The importance of ethnographic knowledge to fishery research design and management in the South Pacific: A case study from Kolombangara Island, Solomon Islands

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Introduction

The successful management of a multi-species reef fishery in a contemporary Pacific Island setting cannot solely be based on a purely ecological approach. Charles (2000) for example, states that 'Success in the pursuit of sustainability is closely linked to adoption of a sufficiently broad conception of the fishery as a system of interacting ecological, biophysical, economic, social and cultural components'.

Ethnographic knowledge is an integral component of any holistic approach and can provide fisheries managers with potentially critical information. Researchers working in traditional subsistence village settings would be wise not to disassociate the role of the local inhabitants with the marine environment. After all, it is the villagers that depend on the sustainability of management measures for their own long-term survival. They are also the people who are in constant contact with the marine environment and have access to a wide variety of knowledge, which may not be easily accessible to a visiting researcher.

Many traditional Pacific Island communities that exploit marine resources are guided by deeply entrenched customary marine tenure (CMT) systems, which are based on traditional marine knowledge (TMK). The benefits of local CMT systems and their ability to have a management impact are important issues that need to be researched and analysed if fishery officers are to be effective in implementing localised management strategies.

Ethnographic research, however, should not be limited to the investigation of CMT systems or traditional knowledge. Although potentially accurate and detailed ecological knowledge can be accessed from indigenous fishers, their fishing skills and behaviour also have an equally important role to play in the design of management systems, and these should be investigated.

Jentoft (1998), states that 'fisheries is an industry and fishing is a human activity, and it is through regulatory measures of fishing behaviour that we attempt to secure the viability of fish stocks'. Therefore, to manage well, you need to know not only the fish, but also the fishers and their fishing behaviour. Ethnographic studies clearly have an important role to play in understanding fisheries and in implementing effective management policies (Charles 2000).

Traditional marine knowledge is a term that refers to the customary knowledge of marine life within traditional indigenous communities. It is part of CMT systems, and the importance of this knowledge is increasingly being recognised by fisheries managers and integrated into biologically based management programmes. The volume of literature on TMK is increasing rapidly as researchers record and examine its accuracy. In the case of TMK in Solomon Islands, various authors (Lahn 1998; Lam 1998; Johannes and Lam 1999; Aswani 1999; Hamilton 1999; Hamilton and Walter 1999; Johannes and Hviding 2000) have been conducting research to show how it can be used within contemporary management systems.

Because of the enormous biodiversity of tropical marine life in the Pacific, scientific knowledge about many species is inadequate and so TMK has also proven to be a useful tool for providing baseline data for marine research programmes (Ruddle et al. 1992). Research carried out in Solomon Islands shows that the level of detailed knowledge held by some fishers about the ecology of many species is almost encyclopaedic (Aswani 1997;

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Hamilton 1999; Johannes and Hviding 2000). In particular this knowledge can be separated into three categories:

1. The location of fish aggregation areas and explanations of aggregating behaviour;
2. The behaviour of various species in relation to time, tide, lunar phase and depth; and
3. The use of appropriate fishing methods to capture particular species at particular times and places.

The basis of TMK is long-term observations of ecological conditions, coupled with mechanisms for relaying this information across generations. The fact that ethnographic knowledge is gained through experiences and passed down the generations also requires special consideration. By taking into account the length of time people have lived in the Pacific it can be appreciated that TMK has been well refined and perfected over many generations.

The core of TMK is held by experienced and usually older fishers who possess it in its richest form (Johannes and Hviding 2000). Changing socioeconomic factors have resulted in more and more people leaving their villages in search of work and moving away from a subsistence way of life. This presents a great risk where practical knowledge concerning the behaviour of many marine species may be lost if it is not recorded.

Taking heed of the integrated approach that many fishery researchers are advocating, the aim of this study is to record the structure of a traditional Solomon Island village fishing system in order to demonstrate the value of ethnographic knowledge in fishery research design and management. The purpose of conducting a baseline ethnographic study within an indigenous Melanesian village was, first, to record traditional fishing knowledge and behaviour through systematic interviewing, and second, to record fishing activity through a catch per unit of effort (CPUE) survey. The information gathered from these exercises has been used to satisfy the aim of this project, and also to highlight and discuss various issues with regards to ethnographic research in general.

Environmental and social background

Solomon Islands (Figure 1), the second largest archipelago in the southwest Pacific, consists of two roughly parallel island chains with six major island groups (Johannes and Lam 1999), lying between 5°S and 11°55'S, and 155°30'E and 162°55'E. The major islands in the north are Choiseul, Santa Isabel and Malaita and, in the south, New Georgia, Guadalcanal and San Cristobal (Makira). The nearest neighbours are Vanuatu to the southeast, and Papua New Guinea (Bougainville Island) to the west.

