

# Sunday Travel

The Sunday Star-Bulletin & Advertiser

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## Fiji's charm is off

By Dennis A. Olkowski  
Special to The Advertiser

If you're the type of traveler who shuns conventional wisdom and likes to strike out on your own, you'll find plenty of raw adventure in the Fiji Islands.

Unlike Hawaii, Fiji's island culture remains virtually intact and visitors can share a rare glimpse into the lifestyle of the South Pacific if they're willing to get off the beaten path.

While Fiji does have a smattering of fashionable hotels, its real charm comes from trekking into the "bush," tasting exotic foods, and visiting tribal villages that have existed for hundreds of years.

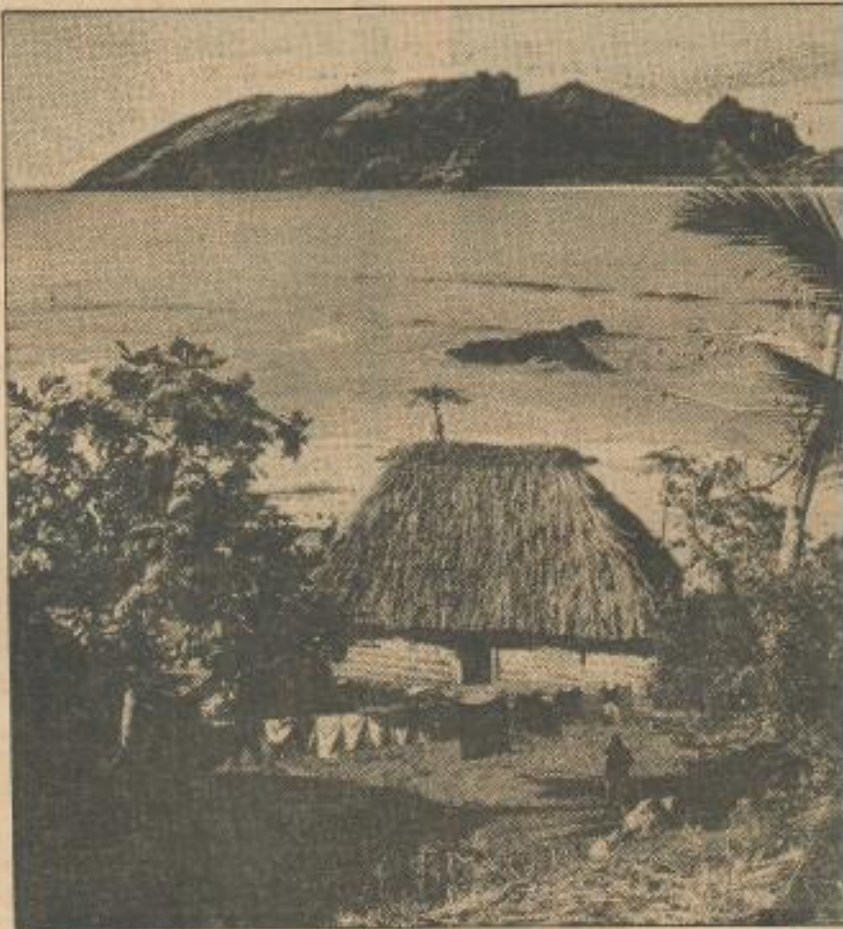
And whether you're headed to Fiji for an extended vacation, or as a quick stop over on your way to Australia, this island chain of 300 volcanic islands (100 of which are inhabited) provides an enjoyable alternative to typical tourist destinations.

Well-written guide books on Fiji are difficult to come by, but here are several ideas that might make your holiday even more enjoyable.

### EXPERIMENTING

**WITH FOOD** is one of the true joys of a visit to Fiji. Over the years the country has grown more diverse from the tastebuds on down, and today you can sample anything from British crumpets at "high tea" and Indian chutneys, to Chinese noodles and baked Fijian breadfruit.

If you're lucky enough to be invited to a Fijian *magiti* (a luau) don't pass up the opportunity. Most feasts include chickens or pigs roasted over open fire . . . or you might be fortunate enough to try *kokoda* (raw fish marinated in lemon juice), *balalo* (sea worms) *lairo* (a large sweet-tasting sea crab) or *palisami* (corned beef



The reefs of Kowata Island, in the background, are popular with d

sure to remember for a lifetime. The tropical jungles of Fiji are nourished by up to 250 inches of rainfall each year, and many remote villages are connected only by narrow footpaths. As you hike from one charming village clearing to another you're likely to come across towering bamboo forests, mangrove swamps, dense underbrush, flame ginger, and miles upon miles of coconut trees.

Because of its volcanic origins, Fiji has a genuine dearth of animal wildlife so hiking is relatively safe. In fact the only real danger comes from wild boars that might cross your path at night. Other fauna include colorful parrots, flying

shuffle-dancing as part of their night entertainment.

The most popular rural area catering to tourists on the main island of Viti Levu is the Sigatoka Valley, which is located along the picturesque Coral Coast. Here you can shoot river rapids on a bamboo raft, explore caves designed with petroglyphs rock carvings, or try your hand at surfing at one of the better beaches in the islands. The Sigatoka Valley is easily accessible by car, taxi, or open air bus and it's situated along the well traveled Queen's Road.

**OPEN—OCEANADVENTURES** are one way to leave civilization in your wake, and the best place to book passage

# the beaten path



Photo by Mike Tsukamoto

vers.

daily boat trips from the city of Levuka on Viti Levu's western shore. Beachcomber and Castaways islands are well suited to the tourist trade, and both are destinations where guests can rent their own bure and spend a day or a week snorkeling among rainbow colored reefs, hunting for shells, or lazing about in the sun.

Hollywood has discovered the wild beauty of the islands, and movies such as "Blue Lagoon" starring Brooke Shields and "His Majesty O'Keefe" with Burt Lancaster used remote Fijian jungles as their backdrops. And if you're old enough to remember the tele-

Street, or you might branch out to the stores along Victoria Parade in the heart of the city.

The Suva Market at King's Wharf is one of the city's main attractions, and it's honey-combed with open-air stalls that sell everything from native handicrafts to fresh produce. Your best buys are hand-woven baskets, wood carvings, *masi* (tapa cloth) fashioned from the bark of mulberry trees and decorated with earth-tone dyes, or Indian designed bangles and filigree silver.

Bargaining for prices is the catchword in both the duty-free shops and market stalls, so don't jump at the first price you hear. If you shop around and haggle with vendors, you're likely to come away with some treasures that will astound the folks back home. In fact, a visit to Fiji is the next best thing to a weekend shopping spree in Hong Kong.

**CULTURAL TOURS** are available and one place worth visiting is Suva's Albert Park. Here you can witness Fijian and Indian dancing for free during the Hibiscus Festival (generally held in early September).

The Hibiscus Festival includes a colorful parade through the city, a week-long carnival, fresh food stalls, soccer games, and a host of handicraft demonstrations.

The Indian community celebrates its *Diwali* festival (generally in October) to commemorate the victory of Lord Krishna over the demon King Narakasura. This celebration is the most important Hindu festival of the year, and one day is set aside for displaying hundreds of lighted candles in windows, doorways, and on front lawns.

Firewalkers from the island of Beqa have puzzled scientists and the medical profession for

decades, and you shouldn't pass up an opportunity to witness this unique Fijian ceremony. The firewalkers are known for sauntering across large beds of white-hot coals in their bare feet without being burned. Performances are held periodically at major hotels and on special holidays.

Near Albert Park are the Suva Botanical Gardens and the Fiji Museum. The museum contains rare South Pacific artifacts, weaponry, the actual rudder of the H.M.S. *Bounty*, or you can view such curiosities as genuine cannibal forks and pots once used for holding human flesh.

**HOTEL ACCOMMODATIONS** on Viti Levu are not only "civilized" but reasonable as well. Prices range from about \$18 to \$50 (U.S.) for a double room in ultra-modern hotels. If you're traveling on a tight budget, you can opt for family-style guest houses where a night's lodging can be as inexpensive as \$8 (if you don't mind sharing a bath).

English is the only language you'll need for most travel throughout the country, and yes, the water is fine for drinking. Guests are advised to pack light summer clothing. However, because modesty is part of the Fijian tradition, it's suggested that women wear dresses or slacks instead of shorts and bathing suits in areas outside of their immediate resorts.

For general information on the islands, resorts, cruises, and tours, write directly to the Fiji Visitor's Bureau, G.P.O. Box 92, Suva, Fiji.

*Dennis Olkowski, a writer with the Hawaii Newspaper Agency, lived in Fiji for three years as a Peace Corps volunteer, and conducted graduate research in communication while attending the East-West Center.*

soaked in coconut milk and baked in banana leaves). Cassava, taro, and fresh baked breadfruit are staples of the Fijian diet, and they make an intriguing departure from Western menus of burgers and fries.

Fiji's sizable Indian community has added genuine zest to the nation's diet by introducing *roti* (flat pancakes) *dahl* (a lentil-based soup), and spicy offerings of mutton, chicken and fish curries to local dinner tables. Indian foods are generally available at urban restaurants, while the Fijian dishes are strictly from the "bush."

**ESCAPING TO THE BUSH** is one adventure you're

fruit bats (edible when steamed with coconut milk), lizards, owls, hawks, the mongoose, and large spiders that weave webs that hang between coconut trees as much as six apart.

**FIJIAN VILLAGES** appear much as they did a century ago with *bures* or huts crafted from bamboo and thatched roofs. Visitors to rural villages have an opportunity to experience life at its most basic level, and overseas guests are encouraged by their hosts to bathe in nearby streams, sleep under mosquito netting, partake in fish drives, gather firewood for cooking the evening meal, and participate in a *tra-la-la-la* or Fijian

on intra-island copra boats is at King's Warf in the capital city of Suva. Overnight and week-long voyages will take you to Fiji's remote outer islands for less than \$20 per person, and you can book passage aboard these tiny craft by negotiating with individual sea captains or by checking with the harbor master.

The harbor master can provide departure times and destinations for most copra schooners plying Fiji's southern waters, or listen to the English broadcasts featured daily on Radio Fiji.

If you'd like to sample island life without being cast adrift completely, you might try

# Being shipwrecked onl

By Mike Tsukamoto  
Special to The Advertiser

**S**hipwreck. Its very mention evokes images of a poor mariner cast ashore on a tiny South Pacific island . . . broad white sand beaches, a sheltered lagoon and thatched native huts hidden among tall coconut palms. But I discovered it's not wild imagination.

It's real. It happened.

Just a few miles off the western coast of Viti Levu, Fiji's main island, is tiny Vomo. Our 18-foot dive boat was anchored here in water so clear and calm it looked like the ocean was a sheet of blue glass. The seaward edge of the main reef was below us, a sudden vertical drop to nowhere. It was literally covered with soft corals, sea fans, tridacna clams and thousands of multi-colored fish.

I was in Fiji to do some serious underwater photography while my Honolulu dive buddy, Steven Lee, wanted to bag some of the local food fish and lobster. After quickly suiting up, we jumped over the side of the boat and followed our Fijian guide Paul down the reef wall.

The dive went well. Steve caught two "coral trout," a fishy red sea bass covered with electric blue polka dots, and a large lobster. I used up nearly all the film in my camera and wanted to get back to the boat to reload, so Steve surfaced to check our position before beginning our return swim.



Photo by Mike Tsukamoto

Beautiful little Vomo Island invites both exploring and photographing.

I knew something was very wrong when Steve motioned me to join him on the surface. As soon as I reached him, he matter-of-factly said, "Mike, our boat sank."

I thought it was a bad joke, but when I turned around to look it seemed more like a bad dream. Our boat was three-quarters underwater, its bow pointing straight up at the sky with our guide Paul hanging onto the anchor rope still wearing his scuba gear.

Paul later told us that he knew something was wrong with the boat when the ice chest and some miscellaneous items floated down in front of him just as he was stringing up a speared fish.

After salvaging what we could find and securing it to the reef, we pulled the boat as close to the reef edge as we dared and just stood there

while it slowly sank to the bottom.

Paul had cramped up both legs while retrieving some floating gas cans, so we left him on the reef with our baggage and swam to Vomo for help. Vomo could have been the model island for all those Hollywood movies set in the South Pacific. There are hundreds of palm trees, beautiful beaches, a clear blue lagoon with a beached schooner and there were 10 very friendly Fijians who helped us pull our equipment off the reef and onto their island.

These people showed us typical Fijian hospitality by giving us warm clothes to wear and food and shelter in their huts until a rescue boat arrived late that night from Viti Levu.

The rest of our stay in Fiji wasn't quite as interesting as

"paradise" with Gardner McKay, you probably have some idea of what to expect in the way of rustic amenities.

**URBAN CENTERS IN FIJI** can be just as exciting, since cities such as Suva, Nadi, and Lautoka reflect an architecture and lifestyle with a decidedly British accent.

This former British colony is ideal for duty-free shopping, and you can buy anything from Japanese cameras, French perfumes, Indian silks, and Chinese art work for half the cost of what you'll find in Hawaii.

The best place in Suva to start your bargain hunting is among the shops on Cummings



Photo by Mike Tsukamoto

Visitors to Fiji are often welcomed into outlying villages.

## y enhanced the diving

our temporary shipwreck on Vomo but, thanks to Grant Scott, Jr., of Diver Services, we were able to dive on remote reefs and visit islands seldom seen by tourists.

The reefs of Fiji offer diving opportunities totally different from what you find in Hawaii. Most startling is the profusion of reef life and coral just below the surface and extending to a depth of 50 to 60 feet.

As soon as you enter the water, you're surrounded by thousands of tiny silver mackerel-like fish that seem to be everywhere on the reef, running about in huge schools that come sweeping around corners at high speed. Massive heads of table coral stick out like platforms along the sheer drop-offs, while giant sea fans and strands of wire coral decorate the reef with their delicate beauty.

Huge jade-green anemones with purple-tipped tentacles are scattered about, their host of tiny clownfish darting out to grab bits of food drifting by. Another striking difference is the reef formations and sudden drop-offs. In Hawaii the depth slowly increases as you swim toward the seaward side of the reef. But in Fiji the reef may start in ankle deep water then immediately plunge in a vertical drop of up to 1,200 feet!

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warmer than Hawaii. However, I'd recommend bringing a wet suit top or vest. The only place you wouldn't need this is when you're snorkeling in the shallows. The water here is very warm, almost like bath water.

It also would be a good idea to pack an emergency repair kit with your dive gear. Extra mask and fin straps, waterproof tape, a tool kit, spare O-rings and a sharp knife will

come in handy on these remote islands where you won't find a dive shop or hardware store.

For underwater photographers, Fiji is definitely wide-angle-lens country. With all the great scenery and clear water, it's hard not to get a decent picture. You may run into some difficulty with close-up pictures of fish, however, because they run for cover as

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Photo by Mike Tsukamoto

Fiji lobsters are big, plentiful . . . and delicious.

# Do you want to regain

By Peter Mirams

Special to the Advertiser

Throughout the world, as tourists scramble to avoid the monstrosities they've built, they trample the life out of happier civilizations where progress had missed out until they brought it, screaming with bad taste, with them. Now Spain has its fish and chips and English teas, Bali its pies and steaks, and Hawaii has succumbed to high-rise development. Surely tourism, and we're all guilty, is ruining the world as the packaged tours penetrate deeper and deeper into unspoiled lands.

And yet, we can still find Paradise Regained. I found it almost on our doorstep, in jet-age terms. While the main island of Fiji, Viti Levu, has suffered the tourist' invasions, and some of

the smaller islands to the north have become the haunts of day trippers, the wonderful dignity and friendliness of the Fijian people have prevented it from deteriorating to the level of some tourist resorts.

Even better, there are islands which are still in another age— islands which Captain Cook would not find much changed if he were to make a return trip.

One of these is Taveuni— about one and a half hours flying time from Nadi in a Norman Islander of Sunflower Airlines. I flew to Nadi with Continental, whose crew really did work at making the flight a pleasant one, and stayed a night at the Nadi Travelodge.

With the sound of "Bula!" still singing in our ears we took off and headed in a north-easterly direction. Cruising at an

altitude of 9000 feet there was every opportunity to admire the fantastic colours of the water as coral reefs and shelving islands changed the hues in an ineffable range of blues and greens. It was a flight just long enough to adjust to the transformation from the World to Paradise.

Our arrival at Matei Airport had been awaited with the gentle expectancy of a people for whom Time is the servant, not the master. I would not want to hurt the feelings of those people by revealing the word, airport a gross exaggeration.

The landing strip has no harsh surface of the 20th Century tearing through the palms. On the contrary its earth blends into the surroundings, and the wooden airport terminal, not much bigger than one of the village homes nearby, wel-

## paradise? Travel to Fiji

comed us discreetly. Apart from the aircraft the only other apparent concession to this century were the taxis waiting for the half dozen arrivals. Ours owned by Soqulu Express was a virtually brand new Datsun, which became very familiar to us over the following days as we explored the island.

Our villa was next door to something, which, I must admit, had, at first, filled me with misgivings—the Soqulu Condominium development. Nothing should be allowed to ruin this paradise. But having wandered through the site, with a number of the town-house style condominium units nearing completion, I realized that the environment itself was too strong. Even before the development was completed and the half-finished buildings could receive

the careful landscaping and planned integration, it was already becoming part of its surroundings.

For those lucky enough to get one of these townhouses they provide a wonderful investment, retirement home or holiday home. Or all three, because Leisuremark, who are managing the development, will arrange rentals for owners. With so little freehold land in Fiji any available is worth snapping up.

It is in a magnificent position, cuddling between the vividly variegated blues and greens of the sea and the masses of flowers punctuating the greens of the Soqulu Country Club.

The three grass tennis courts are in a similar state of perfection, which I constantly found a

source of surprise in such a remote part of the world. The bowling green was outside my experience, but appeared to have the same beautifully manicured condition. I found it all quite enchanting.

In fact the whole of Taveuni is waiting for you. Just relax and enjoy it. The International Date Line passes right through the island which means that, if a day's fishing, golfing or just lazing in the sun has passed too quickly, all you have to do is walk down the road through the Date Line to yesterday, and do it all again more slowly this time.

For further information about the Soqulu Development contact Leisuremark, Ltd., 1188 Bishop St., Suite 2804, Honolulu, HI 96813 or call 521-8524.

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Photo by Mike Taukano

Fiji lobsters are big, plentiful . . . and delicious.

# Japan Extends to Tropical Islands

By ROD LIPKA

ISHIGAKI, Japan—When travelers interested in Japan consider visiting its more remote reaches, they're most likely to think of snowy Hokkaido or the mountainous national parks of Honshu.

But there's someplace else off the beaten track that also happens to be a tropical paradise. Lying between Taiwan and Okinawa in the East China Sea is a group of islands collectively called Yaeyama (Eight Great Mountains).

The islands are almost unknown to the Japanese, much less to Westerners unless they happen to be former American servicemen who wandered here from Okinawa.

The big landfalls in this little group are Ishigaki (Stone Fence) and Iriomote (Western Frontier) islands. Half of Iriomote and all the smaller islands between it and Ishigaki are considered a national park.

This is Japan's southern extreme. From neighboring Yonaguni Island you can see Taiwan on a clear day.

## Standard Japanese Helps

The inhabitants speak a dialect that can't be understood by visitors from the mainland, though of course you can use standard Japanese to get around.

Because Yaeyama is a part of the Ryukyu Islands chain, it has had a somewhat different history from Japan proper.

The Ryukyuan kings, based in Okinawa, paid tribute to the Chinese emperor, recognizing China as the older, more advanced culture. Also, there is more Indonesian and Philippine influence here than in the rest of Japan.

A visitor familiar with both Japan and China would notice that Yaeyama has elements of both.

These islands have their own dance, music, fabric style, architecture, bull fighting and liquor (potent dry sake that you drink cold at \$2.10 a liter).

Modern tourist facilities are built in the traditional style, but as yet there's no sense of overdevelopment. This is because until 1972 the entire Okinawa Prefecture, of which Yaeyama is a part, was administered by the U.S. military.

In 1945 Okinawa was taken by American forces in the last big battle of World War II. Besides the loss of life, most of Okinawa's ancient castles and temples were leveled. Yaeyama's traditional architecture is not as grand, perhaps, but it's intact.

Between 1945 and 1972 tourism wasn't encouraged anywhere in the Ryukyus, and remoter islands such as Yaeyama didn't have electricity. Since then the Japanese have been gradually building up many industries, tourism included.

Ishigaki has a resort town called Kabira that has Western hotels as well as Japanese-style inns. The



Los Angeles Times

beach at Kabira, in an inlet, features emerald green little islands surrounded by warm chest-high blue water. If you've never snorkeled, this gentle cove is a great place to try it.

Farther down the road is an area called Yonehara. If you have a tent and sleeping bag, this is the place. The beach is broad, white and protected by a reef a couple of hundred yards offshore. All the tropical fish are edible, if you have a method for getting them over a driftwood fire.

We had some luck stringing hooks off a main line and using cheap sausage for bait.

In any case, you'll want to have a mask and snorkel to check out the colorful coral and wild variety of marine life.

These places are reachable by public bus from Ishigaki City for a few dollars. Taxis are available, too.

The food is varied, delicious and, for Japan, quite cheap.

You won't find the usual mainland dishes like teriyaki or sukiyaki. Remember, this is the Ryukyus. Soba is a soup with noodles and meat, usually pork. Yakisoba is the same materials but stir-fried instead of in a broth. Donburi is

To Ishigaki's west lies Iriomote, now touted as Japan's last true wilderness. Reachable by boat in a choppy one-hour ride or by helicopter in 15 minutes, Iriomote is home to the famous Iriomote wildcat. Only seen at night by the light of photographer's strobes, this rare feline was discovered by scientists only a short while ago.

About the size of a house cat, from an evolutionary standpoint *neko-kun* is said to be a very primitive animal. Inevitably, it has become Iriomote's publicity mascot.

After staying on the beach on Ishigaki we decided to try an inn on Iriomote. At first the innkeepers were reluctant to accept Westerners, not because they weren't hospitable but because they weren't sure that the non-Western accommodations would suit us. Just a little use of Japanese put the innkeepers at ease, and then the hospitality flowed.

## Balmy November

Staying in these places can be a real treat, because as a visitor from afar you're considered an honored guest. We kept running into a delightful concept known as *sochi-su* (service), which means extras at no cost.

We were in Yaeyama in early November when the weather was still balmy. The inn on Iriomote was deserted except for one other guest we didn't even see. For \$8.70 each a night we got private rooms with tatami mats and cozy futons to sleep on. The bath was down the hall, but large and modern.

Iriomote has a beach for camping at its southern tip, but it's not as fine as Yonehara. You might want to visit there, anyway, just to say you've been to Japan's southernmost landfall. Boats tour the rivers and waterfalls of the inland jungle.

Reaching Yaeyama from Naha, Okinawa, is easy by boat or plane. Southwest Airline has daily flights to Ishigaki City for about \$150 round trip. Arimura boat line has a night cruise that stops over on Miyako Island in the early morning and reaches Ishigaki City in the



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*Lipka is an Oakland free-lance writer.*



Los Angeles Times

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afternoon. Total time required is 19 hours.

We were going to Taiwan, so we took the boat because there are no planes from Ishigaki to Taiwan and the one-way Naha-to-Taiwan boat ticket with a Yaeyama stopover was only \$65.

The boat from Naha to Ishigaki City was pleasant enough. Our lowest class tickets entitled us to sleep in a large room with 50 or so friendly islanders and other low-budget Westerners.

But food availability was brief and inadequate; most folks brought their own. Still, we didn't know how good we'd had it on that leg of the cruise until we boarded our Ishigaki-to-Taiwan boat after enjoying Yaeyama.

This boat was much older and more cramped than the first vessel, so seasick-prone travelers might consider returning to Naha by plane.

These islands aren't the most famous or accessible in the world, but that's why you just might get a beach to yourself.

Stan Delaplane

# The Day of the Giant Turtles in Fiji

KOROLEVU, Fiji—The beach resorts at Korolevu are halfway between the capital of Suva and the crossroads airport at Nadi.

It is a pleasant, long stretch of palm-fringed beach. Coral and sharks make it chancy for swimming. But the sun is bright and the sea is watercolor blue.

There is a certain British stiffness. The food is fair; it could be improved tremendously. Fijians cook on eight kinds of charcoal. That gives a flavor we cannot duplicate no matter how much mesquite, applewood and sassafras we use.

Guests used to sleep in grass shacks called *bures*. They had modern plumbing and mosquito nets, and the sea breeze made them comfortable. Now there are several up-to-date resorts.

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"You should go sometime to Koro and see them call the turtles," said the man from the Fiji Visitor's Bureau. (Tourist bureau people always try to send you somewhere else, I find.)

The men of the village dress in a certain way on certain days. They put on ceremonial wreaths of flowers. All the ceremonies are quite secret.

"One thing about all South Pacific

ceremonies—they usually involve staying away from women and coconuts. This is very difficult in the South Seas. We don't have much else.

"Anyway, ceremonies are performed. And they call the giant turtles.

"You can hardly believe this unless you see it. Dozens of these turtles (they're as big as a dinner table, you know) rise from the sea and swim to the land.

"The natives turn them on their backs and, eventually, eat them. Quite delicious, turtle steak."

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Fiji has more than 300 islands. About 100 are populated. Most are as primitive as the days when Fijians were serving boiled New England dinners—boiled whaler was the entree.

On one island, women call the turtles.

"The women wade into the water from the island of Kadavu, quite nude, you know, except for a flower crown. It probably has some interesting sidelights for social study. Many South Pacific cultures believe pregnancy comes from being splashed with sea water."

The women wade in, calling the turtles.

Just what they say, he did not

know. Probably an ancient chant with magical properties.

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In any case, turtles soon come popping up like bad debts. They swim to land and wind up fricassee.

I asked if the lady turtle callers had to stay away from anything to prepare for this giant event.

The man from the Visitor's Bureau did not know, exactly. He suspected it would be coconut. Coconut is *tabu* whenever you are pulling magic or calling on the gods for cooperation.

In many islands of the South Pacific, women are forbidden certain kinds of fishes. Mainly fishes that have magical properties for men.

"It is well known that women steal a man's mana, his power. Therefore, they must not have anything to do with magic properties."

Something like taking their mink coat away. Only, of course, in this climate, you'd look silly, calling turtles in mink.

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Korolevu is the center of the Coral Coast. The Naviti Beach Resort runs \$58 for single rooms, \$64 double. The Hyatt's single rates range from \$67 to \$77, double rooms \$83 to \$96. A 5% tax is added.

dark brew from Prague. Brewery embodied with a distinctly yeasty flavor and large head. In good weather, patrons flock to the upstairs outdoor terrace. U Tomase boasts some of the best food in any Prague  *pivnice*; especially good is the Tomase goulash with bread dumplings and the cucumber salad.

U Fieku (Fieku's Place), Krenecova 11, Prague 1, the city's only remaining  *pivnice* where beer is brewed on the premises. In New Town Prague, U Fieku endures as the city's most famous tavern and a particular favorite of tourists. A seating capacity of 900 makes it one of the largest  *pivnice*, where three rooms swarm with loud, unrestrained, back-slapping drinkers.

To get into U Fieku's crowning feature, a large courtyard beer garden, you'll pay a 5-crown cover charge, about 40 cents.

Under the shelter of hanging trees, revelers bellow out beer-drinking songs to the accompaniment of a Czech  *oompah* band. Nightly entertainment provided by patrons includes dancing on tables and in aisles, while snouting down singers from other tables.

Fieku Beer

# Sunday Travel

The Sunday Star-Bulletin & Advertiser

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## Turtle Island is Fiji

Although I live on an island, I still dream of islands. And when I take vacations, I still go to islands.

No snow skiing for me. I'll take warm sandy beaches and swaying palm trees any day of the year.

I remember watching actress Brooke Shields swim around "The Blue Lagoon" a few years back and wishing I could do the same. Here was a tropical paradise wonderful enough to delight even the most demanding castaway.

For those who don't know, "The Blue Lagoon" movie (based on the 1906 novel by Henry DeVere Stacpoole) was filmed in Fiji. More specifically on Fiji's Turtle Island, a private hideaway owned by Richard Evanson.



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travel editor

Evanson, a Vancouver native who once attended the University of Hawaii, was back in Honolulu recently to talk about his island and the exclusive guest resort he operates there for the romantic-at-heart.

Evanson, 47, first saw Turtle Island a dozen or so years ago during a round-the-world trip. He sold most of his assets, including a cable television company, and eventually paid \$500,000 for the 500-acre island and moved there in October 1972.

"Turtle Island," he says,

"was first settled by Europeans in 1858 and was granted freehold status by Queen Victoria in 1884. Before I arrived, no one had lived on the island since the 1940s."

Nanuya Levu, the Fijian name for Turtle Island, is part of a chain of 95 islands (100 miles long and 3 miles wide) running north out to sea from Nadi. To the east is Bligh Water, where Capt. William Bligh, after the 1879 mutiny of his ship, HMS Bounty, voyaged in an open boat. To the west is New Caledonia and Australia.

Turtle Island is one of seven islands that ring their own volcanic blue lagoon, two miles across. Three other islands are inhabited. Each has its own village and their combined population is about 400 Fijians.

# 's ultimate resort

and ability to satisfy visitors. Each of the guest houses is "first-class primitive" (thatched roofs but western-style furniture and modern plumbing) and the island has a dozen secluded beaches to choose from.

Only 20 people are allowed on the island at any one time and their average stay is about 10 days each. Children are only permitted on the island four months out of the year.

Accommodations at Turtle Island Lodge, per person per night, are \$70 for adults, double occupancy, and \$140 per night, single occupancy. Children under 12, sharing with parents, are \$35 per night. Service charge included.



Turtle Island (Nanuya Levu), top center, is a privately owned resort island in the Fiji group.



Drawing by Deborah Scales

As on many Pacific islands, the men of Fiji frequently participate in traditional kava ceremonies.

For the first seven years," Evanson explains. "I lived on Turtle Island pretty much by myself. I hired some of my Fijian neighbors and we cleared land and started a garden. My first house or *bure* cost about \$200 to build."

Evanson eventually bought a seaplane and got the Fijian government to license Turtle Airways. Anxious for company, he then added 10 native-style houses on the beach and started a resort.

Turtle Island has become world famous for its beauty



This couple shares a private moment (except for the sneaky photographer) on a secluded beach.

A deposit is required upon confirmation of reservation.

The climate averages 80 degrees during the year. Clothes are informal. Coats and ties are banned.

"Once you're on the island," Evanson continues, "you can put your money away. Everything you might desire — from meals and drinks to transportation, leisure activities and tours — is included in the original price. I want my guests, who often form lasting friendships with each other, to forget completely about the problems of the outside world."

"The Blue Lagoon" crew

surveyed hundreds of possible islands before settling on Evanson's paradise. They filmed for several months and left behind a bunch of place names — such as "Devils Beach" and "Shell Beach." Evanson has kept the "Honeymoon Cottage" and the "Stone God" sets from the film and they are popular with visitors.

Once you get to Nadi International Airport, it's a 25-minute seaplane flight (\$140 round-trip) to Turtle Island. You can only take 44 pounds of luggage per person on the seaplane, so travel

light. Unnecessay luggage can be stored at the Turtle Island office in Nadi.

Evanson says a number of couples from Hawaii have stayed at Turtle Island and he says they've adopted easily to the relaxed pace of his resort. Mainland travelers sometimes find the transition a little harder because they aren't used to island living. For more information, contact Turtle Island's local representative, Tom Reece, at Pacific Marketing Group, Century Center, Suite 3-627, 1750 Kalakaua Ave., Honolulu 96826, or call 942-3786.



A seaplane unloads passengers at the Turtle Island pier. The flight from Nadi takes 25 minutes.

**SOUTH PACIFIC COMMISSION**

**TWENTY-THIRD REGIONAL TECHNICAL MEETING ON FISHERIES**  
(Noumea, New Caledonia, 5-9 August 1991)

**WOMEN AND FISHING IN TRADITIONAL PACIFIC ISLAND CULTURES**

by

Elizabeth Matthews

Women are involved in many types of fishing in the traditional cultures of the Pacific islands. The extent to which women fish varies greatly from island to island. Most women, however tend to fish in shallow waters close to shore, without the use of canoes and implements other than baskets and sticks.

An examination of the role of women in the Pacific islands is complicated by several factors: (1) fishing studies tend to focus on the often highly ritualized, dangerous pursuits of ocean-living fish which are primarily male-dominated activities; (2) studies have often overlooked gender roles in fish collection by the use of general terms such as "fishermen" and the emphasis placed on documenting techniques and implements; (3) early researchers were often men and thus had access to male knowledge; (4) men in the Pacific islands often minimize the importance of women's contribution to fish collection; and (5) women occasionally fish even though it is called men's work.

