Fiji Islands Marine Ecoregion

An overview of outstanding biodiversity, threats, opportunities and key stakeholders for conservation

WWF Fiji Programme
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Acronyms

AUSAID	Australian Agency for International Development
BPOA	Biodiversity Plan of Action
CBD	Convention on Biodiversity
CBO	Community Based Organisation
CITES	Convention on International Trade in Endangered Species
COT	Crown of Thorns
EEZ	Exclusive Economic Zone
ERC	Ecoregion Conservation
FAO	Food and Agricultural Organisation of the UN
FBSAP	Fiji Biodiversity Strategy and Action Plan
FFA	Forum Fisheries Agency
FIME	Fiji Islands Marine Ecoregion
FLMMA	Fiji Locally Managed Marine Area
FSPI	Foundation for the People of the South Pacific International
GCRMN	Global Coral Reef Monitoring Network
GEF	Global Environment Facility
ICRAN	International Coral Reef Action Network
IOI	International Oceans Institute
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
JICA	Japanese International Cooperation Agency
LMMA	Locally Managed Marine Area
MAC	Marine Aquarium Council
MDG	Millennium Development Goal
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy Action Plan
NGO	Non-Governmental Organisation
NZAID	New Zealand Agency for International Development
OISCA	Organisation for Industrial, Spiritual and Cultural Advancement
PACE	Pacific Centre for Environment and Sustainable Development
PAFCO	Pacific Fishing Company
PIROF	Pacific Islands Regional Ocean Forum
SEA	Strategic Environmental Assessment
SOPAC	South Pacific Applied Geoscience Commission
SPREP	South Pacific Regional Environmental Programme
START (Oceania)	The Global Change System for Analysis, Research and Training (Oceania)
TRAFFIC	Joint wildlife trade monitoring programme of WWF and IUCN
UN	United Nations
UNDP	United Nations Development Programme
USP	University of the South Pacific
WCS	Wildlife Conservation Society
WI	Wetlands International
WSSD	World Summit on Sustainable Development
WWF	World Wide Fund for Nature
WWF SPP	WWF South Pacific Programme

Executive Summary

The marine environment of Fiji comprises a range of distinct ecosystems that contain some of the most diverse and significant marine habitats, species and processes in the world. These natural resources are of great economic and social importance to the people of Fiji and the world.

Global and local environmental changes over the last few decades have placed the marine resources and habitats of Fiji under increasing pressure. In the face of these pressures communities, government and NGOs have come together to support and guide the conservation of Fiji's marine resources. Today however, there is a growing consensus that the increasing number and range of natural resource management challenges that Fiji faces need to be addressed collaboratively and at a large scale – i.e. across Fiji as a whole. This realisation has led key conservation stakeholders and partners to adopt the ecoregion conservation approach proposed by WWF-ie to look at the marine biodiversity of Fiji as a single unit. This unit, which represents one ecologically distinct area, is known as an "ecoregion". In Fiji, this unit encompasses the entire marine environments of the Fiji Islands and hence the name "Fiji Islands Marine Ecoregion (FIME)

Since 1998 WWF and its partners have used the ecoregion as the planning unit for conservation. It is at this scale that ecological and socioeconomic analysis, dialogue and collaborative action is undertaken to identify, design and implement conservation and management initiatives across areas of high biodiversity significance that reflect both the global significance of the region's biodiversity, and the needs of the people who depend on its health. This effort is known as ecoregion conservation.

Over the past year WWF has been working with a range of stakeholders to complete the preliminary analyses needed to initiate ecoregion conservation across the marine environment of Fiji. As part of this effort, a biodiversity profile of the marine environment of Fiji has been completed. It details the main issues of ecological and socioeconomic importance, summarises opportunities and challenges for conservation and sustainable use, and identifies key stakeholders who will play a crucial role in the successful management of Fiji's most important marine systems. Discussion and action stemming from this profile document and complementary priority and target setting discussions in December 2003, should provide an important reference point for the development and implementation of targeted marine conservation and management strategies across Fiji that will result in the conservation of the unique ecosystems of Fiji's marine environment for future generations.

Biodiversity
Fiji has an extensive and diverse range of marine habitats including, estuaries, mangroves, wetlands, sea grass, macroalgal assemblages, protected and exposed soft shores, lagoons, sand dunes and coral reefs. Fiji falls within the top 10 countries or geographical locations with globally significant coral systems and hosts the world's third longest barrier reef system.

Some of the impressive biodiversity includes; fish, crabs, lobsters prawns, sharks, sea snakes, giant clams, turtles (green, hawksbill, leatherback, and olive ridley turtles - all of which are listed under CITES), endemic sea birds such as the Fiji petrel, and over a dozen migratory shorebirds that use Fiji's mudflats for feeding. Even though there is low endemism within Fiji, important marine habitats provide essential migratory routes and breeding grounds for many endangered species such as whales, turtles, tuna, humphead wrasse and the world's largest parrotfish, the bumphead parrotfish, *Bolbometapon muricatum*, is also found here. The Ecoregion (which

comprises Fiji's EEZ) is also part of the world's richest fishing ground for tuna, contributing to about 15% of Tuna catches in the region.

Growing Pressures

The job of safeguarding the globally important biological resources of FIME (which in addition to being of conservation importance, anchor the lifestyles, traditions and livelihoods of many people throughout Fiji) is becoming more and more challenging given the complexity of Fiji's socio-economic and political environment. Population growth (having increased 4 fold since the arrival of Europeans and continuing at an annual rate of 2%) coupled with the limited availability of arable land (only 19% of the overall area of Fiji), changes in land use, poor management and the deleterious effects of global climate change all pose an increasing threat to Fiji's biodiversity. These pressures are resulting in huge changes in formerly healthy marine systems, and are threatening many more species and the livelihoods of the people who live here.

Commitments to conservation have been weakened by certain economic motives, with poor long term planning and priority being given to short term economic gains. Other pressing issues identified as obstacles to conservation include; poverty at the local level, lack of appropriate policies and laws, inadequate enforcement of laws concerned with preventing unsustainable harvesting practices, lack of information for management decision-making, lack of resources and capacity to deliver conservation.

Opportunities and Links

The Fiji Islands Marine Ecoregion conservation initiative aims to add value and definition to existing and planned conservation frameworks operating across the Ecoregion. There are a number of projects and activities at the international, national and regional level that present important opportunities for the collaboration and partnership needed to ensure more effective, coherent conservation efforts, promote best practice and make the best use of limited resources. Such opportunities include the Fiji Biodiversity Strategy and Action Plan (FBSAP), the proposed Fiji Sustainable Development Bill (yet to be enacted), and a number of national government strategies and plans (i.e. Tourism, Tuna, and Fisheries) as well as international and regional level linkages such as the World Summit on Sustainable Development (WSSD), the Convention on Biodiversity (CBD), the Barbados Plan of Action (BPOA), and the Action Strategy for Nature Conservation in the Pacific Islands. Partnership strengthening, capacity building and acting to leverage funding to deliver large-scale conservation are key features of the FIME initiative.

Key Players

The success of the approach will be determined by the active involvement and collaboration of the many existing and future players with an interest in the state and sustainability of Fiji's marine resources. Key to the identification of the focal biodiversity elements and priority biodiversity areas of FIME will be Government departments (Fisheries, Tourism, Environment, Foreign Affairs, National Planning, Fijian Affairs Board, Native Land and Fisheries Commission, Fiji Navy, Mineral resources Dept), the University of the South Pacific (Marine Studies Programme, the Geography Department, Institute of applied Science and the Biology Department), NGO's (Live and Learn Environmental Education, International Waters Programme, Partners in Conservation and Development, WCS, Birdlife, WWF SPP, TRAFFIC, LajiRotuma, Greenpeace), donors (UNDP, NZAID, AUSAID), and regional organisations such as SOPAC, the Forum Secretariat, and SPREP to name but a few (for a more comprehensive list, please refer to the corresponding section in the main body of the document). Other influential organisations include the Fiji Hotel Association, Fiji Ecotourism Association, Tourism Resource Owners Association, the Hotel Industry the Tuna

Fishing Industry and the Aquarium Trade Industry. Finally, the process is no one organisation's alone, and as the process takes shape the ultimate responsibility will be on the many stakeholders in Fiji.

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1.0 Introduction

The Fiji Islands Marine Ecoregion conservation (FIME) initiative is designed to provide an opportunity for individuals and organisations with a stake in the future of Fiji's marine environment to come together to work towards creating mechanisms for a unified, well defined and coherent conservation and management strategy for the sustainable utilisation of Fiji's important marine areas. This document gives a brief overview of Fiji's marine biodiversity, the threats and opportunities that exist in terms of its use and conservation, and those stakeholders who have an interest in its future state. This information can be used to inform discussion and debate around the development of conservation and resource management strategies at the national and local level. The primary purpose of the document is to inform WWF Fiji Program staff and the Ecoregion Stakeholders on how to proceed with Ecoregion Conservation planning for FIME.

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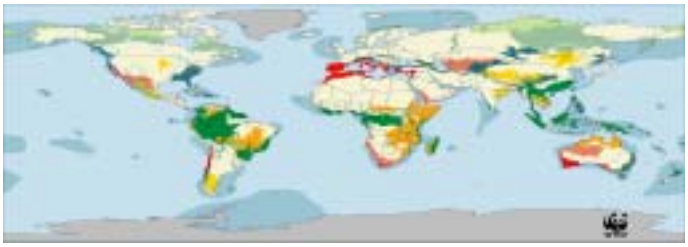
The document has been divided into 7 sections; 1)Introduction to ecoregion conservation and the FIME, 2) Overview of Fiji's socio-economic conditions,3) Profile of relevant environmental processes and the biodiversity of the FIME, 4)Overview of threats to the FIME's biodiversity, 5)Overview of opportunities for conservation, 6) Summary of the stakeholder process and key stakeholders,7) Conclusions

1.1 Background: Ecoregion approach to conservation

Biodiversity is the basis of life on earth and conserving biodiversity has been WWF's Mission since its inception in 1961. The world's biodiversity (species, habitats and natural processes) is being depleted rapidly. In the face of such rapid losses, conservation requires more complex responses than just site based, ad hoc, responses to environmental problems. As a result large conservation organizations such as WWF, IUCN, WRI, TNC, CI are moving towards conservation that

- is driven by a common vision and raises a collective voice for conservation
- executes planning and implementation programs at scales compatible with ecological processes.
- uses networks of protected areas within managed seascapes as the core component of conservation planning
- addresses the broader social, economic, and policy factors critical to sustainability.

This concept is known as Eco-Region Conservation (ERC). ERC uses ecoregion as the planning and implementation unit. An Ecoregion is defined as 'large units of water or land that contains a distinct assemblage of natural communities sharing a large majority of species, dynamics and environmental conditions'. WWF scientists, in collaboration with regional experts has identified 238 such places that are outstanding in terms of the biodiversity and ecological processes that sustain biodiversity (Map 1), and Fiji is one of them.



Map 1 : G200 map

Ecoregion conservation provides an opportunity and platform for

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- Building collaboration for conservation and creates energy for stakeholder participation.
- Linking policy to field work
- Building capacity to support conservation and development efforts
- Raise awareness and set up networks of ecologically representative areas of marine reserves
- Generating donor and government support.

1.2 Fiji Islands Marine Ecoregion (FIME)

Fiji "a vast archipelago centered on two relatively shallow geological features, the Fiji Platform and the Lau Ridge" (Spalding *et.al*, 2001), falls on the eastern margin of the boarder of the coral triangle - a region of medium to high marine biodiversity. It has a high diversity of marine habitats including estuaries, mangroves, wetlands, sea grass, macroalgal assemblages, protected and exposed soft shores, lagoons, coral reefs. It falls within the top 10 countries or geographical locations with globally significant coral systems, hosts the world's third longest barrier reef system and forms part of the world's richest fishing ground for tuna, accounting for 15% of the catch in the region (National Tuna Management Plan – Managed by the Ministry of Fisheries and Forests). Biodiversity of interest include: a number of fish species, giant clams, turtles (green, hawksbill, leatherback, and olive ridley - all of which listed under CITES Appendix I), the endemic Fijian petrel and over a dozen migratory shorebirds that use Fiji's mudflats for feeding. It is also part of an important migratory route and breeding ground for whales, and feeding grounds for marine turtles.

A host of factors are leading to the rapid erosion of these unique habitats and biodiversity. These include: an expanding population and increasing urbanisation, growing commercial interests in activities that negatively impact biodiversity resources, a lack of available information to base management decisions on, rising poverty, and the inadequate enforcement of laws. Moreover, Fiji's economy is highly dependent on the utilisation of natural resources (agriculture, fisheries, forestry, mining and tourism). With approximately 40% of the overall population subsisting on marine resources and a distinct lack of alternative livelihood options, reliance on marine resources is increasing amongst the poorest people of Fiji. As a result, effective marine ecosystem management and the development of sustainable livelihoods are two issues that are closely linked.

Pursuing conservation at the ecoregion scale allows key stakeholders and sectors to take account of both biological and socioeconomic needs and opportunities at a scale (i.e., larger than site) that will ensure the sustainability of outstanding natural characteristics and local lifestyles and livelihoods. The ecoregion conservation approach aims to inform and support all stakeholders as they move to scale up and focus planning and action around natural resource protection and management, link policy to field work, build capacity to support conservation and development efforts, raise awareness and set up networks of ecologically representative areas of marine reserves. The FIME process aims to create a strategy and plan for an ecoregion by engaging a range of stakeholders (from scientific expert to policy maker to community) in a process of assessment, target setting planning and collaboration. This document presents an initial profile of this process within the FIME.

2.0 FIME : Socio-Economic, Policy and Cultural Environment

2.1 The Social Context

2.1.1 Population and Demography

Fiji is a multi-racial country with a population of just under 800,000. Of the overall population, 49% are ethnic Fijians, 46% are Indo-Fijians and around 5% are of Chinese, European, mixed race or other descent (Chandra, 1998a). Fiji is rapidly moving from a largely rural society to an urban one, and the current urban population is estimated to be 39% of the entire population, and it is thought that levels of urbanisation are growing (Chandra, 1998b). These movements are expected to add to the already considerable pressure on the urban environment including social problems, squatter settlement, an over-utilised infrastructure, congestion and pollution. One factor that may be contributing to the urban drift is the phenomenon of sugar cane farmers being displaced from rural areas in response to the expiry of their land leases, and being left with few livelihood options. Population movement towards the coast and on to reclaimed land poses a clear threat to wetland and mangroves, and therefore to sustainable marine management.

2.1.2 Poverty

Poverty is also becoming an increasingly serious issue in Fiji. According to the 1997 Fiji Poverty Report (UNDP, 1997), 25% of Fiji's households live below the poverty line. The same report highlighted that 13.3 % still drink untreated well, creek or river water, and 53 % do not have proper housing or toilet facilities. Indications are that poverty has risen since the last report, particularly after the 2000 political crisis, with households experiencing difficulties meeting their basic needs (Ministry of National Planning, 2001). Plate 1 depicts a scene not only in rural areas, but one that is becoming increasingly common in the urban areas. Most people do not get an adequate level of support to meet even their basic needs, and most of the population receives no social security (UNDP, 1997). The low-income status of much of the population could well be one of the greatest factors leading to the drive for short-term economic gain from marine resource exploitation.

The majority of the traditional Fijian populations have always lived on the coast (Plate 2) and have survived almost exclusively on marine resources for generations. These lifestyles and livelihoods are currently under threat as an increasing number of people – including dispossessed sugarcane farmers - becoming reliant on marine resources as the socio-economic status of Fiji undergoes a major change.

(Source: Watling and Chape 1992)

Plate 1 : Inadequate housing in rural areas

(Source: Watling and Chape 1992)

Plate 2 : Typical coastal village

2.2 The Economic Context

Fiji is has an agriculture-based economy dominated heavily by a single crop - sugar cane, and this crop dominates the export market (Annex I). The production of non-sugar crops (dalo, cassava, ginger, yaqona, pineapple, pawpaw, mango, vegetables, spices, cocoa and coconut products) and livestock (beef, dairy, pork, poultry and goat) are amongst some of the other agricultural activities pursued in Fiji (Thaman, 1998). Forestry is another major sector contributing export earnings to the country's economy (Chandra, 1998c). Tourism and fisheries, sectors that have grown steadily over the last few years, are now two major economic activities in Fiji and these sectors are discussed in greater detail below.

2.2.1 Fisheries

Fisheries is the third largest export industry. The sector accounts for 1.5% of GDP and shows considerable potential for expansion. The tuna fisheries dominate the sector. Pacific Fishing Company (PAFCO), cans tuna using yellow fin, skipjack and albacore, with most tuna is sold to the United Kingdom. But with the expected erosion of preferential agreements with European markets, the nature of the industry may soon change. Large tuna (albacore, yellowfin, skipjack, and bigeye) are currently also exported to the Japanese sashimi market and the US, and there is scope for expansion in the longline tuna fishery, which exports to the high quality sashimi market in these two countries (Ministry of National Planning, 2001).

