

Man and Turtle in the Central Carolines

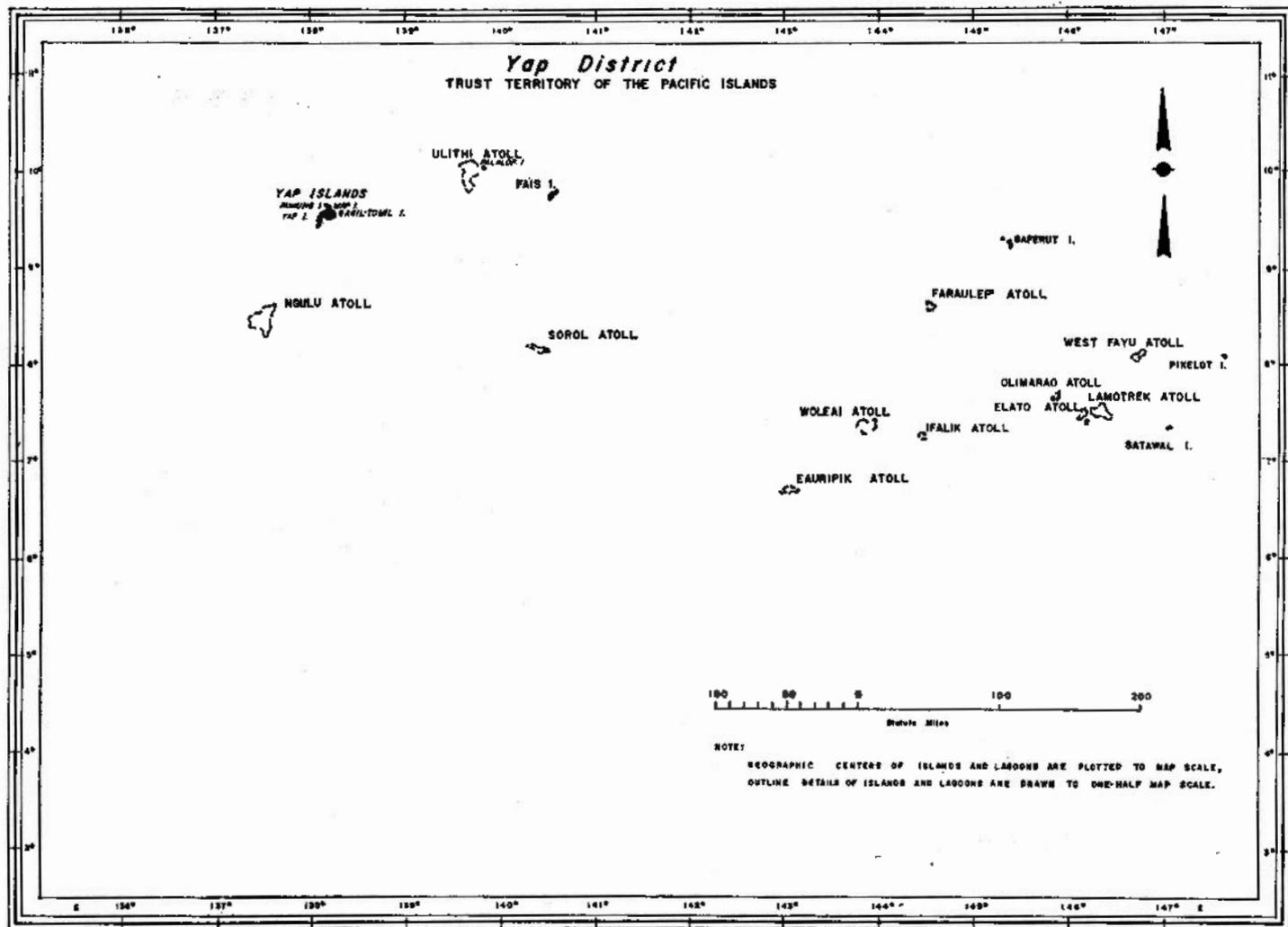
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Abstract

This paper shows the relationships, both past and present, between the people of the central Carolines and the green sea turtle, *Chelonia mydas* (Linnaeus). The report focuses on the islands from Satawal to Woleai, including various uninhabited islands and atolls. Much of the information contained here is embodied in taboos, beliefs, and practices, both past and present, which for generations have been a part of life in these islands. A survey of factors governing the present harvesting of turtles shows that increased pressure in being placed on the stocks in this area. The dependence of these island people upon the sea and the green turtle as a major source of protein make it imperative that the islanders be educated as to the detrimental effect of poor management on the resource.

