

Traditional Time Reckoning and Resource Utilization¹

GARY A. KLEE

*Department of Geography, The Pennsylvania State University, State College,
Pennsylvania 16802*

Abstract.—The perception, utilization, and consequent management of natural resources can partially be attributed to a culture's perceived model of "cyclic time". This field study focuses on an important aspect of cultural ecology which is usually neglected in studies of traditional subsistence. The study area, Ngermetengel, is a small fishing village in Micronesia.

Introduction

In order to study Ngermetengel's management of natural resources, it is necessary to first understand this community's traditional system of time reckoning. To the village elders, the heavens and the phases of nature serve as a clock and calendar to be read and sometimes acted upon. The position of the sun, the rising and setting of the stars, the waxing and waning of the moon, the ebb and flow of the tide, the changing wind directions, the height of the breakers on the reef, the natural smells within the village, and the life cycles within the lagoon all serve as a system of time reckoning, and consequently, are discussed in order that "cyclic time" be understood as a part of this Palauan village landscape.

The geographer records interrelationships between man and environment as they affect place, but he often neglects the invisible forces of nature. Too often he has limited his scope to : (1) the elements or things that make up the landscape; (2) the processes or ways in which the elements in the landscape originated and developed; and (3) the agents or individuals or groups that activate the processes. But these characterizations do not adequately describe an area that is very much alive. One means of capturing a landscape's dynamic quality is to include in the study a discussion of "cyclic time". Yi-Fu Tuan (1966) introduced this notion of "cyclic time".

Having this temporal framework, it is possible to discuss optimum times of human activities in Ngermetengel as they relate to perceived aquatic and terrestrial cycles. This study shows how the securing of fish is the most regular and predictable of subsistence activities in Ngermetengel. The village's fishing grounds are mapped

¹ This study is part of a larger project on Palauan cultural ecology carried out in 1967-1969 during a Peace Corps contract. Additional data were obtained in Micronesia 1971-1972, supported by a University of Oregon Research Grant for Field Work.

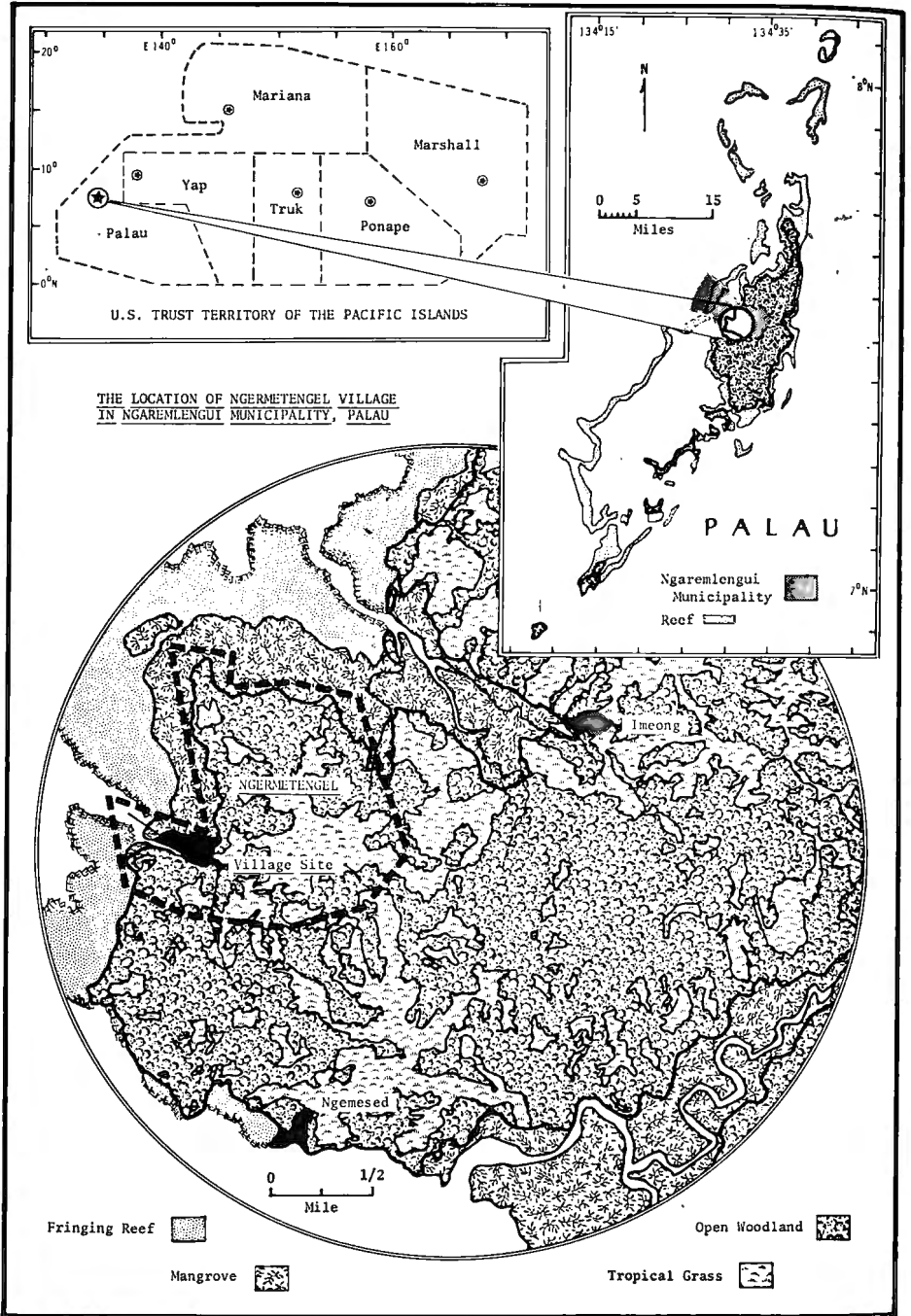


Fig. 1. The Location of Ngermetengel Village in Ngaremlengui Municipality, Palau Islands, U. S. Trust Territory of the Pacific Islands.

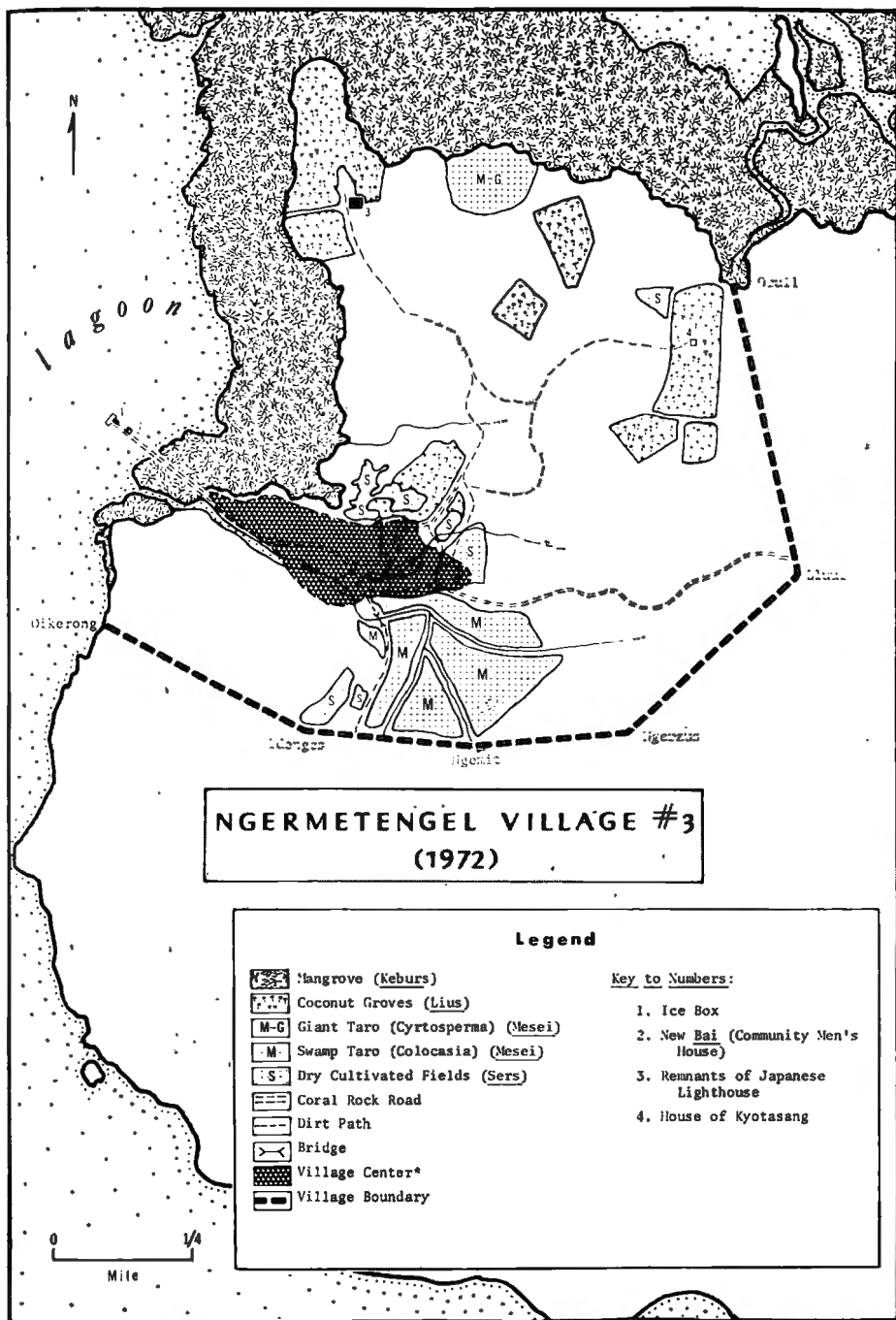


Fig. 2. The location of Ngermetengel Village on the western coast of Babelthup Island, Palau, Micronesia. Terrestrial resource areas exploited by Ngermetengel Villagers are shown. Number three in the map title refers to the third major expansion of Ngermetengel's boundary.

and a description is included regarding the optimum times to use particular types of fishing devices and techniques. It also shows how the trees, plants, and shrubs on the land also have their particular cycles throughout the year, and how man rotates his existence and activities around the blooming of flowers and the harvesting of fruits.

By combining the data relating to time reckoning with the information on human activities, an ideal model calendric system is presented. With such a device, it is possible for the reader to view this culture's perception of "cyclic time". Questions are then raised as to whether or not this ideal model corresponds with actual events, and more importantly, what is the role of time reckoning in resource utilization and conservation.

The Palauan and His Islands

Village and Environment

Ngermetengel village lies on the west-central coast of Babelthuap Island, seven and one half degrees north of the equator (Fig. 1 and 2). Babelthuap, approximately twenty-five miles (40 km) in length and ten miles (16 km) at its widest point, is a volcanic island with a maximum elevation of 794 feet (242 m) in the northwest section. Because of the mangrove swamp that surrounds much of it, the majority of villages on the island have a pier extending through the mangrove so that boats can land and discharge people and/or goods. The interior of the island has a countryside of either grassy hills and flatlands (*Ked*) or hills and flatlands which are heavily wooded or jungled (*Oreomel*).

The climate of Ngermetengel is characterized by high temperatures with little diurnal and annual variation, abundant rainfall with a July maximum, consistently high humidity, a surface wind that has seasonal characteristics, and an occasional typhoon. Hence, the climate is maritime and tropical.

Population and Livelihood

The Palau District of the U. S. Trust Territory of the Pacific Islands is subdivided into sixteen chartered municipalities, ten of which are located on Babelthuap. Ngaremlengui, the municipality in which Ngermetengel is located, lies midway along the western coast of Babelthuap and covers the west-central section of the island. Ngermetengel village has an average total year-round population of 210 persons.

Despite rapid westernization occurring throughout the villages of Palau, fishing and subsistence agriculture remain the primary means of livelihood. With the exception of extracting certain marine animals off the reefs during low tide, the lagoon area is the habitat of the men. Men do the fishing, whether from a bamboo raft, a speedboat, or a 35-foot (11 m) commercial fishing vessel. It is the men who hunt the turtle, net the fish, or spear the crocodile. It is also the men who clean the fish, butcher the pig, and provide the protein (*Odiu*) for the meal. Although fishing in Ngaremlengui is undertaken for the primary purpose of providing the protein por-

tion of the meal, fishing for commercial purposes is on the increase.

Women also have their place in traditional Palauan society, and that is in the taro swamps. Propagation of taro and children are the primary roles of even modern Palauan women. With the exception of a few men who regularly work farms of cassava or an assortment of other food crops, field agriculture is and always has been the work of women. Just as the lagoon is considered the territory of the men, the swamp and the cultivation of taro is considered the women's territorial activity. Simply stated, it may be said that the men provide the protein (usually fish), and the women provide the starch (usually taro and/or cassava).

