

SAVINGRAM.

From: Agricultural Instructor . T. KALOJA .

To: Director of Agriculture

Saving No.

Date.....30 May 1972

TONGA TURTLE SURVEYI. Itinerary

6	December	1971	-	4.30 p.m.	-	Left Nuku'alofa
7	"	"	-	5.30 a.m.	--	arrived Meama Island
13	"	"	-	10.00 a.m.	-	depart Meama
13	"	"	-	12.00 p.m.	-	arrive Fonoifua Island
15	"	"	-	8.00 a.m.	-	depart Fonoifua
15	"	"	-	2.00 p.m.	-	arrive Fonuaika Island
20	"	"	-	10.00 a.m.	-	depart Fonuaika
20	"	"	-	7.00 p.m.	-	arrive 'Uiha Island
21	"	"	-	7.00 a.m.	-	depart 'Uiha
21	"	"	-	6.00 p.m.	-	arrive Ha'ano Island
30	"	"	-	8.00 a.m.	-	depart Ha'ano
3	January	1972	-	11.00 a.m.	-	depart Luahoko
3	"	"	-	6.00 p.m.	-	arrive Pangai
4	"	"	-	2.00 p.m.	-	depart Pangai
5	"	"	-	1.00 p.m.	-	arrive Nuku'alofa

II. Summary of Survey Results

A. Meama Island (Geocode No. WQKJ 56)

This island is located about 1 mile NW of Fonoifua Island. It is uninhabited and about 400 yards in circumference with a steep sand beach surrounding the entire island. It has a fringing reef which varies from 50 - 75 yards in width.

When we arrived we found only 2 recent turtle nests, approximately 1 - 2 weeks old. Throughout the nights we stayed on the island, checks for nesting turtle were made every 2 - 3 hrs. Only one turtle nested while we were on the island, that being on Monday 13 December, 1971 between 2 - 5 a.m. Unfortunately the turtle came ashore layed her eggs and returned to sea in between our beach checks, so we have no idea what species it was.

The weather during our stay was bad. From 7 December - 12 December there was strong winds, much rain and moderate to heavy seas.

B. Fonuaika Island (Geocode No. WQKJ 46)

This islands is uninhabited and about 1/4 mile in circumference. This island has a sand beach around the total circumference except for a 75 yard stretch on the northeast which is broken limestone. On the south shore there is limestone, shhet - like that is exposed during low tide.

It has a fringing reef between 75 - 100 yards in width. When we arrived we counted 9 nests between 1 - 3 weeks old and 2 nests that were 1 or 2 days old. Only one turtle nested while we were on the island that being on 15 December, between 10 - 12 p.m. The turtle came ashore, nested and returned to sea between our beach checks, so unfortunately we don't know what species it was.

The weather was bad with much rain, strong winds and moderate to heavy seas throughout our stay.

C. Luahoko Islands(Geocode No. WQKJ 31)

This island is uninhabited and about 5 miles in circumference. It has sand beaches around its circumference with on the west and limestone sheet-like north shore that is exposed at low-tide. It has a fringing reef of 75 - 100 yards in width.

When we arrived we found only 4 nests 2 - 4 weeks old. One of these nests had been dug up and the eggs removed. No turtles can ashore to nest during our stay there even though the weather was good, no rain, slight winds and slight seas. We were also on this island during a full moon, which according to the local natives and scientific studies is when the turtles do most of their nesting.

D. Limu Island and Uanukuhake Island (9 January '72)(? January '72.)
These two islands were visited by Taniela Koloa, Agricultural Instructor, working for the Fisheries Division.

Limu Island is about $\frac{1}{2}$ mile in circumference uninhabited, with a steep sandy beach on all sides except the south side which is limestone. It has a fringing reef of 50 - 75 yards wide.

When he arrived he found only 2 recent turtle nests, approximately 1 - 3 weeks old. One of these nests was dug up and the eggs were taken to Nuku'alofa to the Marine Laboratory for hatching and rearing studies. No turtles came ashore the three days that Taniela stayed on the island.

Uanukuhake Island is a large uninhabited island about 3 miles in circumference. It has a sandy beach around its total circumference. It is surrounded by a fringing reef.

Taniela spent only one day on this island and found no turtle nests.

The weather during his visit to both of the above island was good with calm seas and slight winds.

CONCLUSION:

From all the information we gathered from the local people, we visited 5 of the best turtle islands in Tonga. We visited these islands during the peak of the nesting season, it being December and January. Since very few nests were found, 19 in all, we have come to the conclusion that the breeding turtle population in Tonga is very low.

We believe the breeding population is at a critical low level and if the turtle is not protected by better laws and enforcement and a rearing project that the turtle population will become non-existent in the Tonga area in 5 - 10 years.

RECOMMENDATIONS:

We recommend that Fonuaika Island be made a turtle sanctuary. Since this island is government owned this could be done easily by law or decree by the government.

We further recommend that two men be placed on the island sanctuary to protect the eggs and raise the young turtles, in water tanks constructed of cement or 55 gal oil drums, to the age of 1 - 3 months. This would raise the survival rate of the young turtle considerably thus allowing more turtles to reach maturity and this in turn increasing the breeding turtle population in Tonga.

There have been studies made in other parts of the world to show that under natural condition only 1 - 15% of the turtles hatched reach maturity. That means that out of one nest of 100 eggs usually only one turtle reaches maturity. But if the turtles are reared in captivity for at least one month the survival rate to maturity increases markedly say 15 - 20%. If the turtles are raised even longer than one month the survival to maturity increase even more.

Also we recommend that new laws, those now before Parliament, be passed and enforced strictly.

If one or more of these recommendations is not enacted within the next year it is our firm belief that the breeding population of marine turtles in the Tonga area will be doomed to extinction due to nothing but the back of foresight of the Tongan people and the Tongan Government.

The marine turtle in the past has been a large protein source and source of raw materials for crafts for the Tongan people. The number of marine turtles now caught is much lower than 25 years ago.

In the future, unless some action is taken to protect the marine turtles in Tonga, their population will diminish thus reducing the sources of protein and raw materials for crafts for the swelling Tongan population.

We believe that the minimum protection needed to insure the turtle population survival in Tonga in the future should be:

1. More protective laws and better enforcement of those laws and,
2. the establishment of small turtle rearing stations on at least one of the turtle nesting islands in the Ha'apai Groups as mentioned above.

SUBMITTED BY

Taniela Koloa
Taniela Koloa.

SOUTH PACIFIC COMMISSIONJOINT SPC-NMFS WORKSHOP ON MARINE TURTLES
IN THE TROPICAL PACIFIC ISLANDS
(Noumea, New Caledonia, 11 - 14 December 1979)THE MARINE TURTLE SITUATION IN THE KINGDOM OF TONGA

By W.A. Wilkinson

1. Considerable interest has been shown in the past several years over the marine turtle plight around the globe. Some scientists, such as Dr Archie Carr and Dr Peter Pritchard of the University of Florida, have been involved in marine turtle research for over fifteen years. The one thing most concerned people realize, is the rapidly dwindling populations of all five genera. Caretta, the loggerheads; Lepidochelys, the ridleys; Eretmochelys, the hawksbills; Chelonia, the green turtles; and Dermochelys, the leatherbacks. Lepidochelys and Chelonia have clearly differentiated, named species, unlike the other three genera.
2. In an article written last year by Dr Carr, he put the kinds of marine turtles in a relative order of decreasing security. They are as follows:-
 1. Dermochelys coriacea, the leatherback. Not used for meat, skin not used, no true shell is present. Eggs taken at main nesting beaches. (Still considered endangered by Carr).
 2. Chelonia depressa, the flatback turtle - many nesting beaches in Australia where it is strictly protected.
 3. Caretta caretta, nesting rookeries protected on Sululand coast of Southeastern Africa, Heron Island (Great Barrier Reef) and the American rookeries. Eggs, meat, taken elsewhere.
 4. Chelonia agassizi, black turtle of the Pacific, taken by the hide hunters and egg poachers in many areas, especially Central and South America. Great slaughters take place. Stock in the mid Pacific Islands and Indian Ocean may be less endangered.
 5. Lepidochelys olivacea, the Pacific ridley. This turtle nests in large groups and thus it is easy to quickly decrease the numbers of its population, which has occurred in a number of nesting areas. A large nesting "Arribada" in the State of Guerrero, Mexico, dwindled from 30,000 in 1968 to a few hundred in 1969. They are taken for the turtle leather; the eggs are taken as well. This turtle was not placed lower on the list because of some indication of a dwindling sea turtle leather trade.

6. Chelonia mydas, the green turtle. This "species" actually includes many varieties of green turtles. The most research done on any marine turtle has involved the green turtle. Dr Carr says, "In the case of the western Caribbean green turtle, the course of events is especially dismal, because long-term tagging has roughed out the migratory cycle of the Tocuquere colony in Costa Rica, it can be shown to be increasingly under attack everywhere. Even in Florida, medieval legislation, staunchly supported in recent political controversy, permits the commercial exploitation of an almost vanished green turtle colony".

7. & 8. Dr Carr places these last two turtles together as the most endangered sea turtles - Lepidochelys kempí, the Mexican ridley, and Eretmochelys imbricata, the hawksbill. The Mexican ridley is listed here because it nests in "concentrated groups" - its total population, all nesting in two or three places, makes it easy prey for the hide hunters and egg poachers. The hawksbill is listed here, because it is more solitary in its nesting than any other sea turtle. Occasionally small groups will come ashore together, but generally the females come ashore singly on the beach, sometimes where other turtles nest and sometimes on little patches of beach few other turtles would consider. There has been a drastic increase in the past twenty years involving the exploitation of the hawksbill. Although turtle shell products are barred from the U.S.A., there is still a rising market for them in Europe and Japan. The skins are used and the turtle meat is eaten. Hawksbill eggs are favoured by more people than other turtle eggs, and seaside gifts and curio shops also sell young hawksbills stuffed and polished. Its diffuse nesting makes it difficult to have adequate breeding sanctuaries. With all this pressure on the population of hawksbills, it is no wonder that it is heading for extinction and considered the most endangered species along with the Mexican ridley.

3. The life cycle of the sea turtle is complicated. With the rising rate of increase of man's seaside population and the rise in local demand for sea turtle products, the consumption and destruction wrought by people, has grown beyond the tolerance of the relatively small populations in which marine turtles exist.

4. A wrong contention people hold, is that any organism from the great oceans must be without limit, but this is far from true, with sea turtles as well as a large number of other marine organisms. Great nesting colonies of marine turtles have been decimated before - the Bahamas, Bermuda, all around the Caribbean, Florida, Cape Verde Islands, and the Hawaiian Archipelago.

Professor George H. Balazs of the Hawaii Institute of Marine Biology, in a report on "The status of marine turtles in the Hawaiian Islands", says nesting of green turtles took place on some of the main Hawaiian Islands just forty years ago. Sightings were made on a number of beaches on Oahu, the west coast of Molikai and north shore of Lanai. It is probable sites existed on Kauai, Maui, Kahoalawe and Hawaii, although no substantiated reports of past nestings have been found. Today no animals are reported to nest on any of the main Hawaiian Islands. The few small outer islands which green turtles do nest in are given complete protection by the United States Government.

5. Even when all human predation is stopped, the eggs and young hatchling are faced with many natural predators ready to reduce their numbers. Dogs and pigs often eat eggs just after having been laid. On small nesting islands such as in Tonga, Polynesian rats, Rattus exulans, are a potential predator. The ghost crab, Acypode sp. (Keviki), is in large numbers on all nesting beaches, and when the hatchlings emerge from the nest the ghost crabs are waiting to pull them into their holes. Beach rocks must then be passed which is difficult enough for young hatchlings, but rock crabs (Grapsidae) live in large numbers here and prey heavily on the young turtles. Again sea birds nest on these same islands as the turtles, and when the hatchlings emerge the birds have a feast. Young turtles cannot swim and dive properly for the first two or three weeks, so they are constantly in danger from these birds, even miles out to sea. There are many predators in the ocean itself, sharks, wrasses, grouper, trevally, snapper, barracuda, garfish, as well as deep water bonito and skipjack tuna. Out of the 100 eggs laid in each nest, possibly two or three hatchlings will grow to adult reproducing members of the population. With heavy human predation, especially the taking of eggs and nesting females during the breeding season, the tolerance level of the turtle population is exceeded and the population continually dwindles toward its fateful end.

6. Previous Peace Corps marine biologists did a preliminary survey in December 1971 to assess the approximate turtle population in Tonga. Five islands in the Ha'apai group were surveyed, these supposedly being some of the best turtle nesting islands in Tonga. They found very low levels of nesting occurring during this peak nesting month of December, concluding that the hawksbill turtle (fonu koloa) would be non-existent in the Tonga area in five to ten years. They found evidence of only hawksbill nesting but no other genera of sea turtles. Thereafter the biologists also established a small hatchery for hawksbill at the marine station in Sopu. They raised the young turtles for one or two months before releasing them, hoping to aid the population by growing the turtles large enough to avoid most potential predators. Unfortunately, the biologists involved had to terminate the work and leave Tonga due to illness. Nothing has been done on this project since they left.

Marks? →
Bradey

7. In May 1973 a fisheries survey was carried out in the Ha'apai group. The islands of Nomuka, Fonoifua, 'O'ua, Tunga, Ha'afeva, 'Uiha, Lifuka, Foa and Ha'ano were covered in this survey. Information was collected on types of fish caught, relative amounts in a given time, names of fishermen, boats and fishing equipment used, etc. Along with this information a general invertebrate habitat and frequency survey was done, specimens were collected for the marine station at Sopu, and sea turtle nesting island information was collected from all the islands visited on the survey. Information regarding sea turtles included main turtle nesting islands for fonu koloa (hawksbill); names of sea turtles caught; whether any other turtles besides the hawksbill have been seen nesting and, if so, which islands; the most common and least common kinds of turtles; and the main nesting months. They found that the hawksbill nests on the following islands:

- | | |
|--------------------------|---------------------------|
| 1. Kelelesia | 15. Putuputua |
| 2. Tonumea | 16. Limu |
| 3. Telekitonga | 17. Uonukuhahake |
| 4. Lalona | 18. Tofanga |
| 5. Telekivava'u | 19. Uonukuhihifo |
| 6. Fetokopunga | 20. Luangahu |
| 7. Nukufaiva | 21. Hakauata |
| 8. Meama (near Fonoifua) | 22. Tatafa |
| 9. Fonuaika | 23. Luaheka |
| 10. Tokulu | 24. Nukutula |
| 11. Nukulai | 25. Nukupule |
| 12. Luanamu | 26. Meama (near Nukupule) |
| 13. Kito | 27. Niniva (uninhabited) |
| 14. Fetoa | 28. Nukufaiu |

One additional uninhabited island which is a probable hawksbill nesting site is Lekeleka.

The turtles are known to nest on three inhabited islands: Mango, 'Uiha (Liku side), Ha'ano (Maitoa).

8. The following are the Tongan names of the different marine turtles in Ha'apai and the English and scientific names which fit descriptions of the Tongan names:-

- | | | |
|-------------|--|---|
| Fonu koloa | - the hawksbill (<u>Eretmochelys imbricata</u>) | |
| Tuangange | - probably Pacific ridley (<u>Lepidochelys olivacea</u>) but may possibly be the Indo-Pacific loggerhead, since they are somewhat the same in appearance (<u>Caretta caretta gigas</u>) although the descriptions sound like the Pacific ridley. | |
| Ika ta'one |] males of the green turtle; different size, colour. (<u>Chelonia mydas</u>) | |
| Hulemui | | |
| Tu'a polata | |] females of the green turtle (<u>Chelonia mydas</u>) - |
| Tu'a 'uli | |] different names due to size |
| Tongotongo | |] age variation as well as colour variation |
| Aleifua | |] possibly the black turtle (<u>Chelonia agassizi</u>) is |
| Tu'a kula | |] included here. |
| Tufonu | | |

9. Of the ten Tongan names for marine turtles, eight of these describe Chelonia mydas (the green turtle) with possibly one of the names describing Chelonia agassizi (black turtle). This is reasonable however, since Chelonia mydas is really a combined species name for a number of yet unnamed races of the green turtle. There are small differences in colour, head, flipper size and overall size between these unnamed races.

10. Therefore, it is believed that of the five genera of marine turtles in the world the Ha'apai Island group has three (Eretmochelys, hawksbill; Lepidochelys, ridley; Chelonia, green), Lepidochelys, Chelonia and Eretmochelys were the last three turtles selectively listed on Carr's endangered list. Eretmochelys (hawksbill: fonu koloa) is more common in Tonga, Fiji and Samoa than anywhere else in the South Pacific. The reason is that hawksbills do not travel long distances between nesting and feeding grounds like other marine turtles. Since Tonga, Fiji and Samoa are its breeding grounds, the hawksbill would appear to be much more abundant than the endangered species report indicates; however, all the hawksbills in these three areas include the major populations for the entire South Pacific! A hawksbill hatchery and restoration project began early in 1971 to attempt to replenish the turtle stocks in Western Samoa. They found that only four nesting beaches on three small islands still support nesting turtles in Western Samoa. The great increase in population of Western Samoa caused the greatly reduced turtle population, and pushed the hawksbill off some of the most excellent nesting beaches. The same situation is occurring in Tonga, although the greatest rate of population growth is not in the Ha'apai group - fortunately for the turtles for the time being.

11. Fishermen from the Ha'apai islands were also asked whether they had seen (and not just heard it from others) any of the other turtles nesting besides the fonu koloa (hawksbill). The tu'a 'uli, one of the names describing the female green turtle (Chelonia mydas) has been seen nesting by fishermen from Tungua, 'O'ua and Ha'afeva islands (also the aleifua, the green turtle). The islands the green turtle has been seen nesting on include two uninhabited and one inhabited island.

12. Uninhabited nesting islands of the green turtles:

Nukufaiva
Fetoa

13. Mango island is the inhabited island where they have been seen nesting.

14. It is probable that two other islands on which the hawksbill nests are also nesting islands for the green turtle. Unlike the hawksbill, the green turtle nests in groups, so there would be fewer islands where they are found nesting. A portion of the green turtles found around Ha'apai are probably migrants from other areas just using the feeding grounds here, but some may also be the greens, which nest on at least these three islands. Green turtles are ones most commonly seen aboard the Olovaha and along the Government Market in Nuku'alofa.

15. No one mentioned having seen the ridley nest anywhere in Ha'apai.
16. The most common and least common turtle names were asked of the fishermen. Almost consistently they mentioned the tu'a 'uli (green turtle) as being the most commonly caught, which is what we have observed as well. Many said the fonu koloa (hawksbill) was not the least common turtle in Ha'apai, so apparently the population is not down to its most critical level as yet. Tuangange (ridley) and tu'a kula (Chelonia sp.) were often mentioned as being the least common and maybe the black turtle. This is what was expected since no ridleys have been seen, nor their shells at the market or on the boats.
17. Finally, the main nesting months were asked of the fishermen. The nesting begins very sparsely in October, increases in November and reaches a peak through December/January, slackens off quickly, and nesting probably ceases sometime after the middle of January.
18. This, then, is the picture we have of the marine turtles situation in Ha'apai. During December 1979 a tagging and nesting survey is planned to take place. Hopefully twenty or twenty-five of the uninhabited islands will be surveyed by four groups of people. This will give us the best available information on the actual population of nesting turtles in Ha'apai, and by tagging the turtles we will hopefully get information on migrations of these turtles, etc. when they are caught by fishermen. Some hatchlings will be raised at the marine station at Sopu, mostly for studies on feeding and growth.
19. In the Vava'u group the composition of the turtle population is the same as identified in the Ha'apai group, viz: tungange - is most likely the Pacific ridley Lepidochelys olivacea; aleifua, probably the green turtle Chelonia mydas; fonu koloa, the hawksbill Eretmochelys imbricata; tufonu - possibly Chelonia agassizi. In discussions with fishermen, it was found that the main egg laying season is from November to January, though the gathering of turtles on the sea, off the nesting sites, begins as early as October.
20. The main nesting islands are in the southwestern area. They are Fonua'one'one, Fangasito, Folifuka, Foeata, and Maninita. These islands are relatively accessible and all should be declared seasonal breeding sanctuaries. Fishermen admit the islands are visited by people and the eggs taken. In the long-term, this practice could be disastrous for the turtle population in Tonga. Enforcement of sanctuary regulations should not be a difficult exercise if a fisheries station and regulatory staff were stationed in Vava'u. It is also possible that assistance may be solicited from international conservation bodies for funds to employ sanctuary wardens equipped with small fast patrol launches. The conservation of marine turtles has become an international issue of some significance. Tonga would gain considerable prestige if effective measures are taken now.
21. Turtle nesting is reputed to occur on Malinoa Island off Tongatapu. Nowhere else, on or around Tongatapu, do turtle nesting areas presently exist, mainly due to human production and interference.

22. Tonga must take some action to protect the marine turtles which feed and nest within her boundaries if turtle meat is to be eaten very much longer by Tongans. With sensible protection the population of marine turtles in Tonga should be able to tolerate the turtle catch being taken with the present methods. Any up-dated methods, including the spear gun method of catching turtles, would certainly cause the populations to dwindle quickly. The important point to be made is that the eggs must not be taken by people, nor the turtles congregating and breeding offshore, nor the nesting females. The breeding and nesting time is the most valuable period in a marine turtle's life, and protection from human predation must be given at this time or the population of turtles will continually move down toward extinction. Carr has said this many times; that "the greatest need is for inviolate sanctuaries where the capture of turtles is prohibited on or anywhere near the beach, and where no eggs are taken".

23. It is suggested that the Government of Tonga set aside seasonal sanctuaries for marine turtles. It is obvious that restrictions would be hard to police on the uninhabited islands where turtles nest, but there are only three inhabited islands in the Ha'apai group where turtles do nest. Most of the uninhabited turtle nesting islands listed in this report are government islands; a few belong to inhabitants of Ha'apai. If these government owned uninhabited islands were made off-limits to people during the months of November to January it would greatly aid the survival of the marine turtle population in Tonga. December and January are suggested because the peak season for nesting is December, and giving the eggs one more month (January) to develop would assure the eggs of not being taken for food by people. Enforcement of this would be the difficulty because the islands are so far away from main inhabited areas. The presence of the tagging and nesting survey groups going to these islands in December would help to keep poachers away. Also, beginning in September and October, explanatory information regarding these sanctuaries and the law could be given for a short time on the radio. This would help inform the people and explain to them that the long-range effects of this protection will help ensure a continued turtle population.

24. It is also suggested that a year-round sanctuary for all marine life, including turtles, be made on and around Malinoa Island, off Tongatapu. The shellfish, so badly depleted around Tongatapu, are abundant around some of the small islands off Tongatapu; Malinoa is included as well. With reports of turtles nesting on Malinoa, it being the farthest off Tongatapu and having its own reef makes it the best possible site for a marine reserve for the Tongatapu group. It can quite easily be patrolled as well.

25. It is imperative that these seasonal and year-round sanctuaries for turtles and marine life be set aside now, not next year or the next, because a dwindling population of living things will be at a much lower level, perhaps beyond the point of no return, if human action is not immediately taken.

26. The Government of the Kingdom of Tonga has already taken conservation measures such as the setting up of marine parks and reserves, and control over the killing of marine mammals. The marine turtles are protected during the peak nesting season from November to the end of January. Due to the widely isolated nature of the traditional nesting sites, enforcement of regulations is extremely difficult. Only a public awareness that the marine turtle is joining an ever-increasing list of animals which face extinction will stimulate enlightened administrations to take action. It may be too late now.



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Front cover: Indian Wild Asses.

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MARINE CONSERVATION IN TONGA

by W.A. Wilkinson

Fostering the concept of Marine Conservation in a subsistence society is not an easy task. South Pacific Islanders have traditionally believed that the reefs and lagoons always would continue to provide their annual bounty. Although this assumption has served islanders well for centuries, unfortunately the modern need to support increasing populations, coupled with changed fishing methods, has placed excessive pressures on these resources. In some areas destruction of reef habitats and over-exploitation of fish stocks has resulted. In recent years, the Kingdom of Tonga has had the foresight to see the dangers, and has taken remedial steps in time.

Perhaps the most significant of the Kingdom's efforts has been the establishment of a large marine reserve in the lagoon called Fanga'uta, situated in the centre of the main island of Tongatapu, as a fully protected area. This lagoon, an inland water area of some 2830 ha, is very shallow with deeper channels running through it from seaward. Actually an estuarine area, the lagoon serves as a vital nursery ground for many reef and other food fishes which are the main-stay of the local subsistence fishery.

The Lagoon also supports juvenile populations of grey mullet (*Mugil cephalus*) and several species of penaeid prawns, the most important commercially being *Penaeus semisulcatus* and *Metapenaeus ensis*. However, within the lagoon there is no commercial exploitation of these prawns, as bottom trawling has been found to be unselective and destructive, killing large quantities of juvenile food fishes, mainly in the snapper family (*Lethrinus* and *Lutjanus* sp.). The lagoon area is also an important breeding and nursery ground for these species. Actually, all commercial fishing in this area has been stopped, and effective legislation has now been promulgated giving legal powers to the Government's Fisheries Division to control the methods of fishing in this area; to pro-

tect the mangrove periphery; to ensure maintenance of habitats for valuable food fishes; to ensure control of the influx of noxious effluents harmful to fish stocks; and to control human developments along the lagoon periphery which might affect the ecosystem. The legislation has now been in effect for over 18 months and already local fishermen appear to have fully accepted the situation. Conditions in the lagoon have improved; for example there has been a marked improvement in the beds of the mussel *Modiolus agripeta* which has, in recent years, been over-exploited to near extermination of the population. Other species of shellfish, such as the clam *Codakia* sp., are also important features of the lagoon. Three species of the edible alga *Caulerpa* are also found in the lagoon, principally in very shallow areas. These have been used extensively by the local Tongans, and are a rich nutrient additive to their traditionally high carbohydrate diet of root crops. This resource has also suffered from excessive harvesting in the past.

The establishment of the Fanga'uta protected area is quite a significant accomplishment in the Tonga region, and already benefits to the ecosystem are noticeable. This will make the task of establishing similar protected areas elsewhere in the Kingdom an easier one. Legislation to establish Marine National Parks and Reserves in Tonga is already in existence, and several well-defined areas have already been set aside for this purpose. One such area includes recreational beaches, on the mainland of Tongatapu, which are favored areas for visiting tourists. The visitors will not be precluded from these areas but they will be required to observe basic rules of conservation. For example, shells and live corals will be protected and tourists are encouraged to observe the exotic reef fishes and coral formations in their natural habitats. Parks such as

not only as a source of protein but as a potentially more important form of land use. The trend is growing towards the application of more sophisticated types of wildlife management in order to achieve maximum production of protein and other animal products using a variety of wild species.

Another significant trend, growing amongst land use planners in arid regions, is the use of ecological criteria to assess the extent to which present forms of pastoralism are maintaining an environment that may sustain this use on a permanent basis. As more examples of mis-use come to light greater pressures may be expected from various sources to give priority to the stabilization of the environment, and to the development of appropriate forms of land use within these difficult environments. Inevitably, wildlife will eventually become more important in these areas. In areas where it has virtually disappeared wildlife can be re-introduced. In areas which would be suitable for cattle under proper management but which are now depleted, wildlife may be a temporary form of use, the species being carefully selected so that the plants especially favoured by cattle will be allowed to recover. In still other areas several species of wildlife may become a principal form of land use by virtue of their greater potential productivity, superior adaptation to the desert environment and beneficial effects on the health of the dry lands.

It seems important particularly in developing countries to recognize the management and utilization of the wildlife resource as another aspect of management. It can contribute to the recovery, or to the development and maintenance of pastoral lands in wood-land savanna and steppe regions; it can add extra value to some forested areas and be an important source of protein.

For almost all types of land use in marginal semi-arid areas, wildlife can be considered as part of a multiple use programme or as a potential form of use in its own right.

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THAI FORESTRY PLAN

The final result of the voluntary tree planting programme during the rainy season (June-September 1977) is 45,749 ha or about 14.31 percent of the target. The total number of trees planted is 9.9 million trees or about 216 trees per hectare.

from FOREST NEWS Vol 1(2)

(The actual goal of the Royal Forestry Department was 320,000 ha per year. It is, therefore, very unfortunate that less than 46,000 ha was planted. See also the article by Boonsong Lekagul and Jeffrey A. McNeely on the Thai Forests in TIGERPAPER Vol V no. 1. Ed.)

HOPE FOR RARE INDONESIAN DEER

The rare Bawean deer (*Axis kuhli*), which was being driven rapidly to extinction, may now be recovering as a result of enforcement of a ban on hunting in its sole habitat on Bawean island in the Java Sea.

In a report to the World Wildlife Fund, Mr. Raleigh Blouch of the University of Washington said that he thought between 200 and 400 of these small brown deer survived.

Bawean Island, 150 kilometres north of Java, has an area of only 200 square kilometres and a human population of 70,000. Less than a quarter of the island has forest cover, and of this 60 per cent has been turned into teak plantations in the last 35 years. Since the deer like dense, bushy vegetation the plantations are not much used.

The deer are extremely shy, probably as a result of hunting, and will abandon any areas where wood is being cut.

Mr. Blouch and Mr. Sumaryoto Atmosoedirdjo of the Indonesian Nature Conservation Department (PPA) are building up data on the deer's life and habits so that reserve areas can be established.

The decline in the population began during the second world war when local people were confined to the island and hunted the deer for meat. In addition agriculture has been taking over more and more of the deer habitat, and forests are cut for wood.

from WORLD WILDLIFE FUND-PRESS RELEASE
No 1/1978

these should be an attraction to tourists, a fact which has been proven elsewhere in the world.

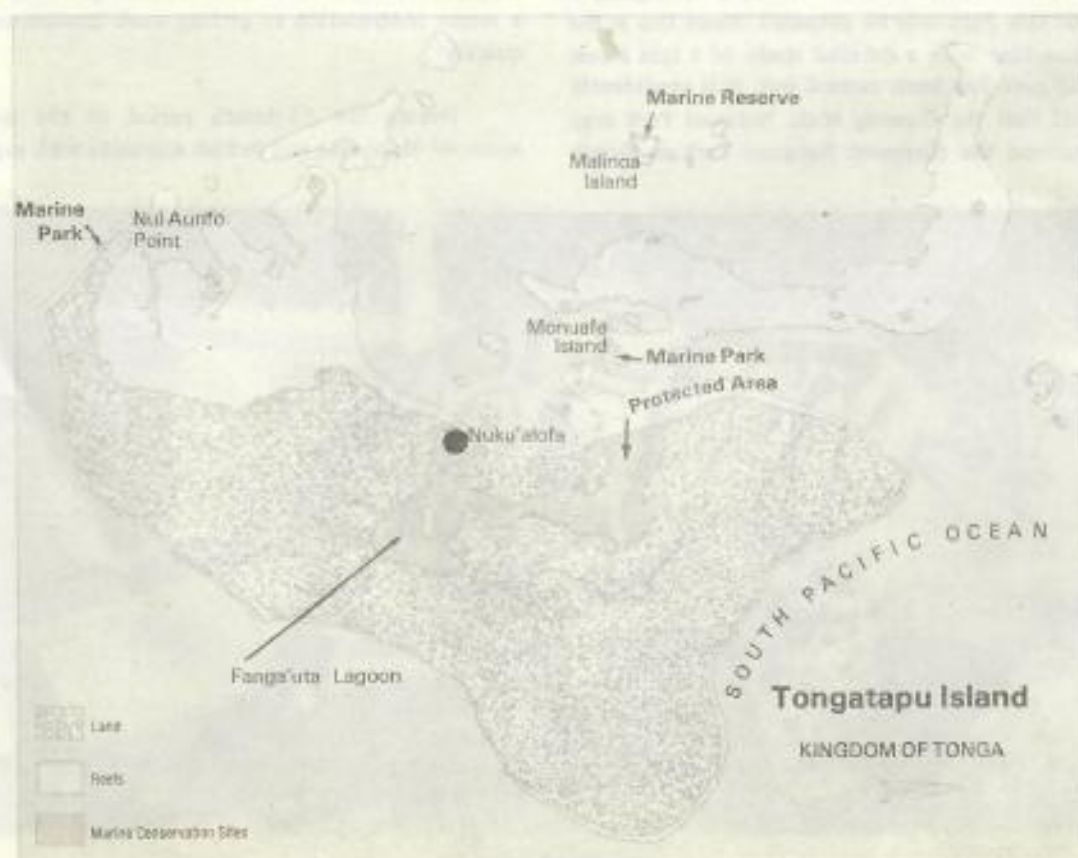
Two outlying islands also have been declared as Marine Reserves. The island of Malinoa, approximately nine miles north of Nuku'alofa, has historical as well as natural interest. There, in earlier times, would-be assassins of the then Prime Minister Rev. Shirley Baker were summarily shot beside their own graves. The graves are clearly marked and well tended to this day—perhaps an indication of some sympathy for the deceased. Nearer the capitol of Nuku'alofa the typical atoll called Monuafa has also been declared a Reserve. This is considered one of the best shelling atolls with a fringing reef of Stag's head coral. (*Acropora* sp.). This area has suffered recently from a local method of fishing—called "Tu'afeo" in Tongan—which is particularly destructive to habitat and fauna. The method is simplicity itself: a large coral head is encircled by a small mesh net, and then the coral head is systematically broken up and the small escaping reef fishes captured in the encircling net. All fish—unfortunately mostly very small specimens—are taken in this way, and the habitat itself is irretrievably destroyed. Creation of Marine Parks can effectively control this destructive method of fishing, which has devastating effects on

the long-term productivity of the reef.

In Tonga, we are pleased to note that the South Pacific Commission has recently appointed an Environmental Officer to its staff. He will be involved in the coordination of conservation efforts throughout the region, as well as advising on environmental policies, both terrestrial and marine. Hopefully, educational systems in the region will play their part in ensuring that environmental studies—even in the simplest terms—are included in the curriculums of both primary and secondary schools. Only by inculcating essential environmental concepts in the young people of the islands will we ensure the future preservation and wise use of island marine ecosystems, which is so essential for future food requirements, as well as the attractiveness of the islands to visitors. Though much remains to be done, the Kingdom of Tonga has made an encouraging beginning. We hope other Pacific Island areas will follow.

W.A. Wilkinson is Fisheries Officer, Department of Agriculture, P.O. Box 14, Nuku'alofa, Kingdom of Tonga.

from PARKS Vol 2 no.2 September 1977



Pea nau au atu ki ai, pea lea ange a Tuitatui: "Tahine, malo ae tau moe tuuhia ni." Pea lea mai ae tahine: "Io, malo pe ae fakaope i haka." Pea toe lea mai a Tuitatui, one pehe: "Ta nei nei te mau fu he sio, ikai te mau ilo ha hamaun, i haka: Ta koveni, oku i uta ni!"

Pea ne pehe: "Heka mai, ka tau ake." Pea pehe ange ae tahine. "Tau ake ki fe? Ki Tonga, pe ki motu ni? ke mou malo, pea tau toki folau apongi-pongi ki Olotete." Pea lea ange a Tuitatui, one pehe, "Vakai pe ka mea e faingofua, he nau mau sio ange oku loka ae ava." (Ko ene loipe; ka oku nongape ae ava.)

Ka oku kei lotolotonape a Tuitatui, pe koe tevelo pe koe mama. Pea lea mai ae tahine o ne pehe: "Oau teke ala, mo oua; he oku ikai ha mea e faingata, kapau oku ikai, ke atu, moona ae loka, kae ha ae loka. Ka oku takavale pehe e ae faingalona, pea mou haele ki Olotete, kau nifo au, he ikai ten heka au."

Pea toki iloi e Tuitatui, ta koe manape! Pea toki kode mai a Tuitatui, one pehe mai: "Tahine, fakamolemole, ka ke mea mai o heka ke tau folau ki Tonga. Kapau, e ikai, teke mena ni, te mau malape a i tahi ni." Pea toki heka ae tahine. Pea nau tau atu ki uta, pea feui ange a Tuitatui: "Tahine, kohu kon ko hafa?" Pea pehe mai e he tahine: "Ei, ko Nua sioku hinga." Ka nae toka iloipe a Tuitatui, che tahine, i he e nau tau ange, nae faingono he talanca ko Tuitatui koe ciki sin fuohi, pea lona, oku ikai ke pehe ha ulu o ha tangata. Pea stope ae tahine, pea ne iloi leva ko Tuitatui eni.