According to local legend, long before people inhabited the island of Satawal and the rest of the Carolines, a number of birds got together and decided to build a canoe. Built of leaves, it was ready to sail when a rat came to the water's edge and asked to accompany the birds on their voyage. As the voyage progressed, the rat made a continual nuisance of himself—drinking all of the coconuts stored on board and eating most of the copra with which they had provisioned the canoe. Finally, unable to stand it any longer, the birds bade the rat farewell and flew off in the direction of an island. The rat drifted aimlessly, later spotting a large turtle drifting lazily on the surface. The rat summoned the turtle, and related his plight, asking the turtle to take him back to land. The turtle agreed, but made it plain that he was an ocean animal, and would not approach close to land. The cunning rat jumped on the turtle's back unging him to swim as close to the island as he wished. As they approached the island the turtle commanded the rat to jump off and swim ashore. The rat pleaded that the reef fish would eat him if he tried to swim ashore and asked the turtle to get just a bit closer. The turtle swam over the fringing reef and once again told the rat to jump. Once again the rat refused, saying that the fish would surely eat him. So the turtle came up near the beach and begged the rat to jump off onto the sand. The rat, however, was not inclined to, saying that the small land crabs would eat him. He again asked the turtle to get just a bit closer. So the turtle, a creature of the deep sea, crawled up onto the beach for the first time and told the rat to jump off. The rat asked him to go just a little farther inland. As they reached the edge of the woods, the rat quickly jumped down, and called to his former companions, the birds. They descended upon the hapless turtle, flipping him over and rejoicing at their good luck.

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Thusly, the people of Satawal recorded the legendary beginnings and result of the first turtle's slow and laborious ascent onto land. There is no need for the rat's cunning today, however, for many turtles meet a similar fate as the people of Satawal patiently wait for turtles to nest on several uninhabited islands in the vicinity.

Since 1969 I have lived in the island of Satawal and have accompanied the men of the island on numerous turtling expeditions via canoe to neighboring islands. Often, the older men lament the passing of the former "good times" of abundance. Although no quantitative information from the past is available, the previous five years have shown me that increased pressure on the turtles of the central Carolines is evident.

Working with the U. S. Peace Corps and later the Marine Resources Division of the Trust Territory, I have been able to collect information on turtles from throughout the area. This in part, led to the establishment of an experimental turtle hatchery at West Fayu Atoll in 1972, and an on-going tagging program staffed by volunteers from Satawal Island.

General Description of Satawal and its Resource Islands

As the easternmost inhabited island in Yap District of the Trust Territory of the Pacific Islands, Satawal is situated at $7^{\circ}21'N-147^{\circ}02'E$. A total land area of .505 square miles is covered with coconut palms and breadfruit trees, with a large taro patch in the center of the island insuring an adequate supply of food to the islands approximately 400 inhabitants. In contrast to the abundance of food on the island is the marked lack of reef fish.

Since there is no lagoon, the fringing reef flat must provide most of the protein necessary for the Satawal diet. It is probably this scarcity of fish that has been one of the reasons that the people seek other sources of protein. One of the most important sources has been the marine fauna of West Fayu atoll.

The atoll of West Fayu is approximately 47 miles north-northwest of Satawal. Situated at $80^{\circ}5'N-146^{\circ}44'E$, the atoll contains one small island of approximately .024 square miles and is uninhabited except for the times when canoes from Satawal visit to fish and catch turtles. The lagoon is approximately two and one half miles long with depths of up to 22 fathoms. The main entrance to the lagoon is large enough to permit small ships and canoes to enter on the southeast side. In addition, there is another shallow entrance at the far western side which is navigable by canoes, but only during favorable weather.

For an undetermined number of years, surely reaching back into the last century, the people of Satawal have sailed to West Fayu and exploited the resources there. The conveyances used for the journey are the traditional breadfruit planked canoes which are still built and sailed in the central Carolines. These canoes are up to 28 feet in length and the largest of them are capable of transporting five or six mature turtles as well as a crew of up to ten or fifteen men. West Fayu is traditionally linked to Satawal; all turtles and fish taken there are recognized as the property

of all and are placed at the disposal of the chiefs of Satawal for distribution among the inhabitants.

Satawal, in turn, is linked to Lamotrek and other islands to the west, stretching in a complex social and traditional political system that reaches to Yap, almost 600 miles to the west.