It has been said by many who have been familiar with Palau, specifically with western Babelthuap, that Ngaremlengui and particularly the village of Ngermetengel hold two things within their grasp—the “traditional” way as well as the “progressive” way. Although Ngermetengel may be one of the most rapidly advancing outer island villages, it is simultaneously one of the most traditionally based village societies. Ngermetengel, therefore, emerges as a moderately progressive little fishing community, a community that holds dearly to its ancestral customs while at the same time looking for new ways of accomplishing old and familiar tasks. It is within this acculturated framework, along with the temporal perspective that follows, that the natural rhythms of Ngermetengel must be viewed.

Ngermetengel Village

System of Time Reckoning

They had no method, that was observed, of measuring time but by the height of the sun. Their seasons were divided into wet and dry, as in other tropical countries. They had some knowledge of the stars, having names for several of them, which they pointed out to our people.

Keate (1788)

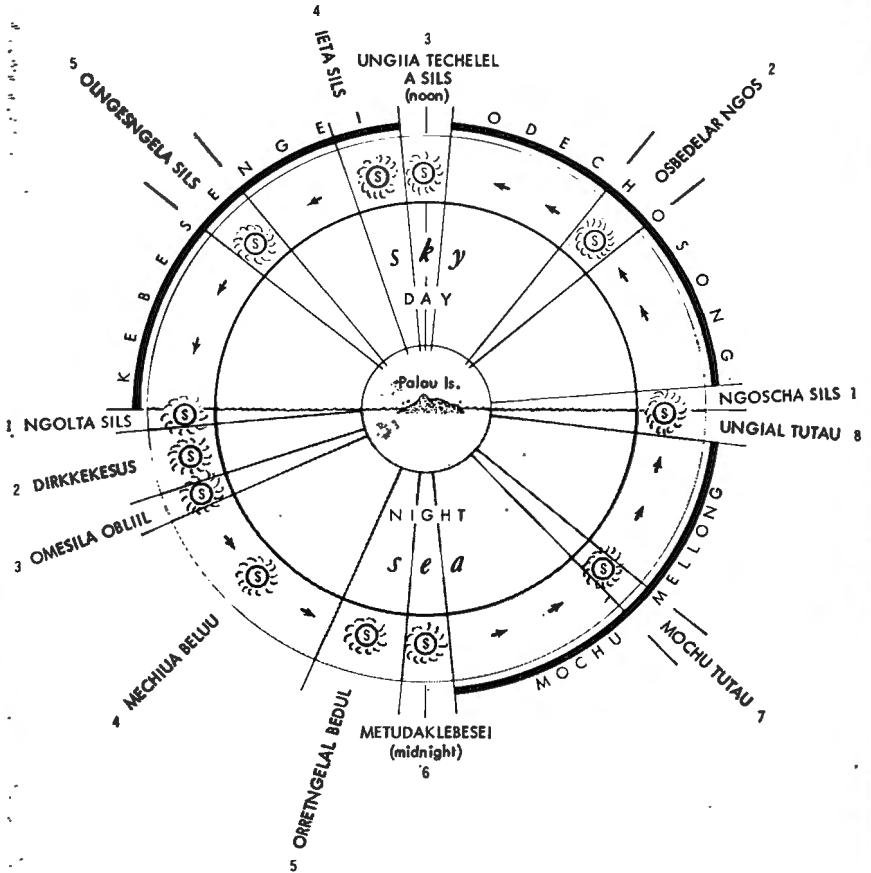
Accepting Nilsson's units of classification, time phenomena have been divided into two main groups: (1) the phenomena of the heavens—the sun, moon, stars, and (2) the phases of nature—variations in climate, plant and animal life (Nilsson, 1920). Owing to its close association with the moon, I have included my discussion of tidal cycles under the classification: the phenomena of the heavens.

I. The Phenomena of the Heavens

A. The Sun

The traditional Palauan day begins when the first rays of sunlight break over the eastern horizon (Fig. 3). From this point to the time when the ball of the sun can be clearly seen is referred to as *Ngoscha Sils* (sunrise). The second period of the Palauan day begins when the sun is roughly at a forty-five degree angle in the sky, thus splitting the span of time between sunrise and noon. Since Palauans had no instruments to measure the height of the sun, these heights were approximations. This short period is referred to as *Osbedelar Ngos*. The third period of the day is

THE TRADITIONAL PALAUAN DAY



TAL SILS (one day) -- From the Beginning of the First Light to the Time when the Sun has gone below the Horizon

Fig. 3. Time reckoning by the location of the sun.

when the "sun rests on one's head" (*Ungiia Techelel a Sils*). A general term for the entire period from the end of sunrise to the beginning of the noon hour is referred to as *Odechosong*.

About an hour after the noon hour, there is a short period which is referred to as *Jeta Sils*, the fourth period of the day. After the sun reaches approximately forty-five degrees from its highest point in the sky, you are in the fifth and final period of the day, called *Olngesngela Sils*. A general term for the entire time span from the end of the noon hour to the time when the sun begins to set is referred to as *Kebesengei*.

As with many non-western societies, the night is considered as a separate entity from the day. *Tal Sils* (one day) does not encompass both the period of sunlight and darkness (24 hours), but merely the period from the beginning of the first light to the time when the sun has gone below the western horizon.

In precontact times, it was believed that Palau was the only land mass in the world. Hence, when the sun went below the horizon, it was believed that it had sunk beneath the sea, would travel underwater to the other side of the island, and would then emerge from the sea at sunrise. The period from the sun's first sinking into the sea to its emergence on the other side of Babelthup is the traditional Palauan night.

This phase of the cycle, the Palauan night, is divided up into eight periods. *Ngolta Sils* refers to the beginning of sunset to when it is completely dark. The second phase is referred to as *Dirkkekesus*, that part of the night from the end of sunset to when the villagers begin to eat their evening meal. *Omesila Oblil* is the period when most people within the village are eating their evening meal. The next and fourth period is called *Mechiua Beluu*, when most people within the village are asleep. *Orrengelal Bedul*, the fifth period, roughly translates into "the period of the night when everybody could be hit on the head and they still wouldn't wake up." *Metudaklebesei*, the sixth period, translates nicely into "the middle of the night."

Mochu Tutau, the seventh period of the night, is the middle hour between midnight and sunrise. When the sky is beginning to lighten but the ball of the sun still cannot be seen, this is the period known in olden days as *Ungial Tutau*, the eighth and final division of the night. A general term for the entire time span from the midnight hour to the beginning of *Ungial Tutau* is referred to as *Mochu Mellong*. As *Ungial Tutau* ends with the onset of sunrise *Ngoscha Sils*, the night has ended, and the cycle is complete.

B. The Moon

THE MONTH (*Tal Buil*). Whereas the traditional Palauan day is considered in suns (*Sils*), months or their equivalent are considered in darknesses (*Klebesei*), fifteen evenings from new moon to full moon, fifteen evenings from full moon back to new moon (Fig. 4). The total number of darknesses necessary for a month is called *Okedei el Klebesei* (thirty darknesses).

The Palauan month begins when the rim or crescent of the new moon first appears in the west. This darkness is known to the Palauan as *Ta Buil* or *Tara Rengikel*.

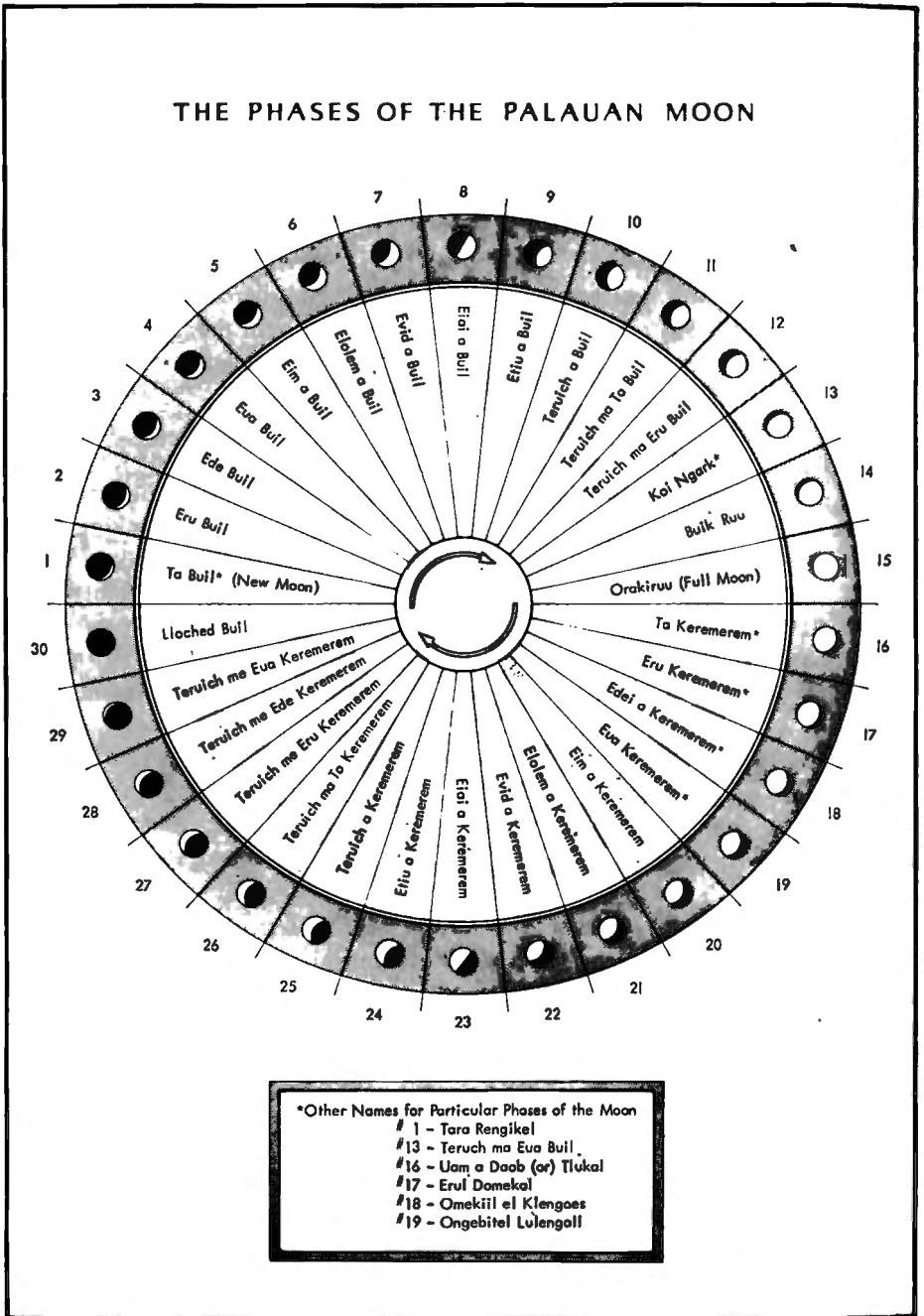


Fig. 4. Time reckoning by the phase of the moon. There is little concern in traditional Palauan society that the "Synodic Month," the period from one new moon to another, is only 29 1/2 days, not thirty. Nor are they concerned that the "Sidereal Month," the moon's revolutions in relation to a fixed star, is only 27 1/3 days.

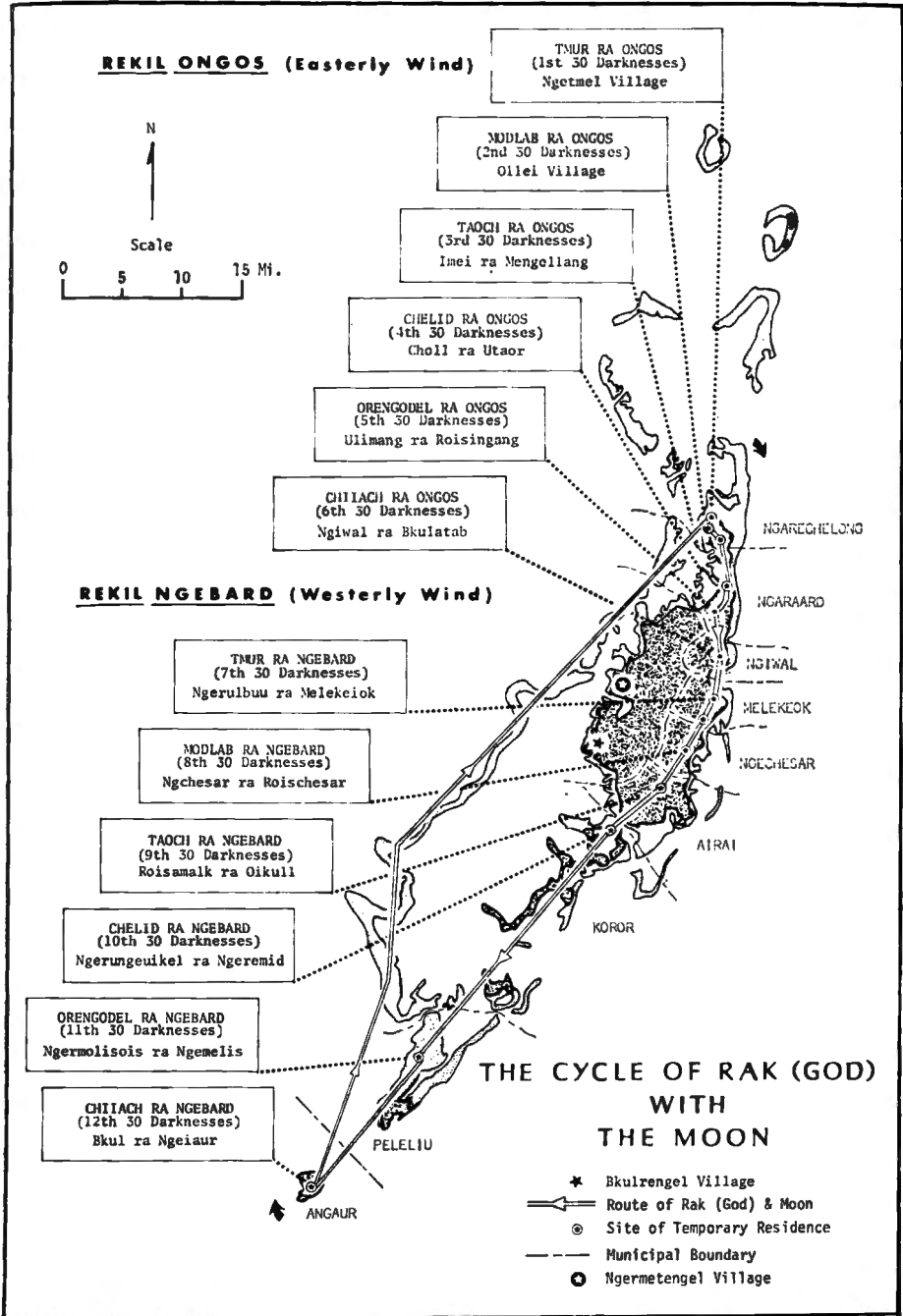


Fig. 5. The twelve months of the Palauan year.