2.2.2 Tourism

In comparison with other industries, the tourism industry has become one of Fiji's largest sources of economic growth. Tourism contributes approximately 17% to GDP and provides direct and indirect employment to an estimated 40,000 people. In 2001, tourist arrivals totalled 348,014, an 18.3% increase from 249,070 in 2000, and this upward trend is set to continue. According to the Tourism strategic plan 2002-2006, in the next 5 years the industry is expected to grow into a billion dollar industry (Ministry of National Planning, 2001).

2.3 The Policy and Cultural Context

2.3.1 Marine Resource Ownership

The coastal and foreshore waters and resources of Fiji are shared under dual, national ownership. All coastal land and resources below the high water mark to the reef, archipelagic waters and beds, and inherent resources underneath up to the 200-mile of Fiji's Exclusive Economic Zone (EEZ) boundary are owned by the state. The inshore fishing grounds *(i qoliqoli's),* which cover the low water mark, including the fringing reefs within coastal waters and around isolated islands are owned by indigenous Fijian tribal units.

2.3.2 Marine Resource Use

The use of marine resources by people other than traditional owners or tribes is only allowed with the acquisition of the appropriate license. Commercial fishing activity in any fishing area or EEZ requires a license from the Fisheries Department which can only be issued following the production of a letter of consent from the chief of the '*i qoliqolis'*. Currently, the Fisheries Department has the legislative responsibility for the management of the marine environment in Fiji (Sauni, 1999). The other government departments that share aspects of environmental responsibility are the departments of Environment, Planning, Public Health and local governments (Sauni, 1999). However, the rights and responsibilities for the *i qoliqoli's* will revert back to traditional owners by the year 2005.

There are a variety of legislations and policies that are relevant to marine resurce management and conservation and these include: the State Lands Act 1946, which governs the littoral zone,

foreshore and submerged seafloor; the Fisheries Act 1942, which prohibits destructive fishing practices and imposes minimum sizes on a number of reef species; the Marine Spaces Act 1977, which deals with the demarcation of marine areas under Fijian sovereignty (i.e. clarifies the boundaries of Fiji's EEZ, territorial waters and archipelagic waters; Quarantine Acts and the Sustainable Development Bill (yet to be enacted) which provides codes for sustainable practice, national management plans, offences and penalties. International legislation that Fiji is committed too include: the Convention on Biological Diversity which, was signed in 1992 and ratified in 1993; the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (UNDP, 2003).

2.3.3. Marine Resource Management

Traditional owners have been managing marine resources since long before the modern concepts of set-aside or protected areas were developed and introduced by the conservation community. 'Tabu' areas, on which fishing is periodically or permanently controlled, have been a commonly used technique in traditional fishing ground, or *i qoliqoli*, management. However, traditional systems of natural resource allocation and management have been eroded by the shift from marine resource utilisation for subsistence living to that of a cash economy - a shift that is becoming more and more prevalent across Fiji (Sauni, 1999). There is a poor understanding of marine resource use by groups other than resource owners, and thus a lack of knowledge of how over 40% of the population use and manage reefs, or how they interact with the traditional system of land management.

Today, traditional methods of conservation are being actively encouraged through the efforts and successes of the Fiji Locally Managed Marine Area (FLMMA) network, a network of Fijian government departments, communities and NGOs that focuses on issues of marine co-management. The positive changes effected through the work of the FLMMA network are striking, with approximately 40 community based marine protected areas now in operation and the gazettal of Fiji's first nationally recognised Marine Protected Area (MPA) in 2002.

3.0 Profile of important environmental processes and the biodiversity of the FIME

3.1 Introduction

This section presents a summary of vital environmental and geographical features and processes, and a profile biodiversity found within the FIME. Most available, known data and reports on species numbers and distribution have been collated. It must be noted that this information is by no means an exhaustive list, and will be subject to change as more information is obtained.

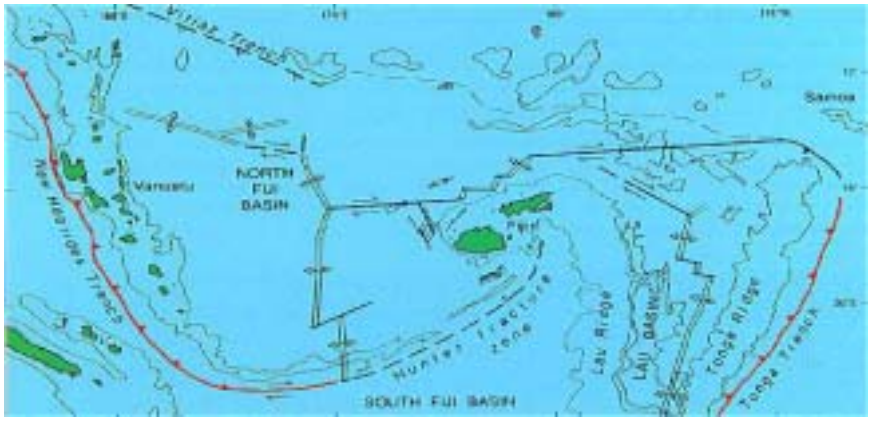
The information in this section is organised under the following categories;

- **marine plants/pseudoplants** (Algae, Seagrass, Mangrove)
- **marine invertebrates**
- **marine vertebrates**

3.2 Environmental and geographical features

3.2.1 Fiji: Geographical Setting (Map 1)

Composed of approximately 844 high islands, cays and islets, and situated between 15-23ºS and 177-178ºW, Fiji has a total land area of 18,500 km² and 87% of this total land mass is made up of the two main islands; Viti Levu and Vanua Levu (Vuki *et al.*, 2000). Located in the centre of the South Pacific, Fiji lies at the midpoint of the opposing Tonga Kermadec and New Hebrides convergence zones. Fiji is separated from these actual convergence zones by two extensional back arc basins, the North Fiji Basin to the west and the Lau Basin to the east, and a series of transform faults including the Fiji fracture zone and the Matthew Hunter ridge. Fiji's islands are largely volcanic with some sedimentary rocks, and a few atoll islands in the Lau group (Vuki *et al.*, 2000).



Source : Ministry of Lands and Mineral Resources 2002a

Map 1 Fiji: Geographic setting

3.2.2 Oceanography

Fiji's oceanic activity is characterised by predominantly south-easterly swells throughout the year, though during the period between July and December there are significant easterly swells. Tides are generally diurnal, lower low water springs fall during the night in summer and this is reversed in the winter, falling during the day throughout with the seasonal change. Sea surface temperatures have an annual average of between 24ºC-31ºC, and surface salinity levels tend to be 35º/00, but can drop with heavy rainfall. The annual mean tidal range is very small at only 1.1m. The mean range of neap tides is 0.9m and spring tides reach an amplitude of 1.3m. Strong tidal currents occur 3 hours before and after low and high tides in lagoons, and the amount of water entering lagoons over reefs and through passages are also dependent on tidal heights (Vuki *et al.*, 2000).

3.2.3 Geomorphology of Fiji's reefs

It is estimated that there are around one thousand coral reefs in Fiji (Zann, 1992). The most common reef types are fringing reefs and barrier reefs (see Table 1 for a summary of reef types found in the FIME), and reef sizes vary from less than 50m long to 370 km long reef systems such as the broken barrier reef chain of the Mamanucas/Yasawas/Great Sea Reef System (Vuki *et al.*, 2000).

Table 1: Reef types found in the FIME

Reef type	Description
Fringing reefs	Partially surrounding or fringing a high island
Patch reefs	Small patches of coral in lagoon areas
Barrier reefs	Elongate reefs forming walls or "ribbons" offshore along the edge of the continental shelf
Platform reefs	Rising to sea level on the insular shelf
Oceanic ribbon reefs	Partially enclosed wall or ribbon reefs growing on a submerged feature or seamount
Drowned reefs	Deep-water reefs, not in an active growth phase
Atolls	Circular reefs, with small sandy islets or motus
Near atolls	Circular reefs, with small sandy islets or motus, but with part of the volcanic basement protruding from the reef as a rocky islet

(Source: Vuki *et al*., 2000)

The geomorphology of the reef systems found throughout the FIME is varied and diverse. Zann (1992) presents a system of classification that divides the reef areas of Fiji into 17 "reef provinces" based on similarities of geomorphology, position and reef type (Table 2). Long-term ecological studies on Fijian reef systems are few, though there have been a number of studies conducted on Suva Reef (Vuki *et al*., 2000). Reef systems in Fiji are known to be sensitive to sedimentation, flooding and cyclones, as well as being affected by outbreaks of the crown-of-thorns starfish, *Acanthaster planci* (refer to section 4.3 below for more detail).

Table 2. Reef provinces in Fiji based on similarities in geomorphology

Distinct area or "reef province"	Reef type
South Viti Levu	Windwards, outer-shelf barrier reefs
Coral Coast	Windward, mid- and outer shelf fringing reefs
Beqa and Vatulele	Windward, isolated shelf (uplifting)

	barrier reefs
North/western/eastern Viti Levu	Leeward, mid- and inner-shelf platform reefs
Mamanucas and Yasawas	Leeward, mid-shelf platform reefs
Outer Mamanucas/Yasawas/Great Sea Reef/northern Vanua Levu reef line	Leeward, outer-shelf reefs, shoals and northern barrier reef system
Northern Vanua Levu reefs	Leeward, midshelf platform reefs
Northern and Eastern Vanua Levu reefs	Leeward, inner-shelf
South Vanua Levu Barrier Reef	Moderate windward, outer-shelf
South eastern Taveuni	Windward, isolated, uplifted, fringing reefs
Cikobia	Fringing and barrier reefs, isolated, uplifted
Lomaiviti reefs	Moderately windward, mid- and outer-shelf
Eastern Vanua Levu reefs	Moderately windward, outer-shelf, atolls and near atolls
Kadavu	Isolated shelf barrier and fringing reefs
Yasayasa Moala	Isolated, barrier and fringing reefs
Lau Ridge	Uplifting fringing, barrier, platform and oceanic ribbon reefs
Rotuma	Isolated, shelf, fringing and platform reef

–Source: Zann 1992

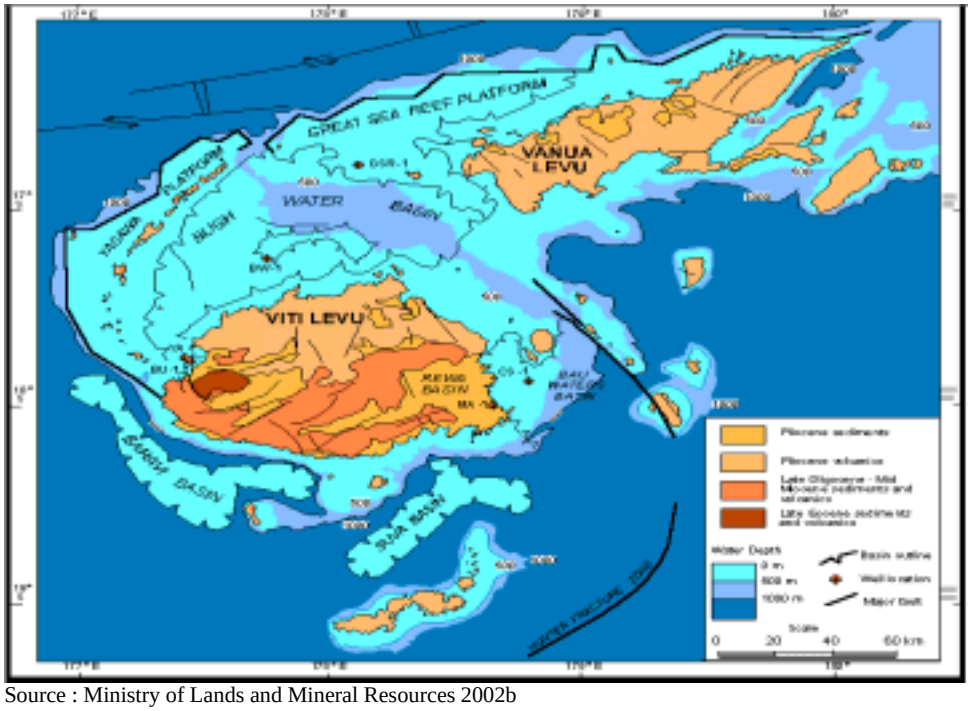
3.2.4 Bathymetry

Current bathymetric knowledge is still incomplete, but there are a number of current initiatives focusing on the collation of bathymetric information. The Hydrographic Section of Fiji's National Marine Department is currently in the process of completing a national bathymetry map, and have yet to survey the area around the great sea reef. Existing bathymetric information available at time of printing is presented in Map 2.

3.2.5 Cyclones and other extreme weather events

Fiji is prone to cyclonic activity and data from the last century estimates a national average of one cyclone per year, with severe cyclonic activity occurring once every 3-4 years. Cyclones assume seasonal patterns of activity, generally showing greatest prevalence between the months of November and April. Climatic and oceanic changes associated with cyclones include high rainfall and elevated sea levels. These weather changes can cause severe flooding and lead to the build up of sediment in rivers and coastal areas. Certain islands and areas are more susceptible to cyclones than others, namely; the Yasawas, west Viti Levu, Kadavu, northwest Vanua Levu, Cikobia and the Lau Group (Vuki *et al.*, 2000).

Cyclone frequencies have been observed to increase during El Niño years. It is known that El Niño events also have a profound effect on oceanic activity, with notably lower western Pacific oceanic temperatures and less precipitation, accompanied by weaker trade winds and a corresponding influence on certain marine species. Tuna and billfish are known to modify their migratory behaviour during El Niño years (Vuki *et al.*, 2000).



Source : Ministry of Lands and Mineral Resources 2002b
Map 2: Geology and bathymetry of the FIME

3.2.6 Rivers

Over 70% of the main island of Viti Levu is drained by three large river systems, the Rewa, Navua and Sigatoka, all which enter the sea at the south coast. The Rewa River has the largest catchment area, covering one third of the island. The Ba and Nadi Rivers have a combined catchment area that covers 15% of Viti-Levu (Scott, 1993). Vanua Levu has two rivers, the Tabia and the Dreketi, which feed out into the great sea reef.

3.3 Biodiversity features

Information regarding the majority of Fiji's marine biodiversity and its distribution is far from comprehensive. As of today most marine fish species found below depths of 60 metres remain undescribed (Richard Pyle, *pers. comm.*, 2003), and large numbers of new species are continually being discovered in Fiji's waters (Cat Holloway, p*ers. comm.*, 2003). To date, most information collected remains unpublished and much of the expertise in this area resides outside the region (Whippy-Morris and Pratt, 1998) making it difficult to assemble a complete profile of the regions biodiversity. A summary of Fiji's marine biodiversity is given in Table 3 and mapped information of biodiversity can be found in Annexes II and III.

Table 3: Summary of Fiji's marine biodiversity

	Information known	Sources
Marine plants		
Algae	422 taxa: 39 Cyanophyceae 113 Chlorophyceae 42 Phaeophyceae 228 Rhodophyceae	N'Yeurt *et al.* (1996)
Seagrass	4 species: *Halodule uninervis* *Halophila Ovalis* *Syringodium isoetifolium* *Halophila ovata*	Morton and Raj (1980)
Mangrove	9 species + 1 hybrid: *Bruguiera gymnorrhiza* *Rhizophora stylosa* *R. mangles* *R. samoensis* *R. x selala* (hybrid) *Lumnitzera littorea* *Xylocarpus granatum* *X. moluccensis* *Excoecaria agallocha* *Heritiera littoralis*	Whippy-Morris and Pratt (1998)
Invertebrates		
Stony coral	198 species	Zann (1992)
Gorgonians	5 species	Muzik and Wainwright (1977)
Zoanthids	15 species	Muirhead and Ryland (1981)
Molluscs		
Gastropods	123 species	Parkinson (1982)
Opisthobranch	12 families, 253 species	Brodie and Brodie (1990)
Bivalves	25 families, 102 species*	Parkinson (1982)
Ascidians	60 species	Kott (1981); Ryland *et al.* (1984)
Vertebrates		
Bony fish	162 families, 1198 species	Baldwin and Seeto (1986)
Seabirds	10 species	Clunie (1985)
Whales	4 species 13 species	Zann (1991)/whippy –Morris & Pratt (1998)
Marine turtles	5 species	Zann (1992)
Sea snakes	3 species	Guinea (1980)

Source: Adapted from Whippy –Morris and Pratt ,1998
*Other studies report higher numbers of bivalve species (Sauni, 1999)

3.3.1 Marine plants

Algae
To date 422 taxa of algae have been recorded (N'Yeurt *et al*., 1996), and there are few species endemic to Fiji. The most thoroughly surveyed areas include the Suva Lagoon and the Great Astrolabe Reef, with the algal composition of large areas of Fiji remaining as yet unsurveyed (Whippy-Morris and Pratt, 1998).

Estimations put the number of seaweed species in Fiji at about 310 (South and Kasarhara, 1992), though knowledge of Pacific seaweed species and distributions is limited. Seaweeds have been traditionally utilised as a food source across the Pacific region, and there are 7 species, all of which are abundant throughout Fiji, that are regularly harvested for consumption in Fiji.These include;: sea grapes (*Caulerpa racemosa*), *Codium bulpolium*, maidenhair (*Hypnea pannosa*) glassweed (*Gracilaria verrucossum*), goldenweed (*Solieria robusta*) and *Acanthopora spicifer* (South 1993).

