

**TITLE: A FISH CONSUMPTION SURVEY OF DRAVUNI ISLANDERS, GREAT
ASTROLABE REEF, FIJI.**

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INTRODUCTION

Dravuni Island is part of the Great Astrolabe which is located south of Viti Levu and extends to about 35 km north of the north-eastern coast of Kadavu. Dravuni island has an area of 200 acres and is located within the Astrolabe lagoon (18.45 S and 178.32 E).

The Dravuni villagers traditionally carry out subsistence fishing and farming. Communal living still exist on the island but the Dravuni villagers are economically in a better position when compared to the average Fijian villages. Tourist ships visit the island several times a year and a large sum of money is paid to the villagers for access to the island, entertainment, reef snorkelling and diving. Monies obtained from tourism are used to build concrete homes that can withstand strong cyclone winds which is one of the major problems for the Kadavu Group. Community hall, church, and water supply developments have taken place on Dravuni Island. Dravuni villagers also depend on remittances from their relatives on paid employment in main urban areas such as Suva and Lautoka.

The main objective of this survey was to assess the importance of fish in the diet of Dravuni islanders and to determine the quantity of edible fishery resources harvested from the Great Astrolabe Reef. The level of fishing activities and its impact on the ecology of the reefs was assessed in relation to the fishing technology currently utilised. It must be noted, however, that it was difficult to quantify the resources harvested from the whole of the Great Astrolabe Reef because there are other villages in the Kadavu Group that also have the traditional right of access to the reef. Their fishing activities were not included. This survey should supplement the base-line data obtained by the Marine Pollution Group to give an overall understanding of the extent of fishing activities and impact on the ecology of the Great Astrolabe Reef.

At the time of the survey, the number of people living on Dravuni island was approximately 148 including children. Other members of the community were living in Viti Levu where there are better opportunities for education and getting paid employment. Urban centres also give alot of freedom to an individual villager with no traditional obligations and customs to adhere to. This new freedom is especially attractive to young people.

The well developed Great Astrolabe coral reef and lagoon has always provided sufficient fishery resources for the villagers' own consumption for centuries. Recent increase in fishing activities for cash economy has caused heavy fishing pressure on the Great Astrolabe Reef. The Marine Pollution Group from the University of the South Pacific is currently carrying out biological and chemical monitoring of the Great Astrolabe Reef.

METHOD

Seventeen households were included in this survey. A member of each household was interviewed in the evening after the family meal. The interview was conducted in the Bauan dialect from the 25th to the 27th of May, 1990 .

The questions asked in the survey addressed three main broad categories. Firstly, the socio-economic status of each household had to be taken into account in this study to give an overview of the general economic situation of the villagers. Secondly, details of fishing activities, area of fishing, gear technology, time of fishing, fishing effort and species caught were covered during the interview. Thirdly, members of each household were also asked to give an estimate of the quantity and identity of fish and shellfish consumed the day before and also in the previous week.

RESULTS

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(A) Households Background Information

Seventeen households were surveyed on Dravuni Island. The average number of people in each household was five. About 99.9% of the villagers were subsistence farmers and semi-commercial fishermen. The average income per week was \$77-00 and were mainly from the sale of fin-fish. The villagers' income ranged from \$30-00 to \$250-00 per week. Income varied from week to week depending on the weather and other social obligations during the week. For example, during very poor weather conditions there would be a very small income because of limited fishing activities. In addition, when there is a death in the village only a few people would be fishing. If they were to go fishing, fish caught would only be for feeding relatives attending the funeral.

(B) Frequency of Fish in Household Diets

Fish was eaten on an average of 6 days per week. In some households fish was consumed twice a day, for mid-day and evening meal. The majority of households consumed fish during their evening meal which was the main family meal. On Sundays, fish was consumed during mid-day and evening meals in all of the households surveyed.

(C) Fin-Fish, Shellfish, Canned Fish and Red Meat Consumption

All the households surveyed were fishing households and consumed fish that they caught. However, all indicated that they shared their catch with relatives, neighbours or friends living in the village. All households had received fish from other fishing households.

The survey showed that an average of 10.5kg of fin-fish was consumed in each household per week. This gave an average of 1.5kg of fish consumed in each household per day. A calculated average of 300g of fish was consumed by each person per day.