Both names represent the first phase or first moon of the new month. Fifteen darkneses after the appearance of the new moon, the Palauan islands experience the phase of the moon called *Orakiruu* (full moon). Beginning with the sixteenth darkness, the moon begins to become smaller. Since the Palauan word that expresses this shrinking of the moon is *Keremerem*, *Ta Keremerem* refers to the first phase in which the moon appears to become smaller, this period, of course, being the sixteenth darkness of the Palauan month. *Lloched Buil* is the Palauan term for the thirtieth and final phase of the moon as it orbits planet earth, that phase in which the moon appears to be totally dark. With the new moon *Ta Buil* appearing in the next darkness, the Palauans are launched into a new cycle.

THE YEAR (*Tal Rak*). The traditional Palauan year is made up of twelve lunar months, each month consisting of thirty darkneses. It would seem then, that there were 360 darkneses in the Palauan year. This is not necessarily so because the early Palauans never counted darkneses beyond the thirty that made up the month. These twelve months are divided in half: half belonging to *Rekil Ongos* (the period of easterly winds) and the other half belonging to *Rekil Ngebard* (the period of westerly winds).

In traditional Palauan thinking, the moon was made by Chief Iechadrengelel who lived in Bkulrengelel, a village on the western coast of Babelthuap Island (Fig. 5). *Rak*, one of many legendary Palauan gods, then took the moon from Chief Iechadrengelel and went to Ngetmel village in Ngarechelung Municipality. With the exception of two rest stops, *Rak* carries the moon to twelve different villages in Palau; *Rak* will live with the moon in each village for a period of thirty darkneses—twelve periods of thirty darkneses equaling one year (*Tal Rak*) in the Palauan calendar. The route of *Rak* with the moon is the essence and foundation of the Palauan Calendar.

The Palauan year begins when *Rak* carries the moon to Ngetmel village in Ngarechelung Municipality, the northernmost municipality on Babelthuap. *Rak* will remain with the moon in Ngetmel for thirty darkneses after placing the moon in the house called *Iromel*. These first thirty evenings are referred to as *TMUR RA ONGOS* (Table 1). Then *Rak* carries the moon to Ollei village and proceeds to place the moon on the hill called *Ngerulek*. This second phase of the Palauan calendar is called *MODLAB RA ONGOS*. With the exception of a rest stop in Ulimang village in Ngaraard Municipality, *Rak* and the moon will slowly move down the eastern coast of Babelthuap until they complete the sixth phase of the year, *CHIIACH RA ONGOS*. It is not known how long *Rak* stayed in each resting place; it is suspected that he remained in these locations for only a few hours at the most.

Once the wind shifts direction, from an easterly (*Rekil Ongos*) to a westerly direction (*Rekil Ngebard*), *Rak* and the moon begin their second phase of the lunar cycle. *Rak* first stops at a village in Melekeok Municipality known as *Ngerulbuu re Melekeok*. *Rak* places the moon on a hill called *Ngerulbuu*. This period of the year is referred to as the *TMUR RA NGEWARD*—the first thirty darkneses of the westerly wind. In like manner, *Rak* will continue to travel down Babelthuap with

the moon until he reaches the island of Peleliu, where he will stay for a temporary rest in Debed village. Once *Rak* has completed the twelfth set of thirty darknesses in Ngeiaur village on Angaur, the wind becomes easterly (*Rekil Ongos*) and *Rak* returns with the moon to Ngetmel village in Ngarechelong. The legendary cycle is then complete.

In traditional society, if a villager wanted to know what month the year was in, he would merely ask a village elder, "A *rak*, *Ngar ker re chechang?*" (The God, where is he now?). The village elder would then respond according to the time of the year. For example, he might answer, "*Ngara beluu ra Ollei*" (He's in Ollei village). From this answer, the villager knows that the moon is in its second thirty darknesses of the easterly wind (*Rekil Ongos*). In other words, the year is only two months old. Likewise, if a villager wanted to know what day of the month it was, he would ask his neighbor, "*Ngtela buil er chechang?*" (How many moons is it now?). His neighbor might answer, "*Ngeru buil*" (The moon is two) i. e., the month is in its second darkness.

On the other hand, if the villager knew his legends and was a keen observer of the moon, he, himself, could tell the month and day of the year. Let's see if we can construct this early form of time reckoning. First of all, the villager knew from his legends the story of *Rak* and how he carried the moon up and down the islands of Palau. He knew that *Rak* carried the moon to twelve different villages where he

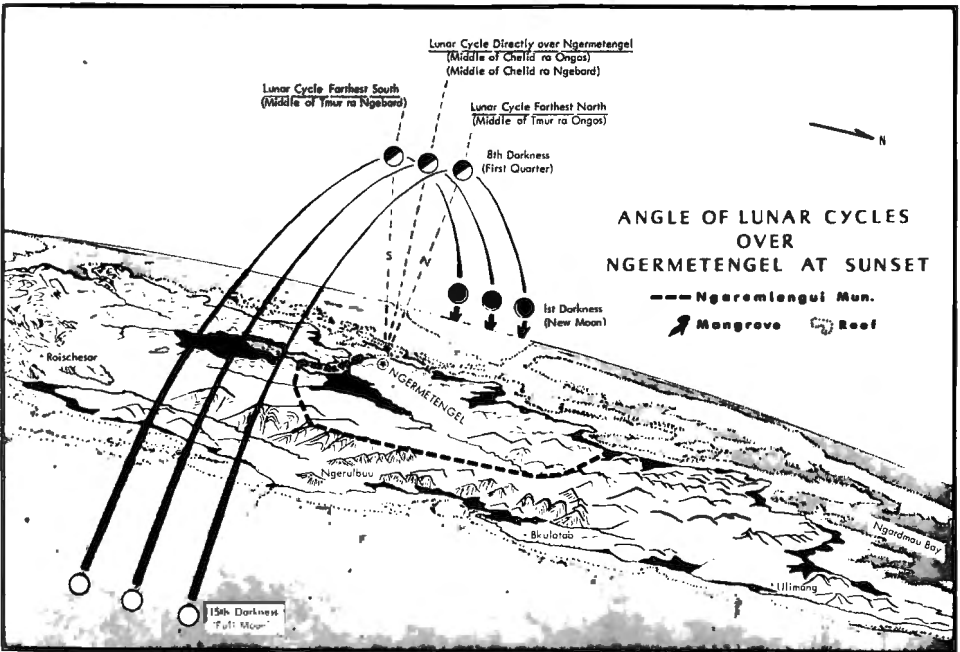


Fig. 6. Time reckoning by the shifting angle of the lunar cycle. Oddly enough there is *no* correlation between the location of "Rak and the Moon" with the "Angle of the lunar cycle." Be careful not to confuse these two systems.

Table 1. Traditional lunar calendar.

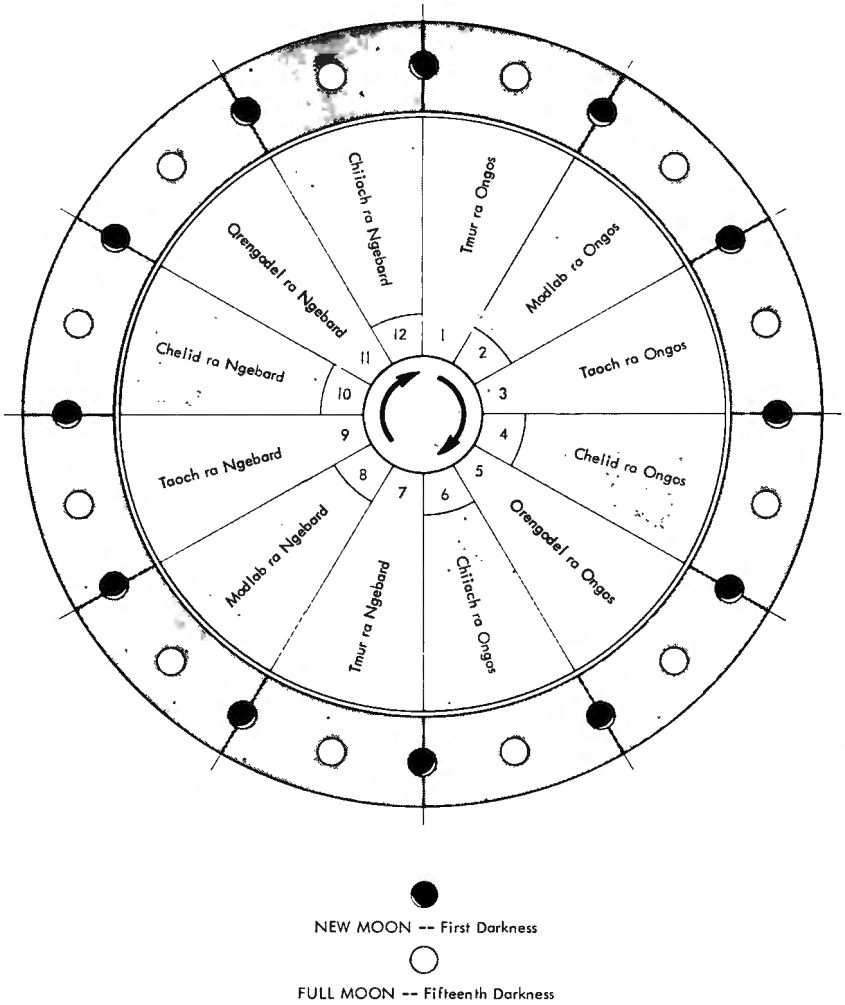
Period of Year	Name of Period of Year	Location of the <i>Rak</i> (God)	Location of the Moon
REKIL ONGOS (Easterly Wind)			
1st-30 days	Tmur ra Ongos	<i>Rak</i> a Ngara Ngetmel (God is in Ngetmel Village)	<i>Tmur</i> a Ngara Blai ra Iromel (The Moon is in the House called Iromel)
2nd-30 days	Modlab ra Ongos	<i>Rak</i> a Ngara Ollei (God is in Ollei Village)	<i>Modlab</i> a Ngara Ked ra Ngerulekelakel (The Moon is on the Hill called Ngerulek)
3rd-30 days	Taoch ra Ongos	<i>Rak</i> a Ngara Mengellong (God is in Mengellang Village)	<i>Taoch</i> a Ngara Blai ra Imei (The Moon is in the House called Imei)
4th-30 days	Chelid ra Ongos	<i>Rak</i> a Ngara Choll (God is in Choll Village)	<i>Elid</i> a Ngara Utaor (The Moon is on the Hill called Utaor)
		E Mera Ngerulemuong ra Elab. E Solae (He came to Ngerulemuong ra Elab and now) <i>Rak</i> mo Cholengull ra Techikebai e Mekiis (God is resting in the house called Techikebai in Ulimong Village)	
5th-30 days	Orengodel ra Ongos	<i>Rak</i> a Ngara Ulimong ra Roisingang. (God is on the mountain called Roisingang in Ulimang Village)	<i>Orengodel</i> a Ngara Ked ra Roisingang (The Moon is also on the same hill.)
6th-30 days	Chiiach ra Ongos	<i>Rak</i> a Ngara Ngiwal (God is in Ngiwal)	<i>Chiiach</i> a Ngara Bkulatab (The Moon is at the place called Bkulatab)
REKIL NGEbard (Westerly Wind)			
7th-30 days	Tmur ra Ngebard	<i>Rak</i> a Ngara Melekeok (God is in Melekeok)	<i>Tmur</i> a Ngara Ngerulbuu (The Moon is on the hill called Ngerulbuu)
8th-30 days	Modlab ra Ngebard	<i>Rak</i> a Ngara Ngchesar (God is in Ngchesar)	<i>Modlab</i> a Ngara Roischesar (The Moon is on the Hill called Roischesar)
9th-30 days	Taoch ra Ngebard	<i>Rak</i> a Ngara Ngeduais (God is in Ngeduais)	<i>Taoch</i> a Ngara Ielech-ra Airai (The Moon is on the Hill called Ielech in Airai)

Table 1. (Continued)

Period of Year	Name of Period of Year	Location of the <i>Rak</i> (God)	Location of the Moon
10th–30 days	Chelid ra Ngebard	<i>Rak</i> a Ngara Ngermid (God is in Ngermid)	<i>Elid</i> a Ngara Ngerungewikel (The Moon is on the Hill called Ngerungewikel)
11th–30 days	Orengodel ra Ngebard	<i>Rak</i> a Ngara Ngemelis (God is on the part of Peleliu called Ngemelis) <i>Rak</i> a mlora Peliliu me Ngolengull ra Debed a mor Ngeiaur. (God went to Debed Village in Peliliu then moved on to Ngeiaur Village in Angaur)	<i>Orengodel</i> a Ngara Ngermolisois (The Moon is on the Mountain called Ngermolisois)
12th–30 days	Chiiach ra Ngebard	<i>Rak</i> a Ngara Ngeinur (God is in Ngeiaur Village)	<i>Chiiach</i> a Ngara Bkulngeluul (The Moon is on a High Place called Bkulngeluul)

Source: Author's field interviews.