Seagrass
Four species of seagrass have been recorded in Fiji; *Halodule uninervis*, *Halophila ovalis*, *Syringodium isoetifolum* and *Halodule pinnifolia* (Morton and Raj, 1980). All are found intertidaly and in shallow subtidal areas throughout protected shores and soft shores across Fiji. Seagrass beds are ubiquitous inshore habitats, and provide important ecological functions in coastal areas.

Mangrove
With an area of 45,000 ha, the mangrove forests of Fiji emerge as one of the largest mangrove formations in the South Pacific (Watling and Chape, 1992). The most extensive areas of mangrove are found in deltaic formations at the mouths of Viti Levu's four largest rivers, the Ba, the Rewa, the Nadi and the Qawa rivers (Marika Tuiwawa, *pers. comm*., 2003). Mangrove areas are also found along the Labasa river, the Dreketi river and along Bua Bay in Vanua Levu (Watling and Chape, 1992). Habitats found in the Rewa Delta in Viti Levu are known to be of significant interest due to their high levels of biodiversity (Whippy-Morris and Pratt, 1998), while the Suva-Navua and Nadi Bay mangroves of Viti Levu are thought to be mangrove habitats under the greatest pressure, being threatened by land development activities (Watling, 1985).
There are 9 species of mangrove found in Fiji, though 3 species and a putative hybrid of the family Rhizophoraceae dominate the mangrove vegetation of Fiji. These are *Bruguiera gymnorrhiza, Rhizophora stylosa, R..mangle* and *R..x. selala* (the last species being a cross between *R. stylosa* and *R.. samoensis*). There are no endemic mangrove species, and less common species include *Xylocarpus granatum*, X. *mollucensis, Lumnitzera littorea, Exoceocaria* species and *Heritiera littoralis* (Watling and Chape, 1992). A Fiji mangrove database has been developed, and this is available from Dr Joeli Veitayaki at MSP(Batiri Thaman, *pers.comm*., 2003)
Mangrove habitats show distinct zonation, with *Rhizophora* dominating the most seaward zones. *R. stylosa* is found in sandy tidal flats while *R.. samoensis* is more common along river channel. Certain mangrove species are strongly associated with each other: *Bruguiera* is known to commonly grown behind stands of *Rhizophora*, while the more landward areas hold associations of *Xylocarpus* and *Exoceocaria* (Vuki *et al*., 2000).

3.3.2 Marine invertebrates

In general, information on marine invertebrates in Fiji is incomplete, and knowledge of the lower invertebrates, i.e. common reef sponges, polychaete worms, is poor. However, most of the major invertebrate groups that would be expected on a biodiversity rich reef system have been recorded (Vuki *et al*., 2000).

Corals

Corals are an essential and dominant part of coral reef communities, and play a key role in determining the composition and nature of reef systems. Knowledge of Fijian corals remains incomplete, with the most detailed description to date being that of 198 species from the Mamanucas and southern Viti Levu (Zann, 1992). Other notable descriptions include: 100 species of stony coral identified from the Great Astrolabe Reef, Kandavu (Paulay 1990, 15 species of zoanthids described from Viti Levu (Muirhead and Ryland, 1981), and 5 species of gorgonian corals or sea fans (Muzik and Wainwright, 1977).

Echinoderms

Apart from the crown-of-thorns starfish (*Acanthaster planci*) and sea cucumber species of commercial and subsistence importance, echinoderm species are not well known (Vuki *et al*., 2000). It is estimated that 15 species of sea cucumber, class Holothuoidea, found in Fiji are used in the preparation of the commercially important processed sea cucumber product "beche-de-mer", and several of these (Table 4) are also used for subsistence purposes (FFA, 1994), and commercial species are generally found in sheltered lagoons and on reef flats. The most studied Fijian cephalapod is the nautilus (*Nautilus pompilius*), which has been studied extensively (Vuki *et al*., 200)

Knowledge of distribution and range is limited, but the following information is available on a few commercial species: the white teatfish (*Microthele fuscogilva*) is most abundant in the Suva reef; the black teatfish , (*Microthele nobilis*) is more common in the reefs of Beqa, Levuka and North and South Astrolabe reefs (FFA, 1994); and the elephant's trunkfish, (*Holothuria fuscopunctata*), is known to dominate certain inner lagoon areas in northern Fiji (Preston, 1993). Most sources of beche-de-mer originate from Lau, Vanua levu, and the Yasawas (FFA, 1994). Some species, such as the sandfish, *Metriatyla scabra*, and *H. fuscopunctata* do not appear to have specific habitat preferences (Preston, 1993). Others seem to have distinct preferences, *M. fuscogilva* appears to be associated with turtle grass (*Syringodium isoetifolium*). *M. nobilis*, the prickly redfish, (*Thelenota ananas*) and the blackfish, (*Actinopyga miliaris*) have been found to mainly inhabit sand channels on the inner rim of barrier and patch reefs.

Table 4: Common sea cucumber species present in Fiji

Common Name	Fijian Name	Scientific Name
Sandfish	dairo, tero	*Metriatyla scabra***
Brown sandfish	vula	*Bohadschia vitiensis**
Sea cucumber	mudra, midro	*Stichopus sp.**
Black teatfish	loaloa, lolo	*Microthele nobilis***
Surf redfish	tarase	*Actinopyga mauritiana***
White teatfish	sucuwalu	*Microthele fuscogilva***
Greenfish	sucudrau	*Stichopus chloronotus***
Lollyfish	loiloi	*Halodeima atra***
Blackfish	driloli	*Actinopyga miliaris*
Deep-surf redfish	dri-tabua	*Actinopyga echinites****

Prickly redfish	-	*Thelenota ananas****
Elephant's trunkfish	-	*Holothuria fuscopunctata****
Curry fish	laulevu	*Stichopus variegates****
Stonefish	-	*Actinopyga lecanora****

*Species of subsistence importance only
**Species of subsistence and commercial importance
***Species of commercial importance only
(Source: FFA 1994)

Molluscs

The molluscs are a phylum that has been well described scientifically and many of the Fijian species are described by Cernohorsky (1968; 1972; 1977). There are 102 bivalve species from a total of 25 different families have been collected from Viti Levu and surrounding islands (Parkinson, 1982), though some claim to record up to 200 species (Sauni 1999). 123 species of gastropods from 12 families have been collected from southern Viti Levu (Parkinson, 1982), and 253 species of opisthobranchs have been recorded from Viti Levu (Brodie and Brodie, 1990).

There are a number of species of mollusc that are of commercial and subsistence importance, and a few are explored below. Four species of giant clam (family Tridacnidae) are found in Fiji; *Tridacna derasa*, *T. tervoroa*, *T. squamosa* and *T. maxima*. The current harvesting pressures on these species give cause for concern; two species (*Tridacna gigas* and *Hippopus hippopus*) recently became locally extinct and there are concerns over the stability of T. *derasa* populations (Sauni, 1999). The ark shell (*Anadara cornea*), kaikoso in Fijian, is an important food item in Fijian households, and is widely traded and sold in markets throughout Fiji (FFA, 1994). The trochus (*Trochus niloticus*) is a commercially harvested gastropod that is thought to currently be threatened by over harvesting fuelled by demand for its valuable shell, but a lack of catch records mean that the status of trochus fisheries are poorly understood (Nash, 1993). The black-lip pearl oyster (*Pinctada margaritifera*) is harvested from reefs, but stocks of gold-lip pearl oyster (*Pinctada maxima*) no longer exist (FFA, 1994). Important cephalopod species include bigfin reef quid (*Sepioteuthis lessoniana*) and a number of octopus species (FFA, 1994). Table 5 lists some of the other commonly utilised edible molluscs in Fiji.

Table 5. Some edible molluscs found in Fiji

Common Name	**Fijian Name**	**Scientific Name**
Bivalves		
Jewel-box shell	bu, su sobu	*Chama sp.*
Arkshell	kaikoso, qeqe	*Anadara cornea*
Hardshell clam	kaidawa, kaibakoko	*Periglypta puerperal*
Venus shell	kaitakadiri, qaqa	*Gafrarium tumidum*
Littleneck clam	kaivdra	*Tapes literata*
Coconutscraper cockle	kaininiu, sakaro	*Vasticardium sp.*
Smooth giant clam	vasuadina, matau	*Tridacna derasa*
Rugose giant clam	katavatu, kativatu	*Vasticardium sp.*
Fluted giant clam	cega	*Tridacna squamosa*
Surf clam	sigawale, silawale	*Atactodea striata*
Mangrove mussel	kuku, boro	*Modiolus agripetus*
Mangrove oyster	dioniveitiri	*Crassostrea mordax*
Thorny oyster	kolakola, saulaki	*Spondylus ducalis*
Pigmy pearlshell	civaciva, civare	*Pinctada martensi*

Gastropods		
Spider shell	yaga, ega	*Lambis lambis*
Red-lipped stromb	tivikea, gwerativi	*Strombus luhuanus*
Stromb	golea, gerra	*S. gibberulus*
Trochus shell	sici, leru	*Trochus niloticus*
Top shell	tovu	*Tectus pyramis*
Moon snail	drevula	*Polinices flemingiani*
Polished nerite	madrali	*Nerita polita*
Horn shell	ciciyarayara, durulevu	*Cerithium nodulosum*
Turban shell	lasawa	*Turbo chrystomus*
Polished nerite	madrali	*Nerita plita*
Miscellaneous		
Chiton	tadruku	*Acanthozostera gemmata*
Green seahare	veata, kotia	*Dolabella auricularia*
Black seahare	veataika, kotiaika	*Dolabella sp.*

Source: Lewis (1996); FFA (1994)

Crustaceans

Crustaceans have been relatively well studied in Fiji. Eighty species of marine Gammaridian amphipod are currently known, and substantial collections of shallow water amphipods have been described in Fiji. Of these 40% of Taxa are new to science, and 41% of all Taxa are of endemic status. Fiji is characterised by a higher percentage of domicolous forms than any other well-studied island group (Meyers, 1985).

There are a number of important crab species that are harvested for commercial and subsistence use. Mangrove species of subsistence importance include: *Cardisoma cardifex*, *Scylla serrata*, *Sesarma erythrodactyla* and *Thalassina anomala*. The coconut crab (*Birgus latro*) is present in only a few islands. The mud crab (*Scylla serratta)* inhabits mainly mangrove areas and is know to be found in the Bua, Labasa, and Rewa deltas. Other important crab species include: the black mangrove crab (*Metopograpsus messor*; kakaloa or ukavulu in Fijian), the landcrab (*Cardisoma carnifex*; lairo in Fijian) which is found most commonly in Fulaga, the red clawed crab (*Sesarma erythrodactyla*; kukadamu or kukadra in Fijian), the swimmer crab (*Thalamita crenata*; qarivatu in Fijian), the threespot reef crab (*Carpilium maculates*; tavutolo or kavika in Fijian) and the redeye crab (*Eriphia sebana*; motodi or taqalito in Fijian) (Lewis, 1986).

The most common Fijian lobster species is the golden rock lobster, *Panulirus penicillatus*. The distribution of this and other lobster species of interest, the majority of which fall under the genus *Panulirus*. The species of banded prawn-killer found in Fiji is *Lysiosquilla maculata*. Locally known as urata, this species is found in areas where the reef flat is overlain with sand (FFA, 1994). An overview of the important crustacean species of Fiji is given in Table 6.

Table 6: Some important crustacean species found in Fiji

Common Nme	Local Name	Scientific Name
Lobster species		
Golden rock lobster	uraukula, rauvatuvatu	*Panulirus penicillatus*
Painted rock lobster	uraudina	*P. versicolor*
Whiskered lobster	-	*P. longipipes femoristriga*

Ornate rock lobster	urautamata	*P. ornatus*
Slipper lobster	vavaba, ivinibila	*Parribacus caledonicus*
Shallow water marine prawnsgilled shark		
Giant tiger prawn	urakeirasaga	*Penaeus monodon*
Witch prawn	uranicakau	*P. canaliculatus*
Green tiger prawn	-	*P. semisulcatus*
Western king prawn	-	*P. latisulcatus*
Greasy prawn	-	*Metapenaeus anchistus* *M. elegans*
Banana prawns	-	*P. merguinsis*
Deep water marine prawns		

Common Name	**Scientific Name**
Pyjama shrimp	*Parapandalus serratifrons*
Striped soldier shrimp	*Plesionika edwardsii*
Striped gladiator shrimp	*P. ensis*
Armed nylon shrimp	*Heterocarpus ensifer*
Mino nylon shrimp	*H. sibogae*
Humpback nylon shrimp	*H. gibosus*
Smooth nylon shrimp	*H. laevigatus*

Source: adapted from FFA (1994)

Sea Squirts
The sea squirts, or ascidians, of Fiji are relatively well known. 60 species, including 14 diademnids, have been described from reefs in Viti Levu and Kadavu by Kott (1981) and Ryland *et al*. (1984).

3.3.3 Marine Vertebrates

Seabirds
Clunie (1985) gives an the total number of seabird species in Fiji as 10, and Fijian seabirds have been well studied by Watling (1982). Fiji has only one endemic seabird, the Fiji Petrel, *Pseudowaria macgillivrayi*, which is found only in Gau Island. There are four common migrants - the Pacific Golden Plover, *Pluvialis fulva*, the Wandering Tattler, *Heteroscelus incanus*, the Bar-tailed Godwit, *Limosa lapponica*, and the Turnstone, *Arenaria interpres*. There are about a dozen less common or vagrant shorebirds which visit Fiji in small numbers yearly or occasionally (Watling, *pers. comm.*, 2002). The Ringgold Island is a major nesting ground for seabirds (Clunie, 1985). Information on sea bird species and distribution, including records of sightings, can be found in Jenkins (1986), refer to Annex IV for mapped information on seabird sightings.

Fish
Current information on marine fish species of the Fiji Islands is incomplete. Most collections have been made in the vicinity of Suva, and most of the islands and reefs of Fiji remain

unsurveyed. It is estimated that at least 13% of fish species inhabiting depths of 30 metres or less, and as many 60-80% of those at depths of 50-100 metres, are as yet undescribed.ref Baldwin and Seeto (1986) have listed a total of 1198 pelagic, deep-water and reef fish from 162 families.

Areas yet to be surveyed include the north of the Northern Lau Group, eastern areas of Vanua Levu, Qelelevu, Heemskerq, Cakau Matacucu, Cakau Vucovuco, the larger northern island of Vanua Levu and its smaller surrounding islands, the Great Sea Reef , the islands of Gau, Nainai, Koro, Wakaya and Namenalala and the northern shore of Viti Levu. There are thought to be 7 species of endemic marine fish species found in Fijian waters, and new species are currently being discovered. Some endemic deep water species found off Suva include *Parmops echinites*, *Thamnacous fijiensis* and *Plectranthias fijiensis* (Seeto, *pers. comm.*, 2003). The most comprehensive literature to date on fish species of economic importance is the Fisheries resource profile compiled by FFA in 1994. There are some fish species in Fiji that have been introduced (Annex V), and a number of these are associated with the aquaculture industry (refer to Annex XI).

Reef-associated fish

Most subsistence and much commercial fishing activity in Fiji and the Pacific are based on reef-associated fish (Wright, 1993). It is estimated that approximately 700 species of reef fish may be present in Fijian waters (see Annex VI for a list of reef-associated fish species). The more common types are parrot fish (ulavi), rabbit fish (nuqa), surgeon fish (balagi), groupers (kawakawa and donu) snappers (kake), Damu, murray eels (abea) and emperors (sabutu and kawaqo)[1]. Species from these groups are found throughout Fiji. Twelve species of Lethrinids are known from Fiji namely the spangled, slender, yellow-spotted, long nosed, yellow- tailed, variegated, black-blotch, thumb print, orange striped, yellow striped and red-eared emperor Lethrinids. Three species of chub mackerel, *Rastrelliger faugni, R.. kanagurta, and R.. Brachysoma*, are found in Fijian waters. The status of stocks is unknown and decline of catches is experienced. There are a number of mullet species found in Fijian waters. The mullet is an important food fish in Fiji and stocks are known to be declining due to over fishing (FFA, 1994).

Open ocean species

There are a number of pelagic fish species that are listed in Annex VII. In terms of oceanic fish, a number of tuna species are of key importance, namely: yellow fin, big-eye, and albacore, though no recent assessment of tuna stocks has been made for Fiji's EEZ. The other species caught artisanally are skipjack and dog-toothed tuna. Several flying fish species (Family Exocoetidae) are thought to occur in Fiji's oceanic waters, but only *Cypselurus* sp. has been officially recorded. There are a wide range of shark species in Fiji (Table A1 in Annex VIII)and those most commonly encountered are the whaler sharks (FFA, 1994). There are also a number of ray and chimera species that can be found in Fijian waters (Tables A2 and A3 in Annex VIII).
Deep water species usually caught include those from the following families: deep-water snappers; shallow-water snappers; emperors; groupers; oilfish and snake mackerels; barracudas and sea pikes (refer to Annex IX for a list of deep water species). Many of the deep bottom species are noted for their susceptibility to over fishing, due to slow growth rates and low recruitment levels (FFA, 1994).