Pea na nonofo, pea fetama a Nua, pea faele, koe tangata ko Uanga; pea toe faele koe tangata ko Afulunga; pea toe faele, koe tahine ko Fatafahi; pea toe faele, koe tangata ko Sina. Nae toko fa ae fanan koin.

Koe ngane a Tuitatui ae langi ke Heketa, moe maka fanekinanga, moe langi ko Moungalafa. Nae toko fa ae fanan koin.

Pea nofonofo a Tuitatui, pea ne pehe inge: "Kau tama, fai mo fai haa mou igau, oku eni kei mou." Ko ene

And when they reached it, Tuitatui spoke and said: "Maiden, it is well your being here at the weather shore. And the girl responded: "Yes, and it is well your paddling on the reef." And Tuitatui spoke again, and said: "No wonder we got tired of looking, and not seeing any birds (indicating fish), on the reef. Why here it is, on the shore?"

And he said: "Come on board, and let us go." And the girl replied: "Where shall we go? To Tonga or to this island (Hekei) for you to rest, and to leave to-morrow for Olotete (Tuitatui's residence at Heketa, Tonga-tabu island)?" And Tuitatui answered, and said, "We will see which is the easier, because we saw the entrance was rough." (It was all his lies; the entrance was not rough.)

But Tuitatui was still undecided whether it was a spirit or a human being. The girl spoke and said: "Don't you go, don't, for there is nothing difficult if you do not go with unbecoming mind when the breakers are seen. But if you are in want of food, well, go to Olotete, and I will stay. I will not come on board."

Then Tuitatui knew that it was only a human being! Then Tuitatui begged her, and said: "Maiden, please, come on board so that we can leave for Tonga. If you don't come we shall die in this sea." Then the maiden went on board. And when they reached the shore, Tuitatui asked her: "Maiden, what is your name?" And the maiden answered: "My lord, Nua is my name." But the maiden knew who Tuitatui was, for when they arrived, she heard people saying that Tuitatui was the chief with the very big long head, and that no other man had a head like his. And the maiden looked, and knew at once that this was Tuitatui.

And they lived together, and Nua was pregnant, and gave birth to a son called Uanga; then to a second son, Afulunga; then to a daughter Fatafahi; then to another son called Sina. There were four children.

The works of Tuitatui were the terraced stone tomb at Heketa, and the resting stone, and the terraced stone tomb of Moungalafa. Four of his children are buried there.

And dwelt for a time Tuitatui, and said: "Lads, make haste and do your work, while I am still alive." He

pehe, ke ngaohi hano langi, ke fai he kuo vaivai. Ka nae ikai ke pehe ae loto e lau tangata. Koina nae fai aipe a Tuitatui, i he teitane, oe ngaohi oe Haamonga. Ka nae fai ange ae lau a Tuitatui, pea nau loto leva, ke nau ngaohi ha nae ki ni koe Haamonga-o-mui, ke oua nau toe auhi e ha taha.

Pea nau kumata ae ngane koin, aki ae inasi, o ngata mei he oku mui, ko Lokma, mo Futuna, mo Ues, moe ongo Nua, mo Haamonga. Nae ta ae maka e tohi, o to ae maka e utu, pea langa ia o tau. Pea tau o tau moe fanga maka ae kekele. Pea toki tekei ki olunga, o hiliaki, pea toe keli o fetuku ae kekele, o tau aki ae ngahi sis, ae nae tau ai a Tuitatui, kae tau ae Haamonga koe matanga.

Koe ngane a Uanga mo hono foto-tehina, ae Haamonga, moe langi i Mui, ko Langileka. Koe ngane a Uanga ae hiki ki Mui, i he lono ai a honau tuofine ko Fatafahi, ai oku vi koe na kakai e hono utulongoa. Nae fakakata e hono tuongoane ki mau.

Oku ikai ke iloi ae kau Tui Tonga, i he vahaa o Uanga, mo Tuitatui. Koe tana a Nua nae fai ki ai ae aokai. Pea oku ikai ke iloi ae kau Tui Tonga i he vahaa o Tuitatui, naane ngaohi a Heketa, moe Eiki nae to mei langi.

Koe ngane a Tuitatui, tehina o Fasi-pale, koe folo ia o Ngongokilitoto; ko in naane ilo a Sangone mei Haamonga, ko fekau e hono tehina Tui Tonga, ke ala o kumi a Sango: pea ne ilo.

Ko Sangone koe fonu ae tahine ko Hinahengi mei Pulotu. Nae hau ene ulu umes i mamani pea hake ki Mokotutu, o fakamoan ai pea fe mohe, pea tokoto o mohe. Pea hau ae

meant for them to prepare his terraced tomb, because he was getting old. But his men were not so minded. So Tuitatui urged the carrying of the earth, for the making of the Haamonga (the great tribulation of Tongatabu). But after Tuitatui had thus spoken they decided to make something that no one could ever surpass, and call it the Burden of Maui.

And they began this work with an aia ceremony, which was attended by the distant islands of Rotuma, and Futuna, and Uea, and the two Niua, and Samoa. They cut three stones and buried two of them which stood upright, and they piled up the earth till it reached the top of the two stones. And the third stone was rolled up the mound and placed on the top. Then the earth was dug and carried away to make the mound where Tuitatui was buried, while the Haamonga stood as an observatory.

The work of Uanga and his younger brothers was the making of the Haamonga and the terraced stone tomb at Mui, called Langileka. Uanga's work was the removing to Mui, his sister Fatafahi by her silence consenting, which was called by their people utulongoa (sis, carry; longosa, silent). And Mui was peopled by her brother later.

Unknown are the Tui Tonga between Uanga and Tuitatui. The child of Nua was the one to whom the provisions were brought, that is to say he was the Tui Tonga. And unknown are the Tui Tonga between Tuitatui, who made (the structures at) Heketa, and the chief (Ahoeku) that came from the sky.

This was the work of Tuitatui, younger (half) brother of Fasiapale, who was the son of Ngongokilitoto; he brought Sangone from Samoa; his younger brother the Tui Tonga sent him to seek Sangone and he found her.

TUITATUI AND THE TURTLE SANGONE⁴

Sangone was a turtle belonging to the lady Hinahengi from Pulotu. She (Hinahengi) came to wash her hair with clay in this world and came on shore at Mokotutu to dry her hair and

⁴ From a manuscript copied by E. M. Mahalo, a native attendant, from the account written by Romano Tongavale and corrected by the Tui Tonga Lavititonga. Translated by Miss Beatrice Shirley Baker.

Compiled by Edward Winslow Gifford

Pea nau au atu ki ai, pea len ange a Tuitatui: "Taahine, malo ae tau moe tuuliku ni." Pea len mai ae taahine: "Ia, malo pe ae fakaope i lakau." Pea toe len mai a Tuitatui, one pehe: "Ta neinei te mau fia he sio, ikai te mau ilo ha laumana, i hakau: Ta koeni, oku i uta ni!"

Pea ne pehe: "Heka mai, ka tau ake." Pea pehe ange ae taahine. "Tau ake ki fe? Ki Tonga, pe ki motu ni? ke mou malolo, pea tau toki folau apongi-pongi ki Olotele." Pea len ange a Tuitatui, one pehe, "Vakai pe ka mea e faingofua, he naa mau sio ange oku loka ae ava." (Ko ene loipe; ka oku nongape ae ava.)

Ka oku kei lotolotouape a Tuitatui, pe koe tevelo pe koe mana. Pea len mai ae taahine o ne pehe: "Oua teke ulu, mo ona; he oku ikai ha mea e faingatani, kapau oku ikai, ke atu, moona ae loto, kae ha ae loka. Ka oku takavale pehe e ae faingalona, pea mou haele ki Olotele, kau nofo au, he ikai teu heka atu."

Pea toki iloi e Tuitatui, ta koe mamape! Pea toki kole mai a Tuitatui, one pehe mai: "Taahine, fakamolemole, ka ke mea mai o heka ke tau folau ki Tonga. Kapau, e ikai, teke mea mai, te mau matape a i tahi ni." Pea toki heka ae taahine. Pea nau tau atu ki uta, pea fehui ange a Tuitatui: "Taahine, kohai koe ko huafa?" Pea pehe mai e he taahine: "Ei, ko Nua sioku hingoa." Ka nae toka iloipe a Tuitatui, ehe taahine, i he e nau tau ange, nae fungono he talanoa ko Tuitatui koe eiki ulu fuolahi, pea loloa, oku ikai ke pehe ha ulu o ha tangaga. Pea siope ae taahine, pea ne iloi leva ko Tuitatui eni.

Pea na nonofo, pea feitama a Nua, pea faele, koe tangata ko Uanga; pea toe faele koe tangata ko Afulunga; pea toe faele, koe taahine ko Fatafehi; pea toe faele, koe tangata ko Sina. Nae toko fa ae fanau koia.

Koe ngane a Tuitatui ae langi ke Heketa, moe maha fanekinanga, moe langi ko Moungalafa. Nae toko fa ae fanau koia.

Pea nofonono a Tuitatui, pea ne pehe ange: "Kau tama, fai mo fai haa mou ngane, oku ou kei moui." Ko ene

And when they reached it, Tuitatui spoke and said: "Maiden, it is well your being here at the weather shore." And the girl responded: "Yes, and it is well your paddling on the reef." And Tuitatui spoke again, and said: "No wonder we got tired of looking, and not seeing any birds (indicating fish), on the reef. Why here it is, on the shore!"

And he said: "Come on board, and let us go." And the girl replied: "Where shall we go? To Tonga or to this island (Euciki) for you to rest, and to leave to-morrow for Olotele (Tuitatui's residence at Heketa, Tongatabu island)?" And Tuitatui answered, and said, "We will see which is the easier, because we saw the the entrance was rough." (It was all his lies; the entrance was not rough.)

But Tuitatui was still undecided whether it was a spirit or a human being. The girl spoke and said: "Don't you go, don't, for there is nothing difficult if you do not go with unheeding mind when the breakers are seen. But if you are in want of food, well, go to Olotele, and I will stay. I will not come on board."

Then Tuitatui knew that it was only a human being! Then Tuitatui begged her, and said: "Maiden, please, come on board so that we can leave for Tonga. If you don't come we shall die in this sea." Then the maiden went on board. And when they reached the shore, Tuitatui asked her: "Maiden, what is your name?" And the maiden answered: "My lord, Nua is my name." But the maiden knew who Tuitatui was, for when they arrived, she heard people saying that Tuitatui was the chief with the very big long head, and that no other man had a head like his. And the maiden looked, and knew at once that this was Tuitatui.

And they lived together, and Nua was pregnant, and gave birth to a son called Uanga; then to a second son, Afulunga; then to a daughter Fatafehi; then to another son called Sina. There were four children.

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And dwelt for a time Tuitatui, and said: "Lads, make haste and do your work, while I am still alive." He

Compiled by Edward Winslow Gifford

here?" He replied: "I have come to seek the wind that destroyed my garden." The girl informed him: "The wind is my father. When he is awake the storms occur, but when he is asleep it is calm. Now you go along on tip-toe, for he is asleep. Take one side lock of his hair and make it fast to this big tree. Take the other side lock and tie it to that big tree. Then take the hair on his crown and fasten it to that big bunch of grass." Lekapai obeyed the instructions carefully. Then he stamped on the ground and the wind god awoke. The god knew that these things had been done unto him at his daughter's orders.

The wind god pleaded for his release, promising his daughter to Lekapai. Lekapai complied and unbound the god's hair, whereupon the latter said: "We will now go to the girl." They went to the damsel and the wind god told her and Lekapai to live together. He himself retired to his other premises in the bush.

Lekapai and the daughter of the wind god lived together for a considerable time. One day the girl went for a walk in the garden, leaving Lekapai behind in their house. She warned him: "While I am gone, do not go to the other part of the house, for my water hole is there." Contrary to instructions Lekapai went to see the water hole just as soon as the girl left. He fell in and could not extricate himself and consequently, on his wife's return, he was nowhere to be seen. She found him injured and imprisoned in the water hole.

The two continued to live together for some time after this incident. Then Lekapai said that he had a longing to return to Samoa. His wife acquiesced and told him to fetch a bunch of coconuts, whilst she told her mother, a turtle named Sangone, to prepare to take Lekapai to Samoa. When Lekapai returned with the coconuts, his wife told him that in case he broke out with an eruption while on the voyage, he was not to break a coconut on the turtle's head, but to crack it on her back. So Lekapai departed with the girl's mother for transport. On the trip he disobeyed his wife's instructions and cracked a nut on Sangone's head. Immediately, the girl was aware of her husband's act. Upon nearing the breakers on the coast of Samoa, Lekapai suggested that they go straight ashore and be stranded there. Then the treacherous fellow went and called the Samoans to the beach to kill the unfortunate Sangone. In having the turtle take him to the beach, he again disregarded his wife's wishes, for she had expressly asked him to leave the turtle in deep water.

Whilst the turtle Sangone was being cut to pieces, Lekapai went to sleep. Upon awakening he found himself back in the girl's house. She upbraided him and slew him, for she knew full well that her mother was dead in Samoa, that she had been eaten, and that her plates had been wrapped in a fine mat and buried beneath a candle-nut tree.

with. I thought you would understand my request for a perch for my pigeon, because you tried your riddles on my friends here; therefore I thought that you would know my request. I was talking about a woman." And Fasiapale replied: "Pardon, O Lafaipana, you are right, I now understand what you meant. We are not of one generation, but wait till I sail to Tonga, to bring you something to keep you warm." And Lafaipana said, "Don't, because you have been away a long time, and the 'Tui Tonga might be angry. But we will go, and dig up Sangone." And so they went and dug, and the tortoise shell came in sight and Lafaipana died at once, and was buried with fine mats in Sangone's grave.

And Fasiapale returned and brought the tortoise shell, and gave it to Tuitatui, and it was used as a god, and it was buried down to Lantifitonga. And when Lantifitonga became a Christian, he sold it to a European vessel, and that vessel went and sold it in Fiji. And the King, Maesaka (George L. Tupou), heard about it, and so he inquired in Fiji about Sangone, and he found some of the tortoise shell and brought it and kept it himself. And it is still in existence.

Pea folau mai a Fasiapale moe uno, o ange kin Tuitatui, o tuku ai koe tevelo, pea tuku fakabolo mai, o ngata in Lantifitonga. Pea lotu a Lantifitonga, pea ne fakatuu ki he vaka papalangai, pea alu ae vaka koka, o fakatuu i Fisi. Pea fanongo ai ae Tui, ko Macakafa, pea alu o eke i Fisi a Sangone, pea ne ilo, ae kongu uno iahi o Sangone, pea ne omai o tuku in te ia, pea eku kei tuku.

Pea folau mai a Fasiapale moe uno, o ange kin Tuitatui, o tuku ai koe tevelo, pea tuku fakabolo mai, o ngata in Lantifitonga. Pea lotu a Lantifitonga, pea ne fakatuu ki he vaka papalangai, pea alu ae vaka koka, o fakatuu i Fisi. Pea fanongo ai ae Tui, ko Macakafa, pea alu o eke i Fisi a Sangone, pea ne ilo, ae kongu uno iahi o Sangone, pea ne omai o tuku in te ia, pea eku kei tuku.

TUITATUI, LEKAPAI AND SANGONE⁴⁵
(A Variant)

It is said that there was a man named Lekapai and his family. After living together for some time, he said that they would remove to Samoa. They settled in Samoa and planted breadfruit, plantains, and yams. Suddenly a great storm arose and destroyed the plantation. Following the destruction Lekapai said: "Let us seek the wind and have a tussle with it."

So they set out in search of the wind. After Samoa was out of sight a little island appeared, but there was no opening through the reef which surrounded it. When close to shore a big wave upset the boat. Lekapai, however, made a bound and clung to a big *Mangona* tree from which he could look down. After a while he got ashore and found a small trail leading inland.

Lekapai went along this trail until he saw a beautiful girl standing beside her house. She inquired of him: "Whence come you that you enter

⁴⁵ The Tongan Prince Consort Tungi possesses a fish hook reputed to be a portion of Sangone's shell.
⁴⁶ Told by Unwai, of Pangai, Lifaka island, Haapai.

Upon hearing of Sangone's fate, the Tui Tonga prepared for a voyage to Samoa in search of Sangone's plates. When he arrived in Samoa he found the children playing with canoes at the shore. Among them was a boy named Lafaihana, who was the leader of their play. He called out: "Pay off and huff up to that dead candle-nut tree, for Sangone's plates are buried there." Thus the Tui Tonga by chance learned exactly where Sangone's plates were buried.

The Tui Tonga and his party went ashore and partook of kava while the food was being roasted. After a while the Tui Tonga exclaimed: "If only there were a bunch of wild plantains (of a kind called *pongiavao*) as a relish." The Samoans, however, did not know of this sort, so the Tui Tonga ordered them to search for some other sort of wild plantain that had been planted long ago. This was obtained and used as a relish to the kava. Then the food was brought from the oven and the Tui Tonga bade the people to sit down and eat. He apportioned the food, the back (*fakalaa*) and head (*haohua*) of the pig for one side, and the hind and front feet (*keumui* and *keumua*) for the other side.

Having finished the food, the Tui Tonga made declaration, saying: "What I have really come for is to search for Sangone's plates." The Samoans answered: "We know nothing about them." But Lafaihana cried: "They are buried under the dead candle-nut tree." Then the Tui Tonga said: "We will go and dig for them."

They went and dug. As they neared their goal the plates of Sangone shone forth and Lafaihana shouted: "Those are Sangone's plates." They dug further and, after completely uncovering the plates, took them up and bore them to the Tui Tonga. The Tui Tonga at once ordered preparations made for the return voyage to Tonga. Whilst the Tongans were preparing for the embarkation, Lafaihana asked that he be allowed to accompany the Tui Tonga to Tonga. To further persuade the Tongans to take him he gave them a thing that they much desired, namely, a pigeon's roosting perch. So Lafaihana accompanied the Tui Tonga.

Upon their arrival in Tonga, the Tui Tonga said he would have a casuarina tree on the weather side of the island cut down and taken to Samoa for Lafaihana, who had requested it. Whilst preparing for the trip for the casuarina tree the Tui Tonga's wife said: "Whoever gets a woman is not to bring her to Tongatabu, but to the other islands." When they reached the weather side of the island, Lafaihana said: "Do you think that I meant I wanted a real casuarina tree? I wish you to get me a girl that has not known a man and a woman that has not known a man."

THE THIRTIETH TUI TONGA, THE DUMMY OF TUI WOOD⁴¹

When the Tui Tonga Talaatama died, there were no sons to succeed to the title of Tui Tonga. He had, however, a younger brother who was but a child. This boy, whose name was Talaihaapepe, had a toy in the shape of a wooden doll, which he called Tama 'Tou. When word was brought to the boy that he was to be made Tui Tonga, he objected and desired that his doll, Tama 'Tou, should be made Tui Tonga instead. Of such weight was the desire of this child of high rank that no one dared to object. So the wooden doll was made Tui Tonga.

Several years later, Talaihaapepe became convinced that such a condition of affairs was foolish, and so he had it announced that the Tui Tonga Tama 'Tou was dead. The wooden doll was then buried with customary ceremony and mourning in the two-terraced stone tomb called Langi Tama 'Tou. After that Talaihaapepe became Tui Tonga.

THE TWENTIETH TUI TONGA, TATAFUEKIMIMUA

Tatafueimua, one of the two brothers concerned in the tale next related, is undoubtedly the twentieth Tui Tonga, Tatafuekimimua. The second version of the tale speaks of the chief of the expedition to Samoa as being the Tui Tonga himself, although his name is not given. The Tui Tonga's name differs only from that of Tatafueimua in this story in the insertion of the word *eibi*, chief. Tatafueimua: *tatafu*, to strike fire; *mai*, from; *mua*, the combined villages of Lapaha and Takamotonga, Tongatabu, where resided most of the Tui Tonga; hence, to strike fire from Mua. The brother of Tatafueimua was Nganatatafu: *ngana*, renowned; *tatafu*, to strike fire; hence, the renowned one who strikes fire.

NGANATATAFU BRINGS TUI BONITO TO HAANO⁴²

Tekua koe Tui Tonga e taha aae talo ua hono ika'olo, koe hinga oe lali ko Tatafueimua, koe si ko Nganatatafu. Nae noko pe i Mua a Tatafueimua, kae ala a Nganatatafu o noko ki Haano.

It is said that there was a Tui Tonga who had two sons, the name of the elder was Tatafueimua who became the twentieth Tui Tonga, and the younger was called Nganatatafu. Tatafueimua dwelt at Mua (in Tongatabu), and Nganatatafu went and dwelt at Haano (in the Haapai group).

Koe taimi koina, nae ongo mai ha felene, hohoi'ua nei Haamon ko Hina. Pea kavua ae lota o Tatafueimua i he ongoongo nae faa au mai, o ne pu'e ke ala o fai ene tango ki ai.

At that time came a report about a beautiful woman in Samoa called Hina. And the mind of Tatafueimua was taken up with the report of her that often came, and he said that he would go on a visit to her.

⁴¹ Told by Jusi Fungia, the chief who probably would be Tui Tonga today if the office had not been abolished.
⁴² From the original Tongan as published in the Western Methodist paper *Koe Vanogonogo*, vol. 1, pt. 7, pp. 7, 8, 1916. Translated by Miss Beatrice Shirley Baker.

Final Report for the year
July 1971 - June 1972
William & Janet Mauck P.C.V.'s
INTRODUCTION

1
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The main purpose of this report is to leave behind a brief idea of the work and ideas we have formed during our year here in Tonga. It is our hope that this will be of some help to those persons who will be interested in continuing work in the fisheries division. This report is not in great detail; so we have left all our raw data at the marine lab. in Sopa for anyone who wishes to read through it.

The projects we have been working on are in no way complete. There is still a number of aspects which we have not yet touched that perhaps should be dealt with before the project is to be considered finished. Some of these aspects are brought out in the discussions on the various projects and some are not expressed directly. There is a section on "Other Proposed Projects." This section is merely a chance to express some of the ideas that we have had as to those types of projects that might be useful and relevant to Tonga. These are only a few ideas which hopefully will provide a starting point for our successor.

We must apologize for the incompleteness of this report, as it was written in a relatively short space of time. We unfortunately must leave Tonga before our term is up and therefore we are unable to follow up many of our ideas and projects. We did not want to leave, however, without leaving some record of what we had accomplished and worked out for one year. Especially we did not want that was done to us when we came, (that is arriving without any indication of what really needed to be done in Tonga and what had already been done or attempted), to be repeated. We managed to dig out a certain amount of information to use but not enough for a good starting point.

There are many aspects of the Fisheries Division and Agriculture Department that we did not mention such as: The workmen, and the Ag. Trainees. We hope that whoever reads this report will also consult our two Ag. Instructors -- Taniela Koloa and Tevita Fusimalohi for more information. We included a section entitled "Hints" which comprises only a few of those things which we finally learned after months of stumbling around. We hope these will be useful and provide a basis upon which one may learn of the workings of the Department in a short time. We might add here that we do not expect this report to abolish that period of "stumbling around", not knowing exactly what to do and what is to

be expected, but rather will help to shorten the time period.

We urge those who read this report to also read through the correspondence files in the Ag. Office (Fisheries files and Survey file) and those at the marine lab. (Turtle correspondence and S.P.C. file), We also urge our replacement to keep in contact with us at the address below, if there are any questions.

Lastly we would like to express our appreciation to Mr. John Pitman (Director of Agriculture) for giving us free reign to do what we felt should be done and to Mr. Al Johnson (Peace Corps Director) for giving us encouragement as well as an occasional good meal. We also thank Taniela Koloa and Saia for suffering through our turtle survey with us and the S.T.A. for listening to our ideas. We especially wish to thank Leslie Fern and Villiam Langi for their support and willingness to care for our animals while we were away. Finally we wish to express our thanks to the U.S. Peace Corps for sending us to Tonga and mālo 'aupito to Tonga which provided the means and contry for our studies.

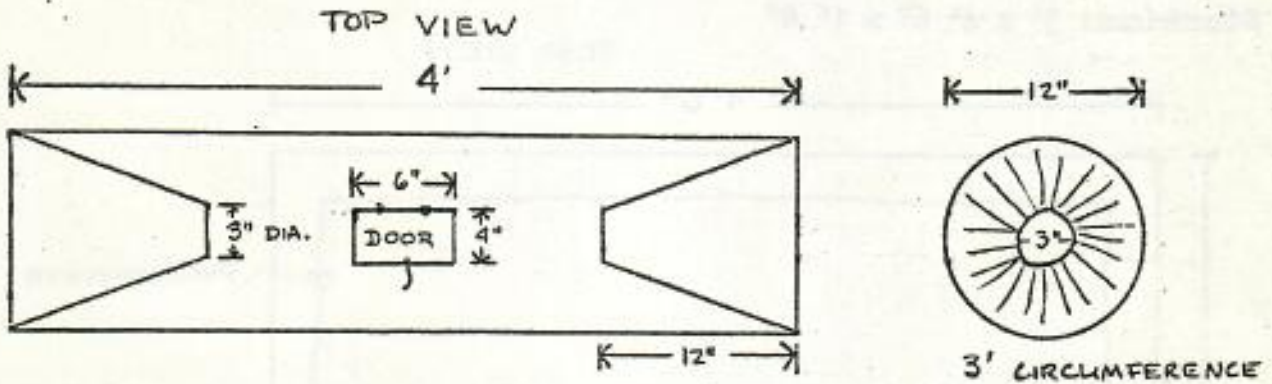
JANET & WILLIAM MAUCK
Rt. 1 Box 60KA
Eureka, Calif. 95501
U.S.A.

C. PROTOTYPE FISH TRAP

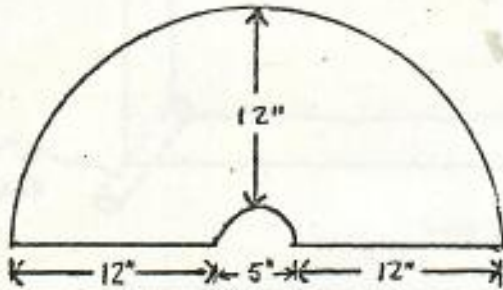
Traps baited with garbage or pig manure (tied in mosquito net to the bottom)
Used to catch Tilapia sp. from the pond to feed the pigs and turtles.

Plan; Proposed by William Mauck

Scale: 1" = 1 foot



TEMPLATE FOR CONE



Entire trap constructed with small mesh chicken wire ($\frac{1}{8}$ " mesh)

Materials: approx 1 section 6' x 3' per trap

Bait: Tied in pieces of mosquito netting; pig manure or
garbage set in trap or
cooked manioke set in trap

Problems: Sometimes the fish are very difficult to catch in the pond because
they get fed so well with the pig manure and washings.
All very successful if the fish are hungry

Suggestions: Perhaps a type of throw net ofcourse this might muddy up the pond

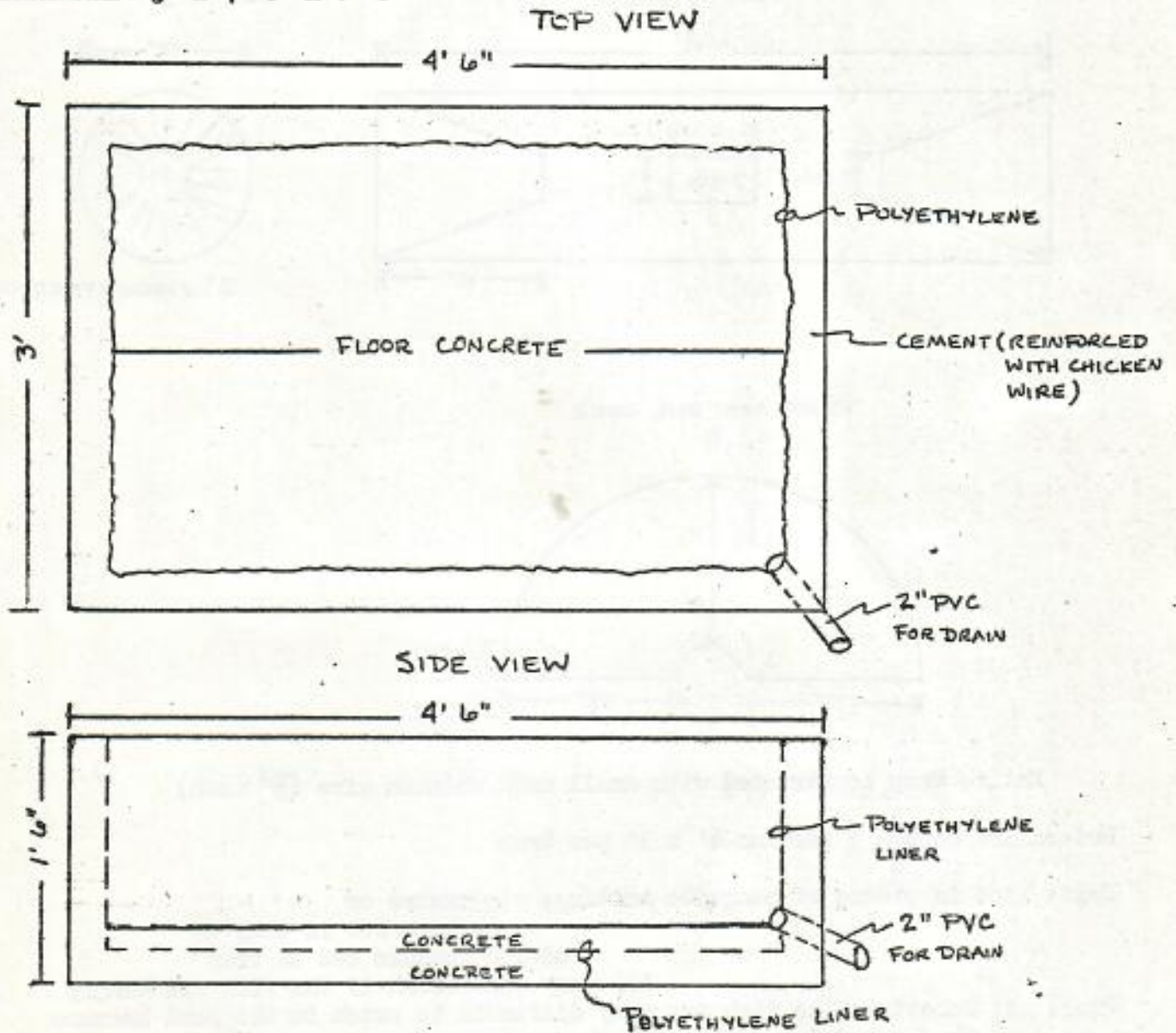
D. OUTDOOR TURTLE TANK

Purpose: To provide a larger area for the turtles: provide the turtles with open air, sunlight and a varied habitat.

Rough Plans

Scale: 1" = 1 foot

Dimensions: 3' x 4' 6" x 1' 6"



completely lined with plastic with concrete filler in bottom
outside structure reinforced concrete

Materials: 2 bags cement at \$1.50/bag , 22sq. ft. chicken wire for reinforcement of sides \$1.00 , 1 ft. piece of PVC pipe 2" in dia. , polyethylene plastic sheeting, lumber for forms either plywood, 1x4 or 1x6

Approximate cost: \$13.00 - materials and labor

2. TURTLE PROJECT

Original Proposed sub-project as presented to SPIFDA (SFC), Director of Agriculture and other Government Agencies.

Proposed Sub-Project

- 1) Title: Nesting and Tagging Study of Marine Turtle along with the Establishment of an Experimental Turtle Ranch in Tonga.
- 2) Scope & Objectives:
A thorough nesting census combined with tagging will be carried out from Nov.--Jan. in the Ha'apai Island group. This will be done in conjunction with the establishment of a turtle egg hatchery with an accompanying turtle ranch.
- 3) Justification:
The IUCN Marine Turtle Specialist Group at its Second Meeting recommended that this type of study should be given priority.
- 4) Background:
Very little is known about the population and nesting habits of the marine turtle in Tonga. Due to heavy exploitation of the marine turtle in this area there should be a population survey. Also the present population should be aided by hatchery management.
- 5) Budget:
Staff: One turtle expert will be necessary only about 2 weeks once a year.
Cost: US \$1,500 (mainly travel)
Equipment:
Scales, microscopes, dissecting scopes, thermometers, aquaria, pumps, fencing, concrete, etc.
Cost: US \$2,500
- 6) Other support:
Two U.S. Peace Corps Volunteers, both Marine Biologists.
The Department of Agriculture could provide local counterpart staff and labour, boat and fuel.
- 7) Source of finance: The World Wildlife Fund has been approached through the IUCN.

I. TURTLE SURVEY

A. List of islands in Ha'apai where turtles are known to nest (hearsay)

NOMUKA GROUP

1. Malatula Is.
2. Keama Is.^m
3. Mulifaiua Is.
4. Lalona Is.
5. Telekitonga Is.

HA'APIVA GROUP

3. Fomaiika Is.^{+m}
2. Lelakeka Is.

LIFUKA GROUP

1. Lima Is.^m
2. Nukurule Is.
3. 'Uiha Is. (North shore)
4. Luahoko Is.^m

+ Island rated no. 1 for nesting

= Islands visited and surveyed during Dec. survey and early Jan. survey (Lima Is. only)

B. List of uninhabited Islands in Ha'apai where turtles may nestNOMUKA GROUP

1. Mangoihi Is.
2. Tanca Is
3. Fetokopunga Is .
4. Telekivava'u Is.

HA'APIVA GROUP

- | | |
|------------------|-------------------|
| 1. Tokalu Is.. | 8. Kito Is. |
| 2. Makulai Is. | 9. Tesupa Is. |
| 3. Peapea Is. | 10. Fetoa Is.. |
| 4. Fakahiku Is.. | 11. Onoiki Is. |
| 5. Kogaloto Is. | 12. Kolo Is. |
| 6. Luanamu Is. | 13. Fomoimaka Is. |
| 7. Foua Is. | 14. Putuputua Is. |

LIFUKA GROUP

- | | |
|---------------------|------------------|
| 1. Uanukuhifo Is. | 7. Uoleva Is. |
| 2. Uerikuhahake Is. | 8. Niniva Is. |
| 3. Tofanga Is. | 9. Meama Is. |
| 4. Tatafa Is. . | 10. Kukunano Is. |
| 5. Luengahu Is. | 11. Ofolanga Is. |
| 6. Hakaata Is. | |

C. Equipment list.

- | | |
|---|---|
| 1. 8-2 $\frac{1}{2}$ gallon water containers | 12. food: talo-2 sacks |
| 2. 4-large sections of black plastic (tents, 30'x12') | siene - 15 stalks |
| 3. 1-roll twine | tea, sugar, some biscuits |
| 4. 1 primus stove | 13. scale for weighing turtles (U.S.P $\frac{1}{2}$) |
| 5. 2 Coleman lanterns | 14. ropes, 2 shovels |
| 6. 5 gal. fuel for lanterns | 15. calipers |
| 7. 2.5 gal. kerosene | 16. diving gear |
| 8. 3 large pots | 17. data sheets |
| 9. 1 large frying pan | 18. millions of fish hooks and fishing line |
| 10. cups, dishes, utensils | |
| 11. 3-2.5 gal plastic buckets | |
| 12. 2-2.5 gal plastic buckets | |

D. FINANCIAL AID

The survey was financed by the Ag. Dept.. If contacted early enough turtle experts around the world (esp. the U.S.) are willing to lend support by supplying tags, etc. U.S.P. will also help out by lending scale and supplying tags. (See correspondence ^{file} section for people to contact for information and help.) We tried to interest some organisations in helping to finance the survey, but they were uninterested at that time. Contact should be established again.

E. DATA (For complete data see turtle book in marine lab.)

6 Dec. 1971 Monday

Depart Nuku'alofa 1630 hrs. on 'Otumotulalo (owned by Peter Werner) \$2.00/person

7 Dec. 1971 Tuesday

Arrive Meama Island - Geo. Code No. WQKJ56 - 0530 hrs.