THE CRESCENT ANGLE OF THE NEW MOON
(Per Palauan Lunar Month)



* This diagram should be read as if Babelthau Is. is at the bottom of the page.

Fig. 7. Time reckoning by the angle of the first crescent of each month.

stayed for a period of thirty darkneses. These periods of darkneses had names. He also knew that at the end of a particular set of darkneses, the wind shifted and *Rak* carried the moon back to its original location in Ngetmel village. This, then, was the explanation for the apparent cyclical characteristic of the Palauan environment.

By observing the moon on different evenings, the villager could also see that the lunar cycle changed its angle in the sky over the year (Fig. 6). During those periods of darkness called *Chelid ra Ongos* and *Chelid ra Ngebard*, the full moon appeared in the eastern sky and passed directly overhead on its way to the barrier reef that lay in the west. The villager also observed that during the middle of *Tmur ra Ongos*, the lunar cycle was at an angle farthest to the north. During that particular period of darkneses, he could face towards the east and the full moon would pass over his left shoulder. During the middle of *Tmur ra Ngebard*, just the opposite was true; the moon would pass over his right shoulder. Hence, the lunar cycle travelled in its southernmost path during this time of the year. Thus, by knowing the angle of the orbit of the moon around Palau, the villager was able to determine the month of the year. With the further knowledge of the phases of the lunar month, the villager was able to predict the day of the month.

A further means of telling the beginning of particular lunar months was to observe the angle of the crescent during first darkness (Fig. 7). During the lunar month of *Tmur ra Ongos*, the tips of the crescent during first darkness are pointing up and towards the north. During *Tmur ra Ngebard*, just the opposite is true—the tips of the crescent during first darkness are pointing up and towards the south. During *Chelid ra Ongos* and *Chelid ra Ngebard*, the tips of the crescent point up to the heavens. Since the angle of the first crescent of *Tmur ra Ongos* and *Tmur ra Ngebard* do not repeat themselves during the year, a keen observer of the moon can determine the beginning of the year *Tmur ra Ongos* and the beginning of the second six lunar months (*Tmur ra Ngebard*).

C. The Tides

The most obvious natural cycle is the ebb and flow of the tides. By observing this phenomenon of nature, the traditional Palauan can tell the phase of the moon and the day and approximate hour of the month. He cannot, however, tell the month of the year by the mere observation of tides. To do this, he must consult some other phase of nature or the heavens. There are, however, tidal extremes that do allow some prediction of the month (Table 2). For example, when the tidal cycle is at its lowest during the nighttime, the traditionally-schooled Palauan knows that it is the months of *Tmur ra Ongos* and *Modlab ra Ongos*. On the other hand, when the lowest tide of the year occurs during the daytime, the Palauan villager knows that he is in the months of *Tmur ra Ngebard* and *Modlab ra Ngebard*. But besides these tidal extremes, most time reckoning according to the tides is reserved for the prediction of the hour of the day, and the day of the month, not the month itself. While governmental agencies publish a print-out each month of tidal heights

Table 2. Time reckoning by yearly tidal extremes.

	ONGOS						NGEBARD					
	Tmur	Modlab	Taoch	Chelid	Orengodel	Chiiach	Tmur	Modlab	Taoch	Chelid	Orengodel	Chiiach
Daytime												
	Low Tide is not so Low						Low Tide is very Low					
	High Tide is not so High						High Tide is very High					
Nighttime												
	Low Tide is Very Low						Low tide is not so Low					
	High Tide is very High						High Tide is not so High					
	Lowest Tide											

Source: Author field interviews, supplemented by personal observations.

for various areas, the villagers of Ngermetengel have a system that does not change each month (Fig. 8). On the first crescent (new moon) of each month of the year, the first lowtide occurs at *Ungiia Techelel a Sils* (noon). The second low tide falls at *Metudaklebesei* (midnight). The high tides come approximately halfway between these two extremes, the first high tide occurring at *Ngolta Sils* (sunset), and the second high tide occurring during *Ngoscha Sils* (sunrise). With the four-pointed-perpendicular-dial one can see how the Palauan arrives at his tide table. Rotating the dial approximately an hour to the left (counter-clockwise), the times for low and high tides can be seen for the second phase of the moon—the low tide occurring at *Ieta Sils*, high tide in *Dirkkekesus*, the second low tide in *Mochu Mellong*, and the final high tide occurring in *Odechosong*. Consecutive rotations of equal amounts will give the tidal times for the remaining phases of the moon.

Although the traditional Palauan may have constructed a similar diagram with sticks and earth-drawings to illustrate the various phases of the tides, the “tide dial” was never permanently constructed nor recorded in traditional Palauan Society. Tidal phases were studied and committed to memory (Fig. 9). For each phase of the moon, the traditional Palauan knew the time at which the low and high tides would occur. If it was the fifteenth moon (full moon), the villager knew that the first low tide occurred at *Orretngelal Bedul*, the first high tide at *Mochu Mellong*, the second low tide at *Odechosong*, and the final high tide at *Kebesengei*. On the other hand, if the villager couldn’t see the moon because of bad weather but wanted to know its phase, he would merely go to the river and check the level of

THE TIDE DIAL

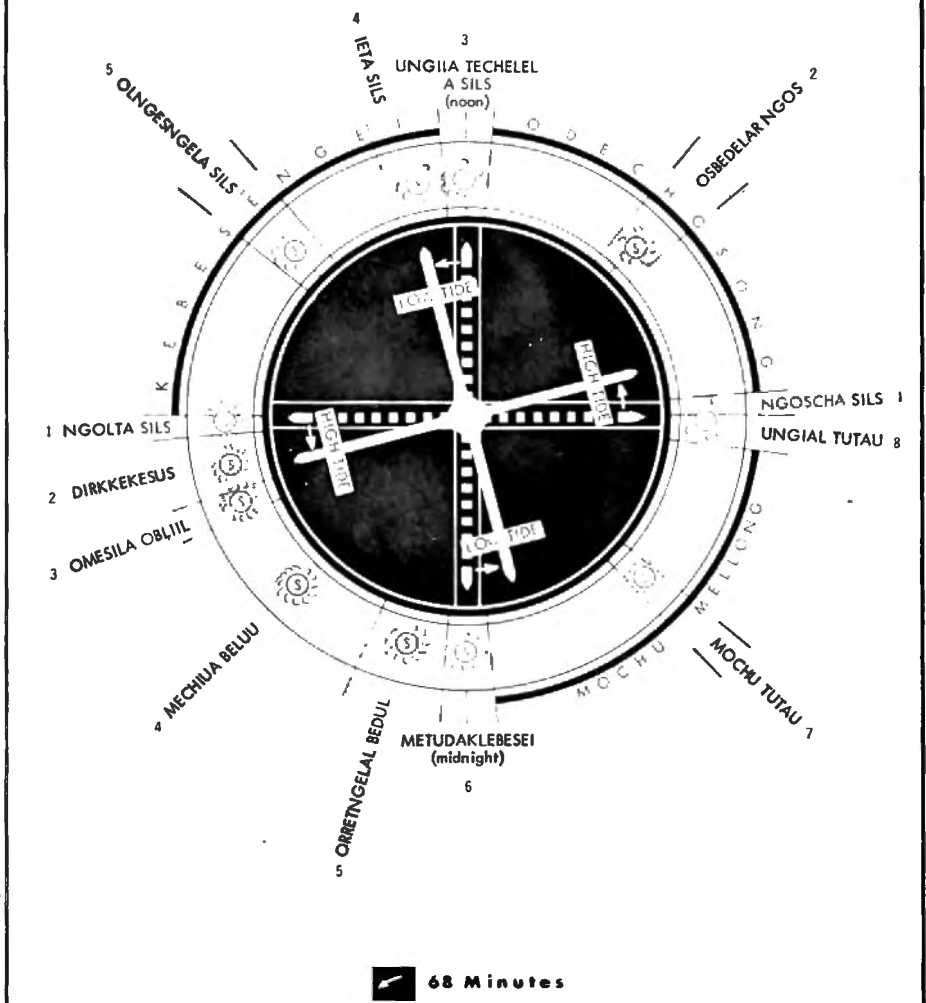


Fig. 8. Time reckoning by the height of the tide.

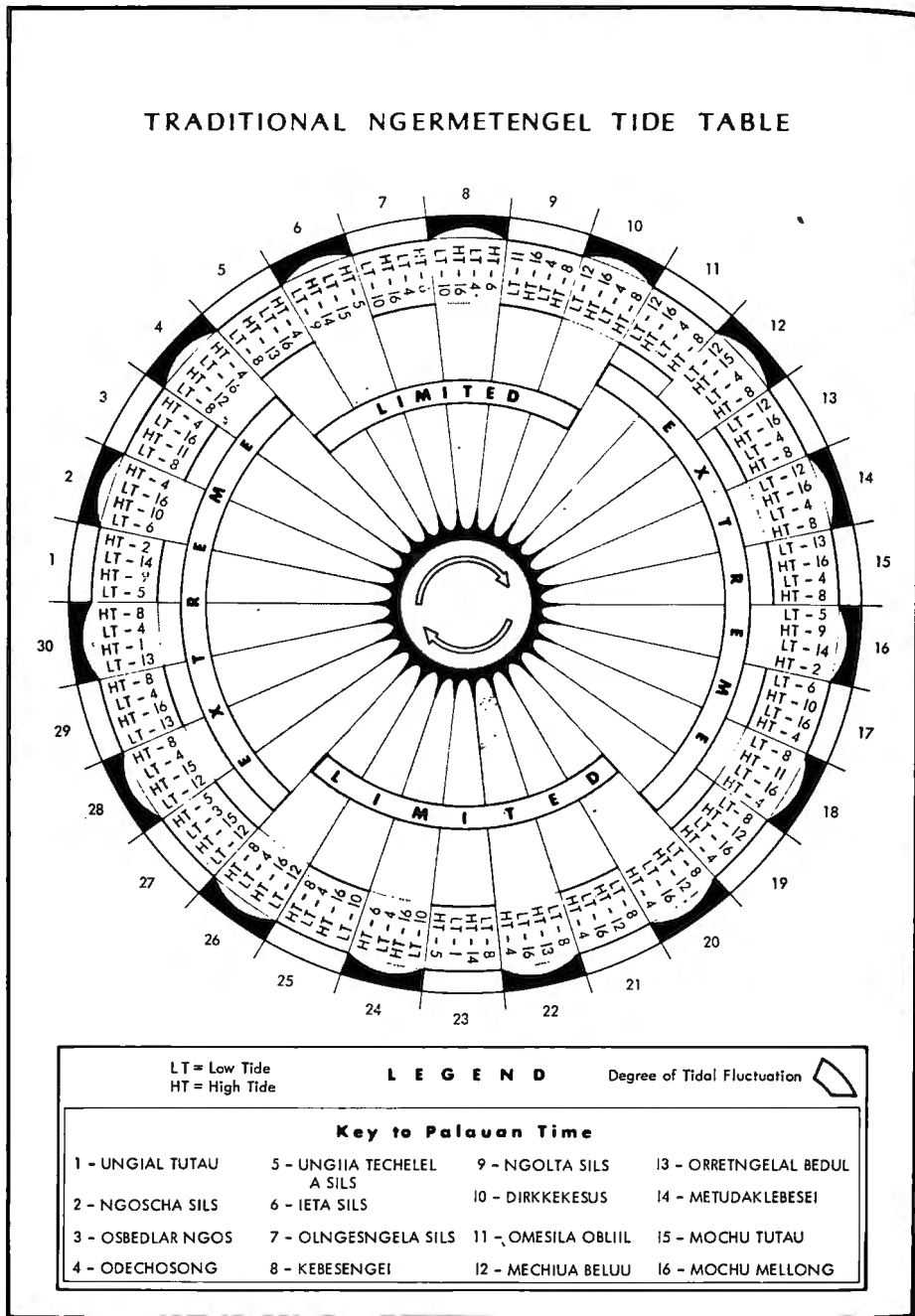


Fig. 9. Tidal phases for each day of the Palauan month.

the tide. The level of the river plus the time of the day told him the phase of the moon, thus the day of the month.

