The Performance of Customary Marine Tenure in the Management of Community Fishery Resources in Melanesia

VOLUME 2b

Fiji
Country Report

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The field staff in Fiji were:

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Data Collectors -	Felix Poni and Frances Osbourne (Vitogo/Vidilo & Tavua); Epeli Qalo* & Apenisa Botilagi (Tacilevu); Siri Wakatibau & Teresia Wakatibau (Naweni); Tulala (Verata). (* Epeli Qalo sadly passed away in April, 1997)

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1.1 Introduction

1.1.1 Site Characteristics

Following a series of rapid rural appraisals (Townsley, 1993; Pido et al, 1996) communities across nine customary fishing rights areas (*qoliqoli*), four *qoliqoli* were selected for more detailed research activities. These sites were chosen to comply with the Project's stated research requirement that investigations cover a range of fishing intensities (see Volume 1 - Project Background and Methodologies). Figures 1 through 6 presents the location and images of the research sites in the Fiji Islands.

Table **1** - Summary characteristics of the six research sites in Fiji *

Site	Position (Lat/Long)**	CFRA Population (1999 est)***	Total Area of CFRA (sqkm)	Total Area of Reef (sqkm)	Max. distance to CFRA boundary	Fringing Reef	Lagoon
Naweni*	179.58E 16.80S	400[1]	9.56	8.01	5 km	Y	Y
Tacilevu†	179.62E 16.77S	250[1]	7.07	7.07	3 km	Y	Y
Tavua	177.83E 17.44S	29000[2/3]	686.8	186.84	36 km	Y	Y
Vitogo/Vidilo	177.47E 17.62S	78000[2/3]	235.2	98.89	21 km	Y	Y
Verata	178.62E 17.85S	1500[4]	102.4	27.95	12 km	Y	Y
Cautata†	178.61E 17.99S	500[4]	3.4	3.29	1 km	Y	Y

* Naweni qoliqoli is under the tenure of a single tribal chief, the Tui Naweni. There are three coastal communities within this qoliqoli, Naweni, Dromoninuku and Tacilevu (plus a number of small settlements in the interior). The population estimate for Naweni includes Dromoninuku village. In terms of management, Tacilevu functions as an independent management unit and is therefore treated as such. A closed area was in operation in Naweni at various times during the period of monitoring.

** The geographical positions given here are the locations of the following communities: Naweni village (Naweni); Tacilevu village (Tacilevu); Tavua Town (Tavua); Lautoka City (Vitogo/Vidilo); Ucunivanua village (Verata); Cautata village (Cautata).

*** Population data Sources : [1] Cakaudrove Provincial Profile (1994-95); [2] Ba Provincial Profile (1994-95); [3] Census96 Statistical News No. 18/98; [4] Tailevu Provincial Profile (1994-95).

† For non-Fijian speakers: The pronunciation of 'c' in the Bauan dialect of the Fijian language is similar to a 'th' sound in English as in 'then'. Phonetic spelling of Tacilevu is therefore 'Tathilevu'; Cautata is 'Thautata' and Ucunivanua is 'Uthunivanua'. Pronunciation of 'g' is like 'ng' in 'gong' so Vitogo is 'Vitongo'. Pronunciation of 'd' (Vitogo/Vidilo) is like 'nd' in 'candy'.

Pronunciation of Vidilo is therefore ‘Vindilo’ (Schütz and Komaitai, 1971).

Figure 1 - Location of Research Sites in Fiji

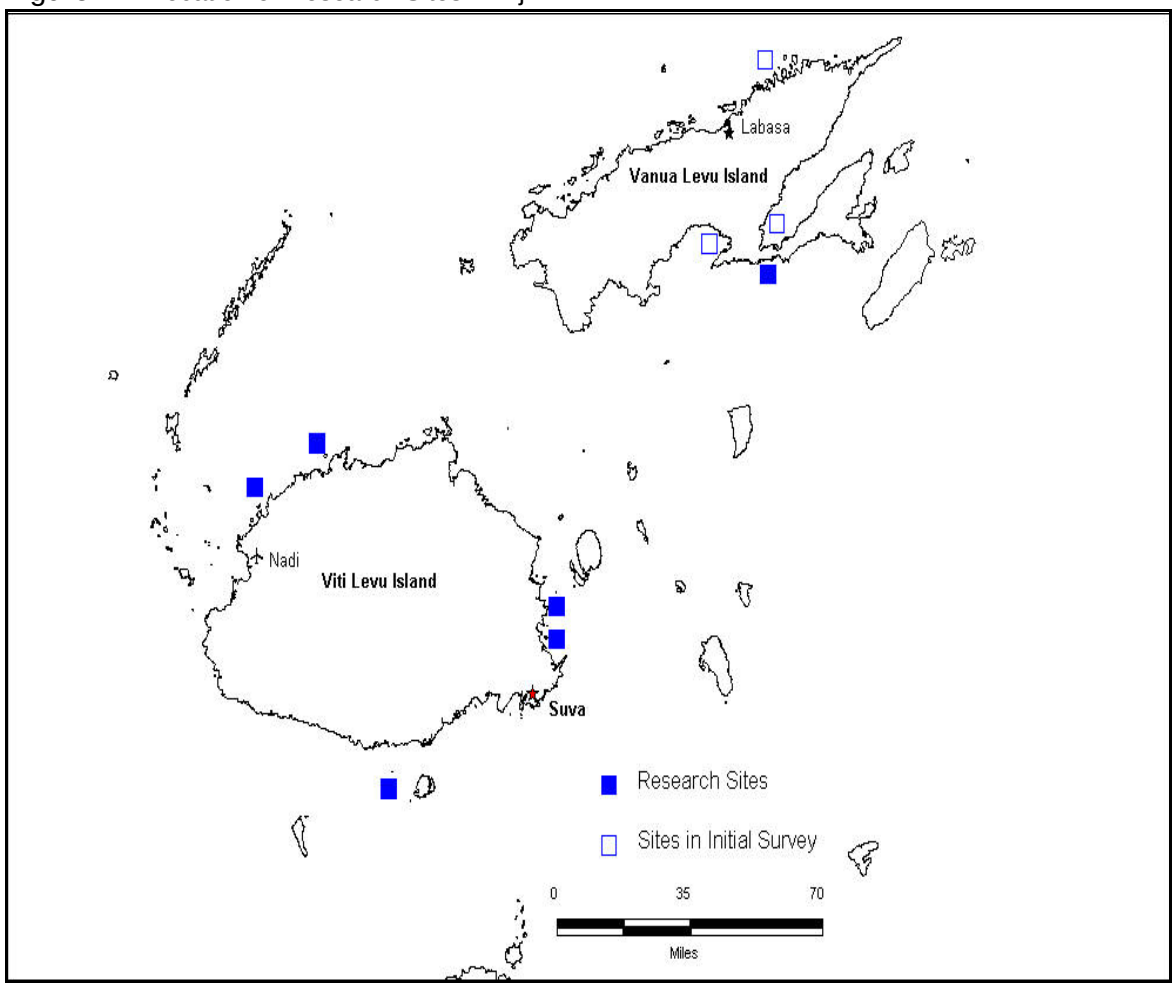


Figure 2 - Aerial Photograph of Naweni and Tacilevu Villages, Vanua Levu

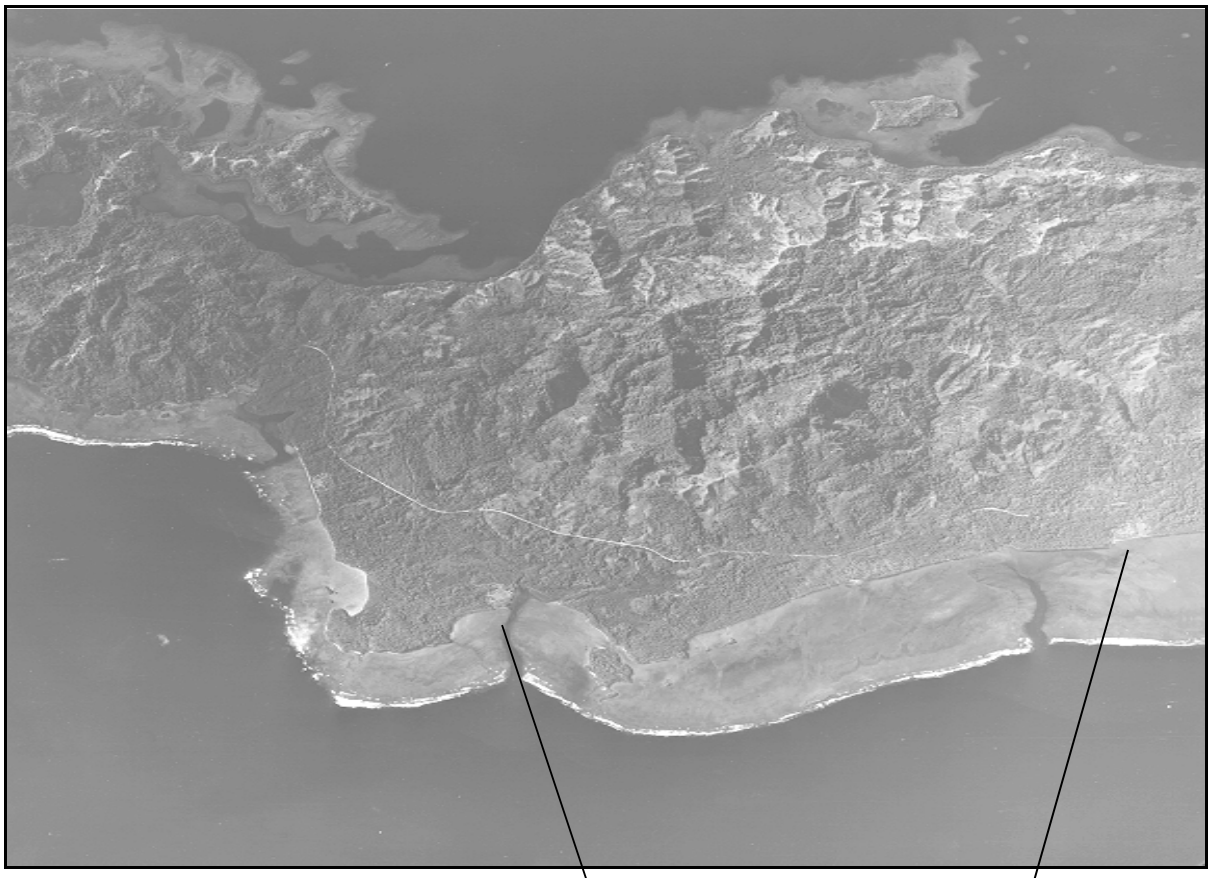


Figure 3 - Chart of Savusavu/Naweni region of Vanua Levu Island, Fiji

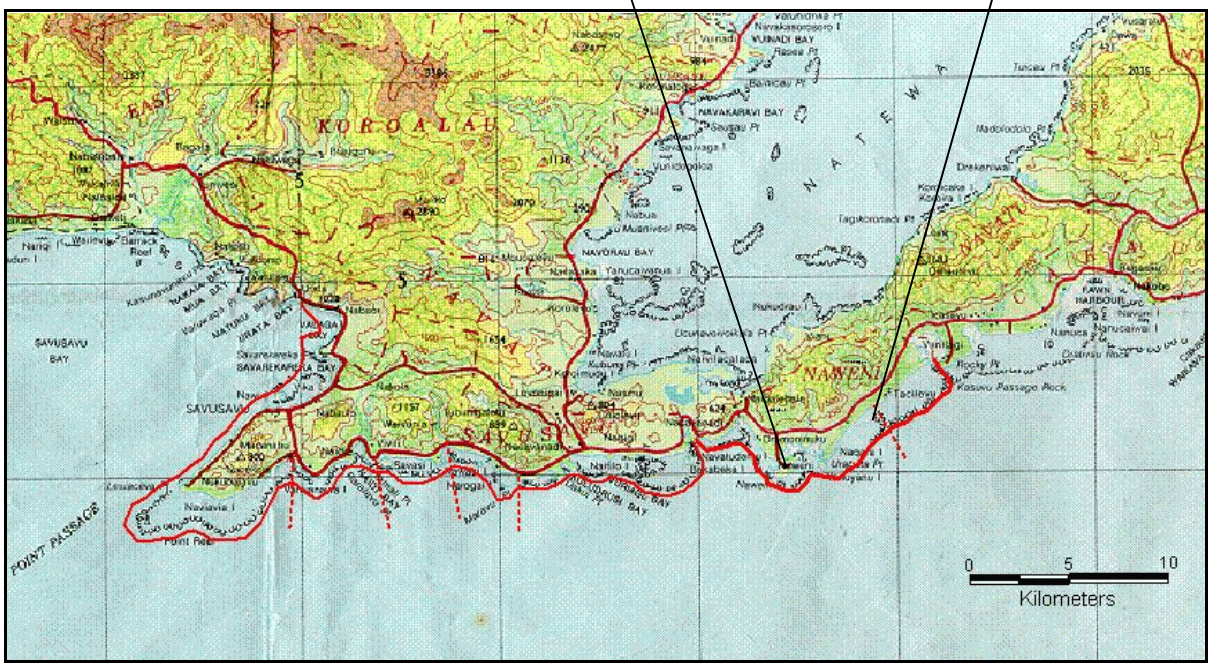


Figure 4 - Chart of North-west Viti Levu. The region of Tavua and Vitogo/Vidilo *qoliqoli*

Figure 5 - The location of the *qoliqoli* of the Western Division of Viti Levu

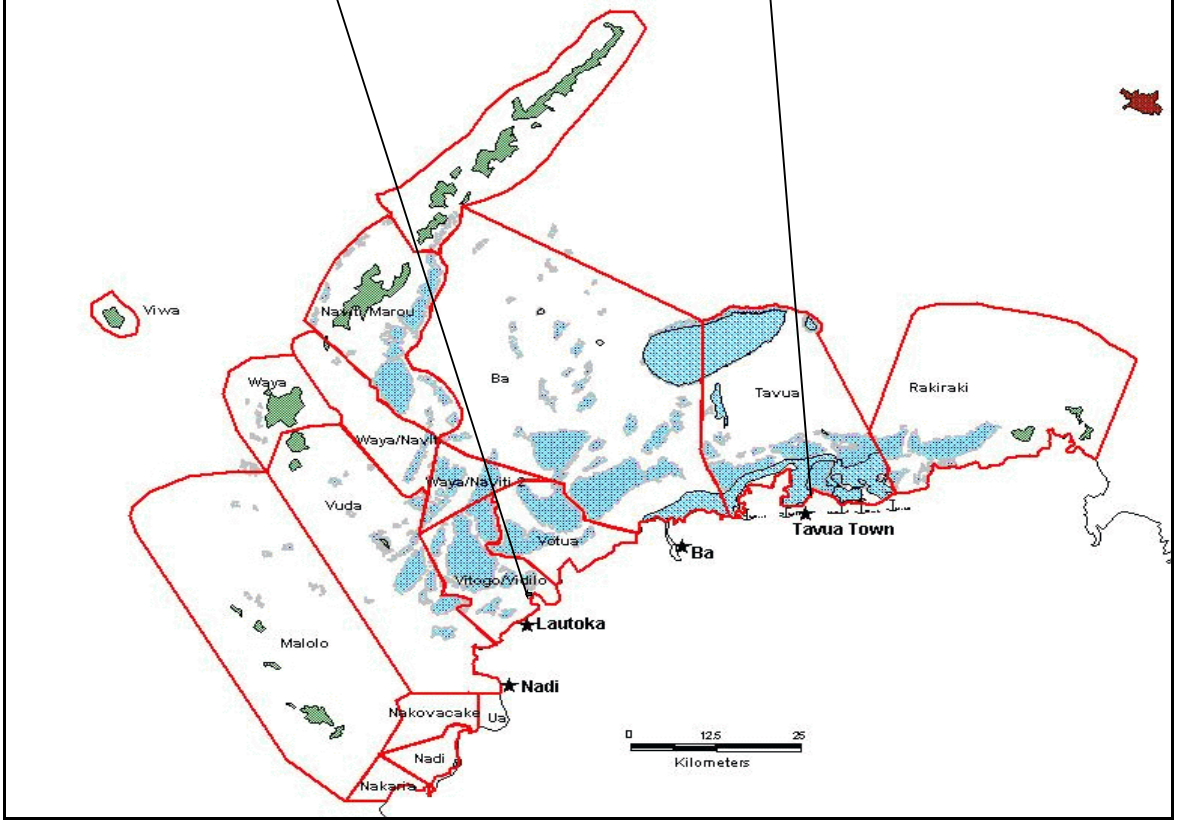


Figure 6 - The *qoliqoli* of eastern Viti Levu

1.1.2 Characteristics of Stakeholder Groups

There are four principal stakeholder groups in Fiji's inshore fisheries. The primary stakeholders, those with access as a birth-right (supported by national legislation), are the native Fijians. Fijians comprise approximately 51% of the total population of Fiji although this proportion varies by location. In Naweni and Tacilevu villages the population is 100% Fijian. In Ba Province (which includes Vitogo/Vidilo and Tavua qoliqoli) they comprise approximately 40% of the population. In Tailevu Province (Verata and Cautata) they comprise approximately 80% of the population.

The economic situation of this stakeholder group obviously varies dependent on local conditions such as the presence of urban developments and associated business opportunities. Tourist developments can also play a significant role in providing economic opportunities. Table 2 presents summary data on the economic activities (number of individuals (mean value per individual in F$)) of the Fijian communities at the research sites. These data are gleaned from 1998 Provincial Profiles.

Table 2 - Summary Economic Characteristics of Fijian Communities at the Six Research Sites

Qoliqoli **Village**	Boats	Trucks	Retail	Cash Crop	Live-stock	Fishing**	Full-time Employed	Subsistence Earnings
Naweni								
Naweni			3	2	1	1	1	
Tacilevu	7*	1	3			1	3	
Verata								
Ucunivanua	7	2	1	20	1	1		56
Kumi	6	1	1					72
Naloto								
Vitogo/Vidilo								
Vitogo	8	1	3	26		8	31	172
Namoli	5	0	1	1		5	100	298
Naviyago	14	1	1	22		7		125
Tavua								
Korovou			2		2			122
Nabuan				10	5		3	200
Tavualevu			2	70	17		158	494
Vatutavui				12	24		10	220

* Include bilibili (bamboo rafts).
** These data are from the Provincial Profile.

The second group of stakeholders are the Indo-Fijians who contribute 43% of the total population in Fiji. This percentage is somewhat less than they contributed prior to the two military coups in 1987 when they represented a majority 48% of the population, the relevance of this being the down-turn in the economy resulting from the significant emigration of Indo-Fijians. The remaining 6% of Fiji's population comprises Europeans and Pacific Islanders. *Economic data for Indo-Fijian population as a whole from Statistics Office data*. Indo-Fijians are involved in the inshore fisheries of Fiji in a number of arenas. The majority of commercial fishers and middlemen are Indo-Fijians and the majority of non-municipal outlets are also

operated by Indo-Fijians.

1.1.3 Analytical Framework

One of the key aspects of customary marine tenure is that it is extremely complex. It includes interactions between cultural, political and economic characteristics of the community (and nation) as well as between the community and environmental and biological components of the resource system over which tenure is applied. In order to make sense of this complexity the application of a framework to structure the data and subsequent analysis is essential. This work utilises an institutional analysis and design framework developed by Ronald Oakerson (Oakerson, 1992) which is applied in a diagnostic manner to analyse the performance of the community management institutions. The reader is referred to the companion Volume 1 - Project Background & Methodologies for a more detailed introduction to the theory and structure of Oakerson's framework. In summary the diagnostic approach works backwards through the framework. The following section (Section 1.2 - Biological and Equity Outcomes) opens the diagnosis with an analysis of the fishery itself, or more specifically, the *outcomes* observed in the fishery. The section includes a summary of the national and local management regulations (*operational rules*) in order to provide an immediate context to the outcomes. A more detailed analysis of operational rules is included in Section 1.5. The outcomes include, *inter alia*, yields, revenues and social effects of the resource management system and, of course, the management regulations in force. In this research outcomes are analysed using, where possible, the criteria of biological sustainability and the criteria of equity. In addition, at least where they differ from sustainability and equity, analytical criteria will include the objectives of the management authority.

In Section 1.3 the analysis then begins to seek causes for the particular outcomes reported in Section 1.2. Patterns of interaction are the combined choices made by individual fishers. If it is possible to derive reasonable explanations for the observed outcomes by analysis of the mutual choice of fishers then it may also be possible to determine how best to alter characteristics of the fishery to promote choices that lead to a closer match between the outcomes observed and ideal objectives of management. In this section analysis is focused on cooperation and conflict between stakeholders.

Fishers' choices are made in response to interpretation of the physical and technical attributes of the resource systems and the decision-making arrangements that are in place to manage these resources. If the effect of these characteristics on choice can be identified then it may be possible to change them to promote choices that produce the required outcomes. In Section 1.4 analysis focuses on the influence of physical and technical attributes on fishers choices and the outcomes observed and covers environmental, technical and socio-political attributes of the fishery and the community. Finally, Section 1.5 focuses on the role of decision-making arrangements in influencing fishers choices and subsequent actions including how the design of management regulations is promoting or thwarting management objectives and equity and the operational structure and behaviour of the management institution itself.

An idealised theoretical example of the diagnostic application of Oakerson's Framework is as follows: the analysis of fisheries data suggests that there is a problem with, for example, over-fishing in the fishery (the outcomes). Subsequent analysis of the patterns of interactions between stakeholders indicates that fishers are in conflict with the management authority and ignoring their regulations. Further analysis of decision-making arrangements may

indicate that these regulations were drawn up without consultation and without adequate explanation to the fishers of the reasons for their imposition. The regulations are also deemed inappropriate by fishers because they apply to an area of reef which is important to fishers whose access to other grounds is seasonally restricted. If the situation is to be remedied it may be appropriate for fishers to be included in the decision-making process and for an fisheries extension programme to be established explaining what the regulations could achieve if they are adhered to. Fishers may then be more willing to cooperate and thus unsustainable fishing practices could be reduced or even eradicated.

1.1.4 Fisher Context: Operational Rules

Operational rules directly affect the potential behaviour of fishers by setting out how, where, when and by whom resources may be harvested. In some situations these rules may simply ban the use of a particular gear; they may enact a temporary closure on a certain area of the fishing grounds, perhaps linked to some cultural event; or they may create a complex set of regulations limiting gears, areas, licence numbers etc. Operational rules are the easiest facet of the decision-making arrangements to describe and to change (although enforcement is usually a problem). From the view of both the stakeholders whose behaviour the rules seek to change, and from the manager who seeks a beneficial (or at least non-negative) outcome from the new rule, there needs to be some confidence that the rules will work. It should be noted that the objectives of action reported in this table are both those explicitly stated by the management authority (the Tui or his representatives) and implicit. By implicit we mean those objectives that are implied off the record or by other members of the community. Table 3 presents a range of the operational rules reported and observed at the size research sites in Fiji.

The first Naweni closure was declared in February, 1996 following the death of the Tui Naweni. The closure had therefore already been declared prior to the establishment of the fisheries monitoring programme for this research. This closure was not a conservation-based management activity. It was specifically related to the observance of the traditional protocol of paying respects to deceased members of the chiefly *mataqali* (the *vale levu* or lit: ‘the big house’). The objective of such closures are to ear-mark resources for a ceremony to pay final respects to the family of the deceased. The period of the closure was initially flexible but is traditionally determined by the Sau Turaga *mataqali* who are responsible for traditional etiquette. This first closure was originally declared for 12-months but was lifted after only 11-months (February, 1996 to December, 1996). The second closure (declared in July, 1997) lasted for a period of 12 months and was set following the death of the senior matriarch of the Naweni *vale levu*.

A range of locally defined regulations exist or until recently existed for Tavua *qoliqoli* and are also listed in Table 3. Not all of these regulations directly relate to the current research objectives either because they target resources not included in the fisheries monitoring programme (ie the ban on the exploitation of beche-de-mer) or because the regulation was no longer in force. (There presence in the table is warranted by way of exemplifying the types of rules applied by local management authorities). However a number of regulations that are currently relevant to fin-fish resource management are identified. Since 1990 there has been a ban, initiated by Fisheries Division, on fishing with set gill-nets at Tubalaloma. This was said to be targeted towards protecting fish migrating into the mangroves to spawn. Regulations limit the use of gill-nets to 20 per licence, were introduced in 1996. Each net is typically 50 metres long. This regulation was initiated by the Fisheries Division with the cooperation of the Tui Tavua. Further restrictions are planned.

Table 3 - The range of operational rules reported and observed at the six research sites

Site	Management Activity	Origin of Action	Objective of Action	Period of Operation
Naweni	1. Closed Area	Tui/ Community	Respect to family on death of Tui	February, 1996 to December, 1996
	2. Closed Area	Tui/ Community	Respect to chiefly family on death of matriarch	July, 1997 to July, 1998
Tacilevu	None	-	-	-
Tavua	Goodwill Payments	Tui	Effort Limitation / Revenue Generation	1997 Ongoing
	Closed Area	Tui	Conservation of resources	1996-1998
	Ban on set gill-nets across river mouths	Tui/Fisheries Division	Conservation of resources/ migratory species	1990 On-going
	Ban on fishing in Nakese River	Tui	Traditional Respect	1996
	Restriction of gill-net number to 20 per fisher	Tui/Fisheries Division	Conservation of resources	1996 On-going
	Unofficial - Access Restriction	Sub-sector of Vanua	Protection of local resources/ Rejection of Tui's Mandate	*ad hoc*
Vitogo	Goodwill Payment	Tui	Effort Restriction Option / Revenue Generation	1987? On-going
	Unofficial - Access Restriction	Sub-sector of Vanua	Protection of local resources/ Reaction against centralised Management	*ad hoc*
Verata	No commercial licences for non-Vanua	Tui & Community	Protection of Native Fishing Rights	1994 On-going

From 1986 to 1998 there was a closed area on the Manava Reef area around Manava Island. This forbids all fishing in the area. The motives for this closure were variously described as "for stock recovery" and to allow the implanting of giant clams in cooperation with the Fisheries Division. The Tui was reported to have regularly fished the reef around Manarva and had noted declines in mackerel (*Rastrelliger* spp) and mullet (Mugilidae). Closures originating out of cultural protocol tend to be placed on rivers. The ban on fishing in the Nasivi River was declared to honour the death of the Tui of the Nabuna yavusa. When an individual as high ranking as the Tui of Tavua dies it was not clear where the closure would be but it

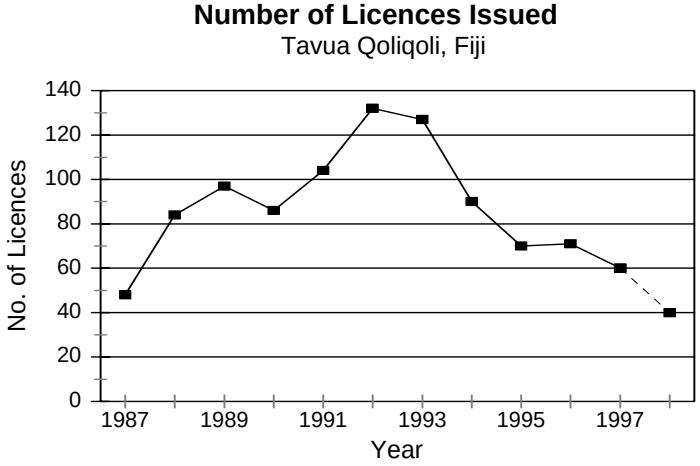
would also be "on some of the local rivers" (Sairusi, pers comm). It was also stated, interestingly, that they wouldn't put a closure on the sea "because to many people depend on it". The closure of Manava Reef would seem to contradict this claim!

Fishers can only obtain licences with the written permission of the Tui Tavua; permission can only be obtained through a cash payment, the so-called 'goodwill' fee. In fact, prior to 1996 there was no formal requirement to pay for this permission (Johan Khan, pers comm), although it was customary that a *sevusevu* be presented when requesting permission, usually in the form of a quantity of kava root. In 1996, a goodwill fee of F$50 was introduced by the Tui, the revenue generated to be used to assist in the building of a new school house. The rate for this "one-off" payment was apparently fixed by fishers themselves once the Tui had announced the need to have this contribution. Many fishers reported that they were happy to contribute to local development in this way but other sources in the area believed that this was essentially a goodwill payment, typical of other *qoliqoli*, but one that was introduced in a 'soft' way. Indeed, in 1998 the payment was still required although it had been reduced to F$30 (Sairusi, pers comm). The process by which a fisher obtains a licence is as follows, although there was some confusion about the process, with different versions of the process reported by some fishers. The fisher must pay the goodwill fee to the treasurer of the local fisheries committee who issue him with a receipt.

Following payment of the goodwill fee, the individual licencee then takes a receipt of payment and a prepared letter requesting permission to fish commercially, and (another) *sevusevu,* to the Tui Tavua's local representative who lives in the chiefly village of Tavualevu, located close to Tavua Town itself. The Tui's representative then takes all new requests and requests for renewal to Suva where the Tui resides. The letters are signed and taken back to the Fisheries office. The Fisheries officer then sends all the letters to the local district officer, the Roko Tui (Commissioner Western) to confirm that the signature of the Tui is genuine. The letters are then sent back to the Fisheries offices who then issue the licence (in exchange for small administrative fee of less than F$10).

Figure 7 below presents data on the number of licences issued for Tavua.

Figure 7 - The number of Licences Issued for Tavua Qoliqoli



There have been attempts by the Fisheries Division to work with the Tui Tavua to restrict the number of licences issued for the *qoliqoli* from the peak of 1992 when 132 licences were reported issued (Fisheries Division, pers comm). Data for 1998 is currently incomplete. On the face of it the licencing scheme has been successfully employed to reduce the fishing effort in Tavua *qoliqoli*. However, there appears a unanimously-held belief amongst both Fijian and Indo-Fijian stakeholders that the number of unlicenced vessels operating in the *qoliqoli* is actually around 100-150 with one individual reporting that there were 300 vessels operating in Tavua. Even amongst members of the Fisheries Committee there was doubt about the number of licenced fishers with one member believing it was 150 (as opposed to the 60 that were actually licenced at the time of the interview).

There are no official local regulations defined for Vitogo/Vidilo *qoliqoli* with the exception of the goodwill payments required to obtain a letter of consent for a licence. In Vitogo/Vidilo *qoliqoli* a total of seventy-one licences were recorded in the Fisheries Department database (Fisheries Department data) for 1998, up from 42 in 1996. Of these licences, eight were issued to native Fijians. Of the remaining licences, fifty-seven were issued to Indo-Fijians for Vitogo/Vidilo qoliqoli only, and six were issued that covered Vitogo/Vidilo and one other *qoliqoli* (Waya (1), Vuda (1), Naviti (1), Viwa (2) and Malolo (1)). Those fishers licenced for Vitogo/Vidilo *qoliqoli* should theoretically restrict their effort to that *qoliqoli* only but as reported in the Outcomes section they do not. Unofficial regulatory behaviour has been reported from communities around Lautoka and to the north.

In 1994, the Tui of the Vanua Verata requested Fisheries Division to undertake a resource assessment of the Verata *qoliqoli*. As a direct result of that assessment and with pressure exerted by Fijian stakeholders all commercial gill-net fishing was banned in Verata in 1994. In 1995, Fijians were once again granted commercial access but licences have not been issued to Indo-Fijians since 1994. No commercial licences were reported from Ucunivanua village during interviews. For Cautata *qoliqoli* there is also a ban on licensing of non-local commercial fishers.

1.2 Outcomes

1.2.1 Equity of Outcomes

The analysis of equity seeks to determine whether a significant proportion of stakeholders are receiving a '...reasonable and fair return on their contribution to a collective undertaking that regulates behaviour.' (Oakerson p.52, 1992). At the research sites we are discussing in this document the 'collective undertaking' is the management system of the qoliqoli which itself is nested within the national management policy declared by the Fisheries Division. To determined whether 'a fair and reasonable return' is being enjoyed by stakeholders analysis should investigate the presence of asymmetries in the exploitation of resources and the presence of asymmetries in the application, or the effect of the application, of the management regulations. Clearly these potential asymmetries may be related through a cause-effect relationship. For example regulations unfairly applied to a sector of the stakeholder community may result in the affected group experiencing a reduced capacity to harvest marine resources.

1.2.1.1 Equity of Access to Marine Space

The use of marine space by fishers was recorded by data collectors on maps of the fishing grounds. These data were then entered in to a geographical information system (GIS) (Map-

X™; Mapinfo *Professional*™). Each location entered onto the computer-generated map picked up a geographical position (latitude and longitude). These positional data were then attributed data on catch, effort, gear-type etc using a unique trip identifier in a Microsoft Access™ database using an ODBC link to export/import the GIS data.

The Naweni traditional closure applies universally across the community. As members of the tribal unit that suffered the loss of their Tui all bore the duty to pay their respects in the traditional manner. Fishing effort was recorded in this area *only* during the period the restriction was lifted. Within the constraints established by the management authority in relation to the closed area, effort was generally concentrated in two main locations to the west of the village (and within 1 kilometre of shore). These locations are within the limits of the protected waters of the lagoon and the lagoon channel. There was little differentiation in the distribution of effort by gear-type. Figure 8 displays the location of fishing effort across the period of monitoring.

In Tacilevu effort was more widely distributed across the *qoliqoli* but again was generally restricted to inside the lagoon and the lagoon channel. This wider distribution was also recorded for the three main gear-types (see Figure 9). No data was collected that indicated that fishers from either Naweni or Tacilevu fished outside the Naweni *qoliqoli*. However, fishers from Tacilevu did report that they occasionally fished in the channel at the border with neighbouring Vunilagi *qoliqoli* to the east of Tacilevu. Within the wider Naweni *qoliqoli*, Tacilevu fishers did fish in waters that are nominally reserved for fishers from Naweni village (eg. Apenisa Botilagi, pers comm; Maria Draulele, pers comm). Similarly, Tacilevu spear-fishers reported that they also fished in Nasavusavu *qoliqoli*, further to the west of Naweni *qoliqoli* (Rusiate Bolatoga, pers comm) in the waters of Nagigi village. For this access permission was requested of the Tui Nagigi although this done as much as a courtesy as a pre-requirement for access.

At both Naweni and Tacilevu there was no evidence of any restriction (apart from that related to the closures) on the access enjoyed by any sector within the community. The only caveat to this is the potential restriction of access bought about by economic (lack of adequate funds to pay for specific gears, or time on a fishing boat) or physical (age, health etc) disadvantage. However, analysis of GIS data did not reveal any clear pattern in the location of fishing activities related to age or gender.

Analysis of GIS data indicates that the use of marine space in Tavua is not uniform across the stakeholder group. It is generally acknowledged that fishers operating from the eastern landing sites (Korovou, Rabulu, Kavoli) typically only fish for one night and in the inshore reef areas (eg. Johan Khan, pers com; Felix Poni, pers obs). The mean fishing time recorded (not total man-hours) at these sites ranged from 10.2 to 14.4 hours, one night's fishing. Of the 92 fishing trips from these landing sites where GIS information was recorded only 2 (2.2%) were recorded from outer reef area and only 11 (12%) were recorded west of Cakau Drala. These data are presented in Figure 10. For these fishers the choice of location of fishing was not apparently determined by any constraint related to the 'collective undertaking' of management. The fishers acquired letters of consent from the Tui and licences from the Fisheries Division in the normal manner but chose their fishing grounds freely.