From the data that has been collected, the tremendous variety of women's roles in fishing throughout the Pacific is immediately apparent. Generalization is not possible even within the confines of a particular cultural group, i.e., Melanesia, Micronesia, or Polynesia since each individual island has developed its own unique set of confines due to a great extent on its geography. However, some generalizations can be made if traditional Pacific island cultures are viewed as a whole. Exceptions, of course, exist and tend to be better documented than the general, mundane fishing activities of women. This paper will explore some of the variety of women's roles in Pacific islands fishing, briefly discuss possible reasons that this role is often restricted to shallow water fishing practices and comment on the importance of this often overlooked aspect of fish collection.

The ocean is an important resource for cultures with limited land areas and resources. Marine resources apparently have been exploited "quite extensively" by most coastal islanders in the Pacific (Oliver, 1989:250-251). The extent of this use varies from island to island due in great part to the geography of the shoreline environments and the accessibility of the sea. Cultures inhabiting islands with steep shorelines, little reef or beach areas and deep, turbulent waters developed open-sea fishing strategies utilizing canoes. Deep-sea fishing activities are generally dangerous, periodic and surrounded by ritual and magic. Both men and women are involved in such fish collection strategies when those are the only options available to the islanders. On the other hand, peoples inhabiting coral atolls that have shallow lagoons and inland reefs in addition to the deeper waters further offshore were able to exploit more types of marine environments and gender roles became more stratified as more people in different environments could be involved in seafood collection (Oliver, 1989:251).

## Women's Role in Fishing

The dangerous, exciting pursuit of deep-sea, pelagic fish such as shark, tuna and bonito tends to be a male occupation throughout the islands that have shallow reefs. Women (and often children) are usually found collecting fish, shellfish and other organisms from the shallower waters closer to the land. Deep-sea fishing is generally restricted to men since it requires considerable strength and the acceptability of being exposed to great personal risk (Oliver, 1989:251). The ability to fish is often synonymous with manhood in these societies. Men who do not fish are sometimes ridiculed. For instance, in Pukapuka in the Cook Islands, a man who does not fish outside of the reef is called a "female god" which implies that he is only concerned with the feminine pursuits that would interest a female god who is not interested in masculine pursuits such as fishing (Beaglehole, 1938).

However, the generalization that men fish from canoes in the deep waters while women stay close to shore in the shallower waters is misleading. In a few Pacific societies, women are involved in all forms of fishing. In New Ireland on the island of Tanga "every man and woman, boy and girl, is a potential if not an actual fisherman" (Bell, 1947). In the Marianas both women and men are excellent swimmers, divers, sailors and both sexes participate in catching fish from offshore boats (Thompson, 1945). Women from Fiji also catch fish in deep waters (Hocart, 1929; Thompson, 1949). In addition, although offshore fishing may technically be men's work, in reality women may also participate. Penelope Schoeffel described an experience she had while studying fishing in the Solomon Islands. She had observed two canoes carrying groups of women when she first approached one of the islands. Once onshore she asked several old women about fishing practices on the island. They told her about "men's fishing" techniques: those utilizing lines, nets, hooks and canoes. When she asked where the women she had seen earlier in the canoes had gone, the old women replied that they had gone fishing and that they would be using those very same "men's fishing" implements - nets, lines and hooks. Apparently, the men own these objects but the women can use them as well (Schoeffel, 1985).

These, however, appear to be exceptions to the more general rule that women stay closer to shore and fish without boats, canoes and the implements and ritual that accompany deep-sea fishing expeditions. Often, restrictions are placed on women, their ability to fish and their access to fishing gear. Not only are island women banned from houses where boats are being built, but they often may not even enter the water when their men are fishing (Hanson, 1982). Throughout the Pacific restrictions limit women's access to deep-sea fishing: a woman in a canoe could bring bad luck in Niue; fishing could be destroyed if the canoe or gear was touched by a woman in Samoa; in the Marquesas women could not have sex, light fires or leave their houses while their husbands fished; in the Society Islands women "would have neutralized the tapu of the craft, gear and fishermen" if they went out in a fishing canoe (Hanson, 1982). These traditions are strong and many hold forth today. In 1988, Marie-Claire Bataille-Benguigui, an anthropologist, recounts her difficulties in attempting a study of beliefs associated with Tongan fishing: "I was never openly forbidden to go on a fishing trip, but unforeseen, inexplicable circumstances usually prevented it!" She was forced to gather information from elderly and resting fishermen on shore (Bataille-Benguigui, 1988).

As one result of these restrictions women are much more involved in fishing activities in shallow nearshore waters such as reef gleaning, fish poisoning, patch reef construction and collective net fishing. Reef gleaning is the practice of collecting octopus, shellfish, sea urchins, crabs and other invertebrates from along the reefs (Chapman, 1987). Women (and in some instances, children) use sticks to probe animals from their coral shelters. They collect small fish, shellfish and crustaceans in baskets. These practices have been documented throughout the Pacific: Tabiteuea in the Gilberts (Luomala, 1980), Pukapuka in the Cooks (Beaglehole, 1938) and in many other areas (Chapman, 1987).



Fish poisoning is another fishing technique that women use in shallow reef areas. In Niuaotupapu, Tonga women place pulverized stems of the 'aukava plant in a sack and shake it under coral heads and overhanging rocks in the reef. Fish are stunned and float to the surface where they are speared, knifed or picked up by hand (Dye, 1983). In Futuna, Horn Archipelago women use a toxic substance from the seed of the Barringtonia fruit to poison small fish. This form of fishing, however, can be very devastating to a reef community since juveniles from as many as forty species of fish are affected (Galzin and Mauge, 1981). Construction of small patch reefs to attract juvenile fish is yet another way the women of Futuna catch fish (Galzin and Mauge, 1981).

Assisting with communal harvests of fish with nets is common in many areas in the Pacific (Beaglehole, 1938; Luomala, 1980). For instance, in Tabiteuea as many as one hundred men, women and children participate in an organized deep-water fishing harvest. The "participants swim in a great semicircle carrying a coconut leaf sweep [braided by the women] to drive fish towards a large purseless seine held by other swimmers." Traditionally married women were not allowed to participate in this event because their husbands would be jealous if their sexual parts were exposed if their kilts were lifted by the water. All women could participate once the British introduced cloth trousers in the late 1800s (Luomala, 1980).

Thus women are involved in a wide range of fishing activities from deep-sea fishing alongside men in boats to reef gleaning and communal fishing activities in shallow lagoon waters. These fishing activities tend to be secular rather than spiritual whereas men's fishing activities, even if they take place in the calm, shallow reef areas are usually surrounded by magic and ritual. Women do not generally utilize magic (Fiji, which appears to be the unique documented exception to this, will be discussed in more detail shortly). This is partly due to the fact that women collect fish and other marine resources on a daily basis for food. Men, on the other hand, embark on the occasional usually dangerous journeys into deeper waters that are often part of ritual feasts (Chapman, 1987).

That women are not usually part of fishing rituals may be a reflection of the traditional beliefs of their relation to the gods and things spiritual in many societies. As noted earlier, Polynesian women are often restricted from such practices as canoe building and deep-sea fishing due to strict taboos on their participation. Menstruating and pregnant women are especially restricted from these activities - to the extent that they are not allowed out of their houses or into the water when their husbands are out at sea. Canoe building and fishing are highly sacred acts in many Pacific cultures; the men involved are in contact with the gods and spirits at these times and are "tapu" (in a sacred state). Women can somehow disrupt this spiritual state and cause the gods and spirits to leave the canoes, the men or the fishing grounds. Women are especially capable of this "secularizing" ability when they are menstruating or pregnant. This has generally been interpreted as being a result of the polluting effects of women and their contaminating bodily fluids which cause the spirits and gods to flee. An alternate view of this ability has recently been expounded by F. Allan Hanson. Hanson claims that women are conduits between the secular and the spiritual world: it is through women that ancestral spirits are born into the secular world in the form of newborn babies. Not only are spirits born into the secular world through women, but through them they can also return to the spiritual world. A woman in the Marquesas could draw the evil spirits out of her husband and other male relatives if she sat naked on the afflicted part or if she jumped over him (Hanson, 1982). Rather than repelling the spirits from the objects they inhabit because of their inherent baseness and uncleanness, Hanson claims women attract spirits because of their connection to the spiritual world. Women are particularly attractive to spirits when they are menstruating or pregnant (Hanson, 1982).

This view can explain many previously confusing beliefs in Polynesia quite satisfactorily as Hanson demonstrates in his study. However, there are still those societies that do not restrict women from fishing all areas of the sea. Perhaps women fishermen in those societies do face taboos and are not allowed to fish when they are menstruating or pregnant. In the Lau Islands in Fiji, where women fish at least as often as men, the mere glance of a pregnant or menstruating woman can destroy turtle nets. Also "during the first 100 days of pregnancy a woman may not bathe in the sea [or] participate in fishing" (Hanson, 1982). Systematic, detailed studies have not been undertaken to further substantiate the relationship between women's fishing taboos and their degree of fishing participation.

### **Importance of Women's Fishing**

Women's contribution of fish and other shellfish to the diets of traditional Pacific island cultures has often been underestimated. Women fish everyday while men fish less often but with great fanfare and ritual secrecy. In addition, Pacific island men occasionally belittle women's fishing efforts and the fish that they catch as not being worth a man's attention (Dye, 1983). Although it may not be a highly esteemed occupation, in some instances women's fish collection may actually contribute more substantially to Pacific islanders diets than men. The women, at least, take it very seriously; shellfish, small crustacea, squid and octopus collecting are considered part of a woman's daily work in Tanga, New Ireland whereas the women see men's fishing as a pastime (Bell, 1947).

Because women fish on a daily basis they supply a great deal of the protein obtained in many subsistence diets (Bell, 1947; Chapman, 1987; Luomala, 1980). The importance of women's fishing contribution to the diets of several island societies is illustrated by the following examples: (1) 32% of the total fishing yield in American Samoa is supplied by the women even though they make up only 17% of those engaged in fishing; (2) in Western Samoa 17% of the daily seafood consumption is made up of invertebrates which are collected by women; (3) in Kiribati 84% of the seafood is collected by both men and women and the remaining 16% is caught solely by reef gleaning by women and children; (4) 11% of the households in Kiribati rely completely on shellfish collected by women and children for protein; and (5) in one village in Papua New Guinea 25-50% of the seafood is supplied by women (Chapman, 1987). Unfortunately, quantitative data such as this is rare. There is, however, some evidence that women's fishing may provide the necessary protein for a village when fish are scarce. For instance, the Tanga rely on meals of lobster, crab, prawns and cuttlefish when bigger, deep-sea fish are in short supply (Bell, 1947). It is reasonable to assume that many other island cultures in the Pacific depend on women's fishing to a greater extent than the men give them credit for.

A second aspect of the underestimation of women's fishing is that their knowledge of marine resources is terribly overlooked. Much has been written about the ethnobiological knowledge of male fishermen and that knowledge has proved to be extensive for their local areas. Often this knowledge is greater than that of the researchers who come equipped with scientific books and university training (Johannes, 1981). Undoubtedly women have similar knowledge of the biology and ecology of the resources they collect or they would not be so adept at finding food on the reefs and in open waters.

For instance, in Fiji, an island society that values women's efforts in fish collection and has relatively few of the more restrictive taboos associated with fishing, women have considerable access to the power and knowledge of marine resources. Fijian culture is an exception to the general rule that women do not possess ritual knowledge or magic control of marine resources. A woman in Fiji can have great knowledge and power over some of the fish resources. One woman of a particular clan knows all about the habits of a special species of worm that swarms seasonally. The worms attract sharks that are in turn attracted to the woman and her powerful magic. She watches these worms until the time is right to call the rest of the islanders. The sharks collect at the base of the rock that the woman stands upon chanting and the villagers are able to collect the sharks as they sit passively at her feet. This woman can even cause the fish to get stranded (Hocart, 1929).

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Myths from other areas in the Pacific also portray women possessing fishing knowledge. A myth from Tabiteuea describes how knowledge was passed from a woman spiritual ancestor to a fisherman. This knowledge consisted of techniques for catching a certain kind of fish as well as where to best catch them. Fishing methods have also been credited to ancestral women. In another story from Tabiteuea a woman "imitated the action of [a migratory wading bird's] beak" as it pokes in the mudflats for marine worms. With a pointed stick, the woman was the first to find how best to catch the edible marine worms. These worms are now caught everyday to be eaten raw, cooked or sun-dried (Luomala, 1980).

Whether it is probing for worms, catching crabs and shellfish as they hide in the shallow reef waters or venturing out in canoes to catch deep-sea fish, women contribute greatly to the fish collection in many of the Pacific islands. On some islands, women's access to the marine resources is limited to the shallow nearshore areas, while on others women fish alongside men in deep-sea fishing canoes. As traditional cultures change upon contact with outside (especially European) influences, the roles of the native peoples change and the management of their resources is affected. In many Pacific islands fisheries are expanding and are becoming more commercialized. Tuna is of both subsistence as well as commercial importance in Samoa, Tuvalu, Kiribati, the Solomon Islands and Fiji, among others (Schoeffel, 1985). However, inshore fisheries have largely been ignored as the development emphasis is placed on offshore resources. This is unfortunate, as the inshore areas have been successfully fished by women and their families for generations providing a substantial amount of protein to the islanders' diets.

It is equally unfortunate that more anthropologists have not studied the ethnobiological knowledge of women. Why a women anthropologist such as Bataille-Benguigui did not opt to study the women's knowledge of fish beliefs and resources in Tonga rather than being forced to sit on the beach while the male fishermen were out to sea is not clear. A woman anthropologist is in a good position to study that side of fishing knowledge that is passed from a woman to her daughters. While a woman's role in Pacific island fishing is not often as exciting and magic-filled as that of her ocean-going husband, it is very important in terms of its contribution to her society's protein input. Without further study of the importance of women's fishing and resource knowledge in the Pacific islands, a complete appreciation of Pacific island culture is impossible. Without this appreciation, commercial development in the islands will not reflect the reality of the traditional culture since it emphasizes and encourages the importance of male-dominated fish collection methods as it omits the role of one half of the population - women. Self-sufficiency and balanced development, however, depend on the contribution of both women and men to the collection of fish resources in the Pacific islands. Development projects should not ignore the importance of the resources that are under the domain of Pacific island women.

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# New Move to Save Turtles

In a move welcomed by SPACHEE and surely other turtle-lovers, the Fiji Cabinet has implemented new moves to prevent over-exploitation of Fiji's turtle population.

The Fiji Government has decided to prohibit the export of unprocessed turtle shells.

Greenpeace visited Fiji recently to launch a campaign against the export of turtle shells and during his visit, Greenpeace member Trevor Daly met with Government officials as part of the organisation's Sea Turtle Campaign. (Report in July issue of the SPACHEE newsletter).

During his stay here, SPACHEE organised a satellite link-up with other University of the South Pacific member countries and a seminar for locals on sea turtles.

However, SPACHEE feels Fiji should still become a member of the Convention on International Trade of Endangered Species (CITES) and a survey should be carried out on sea turtle populations. Members of the public need to be educated on turtle facts such as how long it takes turtles to mature and why it is necessary not to kill turtles under a certain length.

SPACHEE has produced a News Alert on sea turtles aimed at secondary school students. The publication is available to the general public as well. See page 17 for details.

## New move to save turtles

New measures are to be implemented to prevent over-exploitation of Fiji's turtle population.

After considering existing regulations under the Fisheries Act which protects Fiji's turtle stock, Cabinet has decided to prohibit the export of unprocessed turtle shells.

It has also prohibited the sale of turtle eggs or turtles during the breeding season from November to February.

Commercial and private aquariums must now also have permits to keep turtles.

Cabinet has also agreed to research activities which would limit the exploitation of turtles to ceremonial and non-commercial purposes and research aimed at the effective protection of key turtle nesting beaches.

The Minister for Primary Industries, Villiame Goneva, said all species of turtles were internationally recognised as endangered and highly migratory species.

"And the fact that Fiji has a few turtles left is due mainly to the fact that we do have some regulations to protect them," he said.

"The Fisheries Act and regulations already include some fairly comprehensive controls on the fishing of turtles."

Mr. Goneva said the controls included prohibitions on the taking or molesting of turtles during the breeding season, the taking of turtle eggs at any time, killing or exporting turtles less than 35.7 centimetres (18 inches) in shell length and exports of turtle meat.



Perhaps turtles need  
their own 'ninja turtles'  
to save them?

# NOTICE BOARD

## SPACHEE PUBLICATIONS

Two more SPACHEE News Alerts have been produced and are on sale.

The Alerts, which are titled "CHLOROFLUROCARBONS AND THE DESTRUCTION OF THE EARTH'S OZONE LAYER" and "SEA TURTLES ENDANGERED AND EXPLOITED", are part of the SPACHEE Environmental News Alert series, which has been funded by the Bayly Trust of Fiji, the British Development Division in the Pacific and Greenpeace.

The Alerts consist of:

- 1) a series of simple stapled collections of news items, drawings, graphs, articles, cartoons and photos (where possible) from the SPACHEE Environmental Resource Centre (ERC) and other sources on a given issue (e.g., oceanic driftnet fishing);
- 2) a brief summary of the issue being discussed;
- 3) a list of "Terms and Concepts" which the reader or student should know or understand after reading the materials;
- 4) a list of "Study or Review Questions" which the reader should be able to answer; and
- 5) a list of "Suggested Activities" that could serve to improve understanding of the issue.

SPACHEE will distribute the Environmental News Alerts to USP Centres in the USP regional member countries which will then distribute them to educational departments who can then reduplicate/distribute them to schools through their normal distribution systems. Copies will also be sent to SPREP, regional environmental units and other persons, groups or agencies on request.

We hope that the SPACHEE Environmental News Alerts will play a major role in increasing environmental awareness, both in schools and among the general public.

Any SPACHEE member interested can write up an Environmental News Alert.

Copies of the first issue, titled "OCEANIC DRIFT GILLNET FISHING: A THREAT TO OUR FISHERIES" are also available and all three titles are on sale at the SPACHEE Environmental Resource Centre at the following prices:

US\$5 for buyers overseas

F\$2 for waged local people and

F\$1 for local students



ENVIRONMENTAL NEWS ALERT

No. 2 (1990)



SEA TURTLES: ENDANGERED AND EXPLOITED

CHLOROFLUROCARBONS AND THE DESTRUCTION OF THE EARTH'S OZONE LAYER

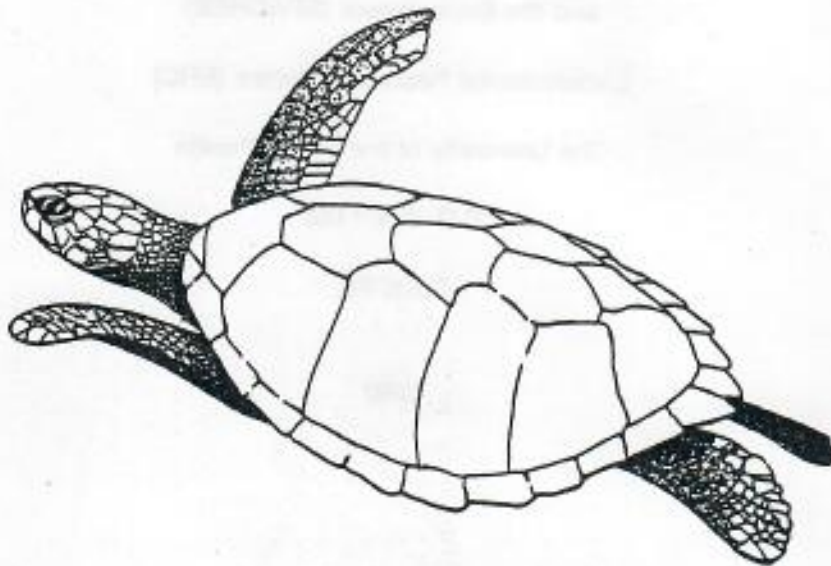




**SPACHEE**


**ENVIRONMENTAL NEWS ALERT**

**No. 2 (1990)**



**SEA TURTLES: ENDANGERED AND EXPLOITED**





**SEA-TURTLES: ENDANGERED AND EXPLOITED**

**SPACHEE ENVIRONMENTAL NEWS ALERT No. 2**

prepared by

Hugi Olafsson and Trevor Daly

South Pacific Action Committee for Human Ecology  
and the Environment (SPACHEE)

Environmental Resource Centre (ERC)

The University of the South Pacific

P.O. Box 1168

Suva, Fiji

1990



SEA-TURTLES: ENDANGERED AND EXPLOITED

Please copy and distribute as widely as possible.

Cover Design: Trevor Daly and Hugo Olafsson

The South Pacific Action Committee for Human Ecology and the Environment (SPACHEE) acknowledges the financial assistance from Greenpeace for the production and distribution of this issue of SPACHEE News Alert publication.

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## SPACHEE, SPREP AND THE SPACHEE NEWS ALERT SERIES

The South Pacific Action Committee for Human Ecology and the Environment (SPACHEE) is a non-government organization based at the University of the South Pacific, Suva. It was formed in 1982 in response to the increasing importance placed by Pacific Island governments on environmental problems, shown by the establishment of the South Pacific Regional Environment Programme (SPREP).

The aim of SPREP is to help Pacific Island countries improve the quality of life while properly managing and protecting their environment. The SPREP Action Plan identifies particular environmental concerns of the Pacific Islands, to which funding, research and education should be directed.

The main aim of SPACHEE, as a support organization to SPREP, is to encourage cooperation and communication between people in the USP and SPREP region who are interested in environmental research, management and education. SPACHEE welcomes the membership of anyone interested in these areas. They can become individual members or start a local SPACHEE group.

Both SPACHEE and SPREP activities have stressed environmental education. Unless the public is well-informed about environmental problems, there is little chance that policy makers take them seriously. In an effort to promote environmental awareness SPACHEE has established the Environmental Resource Centre (ERC) at USP, where publications, videos and other information is kept, and can be used and borrowed by students and the public. The ERC is based at the Curriculum Resource Unit, and the SPACHEE Coordinator can be contacted there at tel. 313-900, extension 465. SPACHEE also holds regular ENVIRANET (Environmental Action Network) sessions, using the USP Satellite network.

Because of an excellent response from the public and schools, SPACHEE decided to prepare collections of resource materials on important issues. The result is the SPACHEE Environmental News Alerts series.

SPACHEE will send the Environmental News Alerts to USP Centres in regional member countries, which will then distribute them to educational departments and schools. Copies will also be sent to others on request. We hope that the SPACHEE Environmental News Alerts will play a role in increasing environmental awareness in schools and among the general public.

The first Alert focused on driftnet fishing, and is available from the SPACHEE Educational Resource Unit for F\$ 2 (US\$ 2 in other countries than Fiji). This issue, the second in the series, was prepared by Hugi Olafsson, a SPACHEE summer intern from Columbia University in New York, and Trevor Daly, Sea Turtle Specialist at Greenpeace, Australia in Sydney.

SPACHEE wishes to thank Greenpeace for their funding of this issue of the SPACHEE News Alert Series and the Bayly Trust of Fiji, the British Development Division in the Pacific and Greenpeace for funding the Environment News Alert Series.

## SEA-TURTLES: ENDANGERED AND EXPLOITED

### TO THE READER,

This publication discusses the threats to sea-turtles in the South Pacific, and possible ways to save them. A short summary of the issue can be found at the end of the text, with a more detailed account starting here below. Words that are printed in bold letters are defined and explained at the end of the paper, under the heading "Terms and Concepts". In the last pages of the paper are also questions that should help you review the material and encourage you to find out about the situation in your own country or neighborhood. Finally, there is a list of activities you can do to help save the sea-turtles.

### SOME FACTS ABOUT SEA TURTLES

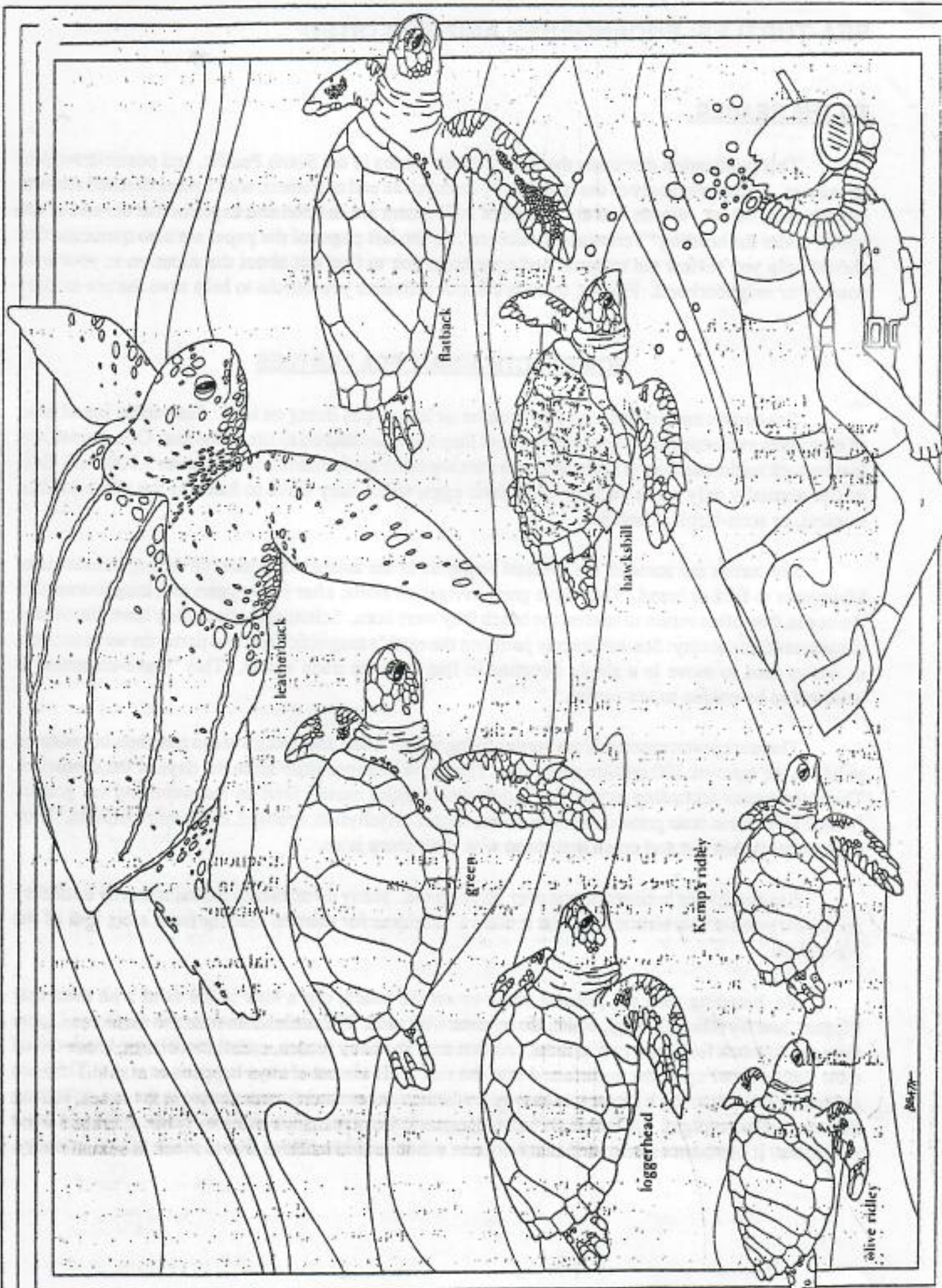
Sea-turtles are reptiles, and they breathe air like turtles living on land. Sea-turtles spend most of their lives swimming in the open ocean, and they are well adapted to life in the sea. One species, the leatherback turtle, can dive to a greater depth than any other air-breathing animal (over 3,900 feet). Sea-turtles normally only come on land to lay their eggs, which they leave to hatch in the warm sand of tropical, or semi-tropical beaches.

Sea-turtles are some of the greatest voyagers in the animal kingdom, travelling thousands of kilometers to feed or breed. They have great navigation skills; after many years and long journeys in the ocean they often return to nest on the beach they were born. Scientists believe they have discovered the secret of this ability: Sea-turtles rely partly on the earth's magnetic field and partly on wave motion, as waves tend to move in a single direction in line with the trade winds. This "wave-compass" is believed to be unique to sea-turtles.

There are seven species of sea-turtles living today. Their ancestors lived in marshes, but adapted to life in the sea over 100 million years ago. They have changed little since the days of the dinosaurs. Their diet varies according to species. Adult green turtles mostly feed on sea weed and sea grasses (which gives them their green colour), but other turtles eat jellyfish, sponges, crabs and mollusks. They have no teeth, but cut and crush their food with their sharp jaws.

Sea-turtles are believed to get over 50 years old. Many do not reach sexual maturity until they are 25-30 years old, which means that it takes a long time for them to recover from a big loss of the population.

At breeding time the females crawl up on the beach, dig a hole in the sand with their rear flippers, and lay 60 to 200 eggs, which are covered with sand. The turtles then return to the sea and leave the eggs to hatch for about two months. At that time the baby turtles, called hatchlings, break out of their shells, crawl up to the surface and into the sea. This almost always happens at night. They are guided by instinct to the lightest area they see, which under natural circumstances is the sea, reflecting the stars and moonlight. On this short but dangerous journey many are eaten by birds, crabs and other predators. It has been estimated that only one in a thousand hatchlings live to reach sexual maturity.



flatback

hawksbill

leatherback

green

Kemp's ridley

loggerhead

olive ridley

Barry

the trade (the Statistics Office in Honiara gives a somewhat lower figure). Altogether around 17,000 of these endangered turtles have been killed in this five year period, and the export has more than doubled. Fiji exported 5,492 kilograms of tortoise shell to Japan in 1985-'89 according to Japanese statistics (Fijian statistics say 4,185 kilograms), corresponding to almost 6,000 hawksbill turtles killed. The Fijian trade has grown even sharper than that of Solomon Islands.

Research in Solomon Islands shows clearly that the killing of turtles for the shell trade is far more than the breeding populations in country can sustain. The same is suspected for Fiji.

### Meat and egg consumption

We do not know exactly how many turtles it is safe to take for local meat consumption. We do however, that sea-turtles (particularly the green turtle) have been eaten by Pacific peoples for thousands of years without seriously harming the population, so probably this is not as dangerous as the shell-trade. There is, however, a dangerous trend in commercializing the meat trade. When turtles are sold on the market it is likely that it increases the turtle meat consumption from the traditional level. Also, turtle meat has shown up on the menus of restaurants, some of which cater mainly to tourists and expatriates. Such meat consumption in addition to the traditional use could have serious consequences.

The taking of eggs is forbidden by law in Fiji and many other countries. Still, illegal harvesting of eggs is a serious problem. One of the largest breeding grounds of the leatherback turtles in the world, in the Malaysian state of Trengganu, has been almost destroyed because of excessive egg collecting. Millions of sea-turtle eggs are also collected each year in Indonesia.

### Accidental catch

Tens of thousands of turtles drown every year in nets and other fishing devices that are not intended to catch turtles. Here in the South Pacific so-called driftnets are the most serious threat. Driftnets have been called "walls of death", as they are huge traps that kill just about everything that crosses their way, including seals, whales, sea-birds and turtles. On a worldwide scale shrimp nets are even more dangerous for the turtles than driftnets. The shrimp fleet of the United States catches almost 50,000 turtles each year, and about 12,000 of these die. Fortunately, there is a device, called the Turtle Excluder Device (TED), that can save 97% of the turtles. TEDs are now mandatory in the United States.

### Pollution

Sea-turtles are very sensitive to all kinds of oil and chemical pollution, whether it is from spills or sewage disposal from ships or from land. Their throats and eyes get congested in tar from oil, and pollution can spoil their breeding and feeding environment, such as coral reefs.

One especially dangerous form of pollution is plastic in the ocean. Sea-turtles eat floating plastic bags, in the belief that they are jellyfish. It has been estimated that around half of all sea-turtles have eaten plastic. Many of them die as a result, as the plastic clogs up their intestines so they choke or starve to death.

### Limit the consumption of meat

Turtle meat should be reserved for indigenous people where it is a part of their traditional diet. The selling of turtle meat in urban markets should be monitored, and restricted if there is a danger of overharvesting. The meat of endangered sea-turtles should not be sold to tourists or expatriates as an exotic dish.

### Don't take turtle eggs

It is forbidden by law to take turtle eggs in Fiji and many other countries. Unfortunately, this law is discarded in many places. People must become aware that this activity is not only illegal, but decreases the number of turtles they can eat in future years. Nesting beaches that are threatened by egg-poaching could be patrolled.