D. The Stars

The early Palauans' use of the stars was not extensive because they were not navigating people, as were the Yapese and other islanders in the Pacific. There was a common belief during earlier times that if you sailed beyond the site of land you would fall off the end of the world. With this belief in mind, it is no wonder that early Palauans did not venture from one island realm to another. Nevertheless, stars were used to reckon time in traditional Palauan society. Stars were also used to tell direction, but only to a limited extent.

By observing the moon and its relationship to the Little Dipper, traditional Palauans could tell the beginning of the Palauan year as well as the first six months of the same annual system (Fig. 10). The method of this prediction is as follows. Only during the lunar month of *Tmur ra Ongos* does the Little Dipper rise in the eastern sky trailing the full moon at *Ngolta Sils* (sunset), lie behind the moon at *Metuda-Klebesei*, and lead the moon into the western sea at *Ngoscha Sils* (sunrise). When this sequence of events occurs, the traditional Palauan knows that fifteen days ago was the beginning of his new year. *Ochit ra Orakiruu* is the Palauan term for the period when the Little Dipper "passes" the full moon; *Ochit* is the general Palauan term for the period when the Little Dipper passes behind the other phases of the moon. Although the Little Dipper doesn't actually move and consequently couldn't

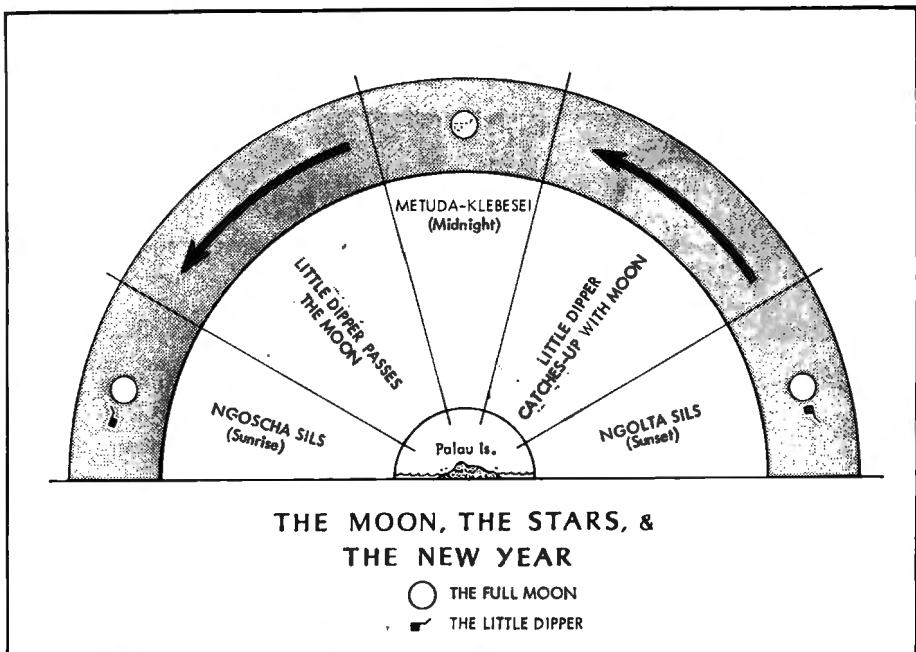
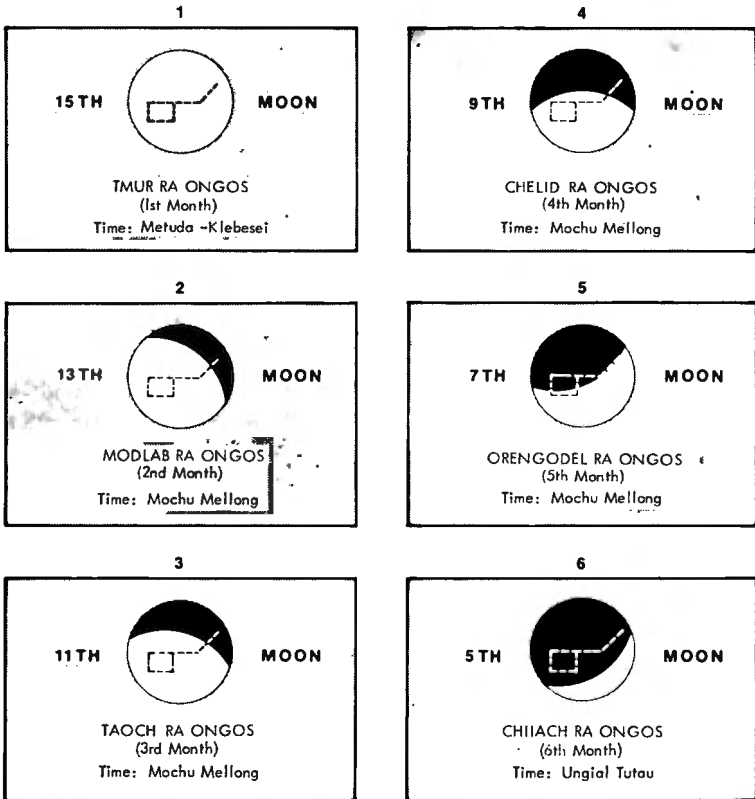


Fig. 10. Time reckoning by the relationship of the Little Dipper to the full moon.

THE SIX LUNAR PHASES OF OCHIT






-  THE PHASE OF THE MOON
-  THE LITTLE DIPPER (MESIKD)
-  THE LITTLE DIPPER BEHIND THE MOON

Fig. 11. The major phases for time reckoning by the stars.

“pass” anything, the traditionally schooled Palauan does describe the stars as objects that do move on their own accord.

The traditional Palauan can also determine the other months of *Ongos* (the first six months of the Palauan year) by the observation of the *Ochit* (Fig. 11). As was just illustrated, the Little Dipper passes behind the fifteenth moon (full moon) during the Palauan month of *Tmur ra Ongos*—the first month of the year. During *Modlab ra Ongos*, the second month of the year, the Little Dipper passes behind the moon during the thirteenth moon or darkness of the month. The Little Dipper is behind the moon during the Palauan time of *Mochu Mellong*. The third month of the Palauan year is *Taoch ra Ongos*. During this month, the Little Dipper passes behind the moon at *Mochu Mellong* on the eleventh moon of the month. This same system of observation of the *Ochit* occurs for the first six months of the Palauan year. During the remaining six months of the Palauan year (*Ngebard*), the observation of the *Ochit* is impossible—*Ochit* occurs during the day when it cannot be seen.

The Palauan named only one star in the Little Dipper. The name of the Little Dipper is *Mesikd*; the name of the star at the end of the handle is called *Terenguul et Lau*. In Palauan legend, *Terenguul el Lau* is a man who pilots the rest of the stars in their path around the islands of Palau. As in steering a canoe, the pilot sits in the back and his actions direct the movement of the vehicle. According to this legend, *Terenguul el Lau* has the responsibility of guiding the rest of the stars that make up the Little Dipper so that they don't “crash into the moon.”

Only one other star is used to reckon time in traditional Palauan society. During the first six months of *Ongos*, there is a very bright star that appears in the western sky. Although the villagers are not positive, they believe this star to be the planet Venus. It is not known whether the villagers are correct in their assumption. When this star is observed in the western sky during the first six months of the year, it is referred to as *Bdudch ra Ngebard* (Star of the West). When this same star is observed in the eastern sky during the remaining six months of the Palauan year, this star is called *Emeraech* (morning star). It gets its name from the fact that it rises in the eastern sky around 4:30 in the morning then passes overhead. Whereas the observation of the *Ochit* could tell the traditional Palauan the month, day, and approximate time of day for the months of *Ongos*, the observation of this other star can only tell him that Palau was either in the months of *Ongos* or in the months of *Ngebard*.

Only two other stars have names, and these are used for telling direction, not time-recognition. *Bdudch ra Dimes* refers to a southern star; *Bdudch ra Diluches* refers to a northern star.

II. The Phases of Nature

A. The Climate

Of such divisions of climate as temperature, precipitation, humidity, and wind, the latter plays the most important role in time-recognition in traditional Palauan society (Table 3). The names of the months of the Palauan calendar, in fact, are

Table 3. Time reckoning by climatic variation.

	ONGOS						NGEBARD					
	Tmur	Modlab	Taoch	Chelid	Orengodel	Chiiach	Tmur	Modlab	Taoch	Chelid	Orengodel	Chiiach
Temperature			Hottest						Coolest			
Precipitation		Dry	Driest				Rainiest	Rainy				
		Dry Season					Rainy Season					
Wind			Calmest				Windiest					
	Easterly						Westerly					
Sky Cover			Sunniest						Cloudiest			
Humidity:			Low Humidity						High Humidity			
Daytime			Low Humidity						High Humidity			
Nighttime			High Humidity						Low Humidity			

Source: Author field interviews, supplemented by personal observations.

derived from the shifts in wind direction that occur during the year. During the first six months of the year Palau has a predominately easterly wind (*Ongos*); hence, the derivation of such names as *Tmur ra Ongos*, *Modlab ra Ongos*, *Taoch ra Ongos*, *Chelid ra Ongos*, *Orengodel ra Ongos*, *Chiiach ra Ongos*. When the wind shifts to a westerly direction (*Ngebard*), the six months that follow have names tagged with this peculiar characteristic—*Tmur ra Ngebard*, *Modlab ra Ngebard*, etc. In like manner, if a person is from the west, he is referred to as *Chad ra Ngebard* (Westerner).

The beginning of the Palauan year, *Tmur ra Ongos*, is named after the period when the winds become easterly. After continuing to be easterly for five months, the wind begins to fluctuate during *Chiiach ra Ongos*; the wind, however, still remains predominately easterly. In the month of *Tmur ra Ngebard*, the wind becomes westerly and will continue in this direction until the month of *Chiiach ra Ngebard*. If at the end of this time the wind changes direction by shifting to the north, it is claimed that the month of *Chelid ra Ongos* of the following year will be extremely windy—a time that is normally one of the calmest periods of the year. When the wind changes from a westerly wind to an easterly wind by passing over northern Babelthup, the name of the shifting wind is referred to as *Sechal Ongos* (Male or strong Easterly Wind) (Fig. 12). On the other hand, if the wind of *Chiiach ra Ngebard* shifts to the south on its way to becoming easterly, the name of this wind is *Rdil Ongos* (Female or Weak easterly Wind). If the shifting wind is *Rdil Ongos*, then Ngermetengel can expect to have a weak wind during the month of *Chelid ra Ongos* of the following year.