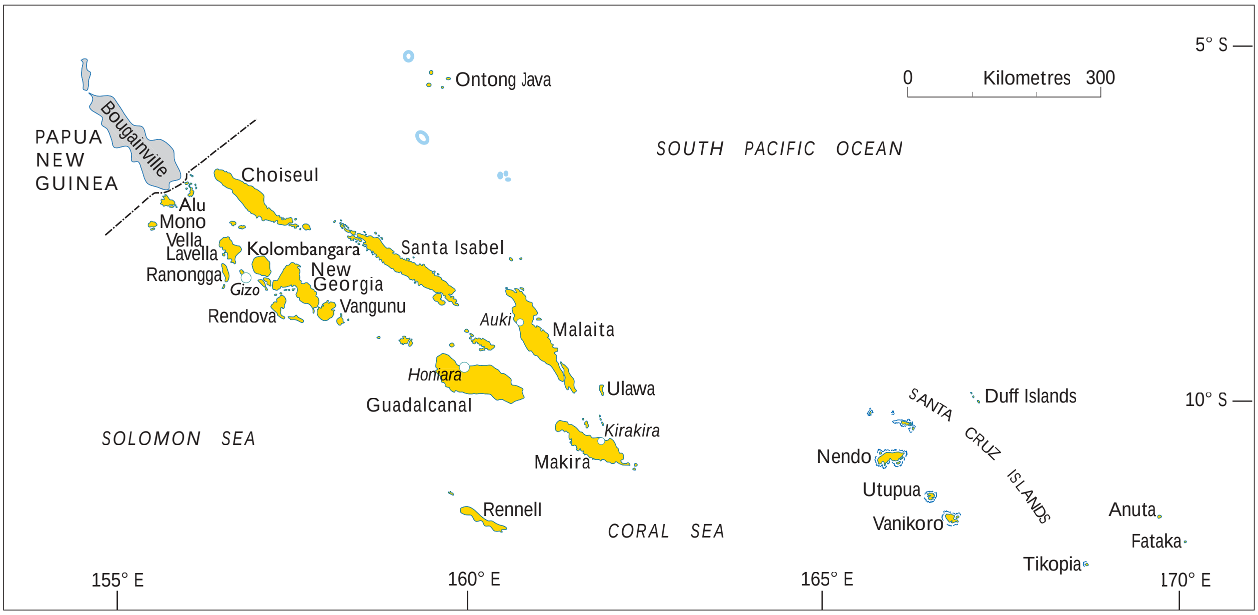

Figure 1. Solomon Islands

There are approximately 992 islands in the Solomons, giving a total landmass of about 28,000 km² (UNEP 1998). Tropical rainforests cover about 40 per cent of the landmass and the climate is predictably hot and humid. Solomon Islands displays a high rate of marine and terrestrial biodiversity, with a variety of small mammals such as opossums and bats, over 150 species of birds and a great abundance of tropical marine life (Leary 1993).

Kolombangara Island (Figure 2) is situated in the Western Province of the Solomons, at 7°55'S and 157°05'E. It is an extinct Pleistocene volcano, with an area of approximately 680 km², and a maximum elevation of 1768 m above sea level (UNEP 1998).

Burslem and Whitmore (1999) describe Kolombangara as having a tropical lowland evergreen rainforest, an aseasonal climate, an annual mean rainfall of 3150 mm, and an annual temperature range of 23 to 26°C. The local people speak *Nduke*, an Austronesian language, but Pijin can be used to communicate with most individuals.

Kolombangara means the 'water god', a reference to the plentiful supply of fresh water from rivers on the island. The island has a long history of logging and reafforestation, which began in the early 1900s. It was extensively logged during the last century after native timber was completely logged out on the nearby island of Ghizo, capital of the Western Province (Figure 2).

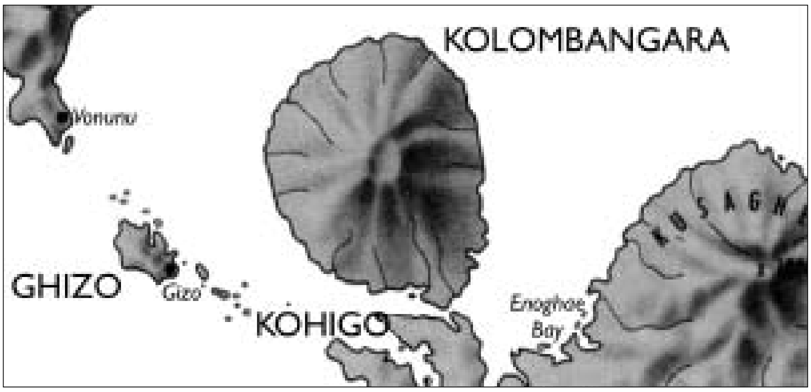

Figure 2. **Kolombangara Island**
(Source: Survey and Mapping Division, Honiara)