7 Dec. - 13 Dec. - Spent on Meama.

Island description

400 paces circumference at low tide

few coconut & lesi trees

old turtle nests on south side

1 new nest on southeast side

1 turtle nested 0200-0400 hrs. 13 Dec. Monday (at new nest location S.E side)

13 Dec. 1971 Monday

Depart Meama Island 1000 hrs. on the Fetu'u Tonga (hired for \$7.00/day of use)

Arrived Fomuifua Island at 1300 hrs.

13 Dec. - 15 Dec. 1971 Spent on Fomuifua Is. waiting for boat.

15 Dec. 1971 Wednesday

Depart Fomuifua Is. at 0800 hrs. on the Fetu'u Tonga.

Arrived Fomuaila Island at 1400 hrs. - Geo. Code No. WQKJ 46

9 recent turtle nests counted

1 turtle nested between 2200-2400 hrs.

1 nest layed the previous nite. (Dec. 14)

fast current around the island. Made fishing & swimming impossible.

15 Dec. - 20 Dec. 1971 Spent on Fomuaila Island

20 Dec. 1971 Monday

Depart Fomuaila Is. at 1000 hrs. on the Fetu'u Tonga.

Arrive Uluu Island 1500 hrs.

E. DATA con't

21 Dec, 1971 Tuesday

Departed Uiha Is. at 0700 hrs. on the Fetu'u Tonga.

Arrive Pangai at 1000 hrs.

Departed Pangai at 1500 hrs. on a boat owned by V. Koloa

Arrive Ha'ano Island at 1800 hrs.

21 Dec. - 30 Dec. 1971 Spent on Ha'ano Is.

30 Dec. 1971 Thursday

Departed Ha'ano Is. at 1100 hrs. on Fungamitca (Ha'ano boat)

Arrive Luahoko Island at 1300 hrs. - Geo. Code No. WQKJ 31

30 Dec. 1971 - 3 Jan. 1972 Spent on Luahoko Is.

4 recent turtle nests counted

1 of these nests had been dug up and the eggs removed

no turtles nested while we were on the island

3 Jan. 1972 Monday

Departed Luahoko Is. at 1100 hrs.

Arrive Pangai at 1000 hrs.

4 Jan. 1972 Tuesday

Departed Pangai for Tongatapu on 'Olovaha at 1400 hrs.

5 Jan. 1972 Wednesday

Arrive Nuku'alofa at 0100 hrs.

10 Jan. 1972- 12 Jan. 1972 Taniela Koloa on Lina Island.

Taniela dug up one clutch of turtle eggs and packed them in a box in sand.

14 Jan. 1972 Friday

box of turtle eggs sent on 'Olovaha to Nuku'alofa

15 Jan. 1972 Saturday

eggs arrived in Nuku'alofa and taken to marine lab

16 Jan. 1972 Sunday

turtle eggs buried in sand bordering the fish pond

F. DISCUSSION

To conduct a survey which involves travel to uninhabited islands is not very easy to do if local transportation is to be relied upon. Local transport, vaka lā (sailboat) is inexpensive, Generally 6 - 8 Pa'anga (T\$) / day of use. There is, However, a risk in taking local transport; viz. it can not be relied upon to be at anyone place at a specific time. In spite of this inconvenience the captains of the vaka lā's are probably the best seamen around and certainly know the area best. Ideally a powerboat should be used so that one doesn't need to depend as much on the weather conditions for travel. The best approach, I think, is to assume that you are going to remain on an island for longer than planned and therefore if enough supplies are brought along there should be no problem.

Cigarettes are good to carry for gifts and in many cases may be used for exchange of food, etc. Not all the inhabited islands have fale kolca's (small stores). To land on most all the islands the vaka lā is moored outside the reef and the loads are taken over to the island by a popau (canoe); so careful packing will be helpful if things go overboard. We used old banana crates for packing everything except our mohenga (bedroll). Using plastic around everything is the only way to keep equipment dry since this is the wet season. The plastic can also be used as water catchment when it rains.

It was unfortunate that we did not see any turtles nesting during our survey. There may have been some problem with lights at night scaring away turtles, since we could not always regulate everyone on the island. As regards to people taking and eating the eggs while you're on the island, we found the best way to stop them is to tell them you're doing a scientific study and you have coated the eggs with a chemical which makes the eggs poisonous to eat.

G. CONCLUSION

We strongly feel that the marine turtle population in Tonga is in danger of becoming extinct. From the nests observed during the survey it is obvious that there are no longer great numbers of turtles nesting. The fishermen and people of Ha'apai remembered that there was a time when the turtles were more numerous and easier to catch (while nesting). There was one incident of men eating recent turtle eggs that happened on Mon. 13 Dec 1971. The fact that this is against the law has no effect upon the people since the law is not enforced. The proposals we made as a result of this survey are presented at the end of the report submitted to the

G. Conclusion (cont'd)

Director of Agriculture (see sect. H.)

We also recommend that a survey be done next year in the hopes of determining if the green turtle nests ~~are~~^{have} in Tonga off not. Ideally a survey should be conducted every year throughout November, December and January, however, December is perhaps the best month and therefor the most critical time for the survey.

19 January 1972

H. TOPIGA TURTLE SURVEY

Submitted by: William & Janet Mauck

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I. Itinerary

6 December 1971 -1630 hrs. - Left Maku'alofa
 7 " " - 0530 " - arrived Meama Island
 13 " " - 1000 " - depart " "
 13 " " - 1200 " - arrive Fonoifua Island
 15 " " - 0800 " - depart " "
 15 " " - 1400 " - arrive Fomuaika Island
 20 " " - 1000 " - depart " "
 20 " " - 1900 " - arrive 'Uiha Island
 21 " " - 0700 " - depart " "
 21 " " - 1800 " - arrive Ha'ano Island
 30 " " - 0800 " - depart " "
 30 " " - 1100 " - arrive Luahoko Island
 3 January 1972 - 1100 " - depart " "
 3 " " - 1800 " - arrive Pangai
 4 " " - 1400 " - depart "
 5 " " - 0100 " - arrive Maku'alofa

II. Summary of Survey Results

A. Meama Island (Geocode No. WQJ45)

This island is located about 1 mile NW of Fonoifua Island. It is uninhabited and about 400 yards in circumference with a steep sand beach surrounding the entire island. It has a fringing reef which varies from 50 - 75 yards in width.

When we arrived we found only 2 recent turtle nests, approximately 1 - 2 weeks old. Throughout the nights we stayed on the island, checks for nesting turtle were made every 2 - 3 hrs. Only one turtle nested while we were on the island, that being on Monday 13 Dec., 1971 between 2 - 4am. Unfortunately the turtle came to shore, layed her eggs and returned to sea inbetween our beach checks, so we have no idea what species it was.

The weather during our stay was bad. From 7 December - 12 December there were strong winds, much rain and moderate to heavy seas.

B. Fomuaika Island (Geocode No. WQJ46)

This island is uninhabited and about $\frac{1}{2}$ mile in circumference. There is a sand beach around the total circumference except for a 75 yard stretch on the northeast end which is broken limestone. On the south shore there is limestone, sheet-like that is exposed during low tide.

IV. RECOMMENDATIONS

We recommend that Fonuaika Island be made a turtle sanctuary. Since this island is government owned this could be done easily by law or by decree of the government.

We further recommend that two men be placed on the island sanctuary to protect the eggs and raise the young turtles in water tanks constructed of cement or 55 gal. oil drums to the age of 1 to 3 months. This would raise the survival rate of the young turtles considerably thus allowing more turtle to reach maturity and this in turn would increase the breeding turtle population in Tonga.

There have been studies made in other parts of the world to show that under natural condition only 1 - 15% of the turtles hatched reach maturity. That means that out of one nest of 100 eggs usually only one turtle reaches maturity. But if the turtles are reared in captivity for at least one month the survival rate to maturity increases markedly, say 15 - 20%. If the turtles are raised even longer than one month the survival to maturity increases even more.

Also we recommend that new laws, those now before Parliament, be passed and strictly enforced.

If one or more of these recommendations is not enacted within the next year it is our firm belief that the breeding population of marine turtles in the Tongan area will be doomed to extinction due to nothing but the lack of foresight of the Tongan people and the Tongan Government.

The marine turtle in the past has been a large protein source and source of raw materials for crafts for the Tongan people. The number of marine turtles now caught is much lower than 25 years ago.

In the future, unless some action is taken to protect the marine turtles in Tonga, their population will diminish thus reducing the sources of protein and raw materials for crafts for the swelling Tongan population.

We believe that the minimum protection needed to insure the turtle population survival in Tonga in the future should be:

- 1) More protective laws and better enforcement of those laws and,
- 2) The establishment of small turtle rearing stations on at least one of the turtle nesting islands in the Ha'apai Group as mentioned above.

William & Janet Mauck
Peace Corps Marine Biologists

WJM/wjm

II. LAB. REARING STUDIES ON HATCHLING HAWKSBILL TURTLES: MARINE LAB. SOFU

A. PURPOSE:

Our main purpose for conducting studies on rearing hatchling Hawksbill turtles was to ascertain what would be required to raise young turtles on Fonusika Isl.

B. MATERIALS AND METHODS:

MATERIALS:

- 1. One (1) clutch of 131 eggs from Liru Island, Ha'apai was carefully transported to Sofu via the 'Olovaha. They were buried in the sand of the front dike (pigger side) of the pond 16 Jan. 1972
- 2. Plastic tubs -- 10 purchased 5 used for turtles
Chicken wire covers
- 3. Tilapia (small ones) from the pond were used for feeding
- 4. Outside cement tank built later -- 6 May 1972

METHODS:

- 1. Newly hatched turtles were put in plastic tubs that were filled with approx. 4" of seawater.
- 2. Turtles not fed until day 5.
- 3. Fed chopped whole Tilapia, live whole small Tilapia, live large Tilapia, and small shrimp (at various times and in various combinations)
- 4. Water was changed 2 - 3 times per day. An effort was made to have the new water at the same temperature as the old.
- 5. The plastic tubs were scrubbed with a brush each change
- 6. The outside tank is cleaned once per day in the evening when the turtles are moved inside to their plastic tubs.
- 7. The turtles are marked by tubs for use in recording weight and length measurements.

7/87

C. DATA (for complete raw data see turtle data book in the marine lab, Sogu)

1. 16 Jan. 1972 - eggs from Ha'apai (Liru Is.) buried at Sogu.

2. 9 Mar. 1972 - 66 of the eggs hatched.

At 1100 hrs. was digging to collect an egg to examine and found live hatchlings.
Turtles headed for the pond not the ocean.

22 turtles transferred to tubs.

44 turtles released in ocean.

Small dead Tilapia put in tubs with turtles, nothing eaten.

Hatchlings swam constantly.

3. 13 Mar. 1972 Day 5

Began feeding.

Diving beginning not very good.

Suggest Hawksbill.

4. 22 Mar. 1972 Day 14

Grouped & measured- see table 1

Staying down long enough to swim under water.

Identified as Hawksbill, Eretmochelys imbricata.

1 runt noticed from group 1.

5. 24 Mar. 1972 Day 16

Feces first noticed.

Noticed feeding preference for red (fish gills).

6. 31 Mar. 1972 Day 23

Diving time approx. 60 sec. \pm 2 or 3 sec.

7. 2 April 1972 Day 25

Measurements taken- see table 1.

8. 21 April 1972 Day 44

Measurements taken- see table 1.

Increased consumption of fish as they grew older.

9. 30 April 1972 Day 53

Measurements taken- see table 1

10. 9 May 1972 Day 62

Moved turtles outside into large tank, turtles were marked.

Tab 1 - no cut

Tab 2 - left anal projection cut

Tab 3 - right " " "

Tab 4 - right side cut

Tab 5 - left " "

From now on turtles were moved outside and left outside all day, moved inside to tubs at nite.

C. DATA con't

11. 12 May 1972 Day 65

One turtle found dead, caught under rock in outside tank and drowned, from tub 2 - weight 70+ gm.

12. 24 May 1972 Day 77

Measurements taken- see table 1

13. 27 May 1972 Day 80

19 turtles marked & released in ocean.

Marked by one notch on each side of carapace.

TABLE 1

Day	14	25	44	53	77
Length of carapace in mm Average (range)	42.5 40-44	48.5 43-52	--- ---	62.9 51-70	71.4 51-82
Width of carapace in mm Average (range)	33 30-35	39.5 33-43	--- ---	54.9 45-61	63.5 45-71
Length of plastron in mm Average (range)	37.5 35-40	42 37-44	--- ---	52.8 42-60	60.2 42-70
Width of head in mm Average (range)	13.5 13-14	14.5 13-16	--- ---	17.8 15-20	19.1 15-21
Weight in gm Average (range)	25 ---	28 20-30	40.4 21-62	54+ 20+-80	73+ 20+-110

D. INFORMATION FROM OUTSIDE SOURCES

1. All the marine turtles are eaten in Tonga. The Green turtle is most commonly caught. As far as we know only Green and Hawksbill turtles are in Tonga.
2. Common Tongan names for marine turtles and turtle products.

Fomu -	Turtle
Fomu Tu'a'uli-	Turtle with black back (green turtle ?)
Fomu Tu'alala-	Turtle with red back (green turtle ?)
Fomu Tu'apolata-	Turtle with back shell breaking up (kind ?)
Fomu Koloa-	Hawksbill turtle
?Tu Fomu ?-	Loggerhead
Tu'a'i Fomu-	Turtle shell (the back)
3. Keys to the various species of turtle may be found among the literature in the lab at Sopo.
4. Hawksbill turtles dive at a very early age, whereas hatchling green turtles do not.
5. Information from Western Samoa turtle research:

1 turtle egg	= 1½ ozs. of protein
1 5 yr. old green turtle	= 56 lbs. meat
	= 17 lbs. refined oil
	= 9 lbs. edible cartilage
1 10 yr. old green turtle	= 125 lbs. of meat
	= 48 lbs. refined oil
	= 16 lbs. edible cartilage

Note: See marine lab for literature on turtles and Western Samoan proposals.

E. DISCUSSION:

As far as we are concerned this project was a success. Raising young hatchling Hawksbills is very easy provided there is a ready source of food (preferably fresh fish) and clean sea water. Turtles are rather dirty animals and the water must be changed often (how frequent depends on the size of the container). The outside tank at the Marine Lab., Sogū is adequate for use on Fomualika Island for the proposed hatchery. It requires change only once a day. Provided the turtles are released after 1 or 2 months the tank is adequate for at least 35 turtles.

According to Alan Banner formerly working at the turtle hatchery in Western Samoa, if the turtles are to be released they should be handled as little as possible and fed at odd (not regular hours) hours, as well as being fed a varied diet. We always tried to keep live fish in with the turtles so they might get used to trying to catch live food and for the visual stimulation. The turtles often chased the live fish and even managed upon occasion to kill them.

More regular data on weight and measurements should be kept. Preferably weekly data should be kept. We did manage to keep relatively accurate data of the number and size of fish we were feeding the turtles. These records are kept in the Marine Lab.

The rearing study was done with hawksbill turtles only. It is known that the hatchling green turtles are carnivorous when young. We think that the methods and materials used to rear the Hawksbill turtles would be applicable to rearing green turtles.

F. CONCLUSION:

The turtle rearing project is most certainly not only a success but also very easy; not requiring complicated methods and materials. We feel that Tonga should begin on a larger scale to raise hatchling turtles and therefore replenish the breeding population. Perhaps in the future studies could be done to determine the possibility of raising $\frac{1}{2}$ the hatchlings commercially, but never any more than $\frac{1}{2}$ and not until it has been determined that protecting eggs and nesting turtles and raising them 1 - 2 months before release is really aiding the population. To determine this last point a turtle survey should be conducted 5 years after release of the turtles since the Hawksbill reaches maturity at 5 years.

III. PROJECTIONS

We strongly believe that action should be taken to preserve the marine turtle population in Tonga as well as general conservation of all the marine organisms. If the new laws are passed, enforced and above all understood (through education) there is a good chance of saving the marine turtle which is a source of protein and material for jewelry as well as an important member of the marine ecosystem. At the present level of population of turtles in Tonga means of raising them should be undertaken as well as law enforcement for protecting the eggs and adults. If these proposals outlined at the end of sect. I. II. are not carried out and if the present rate of exploitation continues Tonga shall lose their marine turtle population within 5 - 10 years. If the present rate of exploitation

EDUCATIONAL ASPECTS
OF THE
FISHERIES DIVISION

The Agriculture department, especially the Fisheries Division, cannot work alone and apart from the other departments, especially the Education Department if we hope to accomplish anything. Educating the people as to the reasoning behind the changing laws and various projects is very important. Our best contacts are through the Science Teachers of Tonga since they are the experienced teachers. We provide them with some of our ideas and they teach them.

During the time we have been here we have been in contact with the Science Teachers Association (S.T.A.) (contact Rodney Hicks, Tonga High). We have attended a few meetings and on occasions contributed to their monthly meetings. The Marine Lab. has been made available for teachers who wish to learn and use the resources and equipment in the lab. We certainly hope that there will remain the open invitation for teachers and students to use the lab.

We have tried to be as helpful as possible to the Science Teachers by providing information on the types of things which may be helpful to them for classroom studies. On one occasion we worked directly with a teacher in planning a intertidal reef flat field trip.

Asking the Science Teachers (through the S.T.A.) to discuss conservation in the classroom (using examples from the laws) would help our work on passing new laws, understanding them and hopefully would make enforcement easier.

REFERENCE COLLECTION:

There has been started a reference collection on marine organisms that is kept in the marine lab. This collection at present deals mostly with the invertebrates (especially those that are most commonly found at low tide). It is our hope that this collection will be expanded to include the fishes and subtidal marine organisms. At present most of the work has been done by a volunteer working for the Ed. Dept. (Leslie Fenn). A copy of her report will be available in the marine lab as well as from the Ed. Dept. There will be a replacement for her when she leaves to continue work on the collection.

The specimens are numbered for easy identification. There is a list of the specimens kept in the marine lab that includes: no. of the specimen, English name, scientific name, Tongan name, and description (habitat, location, color, etc.). We hope that it will be possible to send some specimens to Fiji (U.S.P.) or to Smithsonian, or some other institution for positive identification. This collection and the reference books that are used in connection with identification are to remain available to anyone interested in using them.

A number of people are interested in receiving information on Tongan-English names for marine organisms. Two of the people interested are:

Wendy Rogers
Dept. of Anthropology
Uni. of Auckland
Private Bag,
Auckland, New Zealand

Dr. Albert Barnes
Dept. of Zoology
Coconut Island,
Uni. of Hawaii
Hawaii

1. FISHERIES CO-OP

Special consultant, John Fyson boat designer with SPIEDA, is working on a design for a boat to be used for the establishment of a fishing co-op. It is to be a 35 foot ferro-cement, large displacement type boat.

More research should be done before establishing a co-op. Our idea is the following: A large displacement boat, home port in Nuku'alofa, would travel to Ha'apei and Vava'u with ice and pick up fish from the local fishermen. They, in return would receive some ice for their local ice box. The boat would return to Nuku'alofa after 10 days and sell the fish at the fish market. There is a ready market in Nuku'alofa for as much fish as can be brought in.

We got this idea from the fishing co-op that has been set up in Fiji under the direction of the Fisheries Division. The Fisheries Division in Fiji should be contacted for more information.

In American Samoa there is another type of fishing co-op that has just been started. A group of fishermen pool their money and build a boat from the plans supplied by the Fisheries Division. The boat is a high-speed, deep-sea day boat used for fishing tuna, mackerel, etc. The cost (approx.) is 4,000 dollars for the materials including the motor. This would be a good project to look into. The government would have to put up the money on loan and then the fishermen would repay the loan from their profits of selling fish caught by use of the boat.

2. BÊCHE-DE-MER

We believe that the Bêche-de-mer (sea cucumber) fishery in Tonga could be developed into a profitable export industry. We have not really done any research into this possibility except that the Tongan people eat great numbers of certain types of sea cucumbers. Morefield work is needed to find out what species are in Tonga and their abundance as well as their location.

A special consultant from Ceylon, Kemasathipillai Sachithanathan, working with SPIEDA did a comprehensive study of Bêche-de-mer in the South Seas. The first paper of his study, Market Survey, is in the fisheries files along with some pictures of the acceptable species of sea cucumbers. His final report should be available soon thru SPIEDA.

We identified a few species here. The slides are labeled as to which ones we think are found in Tonga. A copy of the report by Leslie Fenn, Department of Education, will give more information as to which species may be found in Tonga.

Appraising Urban Homesteading

Urban homesteading has caught the imagination of many city people. This may be because of what on the surface appears to be a simple process. Houses abandoned, vacant, and under public ownership are sold for a minimal price (usually one dollar) to those in need of housing and who could not otherwise afford their own home. The abandoned house serving no function except to add to neighborhood blight is again made useful.

Unfortunately, there is one complication. Even though many homes are structurally sound, repairs, often costing thousands of dollars, are required before they can be made to comply with housing codes. In addition, there is usually a limit to the amount of time a city will give a homesteader to bring the house up to code.

Homesteading, then, does not offer a family a house for a dollar; however, it does help cut costs. First, of course, there is a substantial reduction in total overall cost when the house is deeded over for a dollar. Second, in rehabilitating the house, the owner saves when he can do some or many of the repairs himself. This is commonly referred to as "sweat equity." Having enough time and sufficient knowledge to undertake repairs oneself, finding money to finance renovation, and even, in some locales, the requirement that certain kinds of repair be done by licensed tradesmen, are often among the obstacles the urban homesteader faces.

The eight cities listed below are those currently operating an urban homesteading program, according to information furnished by the office of the Assistant Secretary for Housing Management, Department of Housing and Urban Development. For details on how a specific program works, as well as information on what kind of assistance is available to help the homesteader solve some of the most common problems, it is suggested that the persons named for each city be contacted.

Atlanta, Georgia

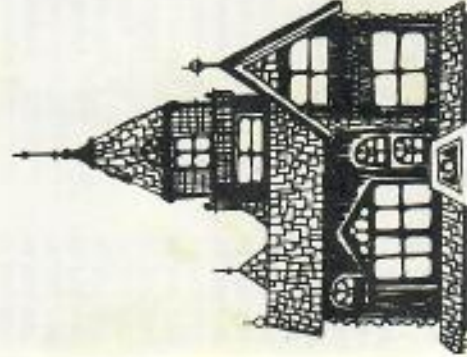
Roy Norman
Director of Research and
Development
Department of Community
and Human Development
673 Capitol Avenue, SW
Atlanta 30315

Baltimore, Maryland

Roger M. Windsor, Director
Home Ownership Development
Program
401 North Charles Street
Baltimore 21201

Minneapolis, Minnesota

R. James Harrington, Director



An endangered Species

Tonga's Sea Turtles



NUKU'ALOFA, Kingdom of Tonga — Most people in this tiny South Pacific island kingdom can't imagine there won't always be sea turtles to eat, because there always have been. Even though they have killed turtles for food with traditional Tongan slings for generations, enough turtles were left to perpetuate the species and provide a good supply of meat.

But that was before the spear-gun was introduced, notes Peace Corps volunteer Richard D. Braley of New Lenox, Ill. Braley is a marine biologist who has been documenting the deadly impact of this modern innovation on Tonga's turtle population. Unless protective measures are taken, he and his colleagues have warned the Tongan government, the turtle population will disappear in five to ten years.

Braley, 25, is working in Tonga to help protect threatened marine species and to study the best ways to utilize and develop the country's marine resources. He was recruited for volunteer service jointly by the Peace Corps and the Smithsonian Institution under a special program to provide skilled environmental assistance to developing nations.

Braley recently completed his first two-year term of Peace Corps service in Tonga and signed on for an extra year to continue his work with the Tongan fisheries department.

He is currently working on two major experimental projects aimed at eventually producing more food and income for the kingdom of 95,000 people. They are a pilot project to test whether

PCV Braley measures water temperature of fishpond.

declined, compared to previous surveys, and turtles were already extinct on some islands once they bring it in.

The fisheries department hopes to develop the outer reef fishing industry, possibly with the assistance of foreign governments. Braley is gathering information on the kinds and numbers of bait fish that could be used for deep sea fishing.

The fisheries department is only about five years old, and all its projects are experimental, Braley pointed out. "We're just in the beginning stages. That's good - you can do things the way

Minneapolis Housing and Redevelopment Authority
217 South Third Street
Minneapolis 55401

Philadelphia, Pennsylvania

Aubrey Myers, Director
Office of Urban Homesteading
502 City Hall Annex
Philadelphia 19107

Rockford, Illinois

Barry N. Feldman, Director
Department of Community Renewal
401 West State Street
Rockford 61101

St. Louis, Missouri

Joseph Backers, Director
Land Reutilization Authority
317 City Hall
St. Louis 63103



Washington, D.C.

Nadine Winter, Director
Hospitality House, Inc.
337 H Street, NE
Washington, D.C. 20002

Wilmington, Delaware

Theodore Spaulding, Director
Urban Renewal Division
200 West Ninth Street
Wilmington 19801

Editor's Note:

InterACTION would like to hear from volunteers who may have been involved with urban homesteading as part of their ACTION service.

oysters can be farmed successfully in Tongan waters and an effort to develop the deep water fishing industry outside the reefs which fringe many of Tonga's 150 islands.

Braley's base of operations is the fisheries department's small Sopa marine station, located on the main island of Tongatapu near the capital city, Nuku'alofa. At the station are both his laboratory facilities and his home, a small tin-roofed thatched house.

When he first came to the Friendly Islands, as explorer Captain Cook dubbed the Tongan archipelago in the 1770's, Braley went to work on the problem of conserving the marine turtles. Several months of nesting surveys and tagging produced sad- dening results, he reported.

The nesting population had

ACTION Reorganization

(Cont. from Pg. 1)

The reorganization, ACTION Director Mike Balzano says, will achieve the following goals:

- Tie recruiting to programming.
- Shorten processing time.
- Lower the number of applications required to obtain trainees by recruiting for individuals with the specific qualifications required by a project.
- Provide a more rapid response to those desiring to serve.
- Reduce constituent complaints by more personal handling of their applications.
- Increase ability to fill programs with quality volunteers because of better knowledge of applicants gained through increased personal contact.

Like recruiting processes, the way ACTION services programs has had to keep pace with program changes and be consistent

each of the individual agency programs through increased exposure and coverage.

"We are confident that as a result of this reallocation of resources, domestic operations will be better able to develop new projects and then properly supervise them to insure that volunteers and resources are being utilized in a manner consistent with our legislation," said Balzano.

ACTION also determined that organizational changes could streamline the structure of its international operations to make it more responsive to the program needs of the overseas operations. As a result, it changed its Washington headquarters structure to:

- Integrate the programmatic and operational functions by merging those responsibilities.
- Identify and create, where possible, career ladders to encourage greater career development among employees.

trying to preserve the turtles so there will be enough for people to eat in the future."

At present, Braley is helping the fisheries department to determine the feasibility of commercial oyster farming in Tonga. He is studying the growth and mortality rates of several thousand oysters being grown from spat at scattered sites around the islands. "It's really a great possibility for the people," he said, noting that the oysters could be both marketed abroad and used for food at home.

Ironically, fishing is not a well developed commercial enterprise in Tonga. Most villagers fish at a subsistence level, taking just enough to feed their families. Fishing is usually done inside the reefs, with the result that lagoons are overfished while the waters outside the reefs are barely touched. The demand for fish in the capital is so great that the government's one large fishing vessel and several private fishing

Beans, Chickpeas, Rice

If you want to know why beans grow better on well drained soil, why chickpeas are "not strongly competitive with weeds," or why one rice crop grows on land and another in water, you can find the answers in AID's "Guide for Field Crops in the Tropics and the Sub-tropics."

The manual is a consolidation of agricultural information gathered from field experiences and technical literature to provide land cultivation information for agricultural specialists, as well as for national leaders and advisors, Peace Corps volunteers, missionaries, teachers, researchers and students.

According to Samuel C. Litzberger, Chief of the Food Crop Division of AID's Office of Agriculture, the book is "a field guide on cultivation of major food plants, written from experiences encountered in the field and includes information from scientific literature, textbooks and other documents found in the library."

The up-to-date handbook has 40 chapters on such topics as climate, soil and farming systems in the tropics and sub-tropics. It also discusses cereals, food legumes and oil-bearing crops.

Copies of the guide are available free in AID missions or from AID, Technical Assistance Bureau, Office of Agriculture, Washington, D.C. 20523.

Telephone: 022/64 1924
Telegrams: Panda, Gland
Telex: 28183 wwf ch

Avenue du Mont-Blanc
1196 Gland, Switzerland

Telephone: 022/64 32 54
Telegrams: iucnure, Gland
Telex: 22618 iucn ch

HJ/cct

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

19 November 1982

Dear Dr Balazs,

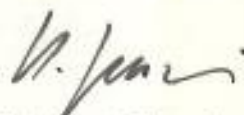
Re: Marine Turtle Project, Tonga (Pacific Ocean Gen. 21)

Bob Scott has told me about the possibility of carrying out a marine turtle project in Tonga. We are naturally very interested in such a project but funding is a problem. WWF, IUCN's main source of funding for projects of this kind has no funds available at present to support such a project.

Bob pointed out that our supporting a turtle project in Tonga might help to promote conservation awareness in the country and facilitate our efforts in whale conservation. What do you think? If this were the case, it would strengthen arguments for a turtle project and facilitate fund raising for WWF.

I am sending a copy of this letter to Sidney Holt and Wayne King and ask them for their views.

Yours sincerely,



Dr Hartmut Jungius
Director
Regional and Project Services

cc: Sidney Holt
Wayne King
Robert Scott

Tongan Society at the Time of Captain Cook's Visits

Discussions with Her Majesty Queen
Salote Tupou

Elizabeth Bott, assisted by Tavi

This work is sure to become a standard reference on matters of Tongan history, title, and genealogy. It was originally written some 25 years ago as a field report for her Majesty Queen Salote Tupou and the Tonga Traditions Committee of the Government of Tonga, based on extensive interviews with the queen supplemented by documentary research in the Palace Records Office and archives in London. The manuscript lay in the Palace Office Archives for 15 years. Though it was used to advantage by foreign researchers, it remained unpublished until its value was recognized by Garth Rogers, who persuaded the author to submit it to the Polynesian Society as a Memoir publication. Before it was to be submitted, every title, place name, and genealogy was carefully checked with authorities by Tavi.

The first of three chapters describes Captain Cook's experience of Tongan society, with additional explanations and interpretations given by Queen Salote. The second chapter gives a generalized account of principles of Tongan political and social organization in the 18th century, based on written sources, the author's personal observations, and discussions with a number of informants, including the queen. The third chapter describes the events, largely as expressed in myths, legends, traditional stories, and genealogies, that are thought by Tongans to have led up to the form Tongan society assumed in the 18th century.

As the author cautions in her foreword, "This account, especially in its third chapter, presents a somewhat idealised picture of the classical period of Tongan society as visualised by Queen Salote, the greatest Tu'i Kanokupolu authority. In the subsequent decade this view has become the new orthodoxy, but the authority of this orthodoxy can now be questioned, so that understanding of traditional and modern Tongan society may be enriched and deepened."

Elizabeth Bott completed the Ph.D. in social anthropology at the University of London. Her book *Family and Social Networks* (1957) has become a classic in the study of urban kinship and network theory.

Distributed for The Polynesian Society, Inc.
187 pages, January, paper, \$15.00s
ISBN 0-8248-0864-9
Not for sale in New Zealand

8-8-83
George Balazs

George:

The guy from Tonga ~~that~~ who told me about
the deaths associated with eating the
hawksbill turtle was:

Mr. Semisi Fakahau
Fisheries Officer
Fisheries Division
Ministry of Agriculture, Fisheries
and Forests
P.O. Box 14
Nuku'alofa, TONGA

RSS

File From Fisheries Dept. W. CAWSON
THE PRESENT MARINE TURTLE SITUATION IN TONGA

In September 1973 a report was compiled by the Fisheries Division of the Tongan Agriculture Department regarding the marine turtle situation on a world wide scale and particularly in the Tongan archipelago. Natural predation on marine turtles and their eggs was discussed, the various species of marine turtles were described and the relative amount of human predation on each.

Suggestions for marine turtle conservation and protection from over exploitation were strongly stated with the hope of governmental action to assist in saving this natural living resource that is a part of Tongan tradition.

Copies of the reports were distributed to science teachers of schools on Tongatapu for reference material. Copies were also made available for Parliament to read.

A marine turtle tagging and nesting survey was carried out between the last week of November, 1973 and the second week of January 1974 to try and assess the size of the nesting turtle population. This time period covers the heaviest period of nesting during the season, which begins near the end of October and finishes around the end of January. We are grateful to Dr. Archie Carr of the University of Florida for supplying us with turtle tags and the people who gave their time and effort to carry out this survey.

Four groups, each consisting of two to three people were sent to various areas of Ha'apai and Vava'u. The survey began with the group covering Vava'u. They began their work the last week of November 1973. Four of the five or six known turtle nesting islands were visited, these being in the Southwestern part of the Vava'u group. The islands visited and information found were as follows:-

Maninita Island: November 22-25. Uninhabited, steep sand beach around most of the island with flat rock covering the remainder. Well-developed fringing reef with a small harbour on one side. Mostly rain, and wind. No turtles nested during the regular checks throughout the nights. One recent turtle nest about one week old was found dug up and eggs had been removed. Four older nests were found as well.

Taula Island: November 25-28. Uninhabited, steep sand beach around 2/3 of the island, 1/3 being rocky. Fairly well-developed fringing reef, rain and wind. No turtles nested during the night time checks, every two hours. Two old nests about 1 month old were found and these had been dug up and eggs removed.

Fonua'one'one Island: November 28. Uninhabited, steep sand beach around 1/2 of the island, 1/2 being rocky. Good fringing reef and a small harbour inside the reef. Good weather, island checked for nests - no new ones seen but two nests about 1 month old found.

Fangasito Island: November 28. Uninhabited, higher island than others visited; very steep sand beach around entire island. Poorly developed fringing reef. Good weather; island checked for nests - no sign of any turtle nests.

Three groups covered the north, central and southern portions of the Ha'apai group.

These are the uninhabited islands which fishermen of Ha'apai say turtles are known to nest on:

Northern Group:

- * 1. Luahoko
- 2. Moama
- 3. Niniva
- 4. Hakaufata
- 5. Luangahu
- 6. Tatafa
- 7. Uanukuhihifo and Uanukuhahake
- 8. Tofanga
- 9. Limu

Central Group:

- 1. Putuputua
- 2. Kito
- 3. Fetoa
- * 4. Luanamu
- 5. Nukulei
- 6. Tokulu
- * 7. Fonuaika

Southern Group:

- 1. Nukutula
- 2. Meama
- * 3. Nukufaiiau
- 4. Mangoiki
- 5. Tonumea
- 6. Nuku (2 islands)
- 7. Kelelesia
- 8. Fetokopunga
- 9. Telekivava'u
- 10. Lalona
- 11. Telekitonga

* considered good turtle nesting islands by the majority of fishermen questioned.

Northern Ha'apai survey group - islands visited and information gathered:

Uanuku Island (hahake and hihifo): December 7-11. Uanuku hahake is a long, narrow island and connected by a sand spit to Uanukuhihifo. West side of both islands suitable for nesting turtles, east sides either steep sand or jumbled rocks. Tofanga not visited, separated from Uanukuhahake by a deep, fast flowing channel. Entire beach of Tofanga looks suitable for nesting. Well-developed fringing reef around the Uanuku's east sides. Good weather December 7-10, hurricane force winds, rain December 10 and clearing December 11. Checks made three times per night because it took two hours to make a circuit around just Uanukuhahake. No check made night time December 10 - storm obliterated any evidence of nesting that may have occurred on December 10. No evidence of old or recent nests on these islands except for two dug up holes 1-1½ weeks old 100 yards apart on the west side of Uanukuhahake.

Uanukuhahake was visited in January 1972 and no nests were found.

Luahoko Island: December 20-24. Sandy beach around most of the island, rocky on the north side. Fairly well-developed fringing reef. Good weather. Checks made three times per night. No turtles nested during the storm on December 10 - the eggs were taken but it was not revealed whether the turtle was also caught. Also December 30 or 31 a turtle nest and may have been taken. Both these nestings were to have occurred well after high tide on a night when the tide was high 8.00 p.m. or later. Luahoko was visited December 30, 1971 - January 3, 1972 a turtle survey and four nests 2-4 weeks old were found, one of these had been dug up and eggs removed.