In addition to West Fayu, the island of Pikelot 54 miles north-east at 8°05' N-147°38' E is also used as a resource island. Resembling Satawal in that it only possesses a small fringing reef, it nonetheless is close to numerous banks and shoals and is exploited primarily for turtles. Some confusion might arise owing to the islanders' local names for these islands. Pikelot is known as *Pik* (pronounced peek) while West Fayu is referred to as *Pigelo*. In addition, the island of Gaferut at 9°14' N-145°23' E is called *Fayu* in the Central Carolines (Gafrut or *Gaferoor* is a mythical island of local navigational lore.)

Although a part of Yap District, Pikelot is exploited primarily by the people of Puluwat, Pulusuk, and Pulap-Tamatam of Truk District. However, the people and chiefs of Satawal claim it as traditionally belonging to Satawal. In fact, whenever canoes from the Truk District islands sail to Satawal, they invariably stop first at Pikelot, winds permitting, and bring turtles to Satawal. There are various reasons given for the relative lack of Satawal voyages to Pikelot. The most probable is that it is directly in the path of the northeast trade winds, and requires a long and laborious journey. Oftentimes, it is impossible to land due to big waves and more than one canoe from Satawal has met its end on the difficult landing approach.² In comparison to the relatively precarious landing at Pikelot, the lagoon at West Fayu with its easily-navigated passage offers a more hospitable place in which to anchor.

Much less often visited by Satawal canoes are the islands of Olimarao and Elato to the west. Olimarao is uninhabited and is exploited primarily by the people from Lamotrek and Elato. Satawal's traditionally subservient position to Lamotrek and to a lesser extent to Elato has meant less exploitation of Elato and Olimarao by the people of Satawal. Olimarao is situated at 7°41' N-145°51' E, and is more than the day's sail that it takes to reach West Fayu from Satawal. A small lagoon to the south of Elato is called *Namoniur* (literally "the lagoon to the south"). Satawal canoes sometimes visit this island to capture turtles, but only after previously securing permission from chiefs at either Lamotrek or Elato. During the years 1969-1972 there were only two voyages by the people of Satawal to this area expressly for turtles. In contrast, West Fayu was visited over fifty times during the same period.

Nonetheless, turtles are said to be plentiful on Elato and Olimarao. The name

² In the 1950's, two canoes from Satawal were lost on the return to Satawal from West Fayu and eventually sighted Pikelot. The waves were high at the only landing spot, but the men were weary from over two weeks at sea and attempted the landing anyway. The waves pounded the canoes to pieces on the reef and stranded the men for over seven months before they were discovered by canoes from Puluwat. The men subsisted mainly on turtle meat and by some estimates consumed part or all of over eighty turtles during their stay on the island.

Elat (the Carolinian designation for Elato) is also the name of an unidentified type of sea-grass which grows in the shallows of that lagoon. Although not the common "turtle grass" *Enhalus acoroides* (L. f) Royle or *Thalassia hemprichii* (Ehrenberg) Aschers, as is found in Yap, it perhaps provides grazing areas for turtles in the area. During a canoe voyage in November, 1972, four green turtles were spotted inside the lagoon during the canoes' approach to the island. In comparison, turtles are very seldom found during the same period on West Fayu where there is no sea-grass. This might point to a small but rather stable population; however, only further research and tagging will tell.

Since the people of Lamotrek do not practice long-distance canoe voyaging and the people of Elato have only one seaworthy canoe, most turtle hunting by the inhabitants of these two islands is done by outboard motorboat. This method, which is also practiced in such places as the Truk lagoon, calls for one man to stand in the bow of the boat, directing the operator as they chase the turtles over the shallows. When close to the turtle, the men spear it with a detachable-head harpoon secured to a line in the boat. The turtle is then pulled in and wrestled to the side of the boat.

Other Turtle Islands in the Central Carolines

The island of Gaferut containing .043 square miles has been used as a resource island for the people from Faraulep, and to a lesser extent by those from Woleai and Ifaluk, in much the same fashion that Pikelot is used by people from Puluwat and the Western Truk islands. In recent years, however, its use has declined owing to a number of factors. One of these is the lack of canoes and men on Faraulep due to a tragic loss of most of the able-bodied men and all of their sea-going canoes during a typhoon in the 1950's. The island is sometimes visited by the Trust Territory field trip vessel, and occasionally passengers from Faraulep, Ifaluk and Woleai take turtles to be carried to their home islands.⁸ A unique feature of Gaferut is a reef extension on the northwest side of the island which contains a large, deep hole big enough to accommodate many large turtles. The turtles often stay in this natural hole during the day or days preceding their nesting. A standard method of capture on Gaferut is to silently sneak up on this depression in the reef and capture the turtles resting there. The island itself is heavily wooded with a large population of sea birds, only one coconut tree and no fresh water. This makes a rather inhospitable place for humans and, except for government field trip vessels it is seldom visited.