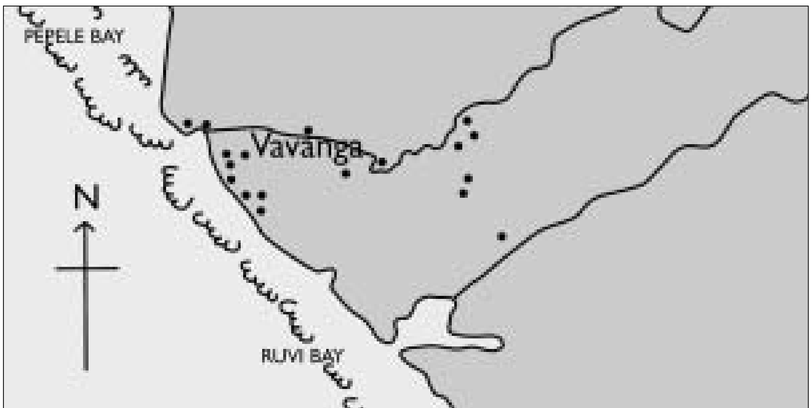

Figure 3. **Vavanga village**
(Source: Survey and Mapping Division, Honiara)

The study site

The study was conducted at Vavanga, a village on the southwest coast of Kolombangara (Figure 3).

Vavanga village comprises approximately 30 households, with most people living in temporary structures that last an average of 8–10 years. More permanent timber structures are continually being built to replace the old houses. At the time of study, Vavanga had a population of approximately 100 individuals, 20 per cent of whom did not live permanently there because of employment or other commitments elsewhere.

Religion plays an important role in the daily life of the villagers, and like most communities on Kolombangara, the Seventh Day Adventist (SDA) church is followed in Vavanga. This is of great significance to the relationship between the villagers and their environment. In accordance with SDA doctrine, restrictions exist on the consumption of various foods such as some meats, pork, coffee or tea.

More importantly, there are strict laws governing which marine products can and cannot be eaten. For example, the trade or consumption of all shellfish, crustaceans, cephalopods, marine reptiles, marine mammals, sharks and fish that have no scales on their outer skin is prohibited. In addition, SDA doctrine states that all activity, including fishing, is prohibited on the Sabbath, from sunset Friday till sunset Saturday. All of these rules have profound implications on the potential possession of traditional ecological knowledge by the villagers and also the health of the marine ecosystem.

Methodology

Ethnographic data were collected between July and September 1999. Prior to leaving New Zealand, a questionnaire was prepared, which included open-ended semi-formal interview questions. The questionnaire was structured in two parts: first, asking about the fisher's general fishing activity and knowledge, and the second, recording their knowledge about groupers (Serranidae, *pazara)* in particular.

Groupers were chosen as a case study species because of their commercial importance to the live reef fish trade (LRFT), and their ecological importance as high trophic level predators within the reef ecosystem. Through personal observation prior to the study it was discovered that in some instances locals felt uneasy or embarrassed (particularly women) when put in a formal interview situation. For this reason the use of video or audio recordings was deemed inappropriate. A total of 30 men and women were interviewed during three months. All interviews were conducted in Pijin.

CPUE data was collected and recorded in a number of survey handbooks prepared in New Zealand. To make it easy for villagers, each page of handbooks was labelled with essential information, such as name, gender, fishing method, time went fishing, time spent fishing, tide, ecological zone, species caught and frequency of catching them. The fishers filled in the necessary information next to the labels. By minimising the effort needed to fill in the CPUE handbooks I hoped to encourage regular participation by the fishers. A number of scales and watches were purchased and given to every major fishing household in Vavanga. The responsibility of recording fishing trips was given to each household, and I made regular visits to check on progress or answer any queries.

The handbooks were collected at the end of the study and brought back to New Zealand. An MS Excel spreadsheet was used to record and calculate various parameters. A total of 93 separate fishing trips were recorded from 1 July 1999 until 30 September 1999, and 49 separate fishing trips were recorded from 30 July 2000 until 10 November 2000. Unfortunately, the second data set was not suitable for CPUE analysis owing to several inter-related factors. Most important among them was that civil unrest in Solomon Islands during the collection of this data set meant that many male fishers did not fish, so most of the catch data came from females. Second, general security risks from the surrounding area meant that the number of fishing trips were drastically reduced. For these reasons it was not possible to obtain a representative sample.

Results

The Kolombangara lunar cycle

The lunar cycle is an integral part of traditional fishing knowledge in Kolombangara because the success rate of fishing depends highly on the behaviour of some species during certain lunar periods. However, traditional fishers do not usually have easy access to watches or calendars, and tend to treat time with less accuracy than westerners. For example, a New Zealand fisher may say that they went fishing on the 3rd day of the new moon, whereas a Kolombangara fisher will simply say that they went fishing during *enga rea*, referring to any day within the new moon period. Also, Kolombangara people do not label the lunar phase with terms such as 1st or 2nd quarters, but rather describe or relate the state of the moon to the environment. Table 1 describes this local lunar vocabulary.

Description of fishing methods and ecological zones

Five different fishing methods and four different ecological zones were used by local fishers during the collection of CPUE data.

The five fishing methods described by local fishers were:

Dropline — using a fishing line, hook, sinker and bait. This method is used when targeting deep-water fish by lowering the fishing line from a canoe.

Gill net (drive) — setting a gill net in shallow water and chasing the fish towards it.

Spear — shooting fish using a locally made speargun.

