the Miskito subsistence system. Tubers are high in calories and turtle meat provides a plentiful source of high quality protein. Neither is sufficient by itself. The dependable availability of both has sustained the Miskito for 350 years.

A.Y. From we small we see the turtle and we used to eat them turtle meat. We kill it and we cook with a coconut. Some-time, we cut it and make little meat ball. All kind a way we cook turtle meat. The blood we eat, cook it, and eat. That nice too. Everything we eat, the head, fin, everything we use. We no throw nothin' there.

R.G. The old people them said that first time nobody eat no turtle. But he cut him up and start to cook first and taste it. And when they taste the turtle meat is nice. So from that they start to eat.

Turtle butcherin'. . . you got to get up in the mornin' around seven o'clock and butcher the turtle and then carry it in your table and chop it up the meat and the people them come and buy the turtle meat.

calculation. Another turtleman may get preference, in the hope that he will return the favor another day. Relatives who once would have been given meat now often buy it, although they will sometimes receive extra meat, or a preferred part.

Normally, each person is sold "mixed meat," a portion that includes not only lean meat, but also pieces of liver, lung and intestine. The green fat is highly prized, and most buyers will receive at least a small amount.

There is often a din at a butchering as people remind the seller of past favors, kinship relations, etc. Since there is often not enough meat to go around, a few people are inevitably disgruntled, and many turtlemen say that the social stress that goes with butchering is another reason they prefer to sell their catch to the company.

For the Miskito, the scale is symptomatic of the irritating fact that they must now buy what was once given.

(374.9) Rio Grande Bar, site of the 1930s banana boom, is now virtually a ghost town, with decaying buildings and sunken hulks of old barges.

Rio Grande Bar is four miles south of Little Sandy Bay, at the mouth of the Rio Grande River, along whose banks the banana companies once controlled thousands of acres. Barges carried the bananas from upriver out to the offshore cays, where larger boats could be loaded in safety. The Miskito, assisted by the companies, cultivated bananas, for which they were paid in U.S. currency. This was spent in the well-stocked commissaries the companies maintained at Rio Grande Bar.

(413.16) Sunken boats along the river towards Karawala.

Karawala is located about three miles from Little Sandy Bay, on a side branch of the Rio Grande River. Most of the men in Little Sandy Bay were employed in Karawala during the lumber boom of the 1950s. Once again, U.S. currency was the form of payment, and once again there were well-stocked commissaries in which to spend the money.

(419.39) Remnants of a sawmill and rusting machinery at Karawala.

Saloons, a movie theater ("show hall") and a landing strip were all a part of Karawala at the height of the boom period.

The reference to "pretty Chinaman" comes from the fact that the Chinese own most of the major general stores on the Miskito Coast, both in the port cities and in some of the Miskito villages.

(460.5) At dawn, the men prepare to set out in their dories to seek turtle.

Dories always depart at dawn or sooner, hoping to catch a wind blowing from the land (caused by the differential cooling of land and sea at night) that will help them sail

NARR. A major change in Miskito life, resulting from wage labor, is the selling of subsistence resources.

Previously shared and given away, these are now sold in the village. Turtle meat, like a man's labor, has become a commodity to be bought and sold.

A.Y. When we was small them never sell turtle. That time was a little better because them no sellin'. If you bring cassava, I get for nothin'. And if some turtle come here and kill it we have share it piece, piece; we not sell. Nowadays, everythin' goin' by pound.

NARR. One boom was centered here, in Rio Grande Bar. During the 1930s, thousands of bananas were shipped from its wharves each week. Food and merchandise of every description lined the shelves of stores along the main street. The Miskito sold all the bananas they could produce and spent all the money they earned. In the early 1940s, hurricanes and soil disease put an end to commercial production.

R.G. My old people them said that when the banana company time, Rio Grande was good, plenty banana. Load up the banana from Rio Grande, carryin' out to Man O' War cay and load the banana to the ship. And everybody have plenty of eatin' and have plenty of cheap things because clothes was cheap and money was strong too. Was runnin' as American dollars. And since that company gone, oh, we all is punishin' now.

NARR. Commissaries and cash returned in the 1950s with lumbermen who came to log pine at Karawala, a few miles upriver from Rio Grande Bar. Forests were soon depleted, and the companies left.

R.G. The same thing the Karawala. Karawala was fixed up all right. Have a big sawmill, have a big lumberyard, have plenty of store, show hall, and everybody happy glad. Now, today, Karawala is pure mountain.

A.Y. When Karawala company did come, beautiful, show house was there, saloon, pretty Chinaman, pretty things. Maybe I did think that thing will never pass. But, well, that is the world; it pass now.

NARR. Once again a boom had failed, leaving the Miskito with empty pockets and a renewed desire to participate in a cash economy.

to the cays. They will be gone from Tuesday until Saturday, and they must carry with them all of the food and water needed to sustain them.