### Don't buy sea-turtle products

This is as simple as it sounds. Don't buy stuffed turtles, turtles shell or leather products. Don't eat turtle meat at restaurants.

### Set a maximum-size limit on turtles that can be killed

In many countries there is a minimum-size limit on turtles that can be killed. Now scientists believe that the most valuable turtles are those of breeding age. They therefore recommend maximum-size limit, so that large sexually mature turtles will not be killed.

### Use traditional hunting methods

As mentioned before, modern equipment such as outboard motors, diving gear and spear guns make turtle hunting much easier than before. This can easily lead to overexploitation. If only traditional methods are used the meat supply would be similar to that of ancient times, and the turtle population would be stable.

### Support indigenous carving industry

Local Pacific people get only a fraction of the money that the tortoise shell they export brings Japanese carvers and traders. If it were instead used only by local artists, Pacific countries could get the same amount of money as before by killing far less turtles. It should be noted, however, that such an industry would have to be carefully regulated and monitored so that turtles will not be killed exclusively for the shell carvers, but only shells of turtles killed for their meat be used. Also, turtle-shell products could almost only be sold to Japanese tourists, as it is illegal to import turtle shell products to most countries.

### Don't destroy breeding beaches

Turtle breeding beaches have to be protected. Tourism should be restricted on them, at least during the nesting season. Lights nearby should be shaded so they can't be seen from the beach at the time the eggs hatch. Breeding beaches could be patrolled to prevent poachers from stealing the eggs, and also to move eggs that are laid in vulnerable places.

## SUMMARY

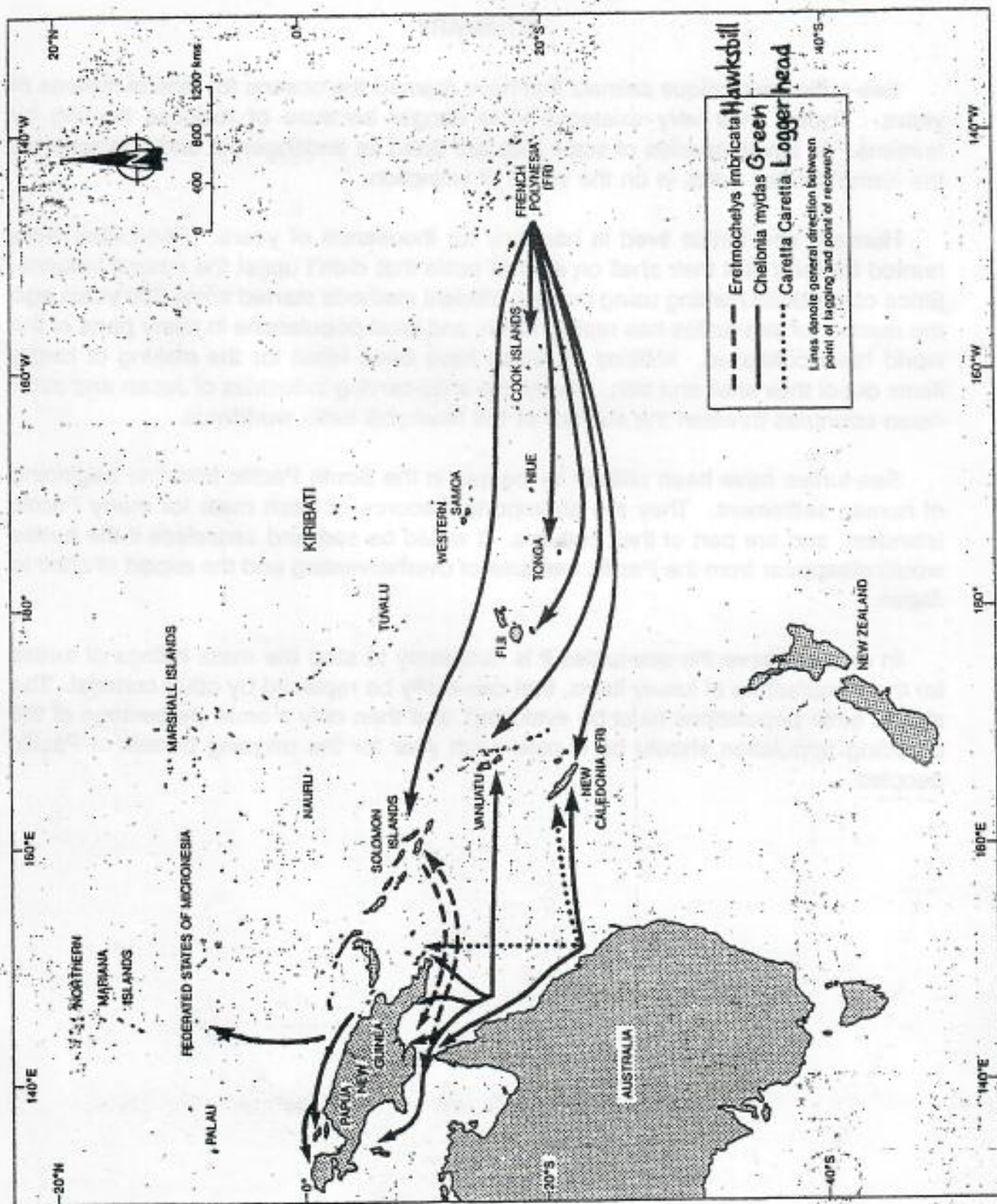
Sea-turtles are unique animals that have roamed the oceans for tens of millions of years. Today, their very existence is in danger because of reckless hunting by humans. All seven species of sea-turtles are listed as endangered, and one species, the Kemp's ridley turtle, is on the verge of extinction.

Humans and turtles lived in harmony for thousands of years. Sea-turtles were hunted for food and their shell on a small scale that didn't upset the natural balance. Since commercial hunting using modern efficient methods started some 200 years ago the number of sea-turtles has rapidly fallen, and local populations in many parts of the world have collapsed. Millions of turtles have been killed for the making of luxury items out of their shell and skin. Today, the shell-carving industries of Japan and other Asian countries threaten the survival of the hawksbill turtle worldwide.

Sea-turtles have been utilized by people in the South Pacific from the beginning of human settlement. They are an important source of fresh meat for many Pacific Islanders, and are part of their cultures. It would be sad and senseless if the turtles would disappear from the Pacific because of overharvesting and the export of shell to Japan.

In order to save the sea-turtles it is necessary to stop the mass killings of turtles for the manufacture of luxury items, that can easily be replaced by other material. The size of turtle populations must be evaluated, and then only a small percentage of the breeding population should be hunted each year for the ongoing benefit of Pacific peoples.





Marine Turtle Migrations in the South Pacific Region.

WATERFRONT

# Help save a turtle or two

TURTLES, whales, porpoises, and baby seals are a variety of marine life that are sure to cause instinctive responses among animal-lovers.

Most of these people do not turn a hair at the thought of eating fish, but put a plate of turtle soup before them and they immediately write a letter to the editor.

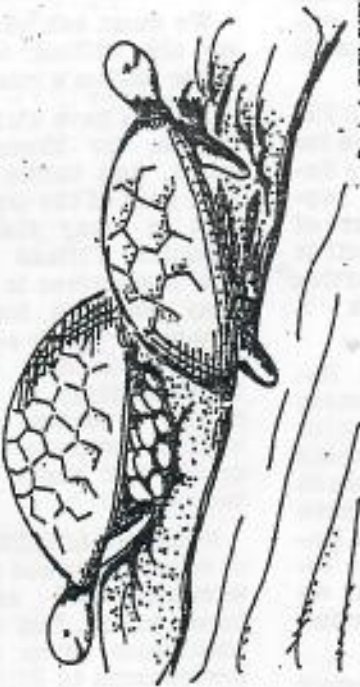
Unfortunately, this "knee-jerk" reaction annoys fishermen so much that it obscures the real reason why we should look after our turtle resources, namely, turtles are disappearing!

**FACT:** Turtles are slow growing. The Green Turtle does not even become capable of breeding until it is 25 to 30 years old.

**FACT:** The Hawksbill turtle is threatened with extinction worldwide, and the Green Turtle is definitely endangered, according to the International Union for the Conservation of Nature.

**FACT:** Nobody has been able to prove that hatching turtle eggs artificially and then releasing them, increases the wild stock. Some people think it may even harm it by destroying the instinct to return to the nesting beach.

Fiji has two main species of turtle: The *Vandresia* or Green Turtle, and the Taku or Hawksbill. The leatherback and loggerhead turtles have both been reported, but they do not often come close to shore.



Design by CECIL DUNN

meat is, and always will be used locally but the excess shell produced might be much better employed by local craftsmen who could greatly add to the value of these exports by producing jewellery.

The raw shell export trade should not dictate the turtle harvest because the demand is unlimited overseas.

The future of turtles in Fiji has never looked bright, but the recent increase in shell exports is likely to turn a slow decline into a rout.

The Fisheries Division would like the public, and industry representatives, to give it their views on this subject, care of the Director of Fisheries, PO Box 358, Suva). In particular, it would like reports of turtle nesting activities, pinpointing the exact location of breeding beaches.

The Fisheries Division does not have the resources to mount a full-scale research and tagging programme on turtles at present, but it needs to get an idea of Fiji's stocks to formulate a realistic management plan, so public response will be most appreciated.

Food for thought: To maintain turtle stocks at current levels, people should harvest no more than five per cent of the total breeding population per year, according to work done on the Great Barrier Reef in

ing further, and eradication would be a good idea for small islands where turtles are known to nest.

But a new source of danger is in the export of turtle shell. In 1981 it was 50kg but exports made a remarkable jump to two tonnes in 1987 and a similar amount is likely this year.

Almost all of this is the more endangered Hawksbill turtle and the figure does not take into account the export of shell which is made into jewellery.

At least 1700 Hawksbill turtles were killed in 1987 to supply the export market. All of these shells now go to Japan, which does not have any native stocks of Hawksbill turtle, and the demand is going to increase as more countries in the Pacific ban the export of turtle shells.

Should Fiji continue to deplete its own turtle stocks for the benefit of other nations?

- Nobody may dig up or use turtle eggs at any time.
- Nobody may molest or kill any turtle in November, December, January or February.
- Nobody may molest or kill any turtle with a shell less than 18 inches in length at any time.
- Nobody at all may be in possession of, or sell any turtle shell of less than 18 inches in length.
- Export of turtle meat is prohibited.

Unfortunately these measures may not be tough enough. Has anyone in Fiji noticed an increase in the turtle population over the past 20 years?

One danger to the Fiji turtle that cannot be legally controlled is the mongoose, which digs up eggs and kills baby turtles when they struggle back to the sea.

The mongoose is a cute little creature but it has caused untold damage to Fiji's indigenous wildlife. Every effort must be

vere outbreak of poisoning in Bus last year.

Turtles have always had a special place in Fijian culture. On the island of Kororua, men of the villages dress in a certain way on certain days. They put on wreaths in secret before performing the ceremony to call the giant turtles and most people do not believe it until they see dozens of big turtles rise from the sea and swim to the land.

On another island, women call the turtles. The women wade into the water on Kadavu, painted, with a crown of flowers, calling out to the turtles. Just what they say no-one knows, perhaps a magical ancient chant. In any case, turtles soon come popping up.

It would be a great tragedy if the extinction of turtles were to further impoverish the Fijian way of life.

The government has recognised that turtles are very vulnerable to over-

# Sea turtles

SIR. — Many thanks to The Fiji Times for the excellent coverage of Greenpeace's recent visit to Fiji to promote a ban on turtle shell exports.

There is an urgent need for such a ban, as the increased killing of Hawksbill or *Taka* turtles for the shell trade could soon result in a total collapse of Fiji's hawksbill turtle population.

SPACHEE, the South Pacific Action Committee for Human Ecology and the Environment, strongly supports a ban on the export of all turtle products until it is known how many turtles can be killed on a sustainable basis.

The South Pacific Regional Environment Program (SPREP) has as one of its priorities a study of sea-turtle populations in the Pacific and ways to save them from extinction. Until we have some results from this project we should stop exporting turtle shell.

The export of turtle shell brings Fiji some F\$100-250,000 annually an insignificant contribution to the economy — but it brings Japanese shell carvers a fortune.

Since 1970 over two million endangered sea-turtles have been killed to satisfy the Japanese demand for high-priced luxury products, such as jewellery, cigarette-lighters and cufflinks from turtle shell and leather goods from turtle skins.

The results have been predictable. Once huge sea-turtle population in places such as Mexico and the Caribbean have collapsed, and one species, the Kemp's ridley, is facing extinction with only 200 breeding females left.

Because the shell-carving industry now has to find new sources of turtles,

there have been increased imports from the South Pacific, particularly from the Solomon Islands and Fiji.

We must ask ourselves if we are willing to repeat other nation's mistakes.

Fijians have utilised sea-turtles for thousands of years, and turtle meat is still part of the traditional diet in many places. The question Fijians have to ask themselves is whether they want to lose these creatures which are a part of their natural and cultural heritage in order to supply a foreign industry which produces luxury goods with cheap raw material.

From SPACHEE's point of view that is not only bad environmental and cultural policy, but also bad economics, given the very low returns to Fijian communities.

We hope that the Fiji government will see that it is in the best long-term interests of the Fijian people to restrict the exploitation of sea turtle to at least local commercial and subsistence use so that future generations of Fijians will inherit this important resource. Sea turtles are integral to the Fijian concepts to *vanua* (land and its resources) and *i qoliqoli* (fisheries resources).

To sacrifice them for short-term monetary gains would be a cultural tragedy.

DR RANDY THAMAN

Chairperson

SPACHEE

Suva.

# Green turtles need their own ninja

After being around for 100 million years, turtles may be lucky to survive the next 100 — and Australians are partly responsible. JACKIE ANNERESLEY reports.

**O**NE of the biggest and most inhumane slaughters of an endangered species is taking place on Australia's doorstep — with the help of Australians.

Every year up to 70,000 green turtles are killed in Indonesia to feed a growing market for turtle meat and a commercial industry in turtle products that defies a world ban on such trade.

At the centre of the bloodbath is Australia's favourite holiday destination — Bali.

On the palm-fringed beaches of Kuta, many of the 130,000 Australian tourists who visit the island every year try turtle meat, drink turtle soup and take home turtles in the form of masks, guitars and hair accessories.

Unwittingly or not, they are contributing to the extinction of an animal that has inhabited the Earth for more than 100 million years.

While turtlemania grips America and Australia in the wake of the *Teenage Mutant Ninja Turtles* television phenomenon, the real-life creatures are struggling for survival.

Their plight has become a major priority for Greenpeace this year. As campaigner Trevor Daly says, if only Australians knew the suffering a turtle shell brooch represented, they would undoubtedly boycott the trade.

"Of all the world's most threatened species, turtles are the most heavily traded — and one of the most inhumanely slaughtered," he said.

In Bali it is not uncommon to see open trucks stacked four deep with big turtles on their backs.

A closer look will show that their flippers are trussed with rope that leaves open wounds. Many will have spent weeks like this in the holding pens of the turtle hunters which are scattered on deserted islands as far as 1700km from Bali.

(Local Indonesian green turtles went into extinction in the 1950s, so now hunters are forced to look further afield for fresh supplies.)

Given little water, the turtles wait in these pens for collection to Tanjung Bynus, the land site for the turtle trade.

There the butchering begins. Instead of humanely killing the marine reptiles, the Indonesians slowly cut them up alive.

As one of the Earth's most enduring living creatures, it has only been in the past few de-



A Bali turtle-hunter.

cadecades that increased international trade has threatened their survival.

"All indications are that the current levels of exploitation are not sustainable," said Mr Daly.

The situation is exacerbated by the fact that turtle eggs are also collected from beaches for food — to such an extent that the natural replenishment of the turtle population in Indonesia is almost zero.

What is more, most of the grim harvest — the big adults — are essentially Australian turtles.

Leading turtle specialist Dr Colin Limpus from the Queensland National Parks and Wildlife Commission estimates 90 per cent of green turtles from the Australasian region nest in Australia.

It takes at least 40 years for a turtle to reach adulthood — the main target for the hunters.

This means a big adult female hauled into a fishing boat today in Indonesian waters started life around 1950 on an Australian beach.

Instead of living well into the 21st century, it will probably end up as a 1990 birthday gift in the shape of a guitar.

Although the longevity of turtles means that total extinction may be many decades away, the move towards it is rapidly gaining momentum.

"We reckon the entire turtle population in the whole region is about 10 per cent of what it was 40 years ago," said Dr Limpus.

By taking the young adults, the hunters are decimating supplies of the next generation.

"It may be in 50 years time but eventually we will run out of replacements," said Dr Limpus.

If turtles do disappear, it will not only be marine ecology that will suffer — turtles are an essential source of food for the Aboriginal people of the Northern Territory.

"Turtle meat is their only available source of red meat," said Dr Limpus. "Besides, turtle hunting is as an important part of their culture and tradition as going to watch football on a Saturday is for most Australians."

If Australian tourists can perhaps be excused for pleading ignorance of the turtle crisis, the Indonesian Government cannot.

The green and hawksbill turtles, the two most heavily hunted of the seven species of turtle, have no protection at all except that their export is supposedly illegal. Greenpeace says exportation continues.

**S**INCE 1970, Japan — the biggest importer of sea turtle products in the world — has turned almost 2.5 million turtles into handbags, belts, shoes, jewellery and other incidental artefacts.

Meanwhile, in Australia, Customs officials continue a running battle with unscrupulous traders trying to import turtle products in the face of a \$100,000 fine or five years' imprisonment.

Customs spokesman Alister Wilson said the situation was not getting better.

"Everyone knows about elephants being endangered and there is this social stigma attached to ivory products — but with turtles, people seem to be less aware of the problem," he said.

Indonesian demand for turtle meat has increased with its population explosion to an extent where meeting that market is demanding more than enough of the delicate turtle population.

Add to that the souvenir industry, Japan's thirst for turtle leather, the ravaging of turtle eggs, the increased danger to turtles from pollution, plastic bags and drift nets — and the prospect for these defenceless, gentle giants look grim.

(THE FIJI TIMES, 28 MAY, 1990)

# Sea turtles have *FIJI TIMES May 28 1990* 'unique compass'

WASHINGTON, (May 25) Reuter — Scientists have discovered that sea turtles use a unique compass, relying on the Earth's magnetic field and wave motion to find their way as they roam the seas, the National Science Foundation reported today.

The turtles accomplish epic navigational feats, travelling up to 1600 kilometres or more between feeding and nesting sites, how they are able to do so has long mystified researchers.

Studies led by Michael Salmon, of the Florida Atlantic University, found that three types of sea turtle — the green, the leatherback and the loggerhead — rely on ocean waves which are driven in a single direction by the wind belts that regularly whip the Earth's surface.

"We call this a 'surface wave compass', Mr Salmon said.

"To our knowledge, this is a unique guiding mechanism never before observed for any open-sea species," he said in a statement released by the NSF.

(look at the illustration of the hawksbill)

- 14) In the text there are examples of old customs related to the hunting of sea-turtles. Could some of them have limited the killing of turtles. How?

**SUGGESTED ACTIVITIES:**

- 1) Go to a nearby beach with your friends or schoolmates for a beach-cleaning campaign. Take big plastic bags or other containers with you and collect plastic rubbish, tin cans and other trash. Imagine that you save one sea-turtle for each plastic bag or rag you collect, and in the end count how many you have saved.
- 2) Go to a local fish market and check if they sell turtles or turtle meat.
- 3) Check if any restaurant in your area sells turtle meat.
- 4) Check the souvenir and tourist shops in your local town. Do they sell products made from turtles? Make a list of the turtle products you see (types of jewelry, whole shells etc.) and record how much they cost.
- 5) Write to a government official, such as your prime minister or fisheries minister, and encourage them to join CITES and stop the export of sea-turtle shell and other turtle products. Use the information in this Alert in your letter.
- 6) If there is a turtle nesting beach close to your home, ask if people take eggs from it. Visit the beach and check if there are buildings, lampposts or other human light sources near it. If you know about egg poaching or see that human settlement could cause a problem, you could write to a government official or an environmental organization and tell them that this beach needs protection.
- 7) Ask your parents, grandparents and other relatives if they know any stories about turtles. Write them down and arrange to tell them to your class at school.

- overharvesting/  
overexploitation** - killing of turtles or other organisms in excess of their reproductive rate. If overharvesting continues it will lead to a decline in the species hunted and eventually in its extinction.
- poaching** - the illegal killing of animals or taking of their eggs.
- predator** - an animal that hunts and eats other animals.
- reptiles** - a group of cold-blooded animals with scaly skin that includes turtles, snakes, lizards and crocodiles.
- reservation to CITES** - an option a signatory country to CITES has if it does not want to obey some particular rule of the convention. Thus, Japan's reservation on trade in the hawksbill turtle allows it to import its shell without formally breaking its obligations.
- species** - a group of related plants or animals that can interbreed. All humans belong to one species (with the latin name "Homo sapiens"), as do all leatherback turtles (*Dermochelys coriacea*).
- SPREP** - an acronym for "South Pacific Regional Environment Programme", which aims to coordinate the environmental policies and efforts of countries in the South Pacific. SPREP has its headquarters in Noumea in New Caledonia.
- sustainable use** - the use of a natural resource in a way that does not diminish or destroy it; the opposite of overharvesting/overexploitation.
- traditional hunting** - hunting of turtles by indigenous people by methods used before the time of industrialization.
- Turtle Excluder  
Device (TED)** - a device designed for shrimp boats that prevents turtles to get caught in the shrimp nets, while not affecting the amount of shrimp caught.

STOP PRESS!!

## New move to save turtles

New measures are to be implemented to prevent over-exploitation of Fiji's turtle population.

After considering existing regulations under the Fisheries Act which protects Fiji's turtle stock, Cabinet has decided to prohibit the export of unprocessed turtle shells.

It has also prohibited the sale of turtle eggs or turtles during the breeding season from November to February.

Commercial and private aquariums must now also have permits to keep turtles.

Cabinet has also agreed to research activities which would limit the exploitation of turtles to ceremonial and non-commercial purposes and research aimed at the effective protection of key turtle nesting beaches.

The Minister for Primary Industries, Viliame Gonelevu, said all species of turtles were internationally recognised as endangered and highly migratory species.

"And the fact that Fiji has a few turtles left is due mainly to the fact that we do have some regulations to protect them," he said.

"The Fisheries Act and regulations already include some fairly comprehensive controls on the fishing of turtles."

Mr Gonelevu said the controls included prohibitions on the taking or molesting of turtles during the breeding season, the taking of turtle eggs at any time, killing or exporting turtles less than 45.7 centimetres (18 inches) in shell length and exports of turtle meat.



03/91 17:18

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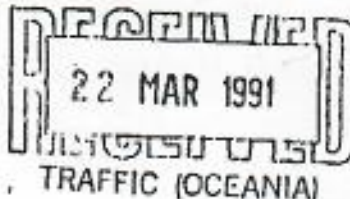
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# DEPARTMENT of the INTERIOR

## news release



OFFICE OF THE SECRETARY

For Release: March 20, 1991

TRAFFIC (OCEANIA)

Steve Goldstein (O) 202/208-6416  
(H) 202/887-5284

### INTERIOR AND COMMERCE CERTIFY JAPAN FOR ILLEGAL TRADING IN SEA TURTLES

Secretary of the Interior Manuel Lujan and Secretary of Commerce Robert A. Mosbacher today certified Japan under the Pelly Amendment of the Fishermen's Protective Act of 1967 for commercial trading in endangered sea turtles.

Upon certification of Japan the two cabinet members may recommend sanctions to President Bush restricting the importation of wildlife products from Japan into the United States.

The certification comes after separate investigations by Interior's Fish and Wildlife Service and Commerce's National Oceanic and Atmospheric Administration found that Japan's continued trade in sea turtles worldwide has severely diminished the effectiveness of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international conservation program. Under CITES, all species of sea turtles are listed as endangered. CITES is designed to protect sea turtles and other endangered species from all commercial international trade.

Japan's hawksbill sea turtle importation has had serious effects on this species' worldwide population. From 1981 to 1989, Japan imported at least 234,000 hawksbill shells from more than 20 countries. It is estimated that over 18,000 more were imported in 1990. The shells are used primarily for fabrication of eyeglass frames, jewelry and folk art. Japan has also been a major importer of skins of endangered olive ridley sea turtles, which are used in the manufacture of leather goods.

Under the Pelly Amendment, the President has 60 days to notify Congress of his decision on what sanctions, if any, will be imposed against Japan.

FORM 1000

Greenpeace International



**GREENPEACE INTERNATIONAL SUBMISSION**

**TO**

**"THE NAGASAKI INTERNATIONAL SYMPOSIUM ON  
THE RESOURCE MANAGEMENT OF THE  
HAWKSBILL TURTLE"**

**NAGASAKI, 20-22 NOVEMBER, 1990**

## CURRENT EXPORTERS

However, the undertaking to ban the imports of bekko where the exports are illegal in the countries of origin has clearly not yet been effected. The exports from Mexico, the Maldives, Comoros Islands, Barbados, Haiti, Antigua/Barbuda, St Vincent and Grenada are all in breach of domestic legislation: either because the exports are prohibited or taking place in the absence of the required export permits.

Although trade with non-Parties is allowed for under CITES, the exporting non-Parties are required to issue comparable documentation. It is important to find out which of the remaining four countries, Cuba, Brunei, Fiji and the Solomons are indeed issuing such documentation. In this instance, the documentation is required to include a declaration that the export will not be detrimental to the survival of that species.

BRUNEI	KG	2739
MALDIVES	KG	933
MEXICO	KG	108
TURKS/CAICOS IS.	KG	17
BARBADOS	KG	529
CUBA	KG	5385
HAITI	KG	1374
GRENADA	KG	1287
ANTIGUA/BARBUDA	KG	2505
COM. OF DOMINICA	KG	263
ST. VINCENT AND THE GRENADINES	KG	1284
ST. CHRISTOPHER - NEVIS	KG	138
COMOROS IS.	KG	109
FIJI	KG	1438
SOLOMON IS.	KG	3650
TOTAL	KG	21755

## STATUS OF SEA TURTLE POPULATIONS

In the twelve countries reported to be exporters of bekko in the Japanese import figures for 1990, few sea turtle populations outside of the Caribbean have been the subject of investigation. The most intensive studies were undertaken for the Second Western Atlantic Sea Turtle Symposium (WATS II) held in Puerto Rico in 1987.

The National Reports submitted by the Government representatives detailed very low levels of nesting activity by hawksbill turtles. The highest reported level of nesting was in Mexico, yet even here the largest population for which there are data consists of only approximately 100 females.

Since the 1970s Japanese Customs import statistics point to the role of certain countries as entrepots for bekko collected throughout the Caribbean. Four major exporters, Panama, Cuba, the Cayman Islands and Haiti have provided three quarters of Japan's imports of bekko from the region during this period (Donnelly 1989). Only Cuba and Panama could possibly have exported bekko principally from domestically caught hawksbills as the others do not have the turtle populations to support such quantities. Little information is available from Cuba to know whether this is the case or not.

Of the remaining three countries principally responsible for exports of Caribbean bekko, only Panama had substantial populations of hawksbills in its waters in recent years. Yet even there, it appears that bekko from neighbouring countries was funnelled through Panama to Japan. According to Japanese import figures, from 1970 to 1986, Panama supplied 15% of Japan's total imports for this period, representing over 80,000 hawksbill turtles. Recent studies have found that the numbers nesting on the principal hawksbill nesting beach is but a fraction of what it once was (Meylan pers comm). Although Japanese customs' figures do not show any imports from Panama after 1986, investigations have revealed that the trade is continuing. On 24 October 1988, a shipment of bekko to Japan was discovered by the Panamanian authorities. It was labelled as "Shell materials" with instructions not to pass through any US ports.

The Cayman Islands, a dependent territory of the United Kingdom, have relatively few resident hawksbills yet from 1970 until 1982 were a major supplier of bekko to Japan exporting the equivalent of 27,590 hawksbills. Although CITES came into force in 1979, it was not until 1984 that the trade to Japan finally ceased. In March, 1989, Japanese customs reported a resumption of illegal shipments of bekko from the Cayman Islands. Examination by the authorities in the Caymans revealed that the origin of the shell was instead Mexico. Furthermore, this shipment travelled through two central American countries and Spain en route to Japan.

A further example of rerouting of bekko involved Jamaica. In the period 1970 to 1985, the average exports of bekko from Jamaica to Japan were 756 kg. In 1986, Honduran exports of bekko dropped from approximately 2 tonnes to zero, and those of Jamaica increased by a similar amount. In 1987, exports from Belize (which are believed to originate mostly in Honduras) dropped a further 2 tonnes, and Jamaican exports increased by this amount yet again. At WATS II, Cruz, Espinal and Erazo (1989) estimated that 5000 hawksbills were being killed annually for tortoiseshell in Honduran and Nicaraguan waters by the Honduran lobster fishermen. As Japan has not recorded any imports of bekko from Honduras since 1985, this shell is likely to be transshipped through one of the entrepots mentioned above.

Shipments of bekko from Antigua Barbuda have been recorded in Japan's customs figures since 1983. Antiguan authorities deny any knowledge of this trade and insist that no permits for exports of bekko have been issued (Fuller pers comm).

More recently, other doubtful sources of bekko have emerged. Since 1985, the rise in exports from Singapore matched the decline of imports from Indonesia, a CITES Party. In 1987, Singapore joined CITES, and corresponding to its disappearance from the import statistics, the exports from Brunei began to increase. In 1989, Japan imported over 2 tonnes from Brunei with this year's figures even higher. Given its geographical proximity, it is most likely that the origin of the bekko imported from both Singapore and Brunei is Indonesia.

It can well be asked why the imports in 1990 from St Vincent and Antigua/Barbuda have suddenly leapt upwards to over 1 tonne from being in the low hundreds of kilos for so many years.

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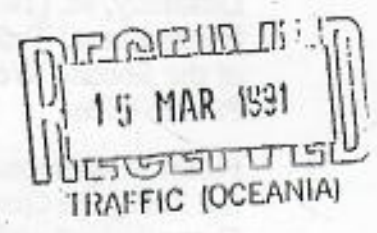
JAPANESE IMPORTS 1990

8801.80-100 ~~べっこう又はさんごの加工品及び製品~~  
 Worked Bekko and Coral, and articles of Bekko or Coral

880180100  
DEC.

	KG				
CHINA	KG			10	3,129
TAIWAN	KG	499	88,048	8,315	2,085,831
HONG KONG	KG	-	-	27	18,875
FRANCE	KG	0	1,098	0	8,072
ITALY	KG	1	1,498	27	55,785
TOTAL	KG	500	88,838	8,379	2,147,592
(E.C.)	KG	1	2,592	27	81,857

1990



TRAFFIC JAPAN  
 BELIEVES IMPORTS  
 IN THIS CATEGORY  
 REPRESENT WORKED  
 CORAL ONLY, NOT  
 SEA TURTLE PRODUCTS.

JAPANESE BEKKO IMPORTS 1990

0507.80-030 ~~べっこう (くずを含む)~~  
 Bekko, including powder and waste thereof

050780030  
DEC.

	KG		(KG)	(YEN)	
BRUNEI	KG	-	-	2,739	80,878
MALDIVE	KG	-	-	833	25,743
MEXICO	KG	-	-	108	3,049
TUK CAI	KG	-	-	17	315
BARBADOS	KG	-	-	529	11,825
CUBA	KG	-	-	5,385	236,057
HAITI	KG	104	3,782	1,374	51,085
GRENADA	KG	299	4,815	1,287	29,475
ANT BAR	KG	183	3,808	2,505	80,888
C DOMNC	KG	-	-	283	4,425
ST CHRI	KG	-	-	138	3,993
ST VINT	KG	-	-	1,284	30,580
COMOROS	KG	-	-	109	5,057
* FIJI	KG	-	-	1,438	28,559
* SOLOMON	KG	105	1,015	3,650	49,149
TOTAL	KG	691	13,420	21,755	820,818



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Southwest Fisheries Center  
Honolulu Laboratory  
P. O. Box 3830  
Honolulu, Hawaii 96812

January 6, 1986

F/SWC2:GHB

Dr. Harold Hirth  
201 Biology Bldg.  
University of Utah  
Salt Lake City, Utah 84112

Dear Harry,

I recently received the enclosed excerpt on sea turtles taken from a Fishery Resources Profiles prepared by the Fiji Fisheries Division. Robert Gillett, Fisheries Development Adviser for UNDP in Fiji, was kind enough to send this to me. I recalled that you visited Fiji during your SPC consultancy. I spent a few days there myself collecting information on sea turtles in 1977, and again in 1979. Except for a few notes written by Bob Bustard and yourself, not much work has ever been done on sea turtles in the Fiji Islands. Clearly, someone needs to undertake a survey project in the area.