Throwline — casting a fishing line without a sinker. This method is used when targeting fish on the shallow reef flat.

Towline — or trolling, is where a non-weighted fishing line with synthetic bait (e.g. lure, cotton) is dragged behind a canoe.

The ecological zones targeted by the local fishers are (Figure 4):

1. Reef dropoff;
2. Reef flat;
3. Passage; and
4. Mangrove .

Table 1. **The Kolombangara lunar vocabulary**

Local terms	English translation	Translation in lunar periods
Lana rea	No moon	New moon
Enga rea	Starting of new moon	New moon period
Enga kale rea	Looking at half moon	First quarter
Tata behi sope	Nearly as big as the sun	First quarter period
Behi sope	As big as the sun	Full moon
Hitele rea	Moon getting smaller	2nd quarter
Tata lana rea	The moon is nearly gone	2nd quarter period

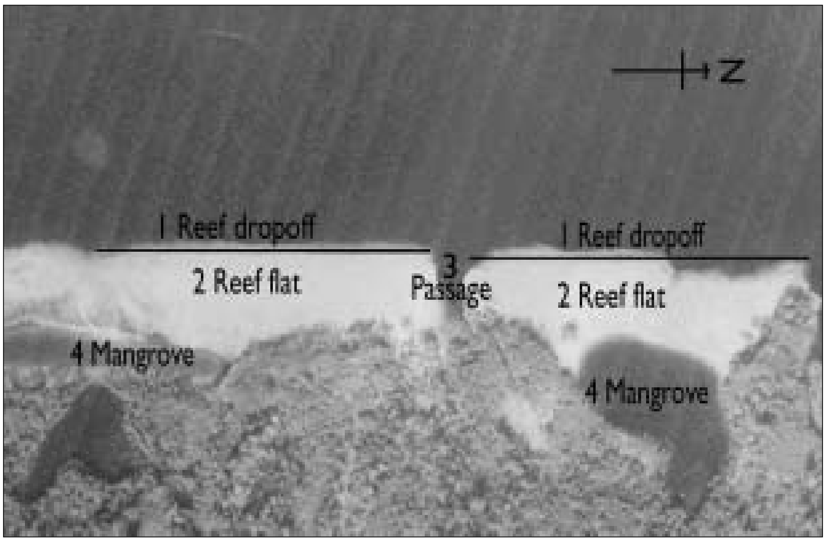

Figure 4. **Ecological zones targeted by local fishers (Source: Survey and Mapping Division, Honiara)**

Ethnographic knowledge

In the first part of the interview fishers were asked about their general fishing knowledge and behaviour. Ninety per cent (N = 27) of the subsistence fishers interviewed said that they fished at least four times a week, using a variety of techniques. When asked to choose their most preferred ecological zones for fishing, 76 per cent (N = 23) said that although not exclusively, they usually target the passage and reef flats. However, female fishers (N = 10) said that they mostly preferred using the throwline technique and usually leave the more labour intensive fishing methods, such as netting or spearing, to the men.

Although there was no consensus, when asked to rank families of fish from most favourite to least favourite, four fish families were described by 80 per cent (N = 24) of the interviewees as common species caught, and thus were important target groups. They are parrotfish (Scaridae), emperors (Lethrinidae), snappers (Lutjanidae), and trevallies (Carangidae). When asked to elaborate on their knowledge about some of these families, the interviewees gave some interesting answers. For example, 66 per cent (N = 20) said that the best time for catching trevally is during a light rain. The same number also said that the best time for catching snapper is during *beita longe*, referring to the few days immediately preceding the full moon, when the moon rises shortly after sunset.

Thirty-three per cent (N = 10) said they have caught parrotfish using potato or tapioca as bait on a hook. In addition, there was unanimous agreement on two pieces of fishing knowledge. The first is that during *saghe ondo* (high tide) most fish swim closer to the surface and are thus easier to catch. And the second is that spear fishing is most successful at night on *lana rea* (no moon) and fairly successful during *enga rea* (new moon). They attributed this to most fishes being asleep or not very active during this period, making them an easy target to spear.

All fishers (N = 30) said that they used their catch for consumption, but indicated that they would be interested in selling their catch if logistical obstacles, such as canoes for droplining, availability of fishing gear, or transport to the market at Gizo, could be overcome. With only a handful of local inhabitants owning outboard motors and canoes, the possibility of moving from a subsistence to an artisanal fishery is remote. However, if transport was available and local catch could be sent to Gizo market, fishing activity would increase markedly. This would mean that some sort of community-based management strategy would be necessary to protect the resource. All interviewees (N = 30) agreed on this.

In the second part of the interview, fishers were asked to demonstrate their individual knowledge of *pazara* (groupers, Serranidae). Sixty per cent (N = 18) reported that their catches of groupers are mainly dominated by *Epinephelus merra* (honeycomb grouper) and occasionally *Cephalopholis miniata* (coral hind).