Although not visited during this nesting season Limu Island was covered in January 1972.

At that time two recent nests were found 1-2 weeks old, one was dug up and the eggs transplanted at the marine laboratory in Sopa where the young turtles were raised for 2-4 months and released in the sea there after. The survey group covering the northern part of Ha'apai found that a number of turtles were being killed around Limu, mostly by fishermen of 'Uiha during December. It is likely that the taking of turtles and eggs occurs during the entire prohibited period of December and January throughout Ha'apai.

Central Ha'apai Survey Group:

Nukulei Island: December 2-6, and December 22-24. Sandy beach 1/4 of the island, rocky beach, 3/4 fairly well developed fringing reef. Good weather, Checks at night made every 1-1 1/2 hours.

* December 4, female green (Chelonia mydas; tu'akuli) came ashore to nest at 9.25 pm. between low and high tide and at half full moon. Time of nesting: 9.25 p.m. - 11.45 p.m., Digging nest - 55 minutes, laying eggs - 20 minutes, Reburying - 65 minutes. Nest dug under old coconut leaves and a pile of coconut husks, well - hidden. Carapace length: 32 1/2 inches, carapace width: 26 1/2 inches, Plastron length: 22 1/2 inches, Head width: 6 inches.

* (all straight line distances, giant calipers used).

Turtle tagged and released. Turtle tracks on sand December 22 indicated nesting occurred the night of December 21. Four nests found, two of which had been dug up and eggs removed. Site where turtle was tagged December 4 yielded a dug up nest and broken egg shells.

While in Tungua between Christmas and the New Year the members of this survey group received information of two turtles shot off of Kito island and one on the shoal south of Tungua within two days. January 8, 1974 a turtle shot at Laulau lahi (believed to be the black turtle Chelonia agassizi; tu'akula). The chief on Tungua reported that Luanamu, Nukulei and Kito are checked daily, weather permitting, for signs of nesting; eggs are taken. One man on Matuku caught six turtles during one week period in December. No attempt is made to protect turtles or eggs during the nesting period.

Luanamu Island: December 8-10. Sandy beach 2/3 of the island, rocky beach 1/3. Good fringing reef. Good weather. Left on December 10 with news of rapidly approaching storm. Checks made every 1-1 1/2 hours at night.

* December 9 female green observed, 1 hour between this check and the last one; the turtle had come ashore, looked for a possible nesting site and was returning to the sea within the one hour. Estimated time 10:05 p.m. - 11:00 p.m. It is unlikely any nesting could have occurred during this short period of time. Moon full, seas calm, going to low tide. Carapace length: 34 inches. Carapace width: 25 inches. Plastron length: 25 1/2 inches. Head width: 4 1/2 inches. Turtle tagged and released.

Kito Island: December 13-17. Sandy beach 95% of the Island, rocky beach 5%. Storm on December 14, good weather by December 16. Checks made every 1 1/2 hours at night. Good fringing reef. No turtles nested while staying here. Fonuaika island was not visited during this survey but was from December 16-20, 1971. It has an almost entirely steep sandy beach with a small amount of broken rock on the Northeast, the fringing reef is not well developed. One turtle nested on December 15, 1971 between 10-12 p.m. Checks were made every 2-3 hours so the turtle nested between checks. Nine nests were found between 1-3 weeks old and two nests which were 1 or 2 days old. This island was the best turtle nesting island found during the 1971-72 turtle survey.

Southern Ha'apai Survey Group: December 10: Before leaving for the first uninhabited island the group came to the inhabited island of Nomuka. The same day of arrival a female green turtle (tu'a'uli) had been shot (speargun) near the reef in front of Nomuka. Fortunately, the director of Agriculture for Ha'apai was in Nomuka and confiscated the turtle and brought it to the survey group when they arrived. The police Officer in Nomuka made no attempt to enforce the present law regarding turtles. It was only a meat wound and did not damage major blood vessels so after observing the condition of the turtle for six hours standard measurements were taken, the turtle was tagged and released. Plastron length: 26 1/2 inches, Head width: 6 1/2 inches. Carapace width: 27 inches.

Tonumea Islands: December 13, 20, 21. Gentle slope sand beach around 2/3 of the island, the remaining 1/3 of 40 - 50 foot cliffs of sedimentary rock. Two checks per night made as it was doubtful of seeing any turtles. Two men work a plantation on Tonumea most of the year. They told of a large green turtle nesting two years ago - it was taken and eaten as well as its eggs. That was the last time a turtle nested on Tonumea according to them. No evidence of old or recent nests found.

Nuku Island: (Small one) December 14-16. Steep sand beach around entire island. Very poorly developed fringing reef. Big storm December 14 at night then good weather. Hundreds of nesting seabirds on the island. Checks made every 1 1/2 hours at night. No turtles nested and no evidence of any nests found. Any nest laid before the storms of December 10 and 14 easily could have been covered with blowing sand and debris, making it difficult to locate them.

Nuku Island: (larger one) December 16-19. Slightly sloping sand beach around $\frac{1}{2}$ of the island, steep sand beach $\frac{1}{2}$ of the island and rocky beach $\frac{1}{4}$. Good fringing reef. Good weather, seas, many hundreds of nesting seabirds here. Beach checks made every $1\frac{1}{2}$ hours during the night. No turtles nested while staying here. Three old nests were found, all on the eastern side and these had been dug up and the eggs removed; these nests were 2-3 weeks old. The men on Tonumea and Mango said a hawksbill (fonu koloa) was taken on the eastern side of this island in November before she had a chance to lay her eggs. Both the female and eggs were eaten.

Kelefaesia Island: December 19, 20. Gently sloping sandy beaches $\frac{2}{3}$ of the island and $\frac{1}{3}$ of 50-60 foot cliffs of sedimentary rock (three sandy beaches separated by cliffs). Ideal looking nesting beaches for green turtles. Two men work a plantation here part of the year. The owner said turtles last nested on Kelefaesia eight years ago. He knows there were hawksbills and believe greens also nested here at one time. Beaches checked for nests but no sign of any found.

Nukufalau Island: December 21-24. Steep sand beach $\frac{4}{5}$ of the island, rocky beach $\frac{1}{5}$. Poorly developed fringing reef. Good weather, seas. Beach checks made every $1\frac{1}{2}$ hours during the night. This island is considered one of the best turtle nesting islands in Southern Ha'apai. No turtles nested while there and no evidence was found of any nests. People from Mango said a large green had been taken as she was going up the beach to nest. She had 170 shelled eggs inside of her, this turtle was supposedly taken in November.

Nakufula Island: December 22. Steep sand beach around island except for scattered rock in a small area. Poorly developed fringing reef. Island checked for nests - no evidence of nests found, but the two storms of December 10 and 14 could have hidden any nests present.

Mangoiki Island: December 26, 27. Fairly steep sand beach around $\frac{1}{2}$ island, rocky beach $\frac{1}{2}$. Not a well developed fringing reef. Good weather. Several checks made at night. No turtles nested and no evidence of nests. People of Mango said greens used to nest on Mangoiki as well as a few hawksbills but that it has been 2-3 years since any have been seen nesting.

Neama Island: was visited December 7-13, 1971 but not during this turtle survey. It has a steep sand beach around the entire island. The fringing reef is fair at most. At that time two recent turtle nests, 1-2 weeks old, were found. One turtle nested December 13, 1971

Rakufaka Island: December 22. Steep sand beach around island except for scattered rock in a small area. Poorly developed fringing reef. Island checked for nests - no evidence of nests found, but the two storms of December 10 and 14 could have hidden any nests present.

Mangoiki Island: December 26, 27. Fairly steep sand beach around 1/2 island rocky beach. Not a well developed fringing reef. Good weather. Several checks made at night. No turtles nested and no evidence of nests. People of Mango said greens used to nest on Mangoiki as well as a few hawksbills but that it has been 2-3 years since any have been seen nesting.

Neama Island: was visited December 7-13, 1971 but not during this turtle survey. It has a steep sand beach around the entire island. The fringing reef is fair at most. At that time two recent turtle nests, 1-2 weeks old, were found. One turtle hatched December 13, 1971 between 2-3 a.m. between beach checks, so the turtle was not seen.

These are the saddening results we have from the 1973-1974 sea turtle survey. All portions of Ha'apai and Vava'u where turtle nesting islands are found were covered. The results of this survey present the truest picture we have of the nesting population of sea turtles in the Kingdom of Tonga. The conclusion made from the results of the 1971-1972 survey was that the turtle population would become non-existent in the Tonga area in 5-10 years unless better laws, enforcement and a rearing project were implemented. No governmental action has been taken on these very important suggestions and now, two nesting seasons after that first survey, we can definitely show the rapid decrease in the numbers of the nesting population of turtles.

The nesting population has been at its critical low level in Vava'u and Ha'apai for a couple of years and has already gone to extinction on a number of islands which were once considered good turtle nesting islands. Old fishermen from Ha'apai talked of all the turtles that came to nest on many of these islands which were surveyed this past December and January. Absolutely no evidence of nesting was found during the main period of the nesting season on most of these islands because in recent years the human predation upon the eggs has continued and it has increased on the turtles themselves. The introduction of the speargun is the main cause for the rapid decrease in the turtle population. This coupled with the total disregard for the present law prohibiting the taking of turtles and their eggs during December and January has nearly obliterated the nesting turtle population. If action is not taken immediately to ban the use of the speargun in taking sea turtles and to approve new laws for the protection and enforcement of the turtles during the nesting season, then Tonga will surely see every remaining turtle nesting island follow suit after those islands that now have extinct nesting populations.

Current turtle regulations are as follows from the law of Tonga, Revised Edition, Vol. 2, 1962, prepared by G. Wylie:

1. Turtles and eggs are fully protected from 1 December through 31 January.
2. A license is required for erecting a fence to catch turtles.
3. It is unlawful to erect fences to catch turtles the
 - (a) mesh of which is less than 1½ ins. across or
 - (b) width of which at any point exceeds 450 ft. or
 - (c) length of which from base to base along the beach exceeds 450 ft. or
 - (d) depth of which from the beach toward the sea exceeds the number of feet specified in such a license.

4. The use of poison, other than the method known as 'aukava (i.e. poison from local seeds and used only in limited areas), and dynamite to catch turtle is prohibited.

We suggest strongly that the following revisions be made and approved by the Government so that it will take effect during 1974.

1. No person shall at any time dig up, use, take or destroy turtle eggs of any species or in any way molest take or kill any turtle the shell of which is more than 35 inches in length (measured along the arch of the back; if straight-line distance regulation would read 38 inches).
No person during the months of January, November or December in any year shall in any a way molest or take or kill any turtle of any size. This regulation shall not apply to turtles kept as pets or in aquaria.
2. No person shall be in possession of, sell, offer or expose for sale or export any turtle or its shell the length of which is greater than 35 inches.
3. No person shall in any way molest, take, kill or be in possession of the species Dermochelys coriacea (leatherback) of any size at any time.
4. No person shall at any time use a speargun to take a marine turtle of any species. (the traditional Tongan sling is excluded here).
- ~~5. A license is required for selling the shell of hawksbill turtles (Eretmochelys imbricata), otherwise known as fenu koloa.~~
6. Seasonal sanctuaries for marine turtles shall be set aside during the nesting months,
 - a) In Ha'apai the islands of Luanamu, Nukulei, Fonuaika shall be set aside from 1 November through 31 January as seasonal sanctuaries for marine turtles.
 - b) In Vava'u the island of Maninita shall be set aside from 1 November through 31 January as a seasonal sanctuary for marine turtles.

These islands will be under the jurisdiction of the Fisheries Division, Department of Agriculture of the Tongan Government during the specified periods and permission to come on the island or near its fringing reef must be given by the Fisheries Officer.

Additional fines, beyond those stated for the taking of turtles and eggs during the prohibited period will be imposed upon any person violating the turtle sanctuary.

Professor Harold F. Hirth, of the University of Utah conducted a study of the South Pacific Islands - Marine Turtle Resources as a Turtle consultant for F.A.O. several years ago. He visited Tonga on this survey and recommended that new regulations, as above, be approved by the Government. He also suggested a thorough study of the Ha'apai group with special emphasis on the nesting population be carried out between mid-November and mid-January and the establishment of inviolate faunal reserves for any islands which are discovered to have concentrated nesting. The nesting and tagging survey for Ha'apai and Vava'u have been carried out and the results from this survey serve to further strongly support those recommendations made by Dr. Hirth.

We do hope that these recommendations for new regulations and the establishment of seasonal nesting sanctuaries are acted upon quickly. Time is a very important factor for the conservation of these marine turtles.

The situation can do nothing other than worsen with time. We believe from the data collected that the nesting population of marine turtles in Tonga is at an extremely critical low level and that if these recommendations are not acted upon now the nesting population of turtles will become extinct within five years.

Let us not witness the annihilation of such an important living resource for Tonga and Tongan tradition.

Compiled by the Fisheries Section of the Tongan Agriculture Department. Field studies carried out by Rich Braley, marine biologist, Peace Corps Volunteer.

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 3734/F2/4/V2

22 December 1980

Dr G. H. Balazs,
Hawaii Institute of Marine Biology,
P.O. Box 1346,
KANEOHE,
H A W A I I 96744 .

Dear Dr Balazs,

Cliff Ratcliffe has asked me to comment on your letter of 5 May 1980 requesting that Tonga should issue stamp portraying turtles. You will be pleased to hear that the Kingdom has already issued such a stamp in the series conservation of Endangered Species. The stamp has a face value of 31\$ and the picture represents a Hawksbill.

Yours sincerely,


A. J. Hopson
Fisheries Research Officer



AJH:vt.

Affix stamp here

BY AIR MAIL
PAR AVION

AEROGramme



Dr G. H. Balazs,

Hawaii Institute of Marine Biology,

P.O. Box 1346,

KANHOHE,

H A W A I I 96744 .



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M.A.F.F., P.O. Box 14,
Nuku'alofa,
Kingdom of TONGA.

To open slit here

To open slit here

Enough food for victims in Tonga, but money needed

By Ronn Ronck

Advertiser Staff Writer

The American Red Cross in Honolulu is no longer accepting food and clothing items for the Tonga victims of last week's cyclone. According to Paulette Maehara, the "emergency needs of the Tongans have been met."

"Food and clothing," she explained, "have been provided by member organizations of the League of Red Cross Societies in Australia, Fiji and New Zealand. Temporary tent shelters have been erected and all of the homeless people are now being cared for."

Maehara said the items most needed now are batteries of all kinds, transistor radios, laundry detergent, and thong slippers. Eleven cases of children's slippers were received yester-

day and adult sizes would be especially welcome now. Also needed are antibiotics, disinfectants and cotton bandages of assorted sizes.

The above supplies may be dropped off at the local Red Cross office at 4155 Diamond Head Road. South Pacific Island Airways, Maehara said, has offered to help with transporting the items to Tonga.

"While these specific items can always be used," Maehara said, "the Red Cross prefers monetary contributions designated for Tongan relief. These funds can be sent immediately to the area and put back into the island economy."

Meanwhile, an estimated 64,000 pounds of food and clothing has been collected in a warehouse at 711 Keeaumoku St. This is a private community project not directly supervised by Red Cross efforts.

5/21/82 HSB

Travel Tiff in Tonga

When it comes to guts, you've got to hand it to Mahe Tupouniua, finance minister of the Kingdom of Tonga.

When King Taufa'ahau Tupou IV asked him for additional funds for royal travel, he refused — twice — explaining that the treasury was low and the extra travel money was not a priority item.

That is where he was wrong. The king thought otherwise, and asked Tupouniua to resign.

In another country, Tupouniua might be hailed as a hero for defending the public purse. But Tonga is a monarchy, the only one remaining in Polynesia.

If the king wants more money for travel, he gets more money. Maybe that's why there are no other kingdoms in Polynesia.

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Edwin E. Edwards, Associate Editor; Charles E. Frankel, News Editor; Claude Burnett, City Editor; Bill Kwan, Sports Editor; Barbara Morgan, Today Editor; Harry Whitten and Carl Zimmerman, Assistant Editors, Editorial Page

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A-18

Friday, August 6, 1976

Response in Pacific

Playing off the big powers against each other can be a profitable if sometimes risky business. Now it seems that some South Pacific nations are learning how to play.

Russian overtures to Tonga and Western Samoa have brought a response from the West. The United States, Australia and New Zealand have decided at their ANZUS alliance meeting in Canberra to extend more economic aid in the region.

Adm. Noel Gayler, the retiring U.S. Pacific commander, publicly expressed concern at the meeting about the Russian efforts to establish port facilities for their fishing fleet. Gayler pointed out that this could lead to a Soviet military presence—an entirely unwelcome prospect from the American point of view.

The story of the Tongan overtures began last April when the Soviet ambassador came to Tonga to present his credentials. He extended an offer to build an international airport and other facilities in the Polynesian kingdom.

King Taufa'ahau Tupou IV later confirmed that the offer had been made, and added that his son, Crown Prince Tupouto'a, had initiated the discussions with the Russians while in London serving as Tongan high commissioner. The prince himself was quoted by an Australian newspaper as saying, "Tonga has many friends, and all we ask of them is that they don't choose our enemies for us."

Then last month the Soviet deputy minister of fisheries visited Tonga. He was quoted as saying there were definite possibilities of cooperation in the field of fisheries.

Russian officials also visited Western Samoa—American Samoa's independent neighbor—last month. The Soviets reportedly offered assistance in improving port facilities, in building a fish cannery and in widening channels in the reefs to improve the fishing.

These developments are not grounds for alarm, but they do justify a degree of concern. Western power has been unchallenged in the South Pacific since World War II. Russian activity in the small island nations of the region would be a startling change, requiring a reassessment of our own role there.

Gayler's warning in Canberra is welcome evidence that the situation is receiving the official attention that it deserves.



This cartoon originally appeared in the Tonga Chronicle, a weekly newspaper published by the Information Office of the Government of Tonga. It shows a small central figure representing Tonga being plied with offers of aid by the Russian bear and the American eagle. At the bottom of the sketch are the Australian kangaroo and the New Zealand kiwi.

The Civilized Society of Tonga

By William Frye

NEIAFU, VAVA'U, Tonga — Church bells rang out over Port of Refuge Harbor, in the South Pacific kingdom of Tonga, calling Tongans to sunrise worship.

Roosters already were raucously saying their prayers.

Soon the soft voices of church choirs singing gospel hymns cast a gentle benediction over the village of Neiafu.

It was a South Pacific quite unlike the cliches of Hollywood and Broadway. No grass skirts; no electric guitars; not even a Bali Hai. Just a reverent, tranquil, rural scene, one that reflected the fervent, fundamentalist Christianity that many Polynesians, effectively wooed by generations of missionaries, have embraced.

The London Missionary Society, the Catholics and the Mormons (among others) have done their work well in this part of the world, and the Tongans, once a warlike, imperialist clan that conquered lands as distant as Fiji and Samoa, now have a total standing army of about 200 men and no need whatever for even that many soldiers under arms.

There is a police force in Neiafu, capital of the northerly Vava'u group of Tongan islands, but its toughest job seems to be to keep youngsters from sneaking in a swim on Sunday.

NOTHING EXCEPT prayer and church-going — no work, no play, not even a swim in the harbor — may legally take place on the Lord's day; and the law is enforced. A cargo ship laden with supplies arrived just after midnight one Saturday while we were here, and had to drop anchor six feet off the dock. It

could not land and unload until 12:01 a.m. Monday. By special permission, the crew was allowed to disembark.

Tongans take their Christianity seriously. When a member of a family goes astray, the rest of the extended family group — including cousins, uncles, grandparents, all the relatives — take the erring one in hand and give him additional love and consideration, concealing his faults until he reforms. Feuds and reprisals are almost unknown.

The contrast between this and the "civilized" world outside is too strik-

The good life in a Polynesian kingdom.

ing to miss. Not long after the church bells rang out one morning, I tuned in a BBC news broadcast on my short wave radio and heard of violence in Afghanistan, Iran, Ireland and elsewhere. The world of BBC might have been on a different planet.

"Why do people fight and kill each other?" Melanie Taufu, the cook on our chartered sailboat, asked in disbelief. A society like the one BBC was describing was so distant from her experience as to be unreal.

A VISITOR is prompted to wonder which of the two worlds is really the primitive one, and which the more advanced.

Tongans may not have the blessings of "Kojak" and "Star Wars," but a teen-ager hurried up to me the other day outside Neiafu and offered

to carry my briefcase up the dusty road to my hotel. It was a gesture of simple helpfulness and consideration, with no motive other than welcoming a visitor and practicing the English that had been learned in school.

Tongans have not, it must be said, entirely overcome the sins of lust and pride.

Tonga needs tourism badly, and could get a somewhat larger share of the income that now goes to Fiji, Tahiti and other better-known islands. But the king of Tonga, one of the few reigning monarchs left in the world, wants his own national airline, and won't let Polynesian Airlines, the national airline of Western Samoa, serve any part of Tonga except the capital city of Nuku'alofa.

One result is that a struggling new yacht-charter agency, South Pacific Yacht Charters, which has been set up in Vava'u by an American couple from Smithfield, Utah, must rely for the final leg of its clients' trips (Pago Pago to Neiafu) on a habitually overbooked, off-schedule commuter carrier which has a way of taking off at 3:30 a.m. (when it takes off at all).

YACHT CHARTERING could be the wellspring of a tourist revival transforming Tonga's economic prospects, as it has been for the British Virgin Islands. Vava'u is a story-book cruising ground, with fantastic coral reefs for snorkeling and diving, trade winds that are steady and usually reliable, especially from May through August, and islanders who offer umus (native feasts of roast pig, lobster, fish, and tropical fruit, served on palm fronds) to the palangis (white men) for \$5 per person.

But letting Samoan airplanes bring in tourists seems an offense to Tongan pride, so the tourist revival has happened only on a very small scale.

In a way, perhaps, it is a blessing, at least for palangis. The very inaccessibility of Tonga tends to preserve its primitive character. Greater exposure to the outside world could spoil it.

The few palangis who do come find an authentic South Pacific hideaway — not a paradise, but a simple, elementary society where loving your neighbor is an integral part of daily life. Such spots are fast disappearing in this world.

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A-10

Saturday, June 12, 1976

Offer to Tonga

Moscow has offered to build an international airport and fishing port in Tonga. There is speculation that this could lead to establishment of a Russian naval base in the South Pacific kingdom.

This prospect is causing reverberations in New Zealand, the nearest nation of any size. American Samoa is much closer—about 400 miles away—but the Russian offer does not seem to have aroused interest in the United States as yet.

In New Zealand, however, the leader of the opposition Labor Party has scolded the government for failing to pay attention to the threat in Tonga.

The Labor Party leader, William Rowling, said, "It would be a sad day for New Zealand if a foreign power were to establish a base in an area in which New Zealand has always played a major role just because the government was too short-sighted to see where its policies were leading."

Rowling said New Zealand had used the Polynesians as a "political football" and should not be surprised if their leaders looked elsewhere for assistance.

Russia and Tonga have established diplomatic relations; the Russian ambassador to New Zealand presented his credentials to Tonga's King Taufa'ahau Topou IV last April. So this former (1900-1970) British protectorate has taken at least a first step in moving beyond its traditional ties.

Acceptance of the Russian offer to build an airport and fishing port would doubtless bring dozens of Soviet technicians and advisers to the little kingdom. Conceivably they could have an important impact on Tongan policy.

The Russians have been expanding their navy in recent years. Their naval activity in the North Pacific and Indian Oceans has increased substantially. Their fishing fleet is operating in the South Pacific and probably would find a port in Tonga useful.

Tonga may well find the Russian offer tempting. The government wants to encourage tourism, and for that needs improved air service. British reluctance to encourage the building of a jet airport was reportedly one of the factors leading to Tonga's independence.

It is too early to evaluate the Russian overtures to Tonga. But a Russian presence in the South Pacific could be a significant development. The situation is worth watching.

Tonga Recalls Hawaii

By Joe
Editor, the Pacific

NUKU'ALOFA, Tonga — Tonga is Hawaii without the tourists, and before the freeways. Tonga is Hawaii without TV, McDonalds, and shopping centers. While much smaller in size, and without the mountains, Tonga is what Hawaii was, perhaps in the 1920s, and 1930s.

Tonga is an ancient Polynesian kingdom. The people have the same roots as the Hawaiians. Much of their culture is the same. King Taufa'ahau Tupou IV is the only reigning monarch in the South Pacific.

It was Capt. James Cook, on his fatal third trip, who gave Tonga the name "The Friendly Islands," which has stuck to this day. Perhaps, because they were tagged with that name the present day Tongans go out of their way to live up to that image.

At the vastly overnamed International Airport of Fua'motu, no fewer than a half dozen Tongans came up to us, to welcome us to their island, and to offer assistance.

Driving the 10 miles into the capital city of Nuku'alofa on a wheezing old bus, with broken windows, hundreds of islanders, walking along the road, or squatting on their well kept lawns, waved at us enthusiastically, like their long lost brothers had returned.

THE NEXT morning, as we made a sunrise stroll along the waterfront across from the first class International Dateline Hotel, we were stopped by no fewer than five Tongans,

aply describes Tonga today.

Getting there, through Fiji, or Apia, Western Samoa, may be steep, but a judicious shopper, looking for bargains, would be delighted by the prices in Tonga. It may well be the best bargain in the South Pacific today.

The bus ride into town, while not plush, only cost 1.50 pa'anga, which is what they call their strange looking money, a rectangular piece of money that has a bemedaled picture of their king on the face. The pa'anga is only about 10 percent higher than the dollar, a happy rarity in exchange rates these days. The fact that there is no tipping in Tonga makes up for the loss on the exchange.

There is presently only one first class hotel, the International Dateline Hotel, on Tonga. It is so named because the International Dateline

A great (and cheap) place for the tourist.

rips through Tonga, making it the place "where the world's day begins."

THE DATELINE has 78 air conditioned rooms, a huge pool, beautiful gardens, snack bar, shops, outdoor dining areas, superb food, and features authentic Tongan dancing on Saturday night, and a late American movie for its guests on Sunday night.

The Dateline rates run about \$33 a night, but the rooms have refrigerators, and a coffee pot, and all the

but most people walk, or ride bicycles. Tonga is much different from Hawaii in one way; it is almost hillless, at least on the main island of Tongatapu, where 65,000 of the 100,000 Tongans live. There are a few cars and a few motorscooters, but this is not a prosperous island.

Each morning visitors wake to the strange sound of what appears to be beating drums. You immediately wonder if the natives are getting restless. It turns out that these aren't drums at all, but the tapa makers at work. Tapa is a way of life on Tonga, with bark peeled from the mulberry or hiapo tree.

This bark is soaked, and then beaten for hours with a wooden mallet. Then the tapa is laid out in huge lengths, up to 100 by 300 feet for special occasions, set out on lawns, where the designs are intricately painted on by many women. Every young girl learns to make the cloth, which is made for the royalty, for wedding gifts, or for sale to the lucky tourist. Nowhere else in the South Pacific is tapa made in such quantity or used so much. The designs are exquisite.

THE TONGAN economy is based upon the land and the sea. This means that Tongans grow enough food for themselves and their families, and catch enough fish for Tonga, but little for export. A few million dollars are realized through copra, through exporting bananas to New Zealand, and more recently, growing vanilla for the American market.

cial in their picturesque, dress, just to chat. High school students, in their colorful uniforms, eager to try out their English, would actually cross the street just to engage us in conversation, to ask how we liked Tonga, and to ask where we were from.

This warmth is a refreshing change for a tourist, who is often ignored completely, or set upon by money grabbers in the resort marketplace. It is how many of us remember the old Hawaii, before the suspicion and mistrust of strangers set in. This Tongan characteristic somehow seems natural, not affected. They do it because they love to see new people, and they love to see these people enjoying their island.

As tourism develops on Tonga, it seems inevitable the islanders will change, too. And that is a little sad.

TOURISM IS bound to develop in this unspoiled kingdom, because the island group has other attractions that are sure to interest the harried, jaded traveler. For one thing Tonga is cheap. That may be blunt, but it

coffee you want. Meals are reasonable, featuring local lobster or steak for \$6 or less. A banana split at the snack bar sets you back a big 90 cents, and you can get sandwiches for under \$1.

But, that's all the first class stuff. For the adventurous, the young, or the people on a budget, there are other choices, which they quickly discover.

There are a number of guest houses, some of which feature Tongan cooking, or motels, where you can cook your own food, purchased at the enormous Tongan open market. Many visitors gravitate to the wonderfully weird Joe's Hotel, a four-story atrocity with 14 rooms that can be had for \$8 to \$12 a night. Joe's Hotel has a great fourth floor dining room, serving T-bone steaks for \$5.40, with wine at 60 cents a glass. The dining room is done completely in tapa, the attractive cloth made by the islanders, or bamboo, overlooking downtown Nuku'alofa, and the shimmering sea beyond.

THERE ARE BUSES and taxis,

Most of the money needed by the Tongans — for education, for health services, and to maintain the roads, harbors, and airports — comes from foreign aid, largely from Germany, surprisingly; Australia, New Zealand, Japan, and a little from the United States.

A good many hard dollars also come from the 30,000 Tongans living in Hawaii, California, New Zealand and Australia.

Tourism is being applauded as being a mainstay of the Tongan economy, but last year only about 11,000 air travelers, and 44,000 cruise ship passengers managed to find their way to Tonga.

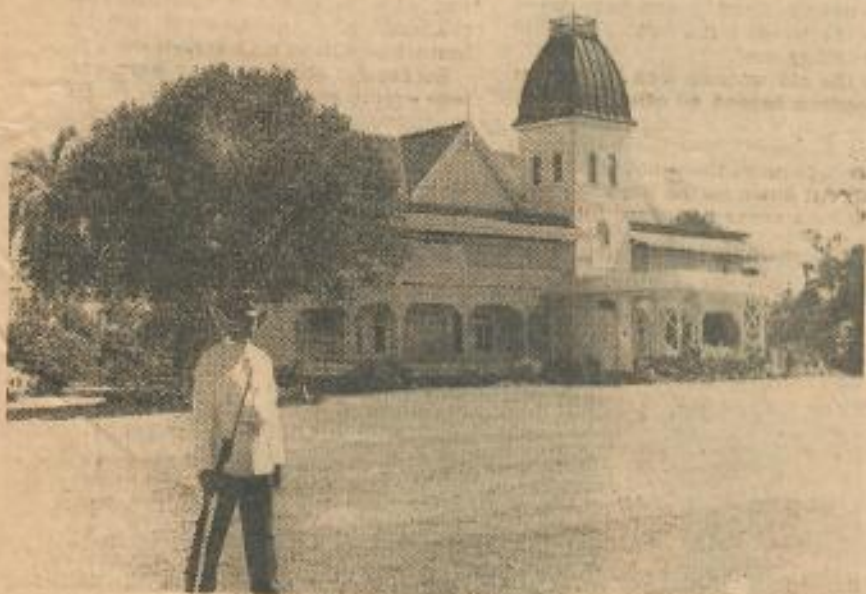
The cruise ship arrivals are major events in Tonga. Recently even the Queen Elizabeth 2 pulled up to the open-roadstead, bringing its passengers ashore by small boat. Hundreds of Tongans set up shop, under palm fronds, in a big Nuku'alofa park, to sell tapa, beautifully woven baskets and purses, and delightful carvings. Other stands sell coconuts, fruit and black coral found in the lagoons nearby.

Don't expect much night life in Tonga. There are a couple of theaters, and Joe's Hotel does have a band on Friday night. On Sunday, the entire island shuts down.

Tonga, because it is deeply religious, turns into a kind of ghosttown on Sunday. No cabs operate. No buses. There are no soccer or rugby games. No ships or planes are allowed to land. Everybody goes to church.

THERE IS ANOTHER hope for the Tongan economy. There has been attempts at oil exploration in Tonga. King Tupou showed us huge color photos, of oil seeping through rocks, on Tongatapu.

"The oil is here," he said, indicating that they just hadn't drilled deep enough. In July, he said, the firm, an American firm out of Colorado, will be coming again, and this time



The Tongan royal palace.

vaii of Yesteryear

Murphy
fic Daily News

hey plan on drilling in the off-shore areas.
 Asked about commercial fishing in the rich Tongan waters, King Tupou, showing his rich sense of humor,

laughed and said: "When we strike oil we'll be able to buy a lot of fishing poles."
 Someday Tonga may strike oil, or it may become a tourist mecca for

the Germans. But right now, it is a quiet, pleasant little backwater in the Pacific. Wouldn't it be nice, a tourist says, if it could only be kept this way?

An Interview with a King

By Joe Murphy
 Editor, Pacific Daily News

NUKU'ALOFA — Everybody, deep down, has this desire to walk into a real palace, and talk with a real king.
 Few among us ever have that opportunity. But that opportunity was at hand for me. I had arrived in the wonderfully quaint South Sea Kingdom of Tonga two days before, and had carefully set the stage.

Even though Tonga is a small island nation, you don't just arrive on and airplane, hop in a cab, and say: "Take me to your leader!" After all, Tonga's ruling monarch, King Taufa'ahau Tupou IV, can trace his ancestry back 1,000 years.

What you have to do is play a few games, intricately designed so that the king isn't bothered with every half-wit passing through the island. I first went to the Tongan visitor's bureau, because generally these people are used to foreigners, and they know the island protocol. Waving my press card I was led into the office of Russell Mariott, an Australian, on loan from the Australian government to train Tongans in the fine

One small hitch developed. The man, Lianle Maka, was just about a foot shorter than I. The worst thing about that was my wife, Marianne, snickers. As I tried on the coat she laughed out loud, to my embarrassment. Maybe, I suggested, the king will think that this is a new style, a coat that comes to your elbow. At least now I had a coat and tie, and was ready to make my next move forward.

TODAY I WOULD know if I could get an audience with the king. I arose early, and unable to find a cab in almost carless Nuku'alofa, I walked the mile or so into town, to the Palace Office, with my tie hanging out in the hot sun. I waited for more

A coat and tie are required.

than an hour for Maketi Tongilava, the private secretary to his majesty, who appeared, finally, wearing a cool

at a time, through seven copies of invoices. My wife walked on ahead, back to the hotel, to try to borrow an iron, to press the suit. Even the wrinkles had wrinkles on that suit.

By 11 a.m. I had managed the mile walk-run back to the hotel, arriving in a sweat from the hot sun. I had to chase the cleaning girl out of the room while I showered, shaved and tried to shine the dust off my shoes. I typed a quick list of questions while Marianne ironed the coat.

At 11:30 a.m. I was on the dusty road again, looking about frantically for a bus, a taxi or even a street car. I considered briefly flagging down a police car to explain the gravity of the situation, but I didn't have the brass for that. I slipped into the coat as I walked hurriedly into the Palace Office, beads of perspiration dripping down my nose, exactly on time, to the minute. I tried to draw up my arms a little, self-conscious over how much wrist I had left over.

TONGILAVA SMILED in greeting, and summoned a guard to take me

points of tourism.

WHEN I TOLD Mariott that I wanted to interview the king, his eyeballs sort of rolled, like it might be difficult to arrange. He finally suggested that the procedure would be to first visit the king's private secretary, who has an office in the Palace Office, on the grounds of the palace.

"One thing," Mariott said, "you'll have to wear a tie to see the secretary." A tie? To see the secretary? "Yes, and you'll need a coat and tie to see the king," he said.

That sounded reasonable enough. There was a small problem. I was on a six month tour of the South Pacific islands, and was traveling light. I didn't have a coat or tie with me. Who wears such unnecessary articles of clothing in the South Pacific? I could see some storm clouds ahead.

The next day I visited the *Tonga Chronicle*, the island's weekly newspaper, and talked with the editor, a bright young Tongan, and told him about my wish to visit the king.

The editor was very helpful, and called the king's secretary to tell them who I was, and that I would be stopping by for an appointment.

ANOTHER DAY passed, and I'm not much closer to the king, but I have made great strides in upgrading my casual appearance. I considered briefly buying a coat and tie, but the Tongan men's shops in downtown Nuku'alofa were not that appealing. I had a better idea. I had the name of a Tongan man, and a letter of introduction. With the help of a few other Tongans, including a cab driver, I tracked down the man.