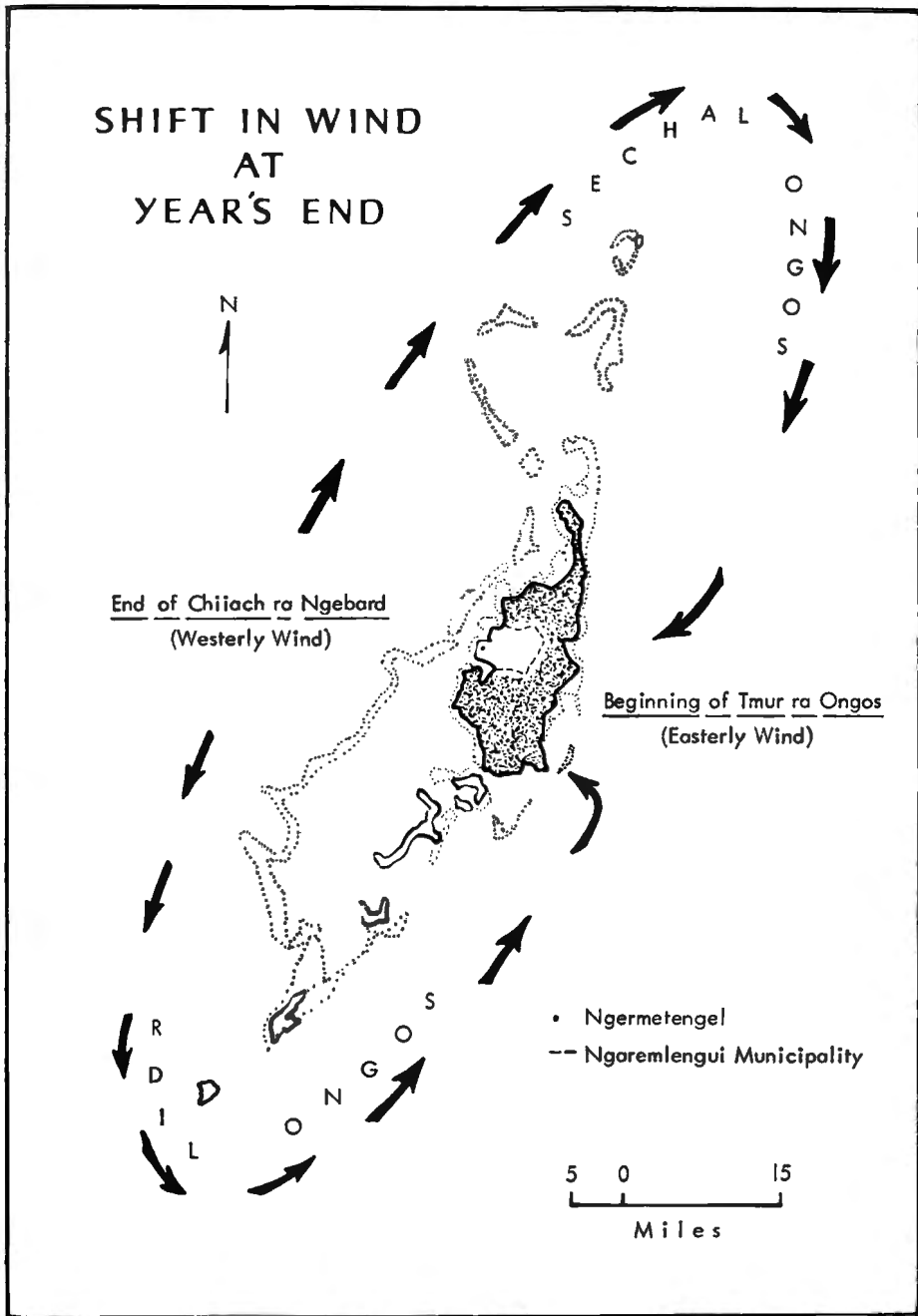


Fig. 12. Time reckoning by the direction of wind.

Second to wind direction, changes in the occurrence and amount of rainfall is a key to early time recognition in Palauan society. However, as is true with other climatic phenomena, the changes in the amounts of precipitation can only be observed and discussed in broad generalizations. The traditional Palauan sees the months of *Modlab ra Ongos*, *Taoch ra Ongos*, and *Chelid ra Ongos* as being dry in comparison with the months that follow. During the six months of *Ngebard*, Ngermetengel receives heavy rains with the first three months as the rainiest.

More interesting, however, is the naming of rains and sometimes the correlation between precipitation, the phase of the moon, and the laying of eggs by fish. During *Tmur ra Ongos*, there is a little rain at dawn called *Olngbedel Orrakel*. Only after the occurrence of this rain would the traditional Palauan go outside the reef to catch sharks. On the day after the full moon (the sixteenth darkness), a rain comes which lasts for 24–36 hours. This rain is called *Dedengel a Kotikou*; it derives its name from the observation that the *Kotikou* fish begins to lay its eggs at this time.

During the second month of the Palauan year, *Modlab ra Ongos*, there is a rain shortly after dawn, *Tubkii ra Ngeuoi*. On the sixteenth moon of the month, the same phenomenon occurs that took place during *Tmur ra Ongos*; there is a short rain called *Dedengel a Kotikou* during which the *Kotikou* fish lays its eggs. By observing that the *Kotikou* fish is laying its eggs, the traditional Palauan can therefore predict that the month of the year is either *Tmur ra Ongos* or *Modlab ra Ongos*. Although the observation of this occurrence would not tell him which of the two months it was, it would tell him the day of the month—the sixteenth.

On the eighth-ninth darkness of *Tmur ra Ongos* and *Modlab ra Ongos*, there is a rain called *Bedengel a Kelat* that lasts for two days. It is claimed that on the tenth darkness or moon the *Kelat* fish lays its eggs. This, again, is a form of seasonality and consequent means of time recognition within the Palau Islands.

A different phenomenon occurs during the months of *Taoch ra Ongos*, *Chelid ra Ongos*, and *Orengodel ra Ongos*—a phenomenon associated with precipitation. Only on the fourth-fifth moon or darkness of these months does a rain come that lasts for two-three days. The name of this rain is *Tebedel a Meyas*. It is during this time that the fish leaves the mangrove swamps during the low tide to lay its eggs. During *Taoch ra Ongos*, the *Meyas* fish lay their eggs on the fifth moon of the month; during the remaining two months, it is claimed that the *Meyas* fish lay their eggs on the sixth moon. Although not associated with the precipitation phenomena, the *Meyas* fish also lays its eggs on the sixth moon of *Chiiach ra Ongos*.

Although there is climatic variation in temperature, cloudiness, and humidity, these phenomena are poor indicators of time and seasonal variation. The hottest months of the year correspond with the driest months—*Taoch ra Ongos* and *Chelid ra Ongos*. The coolest months of the year are in *Taoch ra Ngebard* and *Chelid ra Ngebard*. Within the same months can be found the cloudiest season; the sunniest season, however, corresponds with the driest months of the year. Humidity within the area corresponds with the shift in wind directions. During the months of easterly wind (*Ongos*), daytime humidity is low and nighttime humidity is high. The

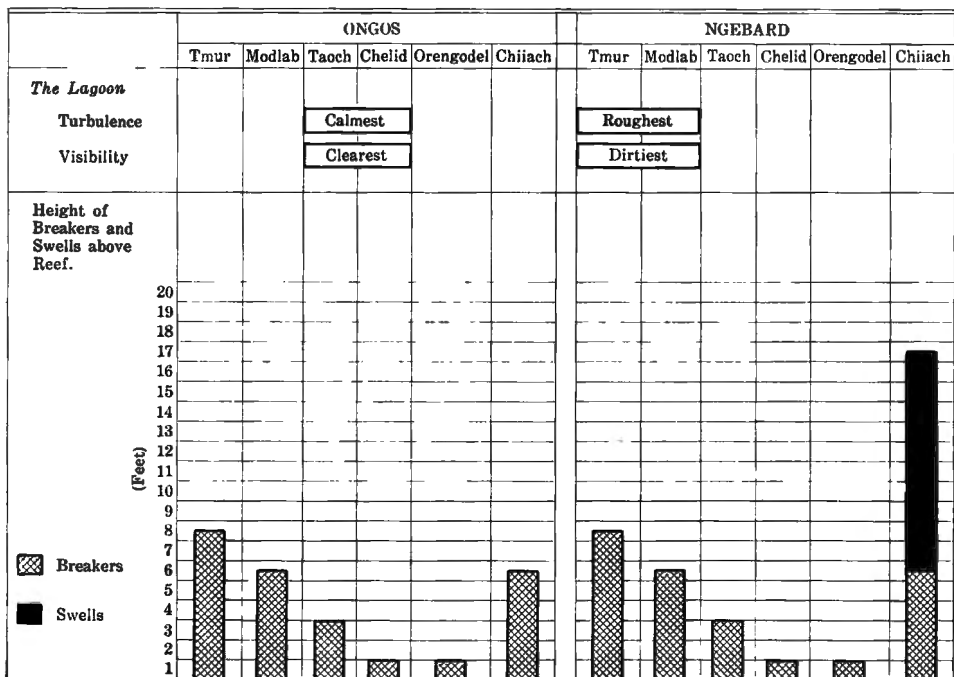
reverse is true during the months of westerly with (*Ngebard*).

B. The Lagoon and Reef

Seasonal variations also exist within the lagoon which the traditional Palauan uses to base his calendar. Although it is sometimes difficult to distinguish when the lagoon is the calmest and clearest, *Taoch ra Ongos* and *Chelid ra Ongos* are held to be those months that are most representative of this characteristic (Table 4). There is no difficulty, however, in determining when the lagoon is at its roughest and dirtiest condition. In fact, water visibility decreases so much that traditional Palauans can determine the approximate beginning of the month of *Tmur ra Ngebard* by the observation of the lagoon alone. The increase in "roughness" and "dirtiness" during the month of *Tmur ra Ngebard* is a natural result of the wind becoming westerly and the onslaught of the rainy season.

The breakers on the barrier reef outside Ngermetengel have also been observed to have monthly variations. It is known that during the months of *Tmur ra Ongos* and *Tmur ra Ngebard* the breakers reach an average height of seven to eight feet (2.1 to 2.4 m). During the months of *Chelid ra Ongos*, *Orengodel ra Ongos*, *Chelid ra Ngebard*, and *Orengodel ra Ngebard*, the breakers are very hard to distinguish because they are so low. This is a dangerous time for fishermen that go beyond the reef, for when they return in the darkness of the evening the reefs are often hidden

Table 4. Time reckoning by observation of the lagoon, reef, and breakers.



Source: Author field interviews, supplemented by personal observations.

from sight. When this occurs, it is naturally easy to ground a boat. Even at the time of this writing, an Okinawan ship lies grounded on the reef that the villagers of Ngermetengel use as their fishing grounds. The first Englishman, Captain Henry Wilson, to have any real contact with Palauans was introduced to the Palauan Islands by being grounded on its reef. No doubt he landed in one of these four months of the Palauan year when the reef is most submerged.

A most interesting phenomenon occurs during the month of *Chiiqch ra Ngebard*, a phenomenon that clearly indicates to the traditionally schooled Palauan that one year is ending and another one is beginning. During *Chiiach ra Ngebard*, three distinct giant swells come up from southern Babelthuap, break over the reefs, pass over the tip of northern Babelthuap, and return to their origin near Angaur by way of the eastern coast, thus making a complete cycle around Babelthuap. These swells create breakers on the reef reaching fifteen-eighteen feet (4.6–5.5 m) in height above the reef. Palauans of traditional society counted the passage of these three swells. Since each swell lasted for approximately ten days, they knew that at the end of the third swell the wind shifted, *Rak* (god) moved north once again to Ngetmel village, and thus the new year had begun.

Boid or Labk, the name of the first swell, is the strongest of the set of swells. According to Palauan belief, *Boid or Labk* clears the path for the legendary god *Rak* by breaking up the old, dead coral. Having done so, *Boid or Labk* informs the younger stronger coral that *Rak* will be coming soon. *Omeka Dnger*, the second breaker, rolls over the reef pushing crushed coral under the younger corals so that they don't break when *Rak* moves north. *Mengelechel a Uchach*, the third and final swell, breaks over the reefs of western Palau. His responsibility is to act as a messenger, warning the remaining corals that *Rak* is now on his way to Ngetmel village in northern Babelthuap. He warns the corals not to break under the heavy foot of *Rak*.

In addition to telling the beginning of the year by counting the three swells as they broke over the reef outside their village, the traditional Ngermetengel villager could also tell the beginning of the Palauan calendar by a peculiar smell within the village: a smell associated with the movement of *Rak* from southern Babelthuap to northern Babelthuap. The smell was that of the sea coral that broke under the foot of *Rak*. Since *Rak* moved to his position in the north only once a year, it was a natural deduction that the smell of sea coral within the village was an indication that the new year had begun.

C. The Flora

The trees, plants, shrubs, and grasses of Ngermetengel also have cycles that indicate to the keen observer the passage of time, some flora being particularly useful to the villagers as a form of time-reckoning.

The flora of Ngermetengel can be divided into three types: (1) those trees and plants that bear fruit year-round, thus having no seasonality; (2) those trees and plants that have one fruiting season; and (3) those trees and plants that have two fruiting seasons. Of these three groupings, the majority of species lie in the latter

category; one hundred and thirty-nine known species of this category exist today in Ngermetengel. There are ninety-three species that fall into the first category and only eleven species fall into the second category. Since trees and plants that bear fruit year round are poor indicators of the passage of time, this discussion will be centered only on those types of flora that show some sign of seasonality.

Of those types of pre-contact flora having one season, *Jul* (Freycinetia) is reported to be the most dependable as an indicator of time. When this tree first bears its flowers, the fragrance informs the traditional Palauan that the month of *Modlab ra Ongos* has arrived. Pineapple, Mahoney, Rambutan, and Kapok are foreign introductions, and therefore are not formally used to reckon time.

Since most of the trees and plants in Ngermetengel blossom or bear fruit during the same months twice a year, it is not surprising to find that there is a Palauan name for each one of these two growing seasons. The first growing seasons begins during *Modlab ra Ongos* and continues through *Chiiach ra Ongos*; The Palauan name for this season is *Remus*. Since this season produces the least fruit of the two seasons, this period is also known as the time of *Kesai a Kall* (little food). *Sim* is the name of the second growing season; this period of growth begins in *Modlab ra Ngebard* and continues through *Chiiach ra Ngebard*. *Sim* is the time of *Betok a Kall* (much food).