The spatial resolution of the data for Tavua indicates that fishing trips contained a component of effort spent inside Tavua qoliqoli. The exploitation of fishing grounds in Rakiraki *qoliqoli* indicated inequity not for Tavua fishers but for the stakeholders of Rakiraki.

Figure 8 - Location of Fishing Trips by Tacilevu Fishers, Vanua Levu

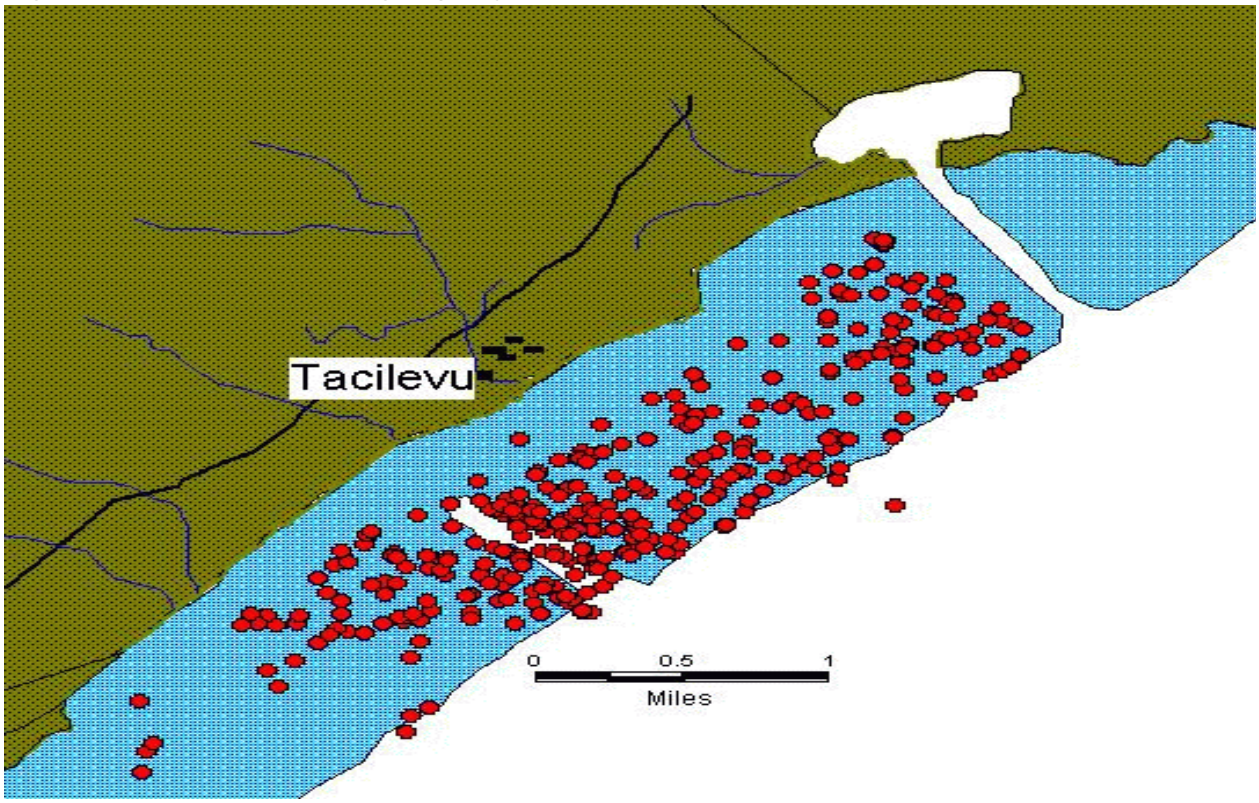
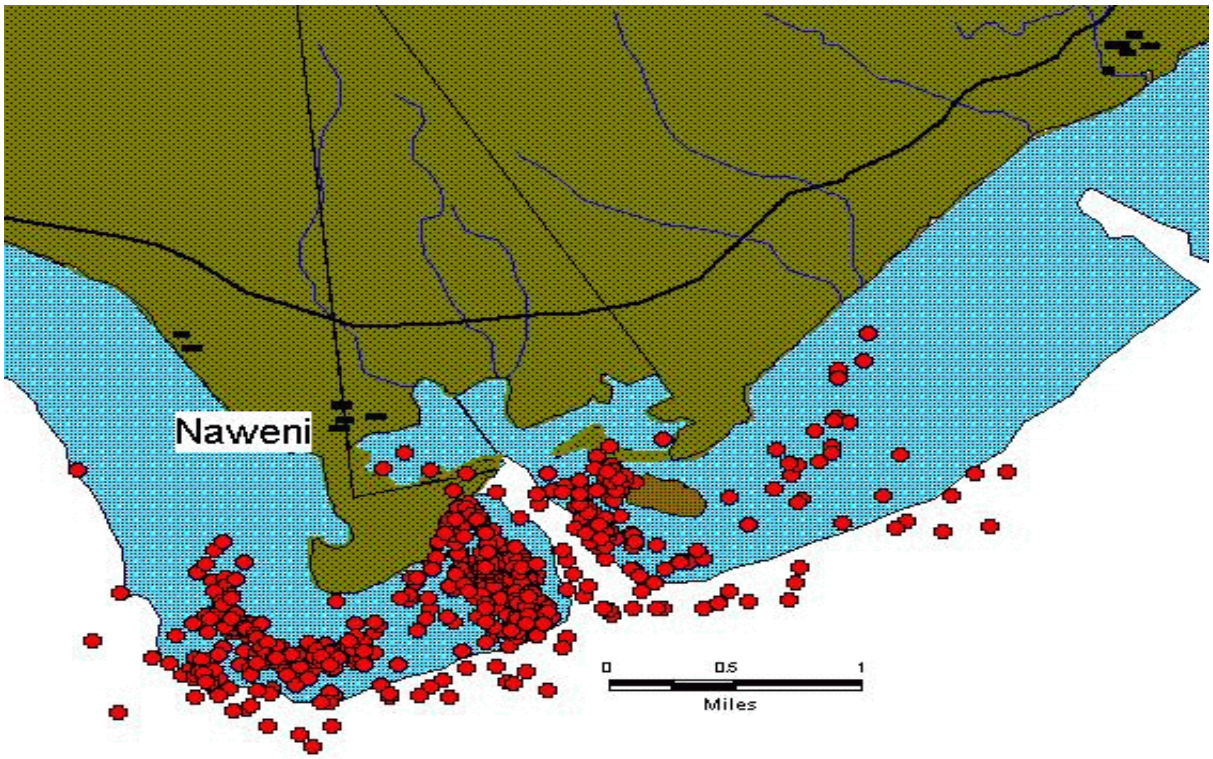


Figure 9 - Location of fishing trips by Naweni Fishers, Vanua Levu



At the western end of the *qoliqoli* the mean fishing time for boats operating out of Vatutavui and Lausa were 21 and 23 hours respectively which spans a minimum of two night's fishing. Of the 140 fishing trips recorded with GIS information from these landing sites just 25 (17.9%) were recorded from the inner reef area and of these only 4 were recorded on or east of Cakau Drala. Figure 11 presents data on the location of fishing effort by vessels operating out of Vatutavui landing site clearly displaying the concentration of fishing effort in the outer reef area of Tavua *qoliqoli*.

Because the majority of recorded effort was for handline only, there is no data available to determine any spatial variation in the distribution of effort by particular gear. The majority of the subsistence effort is directed at the inner zone (Timoci Tavusa, pers comm) but catch/effort data on this component of the fishery was not collected due to logistical and financial constraints.

In Vitogo analysis of the GIS data indicated that Vitogo/Vidilo licenced vessels actually fished across at least eleven *qoliqoli*. (See Figure 12).

Figure 10 - The location of fishing effort by vessels operating from Korovou, Rabulu and Kavoli landing sites, Tavua *qoliqoli*

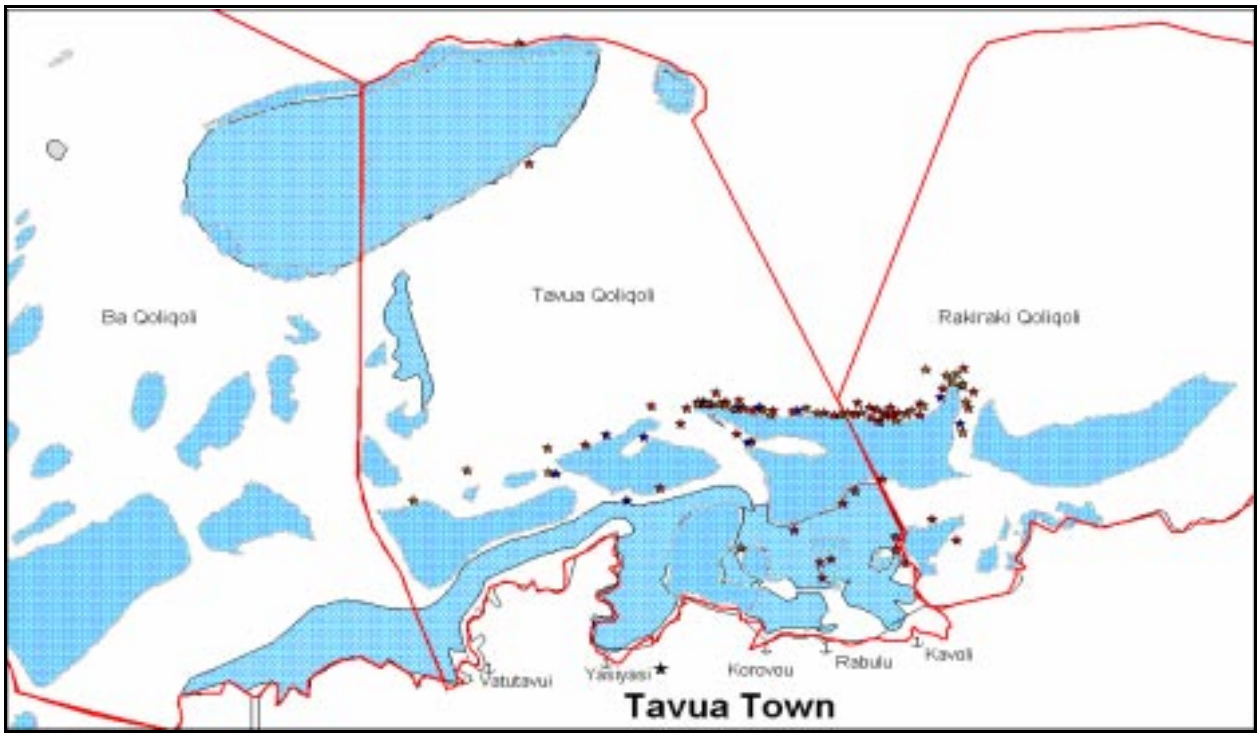


Figure 11 - The location of fishing effort by vessels operating from Vatutavui landing site, Tavua qoliqoli

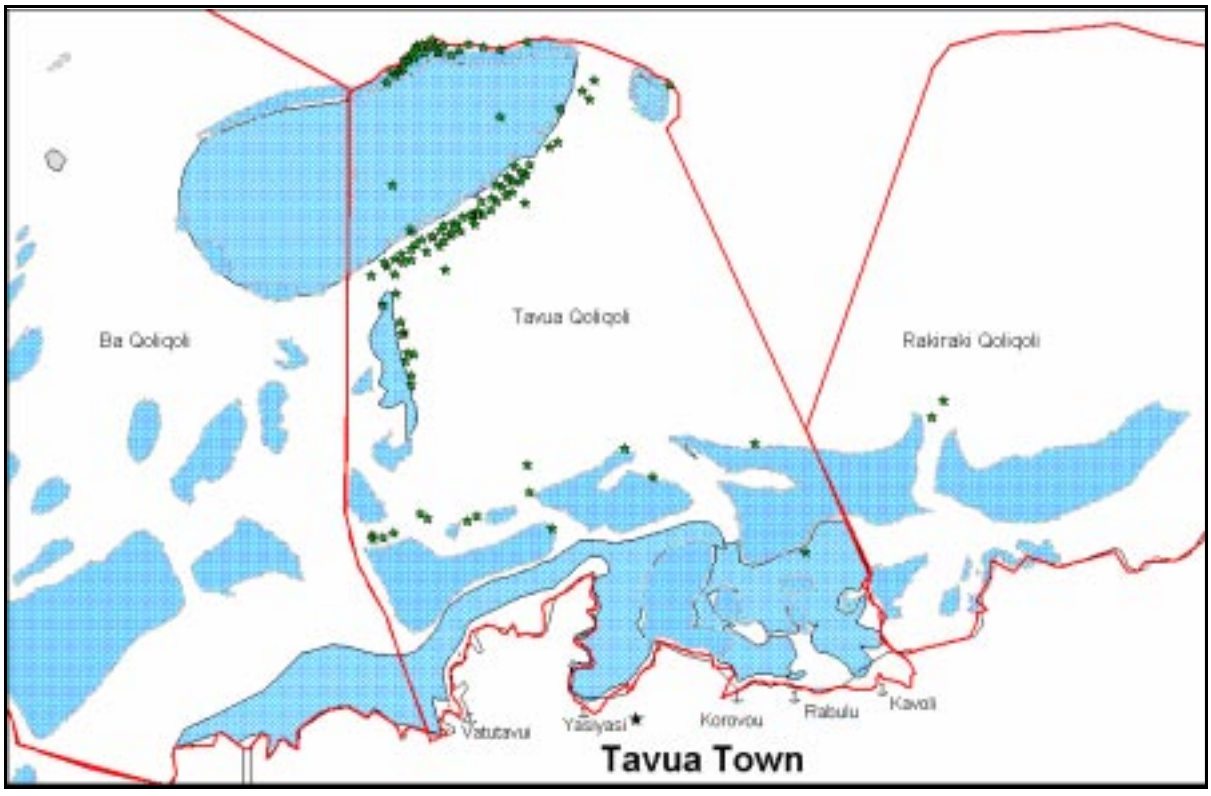
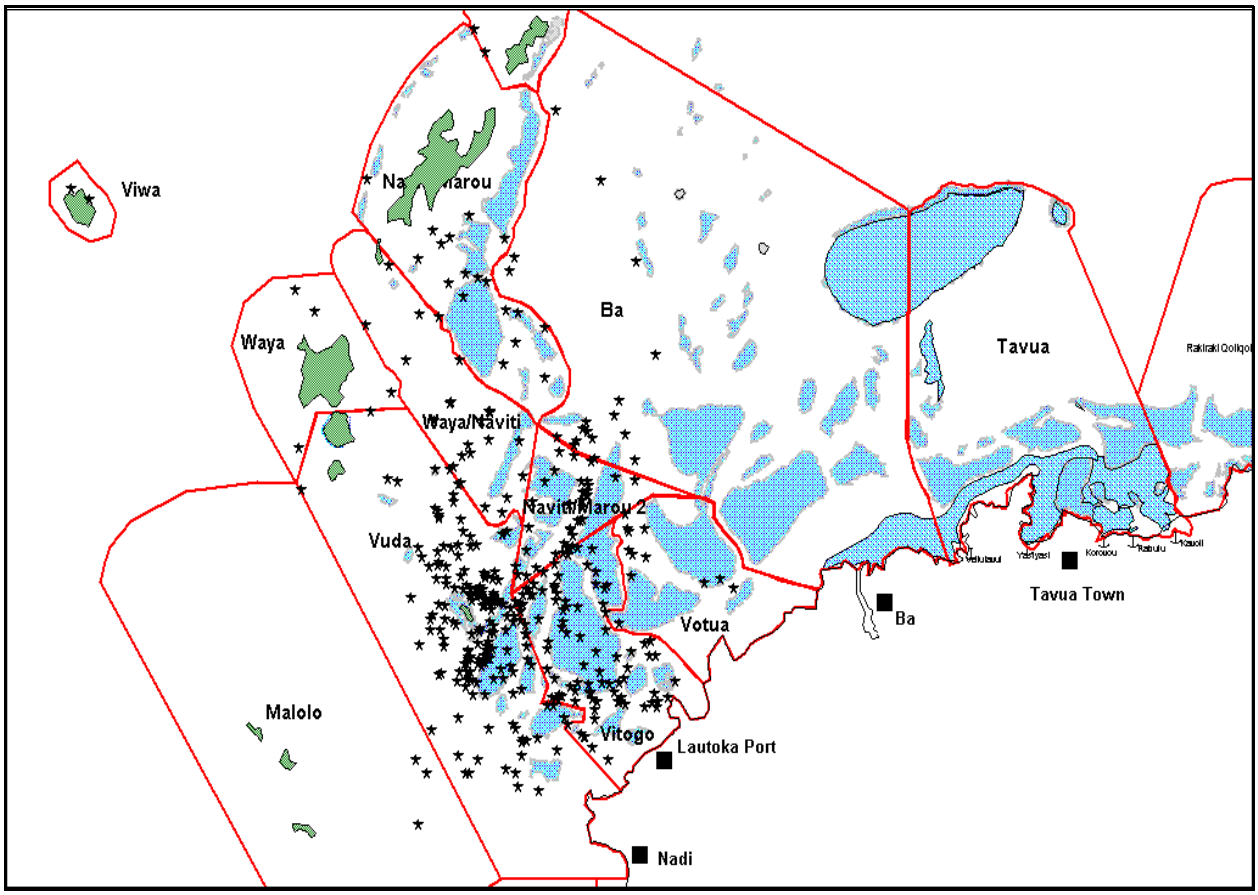


Figure 12 - The location of fishing effort by vessels licenced for Vitogo/Vidilo *qoliqoli* only



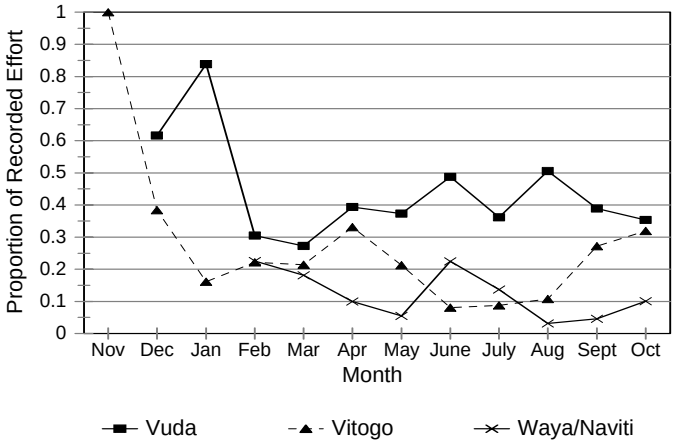
The majority of this effort was located in Vuda *qoliqoli* which lies to the south and west of Vitogo/Vidilo *qoliqoli.* In 1998 in Vuda *qoliqoli* forty-five licences were issued (independently of Vitogo/Vidilo) to fish Vuda waters. Through the period of monitoring the proportion of monthly fishing effort recorded inside Vitogo/Vidilo itself varied from 15% to 40%. Overall, fishers licenced for Vitogo/Vidilo *qoliqoli* only expended only 21% of their effort in Vitogo/Vidilo over the period of monitoring and 42% in Vuda. Table 4 presents the breakdown of effort by *qoliqoli* for vessels licenced only for Vitogo/Vidilo.

Table 4 - The distribution of effort recorded by fishers licenced for Vitogo/Vidilo *qoliqoli* only

Qoliqoli	Percentage of Recorded Fishing Effort
Malolo	1 %
Vuda	**41 %**
Waya	1 %
Viwa	1 %
Vitogo/Vidilo	**21 %**
Votua	3 %
Naviti-Marou 2	**8 %**
Waya-Naviti	**11 %**
Naviti-Marou	5 %
Ba	5 %
Yasawa	1 %
Unrecorded	2 %

Further analysis of the distribution of fishing effort through time is presented in Figure13.

Figure 14 - Distribution of fishing effort (by month) for vessels licenced only for Vitogo/Vidilo



Fishing effort is concentrated in the two qoliqoli of Vuda and Vitogo/Vidilo during the wet season period of November through January. Effort is then more equally distributed amongst

the three *qoliqoli* during the late wet season (Feb-March) before concentrating once more in Vuda and Vitogo/Vidilo. There is a small peak of effort in Waya/Naviti in June and during this period of the dry season the majority of fishing effort is concentrated in Vuda. Effort in Vitogo/Vidilo rises once again in September and October. Analysis of the GIS data recorded from Ucunivanua village in Verata qoliqoli indicated that fishers utilised Verata and four of the neighbouring *qoliqoli*. (See Figure 14).

The relative contribution of Verata and adjacent *qoliqoli* is represented in tabular form below in Table 5. Although Verata, the 'home' *qoliqoli* of the fishers from Ucunivanua experienced the majority of effort, significant effort was also recorded for Kubuna (35%) and Viwa (14%).

Table 5 - The distribution of effort recorded for fishers from Ucunivanua, Verata qoliqoli

Qoliqoli	Percentage of Recorded Fishing Effort
Verata/Namena	2 %
Namalata	2 %
Verata	46 %
Kubuna	35 %
Viwa	14 %

Further analysis of the use of marine space by fishers related to the use of different fishing gears indicated that fishing with gill-net and handline was concentrated in the inshore area of Verata *qoliqoli*, close to Ucunivanua village itself and in Viwa *qoliqoli*. Figure 15 presents GIS data for the use of gill-nets by fishers from Ucunivanua village.

The location of fishing effort by fishers utilising spear-guns was more widespread and extended into Kubuna *qoliqoli*. These data are presented in Figure 16.

In Verata there was no evidence of any restriction on the access enjoyed by any sector within the community of (indigenous Fijian) stakeholders. The extent to which fishers operated outside the fishing ground to which they claim traditional access rights was significant. Respondents indicated that fishers from Kubuna and Viwa did not fish in their grounds although there was no evidence collected during this research that could verify or refute this.

In Cautata only 37 (24%) of the 157 fishing trips that recorded the location of fishing were located inside the Cautata qoliqoli boundary as defined by the Native Fisheries Commission. The remaining fishing trips were recorded from Kubuna qoliqoli. However, the Tui claimed that the existing boundary was inaccurate and that the true area of Cautata was somewhat larger. If the original boundary is used, 43% of the recorded fishing trips were prosecuted in Cautata waters. Figure 17 presents the distribution of fishing effort by Cautata fishers. The dashed boundary represents the area claimed by the Tui of Cautata.

Figure14 - The distribution of fishing effort by fishers from Ucunivanua village, Verata *qoliqoli*

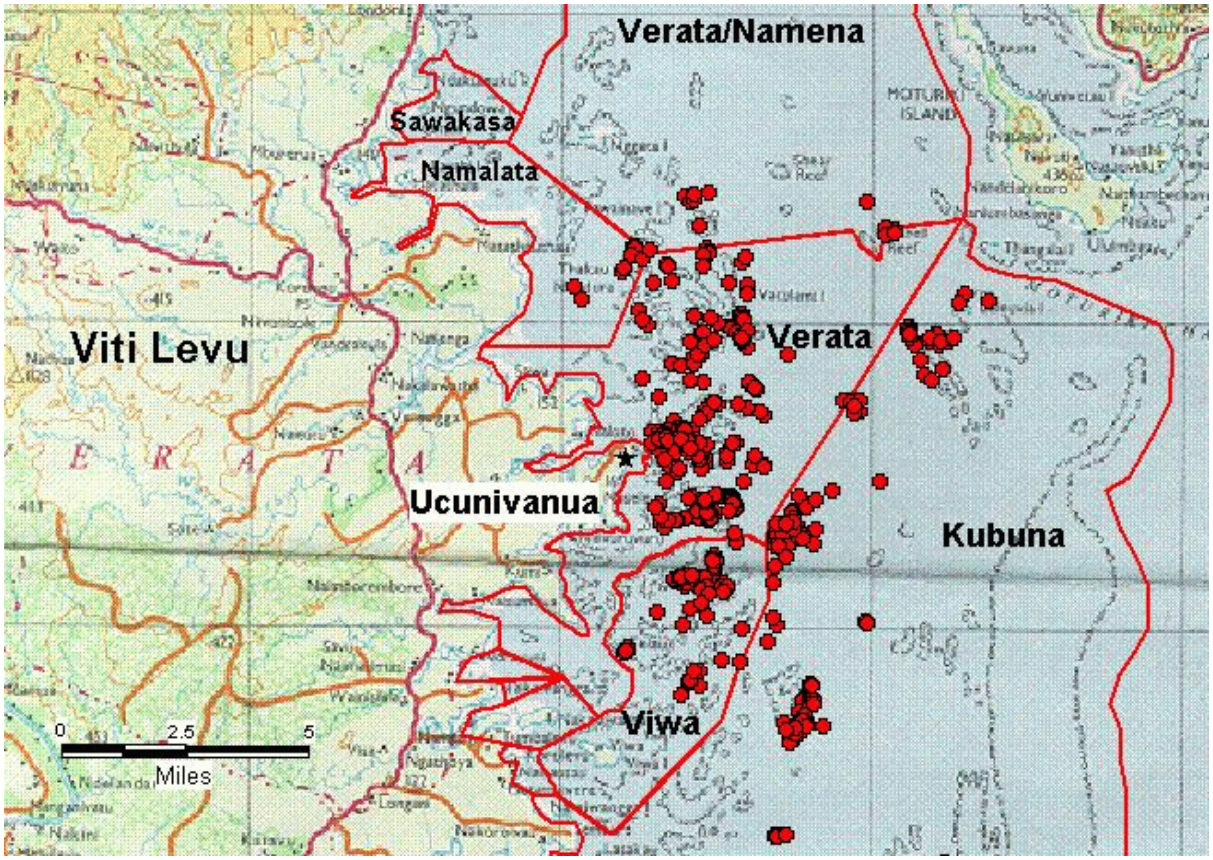


Figure 15 - Location of fishing trips by gill-net fishers

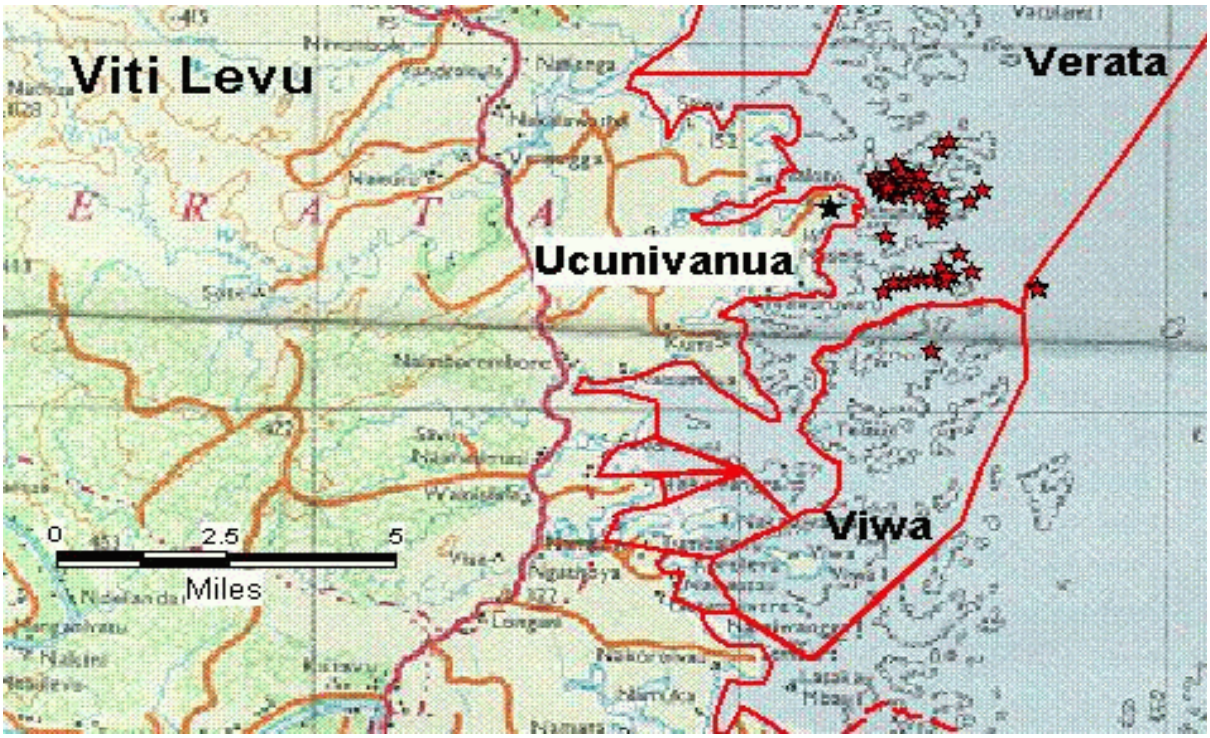


Figure 16 - Location of fishing trips by spear-gun fishers

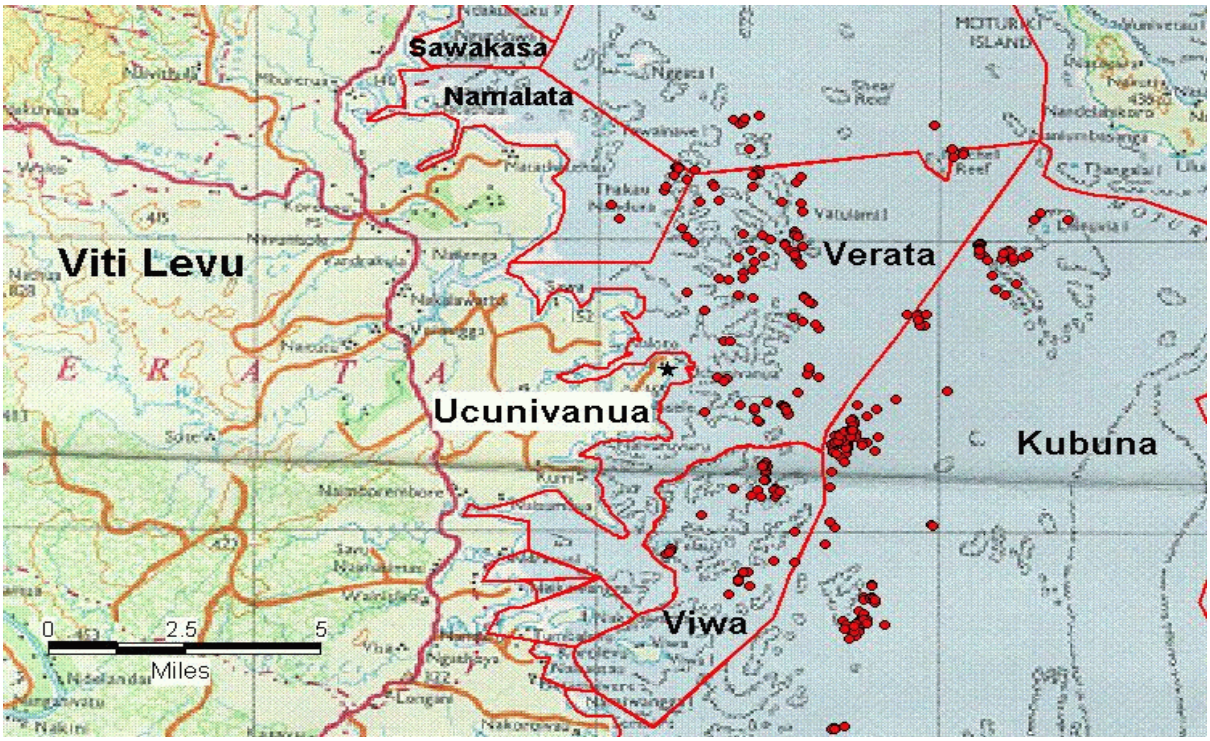
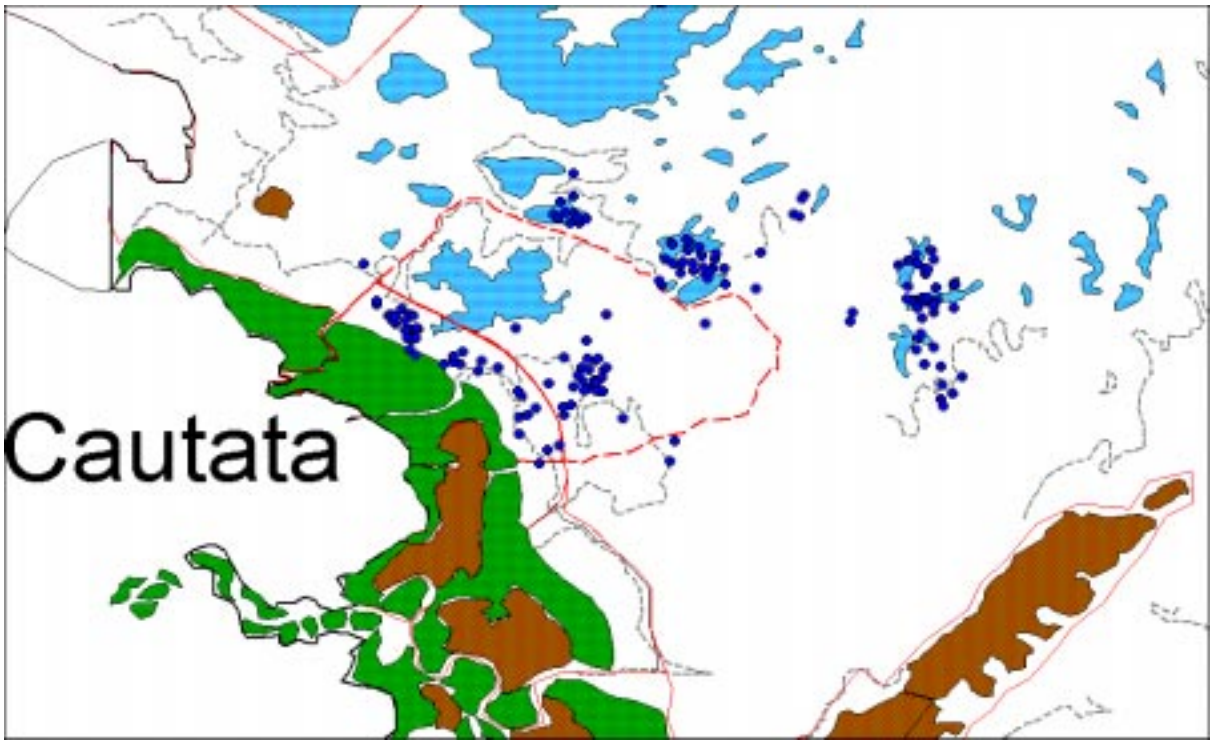


Figure 17 - The location of fishing effort by fishers from Cautata *Qoliqoli*



1.2.1.2 Efficiency and Equity of Licensing

In 1996 there were ten licences held by Naweni fishers and eleven by Tacilevu fishers. In 1998 there were 8 licences issued for Naweni and 5 in Tacilevu. Licencing is used as a means by which fishers can sell their catch legally in the market. However, 90% of those interviewed in the two communities reported that they fished commercially during the year. They indicated that they used a licenced individual to sell their catch at the market in the town of Savusavu or to a private fish trading company, Cakaudrove Fish, in Savusavu. Other private outlets were also reported (eg. hotels, restaurants etc). Section 1.5 (3) of the Fisheries Act (Cap.158. Rev 1985) states that :

'No person shall take fish in Fiji fisheries waters by way of trade or business or as an employee of a person carrying on the trade or business of a fisherman unless such a person is authorised by a licence to take fish'.