After chatting for a few minutes about our mutual acquaintance, I quickly lowered the boom: "Could I borrow a coat and tie from you?" He looked a little startled since we had just met. But, when I explained the need, and my goal, to meet his king, he quickly agreed. He took me into his house, and gave me a choice of about five coats.

looking lava-lava. He was a little surprised to see me, and said that I should have gone to the Foreign Office first.

But, he warmed up after a while. I showed him a letter of introduction from Lt. Gov. Joe Ads of Guam.

He told me that I had to have a list of questions that I would ask the king in advance, typed up. And yes, I would need a coat. "No problem," he said finally, checking his watch. It was then 10:15 a.m.

"IN FACT," he said, "I think I can arrange an audience this morning, after the king's cabinet meeting, say at 11:45 a.m."

Today? I thought frantically.

"Today," he said. Muttering my thanks I hightailed it out of there. First I had to stop at the airline office to ship out a beautifully carved four foot totem pole that I had purchased. I assumed, idiotically, that would be just a five minute stop. But airlines don't work that way.

I watched, nervously, as the young clerk typist pecked away, one letter

to the palace. Now I'm not sure whether he was smiling or laughing out loud.

The guard was colorfully dressed in khaki, and blue stripes. He led me across an expanse of lawn into the Victorian-style palace. It had been built in New Zealand in 1876, and carted piece by piece to Tonga. He told me that there were more than 100 people living there, including members of the royal family, guards, retainers and servants.

The guard ushered me into what appeared to be a big sitting room. King Tupou was already seated, at the head of a long, polished table. He also wore a cool lava-lava, and tunic. The sitting room overlooked the green palace grounds, with the Pacific Ocean shimmering off in the distance.

HE WAS A VERY warm, friendly human being. He remembered meeting us once before at a dinner party at Government House on Guam.

King Tupou has a marvelous sense of humor.

When I was talking to him about Guam's congressman in Washington, he interrupted me to say: "But he doesn't have a vote on the floor of Congress!" I was so startled by this observation that I said: "You seem to know a great deal about the American constitution."

The king looked at me, and smiled: "I should know a lot about America — I was born on the Fourth of July!"

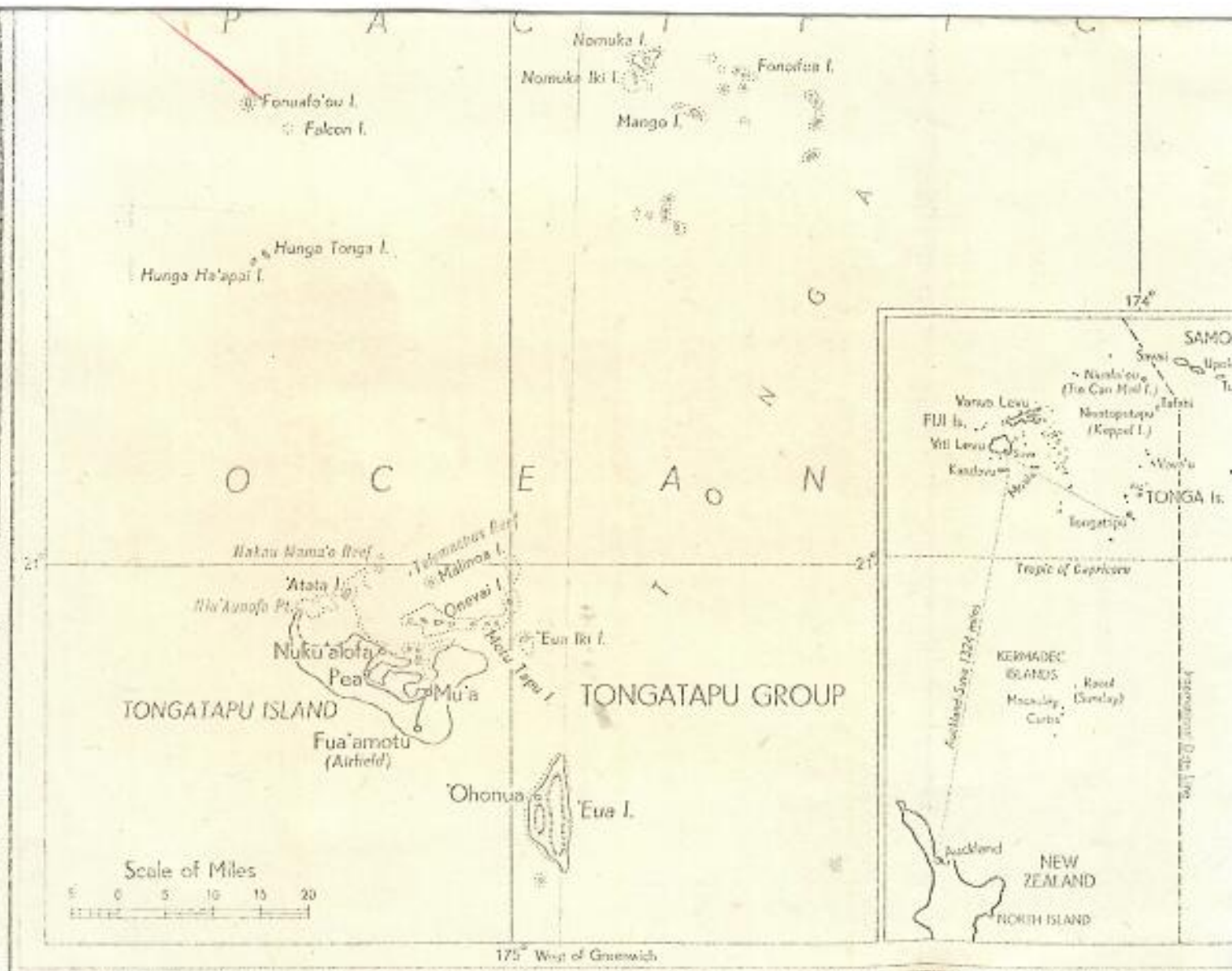
After an excellent interview, I made the mile walk back to the hotel, the fourth mile of the day, carrying my coat and tie.

As I leaped up the steps, two at a time, to the top of our four-story hotel, where the dining room is located, some of the other guests going down passed me and said: "Hurry, or you'll be late for lunch!"

I just couldn't resist the ultimate in name dropping: "I know I'm a little late," I said, "but I was just chatting with the king." That stopped them in their tracks.



King Taufa'ahau Tupou IV



Printed by the Government of New Zealand, Wellington, N.Z., 1944.

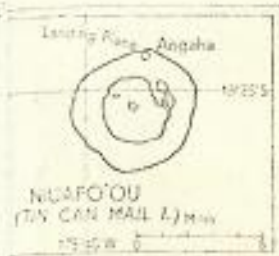
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Various Islands
Yasawa Group
Viti Levu
Koro Group
Eleva Is.
Covey Reef
Tongareva Is.
Tongatapu
Eastern Group
Lotoa
Tonga Is.
Ha'apai Group
Tongatapu Group
Nukunono
Tutuila
Fangatapu
Atafu
Tongareva Is.

Late I. (with circled 'I')

Hunga I.
Ovaka Is.
Vava'u Group



Tropic of Capricorn
S O U T H
P A C I F I C
O C E A N
Road (Sandy) (NZ)

S O U T H

Kao I.
Tofua I.

HA'APAI GROUP



KOTU GROUP

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NOUVELLE-CALÉDONIE

22 March 1982

Yours sincerely,

Mr R. Volk
Fisheries Development Officer
Fisheries Division
MAFF
P.O. Box 14
NUKU'ALOFA
Tonga

Mark Gentle
Assistant Fisheries Officer

Dear Richard,

Your letter of 2 March, asking us to recommend experts on turtles and bêche-de-mer, has been passed to me for reply.

For turtles I would suggest you contact Mr George Balazs of the National Marine Fisheries Service, Hawaii, who is an authority on marine turtles and has wide experience in the Pacific islands, having carried out surveys of turtle resources in Western and American Samoa, the Cook Islands and the Tokelau Islands. His address is:

Box 3830
HONOLULU
USA
Mr G. Balazs
Biologist
National Marine Fisheries Service
Box 3830
HONOLULU, Hawaii 96812
USA

Regarding bêche-de-mer, a considerable amount of work has been done in the last few years on the biology of commercial bêche-de-mer species, and it may be that the results of this work will be sufficient for your needs. Two excellent papers have been produced recently by Mme Chantal Conand of ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer) Noumea on the reproductive biology of holothurians. I have passed a copy of your letter to her and she will write to you shortly.

In addition a Masters thesis has just been produced by a Mr Colin Shelley at the University of Papua New Guinea and entitled Aspects of the Distribution, Reproduction, Growth and 'Fishery' of Holothurians (Bêche-de-mer) in the Papuan Coastal Lagoon. This thesis deals with the species Metriatyla scabra (chalky fish) and Actinopyga echinites (red fish) and gives estimates of production per hectare. You should be able to obtain a copy of this thesis by writing to Mr Shelley C/- Biology Dept., University of Papua New Guinea, P.O. Box 4820 University Post Office, Port Moresby, Papua New Guinea.

.../.

Lastly, I am at present finalising a report dealing with aspects of the biology of the most valuable commercial species, Microthele fuscogilva (the "mhuwalu" of Tonga), including the effects of harvesting on a local population. I will certainly send you a copy of this when complete.

I hope this information is helpful. Please feel free to contact me again if I can be of further assistance.

Yours sincerely,

Mark Gentle
Assistant Fisheries Officer

cc: Mr C. Ratcliffe
Principal Fisheries Officer
Fisheries Division
MAFF
P. O. Box 14
NUKU'ALOFA
Tonga

✓ Mr George Balazs
National Marine Fisheries Service
Box 3830
HONOLULU, Hawaii 96812
USA

Mme C. Conand
Océanographe
ORSTOM
B.P. A5
NOUMEA CEDEX

born, and sent down to earth to live in a house formed from a stone thrown down by Tangaraoa. The bird found the sun an annoyance, so Tangaraoa threw down a creeping plant as a shady protection, and the *tuki* bird lived there. The bird annoyed Tangaraoa in some way, so he sent down a worm or maggot to devour the creeper, which it did, and the bird told Tangaraoa that its roof was gone. Then the bird, by order of Tangaraoa, shaped the worm into a man¹.

Wegener refers to another story, which says that at the beginning was *leai* (nothing). Then arose smell, which was not yet palpable but was felt as something material. The smell became smoke, which again became clouds, and finally condensed into solidity or land. The sea too arose, and in a stupendous catastrophe of nature the land sank into the sea. With this fire arose, and fire married water, and their offspring was the new earth—i.e. the Samoan Islands—which arose out of the womb of the last earth². I draw attention to the similarity between the beginning of this myth, referring to "nothing" and "smell," and that, commencing with "nothing" and "fragrance," of one of the others.

The following is the commencement of the genealogy of the *Atiaana* [kings of Aana], as given by Krämer, the explanations of the names being those inserted (in German) by him:

Malamanganga'e (Light eastwards) married Malamangangaifo (Light westwards), and had issue Lupe (the Dove; also the bluish, shining, smooth lava, which at Aopo in Savai'i was held to be transformed doves); Lupe married Papatu (Upright rock), and had issue A'alua (*a'a* = "family relations"; *lua* = "two," more probably from *a'alua* = "sediment," "dregs"); A'alua married Papamau (Firm rock), and had issue Papafoangia (Broken or crushed rock);

Papafoangia married Ma'ata'anoa (Little scattered stones), and had issue Papa'ele (Rock dust);

Papa'ele married Palapala (Marsh, Swamp), and had issue Papamavae teine (*maeva* also means the vagina; probably in the sense of being able to conceive, as "a girl"; (see Pratt's Dictionary and Turner, p. 364));

Papamavae married Imoa (the Rat, the Mouse), and had issue Salasala teine (Cut-off);

Salasala married Tangaraoa-nimonimo (*nimo* = "infinite," so this name means Tangaraoa-the-infinite) and had issue Tupufua (Derived-from-nothing; the first man);

and two generations later came the first alleged *tufuaana*³.

¹ Stuebel, pp. 59 sq.

² Wegener, *Z.G.E.*, 1902, p. 415.

³ Krämer, *S.J.* vol. 1, pp. 167 sq.

Krämer's tree of Lu and Pili may be compared with the myth last referred to, but according to it Lupe married Loose stones, and had issue Marsh; and Marsh married Land, and had issue the first man, Derived-from-nothing¹.

Pratt commences a genealogy as follows:

Papatu (Standing rock) married Papale (Earth rock), and had a son Ma'ataanoa (Loose stones);

Ma'ataanoa married Palapala (Mud), and had a son Tangata (Man) called Tupu-fua (Grown-from-nothing).

This Tupu-fua married the daughter of Tangaraoa-of-the-skies, and their son was [the god] Lu, who married the daughter of the king of heaven, and their son was the king of Atua. This genealogy was obtained in Manu'a².

1933

Tonga

Sarah Farmer reports a Tongan belief that slime and seaweed gave birth to a rock, from which sprang many gods of various natures, including the serpent and wood pigeon³.

Both Reiter and Caillot tell a story, their versions of which are substantially the same, of a number of marriages and the children born of them⁴. I will reproduce this story in tabulated form, putting the names of parents in an outer column and those of children in an inner column, indicating sexes by letters, and adding in a third column the explanations given of the meanings of the names, but in some cases I will only indicate their effect broadly without giving details. The letters R and C in parentheses will show by which of the two writers the explanations have been given. Notes in square brackets will be my own.

{Any inconsiderable sea plant (R.)

{Seaweed (C.)

{Mud; any deposit left by a liquid (R.)

{Slime (C.)

{It was a ferruginous stone (R. and C.)

{Something existing since long ago? (R.)

Limu (m.)

Kele (f.)

Touiafutuna (?)

Touiafutuna, who must have been regarded as feminine, was a large metallic stone, which from time to time, being in labour, shook and rumbled like thunder and opened, producing each time a pair of twins, one male and the other female. There is no reference to any male element being connected with the parentage of these children.

¹ Krämer, *S.J.* vol. 1, pp. 24 sq.

² S. Farmer, p. 133.

³ Reiter, *Anthrop.* vol. 11, pp. 230-8. Caillot, *Mythes*, pp. 239-44.

⁴ Pratt, *A.A.A.S.* vol. 11, p. 657.

Touiafutuna

Piki (m.)
Kele (f.)Adhering to something (R.) (C.)
{ Deposit left by a liquid; mud
(R.). Slime (C.)

Touiafutuna

Atungaki (m.)

{ To give, or lance, throw with,
offer (R.). Him of the lance (C.)

Touiafutuna

Maimoa Alongona (f.)

{ Resounding, echoing, gulf (R.)
{ Futility (C.)

Touiafutuna

Tonu-uta (m.)
Tonu-tai (f.)The land turtle (R.) (C.)
The sea turtle (R.) (C.)

Lupe (f.)

Pigeon (R.) (C.)

Tukuhali (m.)

{ That which roams about in the
sea—a large sea-worm [or sea-
serpent] (R.). Sea-serpent (C.)Piki and Kele
(twins) [above]

Tau-fuli-fonusa (m.)

{ He who upsets or unsettles the
earth (R.). He who overthrows
the lands (C.)

Havea-lolo-fonusa (f.)

{ One who breaks or crushes the
interior of lands or the earth
(R.) (C.)Atungaki and Mai-
moa Alongona
(twins) [above]

Tonu-uta and

Tonu-tai (twins)
[above]

Vele-lahi (f.)

{ Great passion or desire (R.)
{ Great desire (C.)Tau-fuli-fonusa and
Havea-lolo-fonusa
[above]

Vele-sii (f.)

{ Little passion or desire (R.)
{ Little desire (C.)Tau-fuli-fonusa and
Vele-lahi [above]

Hikuleo (m.)

[The Tongan god of the dead]

Tau-fuli-fonusa and
Vele-sii [above]

Tangaroo (m.)

[The god]

Maui (m.)

[The god]

Hikuleo was sent by his parents to Tonga, and Tangaroo and Maui went there also, and they dwelt there together. They then agreed to divide the world, and this was arranged by Hikuleo as follows. Tangaroo and his mother were to go to the sky and govern there; Maui and his mother were to have *Lolofofua* and govern there; Hikuleo was to remain in paradise and govern

there and reign over all the world. Reiter interprets *Lolofofua* as meaning "the kingdom of the earth." Caillot gives what is, I think, a more correct linguistic interpretation when he says that it was the land or country down below; and he was told that it represented the region situate below and surrounded by the waters of the ocean, which concealed the foundations of the earth. I may say that Tangaroo was commonly regarded as living in the skies above; Hikuleo was the god of the Tongan paradise, called *Bulotu*; and I shall suggest in a later chapter that *Lolofofua* was the destination of souls that did not go to *Bulotu*.

Society Islands

Fornander refers to a Society Island tradition that in the beginning there was nothing but the god Ihoiho; afterwards there was an expanse of waters which covered the abyss, and the god Tino Taata floated on the surface. He says that Ihoiho may mean "empty space," and probably referred to a dead or perished world covered by water, and that Tino Taata probably means the "divine type or source of mankind¹." According to Davies's Dictionary the literal meaning of Tino Taata is simply the "body of a man," and Ihoiho means "the manes or remains of the dead," whilst the word *iho* has several meanings, of which one is "to descend, or come down from an eminence."

Hervey Islands

Gill supplies a Mangaian myth as to the beginning of all things which I will introduce here, though it does not indicate in detail, as some of the others do, a process of what I may call evolution, or of a supposed evolutionary character. In this myth the universe was conceived of as being like the hollow of a vast coconut shell, this coconut shell being shown by Gill in a diagram as being in an upright position, with its narrow end pointing downwards. Projecting downwards, outside from the lower, narrow, end of this coconut, is a stem or root, which tapers downwards, and terminates at the bottom in a point. Mortals (that is, Mangaians) were supposed to live outside, above the coconut; and at the top of the coconut was a single aperture, which formed a means of communication between the interior of the coconut and the upper world, where mortals lived. At various depths, in the interior of the coconut, which

¹ Fornander, vol. 1, p. 64.

RELIGIOUS AND COSMIC
BELIEFS OF CENTRAL
POLYNESIA

BY
ROBERT W. WILLIAMSON, M.Sc.

AUTHOR OF *THE MAFULU MOUNTAIN PEOPLE OF BRITISH
NEW GUINEA AND THE SOCIAL AND POLITICAL
SYSTEMS OF CENTRAL POLYNESIA*

IN TWO VOLUMES
VOLUME I

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University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

August 24, 1982

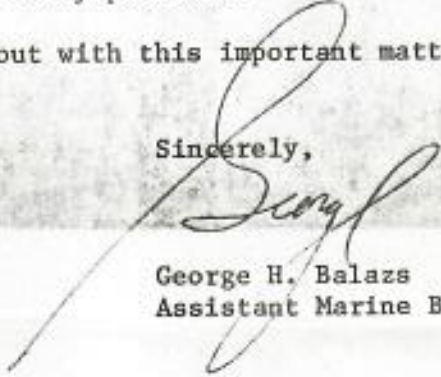
Dr. Robert Scott
Executive Officer
Species Survival Commission
I.U.C.N.
Avenue du Mont Blanc
CH-1196 Gland, Switzerland

Dear Bob:

I am writing to you informally to ask for some guidance and advice for the Kingdom of Tonga to obtain WWF funding for a two-year sea turtle assessment and conservation program. As you know, a very successful project of this sort was recently accomplished in the Solomon Islands. On their own initiative, the Fisheries Division in Tonga has decided that urgent attention is needed to their sea turtle stocks. Apparently this interest extends all the way to the King. I have been asked by the Division to aid them in whatever way possible.

Would you please help me out with this important matter at your earliest convenience.

Sincerely,


George H. Balazs
Assistant Marine Biologist

GHB:md

AN EQUAL OPPORTUNITY EMPLOYER



Memo

To: Project Screening Coordinator
From: Executive Officer SSC *R. Scott*
Cc: G. Balazs / A. Schiøtz
File Ref:
Date: 2 September 1982
Subject: Potential Marine Turtle Project - Tonga

Attached self-explanatory enquiry is from George Balazs, Deputy Chairman of IUCN/SSC Marine Turtle Specialist Group. He has been working in the Pacific.

As you know, we have continuing communication with Tonga about their whale conservation problems. Perhaps including turtles would strengthen their conservation attitudes.

Could you please reply direct to Dr. Balazs?

Encl.

August 24, 1982

Mr. Richard Volk
Fisheries Development Officer
Department of Agriculture
P. O. Box 14
Nukuslofa, Kingdom of Tonga

Dear Richard:

Many thanks for your interesting and somewhat encouraging letter of 29 July concerning a comprehensive survey of sea turtles in Tonga. The summer months up here are the busiest for me in terms of field work, so lately I have been spending most of the time away from my office. Nevertheless, I have been giving serious thought to your letter and, within the next few weeks, will be meeting with University and NMFS administrators to discuss the subject. Also, I have written to the Executive Officer of the IUCN Species Survival Commission (SSC) to ask informally just how funding from the World Wildlife Fund might be achieved. As you may know, the Solomon Islands received money from WWF for several years to assess their turtle stocks. While it may not prove to be necessary, I wonder if it would be possible (and appropriate) for your Division to request the King of Tonga to write directly to the Secretary-General of IUCN asking for financial assistance in undertaking a turtle study? Such action may indeed be needed to obtain results.

The inexpensive study that I carried out in Tokelau was funded in part by the WWF - United States appeal. The WWF - U.S. is, of course, a part of WWF - International, but in certain instances can act somewhat independently. My small study was one such case. The WWF - U.S. paid for my air travel expenses, while my salary continued to be paid by the NMFS through a continuing contract with the University. The project proposal for work in Tokelau was originally my own idea, being pursued after receiving encouragement, endorsement, and partial financial help (vessel travel and an assistant) from the Tokelau administration. The WWF - U.S. could not be approached for the larger, longer and more complex study we envision for Tonga. The WWF - International in Switzerland would have to be our (Tonga's) contact point.

I was surprised to learn from your letter that the CPIC would be "very unlikely" to accept a non-commonwealth member as a chosen consultant, if funds were made available. This apparently fails to take

Mr. Richard Volk
August 24, 1982
Page 2

into account the fact that marine turtle biologists with experience in the Pacific (and knowledge of Pacific-island cultures) are simply few in number and not readily available for large assignments.

My current contract and research responsibilities are such that I have no available time for added field work until July of next year. Consequently, the initiation of a study in Tonga under my direction would best be in November of 1983. I'm sure it will take at least that long for both of us working together to come up with the necessary money.

Let us continue to correspond as new information becomes available.

Best regards.

Sincerely,

George H. Balazs
Assistant Marine Biologist

GHB:md

All letters to be addressed
THE DIRECTOR OF AGRICULTURE



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

Our Reference... 5092 / F2 / 12

29th July, 1982

Dr George Balazs
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P O Box 1346 Coconut Island
Kaneohe, Hawaii
U.S.A. 96744

Dear Dr Balazs

Please excuse the delay in correspondence. I found your report, Sea Turtles and Their Traditional Usage in Tokelau, to be much in line with the type of report aimed for by the proposed survey work in Tonga. It was, in my opinion, a well-balanced composition between the cultural and natural history parameters which we hope to utilize in our own sea turtle management decisions. Of course, the Tonga survey will necessarily encompass a much wider geographical area and include, hopefully, the first real population assessment in terms of utilization and recruitment potential. We envisage perhaps several years of follow-up work to achieve proper management.

The Central Planning Department here has returned our funding request with two pertinent comments. The Commonwealth Fund for Technical Cooperation (CFTC), whom has funded survey work of a similar nature in the past, apparently is exhibiting a tightening rein on their funds and, in addition, would be very unlikely to accept a non-commonwealth member as the chosen consultant. This puts us right back out in the open to accept alternative avenues.

We have discussed amongst ourselves here at Tonga Fisheries Division the various possibilities open for this survey. It is our consensus that your own experience and qualifications are those most desired. We also noted with interest the funding arrangements involved in your Tokelau survey. It seems fairly certain at this point that the only survey work to be considered for approval by this Government will be a proposal involving no expenditure on their part. Where do we go from here?

The World Wildlife Fund has, as you probably know, funded a survey of the humpback whales in Tonga in 1980, including follow-up assessment just this past month. This survey arose through efforts outside the Tongan Government. What I am aiming at is, from your knowledge of WWF, what sort of response is likely from them upon request from the Tongan Government to fund this sea turtle survey, or in trying to expedite matters, would it be simpler for you to deal directly with the WWF in arranging funds to do this survey? A brief explanation of how the Tokelau survey came about will probably clarify this for me.

Secondly, is the possibility for assistance from the National Marine Fisheries Service (NMFS) and/or the University of Hawaii still open?

Thirdly, I am presently pursuing one other potential funding source, the UN Development Advisory Team (UNDAT), directed by Mr A. Holcombe in Fiji. At this point I am simply looking for an indication from him as to whether or not such survey work as this fit into the criteria of their organisation and if there are possibilities for pursuing this with them.

I think it would be most useful at this point, if you are interested and perhaps see possibilities for having this survey funded, for you to draft out a preliminary survey design, indicating the criteria and time-frame you feel will be basic to a first attempt in Tonga, and including a fairly broad break-down list of expenditures you foresee. The survey design and criteria will be necessary at any rate for a proposal to this government. An indication of expenditures, including what you can or cannot get funded through your own resources, will lend some direction and some specific information for us to address potential funding agencies.

This should give you a good idea of where we stand now. We are very interest in you carrying out this work here in Tonga. We also feel that December of January would be good months to at least begin the work, as our information is that this is the height of the nesting season, at least for Chelonia mydas. We have read with interest about your work with radio telemetry in Hawaii, and would certainly encourage thought to extended scientific research in Tonga as you may deem feasible. At this point though I think we must await your comments to this letter.

I trust that all is well with you these days in Hawaii.

Regards

RVolk

Richard Volk
FISHERIES DEVELOPMENT OFFICER
MAFF.



RV:af

cc: Director of Agriculture

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: 4941/P2/143.....

14th May, 1982

George Balazs
National Marine Fisheries Service
Honolulu Laboratory
P.O. Box 3830
HONOLULU
HAWAII 96812

Dear Mr Balazs,

Richard Volk recently showed me the poster you sent to Tongan Fisheries on "Sea Turtles of the World". It has really provided a much needed bit of colour to our research office and, of course, helps in our explaining the Turtle situation to Tongans and expatriates.

If you have extra prints of the poster could you send out 3 copies. This would really be appreciated. Any other conservation posters could also help to brighten our surroundings and minds. Our office really is quite bleak following the hurricane!

I checked around in our Cabinet for turtle Tag T-755 thinking it might have slipped into a hidden hook, but no luck. Hope to hear from you soon. Thanks.

Sincerely,

Brian Hickson
Brian Hickson,
Research Biologist.



BH:af

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 4952/F2/2

18 May 1982

Dr. George Balasa
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P.O. Box 1346 Coconut Island
Kaneohe, Hawaii
U.S.A. 96744

Dear Dr Balasa,

Thank you very much for your reply of April 16 expressing interest in our proposed resource survey of sea turtles in Tonga. Unfortunately, I can give no further information at this time as we are still awaiting a decision from Government for funding of this survey.

However, I have noted your indication of the possibility of a cooperative agreement with the National Marine Fisheries Service and/or the University of Hawaii. We certainly welcome such an offer as perhaps this will speed a decision here.

I ask you to please await our further correspondence pending Government decision.

Regards,

R. Volk

Richard Volk

Fisheries Development Office



PS - The turtle poster has made a worthy addition to our research office.



University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW
16 April 1982

Mr. Richard Volk
Fisheries Division
Department of Agriculture
Nuku'alofa, Kingdom of Tonga

Dear Mr. Volk:

I am writing to ask for more information about your interest in undertaking a comprehensive biological and cultural assessment of Tongan sea turtles. It recently occurred to me that possibly I could be involved in such a project through a cooperative agreement of some sort with the National Marine Fisheries Service (Honolulu Lab) and/or the University of Hawaii.

The enclosed report will provide you with the findings that resulted from my recent short study visit to Tokelau. I am especially interested in the status and cultural/nutritional role of sea turtles at small and relatively isolated Pacific islands such as Tokelau.

I look forward to hearing from you at your earliest convenience.

Sincerely,

George H. Balazs
Assistant Marine Biologist

Dr. Helfrich -
PVI

please return -

George

Thanks - I need to do a
survey in Tonga also -
maybe we can combine
forces.

PH

MARINE RESERVES

Tonga has five marine reserves and two island parks. All the areas lie on the northern side of the main island of Tongatapu.

The two island parks — Malinoa and Monuafu — and the reef and beach reserves are all protected by law but are open as recreation and picnic spots for everyone. All areas have excellent access for snorkelling, for offering an assortment of colourful reef fishes, shells, corals and other marine organisms.

The parks and reserves are managed by the Ministry of Lands and Survey; the areas are under study by marine biologists, and Tonga's Fisheries Department is tagging giant clams in the reserves for growth study.

HA'ATAFU BEACH RESERVE

Ha'atafu Beach Reserve is 20 km west of Nuku'alofa near the village of Ha'atafu. This reef area is unique in that the fish populations of the windward and leeward sides of Tongatapu overlap.

At least 100 species of fishes can

be seen here. Inside the reef, there are pools and channels with excellent snorkelling even at low tide. The reef crest protects the inner reef from waves and strong currents, and swimming is very safe, but only strong swimmers should swim across the reef where the reserve extends into deep water. Ha'atafu Beach has some of the best surfing in Tonga. The reserve encloses 8.4 ha (20 acres).

HAKAUMAMA'O REEF RESERVE

Hakaumama'o means the "Reef Faraway." Being 14 km from Nuku'alofa, Hakaumama'o is the last reef before one leaves the Tongatapu Group.

Exposed to strong wave action, this reef has a fish population somewhat different from the other reefs of Tongatapu. The brilliant parrotfish are numerous.

The entire patch of reef and the very deep waters around it are included in the reserve which covers 126 ha (312 acres).

MALINOA REEF RESERVE AND ISLAND PARK

Twenty kilometres north of Nuku'alofa is Malinoa. This island park features a lighthouse and the six graves of the assassins who attempted to kill Tonga's second Prime Minister, the Rev. Shirley Baker, in 1886. The surrounding reef supports brilliant blue damsel fish, orange and white clown-fish, large grouper and snapper plus

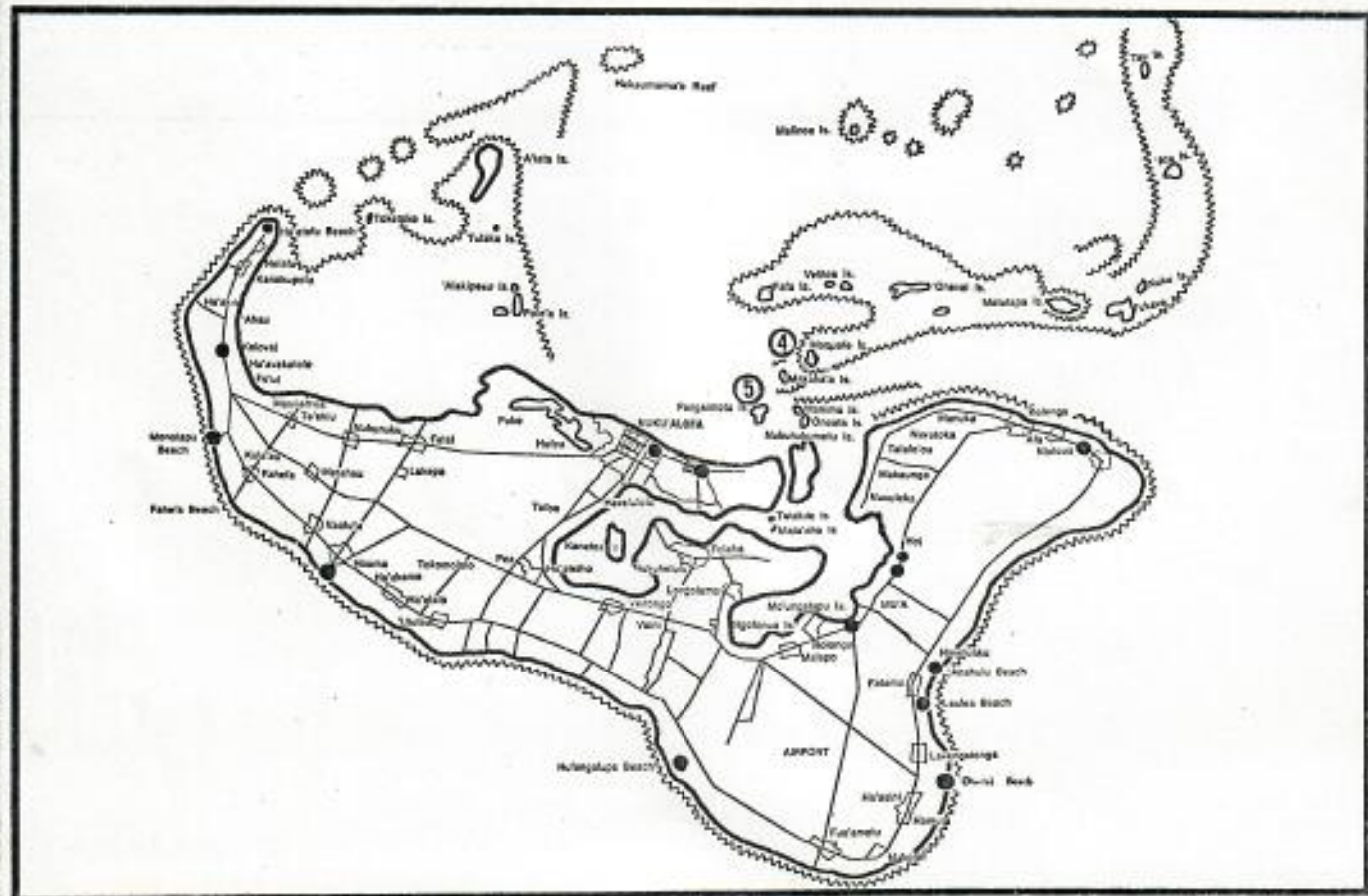
octopuses, giant clams, and other shellfish. It is perfect for a day's outing from Nuku'alofa. The reserve covers 73 ha (181 acres).

MONUAFU REEF RESERVE AND ISLAND PARK

The tiny island of Monuafu is an island park. Its vegetation is typical of strand plants of the South Pacific. On the sandy beach, you can see the claw-prints of many hermit crabs. Off-shore in the reef there are extensive growths of butterfly fishes. The sandy areas support several species of marine snails. The reserve covers 32 ha (81 acres.)

PANGAIMOTU REEF RESERVE

Pangaimotu reef reserve is a short boat ride from Nuku'alofa. The reserve includes a shallow reef flat with coral rubble and large eelgrass beds, and the outer reef which extends into the deep Piha passage. Close to the north side of the island, a small group of mangrove trees are growing. The shallow area has numerous shellfish such as snails, clams, sea urchins, and sea cucumbers. Careful observation will reward you with views of more invertebrates (animals without backbones). The eelgrass is important as a feeding and breeding area for many kinds of fish. The deep areas are excellent for scuba divers. The reserve covers 48 ha (120 acres.)



Telegrams: AGRICULTURE NUKU'ALOFA

All letters to be addressed
THE DIRECTOR OF AGRICULTURE



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

Our Reference... 4796/F2/12

...2... March... 1982...

George Balazs
Howie Institute of Marine Biology
PO Box 1346
Kaneohe, Hawaii 96744

Dear George,

The Fisheries Division of the Kingdom is currently in the process of doing survey work to determine the life history strategies, exploitation practices, and management policies of various marine resources. Our intention is to request expert services from within the scientific community who are capable of conducting a comprehensive population assessment with proper consideration of the social and cultural atmosphere in Tonga. Such survey work would generally require from 2 - 6 months of extensive field observation.

At this time we are particularly in search of personnel with qualifications to conduct such survey work for both the sea turtle and ^(SEA CUCUMBER) beche-de-mer populations in Tonga. We would be most grateful for your recommendations on this matter should you happen to know of such persons. If possible, please include a summary of qualifications with special regard to experience in either of these two taxonomic specialties, and their present address.