Of all the types of flora that blossom or bear fruit twice a year, only two do not fall into the above two growing seasons. The Cocoa tree (*Theobroma cacao* L.) was introduced by the Spanish and consequently did not play a part in Ngermetengel's early system of time reckoning. The Indian Coral Tree (*Crythrina Variegata* L.), however, did play such a role. In fact, the second chief of Ngermetengel transplanted an Indian Coral Tree that was growing in the mangrove to an area on his property. He did this for two reasons. One reason was to bring luck to his house and to the village, a belief handed down through Palauan legend. Secondly, the chief transplanted the tree to an area close by so that he could observe the pattern of flowering, a means for telling the month of the year. When the flowers first bloom at the base of the tree, the chief knows that the month is *Taoch ra Ongos* or *Taoch ra Ngebard*. The chief further knows that when the flowers have bloomed at the top of the trees and the leaves begin to fall, the month is either *Chelid ra Ongos* or *Chelid ra Ngebard*. Since this pattern of flowering happens twice a year, a villager would have to observe some other phenomena of nature or the heavens to distinguish exactly which *Taoch* or *Chelid* Palau was experiencing.

D. The Fauna

Palauans are excellent fishermen. One of the reasons for their repeated success is their knowledge of the cycles of marine life. Although the marine fauna within the lagoon and outside the reef is numerous and the species can be listed by the hundreds, only the cycles of those fish most sought after are known. It is the cycles of these forms of marine life that serve as a calendar for the traditionally schooled Palauan.

If while diving for fish the villager sees a school of either *Meyai*, *Kelat*, or *Kotikou*

fish laying their eggs, this tells him that Palau is in the month of either *Tmur ra Ongos* or *Modlab ra Ongos*. Since he also knows the phase of the moon in which each of these fish lay their eggs, the observation of the act tells him the day of the month. For example, if he sees a school of *Kotikou* fish laying eggs, he knows it is the sixteenth moon of the month of either *Tmur ra Ongos* or *Modlab ra Ongos*. One of the most popular fish within Ngermetengel is *Meyas*. If a traditional villager sees the *Meyas* laying its eggs on the fifth moon or darkness, he knows that the month is *Taoch ra Ongos*. Yet, if he sees the same type of fish laying its eggs on the sixth phase of the moon, this tells him that the month is either *Chelid*, *Orengodel*, or *Chiiach ra Ongos*. Or, if it is the mangrove snake (*Kemairs*) that he observes laying its eggs, the traditional villager knows that it is the full moon (fifteenth darkness) of *Taoch ra Ongos*. He knows this because the snake only lays its eggs on this one day of the year.

An interesting sidelight is related to the crocodile and its pattern of laying eggs. The crocodile lays its eggs in layers on the swampy land. Since the traditional Palauan knows that the crocodile lays its eggs every fifteen days for seven times anywhere during the first six months of the year, he knows that he only has to check the freshness of the last eggs laid to determine the time he must return to catch the crocodile. Although the turtle doesn't lay its eggs in layers, it does have the same cycle of laying eggs, every fifteen days for seven times somewhere within the months of *Ongos*. The turtle, however, lays its eggs on sandy beaches, not on swampy land.

E. Avifauna

The traditional villagers of Ngermetengel only use a few of the thirty-eight known types of migrating birds to reckon the time of the year. The beginning of the Palauan calendar can be told by the appearance of the Longtailed New Zealand Cuckoo (*Eudynamis taitensis*), a migrating bird by the Palauan name of *Charmongos*. Only during the month of *Tmur ra Ongos* does this bird make its appearance in the village of Ngermetengel. Another bird that makes its presence in the village only during a certain period of the year is the *Derariik* (Pacific Golden Plover, *Pluvialis dominica*). While the *Derariik* normally lives and lays its eggs in Ngerechur and Kayangel in northern Palau, it does fly down to the Ngermetengel area during the months of *Orengodel ra Ongos* through *Modlab ra Ngebard*. The presence of this bird within the village during these four months is a further indicator of the time of year that Palau is experiencing.

A few non-migrating birds have also been noticed within Ngermetengel as time-indicators. During the months of *Tmur ra Ongos* and *Modlab ra Ongos*, the *Ome-krenguker* (Chinese Least Bittern: *Ixobrychus sinensis*) can be seen laying eggs in the grassy hills and flatlands (*Ked*) of Ngermetengel's interior.

A most interesting time indicator is the *Tutau* (Palau Morning Bird, *Colluricincla temebrosa*). If this bird can be heard in the early morning hours, then the traditional Palauan knows that Palau is in the first six months of *Ongos*. If, however, the bird does not call out in the morning, the villager knows that Palau is in the re-

maining six months of the year—*Ngebard*. Since the *Tutau* calls out in the early morning hours, it is not surprising that the Palauan term for the early morning hours just prior to sunrise is called *Ungial Tutau*.

F. Insectum

Insects also have a role, albeit small, in the traditional system of time-reckoning in Ngermetengel. Only two insects can be designated as indicators, both of them a form of moth. When either the *Esuch-rubuokel* or *Eberdord* fly into the house during the evening, it is indicative that the month is *Chelid*. Since their eggs hatch in both *Chelid ra Ongos* and *Chelid ra Ngebard*, one must observe another phenomenon of the heavens or nature before being able to predict the actual lunar month.

Ngermetengel Village

Clock and Calendar

Among a people who once practiced synchronized village raids, who arranged love trysts, and who wished to keep track of animal and meteorological events, there was a ready use for recording the passage of time. The position of the sun in the sky, the locations of rising and setting of moon and stars, tidal or wind variations, and a host of other cyclic events provide many timemarkers equivalent in function to the clock and calendar.

—Robert K. McKnight (1961)

Day after day, month after month, the piercing sun races across the Palauan sky, only to be followed by the coolness of the moon and its glimmering stars. The tides ebb and flow, the flowers bloom, the heavy breadfruit falls. In the village of Ngermetengel, man lives closely tied to these cyclical patterns of nature.

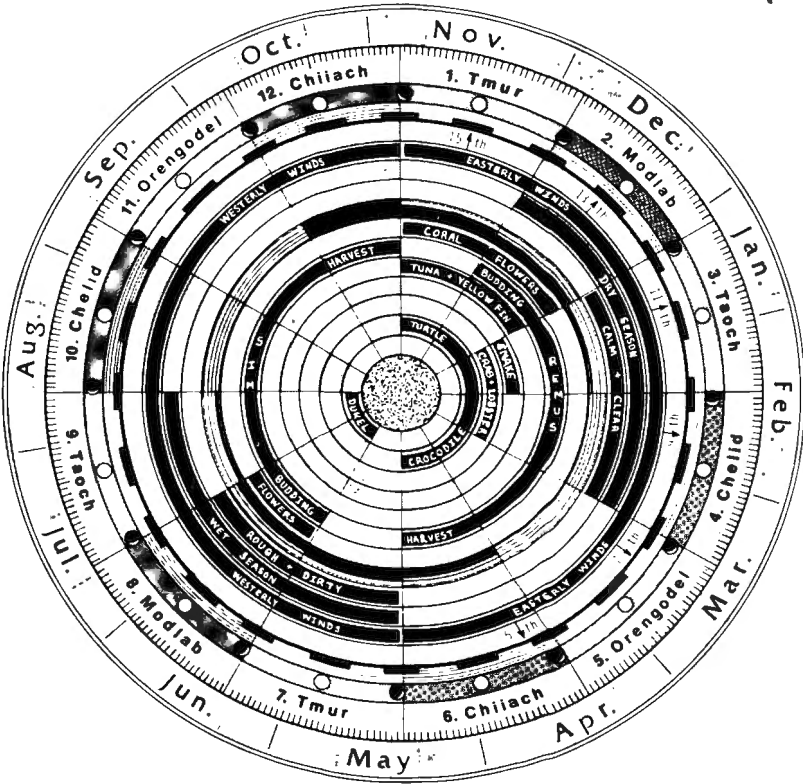
Since the diurnal and seasonal landscape is a continuum of interlocking cyclic rhythms, we can devise a clock and calendar for Ngermetengel that can be used to describe the landscape as well as to predict the probable whereabouts and activities of its people for a given period of time (Fig. 13). The following calendar does not propose to say that on such and such a day, the men of the community, will be at this particular location doing this particular activity. The calendar is merely one means of illustrating the cyclical character of this village landscape, as well as indicating the "best times" for resource exploitation. Since most people will undertake an activity during an optimum time, the likelihood that a people will be carrying out an activity at this time is greater than at a time that is not considered optimum. Only in this sense can we predict the whereabouts and activities of the people of Ngermetengel. With this forewarning, we can now look at the first month of a representative year for the villager of Ngermetengel.

The Cyclic Landscape

Tmur ra Ongos (1st 30 Darknesses)

As the sun sets, the new moon can be seen low in the western sky. The tips

NGERMETENGEL'S CLOCK & CALENDAR



Key: Read Inward

1st Ring - Gregorian Calendar

2nd Ring - Palauan Calendar

3rd Ring - Phases of the Moon

4th Ring - Tide Fluctuation



5th Ring - The Days of the Ochit

6th Ring - Wind Direction

7th Ring - Wet and Dry Season

8th Ring - Condition of Lagoon

9th Ring - Breakers on the Reef



10th Ring - Smells within Village

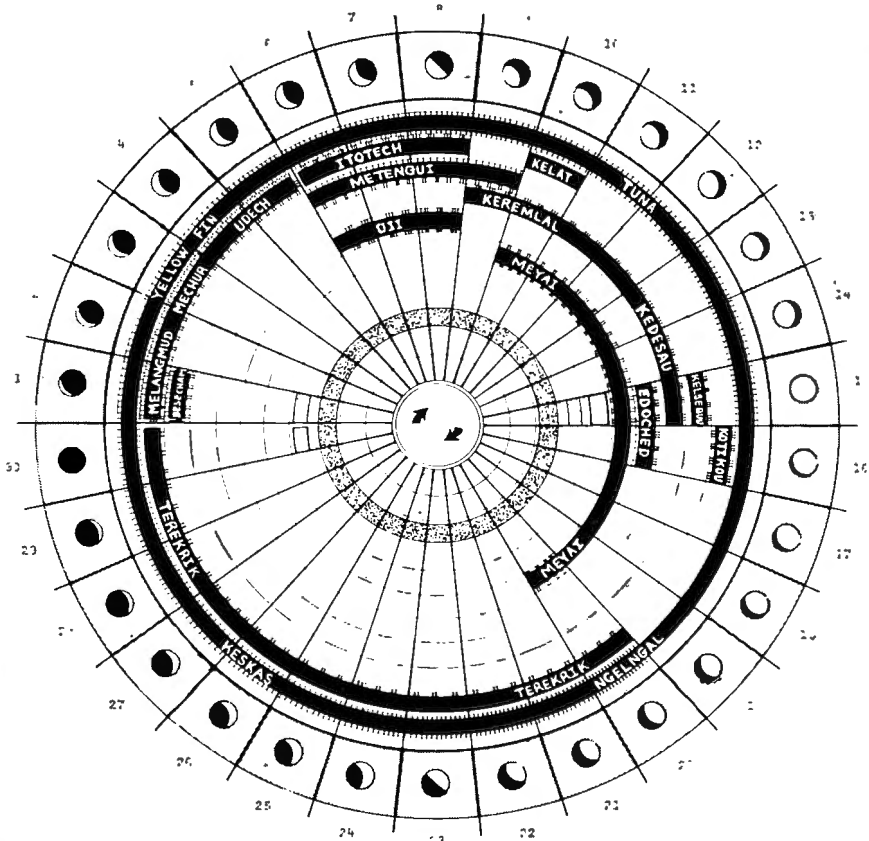
11th Ring - Major Growing Seasons

12th-16th Ring - Marine Cycles (Sample Only)

Fig. 13. The Palauan's perceived model of cyclic time.

TMUR RA ONGOS

(1st Month)



Key		
Optimum Days: Read Symbols		
<u>MARINE ORIENTATED ACTIVITIES</u>		
<p>LINE:</p> <p>Day </p> <p>Night </p> <p>NET:</p> <p>Kesokes</p> <p>Day </p> <p>Night </p>	<p>HET: (Continued)</p> <p>Bidkill </p> <p>Kual * </p> <p>SPEAR:</p> <p>Taod & Lampe </p> <p>Klibiskang * </p> <p>FISHING GUN: </p> <p>*No Optimum Days</p>	<p><u>LAND ORIENTATED ACTIVITIES</u></p> <p>Preferred Season to Plant Taro </p> <p>Preferred Day to Plant Taro </p> <p>Possible Rest Day </p>

Fig. 14. Optimum days for resource exploitation during the first month of the Palauan calendar.