Woleai atoll is one of the larger outlying atolls in Yap District and contains sixteen small uninhabited islands in addition to the five inhabited ones. Occasional turtles are found in the lagoon, but nesting on the beaches is not widespread. Approximately ten years ago, the people of Siliap island in the atoll brought back a

⁸ Such an event occurred in August of 1971 when passengers aboard the vessel M/V *Palau Islander* captured ten or twelve turtle in one evening and transported them to Woleai and Faraulep for consumption.

small hatchling turtle from Elato. They raised it in a small bowl, then transferred it to a 55 gallon drumcan bottom as it matured. When two or three years old, it was tethered to a coconut tree on the beach by means of a hole drilled in one of the marginal plates of the carapace. It was given the name *Mangnos* and eventually became tame enough to be let loose within the lagoon, often returning to the beach to be fed by the islanders. The women, after preparing food on the island, would bring baskets of breadfruit scrapings and copra down to the water's edge and the now untethered turtle would return to eat. The turtle was eventually killed and eaten, but details as to how this happened are sketchy. Some men say it was accidentally speared by men in a motorboat while they were hunting turtles in a distant part of the lagoon; others say that it was purposely killed and eaten during a time when there was not much fishing being done on the island due to bad weather. Whatever its eventual end, it is agreed that it spent a long time in the lagoon as a pet of the people of Siliap.

Thirty miles east of Woleai is Ifaluk atoll. An occasional turtle nests on beaches of Ella islet, but, like Woleai, this is an uncommon occurrence. In the past the inhabitants considered turtles food for the chiefs only and many people of the island had never tasted them. Even today, after their conversion to Christianity and renunciation of past taboos, many of the people on the island refuse to eat turtle meat.

The other important turtle areas in Yap District are the outer islands of Ulithi atoll. Traditional customs are still strong within the atoll and the turtles are considered the property of the chiefs of Mogmog, the highest caste island in the atoll. Information about turtles from Ulithi is sketchy, but the relatively large numbers of nesting turtles reported on two small islands just outside of the atoll in particular, warrant a closer study. During at least one time of the year, graduation period for the Outer Islands High School at Falalap, Ulithi, permission is given for boats to procure turtles on the islands. According to one source on Falalap, feasts of turtles caught during the one or two days preceding the graduation in June have averaged thirty or more turtles during the past few years.

Turtles on West Fayu

METHODS OF CAPTURE

As has been mentioned above, the people of Satawal sail their canoes to West Fayu in search of turtles and fish to obtain protein for the islanders. This is accomplished in either single canoes, or in groups of up to six canoes, each under the direction of a navigator employing the traditional navigational techniques native to this part of the Carolines. Once the island is reached, usually after a ten to fifteen hour sail depending on wind and sea conditions, the canoes are either anchored in the lagoon near the island or pulled inland if a longer stay is anticipated. If the island is reached at night, as is often the case, one of the younger members of the crew immediately jumps off in the shallow water and proceeds to walk around the island

looking for nesting turtles or signs of nesting. If one is spotted on the beach, it is flipped over immediately. This sets the tone for the remainder of the stay, as each night various men are delegated the task of watching for nesting turtles as well as those that might be swimming in the shallows near the island.

During the day, a close watch is kept for mating turtles within the lagoon. If mating turtles are spotted, a canoe races to the position. The men affix large hooks to strong lines and then place the hook in a notch in the end of a piece of bamboo or stick approximately six feet long. The ends of the lines are then tied to a large boom carried on the canoe or, if the line is not long enough, tied to the canoe itself. Two men are given the responsibility of silently swimming up behind the mating turtles with the hooks. They then swim under the mating turtles, each man hooking one with the hook in the bamboo into the skin on the turtle's neck. A sharp watch must be kept for sharks which occasionally cruise around mating turtles and take nips off their flippers. For the most part, the mating turtles are oblivious to what is taking place around them. The swimmers are usually successful in their attempts. Once hooked, the turtles immediately sound and a tug-of-war ensues, with the turtle usually losing in the end.⁴ Oftentimes the necessary hooks, lines, or other paraphernalia for this type of capture are not available. This happens most often when canoes which are on fishing voyages sight mating turtles. In this case, the men still swim up to the unsuspecting turtles, grabbing them in a "full nelson" hold from the underside. The man's hands are then placed under the chin of the turtle and force its head back, minimizing the chances of being bitten. Other men then jump off the canoes with whatever ropes are available and attempt to tie the front flippers in a manner which will allow them to drag the turtle on board. This is a much more dangerous and less successful operation than the hook and bamboo pole method.