We greatly appreciate any assistance you may offer.

Yours sincerely,

Richard Volk,
Fisheries Development Officer.



RV/af

While Tonga develops its position as a trading partner of other nations in the South Pacific there are signs that its sand mining for concrete, its timber cutting for artefact production and even the new forced pace of its agriculture are contributing to a possible ecological problem.

Development poses problems in Tonga

Tonga Faces Ecological Disaster shouted a banner headline across the front page of a recent issue of the *Tonga Chronicle*.

Below it, the paper reported a public lecture given by a US Peace Corps Volunteer, Thomas Hubbard, who until recently had worked in the kingdom as a marine biologist and supervisor of Tonga's five designated marine national parks, in which all lagoon life, coral and beach sands are now fully protected.

Mr Hubbard cited a broad spectrum of causes for public concern, notably:

- Effect on land tenure and traditional subsistence farming of explosive population growth in a country with only about 700sq km of land area, and the consequent emergence of a new landless class.
- Sea-caused coastal erosion resulting from the escalation of sandmining, to meet an ever-increasing demand for locally-manufactured concrete and concrete blocks.
- Rapidly diminishing stocks of important culture trees as used in the making of handicrafts, cosmetic oils and folk medicines, and traditional dance costumes.
- Polluting potential of agricultural chemicals on land and of oil exploration and transport on the sea.
- Endangered wildlife, particularly among certain unique Tongan animal and bird species and the whales and turtles in territorial waters.

In his conclusion Mr Hubbard warned that time was running out and that there was an urgent need to pinpoint the problems and seek the solutions.

Inquiries at senior government level reveal that the problems are, in fact, very clearly realised and that solutions are being actively

sought, though within a framework which must, inevitably, strike a balance between developmental and ecological demands, and allow for both financial and cultural constraints. Relevant departmental heads proved most willing to provide PIM with information relating to their various areas of concern.

Under the constitution, every Tongan male attaining the age of 16 years is entitled to a 'tax allotment' of 3.3ha, but the combination of population explosion and finite land area is effectively nullifying this legal right. An estimated 70% of eligible young men have been unable to obtain a farming land allocation, thus becoming the new 'landless class' to which Mr Hubbard referred.

On the other hand, government surveys indicated that two-thirds of Tonga's available arable land is either uncultivated or capable of far more intensive cultivation; and that about 90% of the nominally landless have access to farming land through extended family links if they really want and need to grow traditional foods for themselves or their immediate families.

With population growth pushing up the demand for housing, development creating the demand for larger-scale commercial, industrial and tourist facilities, and the various religions constantly aiming for more and bigger churches, the volume of locally available building materials required has long since outstripped what can be safely supplied without damage to the environment.

With the assistance of aid funds and expertise, the forestry division is going all out on afforestation and sawmilling projects. But in the short term this can do little to offset the emphasis on concrete and the

consequent drain on the beach sands which are the natural buffer zone against sea-caused erosion.

Somewhat to the ire of local construction companies, desperate for more and more concrete to meet contract commitments, the ministry of lands, surveys and natural resources has imposed stringent licensing and supervisory controls on sandmining.

At the same time it has enlisted overseas experts to help evaluate the cost and feasibility of saving the threatened beaches by obtaining essentials and supplies from uninhabited offshore islands or by dredging the seabed.

Along with its industrial programme, the forestry division has for years been experimenting with the propagation of seedlings of culture trees and in publicising the need for tree-planting programmes by individuals throughout the kingdom.

Action has also been taken to put an end to the lucrative sandalwood export trade. Permission has been given to export stocks from trees already cut, under licence and supervision, but further felling has been banned. Meanwhile it is hoped that the successful propagation technique achieved in Tonga will in time replenish supply.

Tonga's most pressing pollution problem pertains to the stocks of agricultural pesticides and herbicides in the highly hazardous category which were dumped on this country as cut-price bargains after being banned in the producing countries.

The agricultural department is seeking watertight legislation to prevent further import of chemicals designated as dangerous and in the interim is issuing radio and press warnings, identifying highly and moderately hazardous products by brand name. It is also insisting that all agricultural chemicals brought into the country should have safety-usage instructions printed in Tongan as well as English.

The natural resources authority is also keenly aware of the potential problems associated with oil exploration and transportation. In view of the proposed oil-search programme by Webb (Tonga) Inc in the waters



TRADE WINDS

between Tongatapu and Eua, and the real possibility of oil slicks being deposited by giant tankers plying territorial waters, it has sought expert advice on the formulation of stringent regulations on operational procedures and on penalties in the event of pollution occurring.

The government's national parks programme, under the ministry of lands, is designed to counterbalance the environmental effects of the present extensive agriculture, fisheries and economic development programmes.

The five designated marine parks are suitable habitats for breeding fish and shellfish populations whose progeny are expected to migrate from these protected areas to replenish overfished catchment areas.

The terrestrial national parks on the island of Eua and in the indigenous forest area of Pelehake will help to preserve rare and endangered species of trees, plants, birds and animals.

In addition to aiding conservation goals, the parks are intended to serve increasingly important recreational, educational and research purposes by providing areas in which human interference is now controlled and minimised.

Specific bans have also been imposed in territorial waters:

- In 1978 an indefinite moratorium was imposed on the catching of humpback whales, one of whose few identified breeding places lies within Tongan waters.
- A total ban on turtle-catching during the designated breeding season has existed for many years and has been recently extended over a longer period as a further safety measure.

On the broad front of the population problem, nobody questions Mr Hubbard's assessment that this is Tonga's most pressing problem. But it would be simplistic to assume that the

LIBRARY OF
GEORGE H. BALAZS

obvious family planning solution can be implemented overnight, or even over one generation.

'Large families,' said one senior official 'have been part of our cultural tradition since time immemorial. In pre-Christian days they were demanded by the tribal chiefs who needed warriors for their tribal clashes. And in the 19th century the missionaries came and in their turn exhorted us to go forth and multiply. That indoctrination over generations is still powerful today. And, in a country

that cannot as yet afford many social services, a large family is in effect the poor man's insurance policy.'

Public education is obviously one essential but even that is not so simple in a country with a cultural taboo against discussions of sexual issues on radio, in newspapers or in the classroom.

There is a government-sponsored family planning programme under the direction of the ministry of health, backed up by a supportive voluntary one under the aegis of the

Regional Family Planning Association. Measurable results are being achieved but the latest official statistics on the annual birth rate (28.3 per thousand) indicate that effective stabilisation of a population already approaching 100 000 is still a long way off.

Singapore's solution of financial whips-and-carrots, India's experiment — sterilisation of males after two children — are unthinkable in the Tongan context of a proud and inherently independent people. So what alternative is there,

except education and more education?

It would seem that primary and secondary school curricula will have to be revised, so that the message can be pounded home — via geography, economics, social studies, mathematics and biology lessons — that X amount of natural resources in only 700sq km of land area cannot possibly support an ever-expanding population without leading to deprivation for all concerned. — Penny Hodgkinson in Nukualofa.

TRADEWINDS INTELLIGENCE... TRADEWINDS INTELLIGENCE... TRADEWINDS INTI

PAPUA New Guinea's 1981 budget was brought down in November, and, according to Finance Minister John Kaputin, it is directed at overcoming 'stagnation' in the private sector. The budget will provide for an expenditure equivalent to about \$A916 million — an increase of about 5% on the 1980 expenditure. Mr Kaputin believes PNG can continue its economic growth rate of 3%, which will require holding inflation below 10%, a revival of agriculture earnings, and continued high earnings from gold. The budget introduces an agricultural credit scheme in an attempt to boost earnings from smallholder agricultural properties. A feature of the budget is the abolition of a 30% duty on imported vegetables (tinned, fresh and frozen), most of which come from Australia and New Zealand. The duty had been imposed to stimulate local production. But local producers failed to accept the opportunity and simply raised their own prices with the result that consumers were penalised and local production failed to expand. The budget retains corporate tax at 36.5%, but has added trusts and superannuation funds to the taxed economy to prevent tax avoidance book-keeping.

FIVE international timber operators have submitted proposals to the Fiji Pine Commission (a statutory authority) for handling and processing pine logs. The commission is planting 60 000 hectares of Caribbean pine on the islands of Vanua Levu and Viti Levu. The proposals, which envisage multi-million-dollar capitalisation, are from Shell Fiji Ltd, M. K. Hunt Foundation Ltd of New Zealand, New Zealand Forest Products Ltd, United Marketing Corporation and British Petroleum (South West Pacific) Ltd. Canadian consultants to the commission will evaluate the proposals and make recommendations before the end of December.

TWO major hotels in Port-Vila, capital of Vanuatu, are upgrading. The 135-room Le Lagon is adding 15 new rooms, eight of which will be family bungalows, five beach bungalows and two garden bungalows. Food and beverage bars are also getting facelifts, and a new terrace bar with beach facilities is being built. The 166-room Intercontinental Island Inn is working on a new conference/ballroom with seating capacity for 200 people.

THE South Pacific Commission in September ended a three-year field programme of tagging skipjack and other tunas in the SPC region. Skipjack and baitfish resources of all countries and territories in the SPC area were surveyed and more than 152 000 skipjack and other tunas were tagged and released. This exceeded target by more than 50%.

NUKUALOFA, Tonga, stores were without bread in October due to a strike by Tonga's five bakeries. The bakeries, which supply the whole country, wanted to increase the price of a standard loaf by 6¢ to 28¢, but had been permitted only a 1¢ increase by the price-fixing authority. The government said it would consider a bigger increase after getting more information about costs and more talks. THE Lae Port Authority in Papua New Guinea received a loan of \$12 million from the ordinary capital resources of the Asian Development Bank (ADB) as part of the 1980 third quarter allocations. Coupled with an Asian Development Fund loan of \$8 million, the funds will be used to expand port facilities, particularly for handling containerised cargo, and to provide a sheltered tidal basin. The work will include construction of a 180m multi-purpose berth, a transit shed, a paved storage area and internal roads.

LIKIEP and Mejit atolls in the Marshall Islands are the latest to be linked by air with the capital, Majuro, as the government's aggressive programme to open up the outer islands to air transport by constructing small runways on them rolls on. Next on the list is Ailinglaplap, and another is being planned for either Mili or Jaluit Atoll in the near future. The government-owned Marshall Islands Airways flies two Australian-built Nomad aircraft.

BARCLAYS Bank International Ltd is to make an independence gift of \$A20 000 to the people of Vanuatu. The regional general manager of Barclays Denis J. Tabor and the Barclays branch manager in Port-Vila, Eric Crutchley, were to be present when the cheque was handed to President Ati George Sokomanu on November 4. The money will be used to buy medical equipment. THE Asian Development Bank is to make a \$US1 million loan to the Cook Islands and provide a \$70 000 technical assistance grant. It is the bank's first loan to the Cooks. Only one of the development projects to be financed by it will be on Rarotonga, where most development has taken place in the past.

EMPEROR Mines Ltd, Fiji, rode the crest of the gold boom in the latest year to post a sixteen-fold increase in after-tax profit. The company reported in October a profit of \$F1.52 million in the year to June 30 compared with \$95 000 in 1978-79.

STEAMSHIPS Trading Company Pty Ltd, a Papua New Guinea merchandising, manufacturing and service group, announced in November plans to acquire New Guinea Industries Pty Ltd for \$A10 million. The move would mean that PNG nationals' stockholding in Steamships would increase, as they already own about 30% of NGI.

TRADEWINDS INTELLIGENCE... TRADEWINDS INTELLIGENCE... TRADEWINDS IN



LEFT: Tongans displaying three fine specimens of milkfish, of which thousands are taken each year from Lake Ano Ava. They grow to 28 inches long and more.

BELOW: Ano Ava lake, on Nomuka Island, in the Tongan Group. Roughly circular in shape, the lake has an area of 443 acres. It is 4-5 feet deep, and has a mud bottom covered with weed on which the milkfish feed.

Inland fisheries officers and research workers will be interested in the discovery that . . .

Milkfish

Are Breeding In Lake Ano Ava

IN many coastal regions of Asia very considerable quantities of milkfish (*Chanos chanos* Forskal) are raised in fish ponds. Although these are referred to as brackish-water fish ponds, in some the water is almost fresh while in others the salinity is much higher than that of seawater.

The milkfish is a sea fish, and adults are sometimes caught near the coast in fish traps. The fry of this fish is caught by fishermen near beaches and put in ponds. In the course of 8-10 months they grow to a size suitable for consumption.

It is a peculiar fact that the fish never spawn in these fish ponds, even when kept in them for lengthy periods. In other words, adult milkfish in fish ponds produce no progeny. Experts of world renown have for many years been investigating this problem, but up to the present, so far as I know, a solution has not been found. Consequently only those places which are near the points where the fry are found are suitable for the raising of milkfish. To catch and transport fry over long distances to ponds is very expensive, and many die en route.

One can thus see that if the milkfish would breed in ponds, a marked

* Fisheries Officer, South Pacific Commission.



A discovery that may well prove to be a major advance in the development of pond culture of edible fish was made during a recent visit by the author to Nomuka Island, in the Tongan Group. Here he found that in a small lake on the island, milkfish, hitherto regarded as a species that will not spawn in enclosed waters, have been breeding and maturing for many years. The significance of his discovery is explained below.

By H. VAN PEL*

advance in pond cultivation of this species would follow, and greatly increased production would result.

Recently I made a trip through the Tongan Archipelago in the South Pacific Ocean and visited, among other islands, Nomuka Island, which is situated about 60 miles N.N.E. of Nuku'alofa, the capital of Tonga.

This small island has a saltwater lake which has no connection with the sea, being some 300 yards distant from it. The lake is roughly circular in shape and covers an area of 443 acres. I found that in this lake, which is called "Ano Ava" (*Ava* means milkfish and *Ano* means lake), milkfish have been breeding and maturing for many years, thousands being caught there every year. I saw some 28 inches long.

About 48 years ago the lake was overfished and was then restocked with milkfish fry brought from another place. Since that time there has always been fish in the lake.

During my visit the salinity of the water was below that of seawater (much rain had fallen during the previous week), but in the dry season it is higher. The lake is 4-5 feet deep, the water being turbid as in fishponds. Its temperature during my visit was 28.5°. The lake has a bottom of grey-black, sulphurous-smelling mud, in which grow weeds on which the fish feed.

Probably the only reason the water is salt is because of the porosity of the soil, which permits seawater to seep through to the lake. It seems that the fish spawn in the last quarter of the

year. At the end of the year, after the rains, the surface of the lake is crowded with fry. Much of this fry, when it reaches fingerling stage, is used as bait for handline sea-fishing.

I feel that a detailed scientific study of the biological cycle of the milkfish in this lake on Nomuka Island may assist in solving the problem of breeding milkfish in enclosed waters, and for this reason the Commission is informing workers and institutions carrying out research in this field, of this discovery with a view to further investigations being undertaken.

It is quite possible that there are more inland waters in the Pacific area where milkfish (*Awa*) will spawn. If so, any relevant information will be welcomed.

W.H.O. Meeting at Manila

The Fifth Meeting of the World Health Organization Western Pacific Regional Committee was held at Manila, Philippines, from 10th-16th September, 1954, under the chairmanship of Dr. F. S. Maclean, Head of the Public Hygiene Department, Ministry of Health, New Zealand.

Fourteen countries were represented. Amongst the delegates were two members of the South Pacific Commission Research Council: Dr. J. Bierdrager, Head of the Netherlands New Guinea Health Department, and Dr. R. Augère, Head of the New Caledonian Department of Health. The Commission sent Dr. G. Loison as an observer.

In the Commission's area of activities, the Organization will provide assistance for campaigns against malaria, tuberculosis and yaws; it has, moreover, granted a number of scholarships to personnel working in the region.

Attention was drawn to the importance of insect-borne virus diseases. Reports prepared by local experts will be submitted to the World Health Organization Committee of Experts, who will decide on the desirability of organizing discussions on this problem.

At the chairman's request, Dr. Loison outlined the South Pacific Commission's work programme and the results obtained, with particular reference to subjects investigated with the co-operation of the World Health Organization. Dr. J. C. Fang, Director of the Regional Bureau, thanked the Commission for its participation, and announced that next year the Commission would be asked to evolve a programme of filariasis control in South East Asia. Various delegates requested that collaboration between the two organizations be encouraged.

Dr. Loison discussed common problems with the local medical authorities and conferred with the Regional Bureau's technical advisers, certain of whom are to visit the South Pacific during the year 1955.

Dr. Iyengar examines a brackish water pool near Ponerihouen for larvae of *Aedes vigilax*.



Filariasis In New Caledonia

(Continued from Page 27)

different species of mosquitoes and their hybrids with a view to studying experimental infection in them.

To facilitate their researches, a suitable person with the non-periodic type of infection was selected from the Ponerihouen area and sent over to Sydney through the very generous offer by M. Jean Hagen of a free passage from Nouméa to Sydney and back on his ship, "New Hebreuais II". M. Braveau Issaia Noel, the selected man, spent a month at Sydney and gave the fullest measure of co-operation in an investigation of humanitarian and scientific interest.

A preliminary report on these tests by Drs. Backhouse and Woodhill will soon be published. The results show that the filaria occurring in New Caledonia does not develop in any of the *Aedes* mosquitoes present in Australia, and that it develops well in a species of *Aedes* prevalent in Fiji.

To summarise, filarial infection in New Caledonia is the non-periodic type and has a patchy coastal distribution. The vector of the infection is *Aedes vigilax* that breeds in stagnant brackish water pools exposed to sunshine. This mosquito is a strong flier and bites chiefly during daytime.

The incidence of filarial infection in a locality is determined by the numerical prevalence of the vector mosquito. Ordinarily, areas with a high incidence of filarial infection are characterized by the occurrence of a fair number of cases of filarial disease, as for example, elephantiasis. In New Caledonia, on the other hand, in spite of the presence of filarial infection, the incidence of cases of elephantiasis is remarkably low. Consequently, filariasis is not an important pub-

lic health problem in this country.

The reasons for the low incidence of cases of elephantiasis in spite of the occurrence of filarial infection, are being investigated.

Second Malaria Conference

Dr. Robert H. Black, malariologist, School of Public Health and Tropical Medicine, Sydney, acted as observer for the South Pacific Commission to the Second Malaria Conference for the Western Pacific and South East Asia Regions, held at Baguio, Philippines, from 15th to 24th November, 1954.

The report of the ten-day conference, which brought together 42 malariologists from 13 different countries under the auspices of the World Health Organization with the co-operation of the Government of the Republic of the Philippines, reviews the problems connected with the malaria-carrying mosquitoes of the regions, research in the field of malaria, the role of drugs in the fight against malaria and national control programmes.

The report gives examples of nationwide malaria programmes now being carried out in the two regions. It emphasizes the heavy cost to the community of malaria due to its effects on physical, economic and social health. Russell's statement that "no country with a serious malaria problem can afford not to control malaria" is again endorsed, and the undoubted benefits that have followed malaria eradication projects are also stressed.

To reach the ultimate goal, eradication of the disease, the Conference considered that not only should more funds be devoted for control programmes, but that efforts to train adequate numbers of personnel should be intensified.

Tonga I. P. Marine Biologist

MARINE BIOLOGIST

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GEORGE H. BALAZS

appln. # 356158

project name & # → 421-73-AH

The Director of Agriculture has requested a Volunteer with a background in marine biology to work in the Fisheries Division of the Agriculture Department. This Volunteer will follow-up and expand the work done by two Volunteers who worked as Marine Biologists for a period of ten months in Tonga. Many of the projects they implemented, the Agriculture Department wants to see completed and also new ones developed. Projects that should be followed up and expanded are:

1. Nesting and Tagging Study of Marine Turtles: Eretmochelys In Tonga it is believed that the marine turtle (Hawksbill species) population is in danger of becoming extinct. A preliminary survey was done by the two marine biologists and they felt the Hawksbill Turtle would become non-existent in the Tonga area in 5-10 years. To substantiate this theory more surveys have to be implemented to determine the exact turtle population in Tonga. Ideally this should be done during the months of November, December and January. The marine biologist should also follow up on two recommendations made by the two previous marine biologists concerning implementation of a turtle sanctuary and rearing station, where turtle eggs could be protected and the young turtles raised in water tanks for at least one month.
2. Establishment of an Experimental Turtle Ranch: A small turtle hatchery was established for Hawksbill Turtles on Tongatapu. This hatchery could be expanded to the extent possible of raising one half the hatchlings commercially. But this should not be done on a 100% basis until it has been determined that protecting eggs and nesting turtles and raising them 1-2 months, before release is really aiding the population.
3. Setting up a Fisheries Cooperative: Investigation should be made into the possibility of establishing a fishing co-op along the lines of the ones set up in Fiji and American Samoa.

Rich
Braley

4. Development of a Beche-de-mer Fishery: It is believed Beche-de-mer (sea cucumbers) fishery could be started and developed into a profitable export industry. There should be more field and research done to determine what species are in Tonga and their abundance as well as their location.
5. Fish Pond-Livestock Project: An already existing pond was reinforced and Tilapia, a species of fish, were reared in the pond. Livestock pens for pigs were constructed near the pond and the Tilapia provided the main source of protein for the pigs and hatching turtles near the pond. The manure washings from the pigs were used to fertilize the pond. This project should be continued with the possibility of expanding the project to other places in Tonga where a body of fresh or brackish water could be isolated. Based on the results done by the two marine biologists it seems it could be a very profitable project for private entrepreneurs.
6. Fisheries Laws: The fisheries regulations were written in 1970 and then shortened by two Tongan instructors working in the fisheries division. These revised laws were submitted to the Crown Solicitor in April 1972. Once these laws are passed the problem will be in enforcement and educating the public to the new regulations. The Volunteer should work through the Education Department with schools, Science Teachers Association and churches in educating the public in the reasoning behind the laws. Once the laws are understood it will hopefully make enforcement easier.

This information was taken from the report which was submitted to the Agriculture Department by the two Marine Biologists. In Tonga fisheries development is a new area and outside of the work done by these two marine biologists little has been accomplished.

The Volunteer will be directly responsible to the Director of Agriculture (Tongan National) and ultimately to the Minister of Agriculture (Tongan National).

Since the Volunteer will spend a large portion of his time on the other islands, the Volunteer should have a rating of 2 in Tongan. The Volunteer will live in a village near the capital, Nuku'alofa.

There are no unusual circumstances associated with this assignment.

Article and photographs by W. A. Wilkinson

In the Friendly Islands

Saving reefs and whales

WHEN JAMES COOK, English sea captain, explorer, and navigator, discovered the Tongan Islands in 1777, he was met with native smiles. On the Island of Nomuka, a traditional feast was given, with dishes of shellfish, yams, and breadfruit. While outwardly peaceful and friendly, the islanders had plans to dispose of their English visitors. But disagreement among the chiefs prevented the mass execution; no doubt the rich food and local brew brought a change of heart. Cook was allowed to return to his ship, to sail away unharmed. He named his discovery the Friendly Islands.

Not long after I arrived in the Kingdom of Tonga, in April 1973, I learned that Captain Cook had named the islands well. After generations of subsistence fishing and whaling, this small nation has cheerfully acted to preserve its natural heritage, establishing the South Pacific's first marine parks, and curbing the local whaling industry that threatened breeding humpbacks.

I had been sent by the British Overseas Ministry, at the request of the Tongan government. My assignment was twofold, to help develop the local fishing industry, and at the same time establish protection of tropical reefs and lagoons.

Such projects were not new for me. Aside from my work with the Scottish Fisheries Department, I had spent 12 years in tropical East Africa, helping to establish the marine parks along the Kenyan Coast. Life on the isolated islands of the South Pacific was, apart from the almost total absence of land animals, not unlike that along the African coast. Long before Captain Cook dropped anchor off Nomuka, Tongan lagoons and reefs had supported island fishermen. From one generation to the next, the seas provided an inexhaustible bounty.

But the Friendly Islands (actually three island groups spread over some 770 square miles of ocean) represent, on a small scale, a worldwide sickness. The island's burgeoning human population now puts impossible demands on natural

resources. Fifty years ago, the island population was a modest 30,000. Today, it approaches 100,000, with annual increases of 3.5 percent. On Tongatapu, administrative center for all the Friendly Islands, there are 55,000 people. Land resources are inadequate to feed the expanding population, so lagoons and nearby reefs feel greater fishing pressure.

The problem conservationists face around the world, and that I encountered in the Kingdom of Tonga, is fundamental. How does one establish enforceable laws in a close-knit, subsistence society, and how does one convince the affected people that the laws are good, and not just another modern infringement on ancient rights?

I began my work at Tongatapu's main lagoon, the nursery and breeding ground for the grey mullet and other reef species local fishermen depend on. With as many as 20 fish traps in an area of 1,200 acres, the lagoon was grossly overexploited. The mangroves were being systematically de-

nuded. Worse, there was talk that the lagoon should be filled in, to build an international airport.

Before any official move was made, the owners of the fish traps, who lived along the lagoon edge, were consulted. They were remarkably understanding; catches in their traps had declined progressively; given a rest, the lagoon might recover.

The government passed legislation declaring the lagoon the first Tongan Marine Reserve. Four weeks later, all fish traps had been removed. Cutting of mangroves from the lagoon edge became a crime, and a stringent licensing system was set up to control felling of mangroves further from the shore.

Enactment of laws was just a beginning. Enforcing them is more difficult. In developing countries, the people charged with improving a resource should not be the ones policing it. Nothing more quickly brings ill will between conservationists and fishermen.

Local police must understand the new conservation laws, and avoid heavy-handed enforcement that would turn public opinion against future legislation.

Creation of marine parks, let alone policing them, is a new concept. Although in past years they have been established, with success, along the coast of East Africa, in the Red Sea, and in the Caribbean, the park at Tongatapu was the first in the South Pacific.

To succeed the parks must be interesting to visitors, with representative reef

Tongans wait for the catch at the Nuku'alofa fish market; fishermen readily agreed to establishment of island's first marine reserve in Tongatapu's main lagoon, a move that protected butterfly fish and coral. A professional conservationist, Author Wilkinson has worked in Scotland and East Africa.

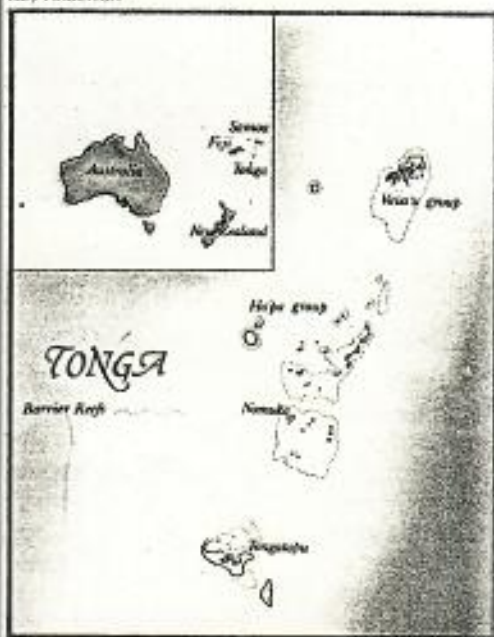


fauna for their enjoyment. Areas should be relatively small, well-defined, accessible to tourists, and possess features of special interest.

Without marine parks, the world's irreplaceable reefs will disappear. Outside the lagoon at Tongatapu, reefs had been picked over by the shell and coral collectors who serve the tourist and artifact trade. 'Fishing' with explosives had wrecked reefs, and had claimed the limbs of fishermen. (Missing hands and fingers are common among Tongan fishermen; few admit how they lost them.)

Save reefs by establishing marine parks, and fishermen soon bring home bigger catches, tourists bring dollars to the local economy, and scientists have another base from which to study the sea's mysteries.

Kay Anderson



In Tongatapu, four marine park sites were selected in 1975. Three years later, protective legislation was passed, and the parks officially established. The people of the South Pacific had taken a monumental step toward saving resources for generations to come.

THE FRIENDLY ISLANDS have done more than establish marine parks. While the rest of the world painfully maps strategies to protect declining whale stocks, the Tongan government has banned all killing by the small island whaling industry.

With unfailing regularity, humpback whales migrate each year from the rich, cold waters of the Antarctic to breed in the warm seas between Tonga and Western Samoa. The Tongan whaling industry was founded, so the story goes, by a British whaler named Cook, who deserted his ship for the languid delights of Polynesia. The Tongan Cooks kept their English surname, and the local whaling industry remained a family affair. Tongan whalers took to the sea in 35-foot, gaff-rigged boats, and stalked their prey with considerable skill. Until the moratorium was passed, Tongans still hunted whales with handheld harpoons, dispatching both mothers and calves. Over the last decade, six to ten whales had been killed each year. In 1978, nine female humpbacks and three calves were taken. The cull by subsistence hunters may seem insignificant until one considers the precarious state of humpback populations worldwide.

Tongans have always regarded whales as big fish, and all fish as legitimate game. And, whales were never wasted, with

every scrap used by islanders.

Since 1935, the Tongan government has had laws providing total protection for baleen whales. Unfortunately, government officials did not realize that humpbacks are baleen whales, and that humpback whales are now endangered marine mammals.

It took time to convince the government that each dead whale represented a breach of long-standing law. But once again, cooperation was remarkable, and a moratorium was passed. Now with breeding whales protected, scientists can study local stocks. Can one, or six, or even twenty humpbacks be taken for subsistence without harming the population? Can a maximum, sustainable yield be assessed, one that will allow humpbacks to replenish their population, and islanders to hunt whales as they have for generations?

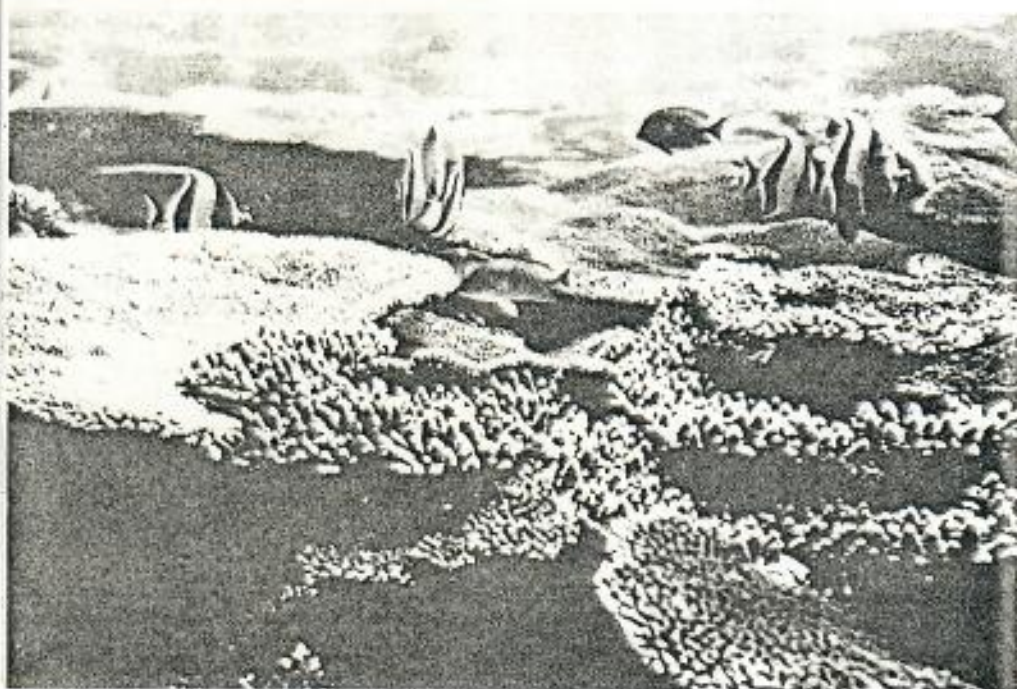
The ban on whaling, and the establishment of marine parks, are beginning steps in the South Pacific. Young Tongans must become conservation conscious, and Tonga's successes must be tested elsewhere; already other island nations in the Pacific show interest in establishing their own marine conservation areas.

Until recently, the island people of Polynesia lived harmoniously with their environment; their culture was founded on a closely cultivated relationship with nature. Conservation in the Western sense was unknown, yet cultural practices ensured that necessary resources survived to serve the community as a whole, and to nourish future generations.

Now, as a modern, cash economy replaces traditional sharing within the communities of the Pacific, as old values erode, westerners are stepping in to repair the harm done by our own forbears.

Years ago, when I became involved in establishing marine parks and reserves on the east coast of Africa, much public suspicion was directed my way.

Why, I was asked, should fishermen be kept from areas they have fished for hundreds of years? My stock answer was: 'Let's try conservation for a year; if you are still not convinced, we will reconsider our program.' Today, Kenya's marine parks are world famous, attracting thousands of visitors each year. Fishing outside the sanctuary areas has improved greatly. Conservation is compatible with a subsistence life style; the job of conservationists is to create the kind of understanding that helps rapidly changing societies preserve a bit of the past for the future.



Defenders

MAGAZINE OF DEFENDERS OF WILDLIFE

February 1980
Volume 55
Number 1

Behind the Lines

Once I explained to a friend what I was doing here: 'I'm one of the four able-bodied men they hired to replace **Mary Hazell Harris.**' It was flip, and ironic, and true. Miss Harris edited this magazine while running the whole Defenders operation and lobbying successfully on Capitol Hill and in the executive offices.

Which may explain some of the unprovable tales about her. One has it that one year only five issues of this bimonthly appeared—she had forgotten one. Another yarn held that she had campaigned so hard for the coyote, and against 'predator control' (essentially federal slaughter of coyotes) that at least one member of Defenders objected, declaring that an issue of the magazine had presented '40 pages of dead coyotes.'

Such stories tend to gather around dedicated individuals, and partake of the truth even when literally untrue. I can believe them—on one level—because I knew Mary Hazell a little.

Success tends to follow such people, too. Mary Hazell Harris lived long enough to see the Interior Department outlaw much of the objectionable 'predator control.' So her replacements will not have to run 40 pictures of dead coyotes in one issue. (Maybe two or three.)

Mary Hazell knew, better than most, that all our battles might not be won. One pervading issue for today and the future is the poisoned rain, falling alike on American and European lakes, shriveling salamanders and fish. **Michael Lipske** explores the problem in our lead story.

In winter, of course, acid rain turns to acid snow, complicating the lives of animals who, over the centuries, have developed ways and means of handling the ordinary snowfall, as examined by **Ruth Kirk** in the educational supplement in the center of this issue. Mrs. Kirk was last seen in DEFENDERS with a piece on deserts—which also get snow, but seldom.

Speaking of snow, I hope you enjoy our cover, a rare one for us in that it is highly styled, rather than realistic; artist **Vint Lawrence** captures his animals in a few subtly colored lines and plays tricks with the snow itself. (Other folk get snowflakes in their trees, with us, it's vice versa.)

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Tony Auth, George Founds, George Andrew Gabriel, Paul Hoffmaster, Harold Smelcer, Patricia Taynton, Don Wright, CONTRIBUTING ARTISTS

COVER: Sharp-eyed lynx and alert hare are frozen in mid-hunt. In snow, the lynx relies on strategy to bring down fleet-footed, well-camouflaged hares. Bounding forward, then crouching quietly, the cat lures its prey into hopping closer; compelling curiosity is the hare's fatal flaw. Inside, Ruth Kirk tells how wildlife—from voles to elk—survives in snow (p. 29). Cover painting by Vint Lawrence. **OPPOSITE:** Black skimmer by E. R. Degginger.

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Publication Number: USPS 151-400

*Journal of the
Pacific Whale Foundation*

Winter 1982

Tonga to resume whaling

PWF has recently received word from our correspondents in New Zealand that the Kingdom of Tonga recently voted to resume whaling. The Tongan whalers use aboriginal whaling methods to kill the humpback whales which frequent their nearshore waters from June to October each year.

The Southern hemisphere stock of humpbacks is highly endangered, and it is estimated that only 200 humpbacks migrate to Tongan waters each year to mate and calve. Tongan waters provide the same winter home that Hawaiian waters do for the humpbacks, except that it is the Antarctic stock of humpbacks which frequent these waters.