A dori will carry three to five men, each of whom sets his own nets and owns whatever turtles are caught in them. Often two men will agree to be partners, sharing whatever they catch between them, and reducing the risk of returning home with nothing.

(471.17) The turtle company at Bluefields.

This processing plant can handle hundreds of turtles every week. Diesel-powered boats of various sizes ply the coast, picking up turtles from Miskito villages and carrying them to Bluefields.

(481.23) Men continue to launch dories.

(487.5) Aerial view of Man O' War cay, and the birds that are its namesake.

Each Miskito village concentrates its fishing efforts on the shoals surrounding one or more of these cays, and the distribution of coastal villages corresponds to the presence of cays.

(495.33) Paddling to the cay; on the cay.

If the land wind fails, the men will paddle several hours to cover the 11 miles from village to cay. They will spend the week fishing, and living in make-shift shelters

(515.4) A man paddles out to a shoal, where nets are set.

Nets are set at mid-day, when the angle of the sun makes it easier to locate the shoals. Familiar shoals are located by "dead reckoning", using the experience of turtlemen who know the direction and time from a particular place on the cay to the shoal they are seeking.

(548.36) The men return to the nets the following morning, finding an entrapped turtle.

The nets are checked each morning at dawn; any delay offers sharks an easy opportunity at the helpless turtles, which die when shorn of their fins by the sharks.

Turtles are removed from the nets and placed in the dori. At the cay, the live animals are confined to a shallow pen (clar in Miskito), where they remain until sold to a passing boat or carried back to the village.

One of the factors that made turtle so desirable for early explorers was that the animals remain alive out of water for weeks if kept out of the sun and sprinkled occasionally. In this way, meat could be stored long before refrigerators were in use.

R.G. Since the company gone, now we got to follow the turtle.

NARR. Recently, turtle processing plants have opened in distant port towns. Foreign companies are buying the 300-pound sea turtles for the few pounds of calipee they yield. Green turtle soup is made from the calipee for the gourmet markets of Europe and North America.

When weather permits, turtlemen from villages up and down the coast set out for a week of turtle fishing on distant offshore cays. The men of Little Sandy Bay will camp at Man O' War cay and set their nets on the surrounding shoals.

L.H. From Little Sandy Bay, 11 miles to Man O' War cay. We no workin' from the compass, neither, we only workin' our brains, with sense. When we have to go to the cays an' we have to take out our things them to the cays and leave it our place there, we have to fix a little lodging there.

Sometime there was sun was clear and the sky was clear, everything good, we have to that time we have to leavin' out from the cays. And goin' out to the shoal we have to lookin' the shoal.

First time was easy our catch the turtle them. Was the company no buy at that time. The turtle was plenty, plenty, plenty. So the turtle them nobody they humbug him so comin' in right inside, inside to the cay. But now, the since from there the company buyin', the turtle them right now the turtle them scarce.

When we go out to the net in the mornin', from far you can see which net them have a turtle. That turtle them they floatin' onto the water with the net tangle up.

R.Y. You see the turtle all the buoy come close. Sometime the callig light, one turtle pull maybe five net close together so you see all plenty buoy 'round it. Maybe two, three turtle there come together like that, whole bunch. We all is poor so we glad when you see one turtle. You glad to catch that.

(583.26) A turtle is brought into a dori.

(607.1) The company boat arrives at the cay. The men load their turtles into the dories and carry them out to be sold.

The current price of turtle is 80 cordobas (about U.S.\$11.50).

(656.20) The turtlemen return home in a storm.

Turtle fishing was once done only in the dry season, when weather is mild and predictable. Now, turtle are pursued at almost all times, and the risks of encountering bad weather at sea have increased. The men will not depart from the village if there is a high wind, but once gone they are subject to the vagaries of wet-season weather.

It now requires an average of almost six man-nights of fishing for each turtle caught. To catch the same number of turtles, the Miskito must invest ever-increasing amounts of time.

(700.15) Men unload turtles on the beach.

(731.14) Turtle meat is carried into the village to sell.

L.H. All 'bout, the boy them workin'. From all place they workin'. Sometime catch, sometime no catch. Well, I don't know what we goin' to do here now.

R.Y. The company is here for buy turtle.

NARR. When the company boat arrives, those who have caught turtle must decide whether to sell their catch or take it back to the village.

R.Y. When the boat come into the bar, harbor, you take out the turtle from the clar and tie the fin them, take to the dori and carry out and load it.

R.G. Company buyin' for 80 *cordobas* a piece for the turtle, big and small, and that's why we fightin' to catch the turtle for live off it. The turtle company buy the turtle from us, carry it to Bluefields, butcher it, and sendin' that meat to United States.

NARR. Once the Miskito took only enough turtle to feed the village. Now there is a market for all they can catch.

With their week's rations exhausted, the men leave the cays for the village. Unpredictable tropical storms can make the trip home hazardous.