Although technically illegal the use by unlicenced fishers of 'middlemen' is not inequitous within the community. However the fact that so many fishers utilise a single commercial licence is inefficient because of the false impression this gives the Fisheries Division who may be called to advise local custodians on management and in the absence of other sources of data would rely on licence numbers as an indicator of the level of commercial fishing activity. Market-based monitoring of catches would also be heavily biased if the assumption was made that the individual selling the catch was also the individual responsible for its capture.

In Tavua the numbers of licences registered with the Fisheries Division has declined since a peak in 1992 of 132 to 60 in 1997 and 40 in 1998. In 1997 37 licences were issued to Indo-Fijians, 22 to Fijians and 1 to an Australian expatriate (Fisheries Division, Suva, pers comm). However the precise numbers are open to some interpretation with respondents reporting as many as 100 licenced vessels in 1998. Illegal fishing was known to the Fisheries officer in Tavua *qoliqoli* whose approach was to encourage Fijians to buy a licence but not to prosecute them if they did not (Joe Radrodro, pers comm). This is clearly an inequitous situation as far as the Indo-Fijians are concerned as much as it is inefficient from the perspective of resource management. The inequity is further deepened for Indo-Fijians by the fact that it is only they who are requested to contribute in kind to Fijian community events, such as the wedding of the Tui's daughter (various pers comm).

In Vitogo/Vidilo 61 licences were issued in 1997 and 71 licences in 1998. Of these 11 in 1997 and only 8 in 1998 were issued to native Fijians. For the remaining 63, issued to Indo-Fijian fishers, goodwill payments were required to secure the written consent of the Tui for the licence to be issued by the Fisheries Department. The level of this goodwill was not a fixed sum universally applied to all applicants but was determined in an reportedly arbitrary manner (*turaga-ni-koro*, Naviyago Village, Vitogo; pers comm). The tariff charged ranged from a payment in kind of a *sevusevu* (a traditional gift) of yaqona, cash payments of F$20 plus a *sevusevu* through to F$100 plus *sevusevu*. The cash component of the goodwilll payments were reported not to be asked of native Fijians (various, pers comm). The majority of Indo-Fijian fishers reported that the choice of *qoliqoli* to buy access to was not based on the expected returns from a particular *qoliqoli* but were based on the cost of the goodwill payment. Not surprisingly however, the choice of the location of fishing effort *was* based on expected returns. The Indo-Fijian fishing community is therefore clearly abusing the licencing system in the Western Division. This again is inefficient, giving a completely false impression to both traditional and Government management authorities of the success of current

management in Vitogo/Vidilo.

In Verata, the decision taken by the management authorities to restrict commercial fishing to members of the vanua is entirely within the law. Section 13 (2) of the Fisheries Act states that:

'The grant of a permit shall be in the discretion of [the relevant District] Commissioner who shall consult the Fisheries Officer *and the subdivision of the Fijian people whose fishing rights may be affected thereby*, prior to granting the same.' (my emphasis)

From the perspective of the traditional rights holders, the decision appears a sensible and rationale one. The Fijian communities in Verata (there are no Indo-Fijian communities on the coast of Verata *qoliqoli*), sought to invoke a precautionary approach to resource conversation as well as to maximise their own share of the resource rent. In addition the lack of an Indo-Fijian community within the immediate area suggests that, on a local scale at least, Indo-Fijians could not legitimately claim to be stakeholders. Although the decision to restrict commercial fishing to members of the vanua was based on a fishery-independent underwater visual census (Fiji Fisheries Division, 1994) the failure of individuals who are fishing commercially to obtain a licence does not help in gaining an understanding of either the level of resource exploitation (in the absence of a monitoring programme) in the *qoliqoli* or the economic contribution of fisheries to the community. This may affect State investment in community development in general and fisheries development in particular. The use of adjacent *qoliqoli* by fishers from Verata (the extent of which can only be determined by monitoring) may also promote misinterpretation of the status of resources in Verata *qoliqoli* itself.

There were no licences issued to non-native fishers for Cautata *qoliqoli*. In fact, local fishers undertake their own surveillance to prevent unauthorised access to other fishers. With both Verata and Cautata the question of whether the use of adjacent *qoliqoli* for commercial fishing activities as well as subsistence fishing is inequitous is a difficult one because of the traditional relationships between the *vanua* of the region. However, the equity could be more easily identified if the arrangement was conspicuously reciprocal but no evidence was gathered of a working reciprocity between these qoliqoli and neighbouring qoliqoli especially Kubuna which bears the brunt of the trans-boundary fishing by fishers from Cautata and Verata *qoliqoli*.

Summary Equity Outcomes*

Site	Summary of Outcomes - Equity					
	Equity of Access - Fijians	Equity of Access - Indo-Fijians	Licensing System Honoured - Fijians	Licensing System Honoured - Indo-Fijians	Poaching	Trans-boundary Fishing - Fijians
Naweni	✔	-	✔✗	-	-	✗
Tacilevu	✔	-	✔✗	-	-	✔
Tavua	✔	✗	✔✗	✔✗	✔	✔
Vitogo/Vidilo	✔	✗	✔✗	✔✗	✔	✔
Verata	✔	✗	✗	-	-	✔
Cautata	✔	✗	✗	-	-	✔

* The ✔ symbol indicates the presence of each particular outcome; ✗ indicates that a particular outcome was not observed at the site in question. The ✔✗ symbols together indicate that the particular outcome was observed, but not universally at the site.

1.2.2 Fishery Outcomes

1.2.2.1 Summary of Fishing Activities

Table 6 presents data on the use of gear as recorded from sampled fishing trips (where gear was recorded).

Table 6 - Use of Fishing Gears (Percentage)

Fishing Gear	Percentage of Effort (Trip Numbers) by Gear-type					
	Naweni (n=785)	**Tacilevu (n=750)**	**Tavua* (n=311)**	**Vitogo/Vidilo* (n=556)**	**Verata (n=1195)**	**Cautata (n=230)**
Gillnet	40	34	2	1	14	23
Handline	40	33	91	98	19	33
Speargun	18	30	1	1	67	13
Fish Fence						30

* At these two sites the focus of data collection was on the commercial fishery which is predominantly prosecuted by Indo-Fijians using handlines. See Volume 1 for details on survey design and selection criteria.

Recorded fishing effort at Naweni was approximately equally distributed amongst gill-net and handline with 18% of effort prosecuted with spear-guns. At the adjacent site of Tacilevu the distribution was more equal amongst the three gears with gill-net comprising 36%, handline 34% and spear-gun 30%. The majority of fishing effort at both these sites is undertaken without the use of fishing vessels.

Tavua and Vitogo/Vidilo are commercially well-developed sites. The recorded fishing effort was clearly dominated by handlines. Fisheries monitoring at these two sites was focused on the commercial sector of the fishery and there was no data collected for artisanal fishing activities by coastal communities. Personal observations (J. Anderson) and data gathered during rural appraisals indicates that artisanal fishing is dominated by trapping (for crabs), gill-net and spear-gun fishing. In Vitogo/Vidilo native Fijian artisanal fishing is dominated by spear-fishing (Suresh Chand, pers comm).

At the third predominantly artisanal and small-scale commercial site, Ucunivanua, fishing effort is dominated by spear-guns (67%) with gill-nets contributing 14% of recorded effort and handline 19%. Within each gear-type there was a distinct relationship between gender and fishing gear with women concentrating their effort on handline fishing and men on spear and gill-net fishing. In Cautata fishing effort appears to be more equally spread amongst three principle gear-types, handline, gill-net and fish fence. Spear fishing is less important than

was reported from Ucunivanua village.

1.2.2.2 Illegal Fishing Gears

The two most common illegal fishing gears reported during rural appraisal interviews were natural poisons and dynamite. Fishers utilise poisons (plants of the genus *Barringtonia*, *Derris*, *Euphorbia*, *Pittosporum* or *Tephrosia*) in shallow tidal pools to capture small fish and invertebrates. No data was collected on the characteristics of the catches obtained from the use of poisons. The use of dynamite is largely restricted to the Western Division, in particular in Tavua, Ba and the fishing grounds to the west of Lautoka City. The Vatukola Gold mine in the interior to the south of Tavua Town is universally recognised as the source of the dynamite which is smuggled out of the mine by workers and security men (Joe Radrodro pers comm; Suresh Chand pers comm). A 'set' of dynamite costs a fisherman around F$10 but can produce F$200 worth of fish in a matter of hours. Charges are set in waters of generally less than 10 metres depth and may detonate on the bottom or in mid-water. One dynamite fisherman reported that he used dynamite both in estuary areas and over (and even in) the reef. Data generated during the rural appraisals reported that 55% of 36 licenced fishers interviewed believed the use of dynamite was common, estimates for the prevalence of dynamite use ranged from 35 to 75 percent of all fishermen. One senior member of the management authority reported that as many as 100 (licenced and unlicenced) boats utilise dynamite (Ratu Ovini Bokini, pers comm). Because the use of dynamite is illegal surveillance (and control) of dynamite fishing is very difficult. Those fishers using dynamite report that their primary target species is Salala (*Rastrelliger* sp.) but numerous species are taken as by-catch, typically small and immature individuals of coral-reef species (anon, pers comm). Physical damage of the reef structure also results from blast fishing (J. Anderson pers obs). Dynamite fishing appears to be almost endemic in Tavua *qoliqoli*. In Vitogo/Vidilo and surrounding *qoliqoli* dynamite fishing is reported to be prevalent with 71% of (Vitogo/Vidilo) licenced fishers reporting that they had witnessed dynamite fishing. All Vitogo/Vidilo fishers reported that those using dynamite were travelling over from Ba *qoliqoli*. The method allegedly employed by the dynamite fishers was to anchor a buoy and set off the charge. They would leave the area immediately to avoid any patrols alerted by the explosion but return after a short period to the buoy collect the dynamited fish. Local fishers reported that their boats were equipped with either twin 40hp or single 70hp outboard engines to evade capture, most fishing boats operate with single 40hp outboards only. Estimates of the numbers of boats involved ranged from seven to fifty but these figures were not independently verified.

1.2.3 Yields by Qoliqoli and Family

The following three sections present summary data on the catch composition, by family, of the sampled fishing trips for which GIS data was recorded. Data are presented as total weights for each management area and percentage contribution of these families to the total sampled catch.

1.2.3.1 Western Division Research Sites

Table 7 presents data on the sample catch from Vitogo (and adjacent *qolioli*) and from Tavua. The data for Vitogo and adjacent *qoliqoli* relates onto the catch reported from fishers licenced to fish inside Vitogo *qoliqoli* only. All data from the adjacent *qoliqoli* therefore represents illegal fishing activity by these fishers. These fishers do not operate in Tavua.

Table 7 - Sampled catch by Family for Vitogo Licenced Vessels and Tavua Licenced Vessels, Western Division.

Family	Percentage of Total Sampled Catch by Qoliqoli/Family				
	Vuda (20.7mt)	**Vitogo /Vidilo (5.6mt)**	**Naviti /Marou 2 (2.4mt)**	**Waya /Naviti (2.4mt)**	**Tavua (33.4mt)**
Lethrinidae	11	31	28	24	29
Scombridae	51	19	27	25	5
Sphyraenidae	13	20	17	15	16
Lutjanidae	7	7	10	12	18
Epinephelini	6	6	5	14	20
Carangidae	12	13	10	9	6

Within Tavua *qoliqoli* there are two distinct habitats, the inner reef area and that large patch reef of Cakau Levu close to the sea-ward boundary of the fishing rights area. Table 8 presents comparative data on the catch composition between these two subareas of the *qoliqoli*.

Table 8 - Catch composition from the outer and inner reef areas of Tavua Qoliqoli

Family	Percentage of Total Sampled Catch by Zone/Family	
	Tavua Inner Reef (12.7mt)	**Tavua Outer Reef (20.7mt)**
Lethrinidae	34	27
Lutjanidae	19	18
Sphyraenidae	16	17
Epinephelini	8	28
Scombridae	6	5
Carangidae	6	5
Siganidae	3	-
Belonidae	3	-

1.2.3.2 Northern Division Research Sites (Naweni and Tacilevu)

Table 9 - Catch composition (%) from Naweni and Tacilevu Communities, Naweni Qoliqoli

Family	**Percentage of Total Sampled Catch by Qoliqoli/Family**		
	Naweni (3.2mt)	**Naweni MPA (0.6mt)**	**Tacilevu (1.9mt)**
Lethrinidae	10	40	27
Scaridae	43	15	14
Mullidae	9	4	12
Acanthuridae	7	7	4
Mugilidae	1	4	19
Lutjanidae	8	3	8
Epinephelini	8	3	6
Carangidae	2	10	1
Labridae	3	5	3
Siganidae	3	2	6

1.2.3.3 Central Division Research Sites (Verata and adjacent *qoliqoli*)

Because of problems in data collection at Verata, particularly during the early period of sampling there are substantial gaps in the time series of GIS data. For this reason Table 10 presents data on the *total* sampled catch for fishers from Ucunivanua village, including the data for catches the location of which is unknown such as that which was taken from adjacent *qoliqoli*.

Table 10 - Catch composition for fishers from Ucunivanua Village, Verata *Qoliqoli*

Family	Percentage of Total Sampled Catch
	Verata (7.9mt)
Lethrinidae	28
Epinephelini	11
Acanthuridae	10
Scaridae	9
Siganidae	7
Lutjanidae	7
Mullidae	5
Haemulidae	5
Carangidae	4
Belonidae	2

Data for catches where GIS information was recorded (hence the *qoliqoli* in which it was caught) is presented, by *qoliqoli* in which it was caught, in Table 11.

Table 11 - Catch compositions (%) for Ucunivanua fishers in Verata and adjacent *qoliqoli*

Family	Percentage of Total Sampled Catch by Qoliqoli*		
	Verata (1.9mt)	Viwa (E) (0.4mt)	Kubuna (0.8mt)
Lethrinidae	38	44	11
Epinephelini	7	7	25
Acanthuridae	4	17	13
Scaridae	5	9	17
Siganidae	5	10	12
Lutjanidae	9	3	4
Carangidae	10		1

Equivalent data for Cautata *qoliqoli* fishers in Table12. Reference to this table indicates that of the 6.4mt of catch sampled, 83% (5.3mt) was recorded as having been taken from the adjacent Kubuna *qoliqoli* rather than Cautata itself.

Table 12 - Catch compositions (%) for Cautata fishers in Cautata and adjacent *qoliqoli*

Family	Cautata (1.1mt)	Kubuna (5.3mt)
Siganidae	38	44
Mugilidae	74	16
Lethrinidae	4	28
Lutjanidae	5	6
Carangidae	7	4
Belonidae	-	4

* Presents percentage data for main families only

1.2.4 Summary biological outcomes

This section summarises the results of biological analyses for Fiji presented in more detail in Volume 3. These analyses aimed to assess the status of fishery resources inside managed areas and draw conclusions on management success. Management success was examined across a range of fishing pressures at different sites. Underwater Visual Census (UVC) and fisheries monitoring programmes were conducted in order to derive data enabling investigation of the effects of fishing, and how management actions have moderated those effects. Comparisons were made between closed areas, areas with restricted access and areas with unrestricted licencing, and variables examined were correlated with fishing pressure.

1.2.4.1 Summary results of Underwater Visual Census studies

Underwater Visual Census (UVC) was employed to examine:

1. Basic habitat characteristics;
2. Species and family abundance, and species assemblages;
3. Species length differences.

Table 13 presents a summary of these analyses. For more detail refer to Volume 3.

Table 13 - Summary of Results of Underwater Visual Census (UVC) Studies in Fiji

1. Habitat characteristics - Results
Within sites, habitat characteristics were similar, and tabu areas were not different from open access areas
Between sites, areas differed. Tacilevu was different from all others
2. Abundance and Species Assemblages - Results **Multivariate analyses with MDS and ANOSIM**
Within sites no significant differences were observed by area or dive site in species assemblage or abundance, except for Tavua inshore reefs (121) which had significantly greater biomass than offshore reefs. Across sites significant differences occurred between areas, and between commercial versus semi commercial sites. No significant differences occurred between closed area 201T (Naweni) and unrestricted areas 20/21 (Naweni and Tacilevu)
3. Univariate analyses of Abundance - Results
Closed vs Unrestricted Areas - Greater abundance of lethrinids and planktivores in 201T. Species differences were not conclusive
4. Univariate analyses of Species Assemblages - Results
5. Univariate analyses of the significance of Fishing effort on Abundance
Mean biomass across sites was not significantly correlated to fishing effort
6. Univariate analyses of Mean Length
No significant differences in mean length of any species were detected in closed area 201T compared to open access areas
7. Univariate analyses of Mean Length versus Fishing Effort and Abundance

1.2.4.2 Summary results of the fisheries monitoring programme

Data generated from the fisheries monitoring programme was used to examine:

1. Species length, growth and mortality differences;
2. Species and family abundance, and species assemblages. Table 14 presents a summary of these analyses.

Table 14 - Summary Biological Results from Fisheries Monitoring Programme Data in Fiji

1. Analysis of Mean Length by Species - Results
None of the key species studies indicated significant differences in mean length of fish in closed areas to those in unrestricted areas at either commercial or semi commercial sites except in areas 18 (Kubuna) and 21 (Tacilevu). Significant differences in mean length occurred between commercial & semi commercial (smaller) sites, and in relation to location (fish at Tavua offshore reefs were larger)
2. Mean length and Fishing Effort / Abundance - Results
Few species indicated significant correlations between mean length and fishing intensity and abundance, and except in two cases observations were inconsistent with expectation. Environmental differences or fishing practices (especially between commercial / semi-commercial areas) explained the differences observed. Mean length of fish in closed areas did not differ from expectation.
3. Fishing mortality - Results
For some species, fishing mortality was positively correlated to fishing intensity & negatively to abundance. For closed areas, data was limited. Mortality of fish in area 16 (Verata) and 201 (Naweni closed area) was consistent with the level of fishing effort and abundance.
4. CPUE (index of abundance) - Results
No significant difference in cpue between closed and unrestricted access areas, except 201 (Naweni closed area) in 1997/8 for semi commercial sites. There were no differences in catch rates for licensed areas in commercial sites. No correlation of cpue with fishing effort for any gear/ year/ sites combination (all, commercial, semi-commercial) except gill nets at semi commercial sites. No consistent trend for tabu / licensed areas by year/gear, except 1997/8 when 16 (Verata) and 201 (Naweni closed area) were consistent with the level of effort applied.
5. Species Assemblages - Results
At small-scale commercial sites species assemblages were not significantly different between closed and unrestricted areas
At commercial sites spp. Assemblage was weakly correlated to number of licences issued per fishing rights area and moderately correlated to access fee charged for these areas.
Species assemblage was not correlated to fishing intensity for all sites, small-scale commercial or commercial sites.
Significant differences between commercial and small-scale commercial sites occurred - Family assemblages caught by handlines were significantly different between commercial and small-scale commercial sites.

1.2.4.3 Conclusions on Biological Outcomes for Fiji

Management success : Are management actions respected?

In Fiji, the closure in Naweni was respected in 1998. Elsewhere, licensing can potentially limit

entry, but no limits to licencing were applied

The question remains as to whether fishing intensity would have been even greater in closed areas and licensed areas had these ‘management’ measures not been applied.

Management success : Has management conferred any benefit compared to un-managed open access areas?

Neither fisheries nor UVC data indicated any differences in mean length of fish in closed or licensed areas compared to open access in Fiji.

Mortality estimates were inadequate for comparison.

Species assemblages were not different in closed and open areas of Fiji from UVC or fisheries data from MDS analysis.

Species assemblages at commercial Fiji sites were weakly correlated to number and cost of licences.

Univariate UVC and fisheries analyses indicated some benefits to management with increased abundance of certain families / guilds or overall in Naweni in 1998 in Fiji (UVC and fisheries monitoring data).

Such increases in abundance were not related to growth of fish (no size differences were observed), and may indicate an aggregation effect in less disturbed areas.

Management success : Explaining the observations

Mean length, mortality, abundance and species assemblages at Fiji and Vanuatu showed no, or only weak correlation with fishing effort. The abundance of few species, families or guilds was correlated to effort.

Managed areas were consistent with expectation relative to the level of effort applied in them.

Such differences as occurred could better be attributed to other factors such as inshore or offshore reefs, or level of commercialization.

1.2.5 Economic Outcomes

1.2.5.1 Summary Estimated Revenues by *Qoliqoli*

Table 15 presents estimates for the value of fin-fish resources landed during the period of monitoring. The values are in Fijian Dollars (current exchange rate = US$1:F$).

Table 15 - Estimates for the value of fin-fish resources landed during the period of monitoring [§]

Site	1996/97 (1996 Prices)	1997/98 (1997 Prices**)	1998/99 (1998 Prices**)
Research *Qoliqoli*			
Naweni	**23641**	**30585**	
Tacilevu	**24053**	**20091**	
Tavua		**1285236**	
Vitogo/Vidilo			**404940**
Verata	**17538**	**24596**	
Cautata		**13373**	
Adjacent *Qoliqoli* (Eastern)			
Kubuna	**109239**	**111844**	
Viwa (E)	**5531**	**6184**	
Adjacent *Qoliqoli* (Western)			
Vuda			**1488046**
Votua*			**72296**
Naviti-Marou 2			**172136**
Waya-Naviti			**172712**
Naviti-Marou			**15372**
Ba*			**121410**

§ The monitoring programme commenced in July, 1996. Annual estimated revenues are based therefore on 12-month periods from that date rather than on calender years. Monitoring at Vitogo-Vidilo was completed in October, 1998.

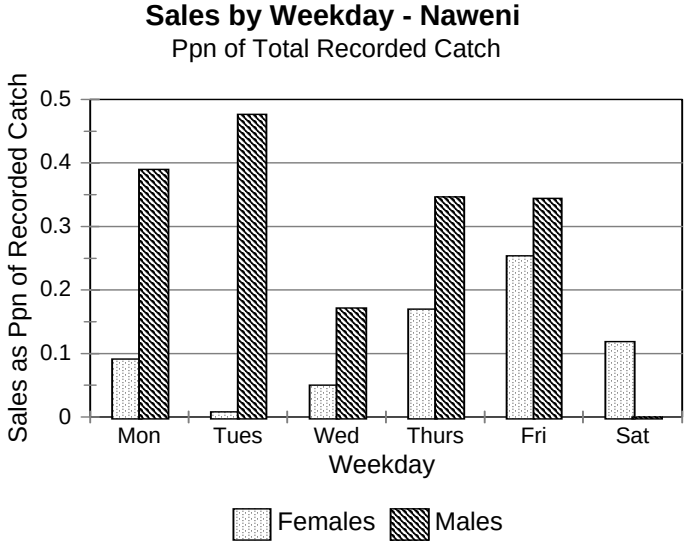
* These estimates are known to under-estimate the total value of fin-fish resources caught in these *qoliqoli.* The figures presented here are estimates based on the use of *qoliqoli* by fishing vessels registered in Lautoka and therefore exclude licences issued from Ba. Estimates of fishing effort based on catch-rates and mean annual effort per vessel generated from this research and licence data reported by the Fisheries Division results in an estimated annual value for fin-fish of F$1,491,675 for Ba *qoliqoli*.

** Prices are based on the mean price quoted in the 1996 Fisheries Division Annual Report but are adjusted in 1997/98 and 1998/99 by an inflationary figure of 5%.

Neither Naweni or Tacilevu currently issue licences to Indo-Fijian fishers so there is no resource rent, in the form of goodwill payments, received by the Tui or the vanua from commercial fisheries. Overall, fin-fish resources weighing 14.5mt and worth an estimated F$54, 226 were calculated to have been extracted from Naweni fishing rights area during the 2-year monitoring period. In fact of this total, 22% were sold, the remaining 78% were kept for consumption. For Tacilevu, fin-fish resources with a weight of 11.9mt and worth an estimated F$44,144 were extracted over the 2-year monitoring period. The utilisation of these resources was somewhat different from that recorded from Naweni. The data indicated that only 33% were saved for consumption by fishers, and the remaining 67% was sold. The maximum value of fin-fish recorded for an individual fisher was F$3,111 in Naweni and F$2,880 in Tacilevu.

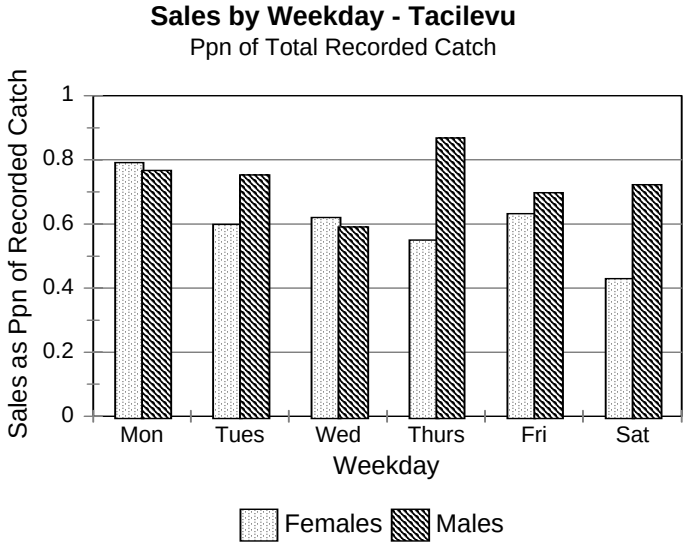
Analysis of data on gender divisions in the use of resources in Naweni indicated that men sold 32% percent of their catch compared with women who sold 12% of their catch. The proportion of the catch made by men which was subsequently sold was largest as the beginning and end of the week. For women it increased towards the end of the week (see Figure 18).

Figure 18 - Analysis of Sales by Weekday, Naweni Village



In Tacilevu where commercial fishing is more important to the community there was less difference between gender with women fishers selling 63% and men 76% of their catch. Sales through the week were more consistent compared to that indicated for Naweni (see Figure 19).

Figure 19 - Analysis of Sales by Weekday, Tacilevu Village



In Tavua *qoliqoli* calculations indicated that a minimum of 363 mt of fin-fish resources were extracted by commercial fishers during the 1-year period of monitoring with an estimated retail value of F$1.28 million. These figures exclude any estimate of the weight (or value) of resources that is taken by unlicensed fishers. Resource rents secured by Tui through goodwill payments were calculated at F$3,000 in 1997 (F$50 per licence, 60 licences issued). This represents 0.23% of the minimum calculated value of resources extracted from Tavua *qoliqoli*. There are particular days of the week when fishing vessels return from sea to sell their catch. Analysis of data indicates that, across all landing site, the major days for the return of fishing vessels are Wednesday (32% of fishing trips), Friday (24%) and Saturday (40%). Some difference was noted between fishers operating from the western and eastern ends of the *qoliqoli*. Figures 20 and 21 present the data for the (western) Vatutavui landing and Kavoli/Rabulu (located in the eastern part of the *qoliqoli*) respectively

Figure 20 - Analysis of Sales by Weekday, Vatutavui Fishers, Tavua

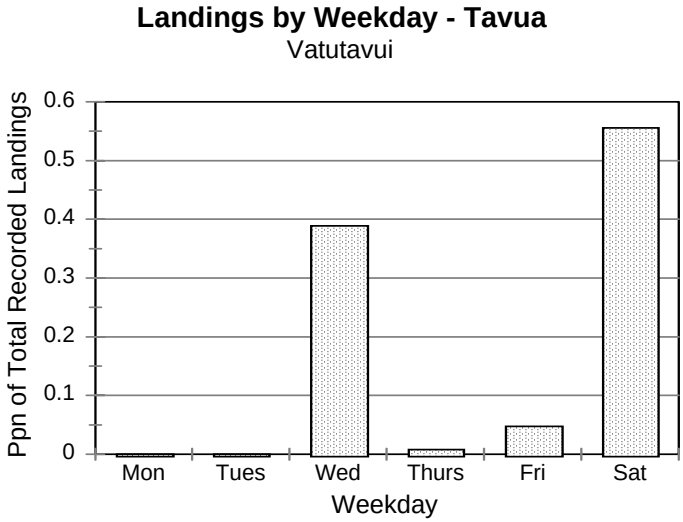
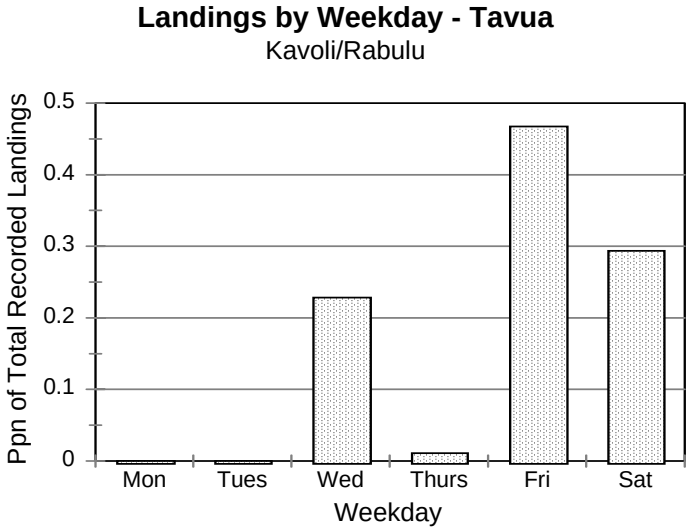


Figure 21 - Analysis of Sales by Weekday, Rabulu Fishers, Tavua



Landings are more frequent at the eastern end of the landing site compared with the western landing site of Vatutavui. Table 16 presents summary statistics on mean revenues, costs, overall profits and crew share calculated from 72 fishing trips where these data were complete.

Table 16 - Summary statistics on Tavua vessels' economic performance (+- 95% CL)

Site	(All data in F$; N = 74)			
	Gross Revenue/Trip	**Trip Costs**	**Profit/Trip**	**Crew Share**
Range	40 to 670	20 to 140	-21 to 575	0 to 115
Mean	234.91 (28.59)	70.89 (5.44)	164.01 (24.62)	33.56 (4.97)

Table 17 presents data on the numbers of fishers on the commercial fishing boats in Tavua *qoliqoli*.

Table 17 - Number of crew in the commercial handline fishery - Tavua *Qoliqoli*

Crew Number	Number of Trips
1	3
2	47
3	215
4	29
5+	3

Crew are taken on a catch-share basis with each member receiving one share of the profits after the deduction of the costs of a fishing trip (fuel, food etc). For an individual in a crew of 3, the share would typically be one-fifth of the profits. One share would go to the boat, one to the engine, and three to the crew members. If a crew-member is also the owner (usually, but not always, the skipper of the vessel) he would in effect receive 3 shares. Analysis of data on the economic returns realised by a Tavua crew member (without a financial interest in the vessel) indicated a mean of F$3.57 per hour.

Fishers licenced to fish Vitogo/Vidilo qoliqoli extracted fin-fish resources calculated at 97.4mt during the 12-months of monitoring worth an estimated F$404,940. Resource rents secured by the Tui through the goodwill payments were calculated at F$3,150 for 1998 (57 Indo-Fijian licences exclusively for Vitogo/Vidilo and 6 for multiple qoliqoli, and a mean price of F$50 for each licence). This represents 0.78% of the minimum value of resources extracted from Vitogo/Vidilo qoliqoli.

In Vitogo landings do not follow a pattern similar to Tavua, at least for those vessels using Lautoka Fisheries Wharf (Figure 22). Landings through the week are more consistent day by day although the majority of fishers return to port towards the end of the week. An informal Sunday market has also developed at the Fisheries Wharf; the usual procedure of fish-dealers buying the majority of the catch is suspended and the fishers themselves (often with other family members) sell their catch direct to the public (J.Anderson, pers obs).

Figure 22 - Proportion of Total Landings by Weekday, Lautoka Fisheries Wharf

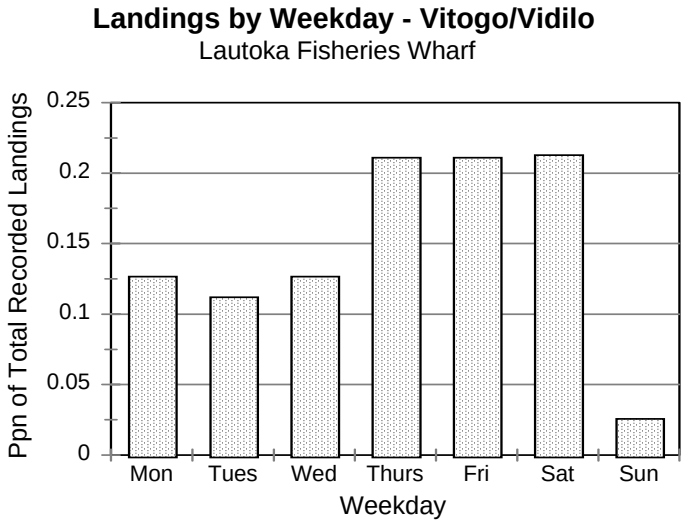


Table 18 presents summary statistics on mean revenues, costs, overall profits and crew share calculated from fishing trips where these data were complete.

Table 18 - Summary statistics on Vitogo vessels' economic performance (+- 95% CLs)

Site	(All data in F$; N = 529)			
	Gross Revenues	**Trip Costs**	**Gross Profits**	**Crew Share**
Range	16 to 1125	10 to 300	-60 to 1000	0 to 250
Mean	237.01 (13.93)	80.86 (4.14)	156.14 (12.03)	35.94 (2.77)

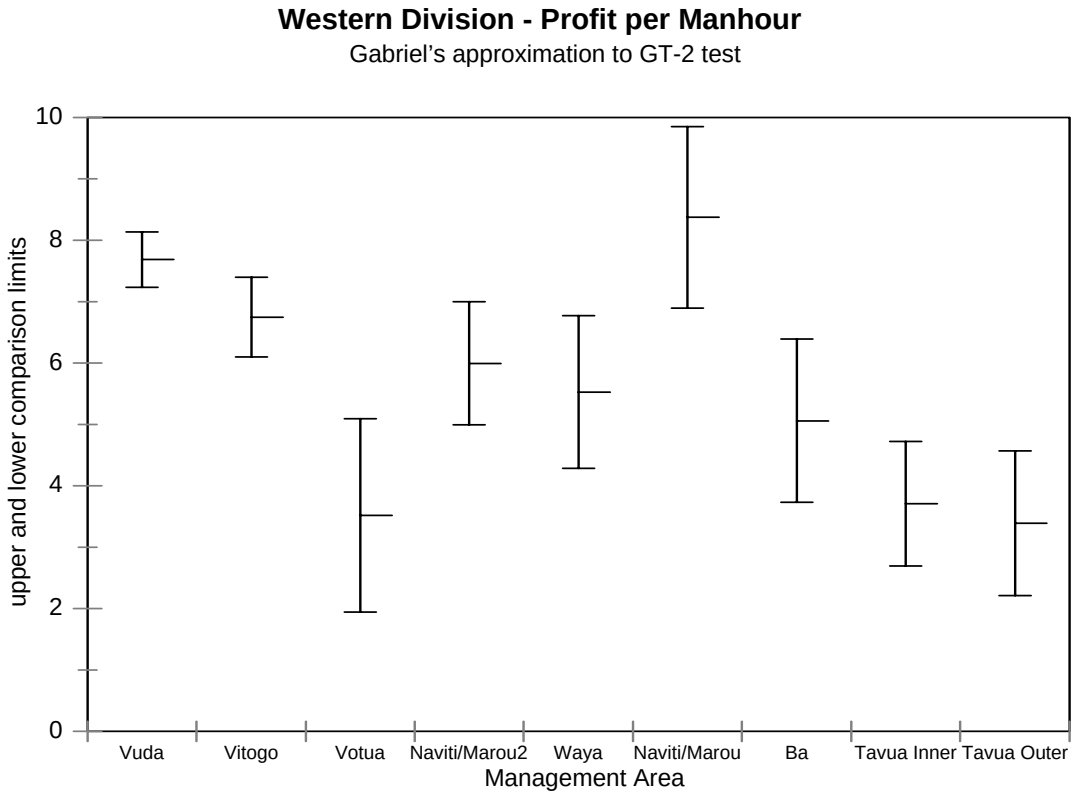
Table 19 presents data on the number of crew members taken on vessels licenced to fish in Vitogo/Vidilo *qoliqoli*.