Research indicates that the North and South Pacific Stocks of humpbacks never cross the equator or mix. Since the seasons occur at opposite times of the year in the North and South Pacific, the whales are always performing opposite functions, e.g., when the North Pacific population is feeding the South Pacific whales are breeding, and vice versa.

The Foundation asks your support by writing the King of Tonga and requesting that they do not resume whaling in Tonga:

His Majesty King Tupou IV
Royal Palace
Nuku'alofa, Kingdom of Tonga

Tongan whalers kill an average of 7 to 10 humpbacks a year. They kill primarily calves, and pregnant mothers since these are the easiest prey to capture from their small sailing boats.

PREDATION ON JUVENILE GREEN SEA TURTLES,
CHELONIA MYDAS, BY A GROUPER, *PROMICROPS LANCEOLATUS*
(PISCES: SERRANIDAE) IN THE KINGDOM OF
TONGA, SOUTH PACIFIC

W. N. Witzell

Documented cases of predation on green sea turtles, *Chelonia mydas*, by fishes are scarce; major world-wide literature reviews and case summaries on the subject are by Hirth (1971) and Brongersma (1972). Predation by groupers (Serranidae) is believed by scientists to contribute to high mortality of green turtle hatchlings, although documented cases are nonexistent, and serranid predation on larger green turtles is limited to one case from Hawaii; Balazs (1979) reported a 52 cm subadult from a 205 kg *Epinephelus tauvina*. This note describes two cases of predation on juvenile green turtles observed during a marine resource survey conducted in the central Ha'apai Island Group of the Kingdom of Tonga from December 1975 to November 1977. In both cases the predators were large groupers, *Promicrops lanceolatus* (Bloch, 1790), recorded here for the first time as turtle predators.

Both groupers were speared at night in the vicinity of Limu Island, Ha'apai, Tonga. This relatively inaccessible island has an abundant variety of unexploited fishes and supports a small nesting population of green turtles. The surrounding reefs and grass flats provide excellent habitat for juvenile turtles, which are frequently seen sleeping at night under coral ledges. The first fish was speared in April 1976, and was 180.5 cm total length and weighed 74.8 kg gutted. The stomach contained six spiny lobsters (*Panulirus* sp.) ranging in size from approximately 0.75 kg to 2.5 kg, and an entire juvenile green turtle 38 cm curved carapace length (CCL). The lobsters and the turtle were fresh and were consumed by the fishermen. The second fish was speared in August 1977 but was butchered before I could measure and weigh it. From the pieces observed, I estimated the fish to be slightly larger than the first fish. The stomach contained two partially digested spiny lobsters approximately 1 kg each, two almost totally digested spiny lobsters of similar size, and an entire green turtle approximately 35 cm (CCL) also in an advanced stage of digestion.

The grouper, *Promicrops lanceolatus*, is a shallow reef dwelling species which frequently enters estuaries (Marshall, 1964), ranging in depth to 80 m (Fischer and Whitehead, 1974). This large species has a somewhat nefarious reputation throughout the Indo-Pacific region, reported to attack and devour native divers (Marshall, 1964; Munroe, 1967). Although occasionally seen during the day, this grouper is generally seen foraging on the reef shallows at night. The strong suction caused by the rapid expansion of the oral cavity, combined with an exceptionally large mouth, enable *P. lanceolatus* to easily ingest sleeping turtles from reef niches. Fishermen interviewed throughout the central Ha'apai area indicated that it was not uncommon to find either turtles or lobsters in the stomachs of these large groupers.

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DATE ACCEPTED: January 14, 1981.

ADDRESS: Fisheries Division, Kingdom of Tonga, South Pacific. PRESENT ADDRESS: National Marine Fisheries Service, Southeast Fisheries Center, 75 Virginia Beach Drive, Miami, Florida 33149.



AEROGRAMME

DR. George BALACS
SOUTHWEST FISHERIES CENTER
NOAA - NMFS
HONOLULU LABORATORY
P.O. BOX 3830 HONOLULU,
HAWAII 96812
U.S.A.



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SENDERS NAME AND ADDRESS
Jon Swidler - Peace Corps Fisheries
P.O. Box 147 Nuku'alofa,
Kingdom of Tonga
South Pacific



TO OPEN BUT HERE

MARCH 16, 83

DEAR DR. BALACS,

I WAS WONDERING IF YOU COULD HELP ME
ACQUIRE A POSTER OF THE SEATURTLES OF THE
WORLD EITHER YOURSELF OR AN ADDRESS. NEXT YEAR
OR LATE THIS YEAR WE ARE GOING TO START A
PROJECT ON IDENTIFYING AND INVENTORING
NESTING AREAS IN TONGA. IF THERE IS ANY WAY
I CAN HELP YOU BY PASSING ON INFORMATION I'LL
BE GLAD TO DO SO. AT THE PRESENT TIME WE
ARE CARRYING OUT AN INSHORE REEF SURVEY.
THANK YOU FOR THE TIME AND ATTENTION YOU HAVE
GIVEN THIS LETTER. I LOOK FORWARD TO HEARING
FROM YOU.

Sincerely,

JON SWIDLER
PEAKE CORPS TONGA
FISHERIES
P.O BOX 147
NUKU'ALOFA,
KINGDOM OF TONGA
SOUTH PACIFIC



Our Reference... 5092/F2/12

29th July, 1982

Dr George Balazs
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P O Box 1346 Coconut Island
Kaneohe, Hawaii
U.S.A. 96744

Dear Dr Balazs

Please excuse the delay in correspondence. I found your report, Sea Turtles and Their Traditional Usage in Tokelau, to be such in line with the type of report aimed for by the proposed survey work in Tonga. It was, in my opinion, a well-balanced composition between the cultural and natural history parameters which we hope to utilize in our own sea turtle management decisions. Of course, the Tonga survey will necessarily encompass a much wider geographical area and include, hopefully, the first real population assessment in terms of utilization and recruitment potential. We envisage perhaps several years of follow-up work to achieve proper management.

The Central Planning Department here has returned our funding request with two pertinent comments. The Commonwealth Fund for Technical Cooperation (CFTC), whom has funded survey work of a similar nature in the past, apparently is exhibiting a tightening rein on their funds and, in addition, would be very unlikely to accept a non-commonwealth member as the chosen consultant. This puts us right back out in the open to accept alternative avenues.

We have discussed amongst ourselves here at Tonga Fisheries Division the various possibilities open for this survey. It is our consensus that your own experience and qualifications are those most desired. We also noted with interest the funding arrangements involved in your Tokelau survey. It seems fairly certain at this point that the only survey work to be considered for approval by this Government will be a proposal involving no expenditure on their part. Where do we go from here?

The World Wildlife Fund has, as you probably know, funded a survey of the humpback whales in Tonga in 1980, including follow-up assessment just this past month. This survey arose through efforts outside the Tongan Government. What I am aiming at is, from your knowledge of WWF, what sort of response is likely from them upon request from the Tongan Government to fund this sea turtle survey, or in trying to expedite matters, would it be simpler for you to deal directly with the WWF in arranging funds to do this survey? A brief explanation of how the Tokelau survey came about will probably clarify this for me.

Secondly, is the possibility for assistance from the National Marine Fisheries Service (NMFS) and/or the University of Hawaii still open?

Thirdly, I am presently pursuing one other potential funding source, the UN Development Advisory Team (UNDAT), directed by Mr A. Holcombe in Fiji. At this point I am simply looking for an indication from him as to whether or not such survey work as this fit into the criteria of their organisation and if there are possibilities for pursuing this with them.

I think it would be most useful at this point, if you are interested and perhaps see possibilities for having this survey funded, for you to draft out a preliminary survey design, indicating the criteria and time-frame you feel will be basic to a first attempt in Tonga, and including a fairly broad break-down list of expenditures you foresee. The survey design and criteria will be necessary at any rate for a proposal to this government. An indication of expenditures, including what you can or cannot get funded through your own resources, will lend some direction and some specific information for us to address potential funding agencies.

This should give you a good idea of where we stand now. We are very interest in you carrying out this work here in Tonga. We also feel that December of January would be good months to at least begin the work, as our information is that this is the height of the nesting season, at least for Chelonia mydas. We have read with interest about your work with radio telemetry in Hawaii, and would certainly encourage thought to extended scientific research in Tonga as you may deem feasible. At this point though I think we must await your comments to this letter.

I trust that all is well with you these days in Hawaii.

Regards

RD Volk

Richard Volk
FISHERIES DEVELOPMENT OFFICER
MAFF.



RV:af

cc: Director of Agriculture



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

August 9, 1983

F/SWC2

Mr. Semisi Fakahau
Fisheries Officer
Fisheries Division
Ministry of Agriculture,
Fisheries and Forests
P. O. Box 14
Nuku'alofa, Tonga

Dear Mr. Fakahou:

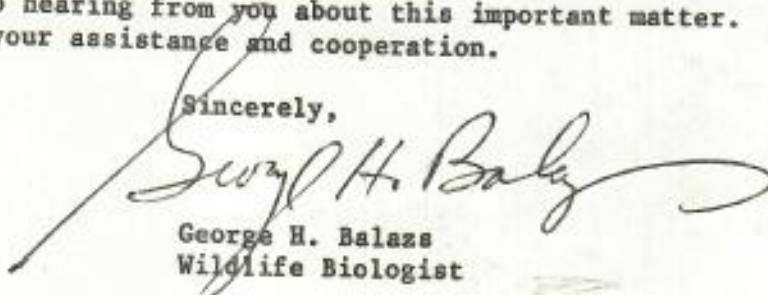
The Director of our Laboratory, Mr. Richard S. Shomura, recently told me about the case you reported at the SPC meeting concerning a poisoning in Tonga from eating a hawksbill turtle. As a researcher of sea turtles in the Pacific islands, I am very much interested in learning more about this case. Your kind assistance in helping our Laboratory obtain information will be greatly appreciated. As far as I know, this is the only report of hawksbill poisoning in Tonga. Are you aware of any other cases that may have occurred in the past?

Your answers to the following questions will be helpful to our research:

1. Where did the poisoning occur in Tonga, and on what date?
2. How many people became sick, and how many died?
3. Was the hawksbill a large or a small turtle?
4. Where was it captured?
5. What is the name and mailing address of the medical doctor, or health officer, that attended the case?

I look forward to hearing from you about this important matter. Again, thank you for your assistance and cooperation.

Sincerely,


George H. Balazs
Wildlife Biologist

Telegrams: AGRICULTURE NUKU'ALOFA

All letters to be addressed
THE DIRECTOR OF AGRICULTURE



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

Our Reference...4255/02/76.....

18th February 1982

Mr George Balazs
Assistant Marine Biologist
Hawaii Institute of Marine Biology
P.O. Box 1346
Kaneohe, Hawaii 96744

Dear Mr Balazs,

Cliff received your letter concerning the sea turtles caught in the trap nets and asked me to reply for him. I have enclosed a sketch of our trap net that was donated by the Japanese Government to help us in our survey of the Fauna on Tongatapu's reefs. This net was designed in Japan and they have worked with many designs of stationery fish collecting nets; ours is only one variation. At present these nets are not being used commercially by Tongans.

A good reference to the fish traps is:

Japanese fishing gear and methods
Overseas technical cooperation agency
Government of Japan, 1974.

If I can be of any further assistance in this matter please let me know.

Sincerely,

Brian Hickson
Brian Hickson,
Research Biologist.



Trap net set of of Pongiamotu Island.

Top View.

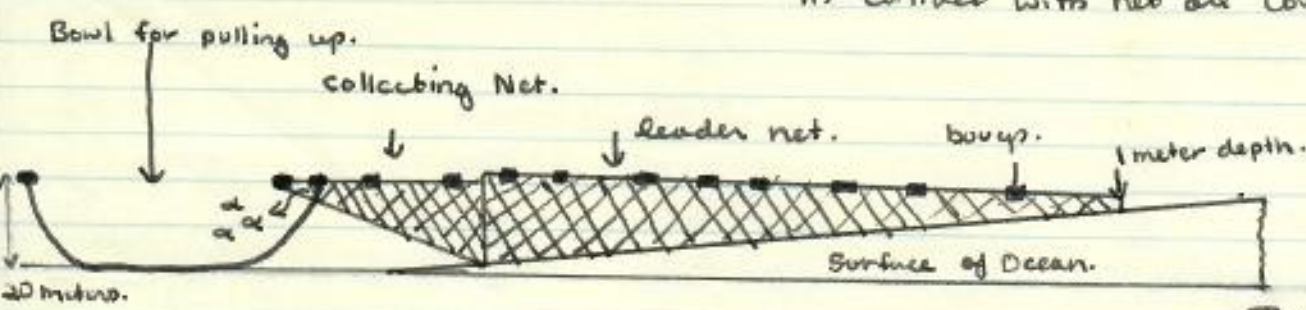


- Material Used
- ① 1/8 inch Net
 - ② Styro foam Bouys.
 - ③ Anchoring lines.

fish enter following leader.
land base station

Side View.

Round net disconnects and is pulled into two boats pulling. net in with trapped fish and turtles (anything that swims in)
Approximately 20% of fish coming in contact with net are caught.



Brian Hickson

COPY



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

October 26, 1983

F/SWC2:GHB

1-16-84
Dear Mr. Muli -
Your help with these
questions will be greatly
appreciated -
George Balazs

Mr. Lata 'i Muli
Medical Assistant
Nomuka
Ha'apai
Tonga

Dear Mr. Muli:

Mr. Tevita Lātū recently sent me information on the hawksbill poisoning that occurred in March of this year at Nomuka Island. Your name was listed as the medical officer that attended the case. I am therefore writing to you in an effort to obtain some additional facts. It would be greatly appreciated if you would answer the following questions to the best of your knowledge.

1. Has hawksbill poisoning ever occurred before at Nomuka Island, or anywhere else in Tonga?
2. How many people total ate the hawksbill? I understand that 18 people became very sick and 2 died. Were there people that ate portions of the turtle but did not become sick? Could the sickness or deaths be attributed to eating a particular part of the turtle, such as the viscera?
3. What were the approximate ages of the two people that died? Were they male or female?
4. What were the symptoms of the poisoning?
5. How soon after eating the hawksbill did the people become sick? How soon did the deaths occur?
6. How was the hawksbill cooked?
7. Approximately how many hawksbills, and other turtles, are captured and eaten each year by the people of Nomuka Island?
8. Do hawksbills, or any other sea turtles, lay their eggs at Nomuka?

Thank you for any help that you can give to this inquiry. I have enclosed a color poster showing the different kinds of sea turtles. This may be of use to you in your work. I look forward to hearing from you at your earliest convenience.

Sincerely,

George H. Balazs
George H. Balazs
Wildlife Biologist

Health Centre
NOMUKA
HAAPAI
TONGA
February 7, 1984

To George H. Balazs.
Wildlife Biologist
Honolulu Laboratory
Hawaii

Dear Sir,

Very sorry for late to reply your letter date October 26, 1983
I just received the letter on January 30, 1984 and the copy receiving
on February 6, 1984. Therefore I am going to answer the question
according for the information of the patients.

A diving fisheries from NOMUKA sailed to a reef
named HAKAM FISH for fishing at CAS NEIGH, and they got
many Hawkbill and Turtle. most twenty altogether and one
of the Hawkbills they got is poisoning.

Answered the Questions

1. No Hawkbill or turtle poisoning before at NOMUKA
or in Tonga.
2. (1) Twenty-one people were ate the hawkbill, eighteen were
very sick and three died, and three of them were not sick, and
mostly of the very sick and those people who ate the viscera.
3. The three people were died name and sex/age
① ELENCA ONGOONGO — F/8.
② STONIA MISHAKI ONGOONGO — M/14 yrs 7 months.
③ MATRARI FONUA IVATA LATAPU M/9 months 29 days.
4. Symptoms:- Headache, Vomiting, Weakness, loss of Power, Pain
in the joints and all the body.
5. Said after an hour of eating, start Head Ache, and Vomiting
and after 1/2 hours and death occur.
6. Boiling.
7. more than twenty Hawkbill and Turtle.
8. No Hawkbill or Turtle lay eggs at NOMUKA.

I hope that this short ^{report} will meet your inquiring, Thanks
very much for your color Post showing the different kind of sea turtles.

Sincerely,

Lata Jones
Health Officer.

Telegrams : Fisheries NUKU'ALOFA

All letters to be addressed
FISHERIES DIVISION, M.A.F.F.,
Telex: Gentel 66225, Fisheries
Telephone : 21-399



Ministry of Agriculture, Fisheries & Forests
P.O. Box 14,
Nuku'alofa,
Kingdom of Tonga.

...13th October, 1983.....

Our Reference *F3/3/4/635*

George H. Balazs
National Marine Fisheries Service
Honolulu Laboratory
P.O. Box 3830
Honolulu
HAWAII 96814

Dear Balazs

Please accept my apologies for the late reply of your letter dated 9 August, 1983 regarding your interest on the Hawksbill poisoning in Tonga in early this year.

Today (13 October) the Agriculture Extension Officer working in Nomuka contact me with the following information.

- The poisoning occurs in Nomuka Island (Position Lat. 20° 17' S. Long 175° 48' W on the 12 March 1983.
- 18 people became very sick and two person died
- The approximate size of the Hawksbill Turtle is 2'4" long and 1'2" width.
- Caught at Hakaufisi Reef situated at the Western side of Nomuka Island
- The medical Officer that attended the case;

Lata 'i Muli
Medical Assistant
Nomuka
Ha'apai
Tonga Island

Please note that the medical officer that attended the case is not a qualified Doctor.

Tevita F. Lātū
.....
Tevita F. Lātū
for Principal Fisheries Officer

TFL:af



July 1, 87

All's not Natives are in a

By Nicholas D. Kristof
The New York Times

NUKUALOFA, Tonga — This is the kind of South Pacific paradise that most Americans would love to be marooned on: lovely beaches, relaxed and friendly people, and bananas and coconuts always available for the picking.

But Tongans are itching to leave paradise. When New Zealand relaxed its visa rules in December, 5 percent of Tonga's population flew there in the space of a few months.

That remarkable exodus from this Polynesian island group of 100,000 inhabitants reflects the growing realization that many South Pacific islands are economic anachronisms, abounding in sun and friendliness but having little on which to build a future.

"When people talk about the rise of the Pacific, they're talking about the Pacific rim," said Epeli Hauofa, a Tongan sociologist who has left his native country to teach in Fiji. "They mean the U.S., Japan, the U.S.S.R., Australia. We in the islands are left out of it."

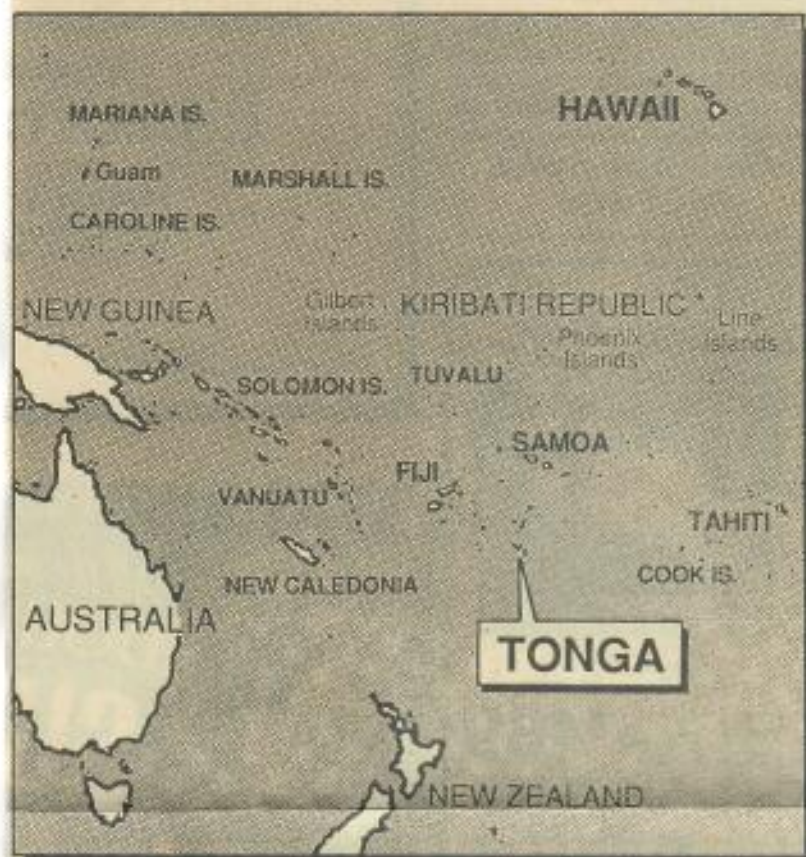
THERE IS NO doubt that the Pacific is gaining on the Atlantic as a center of economic and political might. Already, trans-Pacific trade exceeds trans-Atlantic trade, and the high growth rates in Japan, South Korea and nearby countries have prompted talk that a "Pacific century" is dawning.

But the ships and planes and capital that travel among the Pacific economic dynamos never stop at Tonga or Fiji or any of the other palm-lined specks in the ocean. Indeed, it seems that just as prospects have never looked better for the major Pacific nations, they are looking increasingly bleak for some island groups.

The bloated stomachs of malnourished children on islands such as Vanuatu belie the image of paradise, and some experts say this may be the region of the developing world with the worst long-term prospects. Africa

well in Tonga's paradise

rush to leave for economic improvement



By Ray Higuchi, Star-Bulletin

faces immense challenges, but it has resources that might eventually provide an economic foundation.

THE SOUTH PACIFIC, on the other hand, seems to face built-in problems. Already the island nations receive more foreign aid per capita than any other region in the world. Many economists, diplomats and international aid officials say that the small island nations are destined to endless dependency on other countries and that they may never emerge from the international welfare rolls.

"There is no possibility of creating a viable economy on these islands — none," said David Routledge, a historian of the region who teaches at the University of the South Pacific in Fiji.

The islands were well suited to a subsistence economy, because the natural barrier of water af-

forded protection from enemies and because the climate and often fertile soil produced food in abundance. Even today such blessings give islanders a living standard that is usually better than Africa's.

But the islands lack the means to enter an industrial economy. Increasingly, islanders want medicines, radios, bicycles, books, toilet paper and other modern goods. These must all be imported, at least by the small islands, yet there is little that the islands can sell on the world market.

SOME SELL agricultural products, postage stamps and fishing rights, in addition to seeking out tourists. But there is usually a big gap between the hard currency coming in and the sums that are needed. On the Cook Islands, for example, imports are usually about four times as much as exports.

Usually islands make up for these gaps with foreign aid. The three coral atolls of Tokelau, with a population of about 1,600, get 80 percent of government revenue from grants from New Zealand, for example.

"Today we exist mostly on aid," the prime minister of Vanuatu, Walter Lini, said in an interview, referring to Pacific islands in general. "If we are not careful, we will continue to rely on aid instead of developing a few resources we have."

Vanuatu, Papua New Guinea, Fiji and a few other island groups are lucky in that they have some natural resources. Vanuatu, for example, is mining for gold.

Others are dependent on mother countries — France for New Caledonia and French Polynesia, for example, and the United States for American Samoa and parts of Micronesia — and see nothing wrong with maintaining that dependency indefinitely.

BUT IN MANY places the economic constraints are driving young people away. They feel claustrophobic on small islands and want to pursue careers in larger communities. The result deprives some islands of their most talented young people.

The exodus has been most pronounced from small atolls whose citizens do not need visas to go to a mother country. The tiny Polynesian island of Niue, for example, is home to only 2,500 people, and the population is declining by more than 4 percent a year.

Emigrants often send back money, which is critical to many island economies. But the departures break up families, and some island refugees in New Zealand have turned to drink instead of jobs. And because it is usually the most talented who go, they leave behind them gaps that are difficult or impossible to fill.

The atoll group of Tuvalu, for example, had one statistician for the nation's 8,000 people.

"That's quite enough," Langi said firmly. "This is where you're going to stay. Tomorrow I've to see some of my friends in the spirit world. While I'm in Bulotu a guard will be left in front of the house to see you don't get into mischief."

He threw his cloak round his shoulders and strode off. "This is the chance we've been waiting for," Lola whispered to her sister. "While father is away we'll slip down to earth. We can get back long before he returns from Bulotu."

"You forget the guard at the door," Fatafe'i reminded her. "I haven't forgotten," Lola said. "I look here," and she showed her sister an opening she had made in the back wall of the house.

The two young women crept through it and made their way to earth. Who can tell how they accomplished such a difficult feat? Ah, but were they not daughters of a god and themselves imbued with god-like qualities?

But, as they appeared suddenly in the midst of an all-male kava drinking party they were no longer goddesses, but mischievous girls, ready for any adventures the men of Nuku'alofa might have in store.

The men were all on their feet welcoming them and inviting them to sit with them. The sisters realized that this was an unprecedented honor and attributed it to their forces and figures.

If for a moment their had been cause for wonderment and even alarm at the sudden appearance of two celestial beings, it was quickly forgotten as the girls giggled and showed themselves off to the men as though they were shameless mortal hussies.

One man strove with another to possess the strangers and in a short time the quiet dignity of the kava drinking was gone. Argument gave way to physical violence. Weapons were produced, and before long heads were bloodied and bones broken. Matters became even worse when wives joined in to discipline their husbands. The sound of strife was heard throughout the island.

The two sisters were thoroughly enjoying themselves. The sky land was a world of peace where nothing as exciting as this ever happened. Unfortunately the uproar was heard as

"Then tell them now." Tautafahi raised his voice. "Come here, all my sharks," he shouted. Soon the sea was covered with the black fins. "Listen. You must never, never touch the men of Moungaone. You, of your children, or your children's children. Do you hear me?" The fins bobbed up and down to show that the sharks had heard and would obey.

Tautafahi collapsed like a trodden bladder of seaweed as Fakapatu came out of his mouth.

That is why the people of Moungaone will tell you it is safe to swim outside the reef, for the sharks remember what their lord Tautafahi commanded them long ago.

THE ORIGIN OF TURTLES

THE TONGANS BELIEVED that Langi was the god of the sky land. He ruled his subjects firmly, not least of all his two beautiful, wayward daughters Lola and Fatafe'i. They were discontented with the lofty world in which they lived, and craved the excitement of a visit to the islands far below. On a cloudless day they could see the many islands of Tonga far below. Tongafahu the largest of them, lay on the blue sea like a polished gem. The girls pestered their father to allow them to visit just the one island. Langi was aware of the attractions it offered to two susceptible girls - golden beaches, waves to frolic in, soft winds singing through the palms, music, dancing and, above all, the handsome young men of Tongatapu who had an eye for any pretty girl.

Langi's answer was always an uncompromising "no." "It's not fitting for the daughters of the immortal gods to mingle with frail mortals," he reproved them. "Do you know there are young people down there who yearn to visit the beautiful sky land? Why can't you be content with the best of all worlds?"

If the young men are so anxious to visit the sky land, why don't you let them come here?" they asked. "It's selfish to keep away from us, ourself."

Prohibit boys against touching or pulling sharks

no - outside of boy (when calling) (shakes place) you'll may kill turtle

Tonga Fatafe'i in... of boy (when calling) (shakes place) you'll may kill turtle

Washington Sydney London

March - Oct... all the turtles in Fijimarket - KOW - smoked meat

They had opportunity to
speak on the 11th. I should be

Koro - outside
of Bony (where calling
the birds place) - you'll
know what I mean

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writing - I'll be in
a few days for

Myths and Legends
of Polynesia
A.W. Reed

A.H. & A.W. Reed
Wellington
Sydney
London

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March - Oct
sell. 11th in Fiji market -
Koro - another way

far away as Bulotu. Langi suspected that his wayward daughters were the cause of the trouble. Like a dark thunder cloud he rose from the spirit world and swooped low over Nuku'atofa. Spying his daughters sitting at the kava bowl, lifting the coconut shell cups to their lips, and thoroughly enjoying the tumult they had caused, he materialised in front of them. A sudden silence fell as the Tongans recognised the sky god and scampered back to their homes.

"You have brought shame on me as well as yourselves," he thundered. "Tell me, have you eaten any of the fruit of this world?"

"Yes," Lola said. "I've eaten some. It's good. It's better than what we have in our world."

"You silly, stupid girl! Don't you realise that you are no longer a goddess. You are a mortal. Now you will die."

He turned to his other daughter. "What about you, Fatafe? You are more sensible than Lola. Have you eaten any?"

"Not yet, Father."

"And what does that mean?"

"It means that I'm going to stay here. You've no idea what fun it is. It's the most wonderful experience of my life."

"Even though it means that some day you'll die?"

She tossed her head. "I don't care. I never want to go back to the dull life up there."

Langi looked at her sadly. "I thought you would have had more sense," he said. "Look, Lola is beginning to wilt already."

And indeed her cheeks had begun to wrinkle, her eyes no longer sparkled and there were grey hairs among her black tresses.

"Quick, Fatafe! Will you come with me?"

"No, I'm going to stay with Lola."

"No, you won't," said Langi with a surge of anger. He caught her by the hair, cut off her head, and with a sweep of his arm, threw it far out to sea, where it changed into a turtle the first turtle that was ever seen off the island of Tongatapu.

In Fonga and Samoa they tell a tale about the turtle named Sangone. It is a variant of the legend of Kac and the whale, well known to the Maoris in other islands. The story begins in Samoa, in the plantation of Lekapai, who was an industrious cultivator of bananas, breadfruit, plantains and other fruit and vegetables. For some years he had flourished. He was envied by the people of other villages; but one year a disastrous hurricane levelled all his trees and plants and he had to begin again.

No sooner had the new crops come to maturity than they were destroyed by yet another hurricane. When a third storm wrecked his work Lekapai determined to get to the bottom of the trouble and went in search of the home of the winds to make a protest to their keeper.

After a long voyage across the sea he came to a lonely rock on the edge of the world. The waves surged up the precipitous cliffs, but Lekapai rode his canoe on the top of a huge breaker, jumped out and, as the wave subsided, managed to cling to a narrow shelf. After a desperate scramble he pulled himself out of the reach of the waves and scaled the rocks. The top was wind swept and bare. Presently he came to a hole from which the wind was blowing. He lowered himself into and struggled on against the wind. The rock tunnel opened out into a large, dimly lit cave; hearing a sound behind him he turned and saw a mature, well-built, handsome woman coming towards him.

"You are a rash mortal," she said in a voice that sounded like wind in the tree tops. "What have you come here for?"

"I'm looking for the home of the winds."

"Why?"

"Because they've destroyed my growing crops three times."

"This is the home of the winds, mortal. What do you hope to do now you're here?"

"Stop them blowing," he said curtly.

"That will be difficult. It's a pity your crops have been hurt, but the winds are necessary. Have you ever thought what it would be like if there were no winds?"

Lekapai stood on one leg and then the other.

"No," he said at last. "I've never thought about that. It

would be good — but I suppose we would need them sometimes to blow the clouds away, and fill the sails of our canoes, and make everything cool again in the evenings. It's the hurricanes that do the damage."

"I'm afraid I can't control them," the woman said sadly. "You must take whatever comes. See for yourself."

She snapped her fingers. The winds sprang out from the cave — warm, gentle breezes, strong winds that blew steadily, and hurricanes and whirlwinds that picked Lekapai up until he fluttered round the cave like a leaf. "Stop! Stop!" he shouted. "They're killing me."

The winds ceased, and he fell to the ground.

"You're not hurt," the woman said. "The winds have gone now. Come with me and I'll give you food. I shall remember what you've told me. I can't control the winds once they have left their home, but I shall tell them to be gentle with you. Now it is time for you to return home."

"But how can I?" asked Lekapai. "My canoe was smashed to pieces at the foot of the cliffs."

"Don't worry," she said. "I'll lend you my turtle. He will take you back to Samoa much more quickly than any canoe. Here are some coconuts to take with you on your journey. If you feel thirsty, break the nuts on his back, but whatever you do, don't break them on his head."

She showed Lekapai a path on the other side of the rock. They went down together.

"Sangone!" she called. A huge turtle swam to the surface and looked up expectantly.

"This is my friend Lekapai, Sangone," she said. "I want you to take him to Samoa. Take good care of him."

She turned to Lekapai. "When you arrive, you must take a piece of tapa cloth and a vessel of oil. Wrap them in a large leaf, tie it securely, and give them to Sangone. He will bring them to me. Then I will know you've arrived safely."

It was a strange sensation riding on the turtle's back. Never had Lekapai travelled so fast. The wind dried his lips and made him thirsty. Forgetting what the keeper of the winds had told him, he broke a coconut on Sangone's head and drank the refreshing liquid. Before the sun had time to sink into the ocean he saw the familiar sight of his homeland. The



turtle waded through the shallow water and lay down on the sand. Lekapai ran to his house, but instead of getting the gifts he had been asked for, he brought out a club and struck Sangone repeatedly on the head until the turtle was dead. Turning it on its back he cut up the flesh and shared it with his relatives, after which the shell was burned under the roots of a candlenut tree.

The years passed by Lekapai and all his generation were dead — all except one man who had watched Lekapai bury the shell of Sangone. New generations of children lived and died without ever hearing what their ancestor did to the sacred turtle of the keeper of the winds; but Lafaipana, who had seen the burying of the shell still lived on — and he told no one.

In Tonga it was known that Sangone had been stolen, but not where he had been taken.

"It may be that it went to Savaii in Western Samoa," the Tui Tonga said to his young brother, Fasi'apule. "Are you prepared to go there and see what you can find?"

The young man agreed.

"It will be a mission of great delicacy," his brother warned him.

weary of life, but the spirit of Sangone still haunts me. It will not let me sleep the long sleep I desire."

Fasi'apule took the old man firmly by the arm. "I came to solve a mystery. You have given me the answer. Now I can free you for the long rest you are craving. Show me where Sangone's shell is buried."

Lafaipana led the way to the candlenut tree. "There," he said, "under the roots. That's where Lekapai buried it."

Fasi dug carefully in the sandy soil with his hands, gradually enlarging the hole, until the complete shell was revealed.

Lafaipana bent down to look at it more closely. The shell glowed with a golden light as though the sun's rays were imprisoned within it. The old man fell backwards with a beautiful smile on his face. The curse of Sangone was ended and Lafaipana was at last gathered to his fathers.

WHY THE BONITO COMES TO TONGA

THE THEME OF men and women who live at a distance, and who cannot resist the urge to possess the beauty of Hina who Tonga had heard from voyagers of the beauty of Hina who lived in Samoa. He could not rest until he had seen her for himself. For this purpose he had his largest canoe provisioned and manned and set out on the voyage from Tongatabu. On the way he called at the island of Haano in the Hapai group, where he was joined by the chief Nganatatafu, who was reputed to be the most handsome man in all Tonga, and two of his attendants.

When the canoe arrived at Samoa the Tui Tonga went ashore with his warriors, and was royally entertained with dances and feasting. The Tui Tonga enjoyed the roasted bonito. He had never tasted it before, for the bonito was not

Myths and Legends of Polynesia

Fasi assured him that he could handle such matters with diplomacy and cunning.

In due course he landed at the village where Lekapai had once lived. He made discreet inquiries, but his questions were met with blank looks.

It all happened a long time ago," Fasi thought, "but surely someone has heard of Sangone — that is if he was ever brought home. I wonder who is the oldest person in the village."

That night, at kava drinking time, he propounded a riddle. Calling for silence he said, "Can anyone give me a clap-it-and-it-smokes?" No one except Lafaipana knew what he meant by this mysterious expression, and he had kept well out of sight.

The village masai whispered to one of his sons, "Find Lafaipana and ask him if he knows what Fasi is saying."

The young man came back with a small piece of kava root and handed it to the visitor. Fasi clapped it between his hands and a puff of dust flew out, as fine as a cloud of smoke.

On succeeding nights he asked further questions which he knew could only be answered by one who had lived a long time and had learned the wisdom that had been forgotten in Samoa but remained in Tonga.

"What is the name of the man who has solved the riddles?"

he asked.

"Lafaipana"

"Bring him to me"

"What do you want of me?" asked Lafaipana, when he had hobbled to the guest house.

"How old are you?"

Lafaipana looked surprised. "No one has asked me that for fifty years. He said

"Did you know Lekapai?"

The sudden question startled the old man. "Yes," he said reluctantly. It was because of Lekapai that the curse of Sangone fell on me, You see, I watched him bury the shell."

"Can you show me where it is?"