During moonlit nights on West Fayu, it is also possible to tether a previously captured female to a tree, and allow her to swim in the shallows around the island. Men then climb into the trees near the water's edge and wait for her to attract males. This method, known as *efitefit*, is more successful on an island like Pikelot where there is no lagoon, but is practiced elsewhere, as well.⁵

DISPOSAL OF HARVESTED TURTLES

While on an island, the crews of the canoes usually feast on turtles if they are plentiful. In the case of captured mating turtles, the males are usually eaten on West Fayu, with the larger females saved for transport to Satawal. Turtles that are

⁴ In one instance, however, the line didn't prove stout enough and the female broke loose. Later that same year a nesting female was turned over by the people of Lamotrek on a small reef island in their lagoon. The turtle was trailing about six feet of line.

⁵ Although the methods described are obviously not the best ways of capturing turtles from a conservationist's point of view, it must be remembered that the people here are procuring food for themselves and their families in a never-ending struggle against a sometimes hostile environment. It should also be noted that the people of Satawal are concerned directly with their own survival and means of procuring food are ultimately justified in their eyes by the immediate results produced.

caught in the waters around the island are returned there alive and rested upside down on their carapace until such time as they are eaten or prepared for transport to Satawal. For the purpose of cooking, they are simply dragged to the beach and placed in a shallow pit. A small incision is made just in front of the left rear flipper and the small intestine and colon are pulled from the turtle and cleaned. The intestine is then cut into pieces and roasted on sticks over the fire. Usually the flippers are cut off before this operation to minimize the chances of injury to people preparing the turtle. Sometimes, however, a blow to the head renders the turtle unconscious and makes this operation unnecessary. The incision is then plugged with a handful of leaves and a fire is built on the plastron of the turtle. After cooking for 25 to 45 minutes, the plastron is ripped off and the turtle is then systematically butchered and the meat divided. All meat and internal organs are eventually consumed and there is very little waste.

If the turtles are to be transported to Satawal, they are left in the shade of the trees of West Fayu and can last ten days to two weeks without any ill effect. On the day that the canoes are being prepared for the return voyage, the turtles are dragged down to the beach and their flippers are securely tied together over the plastron. They are then hoisted onto the canoes and placed under mats or under the large seats of the canoe for the return trip to Satawal. Once on Satawal, they are placed under the authority of the chiefs, who ultimately decide how many and on what day they are to be consumed.⁶

Local Lore Relating to Nesting

Voyages to West Fayu and other turtle islands are governed by many factors. Wind and sea conditions are, of course, the primary ones. If conditions are good but prospects for turtles poor, a voyage will still be undertaken for fishing or collection of a variety of clams, the most numerous being *Hippopus hippopus*. In addition, the navigators time their visits to follow stars which denote the seasons. The rising of certain stars or constellations signal months or seasons which bring good winds, storms, and nesting turtles. This sidereal calendar is followed almost explicitly in connection with canoe voyages. For example, a trip will not be undertaken during a certain period in which a "storm star" is visible, even if the current weather is favorable. The calendar is followed somewhat more loosely in relation to turtles but is nonetheless important.

In general, the stars followed correspond to existing knowledge of mating seasons, beginning in early April and continuing until August or September (Hirth, 1971). In addition, however, the characteristics for turtles that appear with each star are different. The turtle nesting traditionally begins with the appearance in

⁶ During 1972, a total of 42 turtles was captured, three males and 39 females. Of these, sixteen were consumed on West Fayu, ten were partially consumed, and partially salted and returned to Satawal. The remainder were returned live to Satawal on the canoes.

the morning of the star *Mailap*. *Mailap* is the Carolinian name for Altair and it is followed in succeeding months by the stars denoted in Carolinian as *Sepi*, *Suta*, *La*, *Ku*, *Yalimatu*, *Mweriger*, *Ul*, *Uliol*, and *Man*. (See Table 1).