Based on our experience, the enclosed Profile is notably incomplete due to the limited information presented on tortoiseshell commercially used by Indian craftsmen and merchants. I am fairly certain that a substantial business exists. When I was there the main buyers were tourists visiting on cruise ships. Tortoiseshell rings, bracelets, and key chains were among the main items being purchased. Over 100 visits a year were being made by passenger liners, each having hundreds of tourists aboard. In addition, as recently as 1984, and possibly continuing to the present, a brisk business existed in these same items at the airport gift shop in Pago Pago, American Samoa. All were imported from Fiji, according to the government enforcement agents that examined the merchandise. It would be valuable to learn the actual annual volume of the Fiji tortoiseshell trade, as well as the specific islands where the material is being obtained.

Sincerely,

George H. Balazs  
Zoologist

cc: Robert Gillet

August 22, 1980

F/SWC2:GLP

Mr. G. L. Preston  
Ministry of Agriculture  
and Fisheries  
P. O. Box 358  
Suva, Fiji

Dear Mr. Preston:

Thank you for your letter of August 6th. I greatly appreciate receiving your information on the methods of market data collection, and the limitations inherent to the program. I now have a much better understanding of what might be achieved with respect to sea turtles.

The use of heads in the sampling program certainly appears to be the best index available. I am confident that some extremely worthwhile information can be compiled using this procedure. The head width should be measured at the site of greatest width, straight line distance, using calipers. I hope that calipers suitable for this purpose are already used in your program. The species identification, which is a very important component, can be carried out based on the enclosed literature, as well as the drawings presented in the draft survey form prepared by Mark Gentle.

I would be interested to learn of the results of your pilot sampling program. Again, please continue to feel free to call upon me for assistance as necessary.

I am sending you some additional items that I thought you would find interesting.

Best regards.

Sincerely,

George H. Balazs  
Fishery Biologist

Enclosures



November 28, 1980

F/SMC2:GHB

Mr. Michael Guinea  
School of Natural Resources  
The University of the South Pacific  
P. O. Box 1168  
Suva, Fiji

Dear Michael,

I hope that you received my brief handwritten note sent by airmail earlier this month telling you that your letter and enclosures of 6 August 1980 only recently arrived here in Honolulu. Apparently mail posted by surface from Fiji to Hawaii requires 2 to 3 months transit time. It would therefore probably be desirable to send all future correspondence by airmail, if your budget will permit.

I was interested to read your comments on the past and possible future use of turtle survey sheets in Fijian markets. You obviously have an excellent understanding of the problems and potential value of conducting this type of activity. My only final suggestion would be that any survey sheet used for turtles be kept as short as possible so as not to overwhelm and discourage the person recording the data and the fisherman being interviewed. As you mentioned, data on turtles would be gathered along with many other types of marine life passing through the markets.

Your listing of some of the local Fijian names for the various kinds of turtles was really quite interesting. If you ever have the opportunity to take dorsal and ventral photographs of various phases (stocks?) of green turtles that you mentioned, it would certainly be worthwhile. Ideally, your specimens should be of the approximate same size for meaningful comparisons.

The next time I write to Patrick Galenon in Papeete I will ask him if he possibly knows of anyone carving "Tahati" on green turtles. He visited Honolulu a few months ago and, based on our discussions, we may be able to start a tagging project at Scilly during November of next year. Incidentally, this practice of carving names and symbols on sea turtles and then releasing them, often for "good luck" seems to be a widespread practice. I've encountered it several times here in Hawaii and it was apparently fairly common during the early 1900's (see page 4 of the enclosed report).

Thank you for the article on marking with injected dyes. I've given some thought to this myself for use as a secondary marking system for sea turtles. Eventually I am going to try using a compressed air pellet pistol. Instead of putting a pellet in the chamber, I would like to try some powdered or crystal form dye. This would work similar to the compressed air method of giving vaccine inoculations. It eliminates the requirement of a needle, that is, it implants the pigment by the force of the compressed air, rather than puncturing the skin with a tattoo needle.

I highly suspect that you have now accumulated more information on Fijian sea turtles and their cultural usage than any other individual. I realize that you are now formally working on sea snakes, but still I would like to encourage you to put your existing turtle material together into some form of a report. At a later date, this could be refined for publication in MICRONESICA, or other appropriate journal. Please give this idea your serious consideration.

My study visit to the Western Samoa hawksbill hatchery is now tentatively scheduled for mid-January. I am looking forward to finding out if any concrete beneficial effects have been achieved after having been in operation now for about 10 years.

I hope to hear from you again when your time permits.

Sincerely,

George H. Balazs  
Fishery Biologist

Enclosure

bc: Balazs  
HL

GHB:iht

September 14, 1982

Mr. Asaeli Bale  
Nukunui  
Ono ilau Island  
Lau, FIJI ISLANDS

Dear Mr. Asaeli Bale:

Dr. Archie Carr, my friend and fellow researcher at the University of Florida, has told me about the turtle you caught on Christmas Day of 1980 that had tag no. T755 attached to it. I study sea turtles here in the Hawaiian Islands and I would be very interested to learn more about turtles and catching turtles, at Ono ilau. Are turtles very plentiful? Do they lay their eggs on the sand beaches of your island? How many different kinds of turtles do you have? How do you catch and cook them? Have you ever found other tags on turtles?

If you still have tag no. T755, I would like to request that you send it to me so I can have the metal examined for corrosion. If you are willing to do this favor for me, please flatten out the tag and wrap it securely for mailing. If you wish, I will mail the tag back to you after it has been examined.

I have enclosed a color identification poster that shows the different kinds of sea turtles. Please accept this from me as a small gift.

Thank you for your kind help. I look forward to hearing from you.

Sincerely,

George H. Balazs  
Assistant Marine Biologist

GHB:md

Encl.

NO DATA AVAILABLE FOR T755 - DEPARTED  
PEACECORPS PEOPLE - LOST DATA,  
NOTE - TAG WAS APPLIED SOMETIME AFTER MAY 1975,  
LIKELY BY U.S. PEACECORPS VOLUNTEERS (WILLIAM ZOOCHIE)  
WORKING IN TONGA.

Nukunui

ONO-I-LANA

LANA.

4th Nov 1982.

To

George H. Balazs.

Assistant Marine Biologist  
University of Hawaii.

Dear Sir

I have just received your  
letters dated on the 15<sup>th</sup> Sept 1982, I am very happy  
to tell you that turtles are plenty full  
here. We have about six types here.  
We catch them by spearing them some

by following them by Outboard till they  
are still. We used to Bake, and Soup the ~~flashes~~  
Turtles do lay eggs here on sandy beach  
of my Island, only for certain  
time of the year. We here didn't  
see any Leathback turtle its funny to see  
can you tell me <sup>more</sup> about <sup>Leathback</sup> ~~more~~  
turtle.

The tag T.755 is there, please do return  
it if you wish.

Thank you

Yours sincerely

Aseli Bala

# Species of turtle face extinction

FEARS that two common species of turtles may become extinct has led the Fisheries Department to issue a strong warning to poachers.

The two species which have almost become extinct are the Green Turtle known in Fiji as Vonudina and the Hawksbill turtle known as Taku.

The two species were once abundant in Fiji waters but are slowly becoming extinct as people hunt for the shell backs, skin and oil.

The eggs and meat are also considered delicacies, and the backs are sold as tortoise shell to tourists. The skin is used for leather.

Turtle oil is used for cosmetics, and its lubrication calipes is used for soap.

A viscera found in turtle is used for animal food.

Demand for these has led to the virtual extinction of turtles.

The breeding season begins between the months of November and February.

People face heavy fines under the Fisheries Act for killing or even molesting turtles during the breeding season.

Under the regulations people are not allowed to dig, take or destroy turtle eggs during the breeding season.

The regulations also forbid the killing or molesting of any species of turtle if the shell is less than 18 inches in length.

This applies all year round whereas the killing of turtle is completely forbidden during the breeding season between November and February.



A MARKET vendor with turtle shells at Lautoka market. Turtle shells are sold for about \$70 each.

There is also a complete ban on sale or export of turtle shells which are less than 18 inches long.

A spokesman for the Fisheries Department said turtles go to remote sandy beaches to lay their eggs in November every year.

They dig out holes in the sand and lay up to 200 eggs in each.

The sandy beaches they choose are mostly on offshore cays. Nesting beaches often

have barrier reefs with coral, rocks, debris, fine to thick sand and thick vegetation.

The Turtles leave their eggs covered with sand to incubate without parental care.

The sand on the beach helps prevent desiccation and protects the eggs from predation.

Nesting seasons vary around the world but mostly coincide with

the rainy season when the wind velocity is low.

Turtles are usually found nesting during the day although some have been known to nest at the night.

They mate on the surface in shallow waters adjacent to the nesting beaches.

Turtles mature at about three years when they are about 13.5kg in weight.

## Fish poisoning: Its cures and symptoms

THROUGHOUT the islands of the Pacific fish remains a readily available and cheap source of protein. Poisoning following consumption of toxic fish is therefore not uncommon.

The clinical syndrome produced by eating toxic fish is well recognised in Fiji and fish poisoning over the years has become an increasingly important medical problem. Epidemics of fish poisoning occur when either an unknown species of fish or a species previously known to be non-poisonous is eaten.

Fish poisoning in some areas has been associated with the annual rising of the brown worm (*Eumeces viridis*) commonly known as "babala", after which many of the fish in the surrounding area are found to be toxic. However concrete evidence associating babala with fish poisoning is yet to be given.

In Fiji five types of fish poisoning are recognised. They are:

- a) poisoning by puffer fish (*Tetraodon* poisoning)
- b) poisoning by clupeids (also known as daniva poisoning and including anchovy and sardines)
- c) scombrid poisoning (tuna and mackerel)
- d) millet poisoning
- e) ciguatera poisoning (ciguatera toxicity is caused by a number of unrelated fishes ecologically associated in narrow regions or reef-crests).

Poisoning following consumption of fish is not only an annoyance to the otherwise healthy victim whose routine work may be interfered with, but reports of deaths after consumption of poisonous fish, have also been made.

In Fiji deaths due to fish poisoning have never reached an alarming level. The earliest reported death from fish poisoning was in 1974 when two peo-

ple died. 1975 to 1977 had no deaths and in 1978, two more people were reported dead after consumption of poisonous fish.

In Fiji ciguatera poisoning represents 96.4 per cent of all documented cases of marine food poisoning. The total number of cases during 1975-1983 was 925 and the annual rate reported per 100,000 population varied from three to 57. Because the figure represented only persons who sought medical treatment the actual incidence rate would be much higher than this.

In spite of the very high morbidity rate, in comparison to all other forms of marine food poisoning, only few people have died from ciguatera poisoning after several days of hospitalisation.

A recent interview with the Principal Fisheries Officer, Mr Surendra Sewak, indicated that since the consumption of fish has increased, fish poisoning cases may increase as well. However he said that with proper methods of cleaning, storing and cooking such incidents can be avoided.

Symptoms of fish poisoning largely depend on the amount of toxic material a person is liable to assimilate after consumption of the fish. One should bear in mind that toxicity of fish, even within one species, varies remarkably from individual to individual, from region to region and from year to year. The viscera, especially the liver are far more toxic than the flesh and the body, but little evidence is available at present on the relative toxicity of the various organs.

The onset of symptoms are as follows:

The digestive system whereby a person complains of severe abdominal pain and diarrhoea (the stool is very watery after the first few motions).



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DATED 24TH NOVEMBER 1987



TEL NO

361122

MINISTRY OF AGRICULTURE  
AND FISHERIES

PO Box 358, Suva, Fiji

REF. NO.

34/4/7

DATE:

17th July 1980

Dr George Balaz  
Turtle Biologist  
University of Hawaii at Manoa  
Honolulu  
Hawaii  
U S A

Dear George,

Many thanks for your letter of 17 March.  
I am now writing up the results of my studies on beche-de-mer  
which will be published as a technical paper by the  
South Pacific Commission.

Am enclosing a copy of a "turtle data sheet" which I have  
designed for use by Fisheries Division market research  
teams in Fiji. As a result of the SPC Turtle Workshop, I  
was left with the strong impression that there is a need for  
basic catch statistics for the turtle fishery in the  
Pacific Islands. The problem in most of the islands is that  
turtles are caught at the subsistence level and it is  
impossible to gather any such data. As a result, there is much  
speculation about "overfishing" but little or no data on  
which to base management measures.

In Fiji, however, there is a unique opportunity to gather catch - statistics because:-

- (i) many (probably most) of the turtles caught are sold in the markets in the towns
- (ii) the Fisheries Division maintains a trained market research team which randomly samples fish catches on all six market days per week in all main centres.

The total catch of turtles (all species) sold in the markets of the 5 main centres over the last 3 years was:

1977	:	18.15 tonnes
1978	:	16.04 tonnes
1979	:	10.02 tonnes

This catch consists of greens, hawkebills and a few logger-heads (all are eaten). At present, the turtles are not measured or identified as to species.

I have designed the data sheet so that the turtles can be identified from the head alone if necessary (shells are often sold separately from the meat.). The idea is to measure shell length where possible, but otherwise to measure head-length or right front flipper length and to estimate weight by regression.

..2//



17th July 1980

---

Any comments you might have about this idea - improvements, criticisms etc, would be most welcome.

Also since I will be leaving Fiji this week (for other parts of the Pacific for the next few months, and then hopefully to James Cook University), I suggest you write to: Garry Preston, Fisheries Officer, of this Division who will be organising this turtle market survey project.

With best regards,

Yours sincerely,

Mark

Mark Gentle  
(SPC Beche-de-mer Specialist)

C.C.

Fisheries Advisor, SPC Noumea  
Mr M Guinea, SNR, USP Suva

TURTLE DATA SHEET

RECORDER :

DATE :

MARKET :

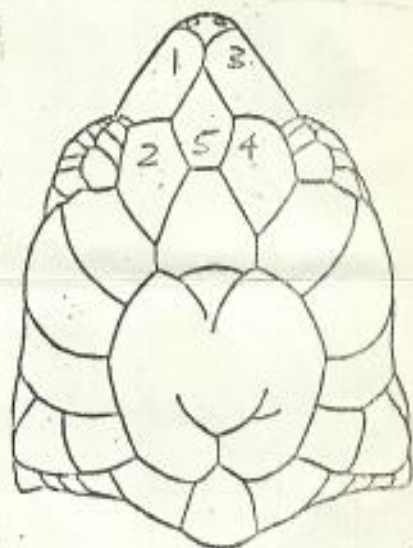
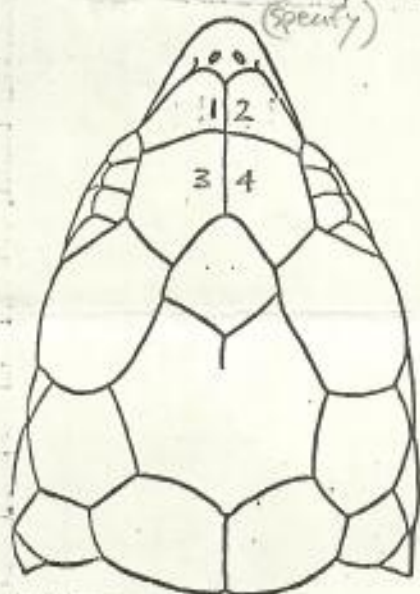
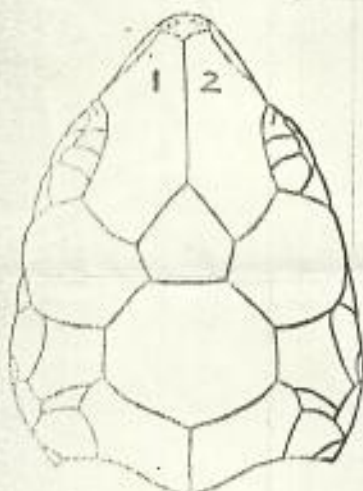
METHOD OF CAPTURE :

NET

SPEAR

OTHER

(Specify)



GREEN (VONU)

HAWKSEILL (TAKU)

OTHER SPECIES

FJT name?

SCALES ON SHELL DO

SCALES ON SHELL

(PLEASE PRESERVE ?

NOT OVERLAP

OVERLAP

HEAD)

SHELL CURVED

HEAD

LENGTH RHT FRONT

LENGTH

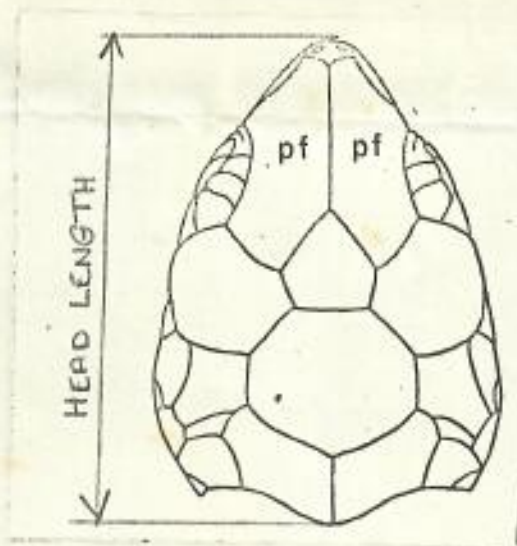
LENGTH

FLIPPER

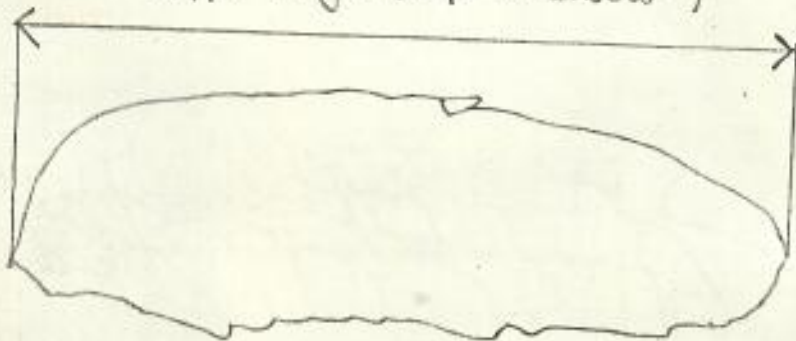
width

LENGTH OF TAIL

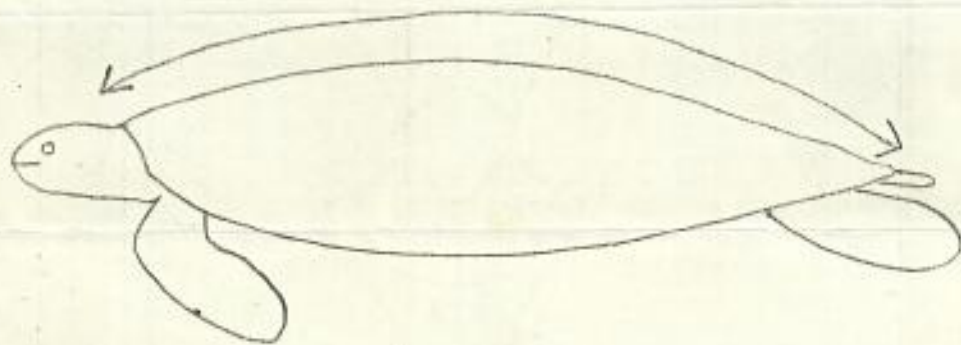
from posterior end of plastron



Flipper length (tip to "elbow")



CURVED SHELL LENGTH



# TURTLES—SOON JUST A MEMORY

ONE commodity that appears in our markets irregularly in small quantities is the "bashful" turtle.

Turtles are called bashful because in most cases they go to great lengths to avoid contact with human beings. However, 16 tonnes from about 320 turtles got close enough in 1978 to wind up for sale in local markets.

Actually, this is only a small portion of the sea turtles caught each year. Most turtles are caught and consumed in island villages, so it is unknown how many turtles end up as meals each year.

One thing is known and that is the turtle population in Fiji and the entire world is dropping at a rate that could lead them to extinction.

The Principal Fisheries Officer for the Fisheries Division, Mr Bill Travis, said, one reason for the turtle population declining was because village fishermen nowadays were able to go further in search of their catches. As a result, fishermen are taking turtles than can be consumed in the village and sending the surplus to city markets.

While more people are now able to sample a traditional island food, the day is rapidly approaching when the turtle itself will be only a distant memory.

In Fiji, there are several laws protecting the turtle. A turtle must have a shell 46 centimetres (18in) in length, and no turtle hunting is allowed from October through February because this is the breeding season. Also, it is against the law to take or disturb turtle eggs.

Enforcement of these laws are difficult. The ultimate responsibility of saving the turtle for future generations must rest with the fishermen, Mr Travis said.

Table 33 Species Composition of Aquatic Non-Fish Products(%) Sold at Municipal Markets, 1979

Market	CENTRAL DIVISION					WESTERN DIVISION						NORTHERN
	Suva	Nausori	Navua	Tallevu	Nasinu	Sigatoka	Nadi	Lautoka	Ba	Tavua	Rakiraki	
Total in Tonnes	352.65	140.37	5.81	10.7	3.12	38.57	32.15	86.33	122.68	23.02	23.41	46.42
No. of days Surveyed	190	111	76	36	126	42	94	168	144	79	50	88
Crustaceans												
Ura(Prawns)	0.3	0.06	2.41		5.77	0.05		0.01	0.01			
Noci "	1.03	0.21			14.42		0.15	0.07	0.15			0.49
Urau(Lobsters)	0.07	0.04			1.28		0.12	0.08	0.22		0.04	0.06
Qari(Crab)	1.80	4.49	4.48	1.49	61.86	1.40	3.08	1.5	3.5	6.95	6.75	36.06
Kuka "	2.85	2.67	0.17	0.47	0.96	0.23	0.65	0.05	0.94	2.69	2.09	0.54
Lairo "	1.08	0.92			0.64	0.05	0.68	5.76	0.20	0.87	0.21	1.44
Nana	2.94	2.35			4.49					0.04	0.04	0.39
Molluscs												
Vasua	0.22			1.68		0.10	0.71	4.18	0.83	0.82	2.05	0.52
Kai(fresh)	64.9	74.55	70.74	68.6	7.37	82.5	80.09	75.2	84.94	67.2	77.6	26.80
Kaikoso(sea)	20.69	10.86	15.49	25.58	2.24	14.13	2.08	3.76	6.06	12.73	6.32	22.53
Octopus	0.37	0.01					1.68	0.95	0.19	0.91	0.32	0.88
Squids	0.06						0.75	0.31	0.33	0.61		
Sigawale	0.06	0.13							0.05	0.30	0.30	
Shells	0.68	1.65	6.71	0.56	0.96	1.22	2.71	1.42	0.41	1.30	1.62	0.52
Cone shells	0.32	0.46		0.93		0.31	1.03	0.82	0.02	1.95	1.20	0.06
Sea Urchins	0.39	0.16		0.56			0.03	0.01	0.06			0.06
Holothurians												
Loliloli	0.06	0.07										
Dairo	0.20	0.43		0.56				1.09	0.56	0.07	1.15	3.08
Sucuvalu								0.87	0.71	2.87		0.80
Algae												0.09
Nana	0.49	0.12		0.28								
Lumi	0.19	0.15		0.28			1.65	2.99	1.08	0.74	0.17	0.77
Turtles	1.28	0.68					0.01	0.01				0.26
TOTAL	4.51	0.95				3.48	1.44	1.44	0.24			4.07
						6.12	1.24	0.19				1.89 = 10

Fish prices

The mean price of fish sold in Fiji's municipal markets in 1979 was \$1.49/Kg, a 4.9% increase over last years mean of \$1.42/Kg. The average price in Central Division was \$1.63/Kg (\$1.49 in 1978), in Western Division \$1.48/kg(\$1.40 in 1978) and in Northern Division \$1.34 (\$1.00 in 1978). Table 34 below shows the mean municipal market fish prices in the

1.13%

56 Martin St  
Merang 4211  
Ald. Australia

30 December 1982.

Dear George,

I just received your letter of 25 Oct regarding the Fisheries of Fiji. The figures quoted by Gwasawa appear to be a rehash of data which ~~are~~ are presented in the annual reports of Ministry of Agriculture and Fisheries, Fisheries Division. The 1979 figures for all turtle species at all Municipal markets total just over 10 tonnes. The 1978 figures correspond with those in the Fiji Times 13/7/79. I assume the figures to be correct although what percentage of the total catch they represent is any body's guess.

I have finished my contract with USP and staying with my parents until late January when I'll be taking a teaching position in the Northern Territory. I've a wife and small son to raise and we plan to make Carwin our home for a few years.

The plans I had for an aerial survey of the southern Lau Group fell through when the plane crashed in November (81). The pilot who was the chief mechanic for Fouth Airways was injured which resulted in most of their planes being grounded for lack of maintenance. So Vonna Balavu South remains unsurveyed.

The sea snake work went well. I'm in the process of writing my thesis but it has been difficult with the shift to Australia and another shift in the near future. I'll be preparing the information I've gathered on sea turtles and sea birds for a publication of some sort. When I have a final draft prepared I'll send you a copy for your comments.

I've enclosed a map of the survey region and  
copies of Fiji Times 13/7/79 and Annual Report 1979 Pg 33.

I wish you every success with your research  
and best wishes for the Christmas and New Year

Regards

M. L. Gurnea.

P.S.

Re. Gwasawa Table 1

'Marine Turtles nei' I think is unspecified  
sea turtle - Loggerhead, Hawksbill + Green.

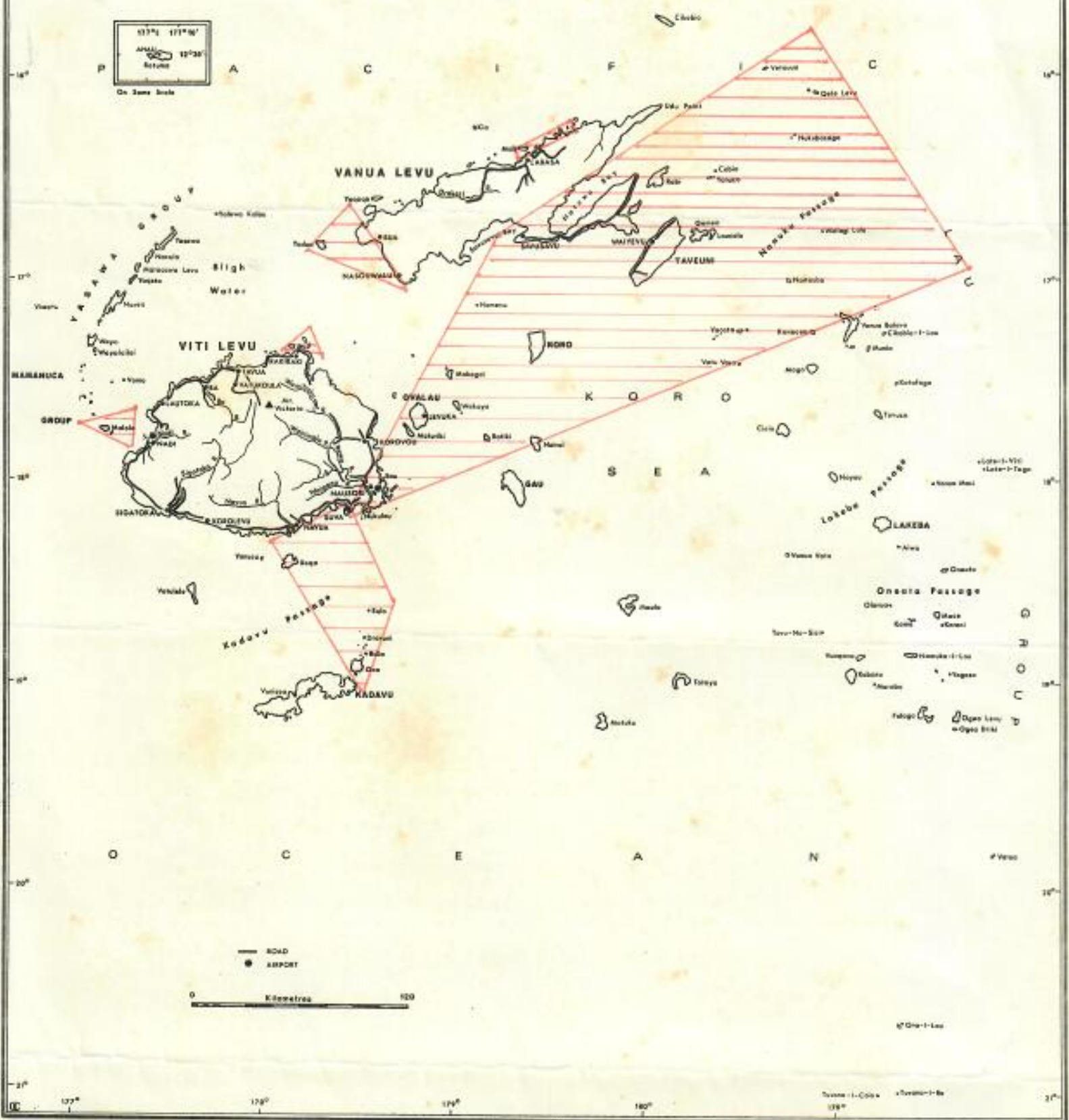
Also the decrease in turtle catches may not reflect  
a decrease in numbers but a decrease in fishing effort,  
or - preference for other sources of protein - tinned fish  
or tinned meat

or - the loss of the turtle hunters - Gonedau  
These are just a few thoughts.

Mich.

*Sea Route Survey 1975-1981*

# FIJI ISLANDS



0 100 Kilometers

ROAD  
AIRPORT

177° 179° 181° 183° 185°



January 6, 1983

Mr. Asaeli Bale  
Nukuni  
Ono-I-Lau  
Lau Group  
FIJI ISLANDS

Dear Mr. Bale:

Thank you very much for answering my letter and sending me the tag you found on a turtle. As you requested, I am returning the tag to you. It appears to be in good condition. I am also sending more information on the leatherback turtle (Dermodochelys coriacea), since you expressed curiosity over this species. If you ever see this turtle by your island, please write and tell me about it.

Can you please write and tell me about how many turtles you catch each year at your island? In what months of the year do you catch the most turtles? If you ever find another tag, please write and tell me about it.

I send you best wishes for this new year 1983.

Sincerely,

GEORGE H. BALAZS  
Assistant Marine Biologist

GHB:ec

Enclosures

NOTE - NO ADDITIONAL CORRESPONDENCE  
RECEIVED FROM MR. BALE  
AS OF 8/90.

There is a wide fringing reef on the north and south sides; on the south it encloses a narrow lagoon and on the east forms a large loop trending north-eastwards almost as far as Nggilanggila. The population in 1936 was 114.

### THE EXPLORING ISLES (Fig. 81)

The 'Exploring isles' is the name given by the United States Exploring Expedition in 1840 to a scattered group of islets enclosed within a barrier reef, lying approximately between lat.  $17^{\circ} 04'$  and  $17^{\circ} 24'$  S and long.  $178^{\circ} 40'$  and  $179^{\circ} 04'$  W. Vanua Mbalavu, the main island, is shaped like a question mark and following

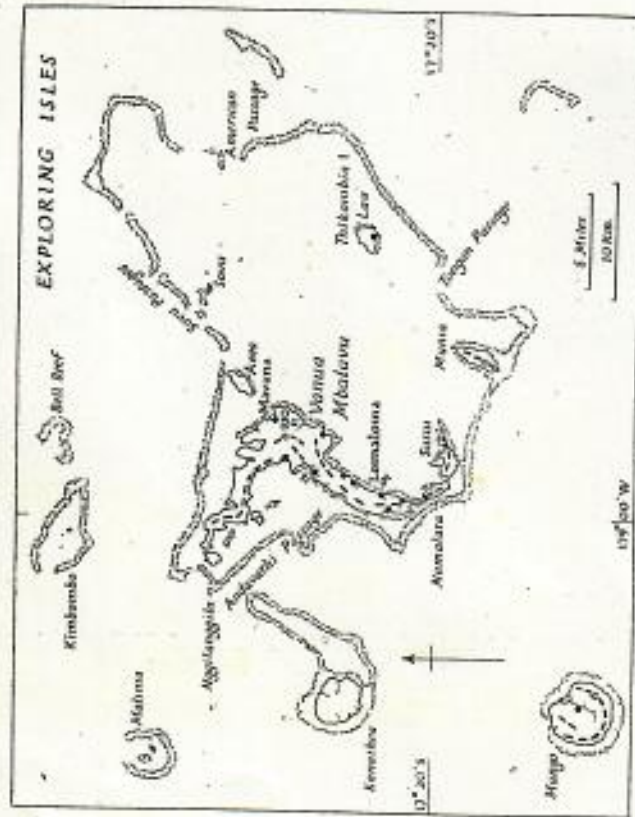


Fig. 81. Exploring isles and adjacent islands

The term 'Exploring isles' is limited to Vanua Mbalavu and the other islands within the large circuit of barrier reef. Based on: (1) Admiralty chart no. 416; (2) R. A. Derrick, *The Geography of the Fiji Islands*, p. 144 (Ndavulavu, 1938); (3) G.S.C.S. map no. 4295.

its curvature is 14 miles long with a greatest width of nearly 3 miles. Its area is 20 sq. miles. The wide central part is volcanic in origin, whereas the two ends are of raised coral limestone. The peak of Koro Mbalavu occupies the centre of the middle portion, while a ridge of lesser height forms a spine for the rest of the island. High limestone cliffs occur on the deeply indented northern coast and round much of the large bight which forms the west coast. The east coast, by contrast, has mainly sandy beaches. A narrow fringing reef surrounds the southern half of the west coast and all of the east and much of the north coasts.