Cetaceans

Very little is known about the abundance and distribution of most species of cetaceans found in Fiji waters, though it is estimated that around 13 species can be found in Fijian waters (Whippy-Morris and Pratt, 1998; refer to Table 7). Much of the available information on species and

[1] Fijian names in parentheses

distribution has been taken from whaling data or anecdotal reports (Annex X). Unpublished records show that a land based sightings survey was carried out by late William Dawbin in Fiji during 1956, 1957 and 1958 around Ovalau, Wakaya and Naigani islands (Paton and Gibbs 2002). A preliminary assessment of Dawbin's data has been undertaken by Paton and Clapham (2002), which adds to the knowledge of historical abundance and distribution of Cetaceans. Dawbin's records show that humpback whales, along with a number of other whale species, were once abundant in Fijian waters during the winter months. More recent studies by the Southern Cross Centre for Whale Research have shown that humpbacks are still present, but in depleted numbers compared to records from the 1950's (Paton and Gibbs, 2002).

Table 7: Cetacean species thought to be found in Fijian waters

Common Name	**Scientific**	**Known, or probable temporal and spatial distribution**	**Comments**
Humpback whale	Megaptera novaeangliae	Mainly June – Setpember	Reliable sightings of calving in Koro Sea
Bryde's whale	Balaenoptera edeni	All year	Probably the most abundant mysticete in the Pacific, some groups migratory
Sperm whale	Physeter catodon	All year throughout region	Most abundant large cetacean in the Pacific; good historical database.
Dwarf sperm whale	Kogia simus	All year; probably widespread in region	Known strandings in Guam and New Caledonia
Short-finned pilot whale	Globicephala macroryhnchus	All year; probably found throughout the Pacific	
Melon-headed whale	Peponocephala electra	All year; probably found throughout the Pacific	Many strandings in neighbouring countries Nauru, Vanuatu and Guam
Pigmy killer whale	Feresa attenuata	All year; probably found throughout the Pacific	A widely distributed species, circumglobal in tropical and subtropical waters
Short-beaked common dolphin	Delphinus delphis	Reported from New Caledonia, probably also from Fiji	Common dolphin recently reclassified as two distinct species: short-beaked and long-beaked
Bottlenosed dolphin	Tursiops truncates	Likely to be in many parts of the Pacific all the year round	Widely distributed
Spinner dolphin	Stenella longirostris	Confirmed presence in many parts of Fiji	Often found in schools resting in lagoons or near deep water

			passages; a population in Southern Mamanucas used as ecotourism resource
Rough-toothed dolphin	Steno bredanensis	Likely to be in many parts of the Pacific all the year round	Widespread species in both tropical and temperate waters
Cuvier's beaked whale	Ziphius cavirostris	Probably common in deep water	Cosmopolitan species occurring throughout the world
Beaked whales	Mesoplodon sp.	Some of the 13 species in this group are likely to be found in Fijian waters	Poor records exist for this group

Source: Whippy-Morris and Pratt (1998)

Marine turtles

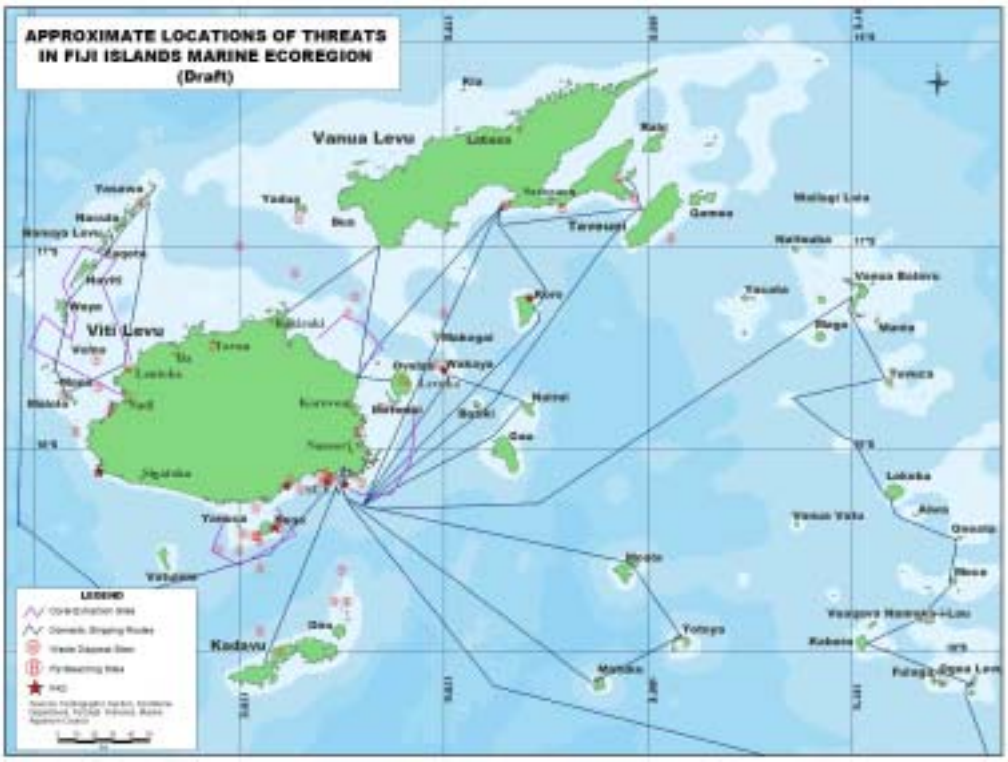
Five of the seven species of marine turtles have been observed in Fiji's waters: Green (*Chelonia Mydas*), Hawksbill (*Eretmochelys imbricata*), Loggerhead (*Caretta caretta*), Oilive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*).Of these Green and Hawksbill are found commonly nesting in Fiji (Zann, 1992). Major turtle nesting areas include the Astrolobe lagoon, Heemskereq Reef, Kadavu Island, Koro Island, Laucala Island, Leleuvia Island, Namenalala island, Nananuira Island, Ovalau, Qamea, Ringold reef, Savusavu region, Tailevu Island, Taveuni Island and Vatulele, Yadua Island (Boyle, 1998).

Sea snakes

There are 3 species of sea snake found in Fijian waters. *Laticauda colubrina* is the commonest sea snake species in Fiji. (Vuki *et al*., 2000) *Laticauda laticauda* and *Hydroplus melanocephalus* are the other two local species. Observations have been made on islands around the Southeast Viti Levu. Samples have been collected from Mabualau in Bau waters and Namaka west of Suva Peninsula; Sausau Island (16º16'S, 179º27'E). Since the introduction of the small Indian mongoose (*Herpestes auropunctatus*) in 1883, the populations of *L. colubrina* have been restricted to mongoose free areas (Guinea, 1980).

4.0 Current and future threats to the biodiversity resources of the FIME

There is limited data on the extent and intensity of many of the threats to Fiji's marine biodiversity, however there is general agreement on the source of major threats. A number of reports have been published on threats and the state of Fiji's environment, and all seem to highlight similar issues.. The following section summarises some of the documented threats as well as those identified during stakeholder consultations. A mapped summary of threats information collated during FIME workshop prepatory stage is given in Map 3.



Map 3: Location of threats to the biodiversity of the FIME

4.1 Economic Activities

Fiji's economy is highly dependent on the exploitation of marine resources. With a growing population and rising poverty, the acute need for better economic growth has led to the pursuit of

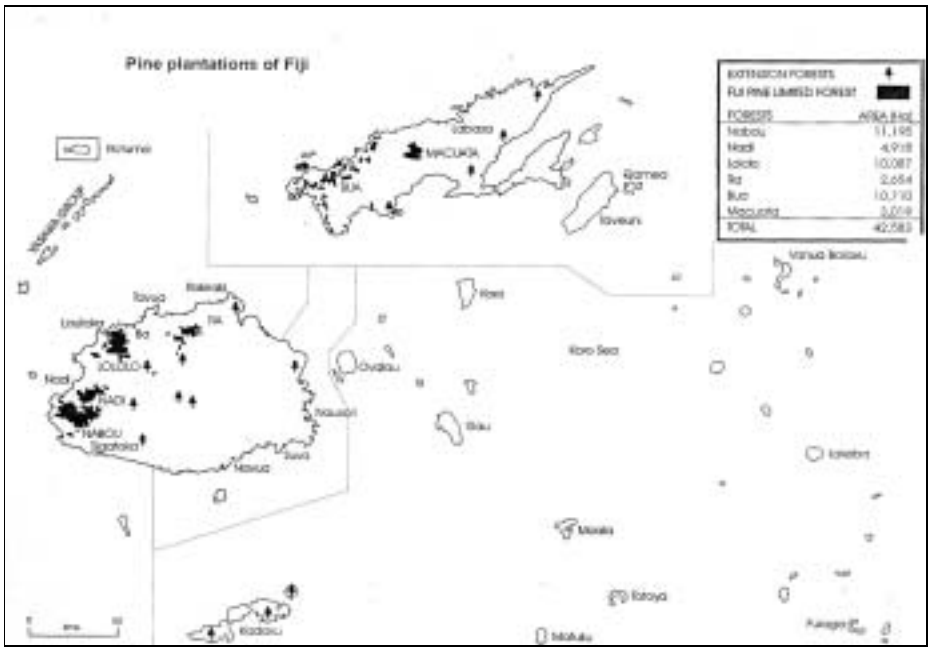
large-scale economic development activities at the national level that may potentially place these resources under greater pressure

4.1.1 Mining

Mining activities often have enormous negative impacts on coastal areas through siltation and polluted run off .. There is considerable interest in the mineral resources of Fiji, and currently mining companies are active in many areas , including Namosi, Wainivesi, Qalimare, and areas in Vanua Levu(Mineral Resources Department 2002). There is further interest from mining developers in prospects for expanding activities in Fiji, and many other areas are under mining tenements(see map ???) , and the Fijian government appears to be supportive of this trend, with The National Strategic Plan (2002-2007) aiming 2 new mining operations by 2007 Ministry of National Planning, 2001).

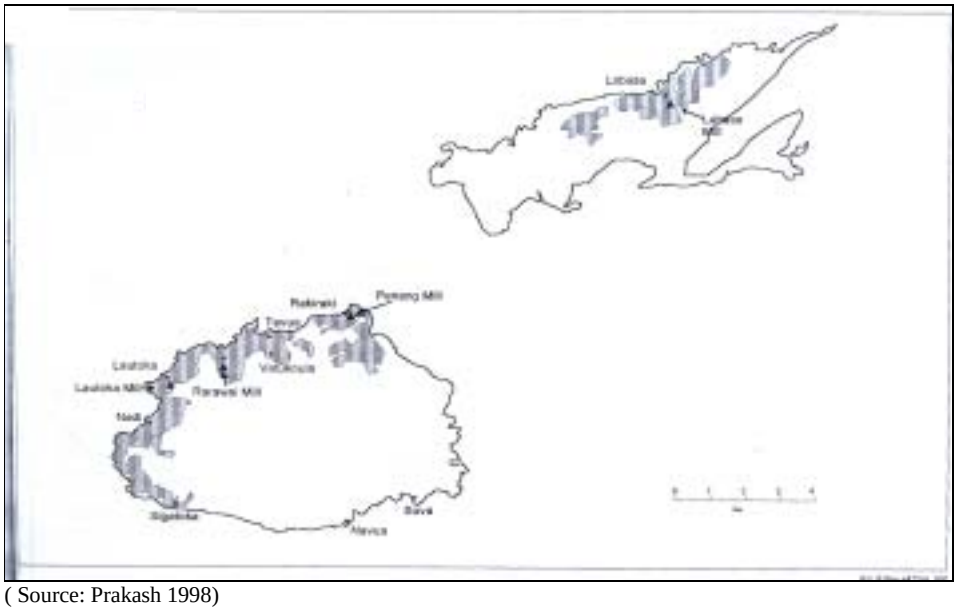
4.1.2 Agriculture

There are a number of agricultural activities that have a negative impact on coastal areas, with associated problems of increased soil erosion leading to high levels of sedimentation. Many streams and rivers and coral habitats are experiencing siltation from terrestrial run-off. Increasing incidences of run off are a direct consequence of farming practices used during the production of sugar cane, ginger, pineapples and pine seedlings, with a large number of farming areas being based in or near coastal areas (Maps 4 and 5). This problem is magnified by the fact that these activities have been extended to marginal land due to lack of arable land. Specific areas that have been severely affected have been documented in a number of places in Viti Levu and Kadavu (Watling and Chape, 1992; Lovell, 1995).



(Source: Chandra 1998c)

Map 4: Areas of Fiji under pine plantation



(Source: Prakash 1998)

Map 5: Areas of Fiji under sugar farming

4.1.3 Tourism and its associated developments

Problems associated with the tourism industry include coastal over-development, anchor damage and the reclamation of mangrove areas for resort developments. For example, the development of a marina complex in Nadi Bay involving the dredging of a harbour and the use of soil for land reclamation resulted in the smothering of seagrass habitats adjacent the site (Lovell *et al*., 1991; Tamata and Lovell, 1993). Tourism is a key sector of interest in Fiji's overall development, and the current National Strategic Plan (2002-2004) has a focus on developing the tourism industry into a billion dollar industry by 2007 (Ministry of National Planning, 2001). Some of the targets include; over 448,000 visitors by 2004, new 3 to 5 star hotels completed by 2005 and the establishment of Nadi Bay and the Mamanucas as a Pilot Tourism Development Area by 2005. General and tourism related development activities such as land reclamation, coastal infrastructure development, channel blasting, dredging and coral sand mining (e.g. from beaches, lagoons) are likely to have profound effects on the physical environment. Hotels and other developments come with associated environmental problems such as waste disposal and pollution (Vuki *et al.*, 2000). Expansions at the scale proposed for the tourist industry without the appropriate environmental planning could pose significant threats to marine habitats.

4.1.4 Aquaculture development s

Aquaculture developments have the potential to take pressure off wild stocks, but activities can often mask the over-harvesting of wild stocks and come with range of environmental problems, especially with regards to the pollution of marine areas. Currently the government is working on an agreement with the Japanese International Cooperation Agency (JICA) to expand develop aquaculture industry, mainly seaweed and prawn farming, in Fiji (Billings, J., Fisheries Dept, *pers. comm.*, 2003). A number non-native fish species are utilised by the aquaculture industry in

Fiji, though there is the potential to develop aquaculture initiatives with native species (Froese and Pauly 2003; Annex XI)

Seaweeds of the genera *Eucheuma*, are commonly farmed across the Asia-Pacific region for their industrially valuable extracts, and operations exist in Fiji in areas such as Southern Lau and Rotuma (Vuki *et al.*, 2000). *Eucheuma* is non-native to Fiji and it has been noted that there are often few or no quarantine procedures observed on the introduction of *Eucheuma* to countries where it is non-native. Though little is currently known about the effects of *Eucheuma* as an invasive species, there is some evidence from Hawaii that it can have negative impacts on native corals (Zemke-White, d*raft*). Physical disturbances caused by the activities associated with seaweed farming can also effect the environment around seaweed farms (Zemke-White, d*raft*). *Eucheuma* farming is described in Luxton *et al.* (1987); Ram (1991); Prakash and Foscarini (1990).

It has been noted that mariculture activities dependent on wild caught juveniles can be misleadingly recorded as aquaculture ventures. Instead of taking pressure off wild stocks, such "aquaculture" ventures serve to put greater stress on wild populations through the initial harvesting of juveniles, and the generation of pollution and waste products through poor management practices. In addition to this, such operations often use significant amounts of wild fish as feed, placing even more pressure on wild stocks (Lau and Parry-Jones, 1999). The issue of correctly defining and monitoring the industry is therefore something that has to be considered.

4.2 Direct exploitation of marine resources and poor management practices

4.2.1 Coral harvesting

The export of coral from Fiji began in 1984 (Lovell, 1999). The extraction of coral reef products such as hard and soft corals for the marine aquarium and curio trades in Fiji has attracted international attention and concern due to the perceived large-scale increase in trade in these products. There is now legislation to regulate the harvest and trade in accordance with the provisions of CITES, and it is government policy that all industry members be certified by the Marine Aquarium Council (MAC). There is currently a moratorium on new companies entering the trade, and presently there are only 6 companies operating in Fiji (Parry-Jones, R., TRAFFIC *pers. comm.*, 2003). The ability of the Department of Fisheries to monitor the extraction of coral and other aquarium products is limited by low capacity and financial resources.

4.2.3 Over-exploitation of coral reef resources for commercial purposes

The over-harvesting of specific reef species for lucrative niche markets poses a serious threat to persistence of these resources. Examples include the harvesting of beche-de-mer, trochus and giant clams for the curio and aquarium industries, and fish for the aquarium and live food fish industries. The unwavering demand for Beche-de-mer from East-Asian markets continues to fuel unsustainable extraction rates in Fiji. Problems with the acute over-harvesting of giant clams have already been recognised, and the export of wild giant clams from Fiji is now prohibited. However, there is a general lack of understanding surrounding the level of regulatory control needed to deal with this issue, and the challenge is to come up with timely and appropriate responses. In other countries, compressors used for harvesting beche-de-mer have been reported as also being used in the harvest of other coral reef resources. Thus activities surrounding the pursuit of key species may have more far reaching effects, increasing harvesting pressures on other, non-target species (Parry-Jones, R., TRAFFIC *pers. comm.*, 2003).