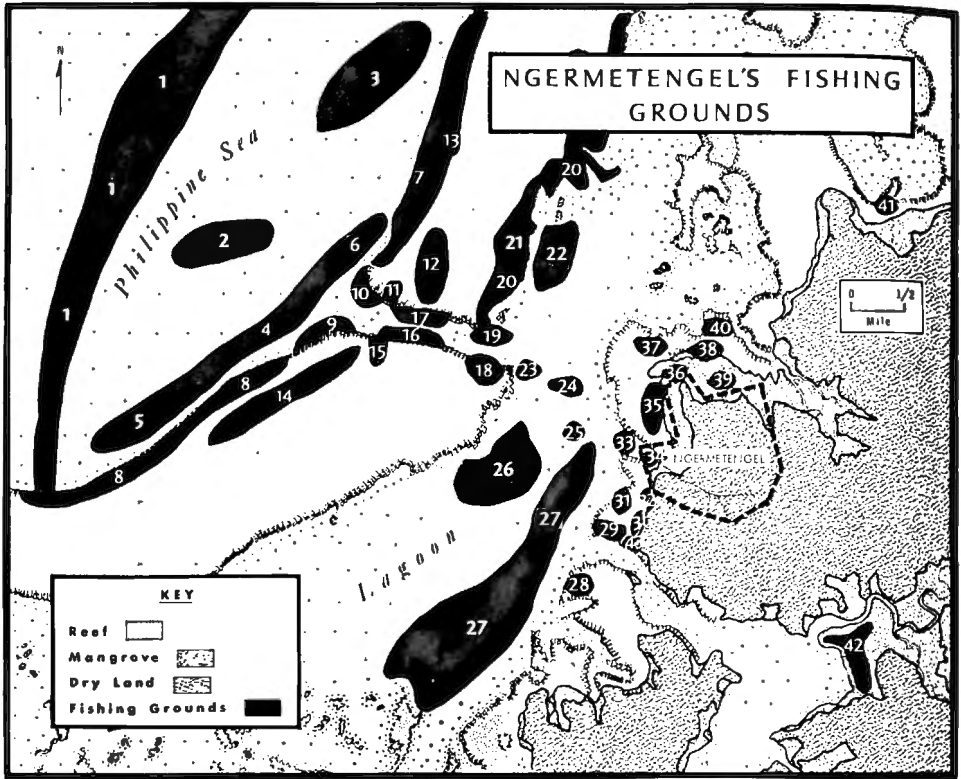


Fig. 15. Aquatic resource areas exploited by Ngermetengel's fishermen.

KEY TO THE MAP

Number	Name of Fishing Grounds	Names of Fish to be Caught There
1	Ngeual	Yellow Fin, Tuna, Keskas, Ngelngal, Meyai
2	Medal a Touachel	Keremlal, Tiau, Mokas, Kedesau, Baungor, Temakai
3	Ikrel a Mecherong	Keremlal, Kedesau
4	Oikeiam	Temekai, Tiau, Mokas, Baungor
5	Ikrel a Songd	Keremlal, Mokas, Kedesau, Banugor, Tiau, Temekai
6	Bkul a Beluu	Temekai, Baungor
7	Ikrel a Chelmol	Mayai, Terekrik, Erabrukel
8	Chelmol	Well
9	Medal a Touachel	Keremlal, Tiau, Mokas, Kedesua, Baungor, Temekai
10	Medal a Touachel	Keremlal, Tiau, Mokas, Kedesau, Baungor, Temekai
11	Mecherong	—
12	Chiis ra Mecherong	—
13	Chelmol	Well
14	Songd	Bebael, Beduut, Reked
15	Tmolch Rams	—
16	Chelsel a Touachel	Manges
17	Chelsel a Touachel	Manges
18	Chiisb	Keremlal, Kedesau, Besechamel
19	Isacheius	Keremlal, Kedesau

KEY TO THE MAP (Fig. 15, Continued)

Number	Name of Fishing Grounds	Names of Fish to be Caught There
20	Ngaraol	Mesekuuk
21	Ngerbuu	Dukel
22	Osmochel Bull	Melangmud, Mechur, Udech, Besechamel, Metengui
23	Dngerulachang	Melangmud, Mechur, Udech, Metengui, Besechamel
24	Uchidalch	Metengui
25	Mokad	—
26	Ikrel Ngesengao	—
27	Melkesokel	—
28	Lkes ra Ngesbokel	Kelat
29	Omeklusech	Meyas, Dech, Itotech, Edoched, Uii
30	Uet ra Oiaol	—
31	Omoachel	Uii, Kalat
32	Uet ra Sengees	—
33	Kliis	—
34	Iungs	Kotikou
35	Uet ra Sechelas	—
36	Lkes ra Bkulengril	Kelat
37	Omdii Meyas	Meyas, Dech, Itotech, Edoched, Uii
38	Uet ra Subungel	Meyas, Dech, Itotech, Edoched, Uii
39	Sebungel	Kelsebuul
40	Ngetbengul	Meyas, Dech, Itotech, Edoched, Uii
41	Lkes ra Kesebelau	Kelat
42	Ngrdebechel	Emang
43	Usas	Kotikou

of the crescent during this first darkness point in the direction of northern Palau. The winds have shifted to an easterly direction, bringing a continuum of warm, dry air. The three giant swells from the south have swept over the barrier reef leaving a smell of crushed coral within the village, an indicator that the God *Rak* has passed with the moon in hand to the village of Ngetmel in Ngarechelong Municipality. The new year has thus begun.

During the daylight hours following the first darkness, the *Besechamel*, *Melangmud*, *Mechur*, *Udech*, Yellow Fin, Tuna, *Ngelngal*, and *Keskas* are laying their eggs at their respective locations outside Ngermetengel (Figs. 14 and 15). Since the *Besechamel* fish lays its eggs only on this one day of the month, there is a good likelihood that some of the men of Ngermetengel will be at either *Osmochel Bull*, *Chiisb*, or *Dngerulachang*—the areas in which this fish lays its eggs. The *Kereal* (line) would be the most favored method of catching this fish during the day. The *Melangmud*, *Mechur*, and *Udech* fish lay their eggs on the first through fifth moon at *Dngerulachang* and *Osmochel Bull*. This would be a likely time to find some of Ngermetengel's men using line or *Kesokes* net in pursuit of these fish. The Yellow Fin, Tuna, *Keskas*, and *Ngelngal*, can now be found laying their eggs in *Ngeuaol*—Ngermetengel's furthest fishing grounds which are located outside the reef. Because of the danger and great distance one must travel, fishermen would least likely

be found in this area.

As moons pass and the evenings become brighter, other fish begin to lay their eggs within the lagoon. On the eighth moon, a rain comes that lasts for two days. At the completion of this rain on the tenth moon, the *Kelat* fish lay their eggs during the daylight hours. This is the time when men can be found using the *Bidkill* net at various locations on the fringing reef; the specific locations are *Lkes ra Bkulengril*, *Lkes ra Kesebelau*, *Ikes ra Ngesbokel*, and *Omoachel*.

At the time of the full moon, the fifteenth darkness, the angle of the lunar cycle passes overhead in its northernmost extent, thus passing over the villager's left shoulder as he faces east. It is the day of the *Ochit*, the time that the Little Dipper passes behind the moon at midnight. Some of the men will refrain from fishing on this night because it is an unlucky time to undertake any activity. On the following day, the sixteenth moon, the islands undergo a rain called *Dedengel a Kotikou*. At this time when the *Kotikou* fish is laying its eggs, men will rush out with their *Kesokes* net to capture this popular fish of Ngermetengel. The place is *Usas*, a small area on the fringing reef south of Ngermetengel.

The nights of *Tmur ra Ongos* are warm and humid. The level of the river along the main road rises and falls as the tide fluctuates to its maximum. At times the river will flow 30 cm beneath the road; at other times a mere trickle can be seen flowing through the black and mucky river bed, a bed riddled with broken twigs and discarded tin cans. The night is a highly desirable time to fish during the months of *Ongos*; it is the time that the fish are sleeping and can easily be caught. Rather than fishing during the daylight hours, some men may prefer to seek the *Besechamel* on the first darkness with a fishing gun (*Klibiskang*). *Melangmud*, *Mechur*, and *Udech* may also be sought after on this same evening, but with line, not the gun. It is very unlikely that any fisherman would go outside the reef at night to catch Yellow Fin, Tuna, *Keskas*, or *Ngelngal*. They might, however, go outside the reef on the twenty-ninth and thirtieth moon to catch the popular *Terekrik* fish laying its eggs at *Ikrel a Chelmol*.

The *Charmongos* (Long Tailed New Zealand Cuckoo) has now taken up temporary residence in the village area and the *Umekrenguker* (Chinese Least Bittern) is actively laying its eggs in the grassy hills and flatlands (*Ked*) of Ngermetengel's interior. The women of the village are also active in their endeavors to plant Colocasia taro in the taro patch (*Mesai*). Generally speaking the entire month of *Tmur ra Ongos* is a good time to plant Colocasia, since it is one of the six months of *Ongos*, the preferred season to plant Colocasia. However, there are a few specifics worth mentioning. Some of the older women of Ngermetengel will prefer to plant even more on the first and fifteenth moon. In the month of *Tmur ra Ongos*, however, the fifteenth is the day of the *Ochit*, believed by some to be an unlucky day for any activity. Therefore, little planting on the fifteenth moon of this month can be expected. Another possible rest day would be the thirtieth moon, an unlucky day for planting Colocasia.

With the passage of *Rak* (god), the first Palauan month fades into the second

set of thirty darknesses, thus continuing the cycle that augments the elements, processes, and agents that characterize this remote island landscape.

Discussion

This report poses several questions: First, is Ngermetengel's clock and calendar a model of "cyclic realities" or "cyclic ideals"? In other words, are the patterns an ideal model of the situation as perceived by the traditional villager, or are they in fact the actual observed phenomena. In spot-checking the model while in the field, all systems seemed to have been on schedule; the phase and crescent shape of the moon were correct, the tide was at the correct level, etc. But, is there really a rain that comes on the eighth moon of the first thirty darknesses? Is the *Kelat* fish really laying its eggs on the tenth moon of the same month? Is it really true that the *Besechamel* fish only lays its eggs on the first day of the first month of the Palauan calendar? Much of this, of course, is highly questionable. I would suspect that the model that is presented in this report is a combination of "cyclic ideals" as well as "cyclic realities." What is really needed is several years of intensive observation in the field—the model of Ngermetengel's clock and calendar in one hand, the cosmos in the other.

Secondly, how much does a culture's perceived model of cyclic time affect actual regulation, utilization and consequent management of natural resources? Based on my own limited field experience, I would argue that resource management in certain subsistence or near subsistence societies can be at least partially attributed to a society's perceived model of their situation. Fishing is the most cyclical of activities in Ngermetengel. It is carried out according to the reading of the heavens as well as the phases of nature. The moon, tides, and even the stars have a bearing on the movement of Ngermetengel's traditionally schooled fishermen. Since the reef and lagoon are primarily the domain and habitat of the men, it is natural that the men lead a life that is closest to the cycles of nature. Although the women will occasionally comb the tidal flats for shellfish, sea urchins, sea cucumbers, and some varieties of small fish, their activities are primarily concentrated on the land in the cultivation of taro and cassava, an activity that varies little with the seasons.

Thirdly, as a society's traditional system of time-reckoning is displaced by the Gregorian calendar, the Swiss watch, and the dictates of the market place, what effect will this have on man/environment relationships and ultimately man's impact on environment? In the five year period between 1967 and 1972, I observed major changes in resource exploitation in Ngermetengel. In 1967, fishing was conducted by bamboo rafts and small runabout boats mainly for the purpose of subsistence. Fishing was undertaken at a leisurely pace geared to the cycles of nature. In 1972, the village built a 35 foot (11 m) commercial fishing vessel for the purpose of supplying the market in Koror. Where, when and how much they harvested the lagoon was now regulated by the demand of the market place, not the traditional clock and calendar. Only a few old traditionally schooled fishermen still observe and ride the

cycles of nature. The conclusion is obvious: further deterioration of Ngermetengel's clock and calendar (the awareness of nature's dynamic cyclic rhythms and interrelationships) will lead to further deterioration of the environment. Paradoxically, Palauans are losing their ability to relate to their environment at a time when modern western society struggles to read and use a landscape without harmful consequences.

This report recorded a system of time-reckoning that is almost a lost art in the Palau Islands. Today, only the very old men and women of the village remember and use parts of Ngermetengel's traditional clock and calendar; only a handful of Palauans remember and use the entire system. Palau's teenagers haven't the slightest knowledge of the old system of time-reckoning. To them, the month is January, not *Taoch ra Ongos* (3rd thirty darknesses); the day is Monday, not *Ta Buil* (New Moon or first day of a particular set of thirty darknesses); the hour is 6:00 a. m., not *Ngoscha Sils* (Sunrise), etc. Yet, the young men and women of the village are suspicious that some other type of regulatory device is operating in the minds of the village elders. They even joke about the difference between "American Time" and "Palauan Time." But few of them are aware, and especially the American administrators in the District Center of Koror, that there is more to "Palauan Time" than meets the eye. It is no wonder that there is often a breakdown in communication between American administrators and Palauan village elders—they're running on two different systems of time.

Literature Cited

- Keate, G. 1788. *An Account of the Pelew Islands*. Nicol Pall Mall, London. 377 p.
- McKnight, R. K. 1961. Mnemonics in pre-literate Palau. *Anthropological Working Papers* 9: 6. 36 p.
- Nilsson, M. P. 1920. *Primitive time reckoning*. Oxford University Press, Oxford. 384 p.
- Tuan, Yi-Fu. 1966. An electric reading: man and nature. *Landscape* 15 (3): 31-36.