"I dare not, Fasi. One curse for a man is enough. I am

147 366p.

TONGAN SOCIETY

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BY

EDWARD WINSLOW GIFFORD

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ONGA

CHARACTERIZATION OF THE TUI TONGA

The following information has been obtained regarding the Tui Tonga listed on page 50:

1. Ahoaitu, the legendary first Tui Tonga of the dynasty which ended on December 9, 1865, with the death of Laufilitonga, the thirty-ninth ruler of the line, was the reputed son of a Tongan woman and a sky-god, Tangaloa Eitumatupua. While visiting his celestial father, Ahoaitu was killed by his half brothers. After his resurrection he was sent by his father down to Tonga to become its ruler. With him came his brothers who occupied subordinate positions. "Ahoaitu returned to earth and became Tui Tonga, the first [divine] Tui Tonga of the world. The Tui Tonga who originated from the offspring of the worm were displaced." (26, pp. 25, 38.)

The non-supernatural features of this legend suggest the beginning of a new line of rulers from the union of a woman of the earlier Tongan population with an immigrant or newly risen chief. The approximate date is believed to be 950 A. D.

The five celestial paternal half brothers, who descended from the sky with Ahoaitu, served him as subordinates in certain capacities. Three of these five are said to have representatives to-day in Tonga, not necessarily lineal descendants, for the names are really titles of offices which may be filled from collateral lines of relatives. The five half brothers of Ahoaitu and their representatives were: Talafale (Tui Faleua), represented today by Tui Pelehake; Matakahe, with no known representative; Maliepo, represented by Lauaki; Tui Loloko, represented by Tui Loloko; Tui Folaha, with no known representative.

2-9. Lolofakangalo, Fangaoneone, Lihau, Kofutu, Kaloa, Mauhau, Apuanea, Afu-lunga. Of the seven Tui Tonga who succeeded Ahoaitu there are known only the names and the statement that son succeeded father, until Momo, the tenth ruler of the line.

10. Momo. If the account is to be trusted, Momo chose as his chief wife Nua, the daughter of Loau, the Tui Haamea of central Tongatabu. This custom of selecting a daughter of a powerful chief of Tongatabu as wife and mother of the new king prevailed thenceforth throughout the whole history of the dynasty. Within the last four centuries the daughter of the Tui Haa Takalaua or of the Tui Kanokupolu was selected. The mythical origin of kava would seem to be connected with Momo's reign, inasmuch as it is the chief Loau of Haamea who plays a leading part in the tale (26, pp. 71-75). However, as there seems to have been more than one chief with the name of Loau this is not absolutely certain.

Apparently the Loau of Momo's time bore the full name of Loau Tuputoka. A chief of that name visited Savaii Island, Samoa, in Momo's reign, at the time the carapace of the famous turtle, Sangone, was reputed to have been buried (26, pp. 49-54). To Loau Tongafisifonua of perhaps another reign is attributed the famous voyage to the horizon (26, pp. 139-152).

The reign of Momo must have been traditionally important for a proverbial expression (*hau 'o Momo*) refers to it. In his day, and in fact down through the time of Takalaua, the Tui Tonga was the temporal ruler (*hau*), as well as the sacred ruler.

It was apparently in Momo's reign or in that of his predecessor that the royal residence was moved from central or southeastern Tongatabu to Heketa, northeastern Tongatabu.

11. King Tuitatui, who reigned about 1200 A. D., left his mark in Tongan legendary history. Even an alleged peculiarity of head form is recorded, and what was believed to be his skull was unearthed in Heketa, Tongatabu, some years ago. He is the reputed builder of the Trilithon. During his reign, the capital was at Heketa, near the famous structure (26, pp. 48-49). There Tuitatui erected the two royal tombs, Langi Heketa and Langi Moungalafa, presumably for his father and himself.

Tuitatui's predilection for the fair sex is illustrated in two tales (26, pp. 46-48), one concerning incest with his sister Latutama, the other with winning the maiden Nua. The recovery of the buried carapace of the famous turtle Sangone was accomplished by Fasiapule, the king's maternal half brother (op. cit., pp. 49-54). Prince Tungi possesses a piece of turtle-shell fishhook, reputed to be made from this carapace. Tuitatui is said to have died in the mountainous island of Eua, whence Fasiapule, his faithful half brother, transported his body to Tongatabu for burial (op. cit., p. 45). An Eua informant, Fakatene, said that the king died at Tuutuu, near Kolomaile.

One version of the story about the Tongan hero Muni states, perhaps wrongly, that Muni's mother embarked on one of the Tuitatui's vessels on the fatal voyage during which she fell a victim to the cannibal oven. (See 26, p. 120.)

Tuitatui is said to mean "king who strikes the knee," referring to the Tui Tonga's custom of hitting with a long stick the knees of his matapule when they came too close. Tuitatui is reputed to have thus established the custom of keeping the matapule at a respectable distance on ceremonial occasions. His reason for this practice is said to have been the fear of assassination, because several [*sic.*] Tui Tonga had been killed at kava ceremonies by their matapule. The Falefa matapule who attended the Tui Tonga were induced by scheming great chiefs to murder them, in order that some relative of the schemers might ascend the throne. As the Falefa were foreigners (*muli*) they were not subject to the curse which would fall upon a native Tongan for touching the Tui Tonga's person. (Actually, there is no tradition of the murder of any king before the nineteenth Tui Tonga.)

12. Talatama. The twelfth king seems to have been the son of Tuitatui who with his brother Talaihaapepe is said to have assisted in the erection of the great trilithon (26, pp. 30, 46). One native account says that the trilithon was made by Tuitatui's sons, Uanga (Talatama?) and Afulunga (Talaihaapepe?). While they were constructing it, Tuitatui died. After their father's death Talatama and his brother Talaihaapepe moved the capital to Lapaha where there was sheltered anchorage for their two favorite vessels (26, pp. 30, 46). Their sister Fatafehi, the Female Tui Tonga, by her silence gave consent to the removal. Another version, however, makes her the instigator of the move: Sometime after the completion of the trilithon, Fatafehi said to the new king, "Let us move from this locality, for I am tired of the noise of the surf on the rocks." So they moved and Fatafehi said, "Goodbye noisy rocks (Utulongoa)," hence the name of the place to-day.

Concerning the reign of Talatama, Krämer (36, vol. 1, p. 468) says: "Es ist kaum anzunehmen, dass eine Verbindung mit dem 'Alifātama in Manu'a besteht, welcher vielmehr als Karika in Rarotonga bekannt ist."

The royal residence was then erected at Lapaha. There was constructed the royal tomb called Langi Leka. (See also 26, p. 49.) It was the first of the great series of royal tombs to be built at Mua. Some generations later the Female Tui Tonga Sinaitakala I was buried there.

13. Tuitonga Nui Tamatou. Tui Tonga Talatama lacked a male heir, apparently for the first time in the history of the dynasty. Talaihaapepe did not directly succeed his brother on the throne. To meet this situation a fictitious king (Tuitonga Nui Tamatou), represented by a dummy of *tou* wood, was provided and declared to be the son of Talatama and father of Talaihaapepe (26, p. 30). McKern, who excavated the terraced tomb reputed to be the burial place of the wooden dummy, found no trace of human bones. The dummy would naturally have rotted away long since.

Krämer writes (36, vol. 1, p. 468):

"Um diese Zeit heiratete die Tochter des Tuitoga mit Namen Laufafa e Toga den Tupa'imatuna, den Sohn des Lealali (p. 84 gen 13) aus deren Ehe viele Savai'i-Familien sich herleiten. Sie wird als eine Tochter des Tuitogamanaia und der Nafanua ausgegeben (III. b. 9. gen 11 p. 96). Von ihm und Lautivunia siehe die Geschichte V. c. 4 und IV. C. c. 1. Nach Fraser No. 5 soll der Sohn des Lautivunia den Bruder seines Vaters totgeschlagen haben und selbst Tuitoga geworden sein."

My material throws no light upon the identity of the Tui Tonga Manaia, of Nafanua, of Laufafa, or of Lautivunia. Possibly Manaia is a nickname for Talaihaapepe. Elsewhere (op. cit., p. 94) Krämer speaks of a Tui Tonga Manaia as the brother of Tui Tonga Fasiatele (Kaulufonua I). If he is the same individual, there is a big discrepancy in time in the two attributions. Lautivunia is said to have been the brother of a Tui Tonga (op. cit., p. 344). The name of the Tui Tonga slain by Lautivunia's son is not known. Possibly it was Havea I, who, however, appears to have reigned somewhat later. If Havea I was the king, it seems likely that Tatafueikimeimua was his nephew, slayer, and successor.

14. Talaihaapepe. The brother of Talatama, twelfth Tui Tonga.

15. Talakaifaiki. According to Samoan tradition, Talakaifaiki was the temporary ruler of Samoa and resided at Safotu, Savaii (36, vol. 1, p. 61). He was expelled by the chiefs Tuna and Fata of the Malietoa line (22). He reigned about 1250 A. D. Krämer (36, vol. 1, p. 468) says:

"Der Tuitoga Tala'alfel'i, der Samoa unterjochte und durch Tuna und Fata (gen. 14) vertrieben wurde (IV. B. c. 2). Nach Stuebel p. 86 wäre er der Vater des Poluleligaga (siehe gen. 15, p. 246)."

The Tongan tale (26, pp. 45-54) about the turtle Sangone seems to indicate that already the Tongan grip on Samoa was strong in the days of the tenth and eleventh Tui Tonga. Whether the relations recorded in this tale were the result of conquest or of peaceful penetration is not clear (26, pp. 45, 54). Presumably Talakaifaiki was the last of a series of rulers who had long held Samoa in vassalage.

16. Talafapite.

17-19. Tui Tonga Maakatoo, Tui Tonga Puipui, Havea I. Concerning the time of the seventeenth, eighteenth, and (or) nineteenth Tui Tonga, Krämer (36, vol. 1, p. 468) writes:

"Um diese Zeit wird ein Tuitoga Tuionu'ulava genannt, dessen Töchter Pate und Alaiuanua nach Samoa heirateten (IV. B. b. 2 p. 246), letztere den Malietoafaiga Uilamatutū (gen. 15). Ein Bruder dieser beiden hat den weiter unten des öfteren vorkommenden Namen Ulufanua (tele), der den Poluleligaga zeugte."

The name Tui Onukulava does not occur in any Tui Tonga list with which I am familiar. It does occur much later as the name of a Tui Haa Takalaua.

Havea I. is the first identifiable king reputed to have met his death at the hands of an assassin.

20-23. Tatafueikimeimua is known chiefly through the tale of his unsuccessful wooing of a beautiful Samoan woman named Hina (26, pp. 55-60). His brother, Nganatatafu, figures in the tale as the king's successful rival. Hina bestowed upon Nganatatafu two bonitos, so that the coming of this fish to Tongan waters is attributed to Tatafueikimeimua's reign. Nganatatafu is possibly the eponymous ancestor of the Haa Ngana, a division of the Haa Fale Fisi, which to-day has its stronghold in Haano Island, Haapai, the home island of Nganatatafu. Suggesting somewhat the interference of Nganatatafu in the love affairs of his brother, is the adventure of Lautivunia, brother of a presumably earlier Tui Tonga. Lautivunia scaled the fence on the island where the Tui Tonga kept virgins destined for his harem. Two of the girls became pregnant and Lautivunia committed suicide when summoned to appear before his brother (36, vol. 1, pp. 343-348).

Krämer (op. cit., p. 468), referring to the time of Tatafueikimeimua, Lomiaetupua, and (or) Havea II., says: "Um diese Zeit heiratete ein Tuitoga die Tochter des Manu'a in Safata, aus deren Nachkommen die Tuiaana—und Malietoa-Linie stammt (siehe IV, B. b. 6, p. 253)."

Havea II, like Havea I, met death at an assassin's hands. He was shot through the head by Tuluvota, a Fijian.

23. Takalaua. Tui Tonga Takalaua, who reigned about 1450 A. D., was murdered while eating food on the island of Mataaho in the lagoon at Tongatabu. His murderers are stated (26, pp. 32, 60, 65) to have been Tongans. Takalaua's sons cap-

- Apaapa.** The alofi (the place occupied by chiefs in a kava party) of the Tui Tonga's kava party. A mark of respect and attention to the conversation of the Tui Tonga.
- Ei koau.** The affirmative, spoken in answer to the call or command of the Tui Tonga.
- Fakahake.** To vomit (Tui Tonga).
- Fakalaa.** Chief woman making coconut oil in the sun. The same operation by a common woman is called *tanakilele*.
- Fakamao.** The tapa belt of the Tui Tonga.
- Fakanofu.** Coronation.
- Fakataufolofola.** To address the King; chief language.
- Falealo.** The family or children of the Tui Tonga and Tamaha.
- Felapalapaai.** Chiefs to kill each other secretly.
- Fietaumafa.** The hunger of the Tui Tonga.
- Finangalo.** The mind, applied to the Tui Tonga, nowadays to the King and the Deity.
- Folefoia.** Word, speech, addressed only to the Tui Tonga or the Deity, and nowadays to the King; not applicable to private persons or even chiefs.
- Foleha.** The hair of the Tui Tonga.
- Haele.** To appear, applied to the gods, the Tui Tonga, and the King.
- Hala.** Demise, applied to the Tui Tonga and Tamaha, also to the King; a sacred club.
- Hau.** The attendants (*takanga*) of the Tui Tonga; a conqueror, a reigning prince; the "tribe" of the King, as *faahinga* ae Hau.
- Hohaa.** The beard of chiefs.
- Huafa.** Name, applied only to gods, king, chiefs.
- Lakoifia.** Well in health, used to (or of) the Tui Tonga, the Tui Pelehake, and the King.
- Lakoifua.** Well in health, used of the Tui Tonga, now used of the King.
- Langi.** The head or face of the Tui Tonga or Tamaha; his burying place.
- Oaikanga.** Finished being seasick (a term used of chiefs).
- Oua e takavale ai finangalo.** A formal remonstrance to the Tui Tonga against the many tasks he has set for one to do in a single day, or in a too short period of time. Only the highest ranking *matapule* could use this remonstrance.
- Puluhi.** Sickness of the Tui Tonga or Tamaha.
- Puluhia.** Death of the Tui Tonga.
- Pupuluhi.** Slightly afflicted, applied to the Tui Tonga.
- Sinifu.** The collective name of the women of the harem of the Tui Tonga.
- Taahine.** Daughter of the Tui Tonga (daughter of other chiefs called *fefine*; daughter of lower orders called *finemotua*).
- Tamasii.** The son of the Tui Tonga.
- Taumafa.** To eat, applied to the Tui Tonga, but now used to high chiefs.
- Tulaki.** To cut the hair of the Tui Tonga.
- Uluvall.** The name of a person killed at the burial of the Tui Tonga.
- Umeumesi.** For the Tui Tonga to strike or whip his small sons.
- Uta.** Inland, land, on shore; the cargo or freight of a vessel; applied to the Tui Tonga and persons of his rank.
- Vaavaakaka.** Poorly, not well (the Tamaha).

CHIEFS

All of the modern chiefs of Tonga trace their relationship ultimately to the first Tui Tonga, the son of Tangaloa Eitumatupua, the sky god. More immediately many trace their relationship to the Tui Kanokupolu, but as

his high position is derived from the Tui Tonga, chiefness is an attribute which flows from the sovereign, the Tui Tonga.

The chiefs of Tonga collectively are called *houeiki* (*hou*, a collective prefix; *eiki*, chief). According to one informant (Puleti of Nukualofa) the term *houeiki* applies only to the Tamaha, the Tui Tonga, the Tui Pelehake, and the Tui Haa Takalaua, and denotes their celestial origin. (Actually only the first Tui Tonga and the first Tui Pelehake descended from heaven according to mythology, the Tamaha and Tui Haa Takalaua being later developments.) Puleti characterized all other chiefs as "braves" (*toa*) and "chiefs by the hand" (*eiki i he nima*), that is, chiefs who won their rank with the club on the battlefield, a characterization which seems subjective.

The arbitrary powers of chiefs, as described by Cook, Labillardière, Mariner, and others, are no longer exercised. Occasionally a chief horse-whips one of his subjects (I learned of one who whipped two young men who walked past his house smoking cigarettes), but the use of the club has entirely disappeared.

The ideal combination for chiefly rank is that both parents be of chiefly blood. The offspring of a chief and a commoner are spoken of as half-chiefs, or, as the Tongans express it, "half-shell" (*ngeesi taha*). A chief may chide a half-chief by saying, "Ah, you half-shell." (The term *vaataha*—one branched—also refers to a person whose parentage is half chief, half commoner.) However, such a person as the son of Jioeli Pangia (who would be Tui Tonga if the office were not abolished) by a wife of low status would be *eiki* because of his father's royal blood.

The children of a woman of chiefly rank and a commoner also are spoken of as "half-chiefs" although they are regarded more highly than the offspring of a male chief and a female commoner.

The terms *eikimotu*, *eikitaupotu*, and *eikitoho* refer to a chief of highest rank, literally a chief of chiefs. The term *eikisii* means a petty chief. The term *eikianga* designates the residence and government of a chief.

So far I have been using the term chief in a loose sense, meaning any person with chiefly blood in his veins and not necessarily the holder of a title. The Tongan expression for title is *hingoa fakanofa* (literally, appointment name). I have been at pains to explain that only one person holds a title at a time, and that within a given family no two siblings are identical in rank. This statement of the situation is paralleled by what Mariner says of his four classes of society: *eiki*, *matapule*, *mua*, and *tua*. This is undoubtedly stating the situation in too ideal a form, but it nevertheless conveys a conception of gradation in rank.

It seems unlikely that anciently people selected their chiefs, except in so far as a choice was made between eligible candidates. However, the first

Tui Vakano to become a Christian was deprived of his title (*liukava* or *liua*; to debase, to dethrone, to depose) by his outraged constituents—a procedure which suggests the Samoan practice. There probably were normally no assemblages (*fono*) in which the people expressed opinions. In ancient *fono*, as in the modern *fono*, the people gathered to hear the orders of the chiefs, not to debate.

The idea prevails that a chief is normally a large, portly person. On one occasion my interpreter remarked, "Can't you see he is a chief? See how big he is."

This observation corroborates Wilson (65, pp. 384, lxix):

In their persons, the men of the superior rank all seem a larger race than ourselves, or the common people . . . at Tongataboo more muscular, and affecting a more stately gait and superiority. . . . At Tongataboo some [women] were held in highest reverence, and Futtafaihe himself paid one elderly woman the same expression of homage which he received from every other chieftain.

The submission paid to the chiefs, and the distinction of private property were much greater here than at Otabeite.

At Tongataboo, the chiefs, to secure plenty, changed their abodes to other islands (65, p. 385).

Chiefs had many prerogatives. Special bathing holes, many of them wells which required many men to dig, were reserved for the chiefs, though occasionally a chief would allow certain of his retainers to use a bathing well. A few wells, far from the establishment of the chiefs, were permitted to commoners for bathing and drinking water. Should a commoner bathe in a chief's well on the sly, it was believed that he would become ill and die either from the swelling of his abdomen or of his neck. Women had special bathing places set aside for them. On Lifuka, Haapai, the beach on the lee (western) side of the island was tapu to commoners for bathing. Five wells—Utulupe, Vailupesias, Hoaheu, Teleki, and Onemato—all the property and bathing places of former chiefs, have been described elsewhere (25). It is related that at the well called Hoaheu the bathing chiefs were entertained by gladiatorial combats in which two commoners with clubs fought until one was killed. It was at one of these wells, Onemato, that Mariner's patron, Finau, bathed when on his way to visit his brother Tupouniua.

Of food, the chiefs, of course, had the best. First fruits and the first of each catch of fish were brought to them. The milk of only small, quite ripe coconuts was used by chiefs; a retainer presenting a large coconut was liable to be knocked down or beaten. On occasions, such food as the hard Tahitian chestnut (*ifi*) was chewed to a pulp by an attendant before being given to the chief to eat.

Visitors of low rank brought a gift of kava, which was handed to the chief by his matapule. Failure to bring this gift resulted in a severe reprimand.

mand. Kava was also brought as a peace offering. A high chief, who was cooperating with me in gathering data, left word for an old man to come to our temporary residence, distant four or five miles. The old man failing to come, a second messenger was sent with a threat of horsewhipping. Thereupon the old man came as speedily as his years permitted, bearing a large piece of kava. He was profuse in his apologies, saying that he did not know whom it was that had requested his appearance. I noticed that servants of this chief in approaching bent low and that if he was seated near the door of the house they would make their exit through a window rather than pass near him.

A general tapu is placed upon the dishes and the remains of food or drink of a person higher in rank. It was thought that one breaking this tapu would suffer from sore throat, but the person of rank might offset the evil consequences by stroking the throat of the unfortunate person with the hand (anciently also with the feet). This tapu which holds throughout Tongan society is particularly observed between a chief and his underlings. To eat in front of a chief is likewise forbidden, the difficulties being avoided by eating with the back turned to the chief (*kaitafoki*).

The head of a person, also the back, is tapu to one of lower rank; it is tapu to pass close behind a chief. At big kava parties a great chief who does not sit in the kava ring takes a position which makes passing behind him unnecessary.

The food of a chief had to be prepared in a certain style and certain portions of mammals or birds were regarded as belonging by special prerogative to the chief. A roast pig is presented to a chiefly person in the following manner: After the pig has been removed from the oven and placed on its back on the hand barrow, sections of fresh banana leaves tied in place by strips of banana leaf are wrapped about the extremities of the four legs, the nose, and the region of the rectum. The purpose of this treatment was said to be the concealing of all those parts of the pig most in contact with anything dirty or filthy. The four parts of a pig which are regarded as fit food for a chief are in order of importance: (a) the back (*tua*), (b) the head (*ulu*), (c) the rump (*tuungaike*), (d) the chest (*fatafata*), spoken of as the common part.

In serving chickens and pigeons to chiefs, the parts in order of importance are: (a) the rump with the oil glands (*muimui*), (b) the skin of the neck and back (*kiliikia*), (c) the legs (*alanga*), (d) the wings and chest (*hikehike*). I saw the operation of dividing a fowl for a high chief. The oil glands and the bit of skin near the rump were given him first. Then the skin at the base of the skull was broken with the fingers and stripped down the back of the neck on to the back.

In some games the chief is given a handicap over opponents of lesser rank. In the game of dart throwing (*sika mamo*) in which the greatest distance thrown determines the winner, if the chief's dart were almost the winner, it would be turned over lengthwise so as to lie ahead of the leading dart. My informant had an impression that the chief's dart might be turned over three times, that is, the chief be given a handicap of three lengths, but not more. From this custom originated the proverbial expression *sii kae ama* (small but successful), which implies that although one has not displayed much energy or skill in an enterprise yet he has succeeded thanks to the assistance of someone else.

The *fekesike* method of fishing was never used by anyone but a chief who could muster the necessary numbers required (43), consequently a *fekesike* rope always belonged to a chief.

Not every chief has the word *tui* (lord) in his title. Various informants were under the impression that the term *tui* in connection with a name indicated higher rank than *eiki* (chief). One informant said that chiefs with the word *tui* in the title (specifically Tui Haa Teiho and Tui Haa Ngana) were in line to become Tui Tonga in event of the lack of a direct successor, whereas a chief like Ulukalala or Malupo was not.

Special rest places, mounds (*esi*), with a shade tree growing on or beside them, were built for chiefs. Sunshade or picnic shelters (*falekakala*, house of flowers) were also erected. The *esi* were given names. (See 25.)

A chief's sitting position is legs crossed and left foot on right knee (*faefakaheka*). When sitting among his inferiors, a pile of mats (*lango-lango*) is provided to raise him above the common level.

In Tonga there seem to have been no official jesters, but at times certain individuals, termed *fakaaluma* or *fakatakataka*, who were considered particularly witty, took it upon themselves to amuse the chiefs. For example, Kaho, a man of Vavau, acted as *fakaaluma* for Akauola (grandfather of the present Akauola) and made fun of the people. He would say anything to make Akauola laugh. On one occasion he had himself tied like a pig and carried to a feast. My informant did not know whether this man was appointed. Akauola is one of the modern landed royal navigators (*toutai*).

A warrior who killed ten men and brought the heads as evidence was highly regarded and might be raised to the rank of a *matapule* or a petty chief (*eikisii*) and be given land; or again he might be given the privilege of drinking his chief's kava when it was called.

Anciently the staff (*tokotoko*) and the fly whisk (*fue*) were used by kings and chiefs but not by *matapules*. To-day, it is said, anyone may use them. The staff was used formerly not only in walking but to lean upon when addressing an assemblage. To-day the term *tokotoko* applies to the

walking stick of a chief and to the staff of a matapule. The skill with which the fly whisk was handled usually elicited remarks from surrounding gossips. To use it swiftly and precisely elicited the comment: "He is an accomplished chief; long has he used the *fue*." If a man were clumsy in handling it, it was asked: "Who is this man who shakes his *fue* like a *tua*?"

Many great chiefs or warriors were tattooed in eccentric manners to distinguish them from common people. Vahai had two lines on each side, the upper ones extending to the breasts. King George I Tupou is said to have had the head of his penis completely covered with tattooing to show his disregard for pain as well as to mark him peculiarly.

A headdress of feathers (*fae* or *faefae*) was worn by chiefs during times of festival or ceremony or at the outset of a war expedition.

A chiefly person or a high matapule (and the members of his household) washed his hands in a special bowl (*kumete fanofano*). That of the Tui Tonga (called *fakafanonga*—rendered by Baker [2] as *fafanonga*) was used by him only. A commoner usually washed his hands by rubbing them with the pith of the stock of the *fusi* banana.

Each chief of consequence had as part of his establishment a public house, *falehau*, for the entertainment of distinguished visitors (42). Tasman (30) pictures such a house as open on all sides. There were also houses for the sons and daughters of chiefs and their associates (42).

The chiefs owned all the land and could take what they pleased from their tenants and even kill them. On Lifuka, commoners inland could not fish on the lee side of the island. A commoner catching a large fish must give it to the chief. If he ate it he might be brought before the chief and condemned to death. To a commoner who refused to obey his order, the chief might say, "You are going to be dead," and it was not unknown for such a one, as he started away, to drop dead.

The arbitrary power and cruelty of some of the chiefs is manifest from the early accounts. The Tui Kanokupolu Tukuaho cut off one arm from each of his cooks and Ulukalala (Mariner's patron) tortured and drowned political enemies. The cruelty of Teukava, a contemporary of Tukuaho and Ulukalala, was of a different type. On one occasion he gave a feast in which the entertainers were naked girls. At another festival (*katoanga*), he arranged in a circle a group of men suffering with elephantiasis of the testicles and went about with a hook pulling their privates out into view. Apparently the victims were entirely at his mercy, opposition probably meaning death.

On Fotuhaa Island, Haapai, is a cliff from which commoners jumped into the foaming surf to get bananas (*hopa*) thrown into the sea by the chiefs. The cliff is named Haamoa because of a Samoan who was killed while thus entertaining the chiefs.

A group of people desiring to obtain something from a chief usually try to have their own chief, or at any rate, some chief, act as spokesman. During my stay in Eua, the Methodists of the island desiring the use of a house in Nukualofa, Tongatabu, that belonged to the chief Tuita, took the Eua chief Hafoka as their spokesman and representative in making application to Tuita. Although one of their number, Hafoka was quite the proper person to make the request, because he was a chief.

The titled chiefs stand in certain fixed relationship to one another. Thus Ata, the "dean" of the Tongan chiefs is "grandfather" (*ku'i*) to all of the chiefs of the kingdom, except the Haa Ngata Motua chiefs, to whom he is "older brother" (*taokete*). The chiefs specifically enumerated as standing in the relationship of "grandchildren" to Ata are Fakafanua, Tui Haa Ngana, Tui Haateiho, and Malupo; but not Tui Lakepa, who is head of the lineage Fale Fisi. To the Tui Kanokupolu, Ata is "younger brother" (*tehina*). These are not true relationships, even though considered as extensions of terms for lineal relatives to collateral relatives. They are, if anything, mirrors of the relationships in which the first title bearers stood to one another. The fact that succession to titles has not always been from father to oldest son precludes the relationship terms from being accurate, classificatory designations of the relationships of present day title bearers. Thus, to a man named David Uasi the present Ata once stood in the collateral relation of "son," whereas, now that he is Ata, he stands in the relation of "grandfather."

Within the lineage Fale Fisi, Tui Lakepa is highest and is denoted as "father" by the other members of the lineage. Tui Haa Teiho is "older brother" to Malupo and Tui Haa Ngana. Tui Haa Ngana is the "youngest brother" and Malupo the "middle brother." At the present time, Tui Haa Teiho is a boy, Malupo and Tui Haa Ngana middle-aged men. Tui Lakepa has the precedence of the other Fale Fisi chiefs at kava parties.

SPECIAL TREATMENT OF CHILDREN OF CHIEFS

Commonly the daughter of a chief had a separate house (*fale fakakaufefine*) within the chief's compound, cared for by one or more old women. In this house the daughter lived with several girl attendants but she might sleep in her father's house if she wished.

Similarly a chief's son might gather about him a number of young men and reside in a separate house (*fale fakakatangata*) and even in a separate enclosure. Cook (19, vol. 1, p. 344) describes Poulaho's (Tui Tonga Pau) son Fuanunuiava, a lad of twelve years, as having a house of his own and as being attended by a circle of boys and by an old man and an old woman. A good example of the congregating of young men with the chief's son

is to be found in the story of Tui Tofua (26, p. 77), one version of which specifically states that the first-born sons were Tui Tofua's associates.

A chief's virgin daughter seems to have been called *taupoou*, a Samoan term which is probably equivalent to the Tongan *taahine*. Girls, classed as *taupoou*, at times took part in dances, sometimes leading, and usually wore finer garments than their dancing associates. The *taupoou* or *taahine* chewed and made kava for visiting high chiefs. She did no cooking, but might sweep the interior and the immediate exterior of the house. Orange juggling was one of her pastimes. There seems to have been no official *taupoou* as in Samoa.

The term *manaia* (a man particularly successful in love affairs) which in Samoa is applied to the chief's son, apparently is not used in Tonga as a title, though evidence is conflicting, but is used in personal names. If *manaia* and *taupoou* were recognized positions in Tonga, undoubtedly early writers would have mentioned them.

Among special names for girls of rank those referring to the *lupe* or large fruit pigeon (*Globicera pacifica*) were often used. Two examples of such names for chiefly girls are Lupefolau and Lupepauu.

Special care was taken of the complexion of girls of rank. The following processes were used: (a) *kaukautuitui*, the rubbing of the entire body with chewed candle nut (*tuitui*); (b) painting of entire body, excluding lips, with a mixture (*valienga*) of lolo oil and turmeric (*enga*). This was done twice a week on alternate weeks and after several hours was washed off, and the skin dressed with oil, to produce a smooth glistening surface; (c) keeping in shade to prevent sunburn.

After bathing a chief's daughter previous to her retiring, her female attendants chew scented fruits and flowers, and mixing the masticated material with scented oil rub it over her body.

A chief's daughter wore her hair long on every part of the head, and braided the side strands over the ears.

The female attendants upon the daughter of a chief did not allow her to eat too much. This tapu was enforced to prevent the overdevelopment of her abdominal region.

When a chief's daughter ate or sat in her house, she was surrounded by a mat screen and seated on a high cushion (*fabamolu*) composed of mats and soft tapa. The purpose of the soft cushion was to keep the skin of her upper legs and buttocks soft and smooth, unblemished by any hard thickness or marks that might result from sitting on a hard surface.

A treatment applied only to the daughters of high chiefs is called *fabatafa*. After an evening bath and oiling from head to feet, the girl's legs were tied together just above the knees with a piece of fine soft tapa, and she was

laid upon her side to sleep. This sleeping position (*tokonaki*), lying on the shoulder with the arms straightened, prevented the elbows from being exposed to pressure or other contact that would mar their beauty. The tying of the knees was for the express purpose of insuring the maiden against sexual attack on the part of a foolish lover or malicious enemy.

A chief's daughter or chief's women of youth and beauty sit with the feet half folded under and crossed at one side in a manner as to protect the ankle bones from possible pressure against a hard surface, a position known as *faite*, thus insuring a smooth skin over the ankles, a mark of beauty.

The "corset" (*nonoo*) for chief-girls consists of a short piece of tapa wrapped about the small of the waist and the abdomen and tied in front. Its purpose is to suppress the abdomen and give the waist a small appearance.

LOAU

A famous chief in Tongan legends is Loau who is called the Tui Haamea from Haamea, a district in Vahe Loto, Tongatabu, which according to a prominent Vavau informant was the seat of residence of the Tui Haamea, Tui Haa Loau, and the Tui Haa Tuunga.

The origin of Loau is unknown. There were two and perhaps three chiefs of the name of Loau. The earlier seems to be Loau Tuputoka who is mentioned in the story of the turtle Sangone (26, pp. 49-54). A second Loau bears the additional appellation of Tongafisifonua and to him is attributed the voyage to the horizon (26, pp. 139-152). A possible third Loau is he to whom is attributed the revision of the government of the Tui Tonga Takalaua. Apparently Loau Tuputoka became the father-in-law of the tenth Tui Tonga, Momo. According to an informant of the island of Foa, three formerly important Haapai chiefs were the offspring of Loau: Taufu Tofua of Tofua Island, Fanua Lofanga of Lofanga Island, and Kava Moungaone of Moungaone Island. These sons were sent to their respective abodes in Haapai while Loau continued to reside in Haamea in Tongatabu. The name of his residence (*api*) was Maananga.

Loau is said to have been able to foretell the future and to have cognizance of distant contemporary events; whence arose the saying, *toka maananga* (first in *maananga*), an expression used to-day as equivalent of omniscient in speaking of the Deity. Whether or not these are attributes of all of the Loau chiefs or only one, I cannot say.

Loau is said also to have resided in Lifuka Island and a district there is still called Haa Loau, although the people of that district claim no descent from Loau.

It is difficult to assign with certainty the period of the rule of the Loau

sees many things in a muddled dream they do not come true. The period that elapses between a dream and its fulfilment is variable—it may be a week or it may be several months.

A sickness called *fafanga*, which is manifested by a "bad stomach" and results in "doubling up" or even death, is caused by dreaming that a man comes and feeds the dreamer pork, fowl, and other rich food.

A sickness called *takiwi*, painful urination, is believed to be caused by the frequent dreaming of sexual intercourse. The belief is that the visitant of the dreamer is a spirit (*tevolo*).

MAGIC

Most of the extant magical practices are to be found in the formulas of the *faitoo* (doctors). Material presented here includes odds and ends of magical practices not largely concerned with curing. Malevolent magic is still practiced. Spoken words were believed to be effective too. Thus the term *talatukii* means to curse, to use imprecations so deadly and horrible, that the person against whom they were directed usually died from the effect.

Any medicine man or woman was called *faitoo*. The house of a *faitoo* was called *falehangatamaki*. One informant said that this house was only that of a *faitoo* who treated boils and skin eruptions, and this statement is probably correct, as *hangatamaki* means any sickness or disease appearing upon the surface of the body. When confronted with a sickness about whose diagnosis he was in doubt, a *faitoo* passed his hands over the diseased part, repeating a formula which named every possible disease known and directed the medicine to cure any one or all of them. (See p. 343.)

When collecting the bark of the *tova* and *siale* (*Gardenia*) for medicine the collector always observes which part is towards the setting sun and collects the bark from that side. It is believed to be particularly efficacious, though no reason was given.

One informant stated that his father had buried his umbilical cord and planted a coconut over it. As the tree flourished, so would the individual. I could get no corroboration of this as a practice. No other account of tree planting was obtained. Possibly fear that the tree might be killed and the person suffer make people reticent.

The story of the turtle Sangone mentions the magical stopping of growth and retention of childhood by striking a child on the top of the head (26, p. 50).

When a child's milk tooth is extracted it is thrown on the roof of a house, so that the second tooth will grow quickly. At the same time this rhyme is said:

Hinehina matailaila
Omāi hoo nifo kovi mooku
Kae o atu hoo nifo lelei moou.

White with spots
Give me your bad tooth
But have a good tooth for yourself.

That there is a ceremonial or lucky number in Tonga I did not definitely ascertain. That there was, or is, such a number seems likely and it may

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