A population of 1,681 in 1936 was divided between 10 coastal villages. Lomaloma, the most important of them, has a considerable population of Tongans. It is also the headquarters of the District Commissioner for the Eastern District.

Nggilanggila is an elevated limestone island with precipitous cliffs. (Fig. 82); it is uninhabited. Namalava, about 1½ miles long and of oval outline, and Susui, about 2½ miles long, are both parts of the elevated reef forming the southern tip of Vanua Mbalavu. They had populations of 65 and 107 respectively in 1936. Munia is oval in shape, about 2½ miles long and 1 mile broad, with a central peak 950 ft. high; it is united to the barrier reef. In 1936 it had a population of 20. Thakombia Lau is a limestone rock 230 ft. high, about 1½ miles in diameter, with a population of 63. Avea is a wooded limestone island 600 ft. high, with a population of 70 in 1936.

There are seven navigable passages through the barrier reef: three in the middle



Fig. 82. Cañon on the east shore of Nggilanggila island

Note the undercutting of the limestone cliffs by wave action. Based on A. Agassiz, 'The Islands and Coral Reefs of Fiji', *Bulletin of the Museum of Comparative Zoology at Harvard College*, vol. xxxiii, plate 74 (Cambridge, Mass., 1899).

of the northern side, opposite the Sovu islets; two wide ones—American and Tongan passages—in the south-east side; Nggilanggila passage, opposite that island; and Andavathi passage, opposite the bight in the west coast of Vanua Mbalavu.

### VATU VARA

Vatu Vara (lat.  $17^{\circ} 26' 8''$ , long.  $179^{\circ} 32' 10''$  W) is a densely wooded circular island, lying 9 miles to the south of Yathata. It is a mile in diameter and rises in the middle to a hill 1,030 ft. high, the highest point in the Lau group. From its distinctive profile with flat top and steep sides rising from a low coastal plain, it was formerly named Hat island. The whole coast is surrounded by fringing reef. It is uninhabited.

## MANGO (Figs. 76, 81, 83)

Mango (lat.  $17^{\circ} 27' S$ , long.  $179^{\circ} 09' W$ ) is a circular island about 4 miles across, lying 8 miles to the south of Kanathia. Its geology is shown in Fig. 36. A small stream flows north-east to a little bay on the coast, cutting through what would otherwise be a circular rim of hills just inland of the coast. Narrow fringing reef, lagoon and barrier reefs surround the island. The small bay serves as an anchorage and has a pier. Lighters and boats drawing 4 ft. can cross the reef at high water. The island is privately owned and worked as a copra estate; in 1936 the population of 139 consisted of the owner's employees.

## KATAFANGA

Katafanga lies 13 miles south-east of Munin. It is less than a mile long, crescent-shaped and 180 ft. high. It lies in the western end of a shallow lagoon almost



Fig. 83. Weathered limestone rocks on the shore of Mango

Note the jagged shapes and characteristic undercutting. Based on E. C. Andrews, 'Notes on the Limestones and General Geology of the Fiji Islands, with Special Reference to the Lau Group', *Bulletin of the Museum of Comparative Zoology at Harvard College*, vol. xxxviii, plate 14 (Cambridge, Mass., 1900).

enclosed by barrier reef, in the north side of which there is a boat passage. There is a small settlement, with a population of 12 in 1936, on the south-east side.

## TUVUTHA, THITHIA, AND NAYAU

Tuvutha, lying about 20 miles south of Munia, is triangular in shape, about 3½ miles long and nearly 2 miles wide, with an area of 5 sq. miles. It rises to a height of 800 ft. at the northern end where the hills fall away in steep bluffs to the sea. In the centre is a basin containing four or five small lakes and draining towards the south-east. An almost continuous barrier reef encloses a narrow lagoon; there is a boat entrance in the western side. The population (76 in 1936) lives in a village on the south-west coast.

Thithia (lat.  $17^{\circ} 45' S$ , long.  $179^{\circ} 18' W$ ) lies 25 miles westward of Tuvutha. It is approximately circular, 3 to 4 miles across, with an area of 13 sq. miles. The interior is occupied by a number of grass-grown hills with scattered pandanus and casuarina trees. The central ridge (540 ft.), which is volcanic, has masses of raised limestone on its sides. The sandy beach is fringed throughout by reef. Anchorage in southerly and easterly winds is obtainable in a bight of the reef on the north-west side. Five coastal villages contained a total population of 560 in 1936.

Nayau (lat.  $17^{\circ} 58' S$ , long.  $179^{\circ} 03' W$ ) lies about 20 miles south-west of Tuvutha. It is oval, densely wooded, about 3½ miles long by 2½ wide, with a coastal fringe of hills which drop precipitously to the sea from heights of between 500 and 600 ft., and a central basin-shaped depression. Its beaches are mostly sandy and are surrounded by fringing reef. Boats can pass round the island within the reef at

half tide, entering by a passage 15 yd. wide on the east coast. In 1936 the population was 392. The paramount chief of Lau (*Tui Nayau*) derives his title from this island.

## LAKEMBA AND NEIGHBOURING ISLANDS

Lakemba (lat.  $18^{\circ} 13' S$ , long.  $178^{\circ} 47' W$ ) is the largest island of the Lau group and its traditional political centre. It is of oval shape, with its long axis running from east to west, and has a promontory projecting from the middle of its south coast. The greatest length is nearly 6 miles and greatest width 5 miles, giving an area of 22 sq. miles. The central peak of Kendekende (730 ft.) is volcanic and has elevated masses of older limestone on its north-western and western sides.

Sandy benches occur all round the coast, which is encircled by a wide fringing reef; a loop of narrow barrier reef on the east coast encloses a rhomboidal lagoon full of coral patches. Steamer passage enters it on the east, giving access to anchorage in 13 fathoms in the lagoon. Fish and turtle are abundant, the latter in the hot months. The population of 1,681 (in 1936) was divided between eight coastal villages.

About 7 miles to the south-east is the narrow uninhabited islet of Alwa within a narrow circuit of reef.

Onestra, a narrow islet 2½ miles long and less than a mile wide, lies in a shoe-shaped lagoon about 21 miles south-east of Lakemba. It has a central depression and several small hills on the coast, the highest rising to 160 ft. The small islet of Loa is ¼ mile off the eastern tip. There are three passages through the western side of the reef and one in the centre of the northern side. The population totals 220.

Vanua Vatu, about 25 miles south-west of Lakemba, is a raised limestone islet with a central depression and a maximum height of 310 ft. on the coastal rim; it is almost circular and about 1 mile in circumference. A barrier reef, with one boat passage on the west, encloses the island within a narrow lagoon. The population was 136 in 1936.

## THE SOUTHERN ISLANDS

Olorua (lat.  $18^{\circ} 37' S$ , long.  $178^{\circ} 44' W$ ) is a small steep island, in origin a much eroded volcanic cone, set on the northern fringe of a solid triangle of reef; a narrow lagoon protected by a further reef fringes the northern shore. It is uninhabited.

Komo is a volcanic island about 9 miles south-west of Olorua and occupies the eastern end of a lagoon enclosed by an oval reef. It is about 1½ miles long and less than ½ mile wide. The central peak rises to 270 ft. A narrow fringing reef surrounds the coast. Two boat passages enter the lagoon at its east and west ends. The island is noted for red ochre, which the Fijians use for stencilling their bark cloth. The 1936 population was 158.

Mothe (lat.  $18^{\circ} 39' S$ , long.  $178^{\circ} 30' W$ ) is a volcanic cone (590 ft.). Almost circular and about 2 miles in diameter, it has a slightly indented sandy-beached coast fringed with reef. An unbroken barrier reef encloses a narrow lagoon which extends in a long loop south-eastwards from the south coast and encloses the small limestone islet of Karoni.

Tavunasisi is a wooded coral islet about ¼ mile in diameter, lying 25 miles south-west of Olorua. It is completely surrounded by wide fringing reef which boats can cross at half tide.

Namuka (frequently known as Namuka i Lau) is a limestone island 5 miles in length from west to east and little more than 1 mile from north to south. It lies about 12 miles south-west of Mothe. It has a raised coastal ridge rising to 260 ft. on the north. Midway along the south coast is a coral-filled bight; a similar bar

smaller bay occurs at the west end. A barrier reef surrounds the whole island, being complete on all sides but the north-west where there is a boat passage through a chain of coral patches. The harbour in the lagoon on the north side has fair anchorage in 7-13 fathoms. The population was 269 in 1936.

Vuanggava lies 13 miles to the south-east of Tavunastibi. It is a limestone island with a coastal ridge rising to 359 ft. and a central depression in which is a small brackish lake. The coast on the western end and along the south-east side is bordered by continuous fringing reef. The island is uninhabited but planted with gardens by natives of Kambara, who also use the central lake for breeding turtles.

Kambara, 3 miles to the north-west of Vuanggava, is an oval limestone island about 4½ miles from north to south and 3 miles from east to west. The centre is a wooded basin; the coastal ridge attains a maximum height of 470 ft. on the north-west. Steep limestone cliffs overlook the beach. The surrounding reef is of fringing type on the east coast. On the west a narrow barrier reef encloses a lagoon. Good anchorage is obtainable off the north-west shore. The population of 418 (in 1936), noted as canoe builders, is divided between 4 coastal villages (Fig. 40).

Marambo, 7 miles east of Kambara, is a circular limestone islet 160 ft. high, less than a mile in diameter and surrounded by a fringing reef. It is uninhabited and has no anchorage.

The Yangasa cluster, a group of four small limestone islands—Navutuira, Yavuha, Navutuikema and Yangasa Levu—within a circuit of barrier reef, lies 4 miles south-east of Namaka. Yangasa Levu, the largest, is less than 2 miles long, while Yuvuha, the smallest, is less than ¼ mile in diameter. They are uninhabited but contain coconut plantations owned by the people of Mothe.

Fulanga, about 8 miles south-west of the Yangasa cluster, is an almost circular limestone island of atoll type, with a central lagoon studded with rocks and islets. Its greatest diameter is about 5 miles and its area 7 sq. miles. The north side of the atoll is broken into a chain of small islets separated by channels linking the internal lagoon with the sea. The south-western side contains a large sandy-beached bight on its seaward side. The whole seaward coast of the island is fringed with coral which encloses several narrow stretches of lagoon. The population (390 in 1936) lives in three villages.

Ongesa Levu (lat. 19° 10' S, long. 178° 25' W) and Ongesa Ndriki are two limestone islands within a single barrier reef. Ongesa Levu, about 4 miles long, is centrally placed within the reef, while Ongesa Ndriki, less than 2 miles long, is attached to the southern part of the reef. The only village, with 105 inhabitants in 1936, is at the head of a sand-filled bay on the southern end of Ongesa Levu. The lagoon has the best anchorage in the southern part of the Lau group, access being gained by the Barricouts passage through the reef at its south-west corner. It is more frequently visited by ships than any of the neighbouring islands.

#### VATOA AND ONO I LAU

The island of Vatoa and the Ono group lie in the far south of Lau, separated from the other southern islands by a broad stretch of sea.

Vatoa (lat. 19° 49' S, long. 178° 13' W), discovered by Cook and named by him Turtle Island, is 45 miles to the south of Ongesa Ndriki. It is a densely wooded strip of coral about 2 miles long with a hill 209 ft. high at the northern end. It lies within an elongated barrier reef which is contiguous with the south-eastern coast. Good water is plentiful at the foot of the hill. The one village had a population of 171 in 1936.

Ono i Lau (lat. 20° 39' S, long. 178° 42' W) comprises a group of 6 islands 100 miles south of Ongesa Ndriki. The main island, Ono Levu, which gives its name to

the group, is crescent-shaped and about 3 miles long. It contains two prominent peaks, the higher of which reaches 370 ft. The enclosed bight is sandy-beached while the outer shore is mostly coral-fringed. Opposite the bight are the smaller islands of Ndoi and Ndavura. All three are volcanic in origin and form the remains of the rim of an extinct crater. The group is surrounded by a lagoon enclosed by a barrier reef having two boat entrances. The three remaining islands, U'doi, Yauia and Mana, with several small islets, are of coral formation and located on the barrier reef. The inhabitants, who numbered 586 in 1936, live on Ono i Lau and Ndoi.

(For Bibliographical Note see Chapter V.)

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GEOGRAPHICAL HANDBOOK SERIES  
FOR OFFICIAL USE ONLY

# PACIFIC ISLANDS

VOLUME III

WESTERN PACIFIC  
(TONGA TO THE SOLOMON ISLANDS)

December 1944

*Pac. Div 22  
G7*

*74188*

Great Britain.

NAVAL INTELLIGENCE DIVISION

October 28, 1982

F/SWC2:GHB

Mr. Michael Guinea  
School of Natural Resources  
The University of the South Pacific  
P. O. Box 1168  
Suva, Fiji

Dear Michael,

I thought that you would be interested in the enclosed article that was recently translated from Japanese by a staff member of our Laboratory. If you have the opportunity, I would appreciate hearing your thoughts on the quantities of sea turtles reported taken each year since 1974. Some of these amounts strike me as being awfully high. Especially when one considers that catch reports of this nature usually represent much less than what is actually being taken.

I hope that your work on sea snakes has been going well. Recently, a live specimen was brought into the Waikiki Aquarium. It was found about 15 miles off the Island of Hawaii. Sea snakes are fairly rare in this part of the Pacific.

Best regards,

Sincerely,

George H. Balazs  
Fishery Biologist

Enclosure

GHB:ey  
cc: Balazs  
HL



MINISTRY OF PRIMARY INDUSTRIES

FISHERIES DIVISION  
P.O. BOX 358  
SUVA, FIJI ISLANDS

---

TEL. NO. 361122

REF. NO. 34/4/7  
DATE: 07/11/86

Dr. G. Balazs,  
Zoologist,  
Marine Mammals & Endangered  
Species Program,  
NMFS, 2570 Dole St.,  
Honolulu,  
HAWAII 96822.

Dear Dr. Balazs,

Many thanks for the wealth of useful information on turtles and the news of green turtle tag recovery.

... I enclose for your information a copy of a recent resource profile on turtles which are consumed in Fiji on a subsistence and, to a limited extent, commercial basis. Hope it doesn't spoil your day.

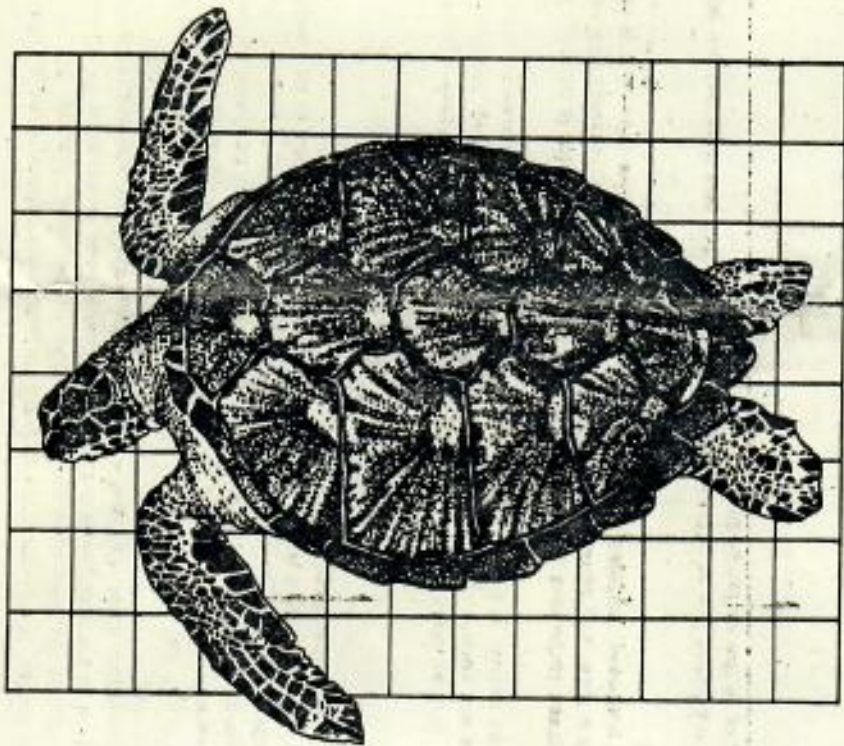
Best wishes,

*Tony Lewis.*

DR. A.D.LEWIS  
PRINCIPAL FISHERIES OFFICER (RA & D)

**FISHERY RESOURCE PROFILE NO.21**

**TURTLE (VONU)**





### 21.1 The Resource

Two marine turtle species are commonly sighted and captured in Fiji, the green (*Chelonia mydas* - vonudina) and the hawksbill turtle (*Eretmochelys imbricata* - taku). Both are found throughout the tropical regions of the world and the green turtle in particular grows to well over 200kg in weight. The even larger leatherback turtle (*Dermochelys coriacea*) is sometimes sighted in offshore waters; there are occasional captures of the powerful loggerhead turtle (*Caretta* - tuvonu) which has a musky odour and is not generally eaten.

As with all marine turtles, the green and hawksbill turtles come ashore, generally between the months of November and February, to lay their eggs on specific nesting beaches. Typically 100 to 150 leathery eggs are laid in a hole excavated in the sand, several times a season. These hatch after 7-10 weeks and the hatchlings run the gauntlet of predatory birds, fish and sharks as they make their way out to the open sea.

Growth of turtles is not well understood; green turtles appear to grow more rapidly but take a longer time to mature (5 years or more). Minimum size at first maturity for females of both species varies with area but can be as small as 80cm (32") and 60cm (24") for green and hawksbill turtles respectively. Males of both species are distinguished by their much longer tails. The green turtle is primarily herbivorous, feeding on various seaweeds, whereas the hawksbill appears to be more omnivorous in its habits eating sponges, sea squirts, seaweeds and other items.

### 21.2 Utilisation

Because of their habit of nesting on specific beaches, female turtles and their eggs are vulnerable to predation by humans and variety of animals. They are also caught by spearing, traditional turtle nets, hand capture by divers when asleep or cruising, or even the use of sucker fish (bokewa) attached to a line.

The meat of the green turtle and particularly the green coloured body fat is prized. Turtle soup and canning factories are a facet of Pacific islands history. The shell of the hawksbill has long been sought after for ornamental purposes (tortoiseshell) and even the less attractive green turtle shell is utilized as a receptacle or curio.

In Fiji, turtles are marketed live or butchered. The meat, bodyfat and intestine are sold and other organs are all eaten, as is the softer undershell (plastron).

### 21.3 Production

#### (a) Fiji

Commercial sale of turtle meat rose from 10 tonnes in 1979 to over 34 tonnes in 1983 then declining to 20 tonnes in 1984. (Figure 1) The 1983 figure is attributed to Hurricane Relief collection activities. Prices

have risen from \$1.74 to \$2.36/kg. in the same period. Quantities of vonu are consumed at traditional feasts and for subsistence purposes. Vonu is regarded as a chiefly food and is offered first to the chief by the gonedou.

#### (b) World

Despite the addition of marine turtles to the CITES List, trade in turtle meat and turtle products continues. The 1983 FAO estimates list green turtle and hawksbill production of 391 and 320 tonnes respectively, mostly from the Caribbean, with much larger unspecified turtle species production of 3800 tonnes, primarily from S.E. Asia.

#### 21.4 Status of Stocks

The status of Fiji's turtle stocks is uncertain and probably should be assessed as a matter of some importance. Easier access to remote nesting islands must be resulting in an increased catch of turtles.

#### 21.5 Management Guidelines

The Fisheries Regulations currently provide for:

- (a) a minimum size of turtles allowed to be taken (18" - 45cm). This in fact is well below the typical size at first maturity and could be increased to 30"(75cm).
- (b) a closed season on the taking of turtles and their eggs, from November 1st to March 31st. This spans the main breeding season.
- (c) restriction on the size of spear barbs which can be used (not less than 3/8" projection from the shaft) to prevent unnecessary wounding of turtles.
- (d) export of turtle flesh is prohibited.

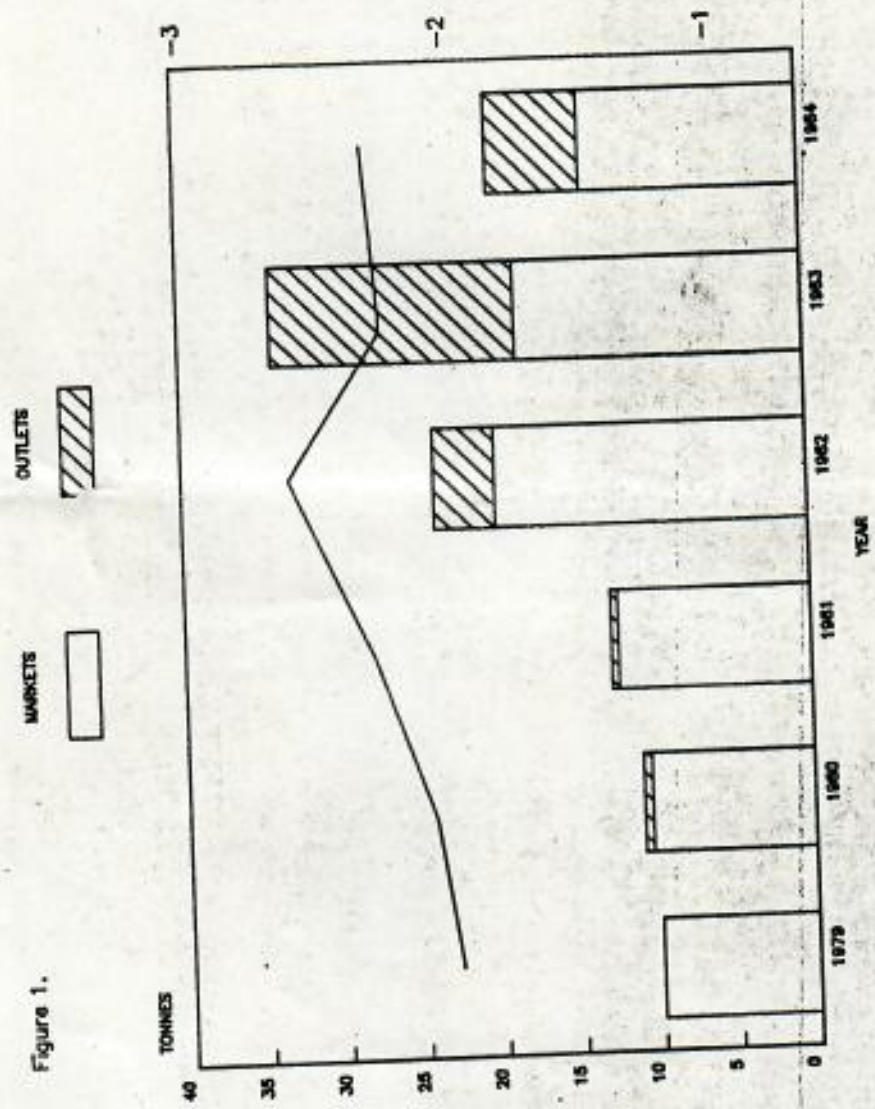
In addition to an increase in the minimum size, Government could also consider a ban on the export of whole shells. Many purchasers have their shells confiscated on return to countries party to CITES e.g. Australia, USA and are thus unfairly penalized.

#### 21.6 Policy and Investment Opportunities

An assessment of Fiji's turtle stocks should be undertaken as resources permit. If warranted, a ban on the commercial sale of meat and shell should be considered. The consumption of turtle in the traditional context would be allowed to continue, save in the unlikely event that stocks appear to be severely depleted.

Clearly, investment opportunities in the harvest of turtle or turtle product are nil.

TURTLE MEAT SALES AND AVERAGE PRICE.



# FISHERY RESOURCE PROFILES

	PAGE	
1. Spiny Lobster (Urau).	1	11. Crab (Qari).
2. Giant Clam (Vasua).	7	12. Spanish Mackerel (Walu)
3. Trochus (Sici).	13	13. Sashimi Tunas (Yatunitoga)
4. Beche-de-Mer (Dri).	20	14. Black Coral (Baka)
5. Aquarium Fish (Tivitivi).	25	15. Marine Prawns (Ura)
6. Ornamental Coral (Lase).	30	16. Freshwater Prawns (Ura)
7. Collector's Shells (Qani vivili).	34	17. Freshwater Eels (Duna)
8. Marine Algae (Lumi).	38	18. Sharks (Qio)
9. Deepwater Snapper	42	19. Reef Fish
10. Freshwater Mussel (Kai).	45	20. Indian Mackerel (Salala)
		21. Turtle (Vonu)
		49
		53.
		57.
		61.
		64.
		68.
		72.
		75.
		79.
		84
		88.

These resource profiles are intended to provide a concise introduction to various fisheries resources which are attracting attention from potential investors in the industry. Their aim is to highlight the various characteristics of the resource (biological, economic) and management measures currently in place, and identify investment opportunities. More details on any aspects of the report can be obtained from Fisheries Division. It is hoped that profiles of other resources will be progressively compiled as required.



ULANGA

Pac. 1940  
DU 600  
T45  
(cop. 4)

153p.

# FIJIAN FRONTIER

By  
LAURA THOMPSON

*Introduction by*  
B. MALINOWSKI

STUDIES OF THE PACIFIC NO. 4

AMERICAN COUNCIL  
INSTITUTE OF PACIFIC RELATIONS  
SAN FRANCISCO    NEW YORK    HONOLULU  
1940

LIBRARY OF  
GEORGE H. BALAZS

On our first visit to one of the Kambaran villages the natives were suspicious because they had heard that we wanted to take away their land and build a sawmill to export hardwood. This they feared because the land titles had not yet been established by the lands commission. One night most of the inhabitants of the village crowded into my native house. About midnight when they had all left, we noticed through the darkness two men (whom we recognized as two high ranking persons in the village) a few yards from the house. They were describing a circle on the ground. When they disappeared we examined the spot and found a piece of pandanus, knotted in the form of a cross, lying in the center of the circle. We found the pandanus had been extracted from the mat on which we had been sitting.

The next night, when the natives had again assembled in the house, we showed the pandanus and asked what it was. Suddenly there was a silence. The dark faces became serious and frightened. Finally a hereditary carpenter, who had been educated for the ministry in a mission school, said: "It's a bad trick." The two men had been so afraid of losing the land that they had practised black magic on us.

Since the practise of witchcraft is forbidden by the native regulations the whole village was upset, and the next day the natives ceremonially presented to us a large sea turtle, weighing over 150 pounds, in atonement. This was the most valuable gift they could give. We returned with the turtle, lying on its back so that it was helpless, aboard our canoe to Tokalau, whereupon Tokalau, not to be outdone by its rival, immediately presented us with a still larger turtle.

Jealousy over land titles reached its highest point regarding the valuable, uninhabited island of Wangava. This island with its rich timber and garden land, fishing and turtle breeding grounds, is claimed by a noble clan (Naivotavota) of Tanggu. A noble clan (Vuanikathu) of Tokalau also claims the west side of the island, but acknowledges the Tanggu

clan's claim to the east side. However, the Tanggu clan enforces its claim by actual cultivation of crops on the island and by control of the fishing and turtle breeding there. But since such a claim is substantiated not only by tenure but also through the clan genealogies there was a constant dispute among nobles of Tanggu and Tokalau regarding their genealogies and the relative merits of the two claims.

The effect of the government policy concerning land ownership has been far-reaching. Native retention of ancestral lands has cemented the tie between hereditary social groups and the soil. A man cultivates the garden plot of his ancestors and frequently even builds his house upon the same house site. In spite of the changes taking place in the culture the link with the natural environment has not been broken. This has not only physical significance in that the natural resources upon which the old culture was built are still available, but also psychic significance in that a social group is still in close contact with its sacred places, sacred animals, and plants. The importance of this condition can hardly be over-emphasized. As long as the physical setting is retained there is a possibility of revitalizing a culture so that a satisfactory balance may be re-established in spite of its changing content. Evidence of new adjustment to the old environment is seen in the increase of the population in recent years—a sign of healthy and socially adjusted communal life which will be discussed in Chapter VI.

As a result of the land policy the native does not suffer from the modern western economic system. He is economically independent and does not need to compete with Europeans or Indians<sup>32</sup> in the struggle for existence. No matter how he chooses to earn his living he can always return to his own village and cultivate his ancestral lands. Hence there is no native unemployment or rehabilitation problem in Fiji.

<sup>32</sup> Since 1879, laborers have been imported into Fiji from India, and in 1936 the total Indian population in Fiji was 85,002. There are, however, no Indians in southern Lau.



George. H. Balazs.  
Assistant Marine Biologist  
Hawaii Institute of Marine Biology  
P. O. Box 1346  
Kauai Island.  
Kaneohe Hawaii 96744

Mukuni

ONO-I-LAN

L.A.H.

4<sup>th</sup> Nov 1982.

10

George. H. Balazs.

Assistant Marine Biologist.  
University of Hawaii.

Dear Sir

I have just received your  
letters dated on the 14<sup>th</sup> Sept 1982, I am very happy  
to tell you that turtles are plenty full  
here. we have about six types here.  
we catch them by spearing them some



Address —

MR. ASAELI BALE  
NUKUNI

ONO-I-LAVI  
FIJI

by following them by Portwood Hill they  
are still. We used to Bake, and Soup the ~~fish~~  
Turtles do lay eggs here on sandy beach  
of my Island, only for certain  
time of the year. We hope didn't  
see any Leatherback turtle its funny to see  
can you tell me <sup>more</sup> about ~~more~~ <sup>Leatherback</sup>  
turtles.

The tag T755 is there, please do return  
it if you wish.

Thank you

Yours sincerely

Asaeli Bale



George H. Balazs.  
Assistant Marine Biologist  
Hawaii Institute of Marine Biology  
P.O. Box 1346  
Kauai Island.  
Kaneohe Hawaii 96744

Nukunui

ONO-I-LANA

L.A.H.

4th Nov 1982.

FLA USA

To

George H. Balazs

Assistant Marine Biologist  
University of Hawaii.

T755



Dear Sir

I have just received your  
letters dated on the 14<sup>th</sup> Sept 82, I am very happy  
to tell you that turtles are plenty full  
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we catch them by spearing them some

Address —

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by following them by Outboard till they  
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Turtles do lay eggs here on sandy beach  
of my Island, only for certain  
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see any Leatherback turtle its funny to see  
can you tell me <sup>more</sup> about <sup>Leatherback</sup> ~~more~~  
turtles.

The tag 1755 is there, please do return  
it if you wish.

Thank you

Yours sincerely

Asaeli Bale



94

TEL. NO

361122

MINISTRY OF AGRICULTURE  
AND FISHERIES  
SUVA - FIJI

REF. NO. 7/1/79  
DATE 30/8/79

Fisheries Advisor  
South Pacific Commission  
B P D5  
Noumea Cedex  
New Caledonia

*Smith*

CONF 2/9/79

*Fisheries  
[Signature]*

Dear Dr Grandperrin

TURTLES

.....

For your information, here is a copy of a discussion paper which I have prepared for circulation among Fisheries Division, U.S.P. and National Trust of Fiji.

*W*

I have persuaded Bill Travis of the great importance of his work in turtle egg farming in W. Samoa and he is now producing a detailed report.

No report has previously been produced on this very interesting project because of the unfortunate death of Alan Banner, who was the scientific advisor.

Regarding your several queries about the beche-de-mer work, do not despair, I shall deal with them in my next letter.

Regards

Yours sincerely

*Mark*

(Mark Gentle)  
Beche-de-Mer Consultant

PS: Thank you for your comments about the SP&E Bulletin article. In fact I was afraid of being too technical! Will work on it this weekend.

TURTLE CONSERVATION IN FIJI - A PLAN OF ACTION

Present Conservation Measures

Marine turtles in Fiji are given legal protection by the Fisheries Regulations which specify:

9. No person shall harpoon any turtle unless the harpoon is armed with at least one barb of which the point projects not less than  $\frac{1}{8}$  inch from the surface of the shaft, measured at right angles to the long axis of the shaft.