Table 19 - Number of Crew per Vessel, Vitogo/Vidilo Licenced Vessels

Crew Number	Vitogo/Vidilo
1	7
2	364
3	169
4	5

In Vitogo/Vidilo the mean hourly return for crew-men was F$6.75 per hour. Figure 23 presents data on the mean hourly share received by crewmen from both Tavua (fishing the inner and outer reef areas) and Vitogo/Vidilo *qoliqoli* (fishing Vitogo and adjacent *qoliqoli*).

Figure 23 - Mean hourly revenue for crewmen licenced for Vitogo/Vidilo and Tavua *Qoliqoli*



These rates of return compare favourably with other non-skilled labour opportunities in the Western Division. Cane-cutting (only a seasonal event) offers labourers in the region of F$7 per day. By way of comparison un-established staff at the Fisheries Division receive in the

area of F$3.50 per hour (Felix Poni, pers comm). The mobility of crew between vessels was relatively limited with individual crew tending to remain with one captain. In fact some vessel owners reported that they rotated their crew in order to provide income for a larger eciprocaonumber of families. The mean number of individuals per family supported by a fishing vessel was 4.5 individuals. The maximum number of households directly supported for one vessel owner was reported as 8, for a vessel licenced for Vitogo/Vidilo.

Table 20 presents a summary of the estimated weight (mt) and value (F$) of fin-fish harvested by fishers from Ucunivanua operating in Verata and the adjacent *qoliqoli* of Kubuna and Viwa.

Table 20 - A summary of the weight (mt) and value (F$) of fin-fish harvested by fishers from Ucunivanua

Year	*Qoliqoli*				
	Verata	**Kubuna**	**Viwa**	**Total (mt)**	**Total (F$)**
1996/97	4.3 mt (F$17,537)	4.9 mt (F$20,055)	1.36 mt (F$5,531)	**10.56**	**43123**
1997/98	5.8 mt (F$24,596)	5.5 mt (F$23,342)	1.45 mt (F$6,183)	**12.65**	**54121**

The maximum value of catch recorded for one year by an individual fisher was F$3,744. Analysis of the pattern of landings through the week are displayed in Figure 24. Landings peak towards the end of the week.

Figure 24 - Analysis of Sales by Weekday, Ucunivanua Fishers

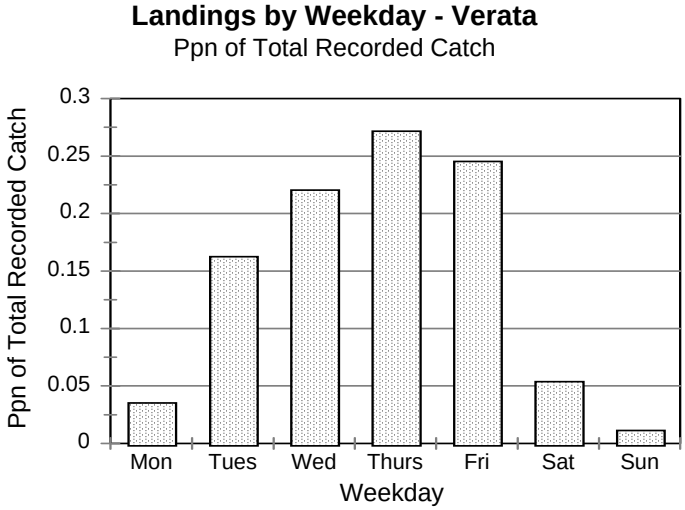
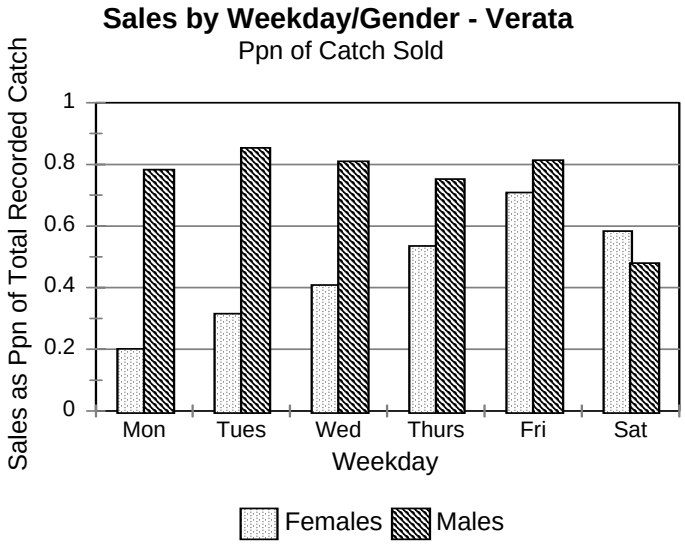


Figure 25 presents equivalent data for landings by gender. As observed at other sites, the proportion of the catch sold by men was fairly consistent through the week; for women there

was a distinct rise, towards the end of the week, in the proportion of the catch sold.

Figure 25 - Analysis of Sales by Weekday and Gender, Ucunivanua Village



1.2.6 Meeting Management Objectives: A summary of Performance

What is the performance of customary tenure in the management of community marine resources? The objectives of management as defined by the communities are listed in Table 21. The objectives of conservation and raising funds for community development are self-explanatory. It was reported earlier that management objectives can include implicit as well as explicit objectives. It is for this reason that a management action can have a number of objectives. Unlike in Vanuatu, the extent to which implicit objectives were hidden was significantly less. The management authority and other respondents within the community were quite forthcoming that the explicit reason for the management action was not conservation. The closure of Verata and Cautata *qoliqoli* to non-native fishers (Indo-Fijian) was clearly stated as the explicit objective. Respondents from Verata reported that in fact the level of fishing effort following the licence ban was perceived to be higher than prior to the ban. This particular management action is clearly to maximise the resource rent obtained by those with primary rights holders to the exclusion of non-indigenous stakeholders.

Note that for Tavua and Vitogo protection of native resources is included as a management objective but is in parentheses. The explanation for this is that these ‘management’ actions are taken unilaterally by groups within the tribal unit and without the explicit agreement of the management authority.

Table 21 - Summary of Management Objectives

Site	Conservation	Raising Funds For Community	Ceremonial	Protection of Native Resources
Naweni			✔	
Tacilevu			✔	
Tavua	✔	✔	✔	(✔)
Vitogo/Vidilo		✔		(✔)
Verata				✔
Cautata				✔

Table 22 presents a summary of the performance of the closed areas according to the criteria of sustainability as measured by scientific quantitative methods by the research team. A qualitative measure of the performance is also presented. This was assessed from the rural appraisal interviews and relates directly to the perceptions of the resource custodians.

Table 22 - Summary of Performance of Community Management Activities

Research Site	Quantitative	Qualitative*
Naweni	Variable	✔
Tacilevu	-	✔
Tavua	✘	36375
Vitogo/Vidilo	✘	✘
Verata	✘	✔
Cautata	✘	✔

1.3 Understanding the Fishery (1) : Interactions between Stakeholders

The outcomes described above are largely the result of choices made by fishers about how, where and when they fish. In turn the choices made by fishers are dependent on the perception of the costs and benefits associated with the different types of action available to them. The understanding of fishers of the potential costs and benefits of a particular choice of action will be influenced by their understanding of the physical and technical attributes of the resource system and by the management institutions that govern them as stakeholders. A fishery is not static nor are the fishers necessarily uniform in their interpretation of the

operational boundaries to their choice of action. Individual choices therefore vary and decisions taken (or at least reported to be taken) by one fisher may be influenced by (or influence) the actions taken by other fishers.

One of the most important aspects of this analysis is to determine the extent to which the choices made by fishers engender cooperation or conflict within the fisher community and/or between fishers and the management authority. Conflict will necessarily reduce the likelihood that the objectives of management are met. A key manifestation of this form of interaction is the so-called 'free-rider' problem. The problem (for an individual wishing to maximise his own catch) is that most management rules and regulations necessarily restrict the rewards available, at least in the short-term, for benefits to eventually accrue to all. Free-riding refers to the idea that some individuals will ignore the rules to maximise their individual benefit while relying on the fact that (most) other individuals will adhere to them. The free-riding individual therefore suffers no loss of benefit from imposition of rules and in fact should gain additional benefits as yields improve as a result of the restraint of others.

This section divides the analysis into a number of components which relate to the different stakeholder groups previously identified. Cooperation and conflict *within* the stakeholder group that actually fishes is described in Sections 1.3.1 and 1.3.2, cooperation and conflict *between* the fishing community and the wider stakeholder groups is described in Section 1.3.4 and Section 1.3.5 and cooperation and conflict *between* fishers, wider stakeholder groups and the management authority is described in Section 1.3.6 and Section 1.3.7. A summary table of interactions is presented in Section 1.3.8.

1.3.1 Interactions within the Fijian Stakeholder Group

Gill-net fisheries

In Naweni, Tacilevu, Verata and Cautata fishers cooperated in the deployment of gill-nets with the catch being shared equally amongst the participating group. In Tacilevu, the majority of gill-nets were owned by a single individual and were made available to fishers who did not own a net on a reciprocal basis. The reciprocity affording the owner the rights to buy the catch which he would then mark-up and sell at the market or to private outlets in the nearby town of Savusavu.

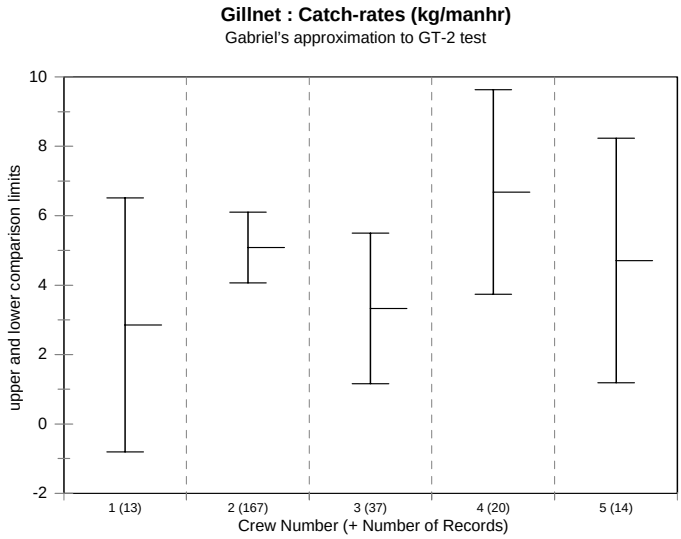
In Verata both simple cooperative fishing and economic exchange was observed in the use of gill-nets. For fishing events close to the village no boat was used and the fishing activity was a simple cooperative action. For fishing events close to the village the use of a vessel was necessary but the use of an engine was not, the boat would be punted out to the fishing site. In these circumstances the boat would be lent without charge. Where fishing was taking place further afield (gill-net use was recorded a maximum of 4.7km from the village) an engine was required. In this event, the boat-owner would charge a flat fee of F$10 per person. The only time when no charge was made was when there was a community function, all the fish caught (whether caught by gill-net or spear-gun) would be pooled for the function.

Table 23 - Cooperation by fishers using Gill-nets

Fisher Number	Naweni	Tacilevu	Verata	Cautata
1	10	13	35	1
2	242	170	103	16
3	42	37	21	28
4	7	20		19
5+	11	17		3

Analysis of catch-effort data for Tacilevu village did not reveal a significant difference in the catch-rates between fishing events with different 'crew' size (see Figure 26). The lowest mean catch rate (2.85kg/man-hr) was derived from fishing trips with a single fisher. Catch-rates for two, three, four and five fishers were 5.06kg/man-hr, 3.32kg/man-hr, 6.68kg/man-hr and 4.71kg/man-hr respectively. This suggests that fishers cooperated for reasons other than improved efficiency of gear. There were no observations of fishing events involving more than one gill-net team operating concurrently.

Figure 26 - **Comparison of catch-rates by crew-numbers for Tacilevu**



Handline Fisheries

Cooperative fishing activities using handlines mirrored that observed for the use of gill-nets. Relationships were both simple cooperative joint action, reciprocity and economic exchange (see Table 23).

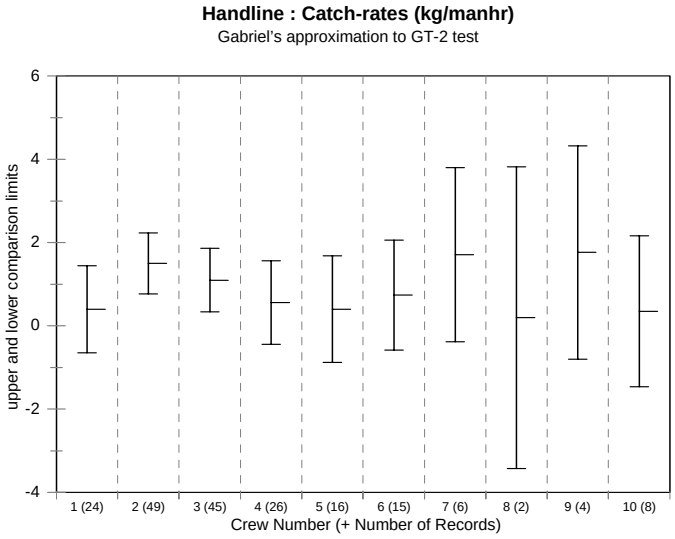
Table 24 - **Cooperation by Fishers using Handlines**

Fisher Number	Naweni	Tacilevu	Verata	Cautata
1	242	88	24	2
2	63	149	49	18
3	8	2	45	30
4	1	4	26	16
5+	1	5	51	9

Although there appears to be a similar level of cooperation amongst fishers using handlines to that observed when fishers used gill-nets, the nature of the cooperative relationship was somewhat different. In Naweni and Tacilevu, where handline fishing is an individual activity generally undertaken without hte use of a boat, (and the fish are kept by the individual who caught them) cooperation is more a issue of social interaction (eg. Alena Tinai, pers comm). The proportion of fishing trips made by a single fisher was therefore greater than with gill-net use (77% with handline in Naweni compared with only 3% for gill-net). The situation in Tacilevu was somewhat different with only 35% of fishing trips with handline being made by fishers operating alone (compared with 5% for gill-net fishing).

At Verata 85% of fishing trips were made with 2 or more fishers operating together. Of these trips 88% were made using a boat. At this site the relationship between fishers is economic; fishers must pay the boat-owner for a place on the fishing trip. Each fisher joining the boat must pay a contribution (F$10 per person in 1998), regardless of the success of the subsequent fishing activities (Ratu Tulala, pers comm). The returns required to make an individual's fishing cost-effective in a group are clearly going to be less than if they were to fish independently. Analysis according to the crew-number did not reveal any significant difference in catch-rates (see Figure 27).

Figure 27 - Comparison of Handline catch-rates by crew-number for Verata



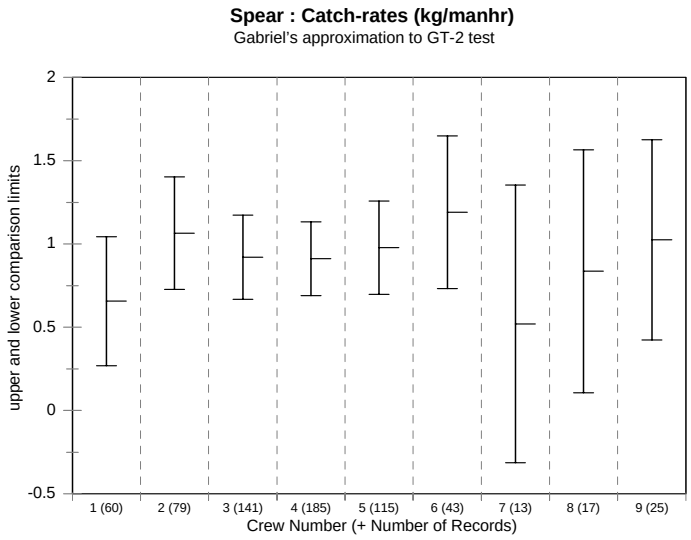
Modern spear guns and more traditional handheld spears are utilised at all the research sites. These gears are used in the normal way although the cost of spear-guns limits their availability. They are used in conjunction with under-water torches, masks, snorkels and fins. Table 25 presents data on the cooperative choices made by fishers using spear-guns. Again there is cooperation between fishers using this gear.

Table 25 - Cooperation by fishers using Spear-guns

Fisher Number	Naweni	Tacilevu	Verata	Cautata
1	77	46	16	9
2	40	157	68	11
3	14	9	95	3
4	3	3	193	4
5+	4	1	209	2

Analysis of catch-effort data for Verata spear-fishing data did not reveal any significant relationship between catch-rate and crew number (see Figure 28). This is what one would expect in so far as spear-fishing is an individual activity and the data does not indicate the presence of significant effects on catch-rate due to crowding as numbers of fishers in the crew increases.

Figure 28 - Comparison of Spear-gun catch-rates by crew-number for Verata



The tendency to cooperate, at least in the sense that they form a crew together, relates therefore not to increased success in fishing but again to the efficiency of fishing where a boat and an outboard engine are required.

Reef gleaning is also an important activity, particular for women fishers who collect shellfish, crabs and octopus. The use of poison plants (of the genera *Barringtonia*, *Derris*, *Euphorbia*, *Pittosporum* or *Tephrosia*) with which the majority of fishers appeared familiar was not recorded during the monitoring activities but most respondents reported that poisons were used in reef gleaning.

Table 26 - Summary Interactions: Cooperation or Conflict within the Fijian Stakeholder Group?

Site	Fishing Activities		
	Non-Reciprocal Cooperation	Reciprocal Cooperation	Economic Exchange
Naweni	✔	✔	✘
Tacilevu	✔	✔	✘
Tavua			✔
Vitogo/Vidilo			✔
Verata	✔	✔	✔
Cautata	✔	✔	✔

1.3.2 Interactions within the Indo-Fijian Stakeholder Group

The Indo-Fijian stakeholder groups at these two sites present a quite different pattern of interaction than that discussed for Fijian stakeholders. The Indo-Fijian stakeholder group is largely made up of individuals involved in the commercial fishery of this area so their interactions tend to be dominated by economic exchange. The details of this economic relationship were presented in Section 1.2.6.

Table 27 - Summary Interactions: Cooperation or Conflict within the Indo-Fijian Stakeholder Group?

Site	Non-Reciprocal Cooperation	Economic Exchange
Tavua	✘	✔
Vitogo/Vidilo	✘	✔

1.3.3 Interactions between Fijian and Indo-Fijian Stakeholder Groups

Interactions between Fijian and Indo-Fijian stakeholder groups in Naweni and Tacilevu were inconsequential due to the lack of a significant Indo-Fijian population in the locality and the lack of an Indo-Fijian contribution to the fishery in the area. Fishers from Tavua and Ba qoliqoli on Viti Levu Island reported that there was a growing tendency for fishers to travel to Vanua Levu Island, although none were licenced to fish in any of the *qoliqoli* around the island. The majority of this illegal effort is reported from Bua Province, to the east of Naweni (Cakaudrove Province) and it is not known whether illegal fishing effort is moving east from Bua.

In Tavua Indo-Fijians reported incidents of intimidation. These reports relate specifically to the community of the Korovou yavusa in the western sector of Tavua qoliqoli. Again this relates to issues of claims of tenure over marine space. Respondents from the community at Navauvau reported that the Cakau Levu, Dakoro, Sawale and Sese Reefs were under the control of Korovou Village. In effect this community rejected the mandate claimed by the Tui of Tavua to licence fishers for the entire area nominally claimed by the Tui and the implication of this was that the licences of these fishers was invalid for the reefs claimed by Korovou yavusa. However, some Indo-Fijian fishers reported that the Fijian community occasionally acted to support the claim of an Indo-Fijian to a fishing licence where it was threatened by the Tui. Cooperative interactions were observed in the use of (the illegal) dynamite. Fijians who had obtained dynamite would borrow vessels belonging to Indo-Fijians, perhaps using the vessel owner as the captain. The vessel owner would take the Fijian crew because of the perception that the risks of prosecution in the (albeit rare) event of capture would be less if native Fijians were onboard. Overall, however, Indo-Fijians dominate exploitation of marine resources in Tavua *qoliqoli*. This asymmetry arises principally from the economic superiority of the Indo-Fijian population and their access to credit finance to fund their activities.

In Vitogo the level of conflict between native and non-native stakeholder groups was more pronounced but reciprocal cooperation was also observed. The principal form of conflict was

intimidation, often culminating in acts of piracy. Although simple thievery is the basis for the majority of the attacks the situation is more complex than this, with some incidents apparently stimulated by the presence of conflict between communities in the Vitogo/Vidilo qoliqoli and the Tui of the Vitogo/Vidilo vanua. In a situation similar to that observed at Korovou in Tavua, coastal communities in Vitogo/Vidilo claim independent rights of management over areas of reef that are nominally licenced by the Tui of Vitogo. From data gathered from interviews with 41 fishers licenced to fish in Vitogo/Vidilo, 18 (44%) reported that they had personally experienced some losses due to piracy in the last five years. The maximum number of incident befalling one vessel was five, the maximum frequency of encounter was 'almost weekly' with half the catch typically being taken (anon. gill-net fisher, pers comm). Typically the attackers approach a fishing boat, usually at night, with a number of their party lying out of sight on the deck of the boat. Fishing gears, stoves, lights, food and fish (and even the outboard engines) may be then demanded with menaces. Actual physical violence was reported by a number of fishers. In some cases, cash payments only are extorted from fishers but fishing gears and the catch may be left untouched. There have been no prosecutions for this type of offence with most fishers reporting that they are reluctant to prosecute for fear of later vendettas. Victims of these attacks believe that the majority of those responsible are from the coastal villages of the Vitogo/Vidilo rather than from further afield although reports were taken of incidents involving individuals from offshore islands in the Yasawa Group.

Reciprocal cooperation between stakeholder groups was again of a form similar to that observed in Tavua *qoliqoli*. Indo-Fijian captains would take Fijian crew on in order that they would not be targeted by Fijians wishing to pirate their catch (anon, pers comm). And again, as described for Tavua, the economic superiority of the Indo-Fijian population in the area is largely responsible for the domination of the fishery by Indo-Fijians which has prompted conflict between some communities in Vitogo and the Indo-Fijian fishers.

Table 28 - Summary Interactions: Cooperation or Conflict between the Fijian and Indo-Fijian Stakeholder Groups?

Site	Piracy by Fijians	Intimidation by Fijians	Surveillance by Fijians	Cooperation
Naweni				
Tacilevu				
Tavua	✔ ?	✔	✔	✔
Vitogo/Vidilo	✔	✔	✔	✔
Verata			✔	
Cautata			✔	

1.3.4 Interactions between Fijian stakeholders and Tribal Authorities

In Naweni analysis of the GIS data, and from interviews with fishers and senior members of

the community it was apparent that both closed areas were, more or less, respected by fishers from both Naweni and Tacilevu villages. Again it was reported to be well respected and GIS data in general supported these reports. In the case of the first Naweni closure, no breaches were reported for fishers from Tacilevu. In fact there was a good deal of cooperation between Fijian stakeholders and the *qoliqoli* management. The lifting of the first closure was prompted by perceptions amongst fishers that the remaining open area was fast becoming less productive as a fishing site. These perceptions, in the small community of Naweni village (population 400), were soon known to the Tui and his advisors in the village. Declining yields and the approach of the Christmas period (when fish sales are used to purchase gifts etc) prompted the early lifting of the closure. Note that this closure was not conservation-based, but was a customary act to mark the passing of a senior member of the chiefly family. The second closure was breached however, with 10% of the recorded fishing trips undertaken inside the closed area. Although there was no substantive evidence of conflict between Fijian stakeholders (fishers) and the local management authority individuals in both Naweni and Tacilevu were aware of the potential for conflict if fishery resources became sufficiently over exploited in Tacilevu. Tacilevu fishers in particular were aware that the reciprocity was already in doubt because Naweni fishers would not want to fish in their area because catches were better in Naweni. They claimed that may become increasingly reliant on access to the neighbouring Naweni and Vunilagi fishing grounds.

In Tavua the potential areas of cooperation include recognition of traditional closures, observance of gear restrictions or bans, and cooperation with the national licencing scheme, a scheme that the Tui Tavua himself considers important (Sairusi, pers comm). So far as cooperation with closures was concerned the only closure of reef habitat was on the reef surrounding Manava Island in the inner reef area of Tavua. This closure was widely reported to have been ignored (Sairusi, pers comm). The situation has been exacerbated by the granting of special permission by the Tui to a relative to fish beche-de-mer in the tabu area some years ago which has not encouraged others to observe it. This was seen as a breach of the reciprocity necessary for all stakeholders to cooperate with the management authority. The use of illegal fishing gears (notably dynamite) is an endemic problem in Tavua. The justification offered by Fijian fishers in particular (and to a lesser extent by Indo-Fijian) was that it was difficult to obtain the necessary capital to invest in buying a vessel, engine and fishing gear. They reported that they could only borrow boats and gear from friends. It is generally accepted that the majority of the dynamite derives from the Emporer Gold Mine at Vatukola. The mackerel species *(Rastrelliger kanagurta*) targeted by dynamite fishers is a favoured bait for fishers targeting ground-fish stocks. Furthermore such is the scale of the problem that dynamited fish contribute significant quantities to the total production of fisheries in the area which would not be easily replaced (Krishna Swarmy, pers comm). The restriction on the number of gill-nets (20 nets with a combined length of 1 kilometre) that an individual licenced fisher can use was reported to be widely flouted. There is no declared scientific objective to this limit (Fisheries Division, pers comm). Data from rural appraisals indicated that 60% of fishers believed this regulation was ignored by net fishers who used as many as 70 nets with a combined length of 3.5 kilometres. Again surveillance of this regulation demands financial and human resources although given the clear-cut nature of any breach of this regulation, breaches of the regulation would not be difficult to prosecute.

The licencing scheme, although a national provision, generates revenue for the community and should contribute to the management of resources. On the basis of these points It is clearly in the interests of the community to cooperate with local management authorities. However it appears that significant numbers of Fijians (amongst others) do not cooperate with the licencing scheme. The lack of cooperation has become particularly obvious since

the establishment of the goodwill payments. Although the payment is required of all those seeking to fish commercially (Joe Radrodro, pers comm) Fijians have been largely unwilling to pay this levy and are therefore not buying licences. Native Fijians rejected this request arguing that it was their birth-right to fish in the fishing grounds. In particular those from Korovou area refused based on the belief that the Tui had no right of authority over the traditional fishing grounds claimed by their *mataqali*. The intimidation reported in the Outcomes section stems directly from this conflict.

In Vitogo/Vidilo qoliqoli the principle area of interest is the conflict that is developing between individual Fijian communities and the Tui Vitogo. As is the case in Tavua, the essence of the problem is that communities are subjugating the legal authority of the Tui and the qoliqoli system by ignoring the valid licences issued to Indo-Fijians who are then targeted for intimidation. The basis of this action is the claim however, that the chiefly leadership is not adequately managing resources on the behalf of the native rights holders who therefore literally take the law into their own hands. This developing trend towards tribal sub-units staking claims over smaller and smaller areas of reef is not likely to promote efficient management or management that fair to the most active stakeholder group in the fishery, namely the Indo-Fijians.

In Verata and Cautata cooperation between Fijian stakeholders and the *qoliqoli* management authority appears to be largely cooperative. There is no doubt that the banning of (Indo-Fijian) commercial gill-net fishers from the *qoliqoli* was a very popular move amongst the Fijian community. But besides this action, there appears to be no significant or organised interaction between fishers and management authority. Responsibility for the surveillance of the qoliqoli has been taken on by fishers from within the community, albeit on a rather ad hoc basis. But there is little action taken on monitoring the progress of the ban or the extent to which Fijian fishers have simple replaced the Indo-Fijian fishers. Respondents from Ucunivanua village reported that it was their belief that the level of commercial fishing effort was now actually higher than prior to the commercial ban. The only specific area that could be described as conflictual in the relationship between these two stakeholder groups is the failure of the majority of Fijian fishers to obtain licences to cover the commercial activities that most fishers are involved with, albeit on a relatively small-scale and in a sometimes *ad hoc* manner. However the *qoliqoli* authorities inVerata and Cautata largely turn a blind eye to this requirement.

Table 29 - Summary of Interactions between Fijian stakeholders and Tribal Authorities

Site	Fijians - Access Equity?	Official Fisheries Forum	*Qoliqoli* Management Regulations Respected by Fijians	Illegal Use of Dynamite	Commercial Use of Adjacent *Qoliqoli*
Naweni	✔	✘	✔	✘	✘
Tacilevu	✔	✘	✔	✘	✔
Tavua	✔	✔	✘	✔	✔
Vitogo/Vidilo	✔	✘	✘	✔	✔
Verata	✔	✘	✘	✘	✔
Cautata	✔	✘	✘	✘	✔

1.3.5 Interactions between Indo-Fijian Stakeholders and Tribal Authorities

There were no interactions observed or reported between Indo-Fijians and the local management authorities in Naweni and Tacilevu.

In Tavua the interactions between the traditional management authority and the Indo-Fijian stakeholder group in Tavua are nominally more cooperative but it will be argued that this cooperation is essentially one-way and one where this stakeholder group have little opportunity to voice opinion, at least in public fora. The 'cooperation' is manifested through the agreement of Indo-Fijians to pay 'goodwill' in exchange for letters of consent from the Tui for them to fish commercially. Prior to 1996 there was no demand for a cash goodwill payment in order to secure the written permission of the Tui to fish commercially in Tavua (as there was elsewhere in Fiji) (Joe Radrodro, pers comm). But there were *ad hoc* payments required, usually in kind (fish), which the Tui would levy at various times of the year usually to provide for vanua functions or functions of the chiefly vale levu. But the goodwill payment has been selectively imposed on the Indo-Fijian stakeholder group, who have little choice but to pay.

In Vitogo/Vidilo the interactions between Indo-Fijians and the local management authority are largely limited to the annual round of goodwill payments. Of particular interest in this relationship is the variations experienced by different fishers on the level of goodwill to be paid for a letter of consent, with fees ranging from F$20 to F$100. The conflict between local Fijian communities and licenced Indo-Fijian fishers has not been adequately addressed by the Tui Vitogo. The main point about this conflict is that in essence it is one between the native stakeholders with the Indo-Fijians to some extent the innocent victims. This amounts to a betrayal of the 'contract' that is established by the payment of goodwill. Indo-Fijians reported that complaints by their representatives relayed to the Tui by the *turaga-ni-koro* of the chiefly village have not been responded to.

There are currently no interactions between Indo-Fijians and the local management authorities in either Verata or Cautata by virtue of the fact that there are no commercial licences issued to non-Fijians for either of these two *qoliqoli*.

Table 30 - Summary Interactions: Cooperation or Conflict between Indo-Fijians and Tribal Authorities

Site	Indo-Fijians Access Equity?	Community- level Fisheries Forum	Use of Illegal Fishing Gears	Poaching of Adjacent *Qoliqoli*
Naweni	-	-	-	-
Tacilevu	-	-	-	-
Tavua	✔ (✘)	✔	✔	✔
Vitogo/Vidilo	✔ (✘)	✘	✔	✔
Verata	✘	✘	-	?
Cautata	✘	✘	-	-

1.3.6 Interactions between stakeholders and the State Fisheries Agency

Relationships between fishers from Naweni and Tacilevu and the relevant State fishery agency (the Fisheries Division of the Ministry of Primary Industries) are not particularly well developed but are generally cooperative. In fact the principal interaction is through the purchase of ice from the Government-run ice plant in Savusavu Town. However, representatives of the Fisheries Division (normally the Fisheries Officer based in Savusavu) do have the opportunity to attend the meetings held at different levels of tribal organisation. These include village meetings which are reportedly rarely attended by a Fishery Officer (bose-ni-koro), the vanua meetings (bose-ni-vanua) and the district meetings (bose-ni-tikina). The representative may be invited to attend or may request permission to attend if the Officer has specific issues to raise. Fishers themselves reported that they viewed practical assistance (particularly help in acquiring fishing gears) as the most important contribution that Fisheries could make. There was no attempts made by Fisheries to develop a dialogue or effective monitoring programme with Naweni or Tacilevu communities. Clearly their work is hindered by the lack of funds to develop a fisheries extension service. The relationship is further hindered by the failure of the majority of commercial fishers from these two communities to register their commercial interest through the purchase of a licence.

In Tavua the two stakeholder groups (native Fijians and the Indo-Fijians) have somewhat different relationships with the national management authority. For both stakeholder groups the primary interaction with the Fisheries Division is when licences are renewed. Individuals must travel to the Fisheries Division offices in Tavua Town (since closed) to display their Letter of Consent to fish, to pay the administrative fee and to collect the licence. Prior to 1997 the Fisheries Division also operated an ice-making facility in Tavua Town where fishers would regularly buy ice. This too has closed down and ice-making is now a private venture.

There is no regular monitoring of fisheries activities by the Fisheries staff in Tavua although some cooperative surveillance work is carried out by the Fiji Navy, the Royal Fiji Police and Fisheries staff.

As noted previously the requirement for the payment of a goodwill by individuals wishing to fish commercially is universal across the entire community of fishers. However, in general Fijians unable (or unwilling) to pay the fee are not prosecuted by the Fisheries Division although they are known to the Fisheries staff and were regularly encouraged to contribute (Joe Radrodro, pers comm; JA pers obs). In 1997, 21 of the 60 licences issued were issued to native Fijians. In 1998 only 7 of the 40 licences issued to May 1998 were issued to native Fijians. For Indo-Fijians the situation is a little different with the demand for payment to obtain a licence enforced more stringently. However, the cost of the goodwill can not always be met at the start of the year (when licences should be renewed for the year). It is for this reason that licence numbers increase through the year. In 1988 only 15 licences had been issued (ie paid for) by the end of March, a further 22 were registered in April and 3 in May. The extent to which Indo-Fijians continue to fish without having paid a licence was not quantified but given that the industry is an important contributor to family economies, and the fact that repayments must continue to be made on loans secured to pay for vessels and engines would suggest that fishing continues illegally.