4.2.4 Unsustainable and destructive fishing practices

Subsistence fishing is of great importance to the livelihoods of the people of Fiji, with estimations of as much as 17,000 tonnes of subsistence catch being removed from reef systems annually (Zann and Vuki, 1998). With increasing populations, subsistence activities are beginning to strain marine resource capacities, and it is noted that the abundance of fin-fish species is declining in coastal areas near highly populated towns and centres. (Declines in mullet, stout chub mackerel and trevally species have all been noted by fishers (Vuki *et al.*, 2000).

Although legislation bans the use of explosives and poisons (e.g. traditional poisons such as *derris* roots and modern poisons such as herbicides and pesticides) for fishing, these practices are still prevalent and widespread in Fiji (Zann, 1992). Such fishing methods are non selective, and can wipe out entire communities of marine organisms, having detrimental effects on reef systems. The introduction of apparatus such as SCUBA gear has increased the effectiveness of fishing efforts, and thus the intensity of pressure on marine resources, and shellfish species have been particularly affected by this trend (Vuki *et al*., 2000).

4.3 Environmental and ecological threats

4.3.1 Land-based pollution

With most development and economic activity occurring in coastal areas, associated environmental problems can have far-reaching and profound impacts on the coastal environment. Studies conducted on the coastal waters of Viti Levu have found areas where nitrate levels exceed those deemed safe for corals (Mosley and Aalbersberg, 2001). Sources of pollution include sewage, mining, industrial discharges, litter and refuse disposal, fertiliser, pesticide and urban run-off, siltation from agricultural practices, and logging and clearing of riparian vegetation. Sources of pollution include major food and chemical industries, rubbish dumps, mining and agricultural activities and improper waste management in residential and tourist developments (Vuki *et al.*, 2000). The pollution affecting the Suva harbour area has been well documented, and poor disposal practices have lead to high levels of nutrients, chemicals, heavy metals and it is noted that the levels of tributyl tin are higher than those documented in the literature for any other port in the world (Zann and Vuki, 2000)

4.3.2 Sea-based pollution

The extent of this threat is unknown, but includes oil spills, toxic spills and ballast water discharges. The latest being the sinking of the ship the Ovalau in August 2003, which contained caustic soda on board.

4.3.3 Climate change

Climate change related impacts are likely to have profound affects on weather activity and oceanic conditions that will have huge implications on the coastal environment. Climate change is predicted to exacerbate natural variations in Pacific weather patterns, leading to slight changes in mean range changes for factors such as rainfall, and result in extreme weather events of a greater intensity. These changes in physical and meteorological processes will translate into corresponding changes in ecological systems and biodiversity. Coral reef systems, with their narrow temperature range tolerance, will be severely affected by predicted increases in sea temperatures (IPCC 2001). It is known that the periodic temperature increases experienced in El Niño years are responsible for coral bleaching, and it is accepted that climate change will exaggerate the temperature extremes elicited by El Niño events leading to a greater incidence of coral bleaching. Rising levels of atmospheric carbon dioxide are thought to adversely affect the ability of reef organisms to synthesise reef building limestone, and a decline in calcification rates

are predicted. Mangrove forests, as well as coral reefs, may also be threatened by predicted rises in sea level. It is recognised that climate change will have a more pronounced negative effect on the biodiversity of small islands than in continental areas, and thus climate change emerges as a huge challenge for Fiji (IPCC 2001).

Mass coral bleaching in March-April affected many of Fiji's reefs, with the exception of those in the far north with more than 40% of colonies dead at many sites. There was also variable bleaching in 2001 and 2002, except for intense bleaching in 2002 in very shallow areas. Many affected reefs are making a strong recovery e.g increasing densities of *Acropora* recruits at sites around Suva (South and Skelton 2002).

The 2000 mass bleaching event catalysed the first major GCRMN activity in the region when 6 independent research groups collaborated to assess bleaching at 19 sites throughout Fiji. Since 1996, the GCRMN has assisted with the seawater temperature-monitoring programme at the University of the South Pacific to record temperatures throughout Fiji. Data on about 100 Fiji reefs comes from researchers, tourist resorts, and reef based tourist operations, such as the Fiji Dive Operators Association, Greenforce and Coral Cay conservation. A campaign to involve tourist resorts in monitoring their local reefs was initiated in 2002 at 7 permanent GCRMN and Reef Check sites around Suva timed in March/April to coincide with the potential bleaching season (South and Skelton 2002).

4.3.4 Crown-of-thorns starfish

The infestation of reef systems with crown-of-thorns starfish (*Acanthaster planci*) is a well-documented phenomenon in Fiji, and *A. planci* outrbreaks can result in large areas of reefs being destroyed. The exact reasons behind why *A. planci* proliferate in certain areas and not other are not well understood.

Whippy-Morris and Pratt (1998) noted the following on *A. planci* outbreaks:

- In southern Viti Levu (in 1967-70) first documented outbreak
- A second outbreak occurred in l979-83 in Suva, the Coral Coast and inner Mamanucas.
- A third outbreak occurred in 1986-88 in the Suva area, Beqa Island reef, Coral Coast, Naigani Island and other areas.
- *A. planci* were recently found on the reefs of the Mamanuca group, which are important for the tourist industry in this area.
- Anecdotal information collected from fishers in the Suva area indicate that *A. planci* were common from the 1920's to the 1960's. Accounts recalled from elders indicated that an intensive outbreak probably occurred before the 1920-30's with a smaller outbreak in the 1940's.
- On intensively fished reefs in Southern Kadavu, Suva reefs, Kabara and Lakeba in the Lau Group, large feeding aggregations of *A. planci* have been observed (Jennings, 1998)

5.0 Opportunities for conservation in the FIME

Marine conservation is a growing field in Fiji, and there are a number of conservation activities and dedicated organisations working both regionally and nationally, as well a range of national, regional and international frameworks and initiatives, that offer opportunities for conservation in Fiji. National conservation initiatives of importance include the highly successful FLMMA network, which continues to aid communities in managing their marine resources effectively using well-received approaches that combine scientific appraisal with traditional management practices. Other promising locally based conservation efforts include research and conservation actions surrounding crown-of-thorn starfish, work with the marine aquarium trade to understand and manage trade in reef species.

Regional organisations such as SPREP and SOPAC remain active and committed to marine resource management and conservation. Environment and conservation related work based on the Pacific-wide Biodiversity Plan of Action (BPOA); fulfilling commitments to the Millennium Development Goals (MDGs); the Convention on Biodiversity (CBD); the Global Enrionment Facility (GEF); the principles of the World Summit on Sustainable Development (WSSD), and various other regional and global initiatives, all provide strong frameworks within which Pacific countries can co-ordinate and collaborate to achieve marine conservation goals.

With the conservation of important marine resources and the maintenance of essential ecological processes being vital to the livelihoods of so many throughout Fiji, it is becoming more clear that for Fiji to develop in a sustainable manner, issues of marine and coastal management must be addressed. Multilateral and bilateral aid agencies working in Fiji and the region are very much aware of this, and have been working on issues of coastal resource management in conjunction with government, communities and NGOs. Activities to support the targets of the MDGs and more general rural development goals will provide opportunities for stakeholders from the aid donor community to achieve development aims through supporting communities to sustainably manage their resources in partnership with other organisations.

National processes have pinpointed a number of areas where gaps have been identified and locations that deserve special attention, and these are included within the FBSAP framework (Annexes XII and XIII). National frameworks and plans offering potential for synergy with conservation action (refer to Annex XIV for a list of national initiatives) include the Tuna Management Plan, the Fisheries Strategic Plan, the NBSAP, SEA of Tourism Strategic Plan, Sustainable Development Bill (1999) and the National Strategic Plan 2002-2004. There are a number of government committees that oversee a number of environmentally related issues such as mangrove management and oil pollution response, a list of these are given in Annex XV.

6.0 Key stakeholders and the FIME strategy forming stakeholder process

For the ultimate success of the FIME programmme, the process has to be conducted with full participation and ownership from stakeholders. Due to the firm social and economic connection to the coast held by the people of Fiji, marine resource management and conservation has always been a issue of importance to a wide cross sector of Fiji. Stakeholders include a broad range of individuals and organisations, from government and NGO organisations to Community Based Organisations (CBOs), bilateral and multilateral donors, and industry groups.

The proposed process for engaging appropriate stakeholders in developing the FIME action plan in Fiji is presented in Table 8. It is essential that that the process is a completely participatory one. The intention is to create a conservation strategy that proposes solutions to the conservation threats to the FIME that are acceptable to all stakeholders. Annex XVI gives a list of stakeholders with contact details. This is by no means an exhaustive list, and will be updated as the strategy forming process proceeds.

Table 8: FIME Ecoregion Conservation Plan strategy forming stakeholder process

Activity	**Details**	**Rationale for Activity and Outcomes**
1. Reconnaissance-a quick overview of biodiversity, threats, key players in the Ecoregion	Review of existing stakeholders, review of national strategies addressing marine issues, review of some of the scientific publications to identify biodiversity & threats	Determine how to proceed with planning
2 Data collection	Marketing of the concept and obtaining data to create GIS base maps and ancillary maps of existing information on locations of biodiversity	The base maps to be used by experts at the vision workshop to delineate important areas of biodiversity. The ancillary maps to provide baseline information to experts at the workshop
3. Biological vision workshop	Approx. 65 participants, including marine scientists and marine policy experts gather to prioritise important areas of different taxa groups in Fiji.	To prioritise conservation areas. To form the first layer of information for a comprehensive multi-stakeholder conservation plan for Fiji. Create a map that can be used a decision making tool by management authorities eg. Tourism & Fisheries
4. Situation analysis	Identify threats, opportunities & key stakeholders for the vision /priority areas	To formulate appropriate strategies to protect priority /important areas of marine in Fiji
5. Ecoregion conservation Plan	A plan of action for conservation that reflects all stakeholders' interests and is aligned and adds value to exiting plans in Fiji.	To achieve the vision

7.0 Conclusions

As this FIME profile highlights, there are a number of complex variables that have to be accounted for throughout the development and implementation of conservation strategies and plans. The threats and opportunities associated with ecoregion scale conservation efforts are significant and numerous, requiring an approach capable if involving a wide range of stakeholders and sectors - each with their own specific interests, needs, skills and resources. And although conservation practitioners have a general sense of priority areas and issues, there is a clear need for the kind of research and dialogue that can add definition and rigor to conservation planning, tradeoffs and decision-making.

The FIME profile allows for the following conclusions:

7.1 Fiji's marine environment contains globally and regionally significant biodiversity that needs to be protected for both for it high intrinsic value, and the central role it plays in sustaining the livelihoods for the people of Fiji.

7.2 The pressure being placed on the marine biodiversity today far exceeds current conservation efforts. The alleviation of poverty and enhancement of community capacity to pursue sustainable lifestyles needs to be tackled in partnership with conservation efforts.

7.3 There are a number of promising initiatives and programmes being conducted at the national, regional and international level, but a concentrated effort is required to link these efforts and ensure coherence of policy and action.

7.4 Current knowledge of Fiji's marine ecosystems and biodiversity is incomplete. It is essential to consolidate and expand this knowledge if future ecosystem and environmental management initiatives are to be effective. Information gaps and opportunities for collaboration need to be identified to ensure that conservation efforts, and considerations for further research and monitoring, are an integral part of future marine management planning.

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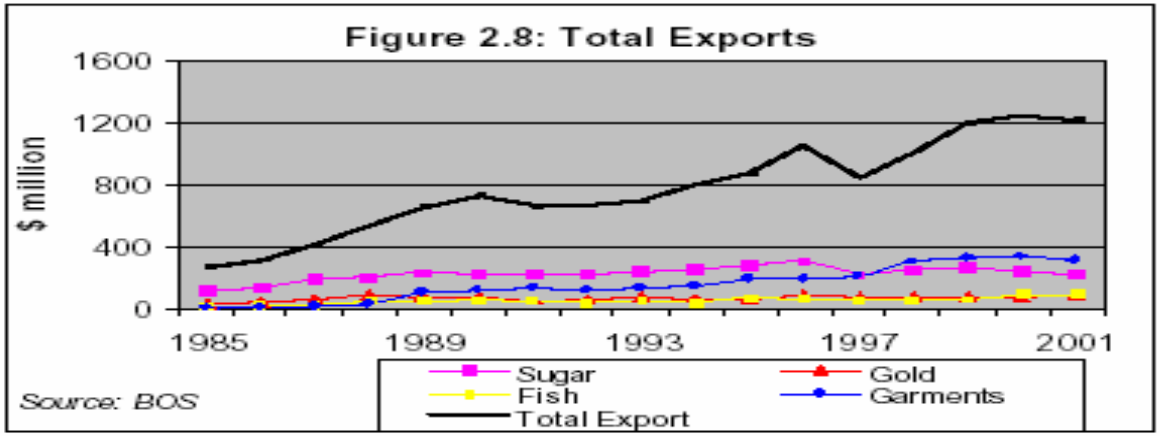
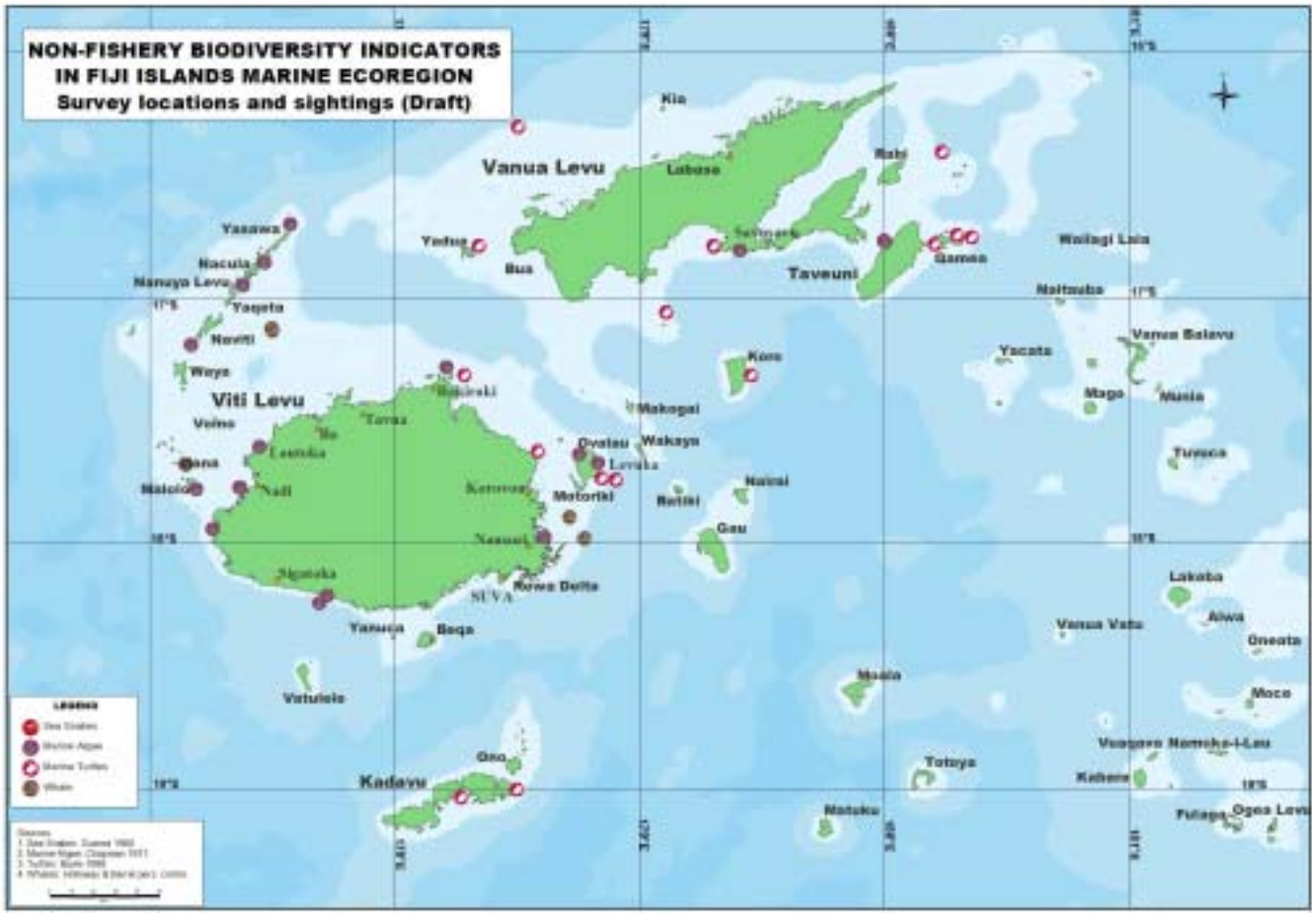
Annexes