20. No person shall at any time dig up, use, take or destroy turtle eggs or in any way molest, take or kill any turtle the shell of which is less than 18 inches in length. No person during the months of January, February, November, or December in any year shall in any way molest, take or kill any turtle of any size. This regulation shall not apply to turtles kept as pets or in aquaria.

(In addition Hirth (1) in his 1971 report recommended maximum size restrictions of 35 inches and proposed complete protection for the leather back turtle. His suggestions have never been enacted into law.)

Excellent though these regulations are on paper, they are not enforced, and (as noted by Bustart (2)) they are openly flouted. Moreover there is no way to enforce the regulations since there is only one part time fisheries inspector in the whole of Fiji and no police at all on any of the remote islands where turtles nest. Although no survey of turtle stocks has ever been carried out in Fiji, there is no doubt that the stocks have declined to the point where they now face imminent extinction.

#### Proposed Conservation Measures

The following ideas are put forward as practical steps towards the conservation of turtles:

(1) A program of public education

Simple clear information about turtles should be made available to all schools in the outer islands. It is suggested that, as a first step, an informative and eye-catching wall poster be produced. A comic strip format would probably be best since it would appeal particularly to children. Captions would be in

Radio broadcasts should be prepared both for schools (in "The World We Live In" series for classes 5-6 and the "Current Events" series for classes 7-8) and for adults in the "Rural Magazine" program (broadcast in all languages). Information on turtle conservation might be incorporated in the proposed "Archers" - type family drama educational serial.

(2) Collection of Basic Biological Data

An aerial survey of nesting beaches during the breeding season should be the ultimate objective of ecological research. Regrettably there seems little prospect of such work being carried out in the near future. However, many hundreds of turtles are bought and sold every year by the National Marketing Authority, yet no data of any kind are at present recorded. It is proposed therefore that a standardised system of data collection be instituted without delay in each of the main centres. It is proposed that this work be carried out by Fisheries Division market survey staff, under the guidance of Mr Michael Guinea of U.S.P.

(3) Egg Farming

Egg farming may be a means of augmenting turtle stocks. However, any decision about the value of such projects should await a scientific evaluation of the results of the egg farm now in operation in Western Samoa. A detailed report on this project by Mr W. Travis will be presented at the S.P.C. Turtle Workshop in November. The advice of turtle specialists will be sought at this time.

References

- (1) HINTON R.P. - "South Pacific Islands - Marine Turtle Resources" PI : SP/SOP/RSC/102/2 SAC, Rome 1971.
- (2) BUSTARD H.R. - "Turtles and an Iguana in Fiji" ORYZ (10) 1970 317-322.

M.P. Gentle

SPC Consultant Marine Biologist

29 August 1979



THE UNIVERSITY OF THE SOUTH PACIFIC

PROGRESS REPORT - MARINE TURTLE RESEARCH

1. INTRODUCTION

Following discussions with the Fisheries Officer of the South Pacific Commission, Mr. R.H. Baird, the author undertook to carry out aspects of research on marine turtles at the University of the South Pacific, in Fiji. The research programme was commenced in January, 1974.

It was agreed that the initial effort should be concentrated on the study of the factors affecting the growth of hatchlings and young turtles. The studies were to include aspects of diet, density factors, the effects of light, tolerances to reduced salinities (mainly for evaluating health problems and the minimum salinity required to inhibit fungal growth) and effective tagging of the smallest individuals.

The immediate problem was to obtain enough hatchlings to carry out the planned research programme.

2. EFFORTS TO OBTAIN EGGS, HATCHLINGS AND YOUNG TURTLES

2.1 In early January a trip was made to Mbeqa Island and to the shores of the adjacent island of Nanuku. Four days search for turtle nesting activities proved fruitless.

2.2. The Department of Fisheries was approached for assistance. Since the Fisheries boats and the personnel were largely involved in the hurricane Lottie relief work, they were unable to search for eggs and hatchlings.

2.3 The Chiefs of the villages in Yasawas, Kadavu, Koro and Tavuni Islands were approached by radio telephones. On 14th February a batch of 122 eggs obtained from a single nest in Yasawas was shipped to Lautoka. Although the eggs were packed in sand, they were distorted and damaged on arrival in Lautoka. They were transported via taxi to Nadi, thence flown to Nausori. From Nausori they were transported in a taxi to the laboratory at the University. In the laboratory the eggs were buried to a depth of 30cms in clean moist sand contained in a round plastic tank measuring 50cm in diameter. The top layer of sand was occasionally sprinkled with distilled water. The temperature of the "nest" was recorded daily with a thermometer permanently fixed in the sand. During the entire incubation period the temperature remained relatively constant at  $26 \pm 0.8^{\circ}\text{C}$ .

2.4 Visits were made to Qoma Island which lies 50 miles from Suva and  $\frac{1}{2}$  mile off the S.E. coast of Viti Levu. The fishermen were instructed to carefully collect only  $\frac{1}{2}$  the total number of eggs from each turtle nest and contact the University for transport arrangements. Two batches of eggs, each containing 145 and 70 eggs, respectively, were obtained from Qoma. They were transported in a boat ( $\frac{1}{2}$  mile journey) and then via road to the laboratory. The eggs were buried in sand in two separate containers, exactly the same as described earlier.

Two young Hawksbill turtles were also obtained from Qoma Island for observations in the laboratory.

3. RESULTS

3.1 Eggs from Yasawas:

These eggs failed to develop. There appeared to be no sign of embryo formation. The result was not too unexpected as the eggs had been distorted in transportation.

3.2 Eggs from Qoma:

The first batch of eggs (145) failed to develop.

The second batch of 70 eggs obtained in late February produced 3 successful hatchlings in early June. There were 4 other fully developed hatchlings which failed to emerge. Thus, from only a single batch the successful emergence was 4.3%.

3.3 Observations on Hatchlings

Species: Eretmochelys imbricata (Hawksbill)

Minimum incubation Period: 60 days

	<u>Date Born</u>	<u>Carapace</u> <u>Length (cm)</u>	<u>Carapace</u> <u>Width (cm)</u>	<u>Plastron</u> <u>Length (cm)</u>	<u>Weight</u> <u>(g)</u>
1	2.6.74	4.27	3.12	3.14	14.690
2	4.6.74	3.98	3.12	3.14	14.816
3	5.6.74	3.72	2.73	2.83	12.550
	Average	3.99	2.99	3.04	14.02

The hatchlings were placed in a small plastic tank measuring 40 x 30 x 20 cm through which there was continuous flow of fresh seawater. They were fed on small pieces of tuna twice a day. Each hatchling could consume approximately 5g of tuna flesh per day. All hatchlings commenced feeding within 3 days after emerging from the egg. An additional hatchling was caught floating in the sea to the South of Suva Harbour. It was also placed in the same tank.

Second Measurement

	<u>Date</u>	<u>Carapace Length (cm)</u>	<u>Carapace Width (cm)</u>	<u>Plastron Length (cm)</u>	<u>Weight (g)</u>
1	14.6.74	4.33	3.52	3.35	16.635
2		4.30	3.35	3.36	16.301
3		<u>3.92</u>	<u>2.80</u>	<u>3.00</u>	<u>13.615</u>
	Average	<u>4.18</u>	<u>3.22</u>	<u>3.24</u>	<u>15.517</u>
*4		4.84	3.90	4.00	23.217

Third Measurement

	<u>Date</u>	<u>Carapace Length (cm)</u>	<u>Carapace Width (cm)</u>	<u>Plastron Length (cm)</u>	<u>Weight (g)</u>
1	2.7.74	4.80	4.17	3.87	23.49
2		4.70	4.04	3.86	23.08
3		<u>4.16</u>	<u>3.39</u>	<u>3.35</u>	<u>15.34</u>
	Average	<u>4.55</u>	<u>3.87</u>	<u>3.69</u>	<u>20.64</u>
*4		5.35	4.64	4.45	30.68

Average Growth Rate of Three Hatchlings in One Month

Carapace Length	14.03%
Carapace Width	29.43%
Plastron Length	21.38%
Weight	47.22%

3.4 Observations on Adults

Species: Eretmochelys imbricata (Hawksbill)

The two adult turtles were maintained in a large plastic tank through which there was a continuous flow of fresh seawater. These individuals were presented with a variety of food to test their diet preferences. Then, they were fed entirely on tuna. Each individual consumed approximately 400g of tuna per day.

	<u>Food Presented</u>	<u>Food Acceptability</u>		
		Accepted	Not Accepted	'Liked'
1.	Cockle ( <u>Anadara</u> spp. - "Kaikoso")	+	-	+
2.	Surfclam ( <u>Latona</u> spp. - "Siqalo")	+	-	+
3.	Freshwater bivalve ( <u>Batissa</u> spp. - "Kai")	+	-	-
4.	Crab ( <u>Sesarma</u> spp. - "Kuka")	+	-	+
5.	Fish (several kinds)	+	-	+
6.	Minced beef (reject cat food)	+	-	+
7.	Ripe bananas	+	-	-
8.	Ripe banana skins	+	-	-
9.	Coconut meal	-	+	-
10.	Turtle grass ( <u>Syringodium isoetifolium</u> - "Vutia")	-	+	-
11.	Turtle grass ( <u>Halophila ovalis</u> - "Vutia")	+	-	-
12.	Mangrove leaves	-	+	-
13.	Freshwater weed ( <u>Hydrilla verticillata</u> )	-	+	-
14.	Water Lily ( <u>Ceratophyllum</u> spp.)	-	+	-

The above observations suggest that Hawksbill turtles prefer animal tissues, particularly of marine origin.

Measurements

<u>Date</u>	<u>Turtle No.</u>	<u>Carapace</u> <u>Length</u> cm	<u>Carapace</u> <u>Width</u> cm	<u>Head</u> <u>Length</u> cm	<u>Head</u> <u>Width</u> cm	<u>Plastron</u> <u>Length</u> cm	<u>Plastron</u> <u>Width</u> cm	<u>Wt.</u> kg
5.5.74	1	37.2	34.9	7.7	4.4	26.5	31.4	3.875
	2	34.6	31.2	7.6	4.2	25.3	28.0	3.075
5.7.74	1	38.1	35.6	7.9	5.6	27.7	32.0	4.250
	2	35.1	32.0	7.8	5.3	26.2	29.0	3.400
% increase	1	2.42	2.01	2.60	27.27	4.53	1.91	9.68
in 2 months	2	1.45	2.56	2.63	26.19	3.56	3.57	10.57
Average		<u>1.94</u>	<u>2.28%</u>	<u>2.62</u>	<u>26.73</u>	<u>4.04</u>	<u>2.74</u>	<u>10.13</u>

3.5 Observations on Stomach Contents of Five Green Turtles

Fresh and complete alimentary tracts of 5 green turtles (*Chelonia mydas*) were obtained from fishermen. The contents of each stomach were carefully emptied in a tray, separated into three following categories and weighed:

4/...

No.	Food Present (% Total Wet Weight)		
	<u>Syringodium</u> <u>isoetifolium</u>	<u>Halophila</u> <u>ovalis</u>	<u>Other</u>
1	95.4	2.1	2.9
2	1.4	98.0	0.6
3	88.6	5.2	6.2
4	80.0	1.2	18.8
5	52.0	46.6	1.4

These results indicate that the main foods in the diet of the green turtles caught near Nukulau Island (approximately  $1\frac{1}{2}$  miles from the University of the South Pacific) are the two common species of "turtle grass". In some parts of the sea surrounding the Nukulau Island Syringodium covers over 80 - 90% of the sea-bed. The average yield of syringodium in such areas is 5,800 kg/ha.

### 3.6. Other Observations

3.6.1. Visits were made to the Orchid Island tourist resort,  $1\frac{1}{2}$  miles from Suva, where four Hawksbills and ten green turtles are maintained for tourist shows. The Hawksbills are fed on fish and the green turtles are fed entirely on fresh mangrove leaves. The turtle run at Orchid island has existed for three years and the turtles of all sizes appeared to be in healthy condition.

3.6.2 Some Analyses of Turtle Food and Aquatic Plants of Potential Value in Turtle Culture

(measurements from single samples collected in late June)

<u>Material</u>	<u>Protein</u> % dry wt.	<u>Fat</u> % dry wt.	<u>*Calorific Value</u> k cal g <sup>-1</sup> dry wt (ash free)
1. <u>Syringodium isoetifolium</u> ("Vutia")	5.50	1.03	4.25
2. <u>Halophila ovalis</u> ("Vutia")	6.88	3.4	4.47
3. Edible marine alga-green ("Nama")	4.19	4.7	4.00
4. Edible marine alga-brown ("Lumi")	6.00	0.4	4.56
5. River weed ( <u>Hydrilla</u> <u>vorticillata</u> )	9.64	3.5	5.42
6.			

\*Average of two measurements.

(Dr.) Uday Raj,  
Lecturer in Biology

School of Natural Resources  
12th July, 1974.



Today's Fiji is a land of fascination. A land of friendliness – and excitement. A land of contrasts – ancient tradition still a living, throbbing reality, side by side with the comforts and luxuries of the international world of the seventies.

Fiji is the land of NOW. The past still lives, unspoiled. The present is peace and leisurely comfort. The future – a soft breeze on a distant horizon.

## Friendly. Fascinating. In the blue of the South Pacific.



Fresh, juicy sweet fruit, tree-ripened to perfection awaits your arrival in Fiji.

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**Merrily on the only free train service in the World.**

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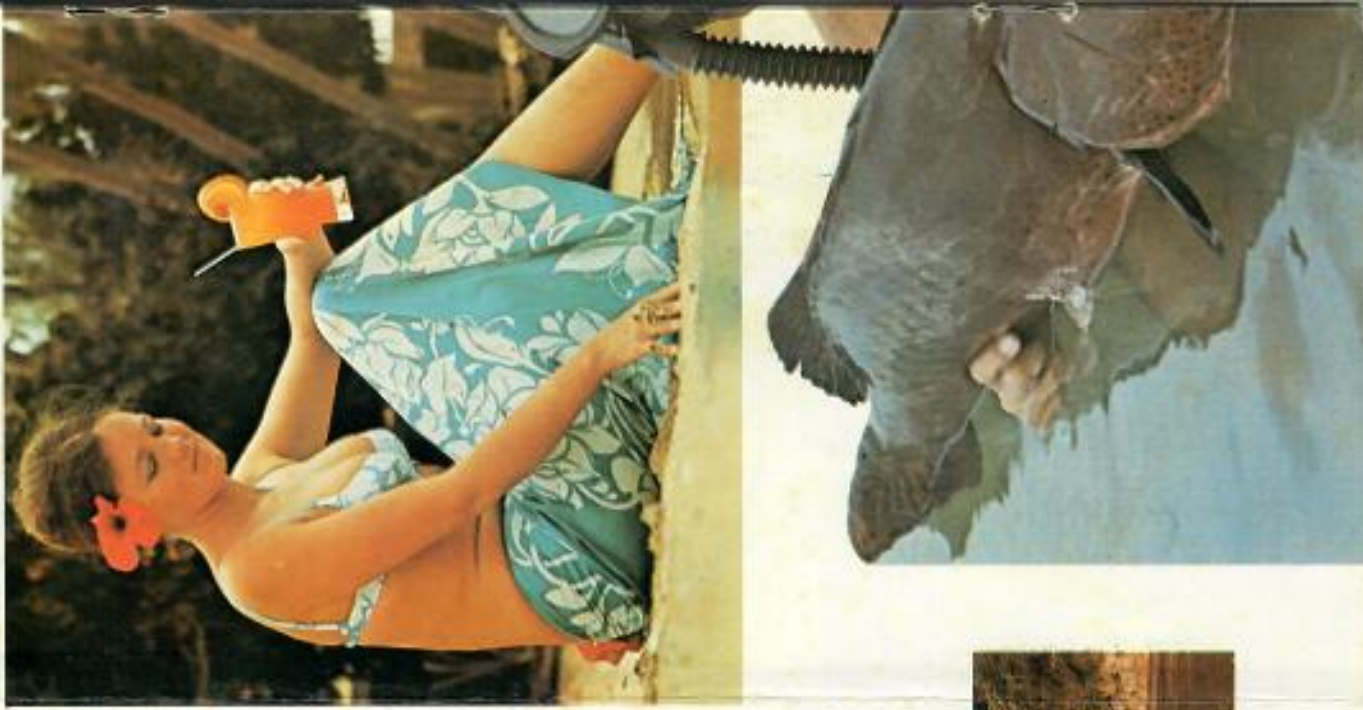
It runs from the townships of Sigatoka and Ba to Lautoka twice every week during the sugar cane crushing season from May through December. You chug-chug through peaceful sleepy villages and townships, across whispering cane fields and along the shores of hidden sandy bays . . . all for free.

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**Frolic in the warm waters of Fiji.**  
Fiji's blue lagoons invite you to come in and make a big splash anytime of the day or night. We've been washing our golden beaches twice a day, waiting for your visit.



Sail up rivers through dense tropical forests to some of Fiji's last untrampled places . . . discover friendly Fijian villages along the way.



Water skiing; skin-diving amongst colourful coral reefs; snorkling; spear fishing and deep sea fishing. Many world records were hooked in Fiji waters... The huge sail fish, black marlin, wahoo and giant groper are waiting just outside the reefs to test your skill and strength.



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One thing you must do when you're in Fiji... and that is, to purchase a souvenir or memento of your visit. Fiji has much to offer. Beautifully printed local fabrics in all the alive colours of the Pacific... and in local designs; flamboyant dresses; wood carvings; baskets; mats; seed and shell jewellery; silverware; masks; and 'tapa' (a local cloth made from the pounded bark of the mulberry tree).



We are pleased to support the Fiji Visitors Bureau

Shop where you see the Fiji Visitors Bureau sign.

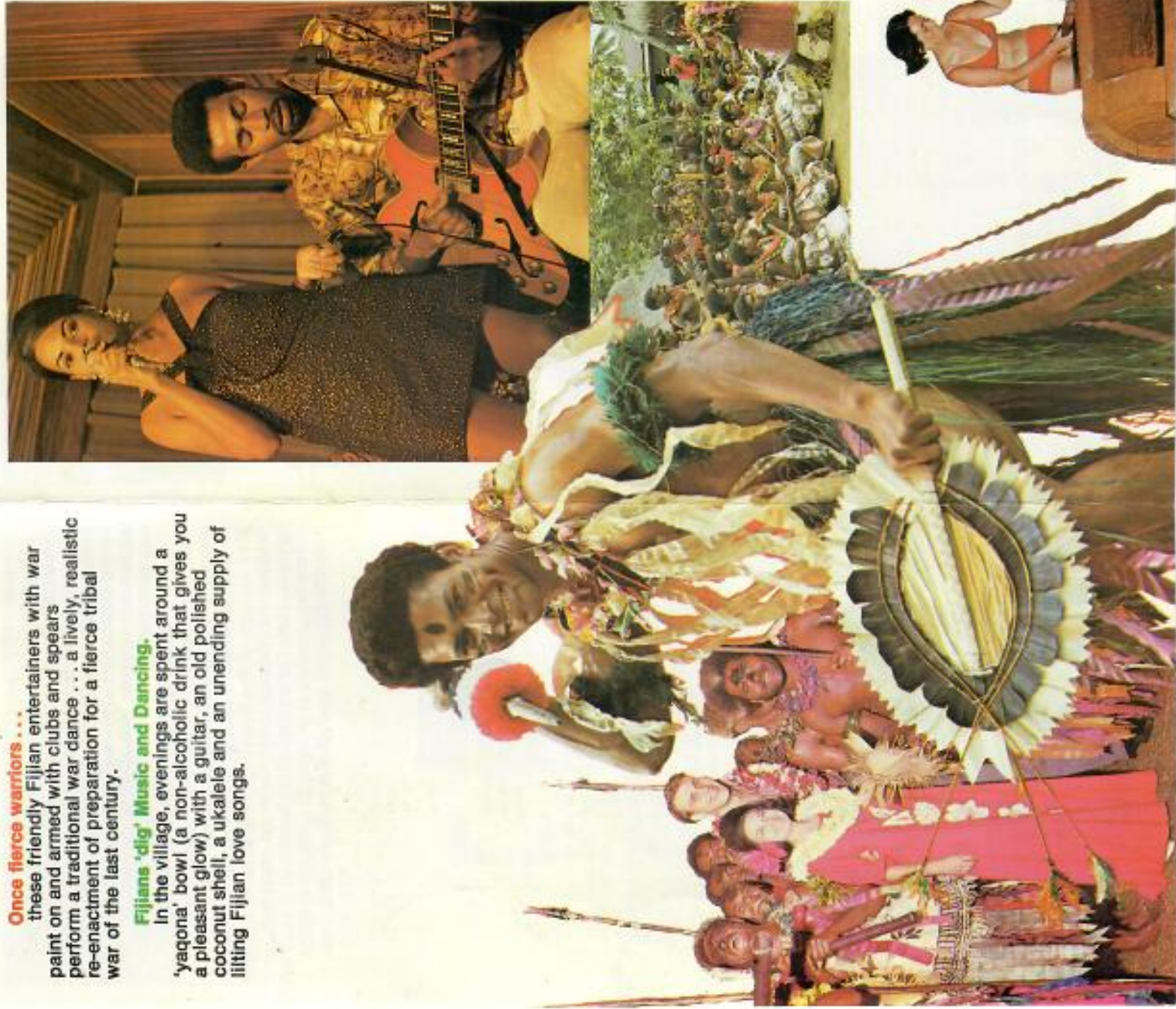
Sit and watch the fascinating ancient art of Masi-making by patient Fijian women. Masi is made from the pounded bark of the mulberry tree.



**Once fierce warriors . . .**  
these friendly Fijian entertainers with war paint on and armed with clubs and spears perform a traditional war dance . . . a lively, realistic re-enactment of preparation for a fierce tribal war of the last century.

**Fijians 'dig' Music and Dancing.**

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Colonial architecture is still preserved in some of the old buildings you'll see in Fiji.



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Although Fiji is now proudly an independent nation - it still retains much of the rich traditions of old British Colonial rule. The Changing Of The Guard and the Trooping Of The Colour are still carried out with the same colourful style of the old days.

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Fiji offers you a holiday that can't be measured in money - yet it costs so much less than many more popular holiday destinations.



Take a few hours to unwind – wrap the moods of Fiji around you and let them work their spell . . . you'll understand the joy of living like a Fijian.



**Fiji**-closer than you think..



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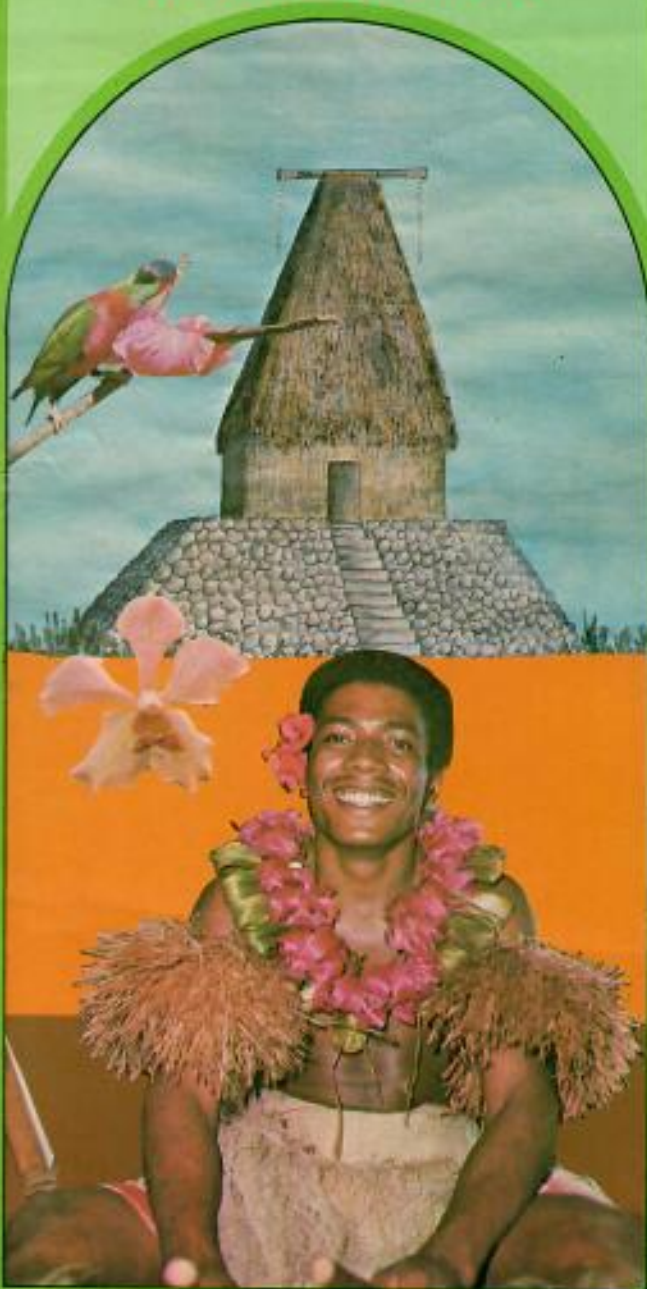


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# fiji on display

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Fiji's tropical climate supports hundreds of varieties of plants that even the most experienced gardener will envy.



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depicting Fiji's reef-life, rocks, timbers, history etc.

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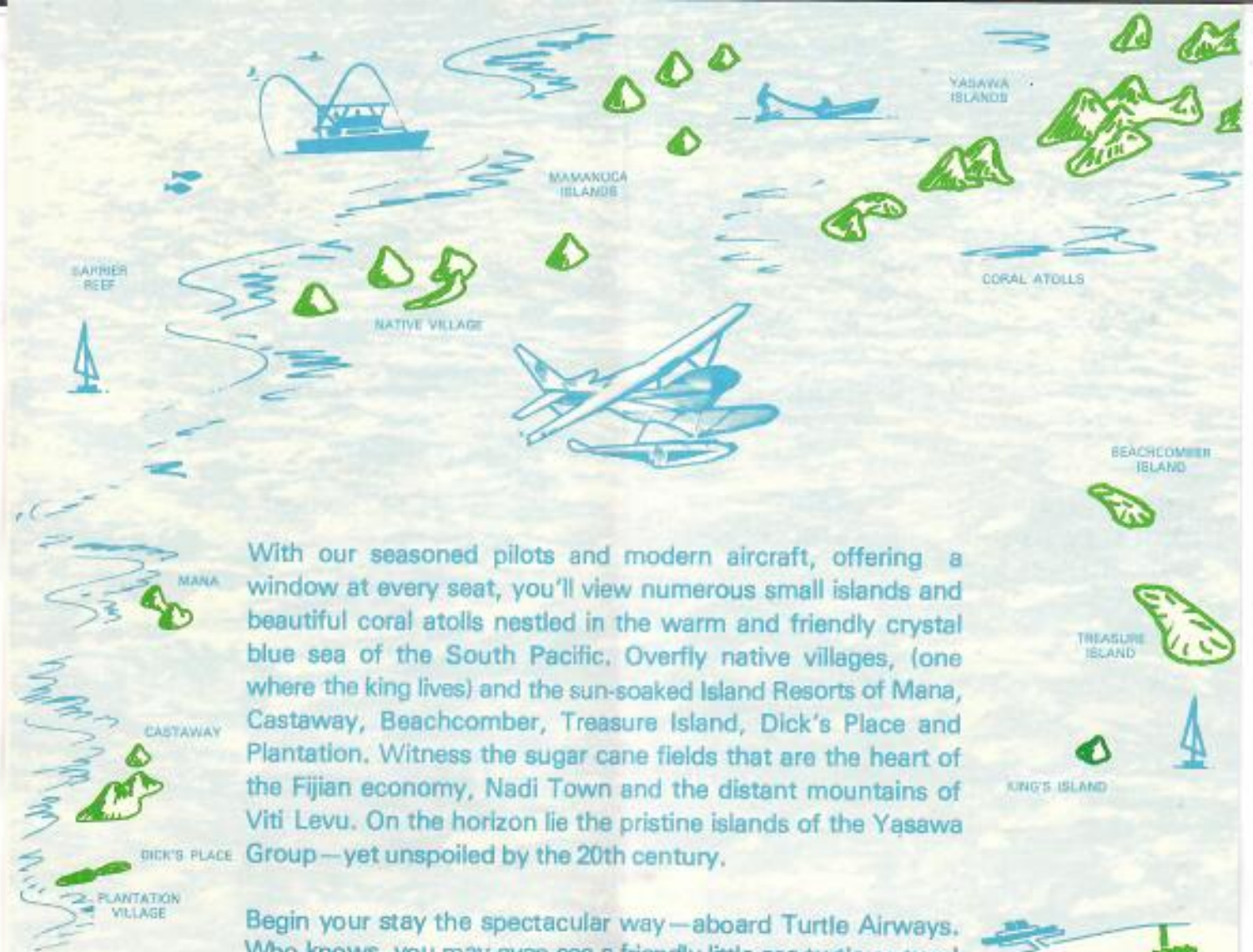
# turtle

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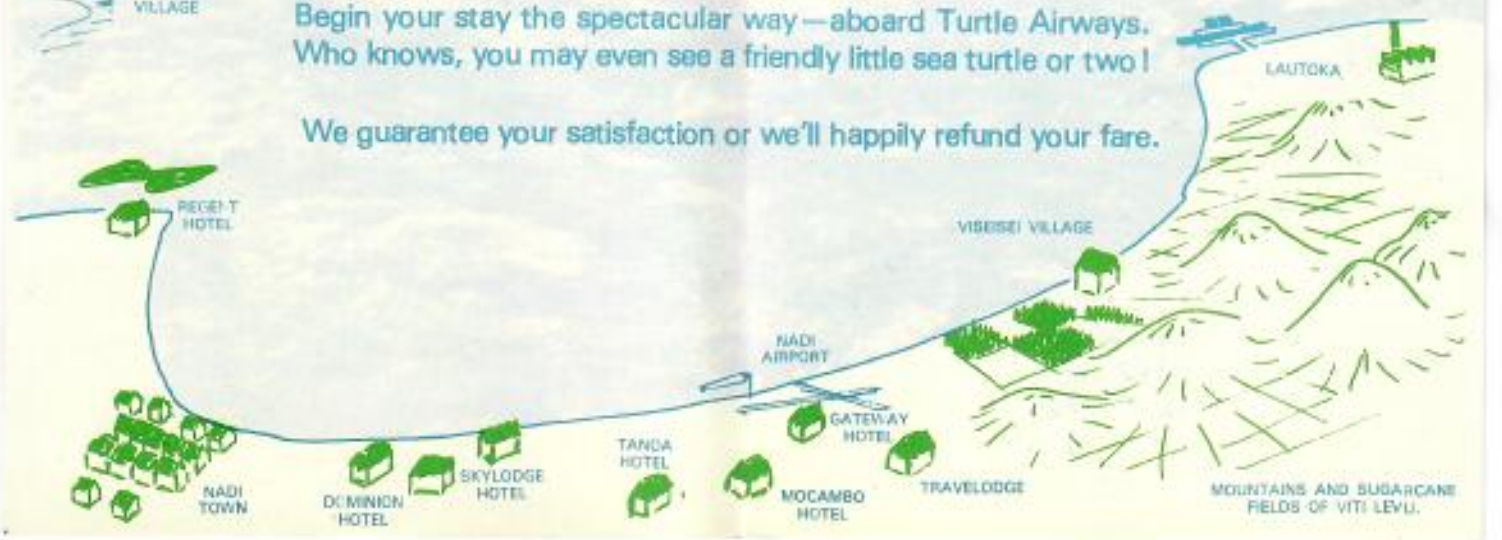
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# dive fiji

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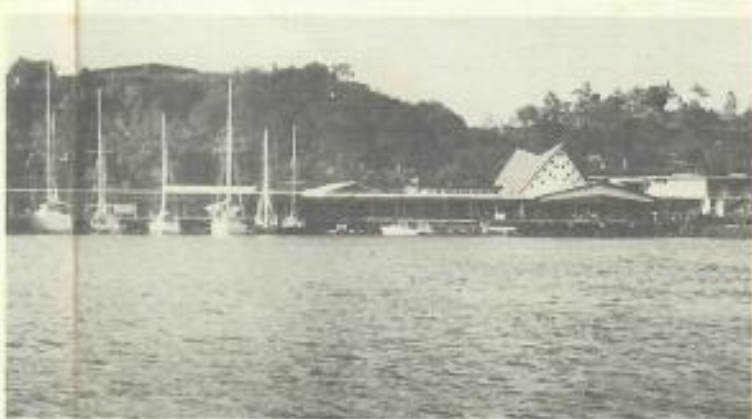


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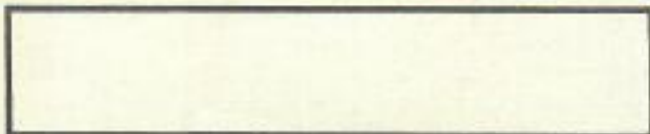
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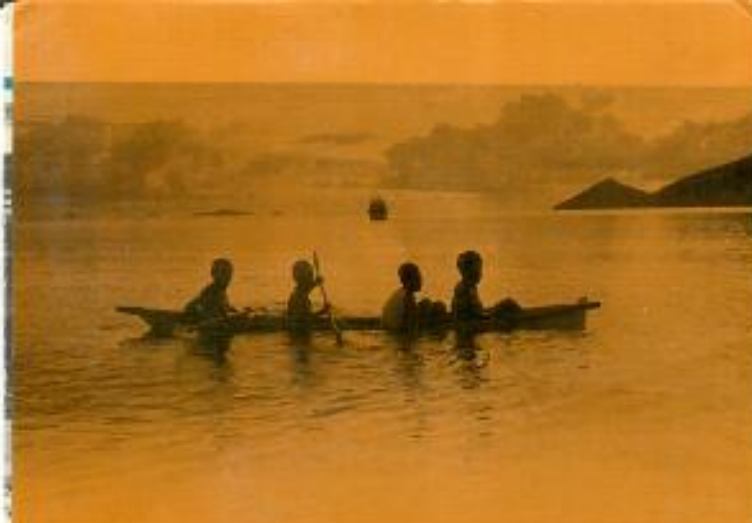
**THE TEAM:** Your skipper guides are Dave Evans and Tui Masi. Between them, these divers have more than a dozen years Scuba diving experience in Fiji waters. It should be enough to say that these men have the greatest available knowledge of Sport Diving in Fiji. Their experience is your guarantee of exciting and satisfying diving. Your hostess Lorraine Evans is also an ardent Scuba diver.