All fishers (N = 30) claimed that droplining is the best method for catching most species of grouper, as they stay close to the reef wall where holes and crevices are easily accessible. When asked questions on the behaviour, movements and characteristics of various grouper species, the responses were fairly unanimous. For example, one female fisher described *Epinephelus merra* as being abundant on the reef flat during high tide. A male fisher said that *Cephalopholis miniata* are easily caught with a 30-m fishing line on the outer reef slope. All fishers, including women, possessed knowledge on the whereabouts of groupers in relation to the reef, the use of appropriate baits on hooks and the most effective method of fishing. For example, it was claimed by 33 per cent (N = 10) of fishers that groupers preferred freshly killed bait, especially skipjack tuna (*Katsuwonus pelamis*).

However, when asked about the seasonality of groupers with regards to spawning aggregation times and locations, or the effects of lunar cycles on their movements, there was no clear consensus and the answers became more vague. Seventy-six per cent of fishers (N = 23) could not answer all the questions on the above topic, whereas the others gave conflicting information.

This lack of knowledge may have many causes, including the absence of any large grouper spawning aggregations around Vavanga, the reluctance of local fishers to frequently target known grouper habitat, or, it might simply be a case of gathering unreliable information from untrained fishers. This will be discussed further below.

Although testing the accuracy of the data described above may require extensive research by a marine biologist with anthropological training, some of the ethnographic knowledge and behaviour of local fishers can be validated through CPUE analysis.

CPUE data

In this exercise I describe the catch rates, catch composition and elaborate on fishing methods and the ecological zones where fishing occurs. The

CPUE data for this study:

1. Shows the ratio of each family of fish caught by subsistence fishers;
2. Shows what species are being caught and in what ratios;
3. Provides baseline data against which a variety of factors, such as seasonality, can be compared in the future;
4. Helps to document the fishing behaviour of local fishers; and
5. Provides an opportunity to validate some of the ethnographic data obtained from local informants.

It is unrealistic to expect all informants to contribute fully to the CPUE exercise. However, the data received came from sources that contributed accurately and regularly. This enabled me to achieve a representative sample of the total fishing activity at Vavanga. However, it is also imperative to keep the results, analysis, and conclusions from the CPUE data in perspective, given the short length of the sampling period. The result of the CPUE data analysis are displayed below.

Apart from the obvious shortcoming of the CPUE exercise, namely the relatively short sampling period during the middle of the year, Table 2 contains other anomalies created by the following three factors. First, there was only one fisher within the whole village who was contributing to the CPUE data from his skipjack tuna (*K. pelamis*) trips. He was the only one with an outboard motor and fuel money to target the open seas, thereby distorting the results so that the Scombridae family represent over 50 per cent of the total catch. Second, 35 kg of the total 35.2 kg from the Sphyraenidae family came from one species, the great barracuda, which was caught during two fishing trips to outer islands. This created a bias, as transport to fishing trips on outer islands is rarely available to local villagers. Both of the above factors represented results that were not representative of normal fishing activity, which created anomalies. Finally, the Scaridae family was biased by an experienced visiting fisher who, while a guest for a short time at the village, followed a few local men to a night fishing expedition. He managed to spear the only three green humphead parrotfish (*Bolbometopon muricatum*) during the whole CPUE survey. In total they weighed 27.9 kg, which had to be deducted from the total weight of the Scaridae family. The final number of fishing trips was recalculated to 71 expeditions. Given the above considerations, the CPUE data for Vavanga is recalculated in Table 3.

Table 2. **Total weight for each family of fish (kg) caught at Vavanga**

Family	Total weight (kg)	Percentage
Scombridae	255.4	53.5
Scaridae	48.0	10.0
Carangidae	41.1	8.6
Sphyraenidae	35.2	7.4
Lutjanidae	30.9	6.5
Lethrinidae	16.2	3.4
Mugilidae	10.3	2.2
Serranidae	7.7	1.6
Acanthuridae	7.6	1.6
Holocentridae	6.7	1.4
Balistidae	5.8	1.2
Labridae	2.9	0.6
Ephippidae	1.5	0.3
Gerreidae	1.5	0.3
Nemipteridae	1.4	0.3
Nephropidae	1.4	0.3
Mullidae	1.3	0.3
Haemulidae	0.9	0.2
Caesionidae	0.8	0.2
Siganidae	0.8	0.2
Scorpaenidae	0.2	0.1
Total	**477.4**	**100.0**

Table 3. **Total weight for each family of fish (kg) caught at Vavanga after corrections**

Family	Total weight (kg)	Percentage
Carangidae	41.1	25.3
Lutjanidae	30.9	19.0
Scaridae	20.1	12.3
Lethrinidae	16.2	10.0
Mugilidae	10.3	6.3
Serranidae	7.7	4.7
Acanthuridae	7.6	4.7
Holocentridae	6.7	4.1
Balistidae	5.8	3.6
Scombridae	3.5	2.2
Labridae	2.9	1.8
Ephippidae	1.5	0.9
Gerreidae	1.5	0.9
Nemipteridae	1.4	0.9
Nephropidae	1.4	0.9
Mullidae	1.3	0.8
Haemulidae	0.9	0.6
Caesionidae	0.8	0.5
Siganidae	0.8	0.5
Sphyraenidae	0.2	0.1
Scorpaenidae	0.2	0.1
Total	**162.7**	**100.0**

In Table 3, Carangidae (trevallies) are the commonest species caught in Vavanga, followed by Lutjanidae (snappers), and Scaridae (parrotfish).