Both Fijian and Indo-Fijian stakeholder groups contribute to the problem of illegal fishing. Efforts by Fisheries staff in Tavua to counter this activity have largely failed with surveillance activities severely restricted by the lack of funds required to mount effective surveillance in the complex coastal environment of Tavua qoliqoli. There were also reports of threats against Fisheries officers attempting to gather evidence of fishers using dynamite. The efforts at developing a good working relationship between fisher communities and the State management authorities have since suffered a setback following the closure of the Tavua Town Fisheries Office. Responsibility for Tavua qoliqoli is now held by the Fishery Officer based in Ba Town (25kms to the west of Tavua Town).

In Vitogo/Vidilo interactions between fishers and the Fisheries Division is equally low-key and at present there is little monitoring of inshore fisheries in the area. There have been a number of aid-programmes including research jointly undertaken by Fisheries staff and overseas collaborators that have, at least temporarily, increased the interaction with fishers. Recent programmes in addition to this research programme have included a fisheries monitoring and UVC programme funded by the Australian Government and a fish-quality project funded by the Japanese Government. Both these programmes involved substantial collaboration and cooperation with fishers although the fish-quality project focussed only on the development of the deep-snapper fishery mainly prosecuted by Indo-Fijian fishers which supplies the retail markets and the numerous hotels in the area. The location of the Western Division headquarters on the Japanese-funded Fisheries Wharf in the City of Lautoka offers further opportunities for improved collaboration with fishers. The relationship between the Indo-Fijian stakeholder group and Fisheries does however display some areas of conflict. In particular, Indo-Fijian (and occasionally Fijian) fishers report that there is little protection afforded by security staff for the vessels (and engines and fishing equipment) that are moored alongside the Fisheries Wharf. This is despite the fact that fishers must pay a small fee for a berth at the wharf and security is provided as part return on that fee. A number of fishers (anon) also reported that unlicensed fishing vessels were not challenged by Fisheries staff when they used the Fisheries Wharf to unload their (illegal) catches.

In Verata and Cautata regular interactions with the Fisheries Division also tend to be relatively

low key. Again there are very real logistical and financial constraints on the Fisheries Division which go some way to explain this. And in Verata *qoliqoli* at least there has been a number of cooperative management activities between local stakeholders, the Fisheries Division and aid programmes. One of the most interesting developments was the request from the Verata management authorities, in 1994, for an assessment to be undertaken of the fishery resources in the qoliqoli. The results from this survey initiated the closure of Verata qoliqoli to outside commercial interests. There appears to have been little consultation with Indo-Fijian stakeholders on this decision. More recent collaborations include the development of sea-weed production in the shallow inshore waters along the east coast of Viti Levu Island. The only specific area that could be described as conflictual in the relationship between these two stakeholder groups is the failure of the *qoliqoli* management authorities relates to licences. Although all fishers selling fish for profit, whether they possess primary rights (the native Fijians) or not, are required to purchase a licence from the State management authority (the Fisheries Division). This is ultimately the responsibility of the individual fishers themselves but the *qoliqoli* authorities inVerata and Cautata largely turn a blind eye to this requirement.

Table 31 - Summary Interactions between Tribal Authorities and Fiji Fisheries Division

Form of Interaction	Naweni	Tacilevu	Tavua	Vitogo/ Vidilo	Verata	Cautata
Formal Liaison Potential	✔	✔	✔	✔	✔	✔
Catch/Effort Monitoring by State	✘	✘	✘	✘	✘	✘
Port-based MCS Activities by State	✘	✘	✘	Limited	✘	✘
At sea MCS Activities by State	✘	✘	Limited	Limited	✘	✘
MCS Activities by *Qoliqoli* Management Authority	✘	✘	✔	✔	✔	✔
Management Interaction (*Qoliqoli* - State) *	✘ (+ ice)	✘ (+ ice)	✔	✘ (+ ice)	✔	✘

* Excludes the issuance of licences

1.3.7 Interactions between marketing stakeholders and other stakeholder groups

There is one more stakeholder group to consider in this section, those responsible for the marketing of fisheries products.

In Naweni and Tacilevu outlets including the local village store in Tacilevu where the owner

acts as a middle-man for licenced and un-licenced fishers from the community. The catch is then sold to a number of outlets in Savusavu Town including the market and Cakaudrove Fish Ltd, a private outlet. Individuals from Naweni and Tacilevu also sell directly in the market but the costs of transport mitigate against this being a standard practice. The role of the middle-man in Tacilevu village in particular is therefore an important one in improving the economic efficiency of the small-scale commercial fisheries sector in the village. Marketing through private outlets requires superior standards of fish quality than is the case with public outlets. There appeared to be no conflicts between the stakeholder groups.

In Tavua, the majority of the post-harvest activities are undertaken on the vessel upon return from the fishing grounds. The catch is gutted and cleaned close to shore and strung together in bundles. These bundles are usually grouped according to species and/or size similarities, for example small lutjanids (eg *Lutjanus fulviflamma*, *L.fulvus* and *L.quinquelineatus*) are often strung together in bundles of about 3-4 kg (equating to a price of F$10-F$15). Larger fish are strung individually. Much of the gutting and cleaning takes place in the narrow channels in the mangrove and always on the boat itself making the collection of biological data (particularly of sex, stomach contents etc) difficult without the full cooperation of the fishers. The catch is then landed at one of at least 14 landing sites along the 50km stretch of coast of Tavua qoliqoli. Onward distribution of fish takes two forms. Fish are either sold directly by the fisher (or members of his family). This may be at the roadside, in Government provided market facilities in Tavua Town or to private outlets, either owned by the fisher himself or by other entrepreneurs (including shops, restaurants and hotels). Alternatively fish are sold to middle-men who then mark up the price for sale at the outlets noted above. Both middle-men and fishers are sometimes reluctant to pay the handling charge (F$0.22 per kilogram of fish) in Tavua Town market and hence the proliferation of informal roadside markets and other private outlets. There can be keen competition amongst the middle-men to secure fish to sell. There are a number of what could be described as ‘part-time’ middle-men but the core of the business is taken by 6 individuals, 4 of which own their own vehicles to transport the fish to the outlets, one of whom also owns a shop and restaurant which is used as an outlet in Tavua Town. Of the 36 Tavua fishers interviewed 10 (28%) reported a reciprocal arrangement in that they used the same middle-man each trip; the vessel would return on a pre-arranged data and the middle-man would await them at the landing site used by the fisher (usually as close to the fishers home as possible). The market facilities were used by 12 (33%) of fishers and 14 (39%) reported that they used no set middle-man; the catch would be sold to the highest bidder. It was reported that an increasing number of middle-men are making the journey from Ba Town to purchase fish and that this competition for produce is beginning to create some conflicts between the middle-men.

In Vitogo-Vidilo the outlets identified are of a similar type to that described for Tavua qoliqoli. However, there is one significant difference in marketing between the two sites and that is the role of middle-men in the Vitogo fishery. Most notably at the main landing site of the Fisheries Wharf in the City of Lautoka. As with Tavua the exact number of middle-men is not a fixed number because there is a good deal of flux in the economic fortunes of individuals involved in the business. There are however about 15 key players based at Lautoka (of which 2 are Fijian, the remaining 13 Indo-Fijians) and probably another 5 at smaller landing sites along the coast including at Saweni. Middle-men may rely totally on the selling of fish for income but for others its contribution to their overall income may only be 25%, with taxis, carrier-vans, shares in fishing boats (one middle-man owns two boats) and other miscellaneous activities also contributing. The competition between middle-men for access to the catch from boats that are not loaded, including the weekend-only boats, can be fierce and fights between middle-men are not unknown.

The majority of fishers own their own boats (usually bought on terms) but a significant number operate in close cooperation with middle-men who pay, or 'load' in the jargon of the fishing port, for fuel, bait, food and ice prior to the fishing trip. These costs are then subtracted from the shares received by the crew. In exchange for this up-front payment the vessel owner/skipper is duty-bound to sell his catch to the middle-men who loaded his boat. The number of boats loaded by a single middle-man (or a partnership) varies from 1 to a reported maximum of 13 boats. In general this works well for fishers and middle-men however if the total value of the catch is less than the costs of loading the vessel the loss is taken by the middle-man. Generally they would seek to recover their losses over subsequent fishing trips but conflicts have developed where fishers, after a series of losses, have switched middle-men. This problem is reported to be especially acute during the 'off-season' which runs approximately between January/February to July/August. Losses were reported to run to F$10,000. As with other fishers, middle-men reported that piracy was responsible for significant losses to their operations.

In Verata and Cautata marketing is less complex and the influence on middle-men is less obvious. Fishers from these *qoliqoli*, given that they are not full-time commercial fishers, tend not to support a middle-man system. The variability of the landings and cost of access to the site for a middle-men discourages this type of marketing organisation. Marketing is concentrated through offices in Nausori Town including the Native Lands Trust Board. Other outlets include butchers, a bakery and at the municipal market in Nausori and in the capital city of Suva on Saturdays.

Table 32 - Summary Interactions: Fishers and Stakeholders involved in Marketing

Form of Interaction	Naweni	Tacilevu	Tavua	Vitogo/ Vidilo	Verata	Cautata
Ice/Market Facilities provided by DoF	✔	✔	✘	✔	✘	✘
Operating Capital Provided by Middel-men	✘	✘	✔	✔	✘	✘
Informal Marketing Activities	✔	✔	✔	✔	✔	✔

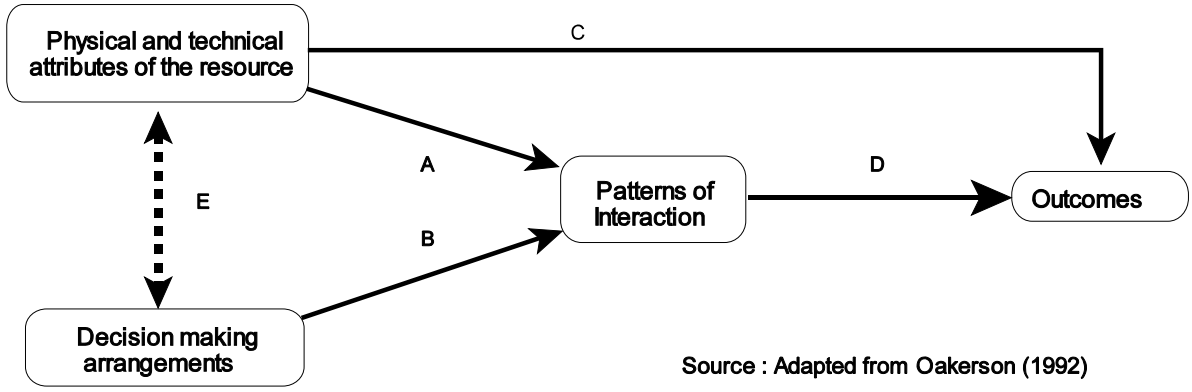
1.4 Understanding the Fisheries (2) : Physical/Technical Attributes

This section seeks explanations, in the physical and technical attributes of each CFRAs, for the patterns of interactions reported in Section 1.3 and to broadly identify the limits on the possible outcomes reported in Section 1.2.

Physical and technical attributes affect a fishery through two paths of influence. As direct or '*hard*' constraints these attributes will influence the possible outcomes by creating their 'boundary conditions'. Whatever choices are made, these attributes still affect the outcomes.

For example, the outcomes presented in Section 1.2 included yields of particular families. The physical attributes will determine what families will be available through it's influence on climate and habitat and, indirectly, on the types of gears that are appropriate to capture these resources. The technical attributes (particularly the level of economic development and its influence on technological development within the fishery and the marketing opportunities that fishers enjoy) will also constrain the potential yields and revenues generated from the fishery. This relationship is represented by line C in Figure 29 below.

Figure 29 - The Oakerson Framework



Physical and technical attributes will also influence the mutual choices made by fishers and the subsequent patterns of interaction (of all the fishers) observed (line A in the figure). The strength of influence will depend on the fishers perceptions of the advantages offered or constraints imposed by these attributes. For example, although fishers may be limited by physical and technical attributes to targeting a particular range of families they still have a choice to make about when, where and how to target these resources on any particular fishing trip. It is important to bear in mind that some choices will be influenced by a number of different attributes in addition to the influences of political and social contexts of a fishery. Furthermore, that these different influences will interact in quite individual ways according to the particular circumstances of each location. The final relationship to identify is that represented by the dashed line E. This relationship describes the influence of physical and technical attributes on the types of community institutions that have developed and the rules and regulations that they may operate. In fact, from the perspective of the stakeholders there exists a feedback mechanism. The size of CFRA for example will determine what the carrying capacity of the CFRA's resources area. Further to this, the rules and regulations will (or at least should) determine the level at which the resources are exploited.

The resource manager, whether customary or a State agency, is primarily interested in the following three attributes of the physical and technical attributes of a fishery:

1. The Capacity of the Resource to Support Multiple Users.

It is self-evident that a finite resource base will have a finite level of exploitation. It is essential that the capacity of a resource is, from the perspective of sustainable exploitation, as best understood as is possible given prevailing knowledge and financial conditions. Theoretically at least this information should provide the basis for taking a precautionary approach to management with an adaptive long-term view. A fishery only exists when fishers capture living resources. For fisheries managers (again whether customary of state-appointed) their

responsibilities lie also with the fishers themselves and they may seek to maximise individual revenues for fishers within the boundaries of sustainable production. Fishers themselves, especially commercial fishers, adapt their activities as individuals and groups to suit local conditions. In fact a good deal of cooperation was observed between fishers, notably at the artisanal and small-scale commercial sites. This cooperation in some part is due to the physical and technical attributes of these particular fisheries. At more commercial sites, the cooperation tends to be purely based on economic exchange and conflict between stakeholder groups intensifies due to perceptions of an imbalance in the benefits being extracted by the different groups. The manager again needs to be aware of the different ways in which fishers adapt as these not only affect cooperation and conflict within the fishery but may potentially affect management actions to be invoked by the managers.

2. The Control of Access

All inshore fishing grounds in Fiji are demarcated as belonging to a particular *vanua* or *yavusa*. Despite this level of sub-division access controls are less important, at least amongst tribal groups, than one might expect. Some of the reasons for this are discussed in more detail in Section 1.5. However, where commercial fisheries are being developed by stakeholder groups (Indo-Fijians) without the traditional family and cultural links, access control is becoming a more important issue. The reverse, of course, is also true. Indo-Fijians, who legitimately purchase access rights (licences), are equally concerned that the value of their investment is not reduced by levels of fishing effort above that which they paid to compete with. (And that their rights of access are not constrained). The ability to control access is central to the success of management actions (to sustain the resources and benefit from the resource rent available from a well-managed resource) and to the success of fishers. The attributes of each site will be identified *viz-a-viz* their ability (and success) to control access. For this section we expand slightly the original use of this term in Oakerson to include all monitoring, control and surveillance (MCS) activities.

3. The Scale of Management

This section will consider the influence of the scale of existing management units (which, in Fiji, are defined by cultural politics) on current interactions. The scale of management is often a thorny issue; on the one hand one wants to maintain small-enough units that the process of management (the gathering of data for example) is practical, on the other hand one needs to consider the underlying distribution of the stocks that one seeks to manage. For example, myriad small management units acting independently along the migratory route of a valuable species, will probably not effect useful management. This section considers the attributes of the research sites in relation to underlying resource distribution and the response of fishers to this distribution. In Fiji management units, the *qoliqoli*, are based not on biological considerations but largely on historical political (and land resource) consideration. A more detailed analysis of the formation of the *qoliqoli* is presented in Section 1.5 and this section will therefore confine itself to observations on the physical and technical attributes of the resource system with regard to efficient management.

1.4.1 The Capacity to Support Multiple Users

Fiji experiences two distinct seasons. The wet (hot) season occurs approximately between November and April, the dry (cold) season between May and October. The dry season is characterised by prevailing South-East Trade winds; the wet season by North-Westerlies. Although the entire archipelago experiences this seasonal variation in weather conditions,

there are regional variations in the extent of the differences. The east coast of Viti Levu in particular, being a weather shore, experiences higher rainfall than the west coast which effectively lies in rain-shadow. Figures 30 and 31 present summary data on mean rainfall by month for Suva (on the east coast of Viti Levu) and for Nadi (on the west coast of Viti Levu). No data was available for a weather station close to Naweni *qoliqoli*.

Figure 30 - Key climate parameters for Suva

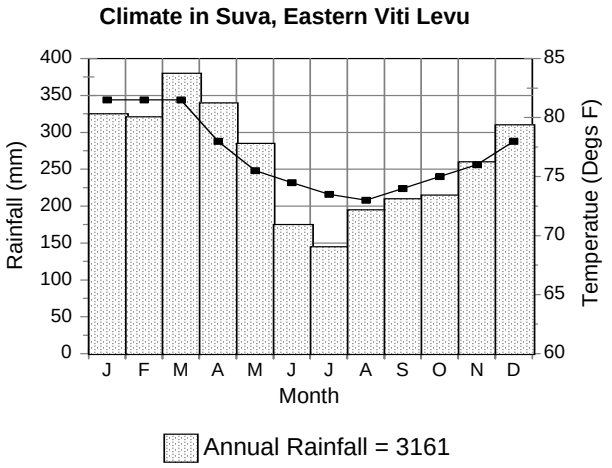
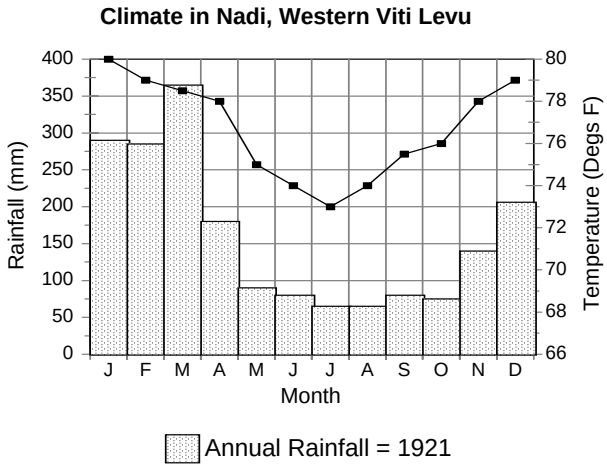


Figure 31 - Key Climate parameters for Nadi



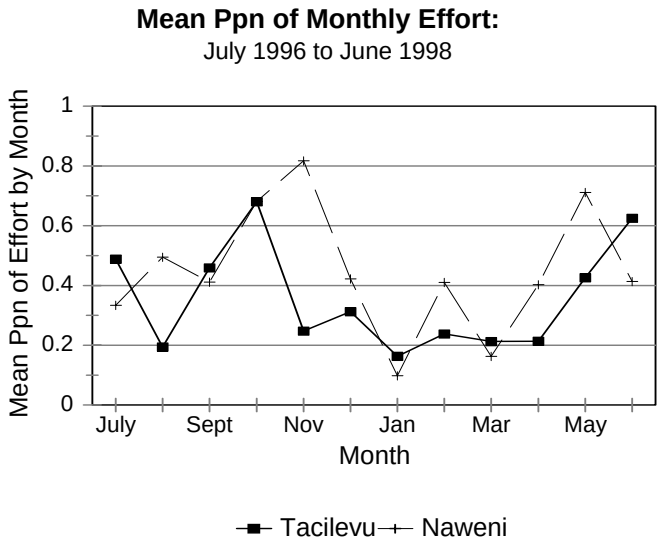
Climate and seasonality will in a very broad way constrain the available habitat and fin-fish resources potentially available to fishers. The abundance of specific resources are often seasonally determined. Spawning aggregations, spawning migrations or ontogenic migrations related to particular seasons. This is no surprise. What is more interesting is the affect these attributes have on choices made by fishers. Seasonal increases in abundance anticipated by fishers can influence choice of target species perhaps through gear selection, method of deployment or location of fishing activity. Location and choice of gear may be determined not by seasonal abundance of resources but seasonal accessibility to particular fishing grounds. For example, deeper offshore reefs may usually be fished with spear-guns or handline. If they become inaccessible during, for example, stormy weather fishers may be restricted to fishing shallow inshore lagoon waters where gill-nets may be a more appropriate gear. The capacity to support multiple users will be determined by these attributes because

the flux in location of fishing, target resources and .gear-type (and mode of use) can act to spread fishing effort across the fishing grounds through the year and to perhaps shift effort from one family/species to another resulting in pulses of fishing mortality on one particular group.

Naweni *qoliqoli* has an approximate total area of 17sq.km with a perimeter length of 22km. The *qoliqoli* extends from the shore line to the barrier reef of the lagoon and is approximately 1.5km wide at its widest point. The marine environments of Naweni and Tacilevu are characterised by the presence of a lagoon with a barrier reef inter-cut by deep channels fed by small rivers and streams. The lagoon area of Tacilevu extending west to the Naweni channel is typically more shallow than the lagoon area to the west of the Naweni channel. Access to grounds is generally not restricted by any particular feature of the marine environment in the Naweni/Tacilevu area. The shallow and wide lagoon and the relatively sheltered channels do not severely restrict fishing locations or require extensive travel. The furthest grounds in the *qoliqoli* are less than 5 kilometres for a village. In Section 1.2 it was observed that fishers from each village generally fished within the locale of the village and did not fish extensively in either the waters adjacent to the neighbouring village or in adjacent *qoliqoli*. Where an extensive off-shore area exists, the putative village fishing rights areas would naturally defer to a shared resource probably fished less frequently than inshore grounds. Naweni *qoliqoli* is narrow, only 1.5km at its widest point which mitigates against sharing of the fishing rights area as a whole. Given the spatial constraints of the resources available, the capacity to support multiple users is thus limited in the Naweni and Tacilevu fisheries. We noted in Section 1.3 (Patterns of Interaction) that catch-rates were not significantly different as the number of crew fishing together increased. For gill-net fishing this represents a constraint on the fishery, the inevitable response of fishers is to fish more nets because no gain can be made from more crew assisting during the fishing operation itself. For Tacilevu fishers the demand for marine resources is such that they are beginning to utilise resources nominally under the control of Naweni village (and in the neighbouring Vunilagi *qoliqoli*). This represents their response and adaptation to the limits of the resource base to support multiple users. A possible development response for this area is to promote the fishing of resources from the outer reef shelf which are only rarely targeted with the current level of technology available. This idea is exemplified at the end of this sub-section using data analysed across all the research sites.

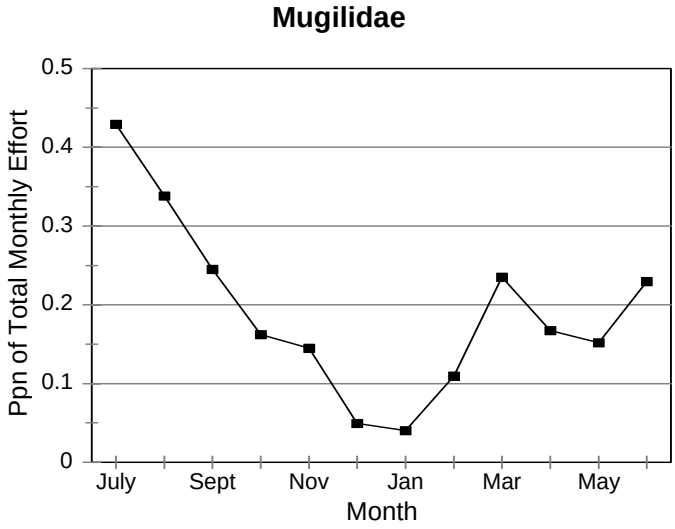
In Naweni fishers reported that there were no strong seasonal patterns to their use of gears but they did report that there was some seasonality to the catches they obtained for some families. Figure 32 presents data on gill-net use by month only starting with the first month of sampling (July). No data was available for the months of January, February, September or October, 1997.

Figure 32 - Proportion of Gill-net fishing effort by month - Naweni and Tacilevu



This figure suggests that there is, in fact, some seasonality to the use of gears with increased use of gill-nets during the dry season/early wet season (May through October/November) compared with the later wet season (December to March). A similar pattern is seen in both Naweni and Tacilevu; two independent data collectors were operating at these sites. The difference in proportion for gill-net use in November stems partly from the influence of the lifting of the Naweni closure in that month when fishers concentrated on the use of gill-net in the newly opened area. Figure 33 presents the mean catch of Mugilidae, as a proportion of the total catch, by month for Tacilevu and clearly the family contribute most significantly during these months.

Figure 33 - Proportional contribution of Mugilidae to the total recorded catch, Tacilevu



In Tacilevu the presence of Mugilidae, reported by fishers to be particularly abundant during June through August, in the shallow lagoon waters off the village influences the use of gill-nets during this period. The mullets are caught using multiple gill-nets linked together and used to corral the fish (eg. Apenisa Botilagi, pers comm; J.Anderson, pers obs).

Figure 34 presents equivalent data for the use of handlines for Naweni and Tacilevu. Again the influence of the closure being lifted in 1996 is responsible for the low proportional contribution of handline effort in November in Naweni.

Figure 34 - Proportion of Handline fishing effort by month - Naweni and Tacilevu

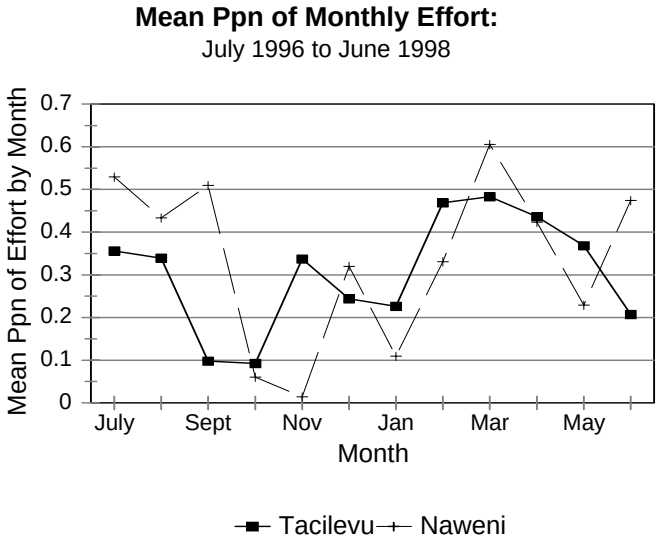
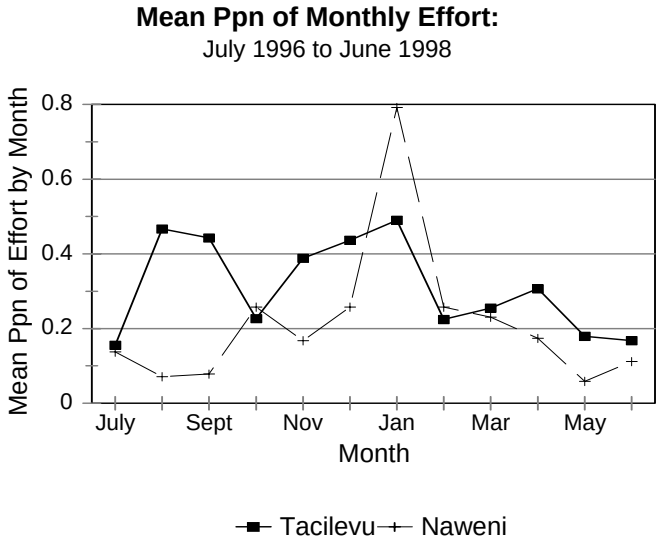


Figure 35 presents equivalent data for the use of spear-guns. In Naweni spear fishing recorded its highest contribution to total recorded fishing effort during the wet season tapering off during the dry season. A peak of effort was recorded in January, 1997 when spear-fishing accounted for 79% of recorded fishing effort in that month. In Tacilevu the situation was a little different with spear-fishing recording a more consistent and higher contribution to overall effort than was the case in Naweni. But again spear-fishing effort tailed off during the early dry-season. The reason for the larger contribution of spear-fishing to overall effort in Tacilevu results from the greater range afforded the fishers by the ownership (by one individual) of a fishing vessel. This individual also acts as a middleman for the community in Tacilevu therefore providing the all important market to which the spear-fishers can sell their catch directly in the village. This facility includes two freezer units. The responsibility, (and cost) of transporting the catch to outlets in Savusavu is also subsequently taken on by the middleman.

Figure 35 - Proportion of Spear-gun fishing effort by month - Naweni and Tacilevu

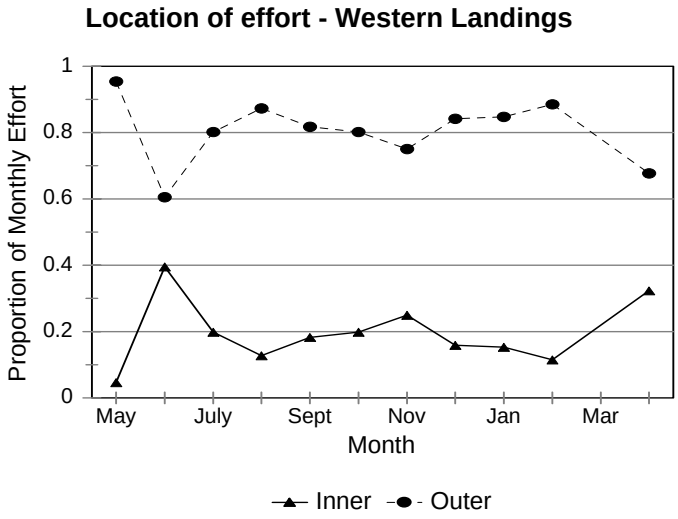


At neither Naweni or Tacilevu analysis of GIS data did not reveal any clear seasonal patterns to the distribution of fishing effort across the fishing grounds either in total or for individual gears. The figures presented above for Naweni and Tacilevu, although a pragmatic response of fishers to the influence of season on resource accessibilty, also affect the resources capacity to support multiple users. Reference to Figure 35 indicates that there are periods of the year when resources targeted or incidentally vulnerable to gill-net fishing will experience proportionally less effort than is the case at other times of the year.

Tavua *qoliqoli* encompasses an area of approximately 680 square kilometres with a perimeter length of 149km and approximately 51 kilometres of shoreline from Vatia Wharf in the west to Rabulu Village in the east. The distance from the coast to the outer (northern) boundary of the *qoliqoli* is approximately 35 kms. The coastline in this area of Viti Levu is characterised by a heavily indented coastline fringed with mangrove and mudflat areas. There are three clear habitat types found in Tavua *qoliqoli*. The inner mangrove, mudflat and lagoon shallows cover an area of approximately 120 square kilometres (of which the mangrove covers 25%) extending out up to 5.5kms from the shore at its widest point. The inner reef area comprises large patch reefs, including Cakau Tavuca and Cakau Salisali, and the western portion of Cakau Drala (these reef areas are often grouped under the name Cakau Levu, lit. the big reef). These reefs extend out to a maximum of 11km from the shore. Cakau Boroboro stretches 10 km north of the inner reef; the total area of this environment covers 91 sq kms in total. The third area, separated from the majority of the inner reef by waters in excess of 250 metres deep, includes Cakau Masi, Cakau Vatutolutolu and Cakau Baraki. Cakau Vatolutolu and Cakau Baraki sandwich an expansive area of shallows and patch reefs covering an area of some 79 sqkm; the total area of this outer reef area covers 91 sq.km. The distance of this reef area (25-35kms) from the coast discourages less experienced fishers and fishers from the eastern villages of Tavua from travelling to this area. We observed in Section 1.2 that fishers from the western and eastern areas of Tavua tend to fish in different areas. This represents the fishers' response to the physical attributes of the CFRA . Further analysis of data for fishers from these sites indicated that there was

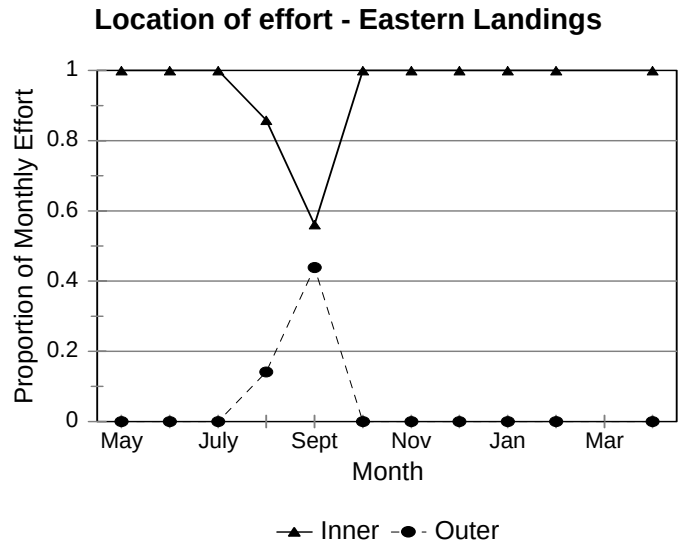
no substantial seasonal variation in the location of their effort. Figure 36 presents these data by month.

Figure 36 - The distribution of effort by fishers from western landing sites between inner and outer reef areas, Tavua *Qoliqoli*



Similarly, there was little seasonal variation in the distribution of effort by fishers operating from landing sites to the east of Tavua *qoliqoli* (Figure 37). The only exception to this was recorded during September, 1997.

Figure 37 - The distribution of effort by fishers from eastern landing sites between inner and outer reef areas, Tavua *Qoliqoli*

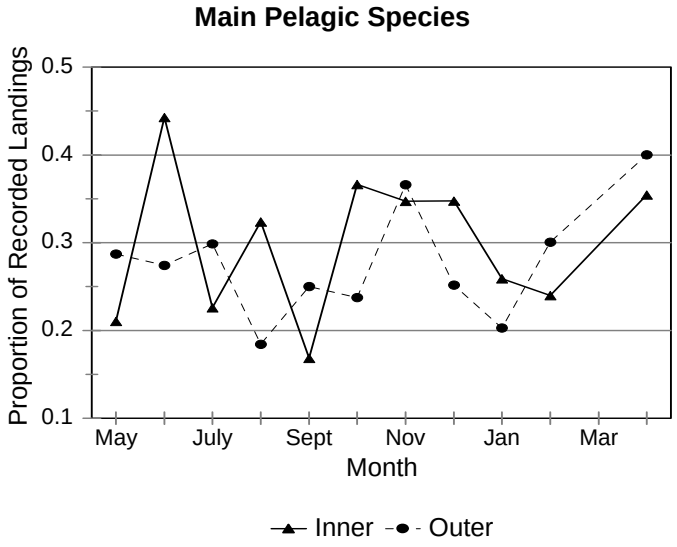


In Tavua the majority of data was collected for handline only so no seasonal pattern could be discerned for the use of fishing gears. In any case, this fishery is largely commercial and gear is expensive (fishers believe they spend as much as F$1,000 per annum on replacement fishing lines, hooks etc). For this reason fishers tend to specialise in the use of

specific gears. However, some seasonal variations in the contribution of particular families was observed both within and across the inner and outer fishing grounds.