Table 1. Characteristics of turtle nesting during the sidereal month.

STARS		CHARACTERISTICS
Carolinian	Western	
<i>Mailap</i>	Altair	Begins the nesting season.
<i>Sepi</i>	Dolphin	Continued but sporadic nesting.
<i>Suta</i>	Aquarius	Nesting more frequent, but still not continuous (i.e. turtles not nesting each night during the period).
<i>La</i>	Pegasus	Nesting more frequent than above, but still not continuous
<i>Ku</i>	Cetus	Same as above
<i>Yalimatu</i>	Andromeda	Increased activity, but still no continuous nesting.
<i>Mweriger</i>	Pleiades	During the days when first visible in the early morning, nesting sporadic. As star rises in the sky each succeeding morning, more and more turtles nest than during previous nights. When the star is highest in the sky but before the next is visible, the highest incidence of nesting occurs. Although more numerous than at any other time, the turtles are said to be smaller, as a rule, than at any other time.
<i>Ul</i>	Aldebaren	When this star is visible, turtles are not as plentiful as the previous month, but those that do nest are generally larger.
<i>Uliol</i>	Orion's Belt	The turtles are less frequent than the two previous months, but generally larger than those of <i>Mweriger</i> .
<i>Man</i>	Procyon-Sirius-Canopus	Turtle are smaller than the previous months and sporadic nesting occurs. This represents the last star during which turtles are generally taken and specific voyages undertaken to take turtles. However, oftentimes turtles are taken up until the end of the year, during succeeding months, with these turtles considered holdovers from this particular month.

The information contained in the table is generally vague and leaves room for interpretation and variation. It is, nevertheless, an integral part of the beliefs relating to turtles in the Carolines. This information relates to West Fayu, as that is the primary island where turtles are taken by people from Satawal. Other turtle islands with which they are familiar include all those mentioned previously as well as East Fayu in Truk District midway between Namonuito atoll and the Hall Islands. All of these islands stretch roughly in an East-West chain, as does the entire Caroline group. It is believed by the people of Satawal that nesting occurs first on the islands

to the east and then proceeds to the islands to the west. Thus, it is held that East Fayu is the first island to have turtles nest, followed in order by Pikelot, West Fayu, Elato-Namoniur, Olimarao, Gaferut, and then the islands in the Ulithi atoll. The last mentioned is never visited by Satawal canoes, however, being almost 400 miles to the west.

Taboos and Beliefs Relating to Turtles

Until fairly recently, the people of Satawal did not come under the influence of the Catholic missionaries of the Carolines. It has only been since World War II that the entire population of the island has been baptized, and memories of former taboos and practices relating to turtles are still vivid in many minds. For the most part these are not spoken of, but, when mentioned in conversation, are joked about and people laugh at themselves for adhering to such customs and beliefs. A quick survey of these taboos will show that they indeed are based on superstition, but as Falanruw (1971) has shown, oftentimes these beliefs, centered on a traditional culture, formed a "buffer" between man and his environment, preventing him from destroying his island or its resources.

One of the oldest and most important taboos decreed that no turtle could be killed on Satawal. All turtles caught on West Fayu had to be slaughtered on the island and the meat brought to Satawal. The intestines, eggs, and so forth were cooked in an earth oven and used for food on the return trip for the crew. All meat adhering to large bones such as the pectoralis major had to be taken to Satawal uncooked and only then could it be prepared. In the past pandanus sails were used for canoes and navigational conveniences such as compasses were unavailable. This usually meant a long two or three day journey by canoe to Satawal. It is not hard to imagine what kind of condition some of the meat must have been in, even protected from the tropical sun, by the time it reached Satawal.

Once the canoes reached Satawal, the edible meat was divided among the people. After the islanders had eaten the turtle, a man was delegated to go into the taro patch and collect a small amount of mud and certain types of leaves. These were then placed, along with a solitary taro leaf, in the middle of the path. No one, after consuming turtle, could walk into the woods or in the direction of the taro patch without first stepping onto the mud placed along the path. In addition, those men who helped pull the canoes onto the beach after the voyage from West Fayu could not walk into the taro patch without first stepping into the basket containing the taro patch mud. This custom, termed *pul-lim*, is not practiced today.