CPUE data in Table 4 show that Scaridae (parrotfish) are the most productive species in terms of meat weight per unit of effort from a fisher's perspective.

In order to include Serranidae, families that made up more than four per cent of the total catch were further scrutinised. Table 5 shows the species that made up more than 50 per cent of the total reported catch within those families.

In Table 5 one species dominates the catch in each family. Pacific longnose parrotfish and fringelip mullet are shown to be the dominant species within their respective families. Interestingly, honeycomb grouper is shown to have contributed approximately 60 per cent of the total grouper catch in Vavanga, confirming its commonly caught status as previously indicated by local fishers.

Table 4. CPUE values for families that made up more than 5% of the total catch

Family	Grams/hour/fisher
Scaridae	1790
Carangidae	734
Mugilidae	468
Lutjanidae	431
Lethrinidae	294

Fisher behaviour

The data in Table 6 display some interesting characteristics. Vavanga fishers conduct most of their fishing activity during the evening, and also during the 2nd quarter and new moon period. In accordance with their statements, the data also show that they mostly target the passage and reef flats,

Table 5. Species that made up more than 50% of the total catch within their respective families

Family	Species	% of total weight
Scaridae	Pacific longnose parrotfish (*Hipposcarus longiceps*)	93.3
Mugilidae	Fringelip mullet (*Crenimugil crenilabis*)	90.1
Carangidae	Yellowstripe scad (*Selaroides leptolepis*)	71.6
Lethrinidae	Pink-ear emperor (*Lethrinus lentjan*)	68.0
Serranidae	Honeycomb grouper (*Epinephelus merra*)	59.3

Table 6. Breakdown of the 71 fishing trips

Time of day	Mid-day 2	Afternoon 21	Evening 46	Night 2
Lunar stage	2nd quarter 23	New moon 23	1st quarter 10	Full moon 15
Ecological zone	Passage 26	Reef flat 28	Reef dropoff 14	Mangrove 3
Tide	High 47	Low 16	Between 8	

and conduct most of their fishing expeditions during high tide.

The data in Table 7 show that the throwline and towline methods are predominantly used by Vavanga fishers. Given the lack of emphasis on droplining in order to catch bigger fish, one should not be surprised at the low total weight of catch by each family in Table 3.

Table 7. Breakdown of fishing methods

Fishing method	Fishing trips
Throwline	27
Towline	23
Spear	13
Dropline	6
Netting (drive)	2

The data in Table 8 show that males, fishing alone, contributed highly to the CPUE exercise.

Table 8. A breakdown of fishing trips by fishers' gender

Gender classification	Fishing trips
Single male trips	41
Single female trips	15
Multi female trips (2 or more)	9
Multi male trips (2 or more)	5
Mixed gender trips	1

Discussion

Although Vanvanga fishers displayed great flexibility in using a wide spectrum of fishing techniques, their effort mostly concentrates on the dropline and throwline methods. In addition, effort is not distributed evenly across the available ecological zones. The passage and reef flats have been shown to take priority over other available areas, with most fishing expeditions conducted during the evenings.

Vavanga fishers also displayed a noticeable lack of interest in night fishing. Given the mostly rough, open sea conditions and the small fishing area available to local villagers, their predictable and unchanging practices should be of no major surprise.

However, environmental knowledge has been shown to play an important role in their decision-making process with regards to appropriate fishing practices at certain time. This is reflected in their preference to go fishing during high tide or the first two weeks of the lunar cycle (Table 6), or the unanimous agreements on when or how to target certain species.

Traditional marine knowledge at Vavanga is very extensive and impressive. Although there was no consensus in ranking the four most important families, it was claimed by a majority of local fishers that parrotfish (Scaridae), emperors (Lethrinidae), snappers (Lutjanidae), and trevallies (Carangidae) were the most common families of fish caught within Vavanga. The total weight data in Table 3 proves this claim to be true. In addition, CPUE values for Scaridae in Table 4 show it to be by far the most productive family (1.79 kg/hr/fisher) as far as a Vavanga fisher is concerned. Carangidae was a distant second (0.734 kg/hr/fisher), followed by Mugilidae (0.468 kg/hr/fisher), which was helped into third place by catches from the only two netting trips in the CPUE exercise. These netting trips helped to inflate the true importance of the CPUE value for Mugilidae, given that it ranked lower in total catch weights (Table 3).

Groupers, however, are shown to only make up 4.7 per cent of the total catch and consequently ranked sixth in Table 3. Table 5 shows that nearly 60 per cent of the grouper catch was dominated by one species, *Epinephelus merra*. This validates the claim by 60 per cent of fishers interviewed, that catches of groupers were mainly dominated by *E. merra*.