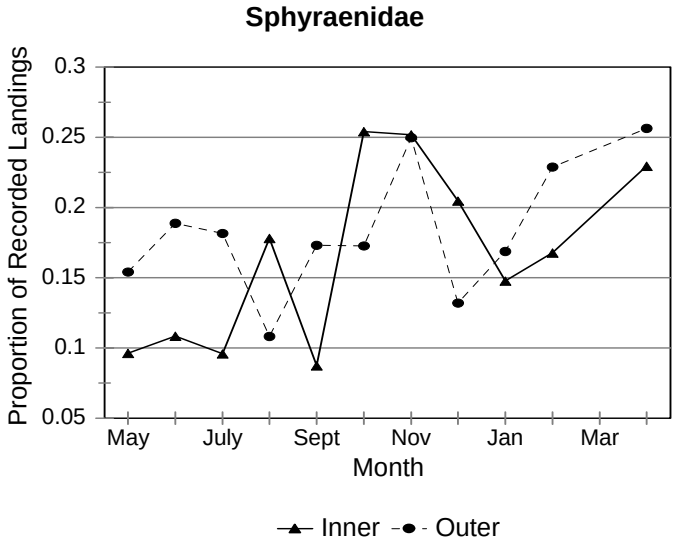
Figure 38 presents data on the proportional contribution of pelagic species to the total catch across the fishing grounds. The key families of these pelagic species are Sphyraenidae, Carangidae, Scombridae and (for the inner reef area only) Belonidae.

Figure 38 - Proportional contribution of pelagic species to total recorded catch by month and fishing ground, Tavua *qoliqoli*



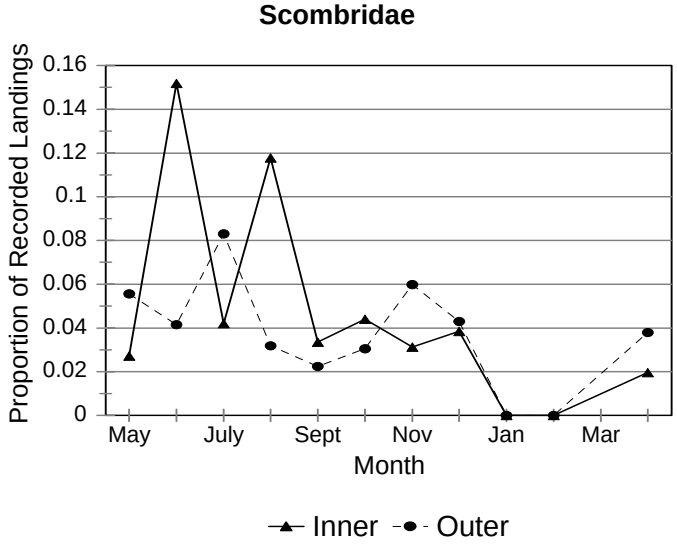
There are clear similarities between the inner and outer reef areas, both in terms of the proportional contribution of pelagic species across the two areas and in the timing of seasonal variations. The one obvious deviation from this pattern in for the inner reef area in June. This peak corresponds to a peak in landings of Belonidae which comprised 10% of total recorded landings during this month in the inner zone. Within this grouping there are seasonal variations in the contribution of particular families. Figure 39 presents data for Sphyraenidae which peaks in its contribution during November in the outer reef area and during October, November and December in the inner reef area. Catches again peak at both sites during February and April. No GIS data (to indicate whether the catch originated from the inner or outer zones) were available for March, but overall Sphyraenidae recorded 19% of the total catch (across areas) in this month.

Figure 39 - Proportional contribution of the Sphyraenidae to total recorded catch by month and fishing ground, Tavua *qoliqoli*



Similarly, data for Scombridae (principally *Scomberomoides commerson*) indicates a seasonal abundance in the catch statistics (see Figure 40).

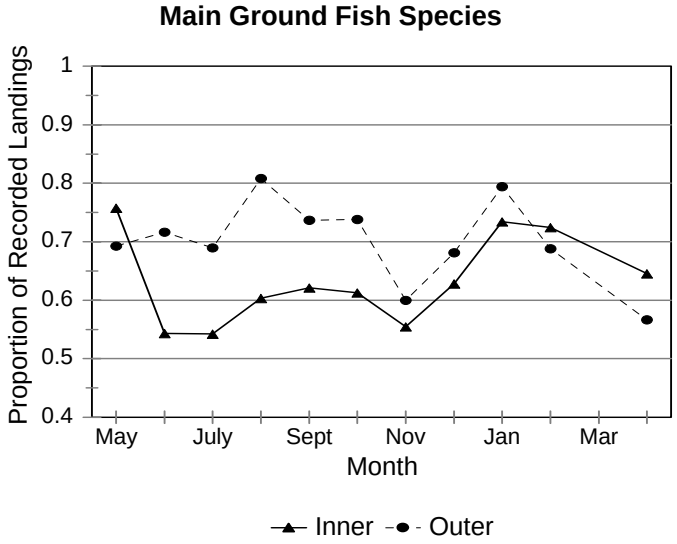
Figure 40 - Proportional contribution of Scombridae to total recorded catch by month and fishing ground, Tavua *qoliqoli*



For ground fish seasonal variations were also observed (see Figure 41). The principal families included in this grouping are Epinephelini, Lutjanidae and Lethrinidae. Landings are

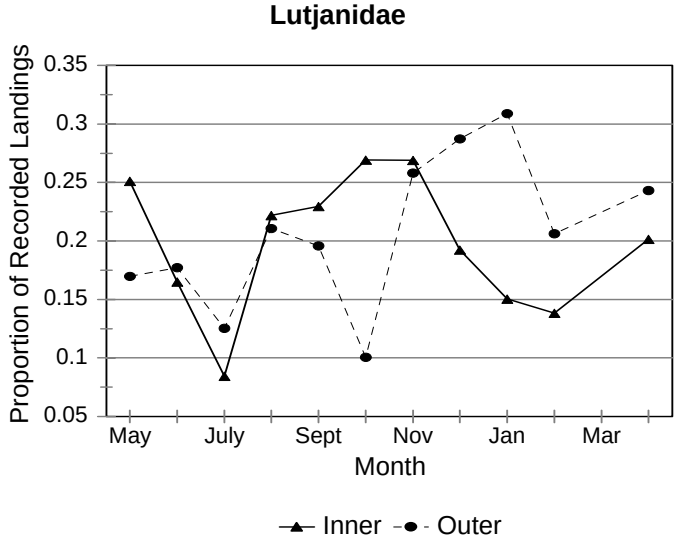
fairly consistent for the outer reef area with the exception of November during which pelagic species dominated the overall catch composition. For the inner reef area landings of ground fish peaked during the wet season months, particularly from December through May.

Figure 41 - Proportional contribution of the main ground fish species to total recorded catch by month and fishing ground, Tavua *qoliqoli*



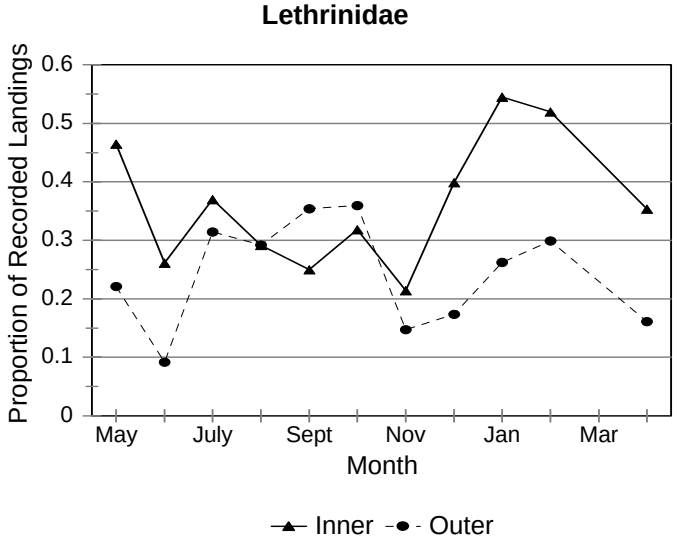
Within the ground fish grouping there were variations at family and species level. Figure 42 presents data for Lutjanidae; the principal species recorded in this assemblage (in descending order of catch) include *Lutjanus argentimaculatus*, *L.fulviflamma*, *L.timorensis* and *L.gibbus*. For the inner reef area a peak contribution to overall catch composition is recorded from August to November but this is followed by a decline in landings relative to other families during the wet season months of December, January and February. In contrast catches of Lutjanidae peak in the outer reef area from November through January.

Figure 42 - Proportional contribution of the Lutjanidae to total recorded catch by month and fishing ground, Tavua *qoliqoli*



Data for Lethrinidae is presented in Figure 43. The principal species contributing to this family assemblage (in descending order) are *Lethrinus atkinsonii*, *L.nebulosus*, *L.harak* and *L.elongatus*. the pattern is essentially reversed with peak landings in the outer reef area during the dry season (May to October) declining during the wet season. For the inner reef area Lethrinds contribute a higher proportion to the total catch during the wet season than in the dry season.

Figure 43 - Proportional contribution of the Lethrinidae to total recorded catch by month and fishing ground, Tavua *qoliqoli*

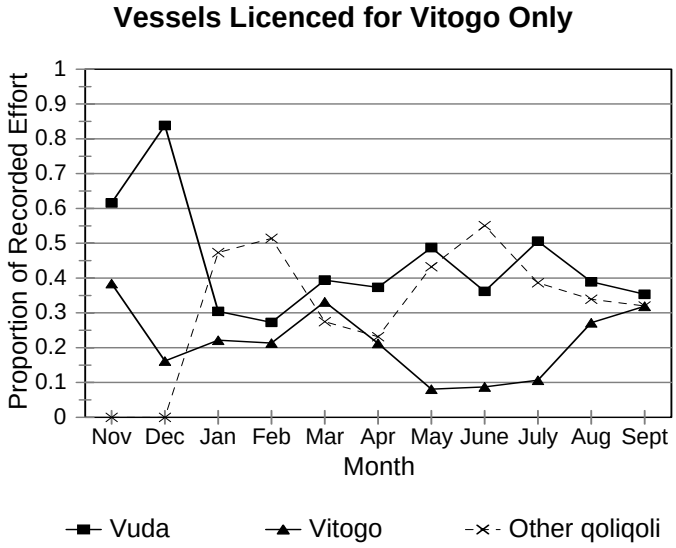


Vitogo/Vidilo *qoliqoli* covers an area of 235 sq.km with a reef area of 99 sq.km and is nested within a broad lagoon area that extends from the Mamanuca Islands in the south to Ba *qoliqoli* in the north. The perimeter length of Vitogo/Vidilo *qoliqoli* (excluding the coast) is 64 km and the *qoliqoli* is bordered on three sides by three different *qoliqoli* (Vuda, Votua and Waya/Naviti 2). The marine environment is characterised by an inner area of patch reefs and small coral cays extending out from what was originally a coast of mangrove. This area is subject to sedimentation caused by run-off from the cane-farms that cover the area cleared of mangrove. The area close to Lautoka City is subject to some pollution from a sugar-cane processing mill and from oil and other pollutants associated with urban development and port activity. Large bulk-carriers load sugar and wood chips. The outer patch reefs are less subject to sedimentation. The reef system of this area of Viti Levu is largely contiguous with the reefs of Tavua *qoliqoli*. The response of fishers to the (limited) capacity of the resource base to support multiple users is somewhat different in this example. We saw in Section 1.2 that a significant proportion of the effort prosecuted by commercial fishers licensed for Vitigo/Vidilo was recorded outside the *qoliqoli*, only 21% of recorded effort was prosecuted inside the *qoliqoli* for which these fishers were licensed. The commercial fishers therefore perceive (and make choices based on this perception) that the resource base cannot support them as individuals (and by implication, multiple users). Their choice is therefore to search for grounds that do, currently at least, support their activities.

As noted above for Tavua, the majority of fishing effort recorded for fishers licenced to fish in Vitogo/Vidilo was prosecuted by commercial handline fishers so analysis of seasonality is limited to location of effort and catch composition. Figure 44 below presents data on the

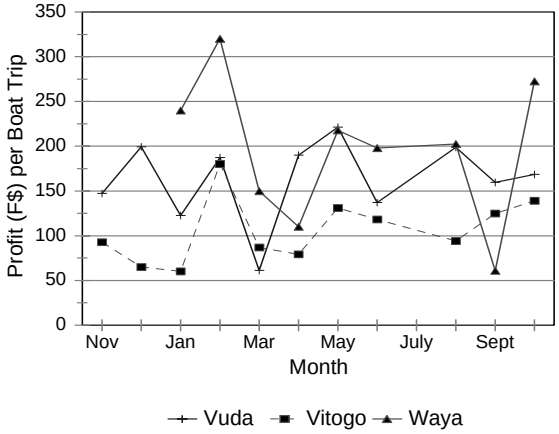
distribution of fishing effort (man hours) by month in 1997/98 for three *qoliqoli* (Vuda, Vitogo and Waya/Naviti).

Figure 44 - The seasonal distribution of fishing effort across three *qoliqoli* by vessels licenced for Vitogo/Vidilo *qoliqoli*



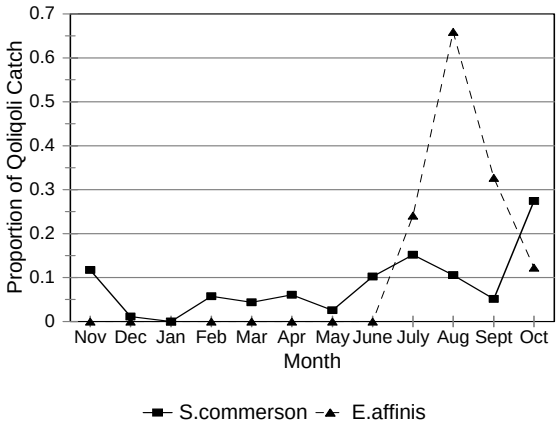
The peak of effort located inside Vitogo/Vidilo itself occurs during the wet season. Relatively little effort, on average less than 10% of the total effort recorded for these vessels, was recorded inside the *qoliqoli* during the dry season months of May, June and July. Fishers tend to operate further off-shore during this period. Effort expended in Vuda *qoliqoli* is relatively consistent with the exception of the peak in November and December. If one were to go by the number of licences requested and issued by the management authorities one would be under the impression that the capacity of the resource to support multiple users has not yet been exceeded. This would be a mistake fishers are not using Vitogo/Vidilo but the more distant reefs in adjacent qoliqoli despite the increase in variable costs that this entails. The fishers perceive that the capacity of the resource to support multiple users in Vitogo/Vidilo has been largely exceeded. Analysis of mean trip profits for fishing trips inside Vitogo/Vidilo versus the adjacent Vuda and more distant Waya present a clear picture of the marginal benefits to be gained from fishing outside Vitogo/Vidilo (see Figure 45).

Figure 45 - Profits per Trip by Qoliqoli



The most important single resource to fishers is the seasonal scombrid fishery, this usually targets *Scomberomorus commerson* but in the early scombrid season the principle catch was of large *Euthynnus affinis* (up to 5kg). The peak for this fishery was recorded in August (4500kg sampled). Figure 46 displays the monthly contribution of *S.commerson* and *E.affinis* to the total catch recorded for Vitogo/Vidilo licensed fishers across all *qoliqoli*.

Figure 46 - Proportional contribution of *S.commerson* and *E.affinis* to monthly catch by Vitogo Fishers (all sites)

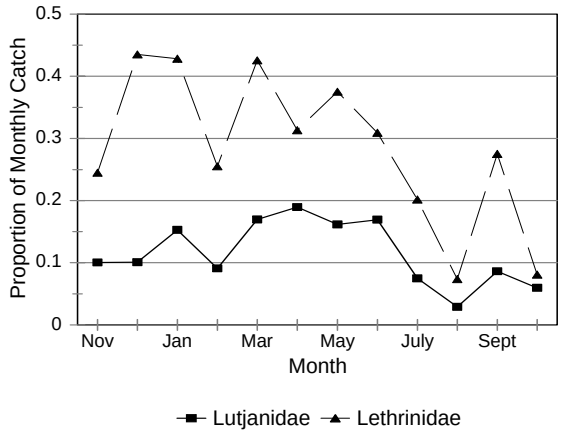


The value of this resource to fishers is high. The price can rise to F$8 per kg at the start of the season for *S.commerson* compared with a mean price of F$3.82 per kg for all species. There is therefore a certain imperative for fishers to target the scombrid migrations. The capacity of the Vitogo/Vidilo *qoliqoli* is insufficient to support these fishers who, making judgements based on their understanding of the physical attributes of the resource base, follow the migratory stocks of scombrids. This will affect the integrity of all *qoliqoli* in the area as fishers target this highly lucrative stock.

The effect of this focus on scombrid can be seen in the relative decline in the contribution of other species usually targeted by the fishers. Figure 47 displays the contribution of Lethrinidae and Lutjanidae to the overall catch by Vitogo/Vidilo fishers across all *qoliqoli* they

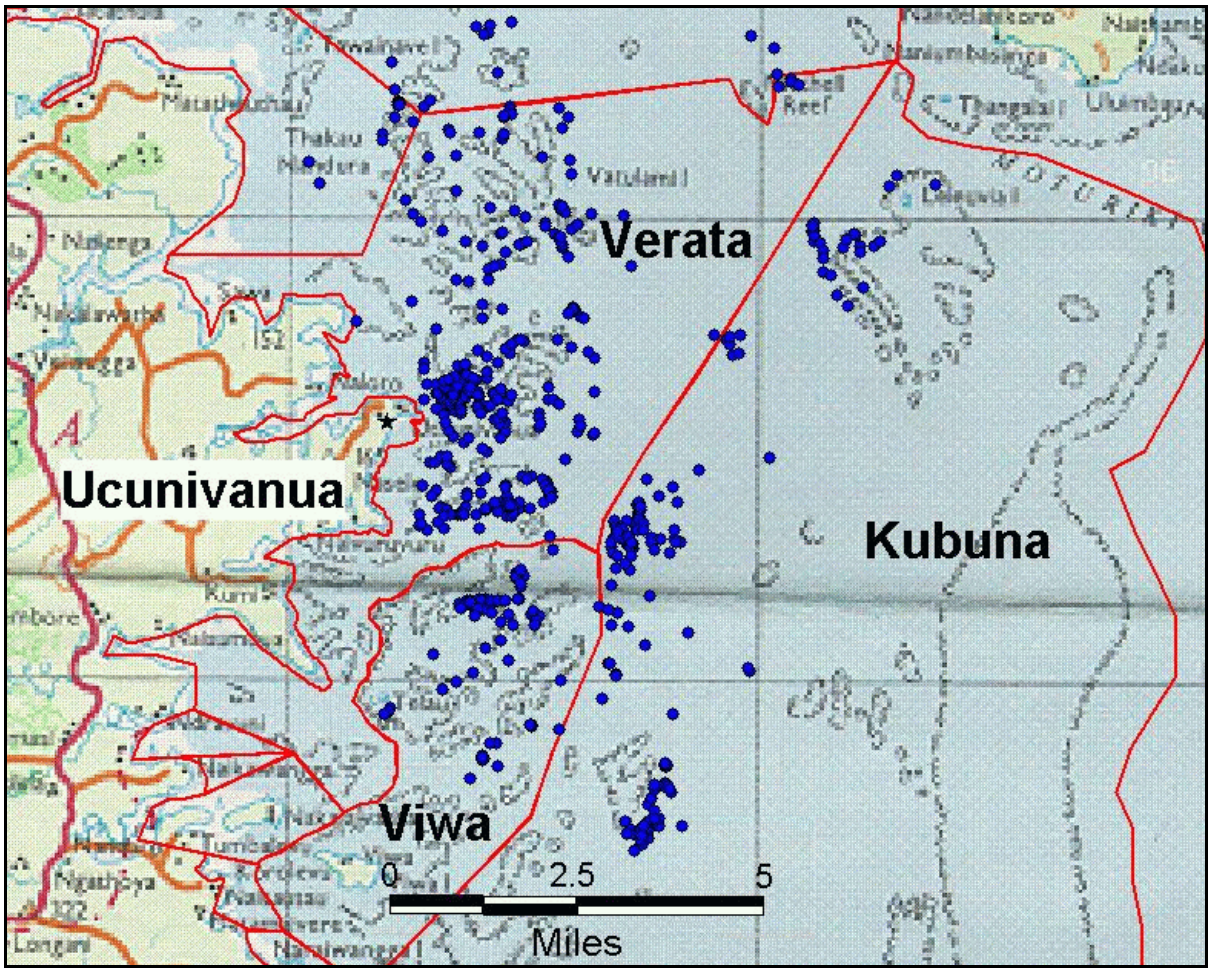
utilise.

Figure 47 - Proportional contribution of two ground fish families to monthly catch (all *qoliqoli*)



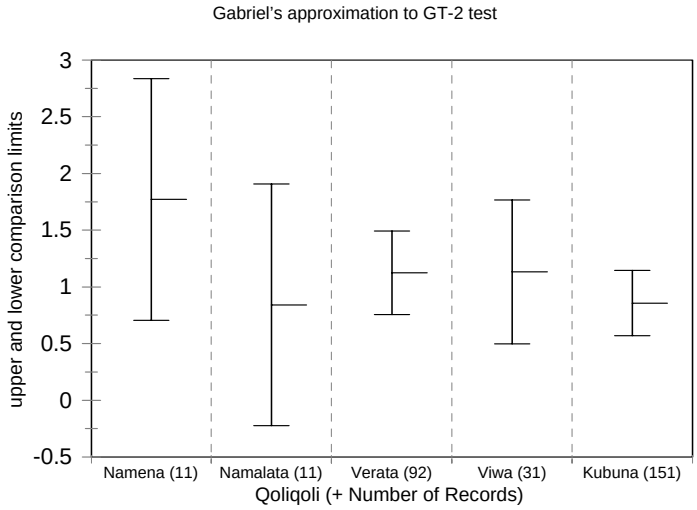
Verata *qoliqoli* covers an area of 102 sq. km with a reef area of 30 sq.km and a perimeter length (excluding the coast) of 50km. The maximum distance to the outer boundary is 12 km. The *qoliqoli* is bordered by 5 *qoliqoli*. This area of the east coast of Viti Levu is characterised by a lagoon extending from Suva in the south and north and west to Ovalau Island. The inshore habitat is characterised by shallow patch reefs with sand channel between; visibility is poor. Due to run-off from the various streams and rivers including the large Rewa River to the south. Again, the response of fishers to the constraints of the resources and the ecology of the area they control, is to expand their sphere of operations beyond 'their' fishing grounds. Only 46% of their fishing effort was recorded inside Verata, with 35% recorded for the adjacent Kubuna *qoliqoli*. Analysis of the data by fishing gear was reported in Section 1.2. It revealed that while he majority of the gill-net activities were reported for inside Verata, the majority of spear-gun fishing trips were reported for outside Verata. Due to poor visibility in the inshore waters of Verata it was not possible to undertake UVC to gain a fishery-independent assessment of the status of species taken by spear-gun. But fishers reported that they fished outside Verata, paticularly with spear-guns, because of a perception that capth-rates were higher. The reason they explained for this was of a combination of environmental conditions (the poor visibility in the near-shore area), the species they were able to target (the habitat was not suitable for them in the inshore area) and their perception of a lower abundance in general resulting from a combination of environmental constraints and fishing pressure. Figure 48 presents the location of fishing trips by these fishers.

Figure 48 - Use of Verata and adjacent CFRAs by fishers from Ucunivanua village, Verata



However, analysis of catch-rates for spear-fishers did not reveal any significant difference between the various *qoliqoli*. Kubuna (which recorded 151 spear-fishing trips) in fact recorded a lower (although not significantly lower) CPUE compared with both Verata and Viwa. Figure 49 presents these data.

Figure 49 - GT-2 test of CPUE for five *qoliqoli*, east coast, Viti Levu.



When analysing the capacity of a resource to support multiple users one can look at two time-spans. We have concentrated on the longer-term responses of fishers to their perceptions of capacity. But in the short-term do concentrations of fishers reduce it's capacity to support multiple users? Do fishers interfere with each other catch-rates when they fish close to each other. Figure 50 presents an analysis of catch-rates from the spear-gun fishery against number of fishers operating from a particular boat.

Figure 50 - Comparison of Spear-gun catch-rates by crew-number for Verata

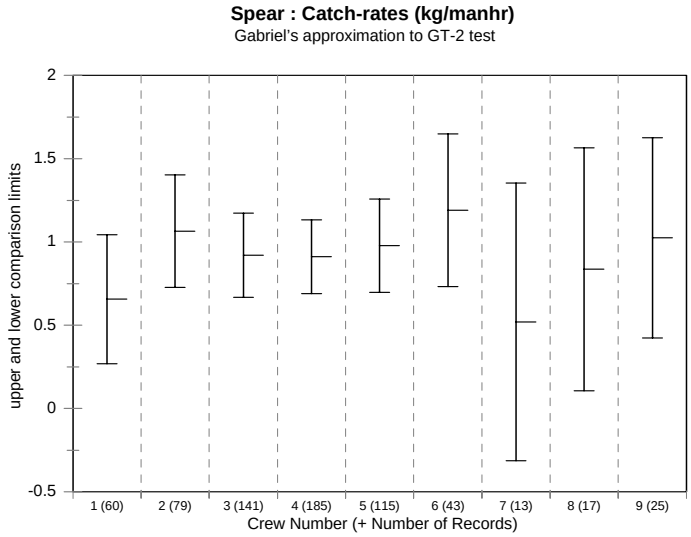


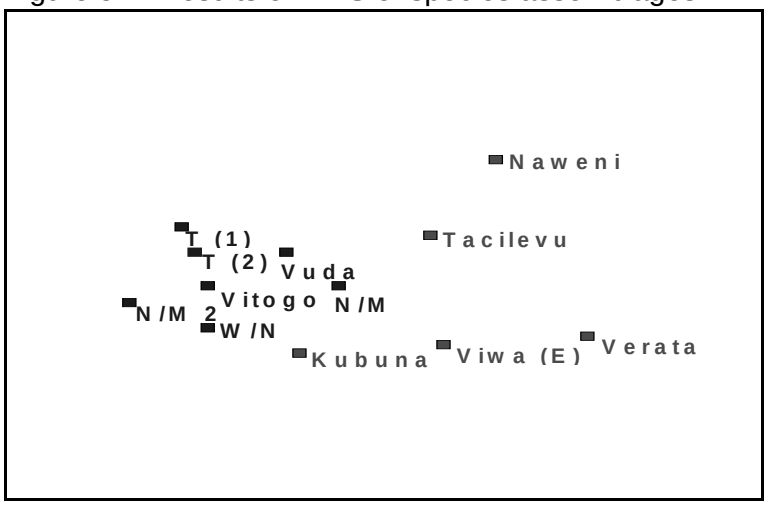
Figure 50 indicates that there was no significant difference between catch-rates versus numbers fishing from a single vessel. Over the short temporal and close spatial range of a spear-gun fishing trip, the number of crew engaged in fishing appeared not to influence the catch-rates mean catch-rates achieved.

Cautata qoliqoli covers an area of 3.4 sq.km with an area of reef flat covering 3.2 sq.km and a perimeter length (excluding the coast) of 4.4km. The maximum distance to the outer boundary is 1.1km. The ecology of the qoliqoli is dominated by mangrove, and silted tidal reef flats with a number of small streams. In fact the right's holders claim a larger area extending a further 1.6km sea-ward with an additional area of 6.7sq km of similar habitat. Cautata displays very similar environmental attributes to those observed in Verata and again the fishers have responded to the constraints placed on their potential fishing activities by moving off-shore and fishing in the sea-ward Kubuna *qoliqoli*. Only 24% of fishing trips recorded for this village were prosecuted inside Cautata *qoliqoli* itself. It was reported in Section 1.2 that the Cautata community believes the boundary to their *qoliqoli* in fact to be larger than currently recognised by the Native Fisheries Commission. Respondents stated that this demarcated area was too small for their needs.

It has been reported at all sites with the exception of Naweni village, that fishers tend to operate across CFRA boundaries. For primary rights holders (the native Fijians) this cooperation across boundaries is an important cultural feature centred on reciprocity. While reciprocity may have been a feature at the local level of de facto village-sized fishing grounds, it remains open to question the extent to which traditional fishing operations using relatively inefficient gears (compared to mono-filament nets and handlines and modern hook technology) demanded such mobility of fishers. Or whether it would have been entirely prudent for fishers to stray too far from the security of their village grounds. Whatever the historical situation, with increasing profits now available from fisheries, there is a risk that the system of reciprocal access may be abused.

A neat example of the way fisheries have evolved to make optimal use of the resources capacity to support multiple users is presented in Figure 51.

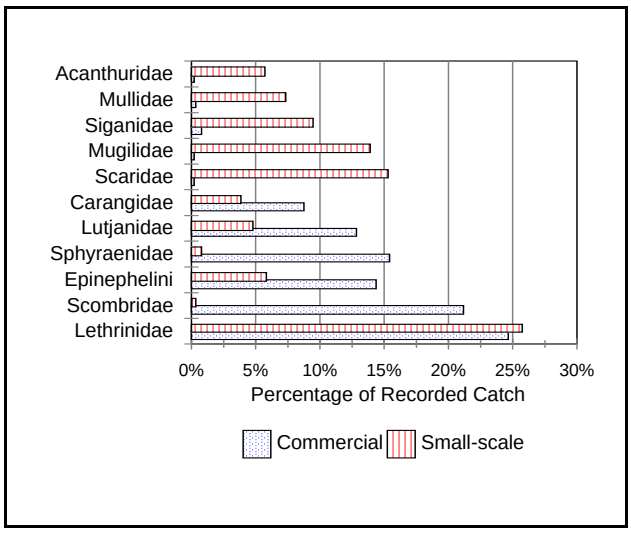
Figure 51 - Results of MDS of species assemblages



This figure shows the results of multi-dimensional scaling (MDS) of species assemblages. It is clear that the commercial sites (Tavua, Vuda Vitogo, Waya/Naviti, Naviti/Marou 2) target a

quite different range of families than the artisanal fisheries (Naweni, Tacilevu, Kubuna, Viwa and Verata), using the full ecology (and habitat ranges) of the resource base across the different levels of development. Where the resource-base is perceived as insufficient, commercial fishers expand into new areas where the species composition is different from that targeted by artisanal fishers. It is also clear that the most commercially important site, targeted by spear-fishers, is Kubuna which shows the most similarity to the fully commercial sites. Figure 52 presents the similar data but in graphical form and again the difference in the assemblage and use of the full ecology are clearly visible.

Figure 52 - Catch composition for small-scale and commercial fishers, Fiji



1.4.2 The Control Of Access

The control of access is a critical issue for managers and fishers. Table 33 presents a summary of the relevant characteristics of the six research sites with regard to controlling access.

Table 33 - Summary characteristics of the six research sites in Fiji

Site	CFRA Population (1999 est)	Total Area of CFRA (sqkm)	Total Area of Reef (sqkm)	Total Perimeter Length (km)	Distance to CFRA boundary (km)
Naweni	400	9.56	8.01	14	5
Tacilevu	250	7.07	7.07	7	3
Tavua	29000	686.8	186.84	84	36
Vitogo/Vidilo	78000	235.2	98.89	64	21
Verata	1500	102.4	27.95	43	12
Cautata†	500	3.4	3.29	4	1

There are no apparent requirements for the local community in Naweni and Tacilevu to undertake MCS activities, at least as far as incursions from commercial fishing vessels. However, were MCS required the physical environment of the area clearly lends itself to MCS activities because there is nowhere in the *qoliqoli* that is out of site of either of the three coastal villages and poachers would be quickly spotted. The furthest distance from a village to the *qoliqoli* boundary in less than 5 kilometres. The one technical problem facing the community at Naweni is that it lacks quick access to a motorised vessel with which to apprehend the poachers.

In Tavua the situation is quite different. The large area of the *qoliqoli* (almost 100 times larger than the area under the control of Tacilevu village) and complex coastal environment places severe restrictions on MCS activities, or at least places a large financial burden on an agency wishing to undertake MCS. Port-based monitoring of catches is complicated by the multiple landing sites utilised by fishers (although, because they are shallow, the timing of the landings are restricted to a reasonably full-tide). There are at least 15 landing sites that are widely known to fishers and Fisheries staff but additional sites inevitably exist. For sea-based MCS activities the situation is equally problematic given the area of the *qoliqoli* and the distance from shore to the outer boundary. The *qoliqoli* boundary cuts through distinct patch reef areas on both the western and eastern boundary and fishers could be excused for not knowing precisely whether they are poaching adjacent *qoliqoli*. If the boundary were to follow a channel for example this would be less problematic. There is a local MCS capability, but this is an activity that is incorporated into a fishing trip rather than being a specific MCS patrol. The distances involved and the costs of fuel without sources of revenue for such an activity mitigate against specific MCS patrols.

In Vitogo again the area is relatively large with a significant length of boundary. The situation is further complicated by its position relative to other *qoliqoli* and the main port of Lautoka where many of the fishing vessels operating across the Western Division are based. Sea-based MCS by Fisheries staff (usually in conjunction with officers from the Royal Fiji Police and the Fiji Navy) is reported to take place occasionally but are by no means an on-going activity for the Fisheries Division. This is largely to do with lack of financial resources. Although it's effectiveness in apprehending poachers is minimal because fishers are often aware of forthcoming patrols it will have some deterrent effect. The complex nature of the reefs and channels in relation to *qoliqoli* boundaries can make it difficult for a fisher to know precisely whether he is inside or outside the fishing ground for which he is licensed. For Fisheries staff too the use of GPS would be essential in cases where a prosecution is sought. Land-based monitoring at least is, by virtue of the Fisheries Wharf, far more practical than, for example, in Tavua although additional landings are reported from Saweni Beach to the south of Lautoka and in Fijian villages along the coast. Vessels with no licence are known to operate with little hindrance from Lautoka Port (Felix Poni, pers comm; J.Anderson, pers obs). Unofficial surveillance activities undertaken by Fijian stakeholders reported by various respondents are typically limited in the extent of their operation. The reason for this is primarily that the patrols are carried out by individuals from specific villages seeking to restrict commercial effort to the grounds near their village. Because these surveillance activities can reward the unscrupulous with fish, fishing equipment and even cash, the few commercial (Indo-Fijians) gill-net fishers are often targeted because when there nets are deployed they are unable to evade the patrols.

In Verata the entire *qoliqoli* is visible from the headland on which Ucunivanua Village is located with an altitude of approximately 25m. The *qoliqoli* is 10km wide at its widest point and it is relatively easy for patrols by local fishers to cover the main fishing locations in the

qoliqoli. The patrols are reported as *ad hoc*, taking place during normal fishing activities, rather than as a coordinated community activity. However, because Verata is bordered by three *qoliqoli*, the largest of which (Kubuna) issues commercial licences, the sea-ward boundary does remain vulnerable to penetration, especially at night when commercial gill-net fishermen are active.

Cautata qoliqoli covers an area of 3.4 sq.km with an area of reef flat covering 3.2 sq.km and a boundary (excluding the coast) of 4.4km. The maximum distance to the outer boundary is 1.1km. The community report that they do occasionally undertake surveillance activities to prevent (Indo-Fijian) commercial gill-net fishers from entering their fishing grounds. There are no licences issued to Indo-Fijian commercial fishers.