**THE WATERS:** Of Fiji, U.S. Skin Diver magazine says — "Beqa Barrier Reef was a veritable coral fantasia! One dive into this magnificent wonderland clearly illustrates why Fiji is rated as one of the top five dive spots in the world." And Beqa's reefs are just 60 minutes from Scubahire's Suva headquarters by fast dive boat! Visibility on Beqa's reefs is seldom less than 100 feet and often reaches 200 and more. When one considers that Fiji also boasts the largest variety of marine fish in the world, better conditions for Scuba diving and underwater photography could not be imagined.

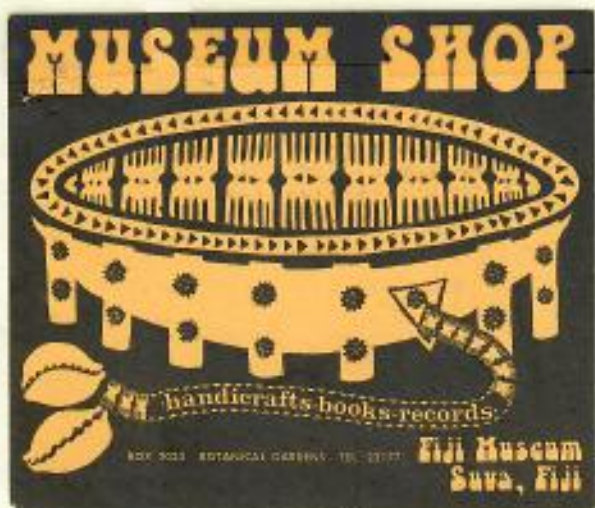
**THE BOATS:** Scubahire has three great boats designed and tuned for diving. "Bonito" is an 18ft halfcabin outboard-powered runabout—perfect for moving small parties to the best diving areas. "Sundowner" is the queen of Fiji dive boats. Her 27ft length and 10ft beam make for space aplenty for 24 tanks and 12 divers, while her 240bhp Chrysler gives her a top speed of over 30 knots. "Sundowner" may be equipped with a 7 cu ft min portable compressor and used as a mobile diving facility. Scubahire's long range cruising boat is Sta Reta, recently refitted for diving. She sleeps seven divers in comfort and can reach all Fiji's out-of-the-way diving spots. The Scubahire fleet of dive boats is without equal in the tropical South Pacific.





**THE SCENE:** 300 magnificent islands in the blue of the South Pacific — almost every one of them surrounded by glorious barrier reefs literally teeming with untouched fish and marine life! It's diving that you've just got to see to believe . . . Dive Fiji — with Scubahire!

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(over)  
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From JAMARC (Japan Marine Fishery Resource Research Center) No. 22,  
p. 11-18, February 1982.

**THE FISHERIES OF FIJI**  
(Fiji-koku no suisan jijo)

Tatsuhiko Iwasawa  
International Section, Marine Fisheries Division  
Japan Fisheries Agency, Tokyo, Japan

**INTRODUCTION**

Although rather unexpectedly, the author was able to spend some time in Fiji between August 9 and 25, 1981, as a member of the investigative team of Japan's Foreign Fishery Assistance Program. Taking advantage of this opportunity, the author visited the Fiji Government's fishery office in Suva, the South Pacific University, the Pacific Fishing Company, Limited, on Ovalu Island, the islands of Taveuni, Vanua Levu, etc., where various observations were made and information on fisheries was obtained.

The Fiji Government is pursuing a dynamic fishery promotion program based on a 5-year plan. There is a great deal of anticipation regarding fishery development, not only to broaden the economic base of the country, but also, to provide a source of valuable protein for its people. The following is a compilation of information on the fisheries of Fiji gathered during the brief visit.

1. General

The Fiji Archipelago is situated at lat. 15°-22°S, long. 174°E-177°W. The archipelago consists of 322 islands of volcanic and coral reef origin centered around the larger islands of Viti Levu (the capital city of Suva is located on this island), and Vanua Levu. The total area covered by the archipelago is 18,272 km<sup>2</sup> (about the size of Shikoku Island in Japan). The population in 1980 was 680,000, about half of which are of Indian descent and the other half, Fijian natives of Melanesian ethnicity.

The principal industry in Fiji is sugar production. However, there has been a very rapid development in the tourist industry in recent years

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Translated from the Japanese by Tamio Otsu for the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, Honolulu, Hawaii 96812, August 1982.

to make sugar and tourism the major industries today. Fiji has a negative trade balance with imports greater than exports. This basic deficit in the economy is made up through the assistance of such countries as England, Australia, and New Zealand. In 1979, Fiji's exports totaled £\$215 million. The principal exports consisted of sugar (70% of total exports), food products including fish (15%), coconut oil (7%), and gold (4%). The exports of sugar, coconut oil, and gold have peaked out in recent years, and in their place, tourism and fishery products are gaining on the economic ladder. The latter industries are being looked on with great expectation for further growth.

Fiji's economy is considered to be relatively good considering the generally depressed economy throughout the world. However, there is no room for excessive optimism since sugar, Fiji's principal product, is so greatly under the influence of the international market. The sugar situation can be considered highly unstable. In 1978, Fiji's gross national product (GNP) amounted to £\$729,900,000 or £\$1,202 (US\$9,619) per capita. This is considerably more than in any other country in the South Pacific.

In a discussion about Fiji, it is not possible to ignore that country's position among the various South Pacific nations. Of the approximately 20 South Pacific countries, Fiji's land area is smaller than Papua New Guinea, Solomons, and New Caledonia. In population size, Fiji falls short of Papua New Guinea. However, in terms of the GNP, government administration or in industrial specialization, Fiji holds a leading position. Fiji maintains a very close relationship with the British Commonwealth countries. On the international front, Fiji plays a very progressive role in the United Nations and elsewhere. Its international position can be seen in the role Fiji plays, along with Papua New Guinea, as the leader of the various island nations. This is also evident in the importance the Fiji Government places in maintaining a close, cooperative relationship with the authorities of the various island nations.

## 2. Fiji's fisheries

The primitive village system of community ownership is still practiced in Fiji today. Thus, fishery products fall under traditional village ownership to a considerable extent and it may be said that the monetary system has not yet fully penetrated all parts of the Fijian economy. Subsistence-type fisheries are predominant in Fiji. Fish and shellfish are taken mostly as a supplementary activity to agriculture and to satisfy the personal needs of the fishermen. If there is a surplus of fish, these are distributed among the village families. There are hardly any full-time fishermen, much less any system organized to distribute the catches.

The Fijians subsist largely on taro, tapioca, and rice as staples, augmented by meat, pork, chicken, vegetables, fish, and shellfish. Fish and shellfish are sold in the fish markets at relatively high prices and are regarded as "high-class" products. There is a strong demand for fishery products and considerable amounts of canned mackerel are imported from Japan as well as frozen fish from such places as New Zealand.

Table 1.--The annual fish landings in Fiji, by species, 1974-79 (FAO statistics).

		1974	1975	1976	1977	1978	1979
FUJ							
	TILAPIAS NEI	4	5	5	7	10	46
	MILKFISH	52	56	52	50	70	71
	DEMERAL PERCOMORPHS NEI	64	69	63	130	190	765
	GROUPERS NEI	140	150	139	246	355	683
	SNAPPERS	28	30	28	72	142	189
	PONYFISHES (=SLIPMOUTHS)	235	253	254	140	161	301
	LARGE EYE BREAMS	8	9	8	11	26	89
	EMPERORS (=SCAVENGERS)	958	1029	982	885	940	4143
	GOATFISHES	86	94	87	115	117	101
	WRASSES	20	20	25	40	110	89
	MOJARRAS (=SILVER-BIDDIES)	68	73	67	25	61	87
	SPINEFEET (=RABBITFISHES)	164	176	163	154	173	155
	SURGGERFISHES	132	141	131	54	314	314
	TRIGONFISHES	16	17	16	22	40	415
	HALIBEAKS NEI	184	197	182	111	93	192
	BARRACUDAS	176	189	174	253	302	1001
	MULLETS NEI	866	930	860	706	912	1630
	SILVERSIDES (=SAND SMELTS)	1	1	6	7	14	11
	JACKS, TREVALLIES	351	377	349	306	373	2483
	SARDINELLAS NEI	0	0	3	14	18	14
	SILVER-STRIPE ROUND HERRING	1	1	5	8	10	8
	SPOTTED HERRING	1	1	8	17	20	15
	"STOLEPHORUS" ANCHOVIES	1	1	5	18	20	15
	NARROW-BARRED KING MACKEREL	56	60	55	247	293	1135
	SKIPJACK TUNA	71	80	570	1555	1906	3374
	YELLOWFIN TUNA	12	11	74	151	540	361
	INDIAN MACKEREL	391	420	388	464	583	741
	MARINE FISHES NEI	20	30	20	190	311	917
	FRESHWATER CRUSTACEANS NEI	10	6	10	10	10	13
	MUD CRAB	181	108	168	100	33	42
	PANULIRID SPINY LOBSTERS NEI	2	4	4	4	3	1
	MARINE CRUSTACEANS NEI	50	30	28	45	44	38
	FRESHWATER MOLLUSCS NEI	60	161	206	1150	733	618
	ARK CLAMS	42	29	29	110	123	123
	OCTOPUSES NEI	8	5	10	12	5	4
	MARINE MOLLUSCS NEI	20	15	15	36	19	13
	GREEN TURTLE	45	36	42	40	13	10
	MARINE TURTLES NEI	0	0	1	1	3	1
	SEA-CUCUMBERS NEI	3	4	4	36	38	19
	TROCHUS SHELLS	266	169	255	274	182	170
	PEARL OYSTER SHELLS	15	10	10	17	20	23
	TOTAL	4800	4596	5451	7874	9176	30420

Unit: metric tons

According to FAO statistics, Fiji's fish landings in 1979 amounted to 20,420 tons, largely consisting of "emperors" [Lethrinidae], 4,143 tons; skipjack tuna [*Katsuwonus pelamis*], 3,374 tons; trevally [Carangidae], 2,483 tons; mullet [Mugilidae], 1,630 tons, etc. (Table 1). The fisheries of Fiji consist of 1) reef and lagoon fishing on unpowered boats or on outboard-powered boats, and 2) modern fishing operations outside of the reef for skipjack tuna by the pole-and-line fishing method. The latter venture is being carried out by a fishing company (a public corporation) established with 100% capitalization by the Fiji Government. According to fishery statistics compiled by the Government, the fish catches in 1979 totaled 20,483 tons, of which 16,988 tons were landed by the inshore fishery and 3,495 tons by the fishing company in offshore waters.

- (1) Inshore fishery. The fishing inside of the reef is a traditional operation carried out exclusively by Fijian natives. The fishing methods include gill net, throw net, and weir fishing, handlining, surface trolling, shellfish collecting, spearfishing, etc. The total catch in 1979 by these various inshore fishing methods amounted to an estimated 13,826 tons. The available data do not allow the separation of catches by fishing method.

In 1979, 1,008 fishing licenses were issued. There were 1,118 registered vessels, of which 261 were unpowered boats and 694 were boats powered by outboard motors. There were 2,338 fishermen.

Table 2.--Fiji's fish landings, 1976-79.

	Unit: tons			
	1976	1977	1978	1979
Total catch	7,721	8,775	9,895	20,483
Inshore fishery total catch (Used in <u>home consumption</u> )	7,004 (4,000)	7,064 (4,000)	7,370 (4,095)	16,988 (13,836)
Fishing company	717	1,711	2,525	3,495

Note: The 1979 values are the result of a special survey. The values differ considerably from the estimated values of earlier years.

As seen in the above table, a large proportion of the inshore catches is used for home consumption. A portion of the catch may be sold to the fish market by the fishermen. Also, sometimes the fish are displayed and sold on the roadsides. Crabs, shrimps, and other high-priced items are

frequently sold directly to hotels and first-class restaurants. The Market Authority, established by the Government, buys fish from the fishermen and resells them to consumers, thus serving as a mechanism to promote fish distribution. Government statistics show that in 1979 the various municipal fish markets sold a total of 1,750.76 tons of fishery products. Of these, 865.53 tons consisted of fish and 885.23 tons were fishery products other than fish. In addition, the hotels, restaurants, and nonmunicipal fish markets sold 1,235.92 tons of fishery products. The total of 2,986.68 tons sold to consumers amount to 22% of the 16,988 tons landed by the inshore fishery. The average price of fish at the various municipal markets in 1979 was £\$1.49 per kg. This was 4.9% higher than the average price of a year ago.

In 1979 the Fiji Government conducted a survey of the fishery situation in the various localities throughout the nation. The nation was divided into 12 subdivisions which included a total of 850 villages. Several villages were sampled in each of the subdivisions. Since the yearly catch by the inshore fishery had been averaging around 7,000 tons, this survey showed that there had been a tremendous growth in the fishery in 1979 as follows:

Average catch per village per day	79.83 kg
Average number of days fished per village per month	16.98 days
Average catch per village per year	16,266 kg
Total 1979 catch by all villages	13,829 tons

Fiji is an archipelago consisting of volcanic islands with mountains reaching a height of more than 1,300 m above sea level. The rainfall is substantial. Thus, there are many mountain streams and the quality of the water is good. Unfortunately, the Fijian fauna is extremely poor. There are relatively few species of freshwater fishes and they are not very abundant. Within a short distance of the coastline, the mountainous region makes passage inland very difficult. Therefore, the distribution of goods and materials, including fishery products, is virtually impossible. The people living away from the coast do not have an abundant supply of freshwater fishes, and they are also not within easy reach of a supply of marine fishery products. Thus, these people are not being provided with an adequate supply of animal protein.

- (2) Offshore fishery. Similar to other developing nations, Fiji's fishermen were unable to get into offshore fishing because they lacked the necessary capital to do so. In 1971-73, the UNDP/FAO carried out a fishery development survey and concluded that there is an abundance of skipjack tuna in the waters surrounding the Fiji Islands. The survey indicated that it would be feasible to establish a skipjack tuna fishery in Fiji. In 1975, the Fiji Government established the IKA Corporation.

In 1980-81, the IKA Corporation operated a total of 10 vessels (all skipjack tuna pole-and-line fishing vessels). Of these, five

vessels were chartered from the Hokoku Suisan Company of Japan and the remaining five were company-owned. In addition, the IKA Corporation owned the IKA No. 5, a skipjack tuna fishery research and training vessel provided by the Japanese Government without charge in 1979 (Table 3). The IKA No. 5 is contributing greatly towards the development of new skipjack tuna fishing grounds. In addition, the Japanese Government is dispatching fishery experts to assist IKA Corporation. There are presently about 40 Japanese and about 70 Fijian crew members on board the Hokoku Suisan vessels.

Table 3.--IKA Corporation's fishing effort (number of vessels) and fish catches, 1979-80 and 1980-81.

Season	1979-80	1980-81
Company-owned	5 vessels 1,177.4 tons	6 vessels about 2,000 tons
Chartered from Hokoku Suisan	3 vessels 2,318.4 tons	5 vessels about 3,500 tons
Total	8 vessels 3,495.8 tons	11 vessels about 5,500 tons

Note: One of the company-owned vessels is the IKA No. 5, a small research vessel received from Japan.

During the 1980-81 fishing season, the IKA Corporation's landings (mostly skipjack tuna) amounted to about 5,500 tons. Of these, the Hokoku Suisan vessels caught about 3,500 tons and IKA No. 5 about 1,000 tons. Although the Fijian fishermen are gradually becoming more skillful at pole-and-line fishing, they are still far from being accomplished fishermen. The Fijians are especially in need of training in engine maintenance and repairs. As it is, there are very many days when the vessels are unable to go to sea because of engine trouble. The vessel operating efficiency is thus quite poor.

The peak fishing season for skipjack tuna in Fijian waters is from November through July. The IKA Corporation is utilizing the IKA No. 5 to look for new fishing grounds with the objective of establishing year-round operations. Fortunately, there is a plentiful supply of baitfishes in various parts of the Fiji Archipelago. All of the present vessels are able to procure an ample supply of baitfishes before each fishing trip. According to the fishery specialist in Fiji, the skipjack tuna resource in Fijian waters is sufficient to allow a doubling of the present catch to around 10,000 tons per year.

The skipjack tuna fishery is expected to contribute much more to Fiji's economy. For the fishery to grow, there must be a growth in fishing effort. More vessels are needed and this means more fishermen. There are now large numbers of men who are interested in employment in the fishery, and these men can help in the growth of the fishery. Including the tuna cannery, the fishery will provide increased employment opportunities. The canned fish produced in Fiji can be exported to improve Fiji's trade balance.

Operating closely with IKA Corporation is Fiji's single large fish processing company known as the Pacific Fishing Company, Limited (hereafter referred to as PAFCO). PAFCO was established in 1963 through joint investment by C. Itoh Company (a trading company) with a 60.9% investment, Nichiryō (10.15%), Fiji Government (25%), PATTERSON (3.95%), for a total capitalization of £\$1,800,000 (¥701,028,000). PAFCO owns a 7,000-ton freezer, a tuna cannery with a production capacity of 600,000 cases per year, etc.

PAFCO's presence makes Fiji one of the prominent fishery bases in the South Pacific along with American Samoa and Tahiti. PAFCO is the exclusive buyer of skipjack tuna (and other species) from the IKA Corporation vessels. Most of the fish from the IKA Corporation are used in canning. The company also contracts Taiwan and Korean tuna longline vessels for their catches of yellowfin tuna [Thunnus albacares], albacore [T. alalunga], etc. The longline-caught fish are mostly canned but some are exported frozen to Japan and to other countries.

According to the 1979 statistics, there were from 23 to 29 Taiwan tuna longline vessels under contract to PAFCO each month. In addition, there were four Korean longline vessels and from one to nine IKA Corporation skipjack tuna pole-and-line vessels under contract. The deliveries by these vessels in 1979 were as follows: Taiwan vessels delivered 2,719 tons, Korean vessels 856 tons, and IKA Corporation, 3,495 tons, for a total of 7,070 tons. By species, there were 2,470 tons of albacore, 1,009 tons of yellowfin tuna, 298 tons of bigeye tuna, 3,495 tons of skipjack tuna, and some miscellaneous species. In 1979 PAFCO produced 547,656 cases of canned tuna [including skipjack tuna], and sold 502,163 cases for revenues of £\$10,540,000. Of the total sold, 496,100 cases were exported to England, Canada, etc., and the remainder was used for domestic consumption. In addition, PAFCO produced 676 tons of fish meal (about £\$229,000) and 43 tons of fish oil.

Of the fish delivered to PAFCO, there were 1,346 tons of fish (valued at £\$1,162,000) which were not used in canning. This included 814 tons of yellowfin tuna (valued at £\$823,000). These fish were exported frozen to the United States and Japan.

The operations of the IKA Corporation and PAFCO, which generated revenues of £\$11,550,000, are not only important in providing considerable revenues (through export of canned tuna, etc.), which places the fishing industry right behind sugar and gold, but they are also of vital importance to the general economy of Fiji by providing employment (197 at IKA

Corporation, 250-350 at PAFCO, plus 100 temporary workers) to the people of Fiji.

(3) Fiji's trade in fishery products. As mentioned earlier, Fiji's 1979 exports of fishery products included 496,100 cases of canned tuna (valued at £\$10,439,000), and 1,346 tons of frozen tuna (valued at £\$1,162,000). In addition, there were shellfish (189 tons, £\$215,000), shark fins (32 tons, £\$283,000), and other products to bring the total to £\$12,241,000. Furthermore, most of the shellfish were exported to Japan.

The 1977 exports of fishery products totaled 10,572 tons, valued at £\$9,877,000. Of the imports, the most important items were canned and frozen fish. Canned fish amounted to 5,678 tons (£\$4,170,000) and this included 4,073 tons of canned mackerel from Japan. Since Fiji's consumption of fishery products is estimated at 24,000 tons per year, this amount of canned fish comprises 24% of the total consumption. The imports of frozen and refrigerated fish amounted to 4,774 tons (£\$5,154,000). Most of these came from New Zealand, the United States, and a few other countries and included inshore fishes, oysters, shrimps, etc., in response to domestic demand. Fiji is also importing saury [Cololabis saira] from Japan but these are probably being used as bait for tuna longlining. Furthermore, all fish purchased by PAFCO from Korean and Taiwan longline vessels are considered among the imports, and this amounted to 3,575 tons in 1979.

### 3. Policy against outside fishing.

According to the Marine Space Act of 1977, the coral reefs that are widely distributed throughout the archipelago, are included within the "internal waters" of Fiji. Furthermore, the line joining the outer coasts of all the islands in the archipelago is considered the base line (Figure 1). The waters surrounded by the base line are "archipelago waters." The waters outside of the base line and extending 12 miles out are the "territorial waters." Furthermore, the 200-mile zone is considered the Exclusive Economic Zone (EEZ). According to this law, Fiji's fishery zone contains the EEZ, the territorial waters, the archipelago waters, and the internal waters.

The 200-mile EEZ is still not being enforced because of boundary problems with neighboring nations, but these problems are expected to be resolved within the very near future. Regarding the total allowable catch from within the 200-mile EEZ, the Government has declared that any part of it that cannot be taken by domestic vessels will be considered "allowable catch by foreign vessels." As for the skipjack tuna resource, the 1980-81 catch of skipjack tuna by Fijian vessels amounted to approximately 5,500 tons. The Government has estimated the potential catch of skipjack tuna as 10,000 tons per year. Thus, the Government's policy is to allow foreign fishing for skipjack tuna. However, the Government has decided to impose a condition that the catches be landed in Fiji.

New Zealand's Pacific Nelson Fishing Company has purse seine vessels surveying Fijian waters as possible fishing grounds. In 1980, one seiner



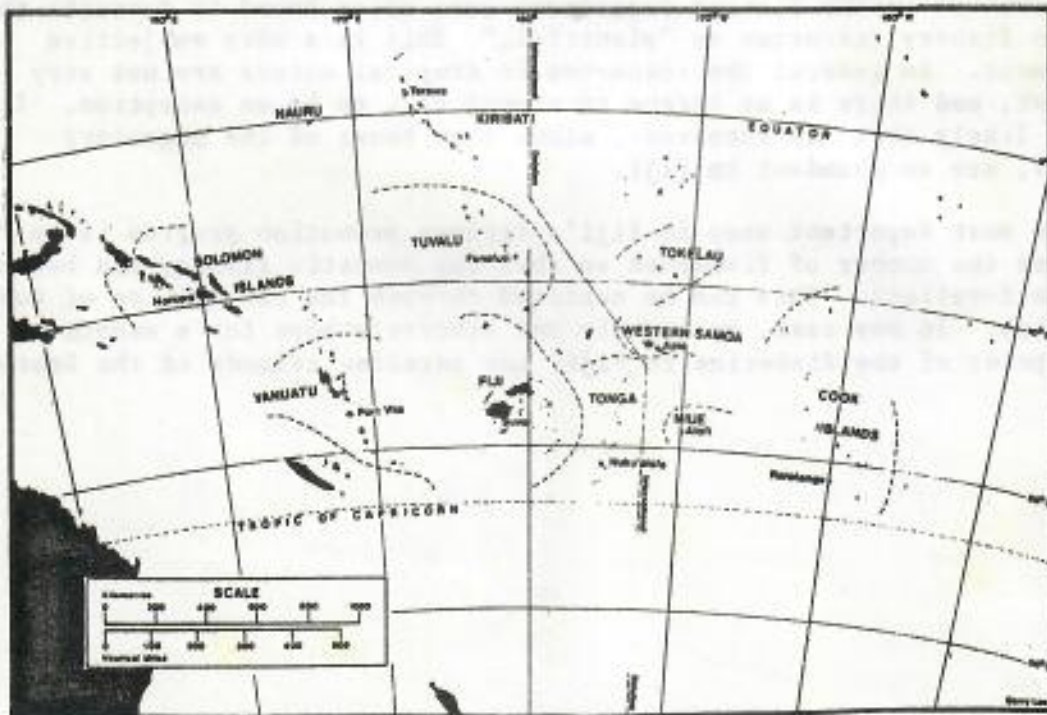
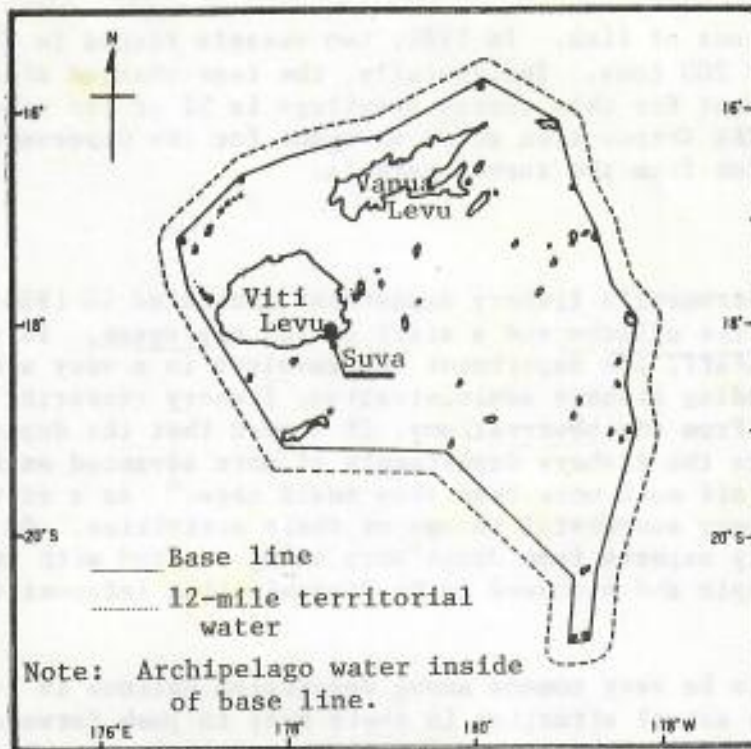


Figure 1.--The Fiji Islands.

caught only 57 tons of fish. In 1981, two vessels fished in June and July and caught about 200 tons. Incidentally, the fees charged these vessels by the Fiji Government for this survey privilege is 5% of the value of the landings. The IKA Corporation acted as agent for the Government and collected the fees from the survey vessels.

#### 4. Conclusion

The Fiji Government's fishery department consisted in 1980 of the principal fisheries officer and a staff of 105 employees. In spite of the rather limited staff, the department was involved in a very wide array of activities including fishery administration, fishery research, fishermen training, etc. From our observations, it seemed that the department was trying to emulate the fishery departments of more advanced nations and was trying to "bite off much more than they could chew." As a result, they were not being very successful in any of their activities. On the other hand, the fishery experts from Japan were being treated with utmost respect by the local people and appeared to be disseminating information very effectively.

What seems to be very common among developing nations is for the people to "misread" the actual situation in their zeal to push forward. What is particularly bothersome about the situation in Fiji is the assessment of the fishery resources by the staff of the fishery department. For example, staff members of the fishery department were often heard to describe their inshore fishery resources as "plentiful." This is a very subjective assessment. In general the resources in tropical waters are not very abundant, and there is no reason to expect Fiji to be an exception. It is hardly likely that the resources, other than those of the migratory species, are so abundant in Fiji.

The most important step in Fiji's fishery promotion program is to increase the number of fishermen so that the domestic fishery can become more self-reliant. This can be achieved through the cooperation of foreign countries. In any case, we eagerly and sincerely hope for a smooth development of the fisheries in Fiji, the paradise islands of the South.

Find enclosed copy of the recommendations of the Ninth Technical Meeting on Fisheries.

6. REPORT BY FAO/UNDP REGIONAL FISHERIES CO-ORDINATOR

The FAO/UNDP Regional Fisheries Co-ordinator presented a report on his past years' activities. He said the Food and Agriculture Organization would consider financial technical assistance in setting up and operating a South Pacific agency. He also described the new FAO Technical Co-operation Programme. This Programme, available only to FAO countries, funds small-scale, quick action programmes limited to less than a year in duration, a financial ceiling of \$250,000.

The World Bank had recently announced that it would also consider financing small-scale fishery programmes.

Progress on the three FAO/UNDP projects in the region was discussed. The Meeting expressed satisfaction at the progress made and passed the following recommendation:

Recommendation No.

The Meeting recognizes the valuable services being provided by UNDP/FAO at the country and regional level for fisheries development in the region and recommends such support be continued to the greatest extent possible.

7. INSHORE RESOURCES AND THEIR CONSERVATION

7.1 Marine turtles

The Meeting reviewed the work of the SPC Turtle Project and turtle programmes elsewhere in the region and recognized that turtles constitute a most valuable resource in the Pacific. Their cultural, as well as dietary, importance was emphasized and the need for informed management of this resource stressed. The SPC turtle farming project had indicated large difficulties in small-scale turtle farming due to disease and feed problems. As yet there was no conclusive data on the value of collecting eggs and rearing hatchlings for a few months before

7. INSHORE RESOURCES AND THEIR CONSERVATION

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and methods of managing the five species at local and regional level in relation to achievable objectives.

The following recommendations were passed:

Recommendation No.

As the SPC turtle project had identified the difficulties in small-scale turtle farming, this project should cease once present experiments are completed and the data compiled for publication. The Bibliography on turtles in the Pacific and the Handbook on turtles presently under preparation should also be completed.

Recommendation No.

In view of the need for urgent and informed management of marine turtles, the Meeting recommends that:

- 1) The South Pacific Commission should find means to fund an expert to review available data on turtle biology and population dynamics in the region and to identify achievable management objectives and to develop strategies to achieve these objectives for discussion at the earliest appropriate SPC Fisheries Technical Meeting.
- 2) The South Pacific Commission should keep member countries informed on turtle management and farming activities elsewhere.
- 3) No further small-scale projects to rear turtles to market size should be set up in the region but local managed and conservation programmes in individual countries should be encouraged.

Recommendation No.

The South Pacific Commission should compile a list of turtle marking projects within the region and the marks and tags used and distribute this widely in the Pacific.

RECEIVED 23 Feb. 81

CK. ORDERED 25 Feb. 81

MAP PINNED                     

RECORDED                     

CK. MAILED 29 Mar 81

Proj Leader 25 Feb. 81

Ratchliffe

Mukuru Village? South of Vatoa

Ono lau

Island.

Ono-i-lau  
~ 20°S 178°30'W

Fiji Island.

27 January 1981.

5/4/81: Records cannot be located.  
See letter 4/6/81 from Jack Lee.

Peace Corps  
254-6950

THE

Dept of Biol. U.S.  
Crainville  
U.S.A.

green, hawk or?

Sir,

Due to No. 1755 attach to a

medium size turtle, I am very pleased  
to inform you that the turtle was caught  
by fisherman on my island on  
<sup>Dec 25, 1980</sup>  
Christmas Day. My island is 200 miles from  
Suva, the capital city of Fiji Island.