Annex I: Main exports from Fiji 1985-2001

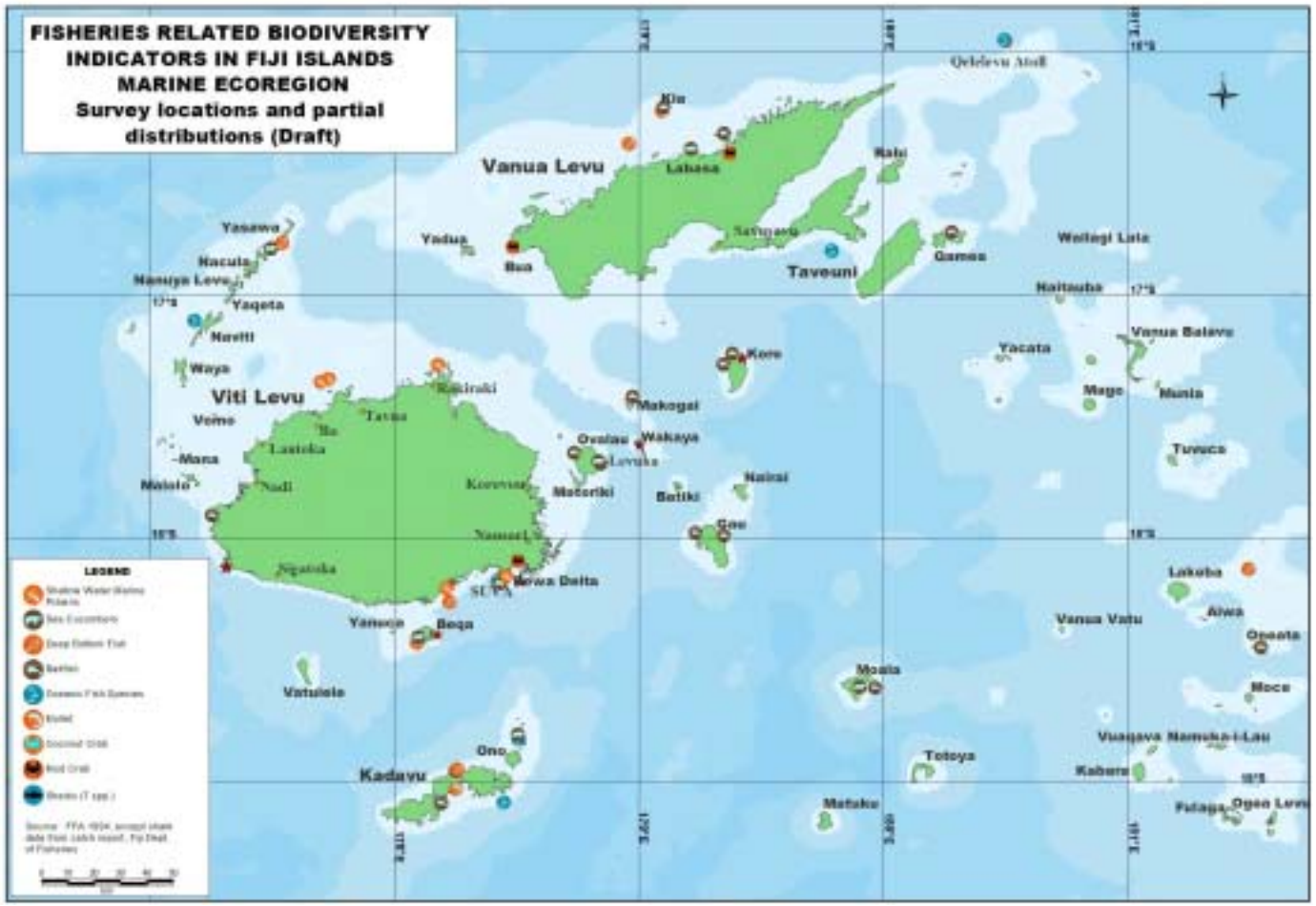


Source: Ministry of National Planning (2001)

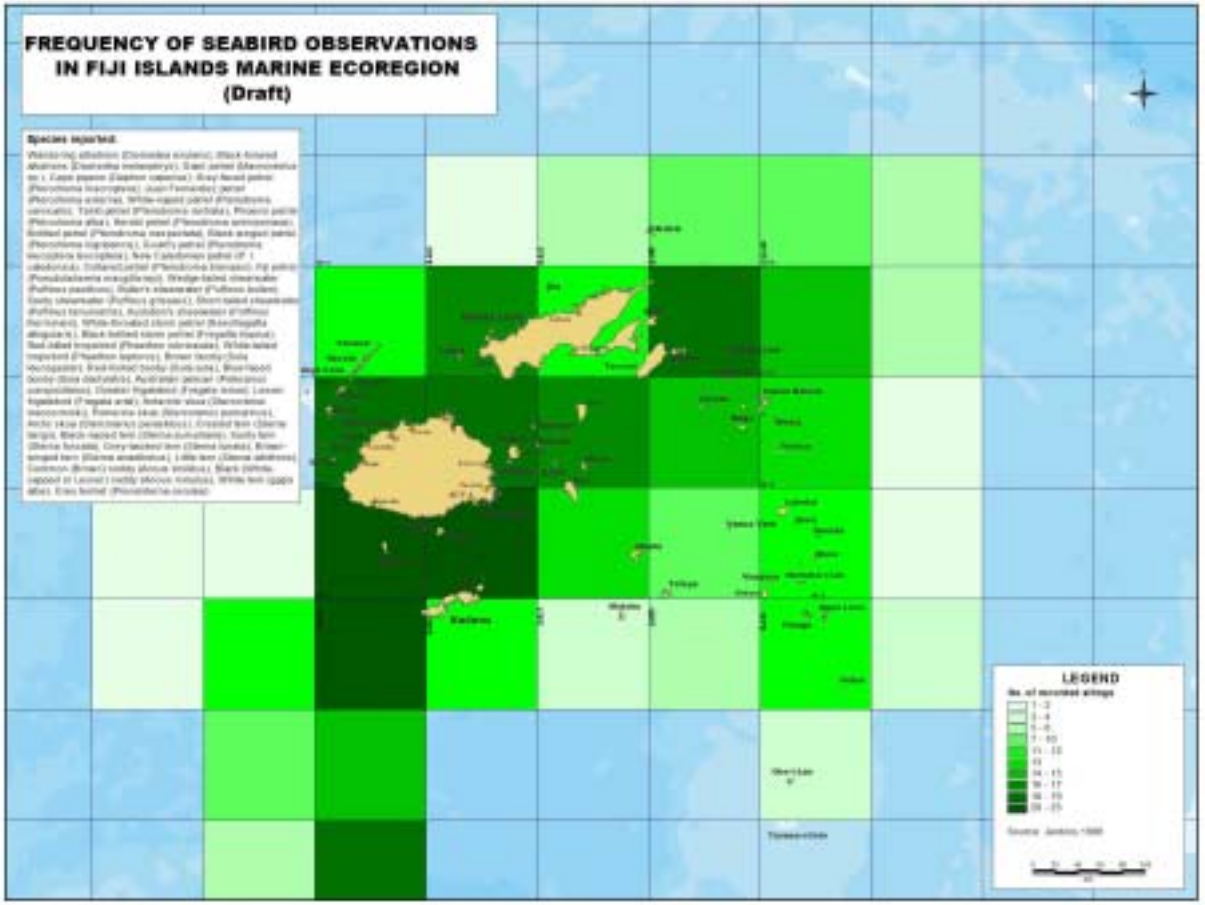
Annex II: Non-fishery biodiversity indicators in the FIME



Annex III: Fishery related biodiversity indicators in the FIME



Annex IV: Seabird observations around Fiji



Annex V: Fish species introduced to Fiji

Common Name	Scientific Name
Bighead carp	*Aristichthys nobilis*
Java barb	*Barbonymus gonionotus*
Grass carp	*Ctenopharyngodon idella*
Common carp	*Cyprinus carpio carpio*
Mosquitofish	*Gambusia affinis*
Silver carp	*Hypophthalmichthys molitrix*
Largemouth bass	*Micropterus salmoides*
Mozambique tilapia	*Oreochromis mossambicus*
Nile tilapia	*Oreochromis niloticus niloticus*
Wami tilapia	*Oreochromis urolepis hornorum*
Shortfin molly	*Poecilia mexicana*
Guppy	*Poecilia reticulata*
Stone moroko	*Pseudorasbora parva*
Rosy bitterling	*Rhodeus ocellatus ocellatus*
Green swordtail	*Xiphophorus hellerii*

Source: Froese and Pauly (2003)

Annex VI:List of reef-associated fish found in Fiji

Family	Common Name	Scientific Name
Acanthuridae	Achilles tang	*Acanthurus achilles*
	Ringtail surgeonfish	*Acanthurus blochii*
	Whitespotted surgeonfish	*Acanthurus guttatus*
	Lined surgeonfish	*Acanthurus lineatus*
	Elongate surgeonfish	*Acanthurus mata*
	Whitecheek surgeonfish	*Acanthurus nigricans*
	Epaulette surgeonfish	*Acanthurus nigricauda*
	Brown surgeonfish	*Acanthurus nigrofuscus*
	Bluelined surgeonfish	*Acanthurus nigroris*
	Orangespot surgeonfish	*Acanthurus olivaceus*
	Chocolate surgeonfish	*Acanthurus pyroferus*
	Thompson's surgeonfish	*Acanthurus thompsoni*
	Convict surgeonfish	*Acanthurus triostegus*
	Yellowfin surgeonfish	*Acanthurus xanthopterus*
	Twospot surgeonfish	*Ctenochaetus binotatus*
		Ctenochaetus cyanocheilus
	Striated surgeonfish	*Ctenochaetus striatus*
	Tomini surgeonfish	*Ctenochaetus tominiensis*
	Spotted unicornfish	*Naso brevirostris*
	Gray unicornfish	*Naso caesius*
	Sleek unicornfish	*Naso hexacanthus*
	Orangespine unicornfish	*Naso lituratus*
	Bluespine unicornfish	*Naso unicornis*
	Bignose unicornfish	*Naso vlamingii*
	Twotone tang	*Zebrasoma scopas*
	Sailfin tang	*Zebrasoma veliferum*
Alopiidae	Pelagic thresher	*Alopias pelagicus*
Antennariidae	Tail-jet frogfish	*Antennarius analis*

	Scarlet frogfish	*Antennarius coccineus*
	New Guinean frogfish	*Antennarius dorehensis*
	Shaggy angler	*Antennarius hispidus*
	Randall's frogfish	*Antennarius randalli*
	Striated frogfish	*Antennarius striatus*
Apogonidae	Broadstriped cardinalfish	*Apogon angustatus*
	Bigeye cardinalfish	*Apogon bandanensis*
	Little tailband cardinalfish	*Apogon caudicinctus*
	Ruby cardinalfish	*Apogon coccineus*
	Transparent cardinalfish	*Apogon crassiceps*
	Yellowstriped cardinalfish	*Apogon cyanosoma*
	Redspot cardinalfish	*Apogon dispar*
	Longspine cardinalfish	*Apogon doryssa*
	Narrowstripe cardinalfish	*Apogon exostigma*
	Broad-banded cardinalfish	*Apogon fasciatus*
	Bridled cardinalfish	*Apogon fraenatus*
	Guam cardinalfish	*Apogon guamensis*
	Iridescent cardinalfish	*Apogon kallopterus*
	Blackstripe cardinalfish	*Apogon nigrofasciatus*
	Sevenstriped cardinalfish	*Apogon novemfasciatus*
		Apogon rufus
	Samoan cardinalfish	*Apogon savayensis*
	Perdix cardinalfish	*Apogonichthys perdix*
	Orangelined cardinalfish	*Archamia fucata*
	Wolf cardinalfish	*Cheilodipterus artus*
	Large toothed cardinalfish	*Cheilodipterus macrodon*
	Five-lined cardinalfish	*Cheilodipterus quinquelineatus*
	Weed cardinalfish	*Foa brachygramma*
		Fowleria isostigma
	Spotcheek cardinalfish	*Fowleria punctulata*
	B-spot cardinalfish	*Gymnapogon urospilotus*
	Gelatinous cardinalfish	*Pseudamia gelatinosa*
	Paddlefish cardinalfish	*Pseudamia zonata*
	Luminous cardinalfish	*Rhabdamia gracilis*
	Pajama cardinalfish	*Sphaeramia nematoptera*
Atherinidae	Hardyhead silverside	*Atherinomorus lacunosus*
	Bearded silverside	*Atherion elymus*
	Barnes' silverside	*Hypoatherina barnesi*
	Fijian silverside	*Hypoatherina ovalaua*
	Samoan silverside	*Hypoatherina temminckii*
	Panatella silverside	*Stenatherina panatela*
Aulostomidae	Chinese trumpetfish	*Aulostomus chinensis*
Balistidae	Starry triggerfish	*Abalistes stellaris*
		Abalistes stellatus
	Orange-lined triggerfish	*Balistapus undulatus*
	Titan triggerfish	*Balistoides viridescens*
	Pinktail triggerfish	*Melichthys vidua*
	Blackbar triggerfish	*Rhinecanthus aculeatus*
	Wedge-tail triggerfish	*Rhinecanthus rectangulus*
	Halfmoon triggerfish	*Sufflamen chrysopterum*
Belonidae	Flat needlefish	*Ablennes hians*
	Reef needlefish	*Strongylura incisa*
	Banded needlefish	*Strongylura leiura*

Blenniidae	False cleanerfish	*Aspidontus taeniatus taeniatus*
	Blue-spotted blenny	*Blenniella caudolineata*
	Red-spotted blenny	*Blenniella chrysospilos*
		Blenniella paula
	Blue-dashed rockskipper	*Blenniella periophthalmus*
	Chestnut eyelash-blenny	*Cirripectes castaneus*
	Lady Musgrave blenny	*Cirripectes chelomatus*
	Spotted blenny	*Cirripectes fuscoguttatus*
	Flaming blenny	*Cirripectes perustus*
		Cirripectes polyzona
	Squiggly blenny	*Cirripectes quagga*
	Red-streaked blenny	*Cirripectes stigmaticus*
	Red-speckled blenny	*Cirripectes variolosus*
	Bicolor blenny	*Ecsenius bicolor*
		Ecsenius fijiensis
	Persian blenny	*Ecsenius midas*
	Ocular blenny	*Ecsenius oculus*
	Comical blenny	*Ecsenius opsifrontalis*
	Tail-barred rockskipper	*Entomacrodus caudofasciatus*
	Wavy-lined blenny	*Entomacrodus decussatus*
	Seale's rockskipper	*Entomacrodus sealei*
	Reef margin blenny	*Entomacrodus striatus*
	Sea blenny	*Entomacrodus thalassinus*
	Delicate blenny	*Glyptoparus delicatulus*
	Streaky rockskipper	*Istiblennius dussumieri*
	Rippled rockskipper	*Istiblennius edentulus*
	Lined rockskipper	*Istiblennius lineatus*
	Forktail blenny	*Meiacanthus atrodorsalis*
	Bundoon blenny	*Meiacanthus bundoon*
	Pygmy blenny	*Nannosalarias nativitatis*
	Cloister blenny	*Omobranchus elongatus*
	Muzzled blenny	*Omobranchus punctatus*
	Bicolour fangblenny	*Plagiotremus laudandus*
	Bluestriped fangblenny	*Plagiotremus rhinorhynchos*
	Piano fangblenny	*Plagiotremus tapeinosoma*
	Seychelles blenny	*Stanulus seychellensis*
Bothidae	Angler flatfish	*Asterorhombus fijiensis*
Bythitidae		*Dinematichthys riukiuensis*
Caesionidae	Blue and gold fusilier	*Caesio caerulaurea*
	Lunar fusilier	*Caesio lunaris*
	Yellow and blueback fusilier	*Caesio teres*
	Slender fusilier	*Gymnocaesio gymnoptera*
	Marr's fusilier	*Pterocaesio marri*
	Banana fusilier	*Pterocaesio pisang*
	Dark-banded fusilier	*Pterocaesio tile*
	Three-stripe fusilier	*Pterocaesio trilineata*
Callionymidae	Goram dragonet	*Diplogrammus goramensis*
	Ladd's dragonet	*Synchiropus laddi*
	Morrison's dragonet	*Synchiropus morrisoni*
	Ocellated dragonet	*Synchiropus ocellatus*
Caracanthidae	Spotted coral croucher	*Caracanthus maculatus*
	Pygmy coral croucher	*Caracanthus unipinna*
Carangidae	African pompano	*Alectis ciliaris*