1.4.3 The Scale of Management

Fishery managements units in Fiji reflect wider political and land-resource issues and are not believed to stem directly from considerations of marine resources. It is certainly true that they do not reflect the underlying distribution of fin-fish stocks. This presents a number of problems for fishery managers; *qoliqoli* demarcation does not take into consideration the migratory (and thus seasonal abundance of species such as the high value Spanish mackerel (*Scomberomorus commerson*). The sheer number may also present a problem for Fisheries Division, seeking to coordinate management across *qoliqoli*. There are 410 *qoliqoli* in Fiji, so 410 managers and at least 410 constituencies to represent. The issue is complicated by the recent emergence of highly mobile, commercial fishers with a high discount rate with little incentive to exploit at a sustainable rate. They can simply move on as we have already observed amongst the Vitogo/Vidilo fishers of the Western Division of Viti Levu. Finally we have reported on a small but potentially important trend towards increased dis-aggregation of stakeholder groups within *qoliqoli*.

Figure 53 presents the official boundaries of two *qoliqoli* in the Savusavu region of Vanua Levu. Naweni *qoliqoli* is located on the southern shore (and at the right of this figure) of the isthmus between Savusavu and the rest of Cakaudrove Province. Nasavusavu qoliqoli stretches from mid-way along the isthmus to Savusavu Bay in the west. Note however that a number of dashed lines are included on this figure. These lines represent the claims of smaller yavusa to their own, independent CFRA (Native Fisheries Commission, pers comm). Respondents stated that at the time of the Native Fisheries Commission first work in the 1960's to officially demarcate *qoliqoli* the yavusa chiefs decided to 'throw their lot' in with the Tui Nasavusavu because of the increasing importance of the town of Savusavu, which remains the only important urban development in the area. In recent years they have sought to retrench their position and recover control over their traditional fishing rights areas.

Figure 53 - The official (and unofficial) *qoliqoli* of the Savusavu region of Vanua Levu

The scale of management thus shrinks from two *qoliqoli* covering a 60km strip of coastline to six *qoliqoli*. (Although there is *de facto* independence between Naweni and Tacilevu there were no reports of any move to officially sub-divide their CFRA). There is one important potential advantage to the relatively small-scale of management observed at Naweni/Tacilevu. We reported in Section 1.3 (Patterns of Interaction) that there was a good deal of cooperation between the fishers (as a separate stakeholder group) and the tribal authorities with responsibility for the closed areas declared as a mark of respect to deceased members of the chiefly family. The sensitivity of the chiefly family to concerns amongst fishers can only be realised where there exists good channels of communication between the relevant parties and when there exists a certain imperative for authorities in a small community to respond to the needs of their constituency.

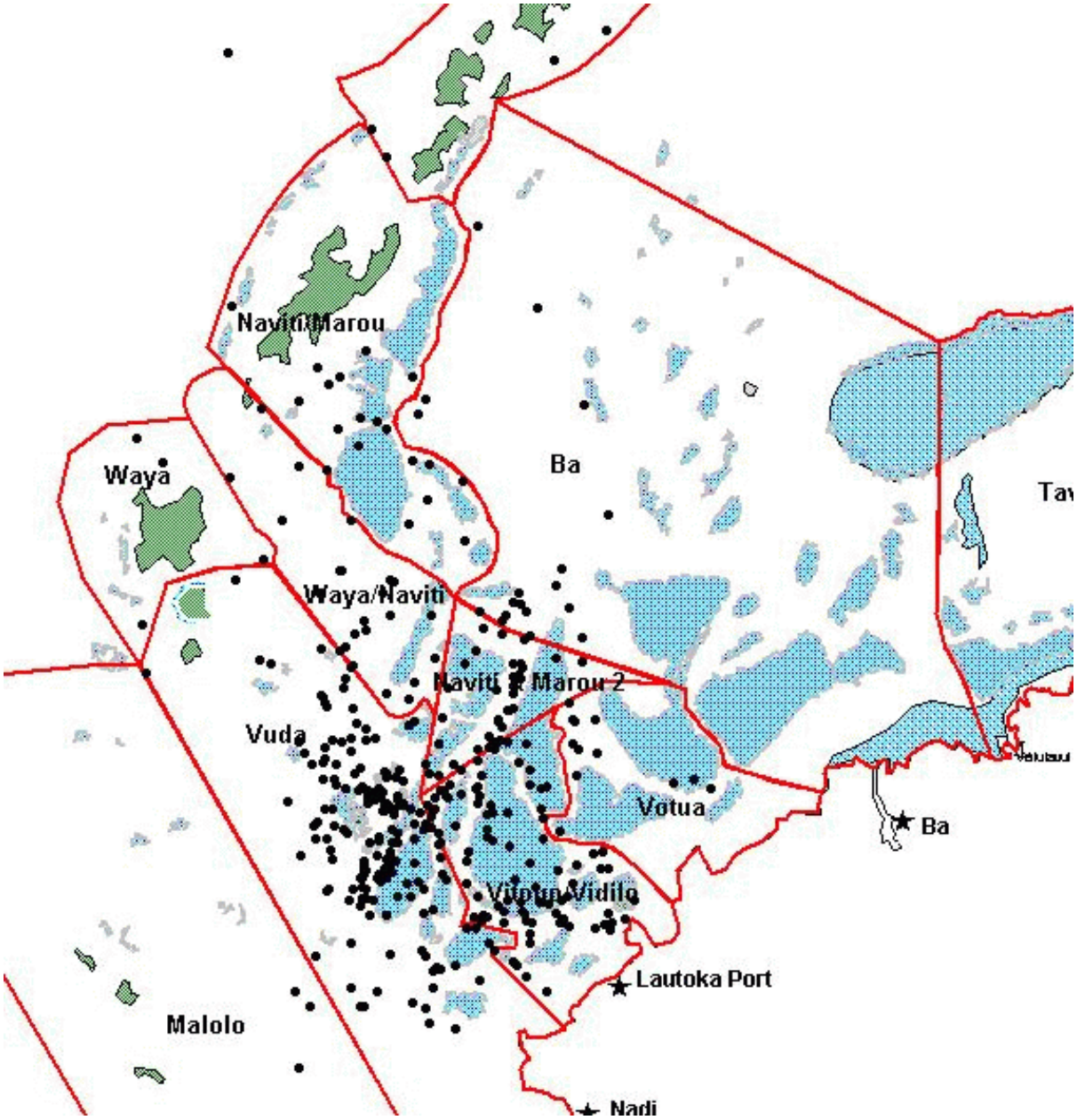
In Tavua the situation is the reverse. The *qoliqoli* is physically large encompassing significant areas of reef, lagoon, mangrove and open-water habitats. It is difficult to state categorically the 'independence' of these habitats from adjacent reefs; the reef system in Tavua is part of an essentially contiguous extent of reef extending from Vomo Island (in Vuda *qoliqoli* (due west of Lautoka City) to Rakiraki to the east of Tavua. But one might expect that closed areas over one of the larger patch reefs would protect a resident resource of sufficient size and ecology of sufficient independence as to effect a real advantage to adjacent reefs following a period of re-generation. For more discussion on closed areas the reader is referred to Volume 3 of this report. From the human perspective the fishing rights area of Tavua is sufficiently large to cater for the majority of fishing trips undertaken by those licenced for the area and for this effort to be spread across the *qoliqoli* reducing conflict between fishers. It was reported however that some fishers stray into Rakiraki qoliqoli to the east as they fish along the contiguous patch reef of Cakau Drala. Likewise the north-western boundary of the *qoliqoli* cuts straight across the large off-shore reef of Cakau Masi. The design of the CFRA in terms of the underlying pattern of reef structures is perhaps not ideal because boundaries cut across natural features, reefs that fishers may view as a single unit and inevitably cross the boundary.

The size of the CFRA is also important for the monitoring, control and surveillance of fishing. It is difficult for the tribal authorities to obtain accurate feedback from the large commercial fleet and the substantial subsistence fishery (population 29,000). Although village-level management committees exist (see section 1.5) there is only one fisheries advisor that interacts directly with the Tui who, as a State minister, is usually not resident in the area but lives in the capital Suva. The problem is further complicated by the complex coastline that was discussed earlier in this section. From the perspective of MCS it is also important to consider the fact that the fisher population comprises two culturally and economically distinct stakeholder groups. The commercial fishers are primarily Indo-Fijian and lack effective liaison and representation in management decision-making authorities. This places additional demands on the management authorities, authorities which are tribal and not specifically focussed on, or designed for, commercial fisheries management.

For Vitogo/Vidilo the key issues are similar but with site specific variations. There are similarities to Tavua with regard to the problem of feedback, the management area itself is relatively large (235sq.km), the resident population is also large (est. 78,000) and there is a significant level of commercial fishing (>130 licensed vessels) in the region in which Vitogo/Vidilo is nested. Traditional feedback mechanisms do not function over such a large area nor the stakeholder groups are quite different in their cultural and economic composition. One cannot discuss Vitogo/Vidilo independently of the adjacent *qoliqoli* for the reason outlined in Section 1.2, namely that given the lack of effective MCS capabilities

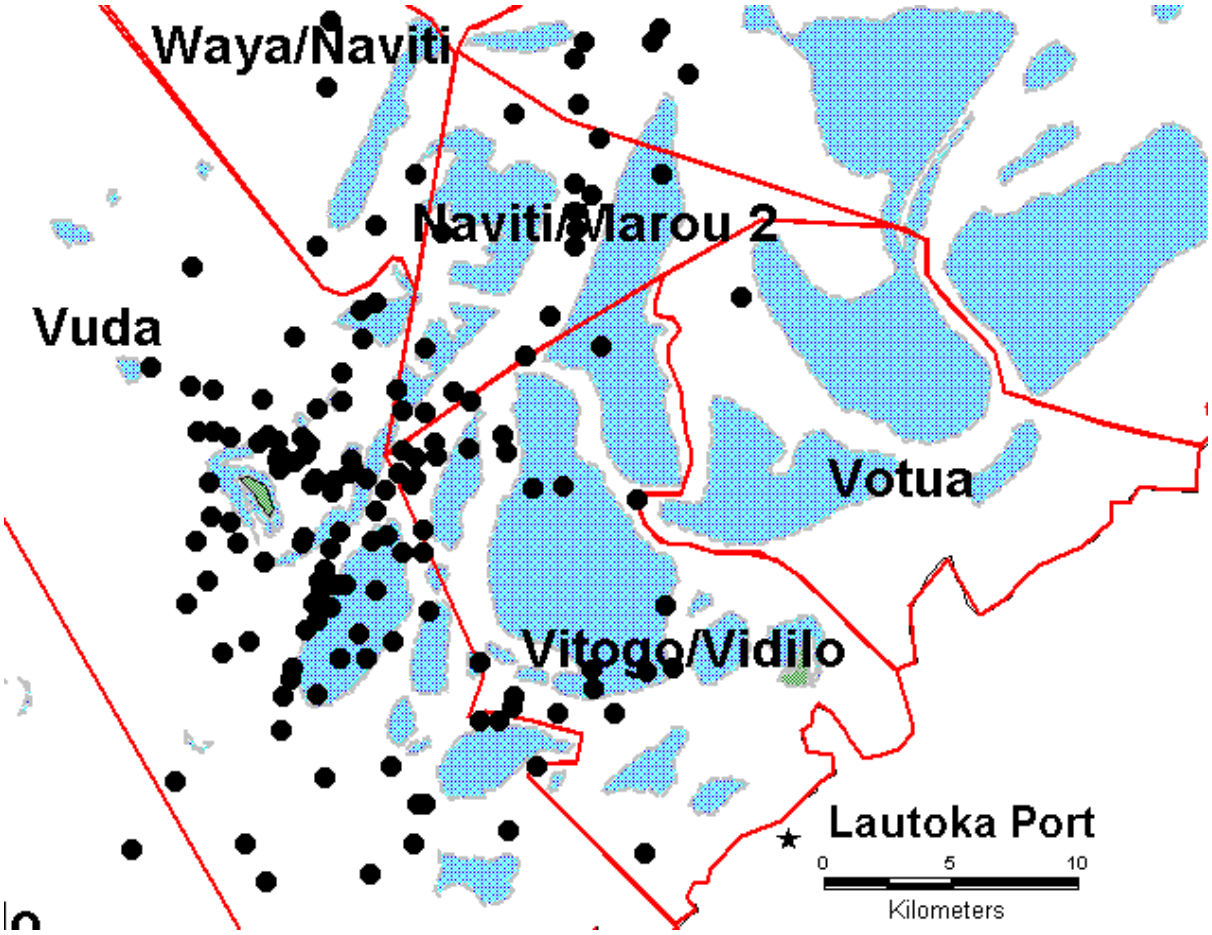
commercial fishers use the whole region across Vuda, Vitogo/Vidilo and Naviti/Marou 2 almost as a single fishing ground. Figure 54 displays the location of fishing trips by fishers licenced to fish Vitogo/Vidilo (this figure was also presented in Section 1.2 - Outcomes and is repeated here to stress the mobility of these fishers). Clearly management is not functioning effectively. The management authorities of Vitogo/Vidilo, which remains one of the most popular licensing authorities, will continue to be under the mis-apprehension that resources are in good shape because there is a constant demand for a licence to fish in this *qoliqoli* although clearly fishers are *not* fishing in this *qoliqoli*. For the managers of the adjacent *qoliqoli* which supports much of the illegal fishing, any attempts by them to manage effort will be thwarted by the constant poaching that this research has highlighted. When discussing the scale of management it is also important to consider the design of the management unit. Reference to Figure 54 also reveals that the CFRA of Naviti/Marou 2 is sandwiched between five adjacent CFRAs and does not have a coastline. This places additional burdens on the relevant management authority.

Figure 54 - The location of fishing trips by vessels only licensed to fish Vitogo/Vidilo *qoliqoli*



The scale of management for these highly mobile fishers, with high discount rates is clearly inappropriate in the context of the combination of effects of the low risk of arrest, the uncoordinated access fees across adjacent *qoliqoli* (fishers will pay the lowest fee to get a licence to land their catch legally at Lautoka Port) and the nature of the fin-fish resources that the commercial fishers target. We reported the value of the seasonal Scombrid fishery during the discussion of the capacity of the resource to support multiple users. Figure 55 presents a figure displaying the location of fish trips by fishers (licensed for Vitogo/Vidilo) targeting just Spanish mackerel.

Figure 55 - Location of Catches of Spanish Mackerel (S.commerson) by fishers licensed for Vitogo/Vidilo qoliqoli only



Given the economic imperative that commercial fishers face it is perhaps not surprising that they will target the most abundant and/or highest value resources, in this case during the months of October through January.

In the case of Vitogo/Vidilo it is apparent that their is no relation between the scale of management units and the distribution of fishing activities. This is also the case in both Verata and Cautata. Fishers use their own and adjacent fishing rights areas, that are nominally managed independently, as a matter of course for both subsistence and commercial fishing activities.

1.4.4 External Marketing influences on fishers' behaviour and the fishery

The majority of technical influences on interactions and outcomes observed in the fisheries across Fiji relate to the availability of markets. The presence of markets subsequently determines the technological advances made in the fishery, this in turn affects the catch composition. Markets influence the routine of fishers, and the nature of their interactions. The extent to which markets have developed in turn relates to the wider level of economic development in an area in particular the transport and communications infra-structure.

Naweni village is located 40 kilometres (along a unsealed road) from the Cakaudrove provincial capital of Savusavu (population 4970; Source: Statistical News, June, 1998). The population estimate for Cakaudrove Province is 44,321. Tacilevu is located a further 8km east of Naweni. Economic development within the community is relatively limited, the key parameters are displayed in Table 34.

Table 34 - Summary economic conditions in Naweni and Tacilevu

Site	Population	No. of Boats	No. of Trucks	Retail Outlets	Core Fisher Group	Total No. of Fishers Recorded	Weekly Fishing Income Range (F$)	Other Paid Work
Naweni	400	0	1	3	21	105	15-100	1
Tacilevu	250	2	0	3	20	123	10-60	3

Figures 56 and 57 present analyses of sales versus consumption of catch by month for the two villages.

Figure 56 - Analysis of fish sales by month for Naweni Village

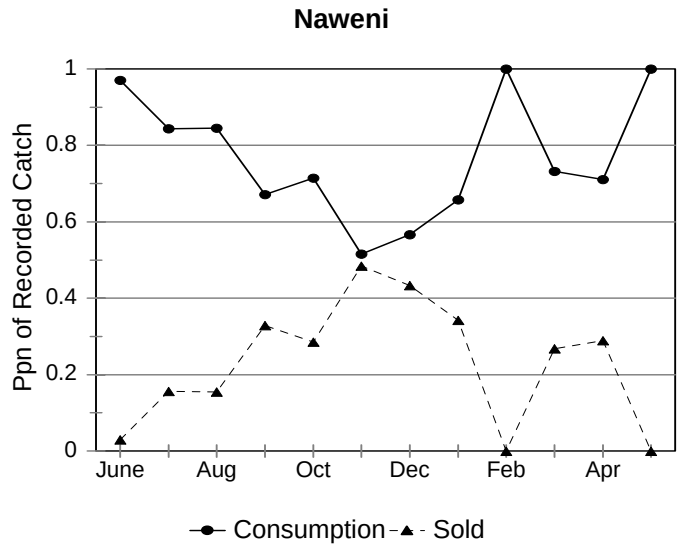
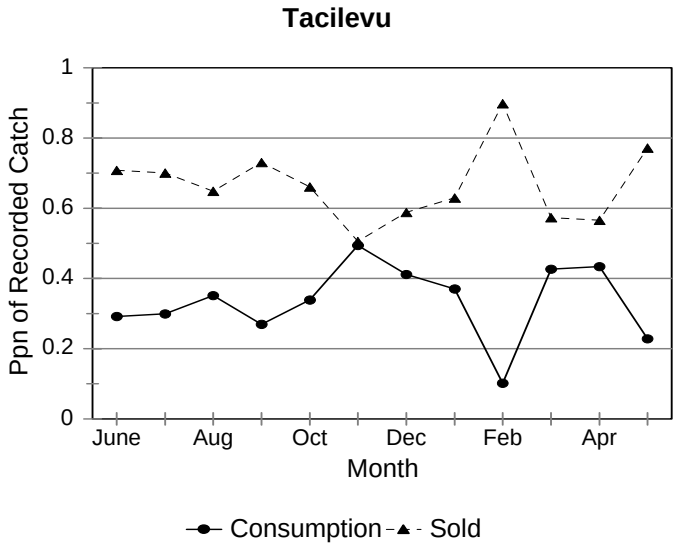


Figure 57 - Analysis of fish sales by month for Tacilevu



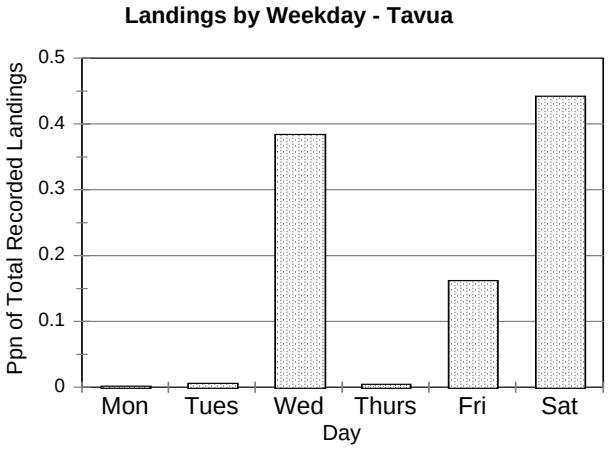
Tavua *qoliqoli* is located in the Ba Province of the Western Division, and there is a substantially greater level, and diversity, of economic development than is the case in Cakaudrove Province, in which Naweni and Tacilevu are situated. There are few constraints to marketing marine resources in this area. The Western Division of Fiji, in which Tavua is located, is the main centre of tourism for Fiji and there are large numbers of hotels and restaurants that purchase fish. The population estimate for Ba province is 212,197 of which 36% are urban dwellers. The population of Tavua Tikina is estimated at 27,915 (Statistical News, June, 1998). There are two towns in the Tikina, Tavua Town (population 2419) and Vatukoula (population 7,079). Further west, the urban areas of Ba (population 14,716), Lautoka (population 43,274) and Nadi (population 30,884) represent a significant market opportunity. The sphere of marketing opportunity for fishers and fish-dealers in the area

therefore includes a significant urban population without subsistence access to fishery resources. In addition, there is a significant Indo-Fijian population without tenured access to fishery resources. In the western division, 58% of the population is of Indo-Fijian descent.

In Tavua Town itself there are a range of Government offices, wholesale and retail outlets of a range of sizes, and small engineering, manufacturing, and service industries including a market selling agricultural, freshwater and marine produce. In fact Tavua (municipal) market does not represent the major outlet for fisheries produce in the area. In 1996 the market at Tavua handled fish sales of just 40mt (Fisheries Division Annual Report, 1996). A further 445 mt was sold through non-municipal outlets with 63% (279mt) sold through unofficial roadside markets. In fact this figure is an estimate for the entire Western Division (including Ba, Lautoka, Nadi and Sigatoka). This research estimates the total annual landings for Tavua qoliqoli alone at 363 mt indicating that a significant proportion of sales of fish products are diverted elsewhere and are lost to the Fisheries Division's fish production monitoring programme. The estimated value of this catch (using the mean price of fish sold at Tavua market) is F$1.22 million.

In the peri-urban and rural areas outside of Tavua Town, the sugar-cane industry is of significant importance for the population as a whole, but particularly for Indo-Fijians. Family lease-holders farm cane on small-holdings typically of 3-25 acres. Gold-mining is carried out at the Emporer Gold Mine at Vatukola in the interior. Employees of the Emporer goldmine generally visit Tavua Town on Wednesdays and Saturdays which, along with increased market activity on these days is reported to have a significant, albeit temporary, effect on commercial activities. This encourages fishers to target these days for (landing and) selling their catch. Figure 58 presents data on landings by weekday for Tavua fishers.

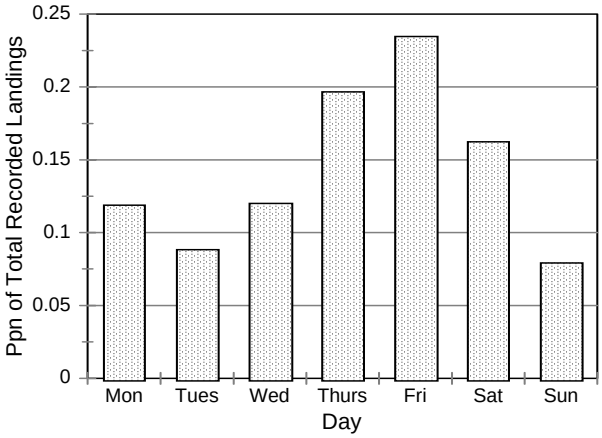
Figure 58 - Proportion of total recorded landings by weekday, Tavua *qoliqoli*



The extent of investment and marketing opportunities presented in the western division has important implications for the manner in which fisheries developments are funded. 82% of fishers reported that they utilised private funds or family credit schemes to purchase their fishing boats. For the purchase of outboard engines the figure is 56%. It should be remembered however that the system utilised by Indo-Fijian fishers that protects at least one share for boat/engine maintenance promotes the use of cash to buy replacement equipment. For the majority of fishers the current fishing vessel they own is not their first.

The principle town of Vitogo/Vidilo qoliqoli is Lautoka, an important port for the export of wood-chip and process sugar products. There is also a range of Government offices, law courts, wholesale and retail outlets of a range of sizes, and small engineering, manufacturing, and service industries including a market selling agricultural, freshwater and marine produce. Lautoka municipal market does not represent the major outlet for fisheries produce in the area. In 1995 the market at Lautoka handled 160mt of fish sales (Fisheries Division Annual Report, 1995). For the entire Western Division (Sigatoka, Nadi, Lautoka, Ba and Tavua areas), a further 445 mt was sold through non-municipal outlets with 63% (279mt) sold through unofficial roadside markets. This research estimates the total annual landings for fishers licenced for Vitogo/Vidilo *qoliqoli* at 97.4mt. The estimated value of this catch is F$404,940. The market system in Lautoka is well-developed. The wharf itself provides an ideal landing site for the majority of the fleet, where engines, fuel and gears can be easily loaded and unloaded. Fish dealers are the principle outlet for most fishers. The fish-dealer is important to the economy of the fishery because they provide the necessary credit/loan facility for fishers to be able to buy their provisions and fuel (up to F$300 per trip) on condition that they sell the catch (minus the value of the loan) back to the fish-dealer. This practice is known as 'loading'. Middlemen have a network of outlets including the municipal market, and hotels and restaurants, the prison service and schools and hospitals. This substantial market development explains the pattern of landings shown in Figure 59 below. There is also an informal auction market at the wharf and the public are welcome to buy fish direct from fishermen. This diversity and size of outlets (and the facility of the wharf) provides superior marketing options than is observed in Tavua.

Figure 59 - Proportion of total recorded landings by weekday, Vitogo *qoliqoli*



The closest urban population to Verata (and Ucunivanua village) and Cautata is Nausori and Suva approximately $1^{1/2}$ hours drive, largely along well-surfaced roads. All marketing is therefore done by individuals who also operate on behalf of other fishers in the community. The peak period is towards the weekend.

1.5 Understanding the Fisheries (3) : Decision-Making Arrangements

Decision-making arrangements are the sets of rules that define the boundaries for legitimate individual and collective choice within a community, ie what is obligatory, permissible or prohibited in any given situation. In a strict sense these rules are established to achieve

certain objectives and include *operational rules* (that may set limits on the level or form of resource exploitation) and *conditions of collective choice* (that define the protocol for decision making). Decision-making arrangements also include wider legal, political and even economic factors (*external arrangements*) that can influence the functioning and behaviour of local management. The operational rules that are currently in force at the research sites have already been described in Section 1.1, providing some initial context to the outcomes reported in Section 1.2. Operational rules are also partially determined by the physical and technical attributes of the fishery and the influence of these attributes on the types of rules employed will also be discussed in this section. In this section analyses the manner in which decisions are formulated and will contribute to an explanation of the patterns of interaction described in Section 1.3. This section will open however with an analysis of the role of the Fisheries Act on the interactions and outcomes observed which will also provide the wider context for the analysis of local management activities in the latter part of this section. Table 35 presents a summary of the patterns of interaction for which explanation is sought in the structure of incentives and constraints of the decision-making arrangements.

Table 35 - Patterns of Interaction for which explanation is sought in DMAs

Site	Management Actions Ignored	Poaching of Adjacent *qoliqoli* *	Reciprocal Use of Adjacent *qoliqoli* **	Inequity of Access***	Stakeholder Conflicts
Naweni	✘	-	✔	-	✘
Tacilevu	✘	-	✔	-	✘
Tavua	✔	✔	✔	✔	✔
Vitogo/Vidilo	✔	✔	✔	✔	✔
Verata	✔	-	✔	✔	✘
Cautata	✔	-	✔	✔	✘

* By Indo-Fijian Stakeholders

** Between Native Fijian Stakeholders

*** For Indo-Fijian Stakeholders

1.5.1 External Arrangements : The role and influence of State management authorities on interactions between stakeholders

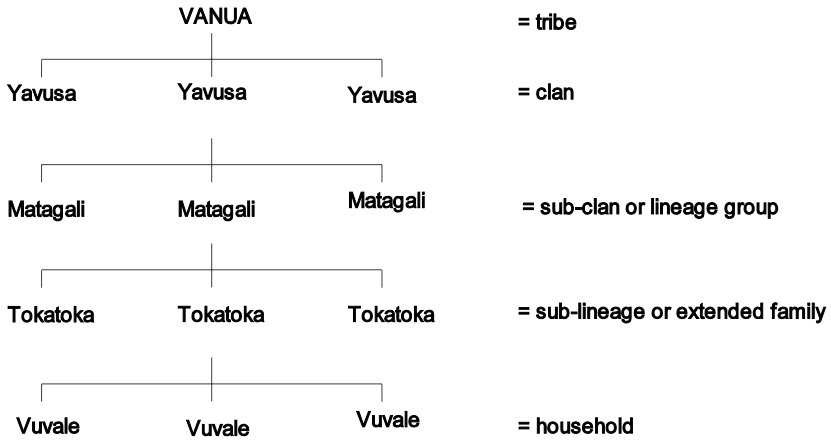
Local management objectives and activities cannot usually be viewed in isolation of the national legislative environment. National legislation seeks to establish the boundary conditions within which communities should operate. They should define what is acceptable and what is unacceptable in the management of resources by local communities. The national (and historical) context of fisheries regulations are also important from the perspective of the scale (*vanua, yavusa* or *mataqali*) at which management is undertaken. It has already been observed, that in Tavua and Vitogo/Vidilo attempts are being made by *mataqali* to secure the management of the fishing grounds they claim for their tribal subdivision. This is in conflict with the current *de facto* organisation whereby management

(as far as licencing is concerned at least) takes place at the level of the *vanua*. Marketing arrangements may also be important in this context because they may be 'relevant in establishing economic parameters within which the management of the commons can be undertaken' (Oakerson, 1992).

The Tribal Context

The social structure of tribes varied across Fiji (Fong, 1992). However, the 20th century has seen the official acceptance of the structure observed in the Bauan region of Fiji. Bau Island was the home of the first (self-proclaimed) Tui Viti (King of Fiji), Ratu Cakaubau who subsequently ceded Fiji to Britain in 1874. Nayacakalou (1975) declared that land (and marine) tenure based on this system and utilised by the Native Lands Commission (NLC) was flawed. He stated that the NLC 'used the law to posit simple patrilineal descent groups in a situation where the reality did not warrant it.' Whatever the variations in social structure were, the Bauan structure maintains primacy over the group. Figure 60 presents the official social structure.

Figure 60 - Official Fijian Social Structure (after Fong, 1992)



In Fiji, traditional society was dominated by a single authority, the Tui, and there appears to have been little democracy although the Tui would consult advisors. Historically, tribal society was segregated into specialist units; the chiefly family coming from the *Vale Levu mataqali*. Advisors were drawn from other specialist *mataqali*. The *Bati* provided warriors, the ....were the farming specialists and the *Sau Turaga* were advisors on cultural protocol. The *Gonedau* were the specialists on the timing of and methods for the exploitation of specific marine

resources, particularly in relation to ceremonial events. In contemporary Fiji, particularly in rural areas, these cultural distinctions remain strong in both the cultural psyche and within national legislation, with individual Fijians registered to a particular *mataqali* at birth. However, in practice the *mataqali* system no longer functions in any practical sense.

An individual is therefore a member of the *mataqali* in which he was registered at birth and the *yavusa* and *vanua* to which the *mataqali* are officially under. The concept of the *vanua* represents far more than simple technical ownership of reefs (or land). Ravuvu (1983) wrote:

'The Fijian term, *vanua*, has physical, social and cultural dimensions which are interrelated. It does not mean only the land area on is identified with, and the vegetation, animal life, and other objects on it, but it also includes the social and cultural system - the people, their traditions and customs, beliefs and values, and the various other institutions established for the sake of achieving harmony, solidarity and prosperity within a particular social context.' Within this definition, the *mataqali* own rights to particular areas of land within the wider area claimed by the *vanua* and substantiated by the Native Lands Commission.

The Historical Fisheries Legislative Context

In Fiji, probably the most important factor that has allowed local tenure of fishing rights to persist is the constitutional support offered since the first relevant legislation included in the Deed of Cession of 1874. Although Article 1 stated that ".....[need to complete] within or adjacent thereto may be annexed to and be a possession and dependency of the British Crown...." the Deed goes on to state that "the rights and interests of the said Tui Viti and other high Tuis ceding parties hereto shall be recognised so far as is and shall be consistent with British Sovereignty and Colonial form of Government, ..."

The situation was further clarified in a speech given by the Governor of Fiji in 1881 in which he stated:

'Chiefs of Fiji....it is Her Majesty's desire that neither you nor your people should be deprived of any rights to those reefs which you have enjoyed under your own laws and customs; and I may tell you, on my part, that measures will be taken for securing to each [*mataqali*] the reefs that properly belong to it, exactly in the same way as the rest of their land will be secured to them....'.

The Birds, Game and Fish Protection Ordinance (1923) further institutionalised the rights of the *mataqali* declaring that it was illegal for any person to fish or collect shellfish within a customary fishing ground "unless he shall be a member of [the owning] *mataqali* or shall first have obtained a licence so to do...".

Note that the latter two references imply that rights are not held at the level of the tribe (*vanua*) but at the level of clan (*mataqali*).

One of the earliest writers on fisheries issues in Fiji, ... Hornell, in an attempt to clarify the nesting of the authority relationships within the *vanua* wrote in 1940 that:

'Prior to the voluntary cession of Fiji to the British Crown, fishing in the rivers and in the seas was ruled by custom. The rights of the Chiefs were paramount, and in practice the Chiefs were the distributing agency in the areas which each controlled. Each tribal unit, the [*mataqali*], had its fishing area accurately defined; fishing within this area by people of

another [*mataqali*] was resented and the intruders treated as poachers.'.

This argues that although rights are allocated by the tribal chief, they are held at the clan level. It does not take a great deal of imagination of pre-colonial life to realise that mataqali-based rights would have been a far more practical and realistic approach to resource allocation. Furthermore given the relatively limited mobility of fishers (even to this day), a vanua-wide tenure system would have been quite inappropriate.

Ravuvu (1983) apparently in agreement with Hornell that the *mataqali* was the relevant authority wrote:

'...the *qoliqoli* (fishing ground) used to be and still is to some degree vested in the community. It includes all rivers, creeks, lakes and stretches of sea which a particular *vanua* or its component *yavusa* and *mataqali* claimed as their traditional fishing grounds.'

But he then went onto state, in apparent contradiction to the statement of Hornell and earlier legislation, that:

'Although other classes of land have been registered under the *mataqali*, the *qoliqoli* is still open to the wider community of related kinsmen to exploit as their most important source of protein food.'.

This statement complicates somewhat the issue of the relationship between the *vanua* and the *mataqali* viz-a-vis the ownership of traditional fishing grounds. But the issue is important given the recent attempts by some clans to take control of particular areas of marine space they consider their rightful property. A final point to consider however is the question of village structure. In contemporary Fiji, villages often comprise individuals of a number of *mataqali*. Although there may be some spatial demarcation of the village (eg in Ucunivanua) by *mataqali*, the concept that fishing rights were held by *mataqali* is complicated by this observation.

The Current Legal Framework

The most recent version of laws related to fisheries is the Fisheries Act 1985. This Act attempts to define more exactly regulations covering the use of fisheries resources in the inshore region of the Fiji's waters.

This sub-section will review the national legislation from the perspective of: 1. the rights and responsibilities of *mataqali*, *yavusa* and *vanua* in undertaking management and; 2. the role of the national Fisheries Division in fisheries management. Table 36 presents a summary of the national fisheries legislation.

Table 36 - Summary of National Fisheries Legislation, Fiji

Key Points	National Legislation	Comments
1. Local Rights & Responsibilities		
a) Community-based Surveillance	Honorary fish wardens	No financial support
b) Fisheries Management	Commercial Licence Required	Local authorities set ceiling
Effort Limitations	Described on licence	Identified by local authorities
Marine Protected Areas		
2. National Fisheries Policy		
Gear Restrictions	Dynamite & poison banned	
Gear Restrictions	Mesh restrictions	
Offences	Various	
Sanctions	Various	

Table 37 presents national legislation in the context of specific management activities.