Yours faithfully,

Asaeli Ball.

Amne -

Returned tag? Condition?  
Corroded?

find current whereabouts

of Zookie & Braley

Willinson?

February 25, 1981

Mr. Clifford Ratcliffe  
Principal Fisheries Officer  
Department of Agriculture  
P.O. Box 14  
Nuku'alofa, Tongatapu  
Kingdom of Tonga  
South Pacific

Dear Mr. Ratcliffe:

Our office has recently received the enclosed letter from Fiji reporting the recapture of a sea turtle bearing tag #T755. This tag was one of one hundred sent to the Department of Agriculture in Tonga in 1973 by Dr. Archie Carr of the University of Florida. At that time, Dr. Carr was corresponding with Mr. Richard Braley, a Peace Corps Volunteer. Subsequent correspondence about the project was exchanged with Mr. William Zochie, also a Peace Corps Volunteer. We received tagging records for tags T701, T702, T704, T706, and T774, but we have no information on that tag reported above (T755). We would like to confirm that this tag was used on Tonga, and to learn the particulars relating to the tagging (date, sex and species of turtle, data and place tagged, date and place released). We would be interested to learn if the turtle was originally tagged on a nesting beach or at sea, and if it was held in captivity for any period prior to release. We will be sending a reward check to the man in Fiji who reported the capture and we would like to be able to give him this information about the turtle.

It would greatly expedite the handling of future returns if we could have a copy of the tagging records for any tags in the series T701-T800. If any additional recaptures are reported to us we will immediately send copies of the letters to your office.

In the report of the Noumea, Caledonia, SPC Sea Turtle Meeting held in December 1979, I read of Tonga's plans to carry out extensive surveys of nesting beaches in the area. We would be very interested to learn of the results of these surveys as we are seriously concerned about the survival of the hawksbill turtle, *Eretmochelys imbricata*, throughout the tropics.

Thank you very much for your kind cooperation. We will look forward to hearing from you.

Sincerely yours,

Anne Meylan  
Research Assistant to Dr. Archie Carr

AM:lw

Telegrams: AGRICULTURE NUKU'ALOFA

All letters to be addressed  
THE DIRECTOR OF AGRICULTURE



Department of Agriculture,  
P.O. Box 14,  
Nuku'alofa,  
Kingdom of Tonga.

Our Reference 4002/F2/12/V1

6 April 1981

*Tonga  
tagging  
records*

Anne Meylan  
Department of Zoology  
223 Bartram Hall  
University of Florida  
Gainesville FLORIDA 32611  
U S A

Dear Ms Meylan

I'm sorry to say that I could not find any record of a turtle tagged with \*T755 in Tonga. The tag may have been used during the time Richard Braley and William Zoochie were here in Tonga, but I cannot say for certain. Below is a list of turtles we've tagged since 2 February 1980. All of the turtles were caught in a Japanese trap net set near an adjacent island, one and one-half miles north of Nuku'alofa.

<u>Date</u>	<u>Type</u>	<u>Length</u>	<u>Width</u>	<u>Tag No.</u>
17 Feb. 80	Hawksbill	43.5	36.9	760
26 Mar. 80	"	48.0	43.0	769
1 April 80	"	80.0	65.0	773
13 May 80	"	48.0	41.4	770
13 May 80	"	74.9	62.9	768
21 Nov. 80	"	-	-	762
6 June 80	"	45.5	38.5	766
13 Nov. 80	"	44.0	39.0	798
25 Nov. 80	"	40.0	49.0	767
10 March 81	Green	-	-	793
30 March 81	Green	-	-	800

*note  
751-59  
not  
here*

*Case No. 4/3/81*

Regarding the plans for the survey of nesting areas, as far as I know, it was never realised due to lack of funds and manpower.

Yours sincerely

Jack Lee  
Fisheries Biologist  
for Cliff Ratcliffe  
Principal Fisheries Officer





DEPARTMENT OF AGRICULTURE,  
NUKU'ALOFA, TONGA.

Ref. No.: - 4109/r2/12/v1.

17 January 1974

Dr. Archie Carr,  
Department of Zoology,  
College of Arts & Sciences,  
University of Florida,  
Gainesville, Florida 32601,  
U. S. A.

Dear Professor Carr,

The Tonga Fisheries division began conducting a sea turtle survey starting the last week of November, 1973. Four groups were sent to various areas of the Vava'u and Ha'apai island groups where there are allegedly turtle nesting islands. An average of three weeks were spent by each group and some began as late as mid-December so the last person just returned about 1 week ago.

Unfortunately, most of the 35 islands which many fishermen named as nesting islands apparently rarely have turtles nest anymore. Despite the paper and ink protection of turtles and eggs during December and January the people living those island group take all they can find. The few nests seen were invariably dug up and eggs taken. Our division is very young and doesn't have the money nor means to try and enforce these basic regulations.

We know hawksbills nest in Tonga because in January 1972 a nest was transplanted from Ha'apai to the marine lab here and the hatchling hawksbills raised for several months before release. We now know green turtles nest here as well because two were tagged after nesting in central Ha'apai and a third was confiscated after she was speared late afternoon coming inside the reef during a high tide and full moon - possibly to nest. It was a meat wound and therefore she lost little blood and showed no signs of weakness after six hours so was tagged and released.

...

Enclosed are the tag data sheets for your records.

I must also inform you that one of the survey groups lost all their tags. They are afraid they may have been taken by someone. The tag numbers were T 726 - T 750 so you know in the case that someone thinks they can try and "cash in".

It appears that there are only two or three islands in the Ha'apai group that are still fair nesting islands, so I believe we should now concentrate our efforts on those.

I will write to you again when I can get all the survey information together.

Best regards!

*Rich Braley*

Rich Braley - P.C.V.  
Fisheries  
Department of Agriculture

Encl.

RB/tk.

AGRICULTURE NUKU'ALOFA

Letters to be addressed  
THE DIRECTOR OF AGRICULTURE



Department of Agriculture,  
P.O. Box 14,  
Nuku'alofa,  
Kingdom of Tonga.

14th June, 1973.

Our Reference 2947/F2/V5

Dr. Archie Carr,  
Dept. of Zoology,  
College of Arts and Sciences,  
University of Florida,  
Gainesville, Florida 32601,  
U.S.A.

Dear Professor Carr,

I am a Peace Corps Volunteer in Marine Biology here in Tonga. I am carrying on the work begun by the first two Marine Biologists, William and Janet Mauck. Unfortunately they had to leave Tonga in the middle of their work because of sickness. Little has been done since they left one year ago.

One project they were working on was with sea turtles (Eretmochelys imbricata in particular). You may have received a letter from them in 1971 so you may have some idea of the turtle situation in Tonga, I just returned from a Fisheries Survey to the Ha'apai Island group (about 80 small coral islands, only 17 of these inhabited). While there collecting fisheries data and specimens I also got information from all the fishermen we talked with about sea turtles. There are 20 islands which appear to be the best nesting islands and nesting occurs from as early as October through January. However, everyone told me December was the main month and most said nesting was pretty sparse in the other months.

The Maucks believed that only the hawksbill nested in Tonga from information they obtained from fishermen on one or two islands in Ha'apai. Several fishermen on different islands told me they have seen (not just heard it or think it to be so) green turtles nest on two or three of these 20 islands along with hawksbills (which supposedly rest at all 20 islands. Green turtles seem to be the most commonly caught in Tonga (from my observation), although the fishermen in Ha'apai say hawksbills are just as common there.

Tongans have 10 names for sea turtles so by asking various characteristics of each name it appears to me that three sea turtles are in Tonga - the hawksbill, the green turtle and the loggerhead. Some of the names apparently were for male and female as well as different color variations and/or sizes.

In December I would like to do a survey of these 20 islands to determine the approximate population of turtles as well as tagging and taking standard measurements. I may get four groups of people to cover 5 islands each during December. I can persuade the Government of Tonga to set aside these 20 islands for December and January. Enforcement will be difficult because of the very presence of the people doing the turtle survey which is somewhat of a deterrent to poaching.

T-701-T-800  
7 pr. pliers

I would also like to raise some young turtles here at the Marine Lab on Tongatapu, mostly for growth rate and feeding information. The Maucks had a small turtle hatchery here in December - April 1971-1972 until they had to leave because of sickness.

If you could send us some turtle tags it would be greatly appreciated as well as any information you feel would be helpful.

Thank you and I'm anxiously waiting to hear from you.

Your's respectfully,  
*Richard Braley*

Richard Braley  
Fisheries Department  
for Director of Agriculture.

RB/mac.

**BY AIR MAIL**

**AEROGRAMME**

If anything is enclosed,  
this form will be surcharged  
at rate for Air Mail Letters.

Dr. Archie Carr,

Dept. of Zoology,

College of Arts and Sciences,

University of Florida,

Gainesville, Florida 32601,

U.S.A.

SENDER'S NAME

AND ADDRESS



← To open cut here

To open cut here →

May 12, 1975  
Nuku'alofa, Tongatapu  
Kingdom of Tonga

Professor Archie Carr  
Department of Zoology  
College of Arts and Sciences  
University of Florida

Dear Professor Carr,

To my knowledge this should represent the third "I am a Peace Corps Volunteer working in Tonga" letter you have received. My name is William R. Zoochie Jr. My main responsibilities in Tonga are public education concerning the work of the Fisheries Division of the Department of Agriculture of Tonga and conservation work concerning marine turtles in the Kingdom of Tonga. It is of course the latter responsibility which provides the basis for this letter.

More particularly the purpose of this letter is to inform you of the tagging of two specimens of Eretmochelys imbricata. Both of the specimens were tagged and released on April 4, 1975. The long delay in sending this information was due to my desire to complete my report concerning the marine turtle research carried out in Tonga from December of 1974 through February of this year and to send a copy of that report together with the tag data. However, as of today I am only beginning recovery from a mosquito-transmitted viral disease which has had me bedridden for the past ten days. I therefore decided to send the tag data now before any further lapse of time and send a copy of my report at such time as I am able to complete it.

Without further useless rambling I will provide a bit of background information concerning the two Hawksbills. Both individuals were caught in a local, reef-flats, fish trap. According to the owner they were caught sometime in August of 1974. The owner kept them in stated trap until April 3, 1975 when he permitted me, acting for the Fisheries Division, to remove them for the purpose of tagging and release. A short news article with accompanying photograph was published in an effort to utilize the enlightened action of the fish trap owner as a means of public education concerning the conservation of marine turtles. Further specifics are entered on the separate tag data sheets.

Before closing, I would like to mention two other related points. First, Rich Braley with whom you have corresponded in the past, expressed the opinion that you wanted the turtle tags used only in the tagging of nesting females. I stated in reply that any turtle capable of being tagged should be tagged; basing my opinion in large part on your own statements about tagging in So Excellent A Fish. In any regard, please inform me as to what, if any, restrictions you desire in the use of the tags.

The second point I would like to raise before closing concerns the tags themselves. Namely, the fact that some have apparently been lost and many others damaged to the point of possibly being unusable. I first became aware of the situation concerning the tags when I inquired as to their whereabouts in November of 1974. I needed them for my upcoming survey work in December of 1974. As it turned out they were literally scattered about both the Fisheries Office and the Marine Laboratory. In any event, I now have in my possession all tags that I could find. The following statements can be made concerning them: tag 703 is no longer usable - I was unable to successfully apply it to either of the aforementioned Hawksbills, tags 707-715 appear to be in good condition, tags 717-725 are in poor condition (bent), tags 751-773 and 775-800 appear to be in good condition. Tags 705, 716 and 774 have apparently been lost.

tag record in green turtles

record  
this  
info.

Another thought just entered my mind. Another green turtle with a Tahiti tag was recently killed off the island of Tofua.

In closing, it seems that my letter presents more problems than offers hopefully helpful data but be that as it may I look forward to further taggings and hopefully someday some returns to aid you in your research and conservation efforts.

Wishing for you and yours, health and happiness,  
And for marine turtles, salvation and peace,

William R. Zoochie Jr.

William R. Zoochie Jr.

Peace Corps Volunteer  
Fisheries Division  
Dept. of Agriculture  
P.O. Box 14  
Nuku'alofa, Tongatapu  
Tonga

3577-23 PINAO ST  
96822

988-7394 100



CONTACT:  
**HOTEL ISA LEI**

P.O. Box 1351  
Suva, Fiji Islands.  
Cable: Turtle, Suva.

# fiji



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12 July 1974

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GEORGE H. DALAZS

THE UNIVERSITY OF THE SOUTH PACIFIC

PROGRESS REPORT - MARINE TURTLE RESEARCH

1. INTRODUCTION

Following discussions with the Fisheries Officer of the South Pacific Commission, Mr. R.H. Baird, the author undertook to carry out aspects of research on marine turtles at the University of the South Pacific, in Fiji. The research programme was commenced in January, 1974.

It was agreed that the initial effort should be concentrated on the study of the factors affecting the growth of hatchlings and young turtles. The studies were to include aspects of diet, density factors, the effects of light, tolerances to reduced salinities (mainly for evaluating health problems and the minimum salinity required to inhibit fungal growth) and effective tagging of the smallest individuals.

The immediate problem was to obtain enough hatchlings to carry out the planned research programme.

2. EFFORTS TO OBTAIN EGGS, HATCHLINGS AND YOUNG TURTLES

2.1 In early January a trip was made to Mbeqa Island and to the shores of the adjacent island of Namuku. Four days search for turtle nesting activities proved fruitless.

2.2. The Department of Fisheries was approached for assistance. Since the Fisheries boats and the personnel were largely involved in the hurricane Lettie relief work, they were unable to search for eggs and hatchlings.

2.3 The Chiefs of the villages in Yasawas, Kadavu, Koro and Taveuni Islands were approached by radio telephones. On 14th February a batch of 122 eggs obtained from a single nest in Yasawas was shipped to Lautoka. Although the eggs were packed in sand, they were distorted and damaged on arrival in Lautoka. They were transported via taxi to Nadi, thence flown to Nausori. From Nausori they were transported in a taxi to the laboratory at the University. In the laboratory the eggs were buried to a depth of 30cms in clean moist sand contained in a round plastic tank measuring 50cm in diameter. The top layer of sand was occasionally sprinkled with distilled water. The temperature of the "nest" was recorded daily with a thermometer permanently fixed in the sand. During the entire incubation period the temperature remained relatively constant at  $26 \pm 0.8^{\circ}\text{C}$ .

2.4 Visits were made to Qoma Island which lies 50 miles from Suva and  $\frac{1}{2}$  mile off the S.E. coast of Viti Levu. The fishermen were instructed to carefully collect only  $\frac{1}{2}$  the total number of eggs from each turtle nest and contact the University for transport arrangements. Two batches of eggs, each containing 145 and 70 eggs, respectively, were obtained from Qoma. They were transported in a boat ( $\frac{1}{2}$  mile journey) and then via road to the laboratory. The eggs were buried in sand in two separate containers, exactly the same as described earlier.

Two young Hawksbill turtles were also obtained from Qoma Island for observations in the laboratory.

3. RESULTS

3.1 Eggs from Yasawas:

These eggs failed to develop. There appeared to be no sign of embryo formation. The result was not too unexpected as the eggs had been distorted in transportation.

3.2 Eggs from Coma:

The first batch of eggs (145) failed to develop.

The second batch of 70 eggs obtained in late February produced 3 successful hatchlings in early June. There were 4 other fully developed hatchlings which failed to emerge. Thus, from only a single batch the successful emergence was 4.3%.

3.3 Observations on Hatchlings

Species: Eretmochelys imbricata (Hawksbill)

Minimum incubation Period: 60 days

	<u>Date Born</u>	<u>Carapace Length (cm)</u>	<u>Carapace Width (cm)</u>	<u>Plastron Length (cm)</u>	<u>Weight (g)</u>
1	2.6.74	4.27	3.12	3.14	14.690
2	4.6.74	3.98	3.12	3.14	14.816
3	<u>5.6.74</u>	<u>3.72</u>	<u>2.73</u>	<u>2.83</u>	<u>12.550</u>
	Average	<u>3.99</u>	<u>2.99</u>	<u>3.04</u>	<u>14.02</u>

The hatchlings were placed in a small plastic tank measuring 40 x 30 x 20 cm through which there was continuous flow of fresh seawater. They were fed on small pieces of tuna twice a day. Each hatchling could consume approximately 5g of tuna flesh per day. All hatchlings commenced feeding within 3 days after emerging from the egg. An additional hatchling was caught floating in the sea to the South of Suva Harbour. It was also placed in the same tank.

Second Measurement

	<u>Date</u>	<u>Carapace Length (cm)</u>	<u>Carapace Width (cm)</u>	<u>Plastron Length (cm)</u>	<u>Weight (g)</u>
1	14.6.74	4.33	3.52	3.35	16.635
2		4.30	3.35	3.36	16.301
3		3.92	2.80	3.00	13.615
	Average	4.18	3.22	3.24	15.517
*4		4.84	3.90	4.00	23.217

Third Measurement

	<u>Date</u>	<u>Carapace Length (cm)</u>	<u>Carapace Width (cm)</u>	<u>Plastron Length (cm)</u>	<u>Weight (g)</u>
1	2.7.74	4.80	4.17	3.87	23.49
2		4.70	4.04	3.86	23.08
3		4.16	3.39	3.35	15.34
	Average	4.55	3.87	3.69	20.64
*4		5.35	4.64	4.45	30.68

Average Growth Rate of Three Hatchlings in One Month

Carapace Length	14.03%
Carapace Width	29.43%
Plastron Length	21.38%
Weight	47.22%

3.4 Observations on Adults

Species: Eretmochelys imbricata (Hawksbill)

The two adult turtles were maintained in a large plastic tank through which there was a continuous flow of fresh seawater. These individuals were presented with a variety of food to test their diet preferences. Then, they were fed entirely on tuna. Each individual consumed approximately 400g of tuna per day.

	<u>Food Presented</u>	<u>Food Acceptability</u>		
		Accepted	Not Accepted	'Liked'
1.	Cockle ( <u>Anadara</u> spp. - "Kaikoso")	+	-	+
2.	Surfclam ( <u>Latona</u> spp. - "Sigalc")	+	-	+
3.	Freshwater bivalve ( <u>Batissa</u> spp. - "Kai")	+	-	-
4.	Crab ( <u>Sesarma</u> spp. - "Kuka")	+	-	+
5.	Fish (several kinds)	+	-	+
6.	Minced beef (reject cat food)	+	-	+
7.	Ripe bananas	+	-	-
8.	Ripe banana skins	+	-	-
9.	Coconut meal	-	+	-
10.	Turtle grass ( <u>Syringodium isoetifolium</u> - "Vutia")	-	+	-
11.	Turtle grass ( <u>Halophila ovalis</u> - "Vutia")	+	-	-
12.	Mangrove leaves	-	+	-
13.	Freshwater weed ( <u>Hydrilla verticillata</u> )	-	+	-
14.	Water Lily ( <u>Coratophyllum</u> spp.)	-	+	-

The above observations suggest that Hawksbill turtles prefer animal tissues, particularly of marine origin.

#### Measurements

<u>Date</u>	<u>Turtle No.</u>	<u>Carapace</u>	<u>Carapace</u>	<u>Head</u>	<u>Head</u>	<u>Plastron</u>	<u>Plastron</u>	<u>Wt.</u>
		<u>Length</u>	<u>Width</u>	<u>Length</u>	<u>Width</u>	<u>Length</u>	<u>Width</u>	
		cm	cm	cm	cm	cm	cm	kg
5.5.74	1	37.2	34.9	7.7	4.4	26.5	31.4	3.875
	2	34.6	31.2	7.6	4.2	25.3	28.0	3.075
5.7.74	1	38.1	35.6	7.9	5.6	27.7	32.0	4.250
	2	35.1	32.0	7.8	5.3	26.2	29.0	3.400
% increase	1	2.42	2.01	2.60	27.27	4.53	1.91	9.68
in 2 months	2	1.45	2.56	2.63	26.19	3.56	3.57	10.57
	Average	1.94	2.28%	2.62	26.73	4.04	2.74	10.13

#### 3.5 Observations on Stomach Contents of Five Green Turtles

Fresh and complete alimentary tracts of 5 green turtles (Chelonia mydas) were obtained from fishermen. The contents of each stomach were carefully emptied in a tray, separated into three following categories and weighed:

No.	Food Present (% Total Wet Weight)		
	<u>Syringodium</u> <u>isoetifolium</u>	<u>Halophila</u> <u>ovalis</u>	<u>Other</u>
1	95.4	2.1	2.9
2	1.4	98.0	0.6
3	88.6	5.2	6.2
4	80.0	1.2	18.8
5	52.0	46.6	1.4

These results indicate that the main foods in the diet of the green turtles caught near Nukulau Island (approximately  $1\frac{1}{2}$  miles from the University of the South Pacific) are the two common species of "turtle grass". In some parts of the sea surrounding the Nukulau Island Syringodium covers over 80 - 90% of the sea-bed. The average yield of syringodium in such areas is 5,800 kg/ha.

### 3.6. Other Observations

3.6.1. Visits were made to the Orchid Island tourist resort,  $1\frac{1}{2}$  miles from Suva, where four Hawksbills and ten green turtles are maintained for tourist shows. The Hawksbills are fed on fish and the green turtles are fed entirely on fresh mangrove leaves. The turtle run at Orchid island has existed for three years and the turtles of all sizes appeared to be in healthy condition.



3.6.2 Some Analyses of Turtle Food and Aquatic Plants of Potential Value in Turtle Culture

(measurements from single samples collected in late June)

<u>Material</u>	<u>Protein</u> % dry wt.	<u>Fat</u> % dry wt.	<u>*Calorific Value</u> k cal g <sup>-1</sup> dry wt (ash free)
1. <u>Syringodium isoetifolium</u> ("Vutia")	5.50	1.03	4.25
2. <u>Halophila ovalis</u> ("Vutia")	6.88	3.4	4.47
3. Edible marine alga-green ("Nama")	4.19	4.7	4.00
4. Edible marine alga-brown ("Lumi")	6.00	0.4	4.56
5. River weed ( <u>Hydrilla</u> <u>vorticillata</u> )	9.64	3.5	5.42
6.			

\*Average of two measurements.

(Dr.) Uday Raj,  
Lecturer in Biology

School of Natural Resources  
12th July, 1974.

DATE 24 - 2 - 92



F I J I 1 9 9 1

ANASA TAWAKE  
 CI-FIJIAN HOTEL  
 PRIVATE MAIL BA  
 NADI AIRPORT  
 FIJI ISLAND

SIR,

2/17/92 A TURTLE FOUND BY MY MOTHER  
 LAST WEEK WAS BADLY WOUNDED, AND WAS STILL  
 DRAGGING THE SPEAR GUN WITH IT. MY MUM  
 WAS FISHING WHEN SHE SAW THE TURTLE LYING  
 CARELESSLY ON THE REEF.

THE REASON WHY I AM WRITING IS THAT  
 IT WAS CARRYING THREE NUMBERS. THE NUMBERS WERE:  
 6821, 6822, 6825, AND THIS WERE WRITTEN ON THE  
 OTHER SIDE: WRITE HIMB, UNIVERSITY HAWAII 96744.

THAT'S ALL I HAVE TO SAY, I WOULD BE  
 VERY HAPPY IF YOU COULD GIVE ME ~~ME~~ SOME  
 INFORMATION ABOUT THE TURTLE.

YOUR'S FAITHFULLY  
 A-TAWAKE



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**NATIONAL MARINE FISHERIES SERVICE**  
Southwest Fisheries Center Honolulu Laboratory  
2570 Dole St. • Honolulu, Hawaii 96822-2396

March 10, 1992

F/SWC2:GHB:JLB  
ANASA-9L.GHB

ROSE TO NADI =  
1600 km OR  
1000 MILES

Anasa Tawake  
c/o Fijian Hotel  
Private Mail Bag  
Nadi Airport  
Fiji

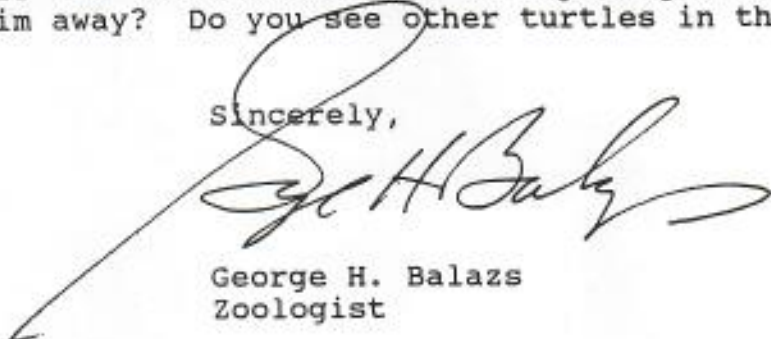
Dear Anasa Tawake:

Thank you very much for your letter of February 24, 1992, reporting the tagged turtle 6821, 6822, and 6823. Your mother's sighting of this turtle is extremely important, and we very much appreciate the effort you made to send the information to us. Under separate cover I am sending you and your mother a special T-shirt with a turtle logo as a symbol of our appreciation.

The turtle you found was tagged on October 13, 1988, while laying eggs on Rose Island in American Samoa. Rose Island is an important breeding site for the green sea turtle, *Chelonia mydas*, but unfortunately there are not as many turtles nesting there during recent years.

I would like to know if the turtle died from the spear gun wound, or did it live and swim away? Do you see other turtles in this area?

Sincerely,

  
George H. Balazs  
Zoologist



INTO THE FUTURE

DATE: 1-5-92



ANASA TAWAKE  
FIJIAN HOTEL  
P.M BAG  
NNA AIRPORT  
FIJI ISLAND

F I J I 1 9 9 1

DEAR SIR,

THANK YOU VERY MUCH FOR REPLYING MY LETTER OF FEBRUARY 24, AND I WOULD LIKE TO THANK YOU ALSO FOR THE T-SHIRT YOU HAVE SEND TO US.

WHEN MY MOTHER FOUND THE TURTLE, IT WAS DYING FROM THE SPARE GUN WOUNDS, AND BEFORE SHE COULD FIND HELP, THE TURTLE WAS DEAD. MY MOTHER FELT SORRY FOR THE TURTLE, BECAUSE IT WAS TAGGED, AND SHE KNEW IT MUST HAVE BELONG TO SOMEONE.

MY VILLAGE IS NEXT TO THE FAMOUS SIGATOKA SAND DUNES AND MY GRANDFATHER USE TO TELL ME WHEN THEY WERE YOUNG MEN THERE WERE HUNDREDS OF TURTLES COMING UP TO THE SAND TO LAY EGGS. BUT NOWDAY'S ITS HARD TO FIND ANY TURTLE IN THE MASA MAYBE IS BECAUSE OF THE LARGE NUMBER OF FISHERMAN THAT MUST HAVE SCARE THEM AWAY. BUT MOST OF THEM ARE FOUND IN DEEP SEA, WATER'S.

I HAVE RECENTLY RECEIVE A LETTER FROM SUZIE GEERMANS A MARINE TURTLE CONSULTANT FOR THE "SPREP", AND SHE ALSO SEND TO ME A T-SHIRT AND SOME POSTERS.

ONCE AGAIN, I WOULD THANK YOU VERY MUCH FOR THE POSTERS AND THE T-SHIRTS, NI SA MOCE" (GOOD-BYE)

SINCERELY,  
A. TAWAKE.

Paravion

Air Mail

**AIR MAIL**  
PAR AVION

To



GEORGE H. BALAZS  
NATIONAL MARINE FISHERIES SERVICE  
SOUTHWEST FISHERIES SCIENCE CENTER  
HONOLULU LABORATORY  
2570 POLE STREET  
HONOLULU, HAWAII 96822-2396

Air Mail

Par avion

THIS IS PRIVATE

Bulia,  
Ono,  
Kadavu.  
P.A. Nagara.  
26<sup>th</sup> April, 1976.

Dr. U. Raj.  
School of Natural Resources.  
U.S.P.  
Suva.

Dear Sir,

Kadavu, long undulating island lies south of Viti Levu and some 30 nautical miles (the nearest point Dravuni) from Suva is undergoing government development during the past 25 months. The P.W.D. has attempted to build a macadam type road beginning at Vunisea Government Station and spiraling along the western coast. Due to heavy rain, rough and marshy surfaces raise operational costs and checks progress.

Only 12% of Kadavu's land mass could be developed agriculturally, but not to a commercial scale. The government backed Pine Scheme is doing first rate work in planting *Pinus Radiata* and *Carribaer* in the barren *talasiga* soil. A Fishery Department boat ploughs its way regularly along the coast

collecting thousand pounds of fish from the six villages in their scheme. ⊕

One can say a lot is being done in Kadavu but I sincerely believe they are just scratching the surface. Kadavu has one distinct advantage over many islands in the Fiji Group. It has the Great Astrolabe Reef which hangs like a necklace around Ono. Marine Biologists can find thousand of interesting sea life humming in this 'at well'. This I suppose is why Ono has always been a breeding place and natural habitat for turtles. The attractions are there. Turtle farming could very well be the village industry of tomorrow once technical know how is achieved.

Time flies ever so swiftly that 5 weeks passed me by without my awareness. Now that I'm conscious of it, I feel that a report is due. To be frank Dr. Raj the search for turtle eggs and young has been my whole occupation and rather than to be disappointed with the fruitless endeavour it has like what the White Rabbit said

(2)

in 'Alice in Wonderland' got 'curiouser and curiouser'. My curiosity and enthusiasm has been aroused such that I have gathered many fundamental and interesting points of the characteristics and local history of this prehistoric beast. By questioning and probing the minds of local folks have uncovered some interesting aspects:

73 year old Māka, who spent the best years of his life in Bulia volunteered the information that he has actually seen the youngs as they emerged from their burrow and ponderously made their way towards the sea. That was some 30 years ago and he claims that he is the only man to have witnessed such scene. Wanitehu (69) and a friend (long deceased) saw youngs too emerging but in uninhabited Vuro isle. Semisi (68) claimed that it was a common sight 20 years ago to spot adult turtles frolicking near beaches any day of the week. That is something very rare nowadays. 17 year old Jone and his friends spent the 1975 Christmas holidays in Dravuni and during the night stood a watching in YAKUVU where



They actually came across a green turtle as she was coming home to roost. They were afraid to catch her, due to her size. Iepani of Natusava boasted that he caught (net) seven adult turtles during Nov-Jan (closed season) 3 of which were sold to the Fisheries dept totalling about 480 lbs. Qovu (20) and Samaila (17) dug turtle eggs a stone throw from the luge I live in during Feb this year. Vairusi (37) of Bulia stumbled on a burrow which he dug and found that an egg has developed into a semi adult stage. He reburied the burrow. Avenai of Dravuni alleged that turtles follow a pattern of favouring certain places for breeding every year. So it is not strange when eggs are plenty in one season and scarce the following year. That of the uninhabited isles visited yielded nothing. There were many such incidents merely indicating that:-

- (a) Adult turtles have diminished in numbers (???)
- (b) Still laying eggs in and around Ono.

(3)

All those that I asked unanimously agreed that I was just a bit too late in my search. However I'm confident I can get them this year.

Further down the coast are also likely places for turtles. During 1975 whilst down there have heard tales which I presume <sup>true</sup> of turtles. Early in 1974 a turtle branded in TAHITI was caught (net) in Naregai. Legend has it that turtles emerged (true tale) when certain verses are chanted from the top of a hill in Namunana. Although I have seen the sight have not witnessed the procedure. Tona of Daku village is famous around the Toba for his prowess in catching turtles. His house is decorated with giant size turtle backs. I have been there.

To day many people in Kadam have used nets and it is a common sight to see them stretched along the coast. An average of about 1 village in every 3 practices this. It has proved a menace to the unwary outboard motor driver and also that no regards, if any, are taken

as to the catching of the permitted size 718° or the closed season. This affair merely proves that the drive to farms turtle is a certainty or there is the likely chance that once they're gone they're gone' as farmer S.F.O. Robinson said.

I hope to have further discussions with you on this subject to extend my knowledge if you are not busy. As I will attempt to do my own pond and farm turtles will it be possible to receive technical as well as financial aid from government or any other source? To further one's knowledge as Guam the Cooks and Torres Islands? I am prepared to scrape the barrel to foot my expenses for such a journey.

As for the fruitless search for turtle eggs which I took most of my expenses were met by my father, Semi Kavea Vueti. - of Bulia. Perhaps \$10 would not be too much to reimburse him. I guess this is all I can provide for the time being. Looking forward for a fruitful 'September morn'.

Your sincerely,  
J. KOVEA VUETI

SEA TURTLES - FIJI

*Smead*

No 153L

HASTINGS, MN - LOS ANGELES  
LOGAN OH - MCGREGOR, TX U. S. A.