A relatively very low level of shellfish consumption was recorded in this survey. The average was 1.1kg per household per week. Of the 17 households surveyed, 12 households reported that they collected shellfish during the week. The shellfish eaten were mainly giant clams (Tridacna squamosa, Tridacna derasa and Tridacna maxima) and gastropods (Trochus niloticus and Turbo marmorata). Shellfish were gleaned by women during low tides.

Canned fish and red meat consumption were relatively very low. Only one household indicated that they ate 2 canned fish for one meal during the week. Similarly, only one household indicated that they had red meat (chicken) for one meal during the week.

(D) Fish Types Consumed

Fish Types

<u>Fijian name</u>	<u>Scientific name</u>
<u>FIN-FISH</u>	
salala	<u>Rastrelliger</u> sp.
saqa	<u>Caranx</u> sp.
kabatia	<u>Lethrinid reticulatus</u>
kanace	<u>V.seheli</u>
matu	<u>Gerres</u> sp.
kawago	<u>Lethrinid nebulosus</u>
sabutu	<u>Lethrinid kallopterus</u>
kawakawa	<u>Epinephelus</u> spp.
sokisoki	<u>Diodontid hystrix</u>
ulavi	<u>Scarus</u> sp.
donu	<u>Plectroponus</u> spp.

SHELLFISH

sici	<u>Trochus niloticus</u>
yaga	<u>Lambis lambis</u>
vasua	<u>Tridacna derasa</u>
vivili	<u>Turbo marmorata</u>
katavatu	<u>Tridacna maxima</u>
cega	<u>T. squamosa</u>

Most fish consumed were smaller in size than those sold and were also a mixture of fish types. High grade fish such as kawago (Lethrinid nebulosus) and walu (Scomberomorus commerson) were sold rather than consumed because of the high prices obtained from the sale. The sale price was \$3.50 per kg for high grade fish and \$2.50 for all types of other fin-fish.

(E) Subsistence and Semi-Commercial Fishing Activities

All households surveyed were fishing households and a proportion of fish caught were either sold or consumed. All shellfish collected were consumed and shells of trochus and giant clams were sold to tourists.

Fishing activities were mainly carried out in the lagoon around Dravuni island. Each fisherman had his own favourite fishing ground in the lagoonal area. Shellfish collecting were carried out in areas where there are volcanic boulders and also on fringing reefs and patch reefs.

(i) Fishing Craft

All fishing craft used petrol and about 90% were made up by 28 foot Food & Agriculture Organisation designed vessels and 10% were outboard motors. Fijian canoes were not used for fishing during the time of the survey.

(ii) Time of Day and Fishing Effort

Fishing activities were mainly carried out during the night. The interview revealed that 80% of the fishing activities were done at night, 10% during the day and 10% were carried out from mid-afternoon to night time.

Most fishermen began fishing after dusk when they had completed their farming activities on land. They usually returned home from fishing during the early hours of the morning.

The average fishing time was about 7 hours. Fishermen stayed out fishing as long as 10 hours while some fished for 5 hours. The time of fishing depended on the fish catch and the time of the month. For example, during dark nights, a high fish catch would take less than three hours. However, during moonlit nights, fishing could take 15 hours in order to get a reasonable catch.

In one calendar month, fishermen indicated that two weeks of dark nights are the best time for fishing. In contrast, two weeks of moonlit nights are very poor for fishing. The two weeks suitable for fishing could be further reduced to a few days if the weather conditions are poor.

(iii) Frequencies of Major Fin-Fish Caught

<u>Fijian name</u>	<u>species</u>	<u>%</u>
walu	<u>Scomberomorus commerson</u>	10
kawago	<u>Lethrinid nebulosus</u>	20
sabutu	<u>Lethrinid kallopterus</u>	30
kawakawa	<u>Epinephelus spp.</u>	20
	OTHERS	20

An average catch of 2.4 kg per man hour was recorded in the survey. This was a very low catch per unit effort. The average weekly sale of fish was 101.3kg (36%) and an average of 5.6 kg (2%) of weekly catches were given away. Therefore an average of 62% of the total weekly catch was consumed by the members of each household.

The number of days spent fishing varied from 3-6 days with an average of 5 days. Fishing days were usually during the two weeks of dark nights each month so the fishing effort could be maximised. There was strictly no fishing on Sundays because it was the Dravuni islanders' sabbath.