There are two Carolinian clans (of the eight represented on Satawal) which have turtles as their totems. The members of these clans, and their spouses had to observe taboos in addition to the island-wide taboos. One of these decreed that any pregnant woman or her spouse from either of these two clans (Souwen and Katamang) could not eat turtle. Although some of the customs surrounding pregnant women still exist, for example the one which prohibits men with pregnant wives

from going fishing near drifting logs, this one regarding turtles is no longer practiced.

Much more could be said about the beliefs and taboos surrounding canoe voyaging, and more particularly voyaging for the purpose of procuring turtles. Suffice to say that, for the participants, it was a rather involved and ceremonial time, shrouded in a cloud of mysticism and superstition that no one dared mention and question, and yet never understood. Today, much of the ceremony is removed but the superstitions remain.

While living on West Fayu, the men regularly prayed to a small house constructed on the west side of the island. Within this house the spirit of *Wy-im* lived. Whenever passing near the house, one had to bend down and walk in a stooped-over position, shouting *Siro!* (excuse me). The navigators of the canoes that had voyaged to the island prayed to *Wy-im* for good winds and, of course, turtles. They also practiced a custom of *fee-ro*—that of cutting a copra nut in half, roasting half over a fire, then rubbing the oil over the posts and other structural parts of the spirit's little house. Prayers were then said, or chanted, requesting many turtles, good winds, and so forth.

Factors Governing Present Harvesting of Turtles

Unlike the islands of Lamotrek, Woleai, and others to the West, the people of Satawal have retained much of their canoe building and navigating skill. Much of this is due directly to the need to journey to West Fayu for turtles. In the islands to the west, where lagoons offer larger amounts of sea fauna and the opportunity to utilize motorboats, much of this traditional knowledge has been discarded. In many ways, this can be seen to have a direct effect on the harvesting of turtles. For example, the uses of motorboats in Lamotrek and Elato have meant that turtles are more vulnerable during all seasons in which they are present. Periodic times of calm weather prevail during the summer months which prohibit the people of Satawal from voyaging to West Fayu. During these periods, motorboats may be effectively used on Lamotrek and Elato for the purposes of hunting turtles. During one period on Lamotrek in 1972, motorboats journeyed to the various islands in the lagoon and Namoniur, capturing ten to twenty turtles on different occasions and returning them to Lamotrek. For the same number to be harvested on West Fayu by the people of Satawal would mean a major expedition by a flotilla of canoes which might be gone from the island for a week to a month. Indeed, during the last four years the largest number of turtles returned to Satawal via sailing canoes was sixteen in April of 1971 for a feast honoring a recently deceased chief.

In addition to the previously mentioned taboos observed on Satawal, many other factors combined to make a turtling expedition to West Fayu hazardous and a major undertaking. Until after World War II, there were no coconuts on the island at West Fayu; then, shortly after the war, a major infestation of an unidentified insect killed many of the bushy trees on the island which had prevented coconuts from receiving enough sunlight to survive. People from Satawal then transported

copra nuts to the island and planted much of the island in coconuts. The coconuts have been the single most important change to the island, for it has meant that men have been able to increase the length of time they might stay.

Another factor that has meant more frequent voyages are the improvements in materials used in the manufacture of the traditional canoes. Up until the middle 1950's, pandanus sails were used exclusively on all canoes on Satawal. The introduction of cotton canvas sails greatly increased the speed and performance of the canoes, shortening the time it took to complete the voyage. Recently, the introduction of dacron sails has lessened the voyage time even further. Other improvements and introductions, such as the magnetic compass, have meant a greater confidence in voyaging and a strong probability that many more voyages are undertaken now than in the past.

Many of these improvements, including introduction of motorboats on other islands, have occurred just during the past five years. This has meant greatly increased pressure on the turtle populations in all of the areas visited by inhabitants of the central Carolines, with the possible exception of Gaferut.

Occurrence of Other Species of Marine Turtles in the Area

Two other species of marine turtles have been reported in the area under discussion. The leatherback turtle, *Dermochelys coriacea* (Linnaeus) has been sighted drifting at sea and in one incidence (Woleai, 1971) was captured and transported to the island for consumption. Turtles of this variety are sometimes sighted by voyaging canoes and are known by the name *Wongera*.⁷

The other species present in the area is *Eretmochelys imbricata*, known to the islanders as *Mau*. In pre-Christian days, this hawksbill turtle was considered sacred to the people on Satawal and was not disturbed, either in the water or when nesting. The shell provided many essential items for the people such as fishing hooks, combs, and the like. All shell thus utilized was procured from other islands, principally Puluwat and the islands to the east. Occasionally people from other islands would harvest hawksbill on Satawal for shell utilization. In such cases, they were required to build a small house on the beach away from other houses of the island and to carry on their operations out of sight of the local inhabitants. Today on Satawal this taboo is no longer observed and the turtle is captured for utilization whenever sighted. As in the case of Ifaluk, many people on the island refuse to eat the meat, giving various excuses for doing so. This is another example of the "buffer" created by the Carolinians to protect their environment and the creatures within it. Hawksbills today are extremely rare throughout the area and Satawal is no exception. During the year 1972 only two were taken near the island, with only two more sighted at different periods. Those taken were consumed with the carapace used to barter with passing ships.