	Indian threadfish	*Alectis indicus*
	Yellowtail scad	*Atule mate*
	Longnose trevally	*Carangoides chrysophrys*
	Blue trevally	*Carangoides ferdau*
	Malabar trevally	*Carangoides malabaricus*
	Coachwhip trevally	*Carangoides oblongus*
	Island trevally	*Carangoides orthogrammus*
	Barcheek trevally	*Carangoides plagiotaenia*
	Blacktip trevally	*Caranx heberi*
	Giant trevally	*Caranx ignobilis*
	Black jack	*Caranx lugubris*
	Bluefin trevally	*Caranx melampygus*
	Brassy trevally	*Caranx papuensis*
	Bigeye trevally	*Caranx sexfasciatus*
	Tille trevally	*Caranx tille*
	Shortfin scad	*Decapterus macrosoma*
	Roughear scad	*Decapterus tabl*
	Rainbow runner	*Elagatis bipinnulata*
	Golden trevally	*Gnathanodon speciosus*
	Torpedo scad	*Megalaspis cordyla*
	Pilotfish	*Naucrates ductor*
	Doublespotted queenfish	*Scomberoides lysan*
	Needlescaled queenfish	*Scomberoides tol*
	Oxeye scad	*Selar boops*
	Bigeye scad	*Selar crumenophthalmus*
	Greater amberjack	*Seriola dumerili*
	Almaco jack	*Seriola rivoliana*
	Smallspotted dart	*Trachinotus baillonii*
	Snubnose pompano	*Trachinotus blochii*
Carcharhinidae	Silvertip shark	*Carcharhinus albimarginatus*
	Grey reef shark	*Carcharhinus amblyrhynchos*
	Bull shark	*Carcharhinus leucas*
	Oceanic whitetip shark	*Carcharhinus longimanus*
	Blacktip reef shark	*Carcharhinus melanopterus*
	Dusky shark	*Carcharhinus obscurus*
	Sandbar shark	*Carcharhinus plumbeus*
	Spottail shark	*Carcharhinus sorrah*
	Tiger shark	*Galeocerdo cuvier*
	Whitetip reef shark	*Triaenodon obesus*
Chaetodontidae	Threadfin butterflyfish	*Chaetodon auriga*
	Eastern triangular butterflyfish	*Chaetodon baronessa*
	Bluelashed butterflyfish	*Chaetodon bennetti*
	Speckled butterflyfish	*Chaetodon citrinellus*
	Saddle butterflyfish	*Chaetodon ephippium*
	Black butterflyfish	*Chaetodon flavirostris*
	Sunburst butterflyfish	*Chaetodon kleinii*
	Lined butterflyfish	*Chaetodon lineolatus*
	Raccoon butterflyfish	*Chaetodon lunula*
	Oval butterflyfish	*Chaetodon lunulatus*
	Blackback butterflyfish	*Chaetodon melannotus*
	Atoll butterflyfish	*Chaetodon mertensii*
	Eightband butterflyfish	*Chaetodon octofasciatus*
	Ornate butterflyfish	*Chaetodon ornatissimus*

	Spot-nape butterflyfish	*Chaetodon oxycephalus*
	Sunset butterflyfish	*Chaetodon pelewensis*
	Blueblotch butterflyfish	*Chaetodon plebeius*
	Fourspot butterflyfish	*Chaetodon quadrimaculatus*
	Latticed butterflyfish	*Chaetodon rafflesii*
	Mailed butterflyfish	*Chaetodon reticulatus*
	Dotted butterflyfish	*Chaetodon semeion*
	Mirror butterflyfish	*Chaetodon speculum*
	Chevron butterflyfish	*Chaetodon trifascialis*
	Melon butterflyfish	*Chaetodon trifasciatus*
	Pacific double-saddle butterflyfish	*Chaetodon ulietensis*
	Teardrop butterflyfish	*Chaetodon unimaculatus*
	Vagabond butterflyfish	*Chaetodon vagabundus*
	Longnose butterflyfish	*Forcipiger flavissimus*
	Longnose butterflyfish	*Forcipiger longirostris*
	Pennant coralfish	*Heniochus acuminatus*
	Threeband pennantfish	*Heniochus chrysostomus*
	Masked bannerfish	*Heniochus monoceros*
	Singular bannerfish	*Heniochus singularius*
	Sixspine butterflyfish	*Parachaetodon ocellatus*
Chanidae	Milkfish	*Chanos chanos*
Chirocentridae	Dorab wolf-herring	*Chirocentrus dorab*
Chlopsidae	Fryer's false moray	*Xenoconger fryeri*
Cirrhitidae	Twospot hawkfish	*Amblycirrhitus bimacula*
	Spotted hawkfish	*Cirrhitichthys aprinus*
	Dwarf hawkfish	*Cirrhitichthys falco*
	Stocky hawkfish	*Cirrhitus pinnulatus*
	Arc-eye hawkfish	*Paracirrhites arcatus*
	Blackside hawkfish	*Paracirrhites forsteri*
Clupeidae	Bleeker smoothbelly sardinella	*Amblygaster clupeoides*
	Spotted sardinella	*Amblygaster sirm*
	Bluestripe herring	*Herklotsichthys quadrimaculatus*
	Delicate round herring	*Spratelloides delicatulus*
Congridae	Longfin African conger	*Conger cinereus*
	Splendid garden eel	*Gorgasia preclara*
	Spotted garden-eel	*Heteroconger hassi*
Coryphaenidae	Common dolphinfish	*Coryphaena hippurus*
Creediidae	Saddled sandburrower	*Chalixodytes tauensis*
	Donaldson's sandburrower	*Limnichthys donaldsoni*
Dactylopteridae	Oriental flying gurnard	*Dactyloptena orientalis*
Dasyatidae	Bluespotted ribbontail ray	*Taeniura lymma*
	Porcupine ray	*Urogymnus asperrimus*
Diodontidae	Spot-fin porcupinefish	*Diodon hystrix*
Drepaneidae	Spotted sicklefish	*Drepane punctata*
Echeneidae	Common remora	*Remora remora*
Engraulidae	Devis' anchovy	*Encrasicholina devisi*
	Shorthead anchovy	*Encrasicholina heteroloba*
	Buccaneer anchovy	*Encrasicholina punctifer*
	Samoan anchovy	*Stolephorus apiensis*
	Indian anchovy	*Stolephorus indicus*
	Baelama anchovy	*Thryssa baelama*
Ephippidae	Orbicular batfish	*Platax orbicularis*
	Tiera batfish	*Platax teira*

Gerreidae	Common silver-biddy	*Gerres oyena*
Gobiesocidae	Urchin clingfish	*Diademichthys lineatus*
	Crinoid clingfish	*Discotrema crinophila*
Gobiidae	Randall's prawn-goby	*Amblyeleotris randalli*
	Gorgeous prawn-goby	*Amblyeleotris wheeleri*
	Nocturn goby	*Amblygobius nocturnus*
	Banded goby	*Amblygobius phalaena*
	Old glory	*Amblygobius rainfordi*
	Starry goby	*Asterropteryx semipunctatus*
	Spotted frillgoby	*Bathygobius cyclopterus*
	Erythrops goby	*Bryaninops erythrops*
	Ridens goby	*Bryaninops ridens*
	Hasselt's goby	*Callogobius hasseltii*
	Common fusegoby	*Coryphopterus neophytus*
	Kouman's prawn-goby	*Cryptocentrus koumansi*
	Gold-streaked prawn-goby	*Ctenogobiops aurocingulus*
	Spotted fringefin goby	*Eviota albolineata*
	Comet pygmy goby	*Eviota cometa*
	Twospot pygmy goby	*Eviota distigma*
	Melasma pygmy goby	*Eviota melasma*
	Nebulous pygmy goby	*Eviota nebulosa*
	Blackbelly goby	*Eviota nigriventris*
	Green bubble goby	*Eviota prasina*
	Pepperfin pygmy goby	*Eviota punctulata*
	Naked-headed goby	*Eviota zonura*
	Mud reef-goby	*Exyrias belissimus*
		Gnatholepis anjerensis
	Eyebar goby	*Gnatholepis cauerensis cauerensis*
		Gobiodon atrangulatus
		Gobiodon brochus
	Rippled coralgoby	*Gobiodon rivulatus*
	Decorated goby	*Istigobius decoratus*
	Goldman's goby	*Istigobius goldmanni*
	Ornate goby	*Istigobius ornatus*
	Rigilius goby	*Istigobius rigilius*
	Whitecap goby	*Lotilia graciliosa*
	Largetooth goby	*Macrodontogobius wilburi*
	Redhead goby	*Paragobiodon echinocephalus*
	Blackfin coral goby	*Paragobiodon lacunicolus*
	Dark coral goby	*Paragobiodon melanosomus*
	Emerald coral goby	*Paragobiodon xanthosoma*
	Barred mudskipper	*Periophthalmus argentilineatus*
	Common mudskipper	*Periophthalmus kalolo*
	Michel's ghost goby	*Pleurosicya micheli*
	Toothy goby	*Pleurosicya mossambica*
	Girdled goby	*Priolepis cincta*
		Priolepis fallacincta
	Brick goby	*Priolepis inhaca*
		Priolepis kappa
	Palebarred goby	*Priolepis pallidicincta*
	Half-barred goby	*Priolepis semidoliatus*
		Priolepis triops
		Sueviota lachneri

	Redface dwarfgoby	*Trimma benjamini*
	Caesiura dwarfgoby	*Trimma caesiura*
	Flame goby	*Trimma macrophthalma*
	Okinawa rubble goby	*Trimma okinawae*
	Red-barred rubble goby	*Trimmatom eviotops*
		Valenciennea decora
	Long-finned goby	*Valenciennea longipinnis*
	Mural goby	*Valenciennea muralis*
	Maiden goby	*Valenciennea puellaris*
	Sixspot goby	*Valenciennea sexguttata*
	Blueband goby	*Valenciennea strigata*
Haemulidae	Two-striped sweetlips	*Plectorhinchus albovittatus*
	Harlequin sweetlips	*Plectorhinchus chaetodonoides*
	Striped sweetlips	*Plectorhinchus diagrammus*
	Harry hotlips	*Plectorhinchus gibbosus*
	Giant sweetlips	*Plectorhinchus obscurus*
	Painted sweetlip	*Plectorhinchus picus*
Hemiramphidae	Blackbarred halfbeak	*Hemiramphus far*
	Dussumier's halfbeak	*Hyporhamphus dussumieri*
	Buffon's river-garfish	*Zenarchopterus buffonis*
	Feathered river-garfish	*Zenarchopterus dispar*
	Viviparous halfbeak	*Zenarchopterus gilli*
Hexanchidae	Bluntnose sixgill shark	*Hexanchus griseus*
Holocentridae	Shadowfin soldierfish	*Myripristis adusta*
	Blotcheye soldierfish	*Myripristis berndti*
	Doubletooth soldierfish	*Myripristis hexagona*
	Shoulderbar soldierfish	*Myripristis kuntee*
	Pinecone soldierfish	*Myripristis murdjan*
	Scarlet soldierfish	*Myripristis pralinia*
	Whitetip soldierfish	*Myripristis vittata*
	Brocade perch	*Ostichthys japonicus*
	Silverspot squirrelfish	*Sargocentron caudimaculatum*
	Crown squirrelfish	*Sargocentron diadema*
	Dwarf squirrelfish	*Sargocentron iota*
	Spiny squirrelfish	*Sargocentron lepros*
	Blackblotch squirrelfish	*Sargocentron melanospilos*
	Smallmouth squirrelfish	*Sargocentron microstoma*
	Dark-striped squirrelfish	*Sargocentron praslin*
	Speckled squirrelfish	*Sargocentron punctatissimum*
	Sabre squirrelfish	*Sargocentron spiniferum*
	Blue lined squirrelfish	*Sargocentron tiere*
	Pink squirrelfish	*Sargocentron tiereoides*
	Violet squirrelfish	*Sargocentron violaceum*
Kuhliidae	Rock flagtail	*Kuhlia rupestris*
Kyphosidae	Blue seachub	*Kyphosus cinerascens*
	Brassy chub	*Kyphosus vaigiensis*
Labridae	Geographic wrasse	*Anampses geographicus*
	New Guinea wrasse	*Anampses neoguinaicus*
	Yellowbreasted wrasse	*Anampses twistii*
	Axilspot hogfish	*Bodianus axillaris*
	Splitlevel hogfish	*Bodianus mesothorax*
	Snooty wrasse	*Cheilinus oxycephalus*
	Humphead wrasse	*Cheilinus undulatus*

	Jordan's tuskfish	*Choerodon jordani*
	Dotted wrasse	*Cirrhilabrus punctatus*
	Red-margined wrasse	*Cirrhilabrus rubrimarginatus*
	Scott's wrasse	*Cirrhilabrus scottorum*
	Clown coris	*Coris aygula*
	Batu coris	*Coris batuensis*
	Pale-barred coris	*Coris dorsomacula*
	Yellowtail coris	*Coris gaimard*
	Argus wrasse	*Halichoeres argus*
	Red-lined wrasse	*Halichoeres biocellatus*
	Circle-cheek wrasse	*Halichoeres miniatus*
	Nebulous wrasse	*Halichoeres nebulosus*
	Ornamented wrasse	*Halichoeres ornatissimus*
	Twotone wrasse	*Halichoeres prosopeion*
	Ring wrasse	*Hologymnosus annulatus*
	Pastel ringwrasse	*Hologymnosus doliatus*
	Redlip cleaner wrasse	*Labroides rubrolabiatus*
	Southern tubelip	*Labropsis australis*
	Yellowspotted wrasse	*Macropharyngodon negrosensis*
	McCosker's flasher	*Paracheilinus mccoskeri*
	Striated wrasse	*Pseudocheilinus evanidus*
	Pyjama	*Pseudocheilinus hexataenia*
		Pseudocheilinus ocellatus
	Eight-lined wrasse	*Pseudocheilinus octotaenia*
	Four-lined wrasse	*Pseudocheilinus tetrataenia*
	Smalltail wrasse	*Pseudojuloides cerasinus*
	Jansen's wrasse	*Thalassoma jansenii*
	Whitebanded sharpnose wrasse	*Wetmorella albofasciata*
	Sharpnose wrasse	*Wetmorella nigropinnata*
Lamnidae	Great white shark	*Carcharodon carcharias*
	Shortfin mako	*Isurus oxyrinchus*
Leiognathidae	Common ponyfish	*Leiognathus equulus*
Lethrinidae	Striped large-eye bream	*Gnathodentex aureolineatus*
	Japanese large-eye bream	*Gymnocranius euanus*
	Blue-lined large-eye bream	*Gymnocranius grandoculis*
	Blue-spotted large-eye bream	*Gymnocranius microdon*
	Pacific yellowtail emperor	*Lethrinus atkinsoni*
	Orange-spotted emperor	*Lethrinus erythracanthus*
	Thumbprint emperor	*Lethrinus harak*
	Pink ear emperor	*Lethrinus lentjan*
	Spangled emperor	*Lethrinus nebulosus*
	Orange-striped emperor	*Lethrinus obsoletus*
	Longface emperor	*Lethrinus olivaceus*
	Spotcheek emperor	*Lethrinus rubrioperculatus*
	Yellowlip emperor	*Lethrinus xanthochilus*
	Humpnose big-eye bream	*Monotaxis grandoculis*
Lutjanidae	Small toothed jobfish	*Aphareus furca*
	Rusty jobfish	*Aphareus rutilans*
	Green jobfish	*Aprion virescens*
	Ruby snapper	*Etelis carbunculus*
	Flame snapper	*Etelis coruscans*
	Mangrove red snapper	*Lutjanus argentimaculatus*
	Two-spot banded snapper	*Lutjanus biguttatus*

	Two-spot red snapper	*Lutjanus bohar*
	Moluccan snapper	*Lutjanus boutton*
	Dory snapper	*Lutjanus fulviflamma*
	Blacktail snapper	*Lutjanus fulvus*
	Humpback red snapper	*Lutjanus gibbus*
	John's snapper	*Lutjanus johnii*
	Common bluestripe snapper	*Lutjanus kasmira*
	Malabar blood snapper	*Lutjanus malabaricus*
	Onespot snapper	*Lutjanus monostigma*
	Five-lined snapper	*Lutjanus quinquelineatus*
	Blubberlip snapper	*Lutjanus rivulatus*
	Yellow-lined snapper	*Lutjanus rufolineatus*
	Russell's snapper	*Lutjanus russellii*
	Black-banded snapper	*Lutjanus semicinctus*
	Timor snapper	*Lutjanus timorensis*
	Midnight snapper	*Macolor macularis*
	Black and white snapper	*Macolor niger*
	Saddle-back snapper	*Paracaesio kusakarii*
	Dirty ordure snapper	*Paracaesio sordida*
	Yellowtail blue snapper	*Paracaesio xanthura*
	Slender pinjalo	*Pinjalo lewisi*
	Ornate jobfish	*Pristipomoides argyrogrammicus*
	Goldflag jobfish	*Pristipomoides auricilla*
	Crimson jobfish	*Pristipomoides filamentosus*
	Golden eye jobfish	*Pristipomoides flavipinnis*
	Lavender jobfish	*Pristipomoides sieboldii*
	Oblique-banded snapper	*Pristipomoides zonatus*
Megalopidae	Indo-Pacific tarpon	*Megalops cyprinoides*
Microdesmidae	Elegant firefish	*Nemateleotris decora*
	Fire goby	*Nemateleotris magnifica*
	Beautiful hover goby	*Parioglossus formosus*
	Naked hover goby	*Parioglossus nudus*
	Rao's hover goby	*Parioglossus raoi*
	Taeniatus dartfish	*Parioglossus taeniatus*
	Blackfin dartfish	*Ptereleotris evides*
	Blacktail goby	*Ptereleotris heteroptera*
	Blue gudgeon	*Ptereleotris microlepis*
	Bristle-tail file-fish	*Acreichthys tomentosus*
	Scrawled filefish	*Aluterus scriptus*
	Blacksaddle filefish	*Paraluteres prionurus*
	Hairfinned leatherjacket	*Paramonacanthus japonicus*
	Blackbar filefish	*Pervagor janthinosoma*
	Redtail filefish	*Pervagor melanocephalus*
Mugilidae	Otomebora mullet	*Liza melinoptera*
	Squaretail mullet	*Liza vaigiensis*
	Bluespot mullet	*Valamugil seheli*
Mullidae		*Parupeneus crassilabris*
	Band-tail goatfish	*Upeneus arge*
	Yellowstriped goatfish	*Upeneus vittatus*
Muraenidae	White-margined moray	*Enchelycore schismatorhynchus*
	Brown spotted moray	*Gymnothorax fuscomaculatus*
	Peppered moray	*Gymnothorax pictus*
	Richardson's moray	*Gymnothorax richardsonii*