They must spend more and more time at the cays for each turtle they capture. Pushed from nesting and feeding grounds throughout the Caribbean, the turtle are being depleted. Ten turtle once fed the village for a week. Now 50 to 75 are often sold to the company. When they can be caught.

L.H. Sometime the boy them fishin' sometime three weeks, sometime bad luck. Sometime no catch. Since from now the company buyin' turtle, the people no want to kill the turtle them, neither no want to butcher the turtle. Jus' they want to send him to the company. Sometime it hard, the place, no meat, no fish, no nothin'.

NARR. When the dories return, villagers gather on the beach to see if the turtlemen have brought meat.

A turtle butchered in the village will not bring as much money as it will if sold to the company. As a result, the amount of meat available in the village has declined sharply. The Miskito are catching more turtle and eating less meat.

The increased time spent at sea hunting turtle has meant a decline in the amount of crops planted. The men hope to catch enough turtle to buy at the store the food they do not grow. A few will succeed, but most will fail. For those who do have money, rice and flour will replace the turtle meat which was once a daily part of the Miskito diet.

(744.14) The villagers gather to buy turtle meat.

R.G. We used to butcher here nine and 12 head of turtle every Saturday; nine and 12 head of turtle. And we not sellin' it, neither. We jus' to get piece, piece, everybody.

The company pay for the turtle 80 *cordoba*, and hard to come here and butcher the turtle for 50 cents a pound. . . you can't make the 80 *cordoba*. So me people them don't want to butcher the turtle here. They say if he. . . if him to bring a turtle and butcher here in Sandy Bay, better for sell it to the company.

L.H. So the boys them figurin' that more or less, them losin' plenty. Because what them company pay is 80 *cordoba*, so the boys them say, figurin' 'No, I'm no goin' to butcher again.' They goin' stop.

A.Y. Nowadays we hardly can get turtle meat. When somebody kill, we hardly take even one pound. Turtle meat here is now is gold.

NARR. When a turtle is butchered, people gather, hoping to buy meat. Even those who have money often find there is not enough to go around. They shout their requests, reminding the turtleman of kinship relations or past favors. Nevertheless, the day's meals for many will be rice and beans.

Food once shared freely among kinsmen is now sold. What was once given away is now weighed.

R.G. My old people them said, first time, food line we not scaling, we no have no scale them days. So we just share them up and eat, piece by piece. But right now, well, is food line is scarce. We got to buy flour and sugar, rice, beans and who don't catch no turtle, when he comin' home, in Sandy Bay, can't go to the store and get rations for he family.

R.Y. So how poor people goin' to live here? Nothin', no work, how we goin' live here. Everything *cordoba* a pound.

R.S. Can't live with money. You have to make your plantation, and then with half and half, well, that's more better.

A.Y. The turtle business come from foreigner for buy the meat. Now is turtle is really hard, hardly get it, because they sellin' now. Sometime one month, two month, three months no get one. Just like dice, how we livin' here.

NARR. Ten thousand turtles are taken from the Miskito coast each year by the companies for making green turtle soup. Distant and unseen markets place a demand on the ecosystem which has supported the Miskito for hundreds of years.

Most Miskito are not aware that the turtle are endangered or that the current boom cannot be sustained. There aren't really fewer turtle, the Miskito say, they're just hiding.

(785.27) A woman prepares a meal of turtle meat.

The hard outer shell is removed from a coconut by chipping it off, using a machete. The coconut is ground, mixed with water and pressed through a strainer yielding the "cream" in which the meat is cooked.

(801.34) A man goes to one of the village stores.

There are several small stores in the village, some owned by Miskito and some by non-Miskito. Some stores sell only one or two items, usually staples such as rice and flour that will sell quickly. Other stores stock a wide variety of goods, from vinegar to Vicks.

Prices reflect the high cost of transportation to the village, as well as the 20 percent markup for the storekeeper. Staples such as flour and rice average around one cordoba (U.S. \$0.14) per pound, and are sold in units as small as "a shilling" (25 cents in Nicaraguan money).

(825.38) A woman prepares a meal.

(841.20) The turtle processing plant.

Ten thousand is the number of turtle reported in the official Customs records. Many more may be taken and exported illegally.

L.H. Well, I think the turtle them no finish. But I think the turtle them maybe movin'.

R.S. You can't finish turtle, but I can't really tell you how, how that go like that, because turtle can't finish.

NARR. Should this boom fail, the turtle companies will simply look for turtle elsewhere. Nearly 15,000 Miskito Indians, however, will be left behind with a subsistence system from which an essential part has been removed.

R.Y. The turtle company no help nothin' for we, only want your turtle, but no help nothin'.

Well, I think he goin' to finish it. Not the Miskito people, them can't finish it. But you got the company, factory, two factory, so got to finish it.

(877.37) Miskito children play in the surf.

(889.7) Three boys play in a small dori their father made them.

(897.12) A dori sail blows in the wind.

(902.21) A turtle shell, left after butchering, floats in the surf.

(913.20) Titles

(932.12) End