Although the traditional marine knowledge from the first part of the interview seemed impressive and detailed, the results from the second part of the interviews showed that local fishers only possessed basic knowledge about the habitat of groupers, or the use of appropriate bait and fishing methods for catching groupers. As mentioned previously, the lack of detailed knowledge on grouper ecology, such as spawning aggregation seasons or lunar movements, may be the result of several factors, one of which may be the issue of labour and cost. Another possible reason for the lack of detailed grouper knowledge in Vavanga could be that no large-scale spawning aggregations occur around its reefs.

Table 7 shows that droplining was the second least preferred method of fishing, indicating that known grouper habitats were not being targeted by local fishers. The reason droplining was rarely used may be due to two interrelated factors; cost and labour. The average cost of a canoe is around SBD 300[2] and not every household possesses one. Also there is the added cost of fishing gear such as lines, hooks and sinkers. Second, fishing on the reef dropoff is labour intensive as the fisher has to try to steady the canoe against breaking waves and also hold on to the fishing line. Results from Tables 6 and 7 show that even when the reef dropoff was targeted 14 times, only 6 times were actually spent dropling-ing. Thus, it is not surprising that groupers only rank sixth in Vavanga's total catch records (Table 3). Given these factors, the villagers seemed to find it easier to use less labour intensive fishing methods, as shown in Table 7.

There is, however, one other probable explanation for this apparent lack of detailed knowledge, which highlights several important aspects of methodology structure in ethnographic research. The data collected may have come from untrained or inexperienced fishers, been reported incorrectly, or been misunderstood by the researcher. These sampling factors are sometime overlooked when gathering and processing ethnographic data. The collection of ethnographic data is not just a matter of interviewing villagers and recording their answers. Most fisheries scientists do not have the appropriate anthropological experience or knowledge to conduct an ethnographic survey. Therefore, the usefulness of such data in fishery research design and management plans may be compromised by the collection of inaccurate data. Here, the precision of traditional marine knowledge becomes an important issue.

More increasingly, the value of TMK has been noticed, highlighted by a lack in formal long-term data sets in most artisanal and some industrial fisheries (Johannes et al. 2000). Because TMK has been refined and passed down through many generations, recognition is also being given to its potential as an important source of baseline data and knowledge, which may be useful from a management perspective.

However, the value and accuracy of TMK cannot be taken for granted. Ruddle et al. (1992) elaborate on this point by stating that the romantic and uncritical acceptance of traditional knowledge is almost as unfortunate as that of totally dismissing it.

By virtue of the word 'traditional', we can be sure that this knowledge is also interwoven with Solomon Islands culture and religion, and cannot be separated. This is because culture and religion play an important and integral role in the preservation, interpretation, and passing on of knowledge. The SDA faith in Vavanga is one example of how religious doctrine can restrict and control marine life consumption and fishing behaviour. Therefore, by trying to separate and structure one component of this knowledge in a scientific form, we may be reducing or simplifying its value. However, once this data has been appropriately collected, interpreted, and its accuracy tested through scientific fieldwork, we can begin to analyse its true value.

Conclusions

One of the most dynamic and important components of ethnographic research is the fishers, their knowledge and their behaviour. Many Pacific Island communities exploit marine resources under the guidance of deeply entrenched CMT systems, which are often concerned with traditional rights of access, enforcement and compliance of cultural or religious regulations, acquisition and preservation of ecological knowledge, and the survival of the resource.

The most obvious benefit of CMT systems is their ability to have a management impact by restricting access to traditional fishing grounds. In addition to this, traditional knowledge of the marine ecosystem is an integral part of CMT systems and has the potential to be directly beneficial to fishery management models.

Traditional marine knowledge in some Pacific Island fishing cultures is remarkably rich, offering resource managers access to some vital, basic, natural history data for managing inshore marine fisheries (Johannes 1992; Calamia 1999). In particular, its value as a management tool cannot be underestimated.

For example, knowledge about the location or movement of reef fishes in response to physical, biological, and environmental stimuli is often available from local fishers. Johannes (1992) uses the example of grouper spawning aggregations, which provide a useful focus for management. Because high catch numbers are often made from them, the opportunity to regulate fishing pressure is easily available. In this case, Johannes acquired the location and times of the spawning aggregations from local indigenous fishers.

2. SBD 1.00 ≈ USD 0.14 (August 2002)

Information about the movement of certain species, optimum fishing periods, or appropriate fishing methods, are just some of the vast array of knowledge held by Vavanga fishers. In addition, the collection of CPUE data proved to be very useful in providing me with important knowledge about the villagers' fishing patterns and behaviour.

The success of an inshore reef fishery undoubtedly depends on the marine knowledge and behaviour of local fishers, who are directly involved with the catching, consumption, redistribution, and management of the resource. Therefore, it is imperative that we as scientists do not dismiss this source of knowledge from the outset, and endeavour to collect and analyse it appropriately, in order to see how best it can be used.