DISCUSSION

Results of this survey indicated that fish was a major component of the diet of Dravuni villagers. The average daily fish consumption was approximately 300g/capita/day. The recommended daily protein of 37g is required by a moderately adult man and 29g by an adult woman (SPC, FNFNC, FSM, 1983). The protein requirement of each household member was in excess of 250g. Surplus protein may be metabolised for energy requirements or stored. Previous studies undertaken by Zann (1984) showed that a calculated 120g/capita /day of fish consumption in other areas of Fiji. The amount reported by Zann (1984) was much lower than those calculated for Dravuni islanders because the fish consumption values were for urban Fijians. Fish was expensive in urban areas of Fiji and so it was expected that the fish consumption values would be lower.

The average catch per unit effort recorded in this study was 2.4kg/man/hour. In contrast, an average catch per unit effort of 1.4 lbs (0.63 kg) /man/hour recorded by Emery and Winterbottom in April, 1983. This was an increase of 1.8 kg catch per unit effort in seven years. The semi-commercial fishing activities of Dravuni islanders had increased with the increase in number of boats available in 1990. The fishing method had remained unchanged. Handlining was the predominant fishing method but spearfishing and diving were occasionally used. However, the low yields did not show overfishing but a time consuming technique used. Emery and Winterbottom(1983) recommended the use of gillnets to effectively fish the Astrolabe lagoon.

This survey revealed a very low level of shellfish and other marine invertebrates consumption. Even though shellfish and other marine invertebrates may not be a major component of their daily diet, they are very important source of protein during poor weather conditions when fishermen are unable to fish. There is a possibility that shellfish such as pearl oysters, giant clams and trochus may have been overfished. Lewis *et al*, 1984 noted that giant clams have almost disappeared from the Bulia and Dravuni reef systems due to artisanal fishing. Giant clam farming can be introduced to alleviate fishing pressure on the Great Astrolabe Reef. Re-seeding the reefs with giant clam juveniles from the Fiji fisheries mariculture research station in Makogai can also be an alternative.

The main source of regular income is from fishing. Cruise ship's visits to the island bring a large sum of money which greatly reduces fishing pressure on local fisheries. It must be noted, however, that money obtained from cruise ship is used for community development. But each household would benefit from cruise ship visits by selling handicrafts to tourists. The impact of cruise ships (which brings about 1,500 - 2,000 passengers several times a year) on the culture and the marine environment is not yet known.

The Institute of Marine Resources, the Astrolabe Lagoon Incorporation, the Marine Pollution Group and the Fiji Fisheries Department could help provide conservation education programmes for the islanders. Future plans to establish the Great Astrolabe Reef as a marine reserve would have to be incor-porated into the conservation programme.

According to Wells(1988), North Astrolabe Reef was recommended for development as a marine reserve between 1981 and 1985. The Great Astrolabe Reef was recommended as a marine reserve and a marine park in 1986. None of these recommendations have been carried out to date. It would be difficult and unrealistic to establish the whole of the Great Astrolabe Reef as a marine reserve because of the semi-commercial fishing activities of the traditional fishing right owners. It is suggested that if such a plan were to be introduced then a programme such as those established in the Philippines be carried out, that is, subdividing the Great Astrolabe Reef into different zones where certain areas are taboo for fishing. This should be imposed by the chief and the benefits to the whole community be explained to the villagers so that they are not threatened by the conservation programme. Taboos are already part of the existing traditional fisheries management system in Fiji as reported by Lewis et al, (1984).

It would also be of benefit to scientists that sections be established for scientific research and commercial scuba diving. Commercial diving should be greatly encouraged and an access fee charged by the government to police and manage the reef zones.

Future investigations should include a more intensive study on the fish consumption to give a long term fish consumption information at different times of the year and also to establish a diary of each household. The diary would have daily records of fish consumption and should be complemented by the use of scale to weigh catches accurately. The villagers should be interviewed every night to increase their ability to recall the previous days events.

Diet is very important in any community due to health problems such as diabetes and heart attacks that are currently prevalent in Fijian villages. This study was undertaken to give a preliminary investigation to such problems. Further multidisciplinary studies would need to be carried out to establish diet patterns and major health problems associated with change in diet patterns on Dravuni island.

Dravuni villagers have valuable traditional knowledge on behaviour, reproduction cycles and predation of many fish and marine invertebrates which can be used by biologists for future research. It is recommended that traditional knowledge of the Great Astrolabe Reef be documented to help manage its fisheries resources.

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