Table 37 - National legislation in the context of specific management activities

Management Activity Type	National Legislation	Relevant Notes
Community-based Surveillance	Honorary fish wardens	No financial support/Low take up
Fishing Effort Management	Commercial licensing	Local management authorities set ceiling
Marine Protected Areas	Include on licence	Areas to be identified by Minister & Tui?
Gear Restrictions	No dynamite or poison	Poor surveillance
Gear Restrictions	Mesh restrictions	Poor surveillance
Offences	Various	Prosecutions rare
Sanctions	Various	Prosecutions rare
Protection of Native Fishing Rights	Commercial Fishing-Licence Required	Widely abused; little consultation between Tuis and Fisheries; Prosecutions rare.

Native Rights and Responsibilities

There a number of key pieces of legislation that furnish those registered as the rightful

owners of fishing grounds with rights to protect, and to exploit, the resources under their control.

i) Protection of Native Customary Rights - Section 13 of the Fisheries Act states that:

'Notwithstanding anything contained in the Rivers and Streams Act, it shall be an offence for any person to take fish on any reef or an any kai (cockle) or other shellfish bed in any area in respect of which the rights of any *mataqali* or other division or subdivision of the Fijian people have been registered by the Native Fisheries Commission in the Register of Native Customary Fishing Rights, unless he shall be a member of such *mataqali*, division or subdivision of the Fijian people who does not require a licence under Section 5 to take such fish or shall first have obtained a permit to do so from the Commissioner of the Division in which such area is situated;

Provided that -

a) such permits shall not be necessary in the case of persons taking fish (other than by way of trade or business or as an employee of a person carrying on the trade of business of a fishermen) with hook and line, or with a spear or portable fish trap which can be handled by one person; and

b) any such permit may exclude fishing for particular species of fish or may exclude fishing in any particular methods or may contain any combination of such exclusions.

2) The grant of a permit shall be in the discretion of such a [District] Commissioner who shall consult the Fisheries Officer and the subdivision of the Fijian people whose fishing rights may be affected thereby, prior to granting the same.

3) A permit may be granted for any period not exceeding three years.....'

The key part of this legislation as far as the rights and responsibilities of native resource custodians is sub-section 2. The requirement that the Commissioner must consult the subdivision of the Fijian people provides the opportunity for local authorities to reject an application for a licence. However the legislation does not state specific criteria by which an application can be refused. The issue of equity (viz-a-vis Indo-Fijian fishers) is clearly relevant here. On the other hand, nor does this legislation seek to provide guidance on the wider responsibilities of native tenure holders to the nation as a whole. That is to say whether applications should be refused on conservation grounds; when the issue of goodwill payments are also considered there are clearly avenues for a significant conflict of interest.

Verata and Cautata provide an example of the exercising of this right by native custodians for there are no licences allocated to Indo-Fijians to fish commercially in Verata qoliqoli. Although a significant proportion of the fisheries production realised by local fishers is destined for commercial markets.

Clarification is perhaps needed of this statute. If a Fisheries Officer rejects a licence application (as is his right as stated in sub-section 2, for example, on the grounds of conservation), does this imply that the rights of the Fijian people are subjugated such that they cannot then permit a licence to be issued? Section 5 (Licensing), sub-section 1 of the Act states that:

‘A licensing officer may in his discretion grant licences to take fish in Fiji fisheries waters.’.

Again there appears to be a conflict between, or at the very least a lack of a definitive statement on, the rights of native peoples versus the rights of the State to protect what are ultimately a national resource. Section 5 (sub-section 2) of the Act goes on to state that:

‘Every licence .....shall be subject to such conditions as the licensing officer shall think fit to endorse thereon in accordance with this Act or any regulations made thereunder.’.

ii) Fish Wardens: Section 3 of the Fisheries Act states that:

‘The Minister may appoint honorary fish wardens whose duties shall be the prevention and detection of offences under this Act and the enforcement of the provision thereof. (*Inserted by Ordinance 34 of 1959, s. 2; amended by Legal Notice 112 of 1970*.)’.

This legislation provides for the recruitment of local individuals to voluntarily undertake surveillance of fishing activities within their fishing ground. In principal this is a sensible approach. The concept that a member of the community be selected to take responsibility for implementing local and national regulations is an attempt at an efficient use of scarce human and financial resources by national legislators. In any case, local communities typically have their own unofficial authority responsible for controlling the behaviour of individuals where there is no rapid access to police support. This legislation is an attempt to harness the potential of this institution within a legal framework. However, in practice there appears to be little evidence that the scheme is functioning with any significant level of success. There are a number of problems. The duties of a fish warden necessarily involve preventing, or at least reporting, individuals with whom he is no doubt very well acquainted. This requires a degree of sensitivity on his part and a degree of respect on the part of the offending party. This may not always exist. Wardens are not actually encouraged to patrol as such but to observe others during their own fishing activities or at landing sites. In addition to the Fish Warden legislation, Section 7 of the Fisheries Act provides for the Power of Examination and Detention. Sub-section 1 states that:

‘Any licensing officer, police officer, customs officer, **honorary fish warden** [my emphasis] or any other officer empowered in that behalf by the Minister, may, for the purpose of enforcing the provisions of this Act;

(a) require any person engaged in fishing to exhibit his licence, apparatus and catch;

(b) go on board any vessel reasonably believed to be engaged in fishing and search and examine any fishing apparatus therein;

(c) where there is reasonable suspicion that any offence has been committed, take the alleged offender, the vessel, apparatus and catch, without summons, warrant or other process, to the nearest or most convenient police station or port. .....where the vessel will be detained.....and forfeited....’

This legislation, while providing legal support for Fish Wardens should they apprehend an alleged offender, is irrelevant to most Wardens because there is no incentive for them to arrest other fishers. Apart from the physical practicalities of an arrest without even basic compensation for expenses outlaid accompanying the alleged offender to the ‘most convenient police station or port’ it is simply not worth their while getting involved. For this

reason, amongst others, the post is probably inappropriate for fishing grounds where a significant level of commercial activity takes place and where the dangers of attempting to arrest fishers can be significant. There is little or no training available for the collection of evidence for subsequent prosecution, there is therefore a significant risk that any subsequent prosecution would be unsuccessful.

State Fisheries Support

1. The Native Fisheries Commission

The role of the state is crucial in facilitating continued opportunities for native Fijians to control access to marine resources. One of the key sections of the Fisheries Act relates therefore to the demarcation of the specific areas of fishing grounds under the control of a particular *vanua* (or *mataqali*). The declaration of the Native Fisheries Commission in Section 14 states that:

'The Minister responsible for Fijian affairs may appoint a Native Fisheries Commission (hereinafter referred to as the Commission), consisting of one or more commissioners, each of whom shall have the power of the Commission, who shall be charged with the duty of ascertaining what customary fishing rights in each province of Fiji are the rightful and hereditary property of native owners, whether of *mataqali* or in whatsoever manner or way or by whatsoever divisions or subdivision of the people the same may be held.'.

The majority of the demarcation of qoliqoli boundaries was undertaken during the 1960's. The process involved the visit by commissioners to solicit evidence from relevant parties on the traditional claims of mataqali, yavusa and/or vanua to fishing rights over particular fishing grounds. Although not a function of the legislation itself, the boundaries largely reflect the distribution of tribal populations on the land and do not reflect any particular biological patterns in the ocean although natural features such as channels or rocks are often used to mark the boundary line. Originally boundaries between tribes, and even between sub-divisions of tribes, would have been fluid as the political fortunes of different groups waxed and waned. It is also likely that in some areas where inter-tribal conflicts were common the effective fishing grounds would have been restricted by the risk of capture at sea when fishing without adequate security. There are, for example, observations made by early missionaries of such risks.

A good example of the flexibility of rights areas can be seen in the history of Tavua *qoliqoli*. The dynamics of this qoliqoli are complex but do explain the observed conflicts between native Fijian stakeholders in Korovou and stakeholders from other communities under the authority of the Tui Tavua. There was some debate as to the history and origins of Tavua *qoliqoli*. A number of respondents, particularly those representing the Tui Tavua at a formal meeting held with research staff, initially reported that the existing *qoliqoli* had always been as it is and that there had not been previous subdivisions. However, a respondent at the Korovou landing on the Tadravula River explained in some detail that the boundaries of the Tavua *qoliqoli* had undergone considerable changes before arriving at the current shape surveyed and approved by the Native Fisheries Commission in 1961. This opinion was subsequently confirmed by further (informal) interviews with representatives of the chiefly Bila *yavusa* in Tavualevu and from the Ba Tikina Office. The Register of Native Customary Fishing Rights (Vol 2, Folio 17) states that the *vanua* Tavua comprises members of the following *yavusa*: Bila, Vanuakula, Navauvau, Nakoro and Nadokana but also includes members of the *mataqali* Nadala of *yavusa* Nadala residing at Korovou Village.

Prior to the NFC establishing fixed boundaries for *qoliqoli* through sworn testimony during the mid-1960s, the Tavua *qoliqoli* was reported as being much smaller than it is currently. The Rakiraki *qoliqoli* to the east apparently extended right up to the Tadravula River near present day Korovou village. On the western side, the Ba *qoliqoli* extended up to Vatia Point and at least included Tavuca Island and possibly Manava Island. This would have left an area just 6-7 kilometres across which was further divided between the Tavua *qoliqoli* and the Navauvau *qoliqoli*. The Tavua *qoliqoli* therefore only included waters claimed by the Bila yavusa, from the border with Ba to some point around the current site of Tavua town. The waters claimed by the *yavusa* Navauvau extended from this point to the Rakiraki boundary to the east. It was reported that the consolidation of *yavusa* Navauvau and Yavusa Bila took place in the 1940's. At the time when the NFC first began gathering evidence there was a move by the Tui NaVitilevu (Ra) to have a kovukovu with the *yavusa* Navauvau. A kovukovu involves the complete incorporation of one *yavusa* (or even *vanua*) by another. The basis on which this developed was a consensual affair requiring a majority agreement by the *mataqali* involved. It appears however that the Tui Tavua also had some strong call on the *yavusa* Navauvau and was able to forestall the kovukovu with Ra by establishing his own kovukovu absorbing the Navauvau *qoliqoli* into the Tavua area but leaving the *yavusa* Navauvau in control of their traditional lands. The current Tavua qoliqoli was formally declared by the Native Fisheries Commission inquiry held in Tavualevu village in August, 1961. The claims of the Korovou people, reported in Section 3, to control of the grounds off their village are based on the pre-kovukovu status of the fishing rights in the area. They reject the mandate of the Tui Tavua to issue licences for others to fish what they consider to be their fishing grounds.

Complications from the amalgamation of fishing rights areas were also observed in Vitogo/Vidilo qoliqoli where individuals from Namoli village are claiming management rights. Following an historical agreement between Vitogo and Vidilo to join their fishing rights areas together there have been recent meetings (April, 1999) between representatives of the two groups with the aim of re-negotiating the arrangement. The essence of the discussions relates to whether management decisions should be taken by each of the two parties individually in future. The outcome of these negotiations has yet to be settled.

Verata *qoliqoli* has also gone through various manifestations. Respondents indicated that the use of some areas of the adjacent Kubuna *qoliqoli* was a traditional right. This was at least partly verified by reference to a version of the original *qoliqoli* maps drawn up in the 1960's which delineates an area of Kubuna as 'Verata permitted to fish in this area'. The majority of recorded effort recorded from Ucunivanua was indeed targeted in this area. There were also reports that Verata was originally part of a greater Kubuna *qoliqoli* until the establishment of the Native Fisheries Commission and the demarcation of *qoliqoli* boundaries. So the very process of *qoliqoli* formation itself created conflict.

Finally, senior representatives of the Cautata *qoliqoli* claim that Cautata was originally larger. Individuals from the village were requested to take the research team around the original boundary by boat. The claimed boundary was marked on a map and compared with the original maps drawn in the early 1960's and in so far as the scale of the original chart allowed they were indistinguishable.

2. Licensing

As noted above, licensing is complicated by the need to balance the rights and responsibilities of the State and the rights and responsibilities of the Tui. Section 9 of the Fisheries Act states:

‘The minister may make regulations-

a) prohibiting any practices or methods, or employment of equipment or devices or materials, which are likely to be injurious to the maintenance and development of a stock of fish;

b) prescribing areas and seasons within which the taking of fish is prohibited or restricted, either entirely or with reference to any named species;

c) prescribing limits to the size and weight of fish of named species which may be taken;

d) prescribing limits to the size of nets of the mesh of nets which may be employed in taking fish either in Fiji fisheries waters or in any specified part thereof;

e) regulating the procedure relating to the issue of and cancellation of licences and the registration of fishing boats and prescribing the forms of applications and licences therefore and the conditions to be attached thereto;

f) prescribing the fees to be charged upon issue of licences and the registration of fishing vessels which fees may differ as between British subjects and others;

g) regulating any other matter relating to the conservation, protection and maintenance of a stock of fish which may be deemed requisite.’

Again, although the Section is clear in itself, providing the Minister with the appropriate tools by which he and his officers can effect conservation, exactly how this interacts with the rights of the native custodians of the resources is less than transparent. While it can be assumed that if both parties sought a conservation-based licencing regime there would be no conflict, what would happen if only the Fisheries Division sought such a regime, to the financial detriment of the Tui? Given the resources potentially available to the Fisheries Division as opposed to the Tui, it is always going to be more likely that this situation occurs rather than the other way around. A good example of cooperation was reported from Verata where a Fisheries Division research team were invited into the *qoliqoli* to undertake a stock assessment (using UVC methods). It was this collaboration that resulted in the closure of the *qoliqoli* to all commercial fishing in 1994 and its subsequent closure to commercial fishing by Indo-Fijian fishers.

Since the completion of the field research there has been a significant new development in the relationship between *qoliqoli* managers and the State management authority. A Cabinet Memorandum (28/04/1999) from the Government of the Republic of Fiji stated:

‘*Fijians are to be given proprietary rights to their customary fishing areas. To honour a long-standing request from the Great Council of Chiefs, the Cabinet has today given approval for the drafting of appropriate legislation which would [sic] have the effect of vesting in Fijians proprietary rights to their customary fishing rights areas or qoliqoli. In taking this decision today Cabinet assures other communities in Fiji that their rights of access to the waters and the fisheries concerned will continue to be respected. All they need to do is to continue what they have been doing now, and that is to seek the permission of the traditional fishing rights owners for access to their customary fishing areas for subsistence purposes. For commercial fishing activities, the requirement for a license will continue to comply. The general rights to the public, and the rights of transit by boat owners and vessel operators*

through these waters, will also continue to be respected.'

The appropriate legislation has yet to be seen but given that the current system already demands that all commercial licences must be approved by the customary fishing rights owner it is difficult to see how the new legislation, beyond it's political significance, will alter fisheries management in Fiji.

1.5.2 Conditions of Collective Choice : Explaining cooperation and conflict within and between Stakeholder Groups

The key aspects of this section of the analysis, besides covering the basic functioning of decision-making, is the need to understand the efficiency and equity of the institution of the *qoliqoli*. What opportunities does it offer to individuals to participate in decision-making, how does it glean information by which to make or adapt it's operational rules and to what extent do the principles of good governance manifest themselves in its behaviour?

In Naweni and Tacilevu there are no specific fisheries-related institutions. The main channel through which individuals initially promote their ideas or views is through informal discussion. Within such relatively small village communities (Naweni's total population is 375 of which 250 are adults >15 years of age) ideas or positions arrived at during informal discussions on local issues are rapidly disseminated through the community. All those with responsibilities for village development or ceremonial activity are usually party to these discussion. Institutions with a broader remit do exist however that permit a more formal level of discussion within the community. At the village level, there are regular monthly or bi-monthly meetings (*bose-ni-koro*) under the chair of the village mayor, the *turaga-ni-koro*. This is usually the first formal opportunity for individuals or a larger group to raise issues in an official forum. Respondents did report that fisheries related issues were sometimes discussed at these village meetings. One issue that was raised fairly often was that of the use of fish poisons. Some fishers demanded of the wider community that the national rules were adhered to. There were also reports of some fishers reporting infringements to the *turaga-ni-kor*o prior to the meetings. *Bose-ni-koro* are open to all members of the village community. This tier of institution represents the most efficient opportunity for the exchange of key information, such as on the perceptions of fishers on the status of the fishery. However, there are no formal processes by which information is gathered to promote adaptive responses by the community. There are also no stated performance indicators or management objectives identified by which the status of the fishery could be measured. The Naweni closures and the response of the community in Naweni village does, however, represent the beginnings of an adaptive response, albeit a relatively informal one. The high level of cooperation observed by the communities following the declaration of the closures is largely a result not of any democratic decision but because the community followed traditional protocol. The first closure, in February 1996 was established to mark the death of the Tui Naweni. This closure was declared for a period of 12-months. The second closure in Naweni, that commenced in July, 1997, was also a traditional response, this time to the death of a senior member of the chiefly clan, the vale levu *mataqali*. There was no opportunity for individuals to veto the decision or any opportunity for them to seek re-dress for the closure of the fishing grounds. Although the 'community' did not have any specific opportunity, as a group, to comment on the declaration of the closures individuals in Fiji have a keen sense of place and community and they in no way viewed this as a restriction that they had to endure (eg. Siri Wakitibau, pers comm). Although the political and cultural leader of the *vanua* is the Tui, matters of cultural protocol are decided by the sau turaga *mataqali*.

However, there was clear evidence that a feedback loop between fishers and the elders of the sau turaga *mataqali* evolved that influenced the lifting of the closure. From around November, 1996 there began a dialogue between these two stakeholder groups with fishers requesting that the closure be lifted. The timing of this was due to two related factors. Firstly, fishers reported a perception that the catchability (and to a lesser extent the abundance) of resources in the open area had declined significantly. Secondly, the community wanted to take advantage of the expected margin on the catch-rates and yields resulting from the closure to contribute to the increased requirements for cash during the Christmas period. This feedback prompted the sau turaga to agree to lift the closure prior to Christmas, 1996. Again, for the second Naweni closure a degree of flexibility in decision-making was evident. The closure was declared, by the sau turaga, after the death of the mother of the Tui Naweni in July, 1997. Initially the closure was to lifted in the Easter weekend of April, 1998, a period when the village traditionally has many visitors from relatives now living elsewhere in Fiji. However, the vale levu *mataqali* demanded that the closure be maintained until one year after its declaration. In response the sau turaga gave over responsibility to the vale levu which subsequently lifted the closure in August, 1998.

For issues of wider import, perhaps relating to vanua-wide actions or the need for a Government response, a *turaga-ni-kor*o will be requested to raise specific issues at the larger *bose-ni-tikina* or district meetings which are chaired by the *vanua* chief. Apart from representatives of the *vanua*, district meetings are also attended by Government representatives including representatives of the Provincial and District authorities. Naweni *tikina* meetings to which project staff were invited were attended by the chiefs of the three villages of Dromoninuku, Naweni and Tacilevu plus senior representatives of each *mataqali*. Representatives of the Fisheries Department can also attend; the Fisheries Officer whose responsibility includes the Naweni fishing grounds does attend *tikina* meetings but usually only when specifically requested to do so by the vanua or if there are specific fisheries issues that the officer wishes to raise himself (Ratu Tevita Temaipeau, pers comm). During one district meeting attended by research staff in May 1996 the only fisheries issue brought up was a question from the *turaga-ni-koro* of Tacilevu who asked the Fisheries Officer why a differential in ice prices had been introduced for those with and without fishing licenses. It was explained that this was in accordance with a long-standing Government regulation which the Fisheries Officer was now obliged to apply.

The crucial difference between this forum and the village-level meetings was observed to be that the latter were open to all members of the village who wished to attend whereas the district meetings were far more exclusive. However, this should not necessarily be judged undemocratic *per se*; the community cannot send everyone to the district meetings and therefore must provide delegates to represent them. But the main issue is that although there are some opportunities for discussion, the extent to which delegates could raise issues appeared to be strongly determined by the Tui's attitude towards the democratic process. Any decisions regarding the management of the *qoliqoli* were regarded as the exclusive preserve of the Tui Naweni (anon. pers comm) and the Tui retains a right of veto on any proposals made from the floor (J. Anderson, pers obs). Decision-making at this level can not therefore be described as particularly democratic or even collective. These fora notwithstanding, there remains no mechanism by which regular information exchanges can be effected or any criteria set against which management performance can be assessed.

In Tavua, the interactions are largely conflictual and the outcomes largely inefficient and inequitous. The background to some of the conflicts has been described previosuly and relates to the declaration of the boundary of Tavua *qoliqoli* in 1961. But the reasons for the

observed conflicts can also be linked to the inefficient manner in which the *qoliqoli* is managed. The management authority in Tavua functions through a loose association between the Fijian stakeholders, the Indo-Fijian stakeholders, the local management authority and the national Fisheries Division officers. The bose-ni-koro and bose-ni-tikina function in a manner similar to that described for Naweni and Tacilevu this process does not correspond to an established mechanism by which information can be passed, from the numerous communities in the area, to the management authorities. For native Fijian fishers, more frequent access to representatives of the Tui is possible, notably for the those living close to the chiefly Tavualevu village where the Tui's fishery representative lives. But exactly what sort of information could be exchanged and to what use it could be put is not defined in any statement of management objectives or criteria by which to judge management performance. In any event the majority of (legal) commercial fishing effort is prosecuted by Indo-Fijian fishers, not native Fijians.

For Indo-Fijian stakeholders, scattered along the 50km coastline, the opportunities to contribute to decision-making are negligible. The only official forum or discussion, a Fisheries Committee, was established by the Tui Tavua. This body is made up of representatives of both the Indo-Fijian and Fijian fisher community with a Fijian liaison officer appointed by the Tui to report on the activities of the community and provide 'minutes' of the meetings. Although tasked with liaising between stakeholder groups the main function of the Committee is to facilitate licensing as described in Section 1.4. The benefits of licensing as a management tool are doubtful as it's main function appears to be to capture resource rent for the resource custodians. It's failure as a management tool is largely because it operates in isolation of any monitoring, control or surveillance operations. The one area where licensing directly interacts with conservation is through the printing, on the licence of the extant conservation measures (closures etc). In fact the Indo-Fijians fisher community reported that the licensing system such as it is was poorly organized anyway. Meetings are called by the liaison officer for Indo-Fijians to obtain signed letters of consent from the Tui Tavua. But Indo-Fijian fishers reported that the majority of meetings, to which they are expected to bring a *sevusevu* of *yaqona* (value of around F$10) in addition to bearing the costs of travel, were often cancelled at the last minute. It was reported that as many as 10 meetings would be called before fishers could actually obtain the letter of consent. There was a widespread lack of knowledge of how many individuals were on the committee, who they were, or when the meetings were held. Furthermore, fishers reported that there was little transparency, at least in the management of finances. What most fishers reported was that the Committee could not account for the F$30 that was demanded annually from each licenced Indo-Fijian to fund recovery of fishers stranded at sea. The Committee's other functions are less clear but there were reports that there are occasional discussions on conservation issues, particularly the use of dynamite to which the Tui is strongly opposed. But it remains that there are no practical mechanisms in place to act on this issue.

The opportunity for the stakeholder groups to contribute to the management of Vitogo/Vidilo are even more restricted than observed in Tavua. The main issue for both Fijian and Indo-Fijian stakeholders is the level of fishing effort that is licenced. Again there are no apparent mechanisms for the feedback of information from fishers to custodians. This aspect is further complicated, as it is in Tavua, by the fact that the majority of commercial fishing is prosecuted by Indo-Fijians not the native Fijians who inevitably have better access to the tribal authorities should they wish to pass on their observations. The situation is further complicated by the fact that even if Fijian fishers were to establish a mechanism for the exchange of information, their experience of the fishery is qualitatively different from that of Indo-Fijians. Comparison of catch composition indicates a significant difference between the

family assemblages of commercial catches and that of the subsistence catches. The relationship between the two, should there be one, remains to be elucidated. Finally, the question of conflict of interests is also important. It is unlikely that commercial fishers (with sufficient mobility to exploit different grounds) will report falling catches if it will lead to restricted access. Clearly there needs to be an independent monitoring of the fishery on which custodians and State authorities can base their management decisions.

The mechanism for obtaining a licence in Vitogo is not standard or transparent. As in Tavua, there are no stated management objectives for the *qoliqoli* and no criteria established by which the performance of management can be measured. Goodwill payments vary depending on the relationship between the individual fisher and the representative of the *vanua* who collects the payment. The popularity of the *qoliqoli* with fishers is largely due to the low goodwill fee (compared with adjacent *qoliqoli*) and its strategic location viz the fishing grounds and the Lautoka Fisheries Wharf. It should not be implied from the number of licences requested (and issued) for Vitogo/Vidilo that the custodians are in any way pro-active in the management of the *qoliqoli*'s resources. Examination of the distribution of fishing effort by those licenced to fish in Vitogo is revealing with only 21% of recorded effort actually prosecuted *inside* Vitogo *qoliqoli*. This does not necessarily imply that resources are over-exploited but it does imply that the resources are less abundant or at least less valuable per unit than elsewhere. Of course, the real implication from this observation is for management across the entire area. For when fishers are not operating in the *qoliqoli* for which they are licensed they must be operating in adjacent *qoliqoli* for which they are not licensed creating inequity for custodians of that *qoliqoli* and for fishers that are licensed to fish there. A very real danger is that it will lead to a complacency by custodians of Vitogo/Vidilo over the status of resources in their area. The conflicts between legal custodians and the community at Namoli is an example of the problems that will develop if management are not seen to be managing effectively. The Namoli community believe that their interests are not being well managed, and the intimidation and acts of piracy against Indo-Fijians reflects this frustration.

In Verata the management authorities have established a working relationship with the Fisheries Division to gather information on the status of their resources. The inception of this cooperation was the community itself who began a dialogue with the tribal authorities over the issue of the level of commercial fishing in the *qoliqoli*. This dialogue was focussed during bose-ni-koro. Their concerns of over-exploitation were based on perceptions of declining catches, particularly of resources caught with gill-nets which were the main gear used by the Indo-Fijian commercial fishers. The authorities responded by requesting that the Fisheries Division undertake a stock assessment of their qoliqoli. The subsequent response was banning all commercial fishing in the *qoliqoli* in 1994 and banning the issuance of licences to Indo-Fijian fishers from 1995 (native Fijians were then permitted to fish commercially). The Fijian stakeholder group have benefited because they have maximised their share of the resource rent. But for one stakeholder group, the Indo-Fijians, access has been closed off without any opportunity to participate in the decision-making process, to seek remedy for their loss of earnings or a right of veto on the decision. The affected population made a collective decision binding on all individuals but only those not in the group holding primary rights suffered as a result of this decision.

In Cautata a very similar process was undertaken by the community. Although there was no request to the Fisheries Division for assessment advice, the community has banned non-local fishers from operating inside the *qoliqoli*. There are no formal institutions through which information may be channeled and no management objectives identified or criteria established. Again, no opportunity was afforded the Indo-Fijian stakeholders to contribute to

the debate.

Table 38 presents a summary of the conditions of collective choice at the six research sites.

Table 38 - Summary data on Conditions of Collective Choice

Site	Community or sub-group closure	Decisions made unilaterally	Decision-making tiers available	Community Council	Fisheries Committee
Naweni	Clan	y	2	y	n
Tacilevu	Clan	y	2	y	n
Tavua	Tribe	y	1	y	y
Vitogo/Vidilo	-	y	1	y	n
Verata	Tribe	n*	1	y	n
Cautata	Tribe	y	1	y	n

* Decision made in conjunction with Fisheries Division but without consultation with Indo-Fijian Stakeholders

1.6 Recommendations

The complexity and scale of community tenure systems in Fiji presents those seeking to manage fishery resources with a number of advantages and constraints. This section will identify the basic recommendations to managers (community and State) arising from the analysis of the data generated from this research project. These recommendations are developed in Volume 5 of this report.

1.6.1 Implications of Institutional Characteristics

1. CFRAs Based on Cultural Politics

Because CFRAs are based on cultural politics the relationship between the area under the coverage of a CFRA and the underlying ecology and distribution of the resource base is negligible. For effective management, based on the premise of sustainable exploitation, consideration should be given to the promotion of more effective coordination of management actions particularly in the area of the western division of Fiji where at least 15 CFRAs are vulnerable to commercial fishing and poaching across CFRA boundaries. This is particularly important given the introduction of the new legislation on proprietary rights of native fishing rights holders.

2. Management Objectives and Responsibilities

It is the role and responsibility of the Fisheries Divison to continue their work in promoting

sustainability as being of central importance for future generations of fishers. This responsibility should also be stressed to custodians who must be made aware of the wider economic implications of the decline of a fishery. It is important that the issue of responsibility must be emphasised, particularly for those with high discount rates and high mobility who do not have a traditional linkage with a particular CFRA.. An important area of responsibility is that fishers must be prepared to offer more assistance in the collection of data on the performance of management activities. This is a duty that fishers operating in the commercial fisheries in Fiji have not been required to fulfill, in any regular fashion, in recent years. However, experience gained during this project and other research undertaken in Fiji in recent years (e.g. Samoilys and Carlos, 1992), indicates that fishers are willing to cooperate if careful thought is given to the actual procedure employed to collect these data.

3. Management Rules

Advice needs to be available on request, and fisheries officers should be given clear advice on improving their extension skills. It is essential that custodians are fully aware of the potential management actions available and the requirements for their effective application. Advice from Fisheries, through a process of participatory appraisals, would identify the most suitable areas for closure (or alternative management actions). A useful model for this approach has been developed in Samoa (eg King and Faasili, 1997). Again, for the larger CFRAs that have extensive commercial fisheries, should be assisted in coordinating their application of management rules.

4. Changing Institutional Dynamics

The need for a recognition of the changing institutional dynamics in many communities across Fiji is urgent. Although the traditional authority structures remain intact in less developed communities, the younger generations are increasingly becoming politically active as a result of educational and economic opportunities. The dominant force in the commercial fisheries are the younger generation. If management for sustainable resource use is to be effective the skills and energies of these generations must be harnessed effectively. The likelihood of cooperation across a community is enhanced by the expansion of representation and opportunities to contribute to decision-making processes.

The issue of feedback from the fishers to the decision-makers is also an important component of contemporary institutional dynamics. Fisheries are increasingly prosecuted off-shore, by fishers from a range of different stakeholder groups. This makes it harder for traditional institutions to gather feedback on the success of their management. In fact, custodians could be completely misled if they were to rely on the proxy measure of success that could be inferred from the demand for licences for their CFRA. The evidence from the western division indicates that licences are bought not on the basis of the expected catches from a particular CFRA but on the cost of a licence relative to the cost in adjacent areas (the fishers then poach in areas of higher expected yields). Traditional responsibilities and community sanction are not relevant to these Indo-Fijian stakeholder groups. For those fisheries with significant commercial development by Indo-Fijian stakeholders there is an urgent need for increased representation by these stakeholders in the decision-making process. The issue of institutional representation again features because of the fact that custodians of some fishing rights areas are themselves have outside interests (politics and business) that take them away from their tribal area for significant periods of time.

It has been observed that the new legislation will provide *qoliqoli* managers with a clearer

framework for obtaining resource rent and predicted that the prices required for a commercial licence will rise significantly. But there remain many issues that need to be addressed. What exactly are the management *responsibilities* of the new 'owners' and in what way can the need for sustainable levels of fishing effort be demanded of the owners of what is essentially now private property? It has been observed in this report that the prices of licences vary from site to site and that fishers will attempt to pay the smallest fee being charged in their area of operation and then poach in adjacent *qoliqoli* that charge more 'goodwill' for a licence. Without coordination of licence fees across a wide area (for example the western division) this problem will only be exacerbated if increases in fees are not coordinated by fishing rights owners. The corrollary of this issue is the question of what levels of licensing can a fishing owner, acting independently, justifiably allocate? Again, without coordination of licensing adjacent *qoliqoli*, any attempt by one Tui to manage sustainably may be thwarted by the (reckless) allocation of licences in an adjacent *qoliqoli*. This is already an issue for managers. In summary, there must be a quite thorough assessment of the rights and the responsibilities of managers in the light of this proposed legislation. For fisheries located close to marketing outlets (e.g. in the western division) this requirement is of greater urgency as these are the fisheries most likely to become over-exploited. These fisheries are important contributors to the supply of (affordable) animal protein to the growing urban population. There is a clear political issue to address when analysing management objectives. It was reported from Verata and Cautata that native Fijians are moving to protect their resources from exploitation from commercial Indo-Fijian fishers. Although this is in many ways understandable given lack of significant alternative employment opportunities for those communities the implications for conflict area clear. Such objectives should be tempered by consideration of the Indo-Fijian stakeholders who lose access as a result of the decisions by the primary rights holders.

For the State fisheries agency too there is a need for some reorientation of policy and activities. Recent developments in fisheries policy focus on promoting expansion of export commodities. Many of these commodities are being developed through aqua and mari-culture techniques but some (live-fish export) are promoted before sufficient thought has been given to assessing the potential for over-harvesting of the large Serranid, Labrid and Scarid species often targeted by these fisheries. A precautionary approach to the development of this trade is a sensible one. This approach could usefully be applied to the assessment of the inshore commercial fisheries that are expanding around the country. Given the wider political developments centered around the termination of sugar-cane field leases, a process that began in earnest in 1999, there are likely to be increasing numbers of Indo-Fijians looking for alternative employment once their leases have been terminated by the land owners and their sugar-cane farms taken over.

A note of caution on co-management. This research project demanded that (the multi-disciplined) staff spent time in villages and at landing sites around the country collecting a wide range of information and data on the fisheries. One of the least discussed area of co-management is the so-called 'transaction costs'. Raja et al (1998) identified three cost areas: information costs, collective decision-making costs and collective operational costs. A possible defence for co-management (as opposed to central management) is the lower costs (Raja et al, 1998). Managers, especially the State authority that would deal with many communities, must attempt to evaluate these costs (to include staff re-training costs where necessary) and such an evaluation may demand that, initially at least, activities are concentrated on those areas with high fishing effort and (/or) domestic/export marketing potential. It does not follow that these sites would be the cheapest to operate although marketing potential does imply proximity to centres of population and likely proximity to

fisheries offices and staff.

1.6.2 Implications for Co-Management - Physical & Technical Attributes

Fishers in Fiji function under a set of physical and technical constraints including seasonal access to certain grounds and the use of particular gears, often limited avenues for regular marketing of their catches and limited financial resources for harvesting alternative resources or fishing grounds. The physical attributes of the environment and resource system are fixed, and in the short-term so too are the marketing and technological attributes. For management to be effective rules must be developed that fit, or are congruent (Ostrom, 1994), with the constraints resulting from these attributes. Again, participatory activities are essential for assessing the most appropriate type, timing and location of action at any one community.

Unlike in Vanuatu where the majority of fishing rights areas are small, CFRAs in Fiji are often large with long perimeters and numerous examples of CFRAs that are nested in a group of CFRAs. Some CFRAs do not even possess a coastline. This attribute presents real problems for control of access which itself is essential if management actions are to have a chance of working. It is recommended that some consideration be given to improving the surveillance capabilities of the Fisheries Division, perhaps in cooperation with the Navy and with resource custodians. Again the shift in responsibility from Fisheries to custodians heralded by the new legislation on proprietary rights brings this issue further into focus.

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