This is often easier said than done, especially if the researcher is not trained in anthropological methods. As the analysis in this study has shown, among various other reasons, the failure to collect detailed local knowledge on grouper was perhaps due to my naive attitude towards ethnographic research. In the midst of the interviews, I may have collected accurate and potentially important information from one or two experienced fishers, but because there was no consensus on some questions about groupers, these answers were not noticed. Thus, as researchers we have to shed our romantic attitudes about indigenous life and be careful not to treat every native person as a potential source of accurate ethnographic information.

Although thirty fishers agreed to be interviewed for the collection of ethnographic data, I was not vigilant enough in checking their background, or observing their daily fishing routines. In hindsight, I think it would have been better to ask the majority of the villagers to nominate fishers who they perceived to be the most appropriate informants.

Johannes et al. (2000) argue that researchers should seek out fishers with local reputations as experts. In these cases, considerable time and effort will be saved as information from a handful of 'experts' may be more useful than information collected from a number of local fishers chosen at random. We do not seek random advice in other facets of research, and acquiring ethnographic data is no different.

In summary, the benefit of considering ethnographic knowledge in fishery research design and management is three-fold (see also Hamilton and Walter 1999):

1. Baseline ecological data can be extracted from CMT systems and used to define research methodologies;

2. Because indigenous fishing communities interact daily with their local environment, the ecological knowledge base is constantly being updated and revised; and

3. CMT systems can be used as the basis for the management of inshore fisheries.

So far, this study has demonstrated that marine research and management in a coastal Solomon Islands setting could benefit from a holistic approach that considers the integration of ethnographic data. However, this source of knowledge continues to be treated with suspicion or used inadequately by some fishery researchers and policy makers (Christie and White 1997; Hamilton and Walter 1999; Kile et al. 2000). There are several reasons for this:

1. Traditional environmental knowledge is sometimes seen as inaccurate, unsophisticated, or not scientific enough to be incorporated into western-based fishery models (Kile et al. 2000);

2. Customary management measures are seen as highly locally specific, and of little use on a national level (Kile et al. 2000);

3. Indigenous people and their institutions are sometimes seen as unsophisticated or problematic (Hviding and Ruddle 1991);

4. The uncritical and romantic espousal of indigenous knowledge can lead to a situation where the data or observations are taken out of their historical and cultural context (Hamilton and Walter 1999); and

5. Indigenous knowledge is contained within complex cultural or religious systems and requires 'anthropological methods to describe and interpret this information in a meaningful manner' (Hamilton and Walter 1999:13).

The first three points are based on ignorance and highlight the exclusively quantitative scientific focus and formalised management strategies in western training curricula (Kile et al. 2000).

The last two points highlighted by Hamilton and Walter (1999) suggest that ethnographic knowledge, when it is used by fisheries scientists, is often misunderstood because of the researcher's inexperience in ethnographic research methods.

The successful operation of an inshore reef fishery in a Pacific Island village must take an integrated approach by combining the research of customary and scientific management systems. The justification for promoting a holistic approach lies in the nature of the Pacific's coastal systems, which involve complex cultural, religious, socio-political and economic components. In most areas of Solomon Islands, for example, there is a long history of communal use of marine resources under the guidance of CMT systems, thus attempts to disassociate their role and influence in any fishery operations may seriously jeopardise the physical or economic survival of the people (Donnelly et al. 2000; Lam 1998).

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Community policing in the Portland Bight Protected Area, Jamaica

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Source: UNESCO Wise coastal practices for sustainable human development — forum of discussion[2].

Efforts to conserve the natural environment often fail — even where there is adequate environmental legislation — because of non-compliance with regulations, and the high cost of enforcement. Non-compliance may have a variety of causes, e.g. profit, lack of environmental awareness, a don't-care attitude towards the environment, lack of an alternative, damaging behaviour may be cheaper or easier than environmentally-friendly behaviour, and the absence of deterrence due to the lack of enforcement.

In Jamaica, environmental degradation and a lack of compliance with environmental regulations has taken place in the context of the traditional top-down approach, and must be viewed against the historical background of a slave society dominated by plantation owners. Distrust of the police and a desire to beat 'the system' are almost written into the genetic code of working-class Jamaicans. And so the challenge of natural resource management is not just to deal with bio-physical issues but also to contend with socio-cultural problems, which underscores the point that natural resource management is more of a social science than a natural science.

People seek to beat a regulatory system that belongs to somebody else, and operates in someone else's interest, or is perceived to do so. So a first strategy towards increased compliance is to create, within the users of the natural resources, a sense of ownership of the laws and regulations. This was achieved in the Portland Bight Protected Area of Jamaica by getting the fishers to prepare their own fisheries management regulations using the local fisheries associations and the Fisheries Management Council. Thus the fishers now feel they own the regulations rather than viewing them as a system of rules being imposed on them

1. Caribbean Coastal Area Management (C-CAM) Foundation, Jamaica, West Indies
2. All contributions to the forum can be viewed on the Internet at: http://www.csiwisepractices.org/ (enter the name: csi and the password: wise). You can also participate to the forum by sending an e-mail to: moderator@csiwisepractices.org