⁷ One small leatherback was captured near Satawal on 2 September 1972. Its carapace measured 694 mm in length and 482 mm in width. It was released with Marine Resources tag #105 1-1052 affixed to the trailing edges of the front flippers.

Conclusions

While it cannot be shown quantitatively that many of the taboos formed the buffer previously mentioned between the people of Satawal and their environment, it can nonetheless be seen that there was a very close relationship between man and turtle and that that relationship continues to exist. One of the prime reasons for the continuing use of sailing canoes and the attendant system of navigation used to sail them are the turtles of West Fayu. Natural occurrences such as tropical storms or periods of calm, force the canoes to remain on Satawal, thus giving some measure of protection to the turtles of West Fayu. In other islands, however, the increased use of motorboats means that this important respite enjoyed by the turtle population of West Fayu will decrease, especially in places like Lamotrek and Elato.

The taking of turtle eggs had traditionally not been covered by taboos. The exploitation of this resource has continued unchecked on almost all islands in the central Carolines. The comparison of one ounce of protein to a possible three hundred pounds needs no elaboration here. However, one must remember the local inhabitants' beliefs that the sea has been, and always will be, an adequate provider for all things. In my discussions with various inhabitants, none expressed great concern over the taking of eggs or, when concern was expressed, it was always by a bird-in-the-hand philosophy.

In the case of the hawksbill turtle, its almost complete disappearance from the waters around Satawal since the pre-war taboos were lifted has not deterred islanders from attempting to capture those few that are sighted.

Existing Trust Territory conservation laws have not been publicized or enforced in any of the outer islands of Yap District. Recommendations for stricter enforcement of such laws such as those comments made by Dr. J. R. Hendrickson, the Marine Turtle Consultant to the Food and Agriculture Organization of the United Nations, to the South Pacific Islands Fisheries Development Agency should keep in mind the needs of the islanders who utilize this resource (Hendrickson, 1972).

In district centers, such as Truk and Yap, the taking of marine turtles is an occurrence best equated with deer hunting in the United States. Often-times the hunting of turtles is undertaken with a form of sport in mind and, although the turtle is often eventually consumed, it does not figure so prominently in the lives of the inhabitants as it does in the central Carolines. In legislating against the taking of both turtles and eggs, special consideration should be given to Dr. Hendrickson's recommendation that "special exemption by government permit for authorized . . . cultural activities . . ." be issued by the Marine Resources Division of the Trust Territory. Nothing could be a more important cultural activity than sustaining the culture itself. If education of islanders to the detrimental effects of taking eggs and not allowing turtles to nest before capture is undertaken, it is felt a reasonable management of the resource can be attained, providing the harvest methods remain the same.

At the present time, there exists no economic incentive for the commercial

raising of marine turtles in the area. Yet, as has been shown, the turtles remain an important part in the maintenance of the way of life in the islands. Future efforts at conservation should be made with this concept in mind and the people of the area should be included in all discussions relating to the conservation of what basically remains their own resource.

The people and chiefs of Satawal have expressed their concern over dwindling reef fish populations in the area. In one instance, they have placed a taboo on the taking of fish on one section of the reef at Satawal, reserving this as a "breeding ground" for fish to supply the rest of the reef. This area is fished only during certain authorized days of the year, these days numbering not more than five during the past three years. Turtles, however, present a different problem, for their movement patterns are unknown and unlike the permanent population of reef fish, they come and go with a regularity that engenders a faith in their perpetual return. Although this may be a difficult obstacle to overcome in conservation education, it is not an impossible one, and if future efforts include a certain amount of sensitivity to the situation vis a vis islanders' lives and culture, those efforts have a good chance of success.

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PLATE 1

- A. Author flipping over mature female for measurement and tagging.
- B. Female turtle returning to sea after nesting in the early morning.



A.



B.