		Gymnothorax robinsi
	Barredfin moray	*Gymnothorax zonipectis*
	White ribbon eel	*Pseudechidna brummeri*
	Slender giant moray	*Strophidon sathete*
Myliobatidae	Spotted eagle ray	*Aetobatus narinari*
	Giant manta	*Manta birostris*
	Spinetail mobula	*Mobula japanica*
Nemipteridae	Fiji threadfin bream	*Nemipterus vitiensis*
	Two-lined monocle bream	*Scolopsis bilineata*
	Bald-spot monocle bream	*Scolopsis temporalis*
	Three-lined monocle bream	*Scolopsis trilineata*
Ophichthidae	Crocodile snake eel	*Brachysomophis crocodilinus*
	Marbled snake eel	*Callechelys marmorata*
Ostraciidae	Shortnose boxfish	*Ostracion nasus*
	Reticulate boxfish	*Ostracion solorensis*
Pempheridae	Pigmy sweeper	*Parapriacanthus ransonneti*
	Black-stripe sweeper	*Pempheris schwenkii*
Pinguipedidae	Cylindrical sandperch	*Parapercis cylindrica*
	Speckled sandperch	*Parapercis hexophtalma*
	Black dotted sand perch	*Parapercis millepunctata*
	Reticulated sandperch	*Parapercis tetracantha*
	Yellowbar sandperch	*Parapercis xanthozona*
Platycephalidae	Broadhead flathead	*Eurycephalus arenicola*
	Longsnout flathead	*Thysanophrys chiltonae*
Plesiopidae	Hiatt's basslet	*Acanthoplesiops hiatti*
	Crimsontip longfin	*Plesiops coeruleolineatus*
	Bluegill longfin	*Plesiops corallicola*
		Plesiops polydactylus
		Plesiops verecundus
		Steeneichthys plesiopsus
Plotosidae	Striped eel catfish	*Plotosus lineatus*
Pomacanthidae	Bicolor angelfish	*Centropyge bicolor*
	Cocos-Keeling angelfish	*Centropyge colini*
	Flame angel	*Centropyge loricula*
	Multicolor angelfish	*Centropyge multicolor*
	Midnight angelfish	*Centropyge nox*
	Keyhole angelfish	*Centropyge tibicen*
		Centropyge woodheadi
	Spotbreast angelfish	*Genicanthus melanospilos*
	Semicircle angelfish	*Pomacanthus semicirculatus*
	Royal angelfish	*Pygoplites diacanthus*
	Banded sergeant	*Abudefduf septemfasciatus*
	Scissortail sergeant	*Abudefduf sexfasciatus*
	Blackspot sergeant	*Abudefduf sordidus*
	Indo-Pacific sergeant	*Abudefduf vaigiensis*
	Spiny chromis	*Acanthochromis polyacanthus*
	Golden damselfish	*Amblyglyphidodon aureus*
	Staghorn damselfish	*Amblyglyphidodon curacao*
	Yellowbelly damselfish	*Amblyglyphidodon leucogaster*
	Orangefin anemonefish	*Amphiprion chrysopterus*
	Yellowtail clownfish	*Amphiprion clarkii*
	Fire clownfish	*Amphiprion melanopus*
	Pink anemonefish	*Amphiprion perideraion*

	Midget chromis	*Chromis acares*
	Agile chromis	*Chromis agilis*
	Yellow-speckled chromis	*Chromis alpha*
	Ambon chromis	*Chromis amboinensis*
	Yellow chromis	*Chromis analis*
	Stout chromis	*Chromis chrysura*
	Deep reef chromis	*Chromis delta*
	Twinspot chromis	*Chromis elerae*
	Half-and-half chromis	*Chromis iomelas*
	Scaly chromis	*Chromis lepidolepis*
	Black-bar chromis	*Chromis retrofasciata*
	Ternate chromis	*Chromis ternatensis*
	Vanderbilt's chromis	*Chromis vanderbilti*
	Blue green damselfish	*Chromis viridis*
	Paletail chromis	*Chromis xanthura*
	Blueline demoiselle	*Chrysiptera caeruleolineata*
	Sapphire devil	*Chrysiptera cyanea*
	Grey demoiselle	*Chrysiptera glauca*
	Starck's demoiselle	*Chrysiptera starcki*
	Talbot's demoiselle	*Chrysiptera talboti*
	Southseas devil	*Chrysiptera taupou*
	Threeband damselfish	*Chrysiptera tricincta*
	Onespot demoiselle	*Chrysiptera unimaculata*
	Whitetail dascyllus	*Dascyllus aruanus*
	Threespot dascyllus	*Dascyllus trimaculatus*
	Honey-head damsel	*Dischistodus prosopotaenia*
	Carlson's damsel	*Neoglyphidodon carlsoni*
	Metallic demoiselle	*Neopomacentrus metallicus*
	Violet demoiselle	*Neopomacentrus violascens*
	Phoenix devil	*Plectroglyphidodon phoenixensis*
	Speckled damselfish	*Pomacentrus bankanensis*
	Charcoal damsel	*Pomacentrus brachialis*
	Imitator damsel	*Pomacentrus imitator*
	Scaly damsel	*Pomacentrus lepidogenys*
	Lemon damsel	*Pomacentrus moluccensis*
	Philippine damsel	*Pomacentrus philippinus*
	Richardson's reef-damsel	*Pomachromis richardsoni*
	Spinecheek anemonefish	*Premnas biaculeatus*
	Whitebar gregory	*Stegastes albifasciatus*
	Pacific gregory	*Stegastes fasciolatus*
	Blunt snout gregory	*Stegastes lividus*
	Dusky farmerfish	*Stegastes nigricans*
Priacanthidae	Glasseye	*Heteropriacanthus cruentatus*
Pseudochromidae	Surge dottyback	*Pseudochromis cyanotaenia*
	Brown dottyback	*Pseudochromis fuscus*
Rachycentridae	Cobia	*Rachycentron canadum*
Rhinobatidae	Giant guitarfish	*Rhynchobatus djiddensis*
Samaridae	Three-spot righteye flounder	*Samariscus triocellatus*
Scaridae	Spinytooth parrotfish	*Calotomus spinidens*
	Bleeker's parrotfish	*Chlorurus bleekeri*
		Chlorurus microrhinos
	Marbled parrotfish	*Leptoscarus vaigiensis*
	Chameleon parrotfish	*Scarus chameleon*

	Globehead parrotfish	*Scarus globiceps*
	Ember parrotfish	*Scarus rubroviolaceus*
	Greensnout parrotfish	*Scarus spinus*
Scatophagidae	Spotted scat	*Scatophagus argus*
Scombridae	Kawakawa	*Euthynnus affinis*
	Double-lined mackerel	*Grammatorcynus bilineatus*
	Dogtooth tuna	*Gymnosarda unicolor*
	Indian mackerel	*Rastrelliger kanagurta*
	Narrow-barred Spanish mackerel	*Scomberomorus commerson*
	Yellowfin tuna	*Thunnus albacares*
Scorpaenidae	Twospot turkeyfish	*Dendrochirus biocellatus*
	McAdam's scorpionfish	*Parascorpaena mcadamsi*
	Northern scorpionfish	*Parascorpaena picta*
	Red lionfish	*Pterois volitans*
	Guam scorpionfish	*Scorpaenodes guamensis*
	Lowfin scorpionfish	*Scorpaenodes parvipinnis*
		Scorpaenodes quadrispinosus
	False stonefish	*Scorpaenopsis diabolus*
	Humpback scorpionfish	*Scorpaenopsis gibbosa*
	Papuan scorpionfish	*Scorpaenopsis papuensis*
		Scorpaenopsis vittapinna
	Yellowspotted scorpionfish	*Sebastapistes cyanostigma*
	Pigmy scorpionfish	*Sebastapistes fowleri*
	Leaf scorpionfish	*Taenianotus triacanthus*
Serranidae	Redmouth grouper	*Aethaloperca rogaa*
	Blotched podge	*Aporops bilinearis*
	Peacock hind	*Cephalopholis argus*
	Golden hind	*Cephalopholis aurantia*
	Leopard hind	*Cephalopholis leopardus*
	Coral hind	*Cephalopholis miniata*
	Sixblotch hind	*Cephalopholis sexmaculata*
	Strawberry hind	*Cephalopholis spiloparaea*
	Darkfin hind	*Cephalopholis urodeta*
	Banded grouper	*Epinephelus amblycephalus*
	Areolate grouper	*Epinephelus areolatus*
	Brownspotted grouper	*Epinephelus chlorostigma*
	Whitespotted grouper	*Epinephelus coeruleopunctatus*
	Orange-spotted grouper	*Epinephelus coioides*
	Speckled blue grouper	*Epinephelus cyanopodus*
	Brown-marbled grouper	*Epinephelus fuscoguttatus*
	Blacksaddle grouper	*Epinephelus howlandi*
	Giant grouper	*Epinephelus lanceolatus*
	Snubnose grouper	*Epinephelus macrospilos*
	Highfin grouper	*Epinephelus maculatus*
	Speckled grouper	*Epinephelus magniscuttis*
	Malabar grouper	*Epinephelus malabaricus*
	Honeycomb grouper	*Epinephelus merra*
	Netfin grouper	*Epinephelus miliaris*
	Comet grouper	*Epinephelus morrhua*
	White-streaked grouper	*Epinephelus ongus*
	Dot-dash grouper	*Epinephelus poecilonotus*
	Camouflage grouper	*Epinephelus polyphekadion*
	Greasy grouper	*Epinephelus tauvina*

	Masked grouper	*Gracila albomarginata*
	Manyline perch	*Liopropoma multilineatum*
	Meteor perch	*Liopropoma susumi*
	Redstriped basslet	*Liopropoma tonstrinum*
	Waite's splitfin	*Luzonichthys waitei*
	Longfin perchlet	*Plectranthias longimanus*
	Blacksaddled coralgrouper	*Plectropomus laevis*
	Leopard coralgrouper	*Plectropomus leopardus*
	Roving coralgrouper	*Plectropomus pessuliferus*
		Pseudanthias carlsoni
	Peach fairy basslet	*Pseudanthias dispar*
		Pseudanthias flavicauda
	Amethyst anthias	*Pseudanthias pascalus*
	Square-spot fairy basslet	*Pseudanthias pleurotaenia*
	Red-belted anthias	*Pseudanthias rubrizonatus*
	Spotless podge	*Pseudogramma astigmum*
	Honeycomb podge	*Pseudogramma polyacanthum*
	Golden grouper	*Saloptia powelli*
	Hawkfish anthias	*Serranocirrhitus latus*
	Freckleface podge	*Suttonia lineata*
	White-edged lyretail	*Variola albimarginata*
	Yellow-edged lyretail	*Variola louti*
Siganidae	Streamlined spinefoot	*Siganus argenteus*
	Barred spinefoot	*Siganus doliatus*
	Peppered spinefoot	*Siganus punctatissimus*
	Goldspotted spinefoot	*Siganus punctatus*
	Little spinefoot	*Siganus spinus*
	Bicolored foxface	*Siganus uspi*
	Vermiculated spinefoot	*Siganus vermiculatus*
Solenostomidae	Ghost pipefish	*Solenostomus cyanopterus*
	Harlequin ghost pipefish	*Solenostomus paradoxus*
Sphyraenidae	Great barracuda	*Sphyraena barracuda*
	Bigeye barracuda	*Sphyraena forsteri*
	Heller's barracuda	*Sphyraena helleri*
	Pickhandle barracuda	*Sphyraena jello*
	Sawtooth barracuda	*Sphyraena putnamae*
	Scalloped hammerhead	*Sphyrna lewini*
Synanceiidae	Bearded ghoul	*Inimicus didactylus*
		Bulbonaricus davaoensis
	Sculptured pipefish	*Choeroichthys sculptus*
	Brown-banded pipefish	*Corythoichthys amplexus*
	Roughridge pipefish	*Cosmocampus banneri*
	Bluestripe pipefish	*Doryrhamphus excisus excisus*
	Booth;s pipefish	*Halicampus boothae*
	Duncker's pipefish	*Halicampus dunckeri*
	Glittering pipefish	*Halicampus nitidus*
	Spotted seahorse	*Hippocampus kuda*
	Rock pipefish	*Phoxocampus belcheri*
Terapontidae	Jarbua terapon	*Terapon jarbua*
Tetraodontidae	White-spotted puffer	*Arothron hispidus*
	Narrow-lined puffer	*Arothron manilensis*
	Shy toby	*Canthigaster ocellicincta*
Tetrarogidae	Cockatoo waspfish	*Ablabys taenianotus*

Trichonotidae	Long-rayed sand-diver	*Trichonotus elegans*
	Threetooth puffer	*Triodon macropterus*
Tripterygiidae	Helena's spiny-eye triplefin	*Ceratobregma helenae*
	Striped spiny-eye triplefin	*Ceratobregma striata*
	Hourglass triplefin	*Enneapterygius elegans*
	Blackbelly triplefin	*Enneapterygius fuscoventer*
	Half-black triplefin	*Enneapterygius hemimelas*
	Minute triplefin	*Enneapterygius minutus*
	High hat triplefin	*Enneapterygius tutuilae*
	Hooded triplefin	*Helcogramma capidatum*
	Little hooded triplefin	*Helcogramma chica*
	Hudson's triplefin	*Helcogramma hudsoni*
	Tropical striped triplefin	*Helcogramma striatum*
	Tropical scaly-headed triplefin	*Norfolkia brachylepis*
	Thomas' triplefin	*Norfolkia thomasi*
	Kulbicki's triplefin	*Springerichthys kulbickii*
	Largemouth triplefin	*Ucla xenogrammus*
Uranoscopidae	Whitemargin stargazer	*Uranoscopus sulphureus*
Xenisthmidae		*Rotuma lewisi*

Source: Froese and Pauly (2003)

Annex VII Pelagic fish of Fiji

Common Name	**Scientific Name**
Wahoo	**Acanthocybium solandri**
Frigate tuna	*Auxis thazard thazard*
Smallscale codlet	*Bregmaceros nectabanus*
Easter island flyingfish	*Cheilopogon rapanouiensis*
Pompano dolphinfish	*Coryphaena equiselis*
Blue fathead	*Cubiceps caeruleus*
Pharao flyingfish	*Cypselurus naresii*
Mercer's tusked silverside	*Dentatherina merceri*
Indo-Pacific sailfish	*Istiophorus platypterus*
Skipjack tuna	*Katsuwonus pelamis*
False trevally	*Lactarius lactarius*
Black marlin	*Makaira indica*
Indo-Pacific blue marlin	*Makaira mazara*
Silver moony	*Monodactylus argenteus*
African sailfin flyingfish	*Parexocoetus mento*
Blue shark	*Prionace glauca*
Shortfin flyingfish	*Prognichthys brevipinnis*
Short mackerel	*Rastrelliger brachysoma*
Island mackerel	*Rastrelliger faughni*
Whale shark	*Rhincodon typus*
Fiji sardinella	*Sardinella fijiense*
Blacktip sardinella	*Sardinella melanura*
Silver-stripe round herring	*Spratelloides gracilis*
Shortbill spearfish	*Tetrapturus angustirostris*
Striped marlin	*Tetrapturus audax*
	Thamnaconus fijiensis
Albacore	*Thunnus alalunga*
Bigeye tuna	*Thunnus obesus*
Bluetail mullet	*Valamugil buchanani*
Swordfish	*Xiphias gladius*

Source: Froese and Pauly (2003)

Annex VIII: Sharks and rays of Fiji

Table A1: Selachii - Sharks
Class 2: Chondrichthyes (cartilage fish); Subclass 1: Elasmobranchii (sharks)

Family	**Species name**	**Common name**
Hexanchidae	*Heptranchias perlo*	Sharp nose seven gill shark
	Hexanchus griseus	**Blunt nose six gill shark**
	Hexanchus vitulus	**Big eyed seven gilled shark**
Ginglymostomatidae	*Nebrius concolor*	**Tawny nurse shark**
Stegostomatidae	*Stegostoma fasciatum*	**Leopard shark**
Carcharhinidae	*Carcharhinus albimarginatus*	**Silvertip Shark**
	Carcharhinus amblyrhynchos	**Grey reef shark**
	Carcharhinus cautus	**Nervous Shark**
	Carcharhinus falciformis	**Silky Shark**
	*Carcharhinus leucas**	**Bull Shark**
	*Carcharhinus limbatus**	**Blacktip**
	Carcharhinus longimanus	**Oceanic White tip shark**
	Carcharhinus melanopterus	**Black tip reef shark**
	*Carcharhinus obscurus**	**Dusky shark**
	Carcharhinus sorrah	**Spot tail shark**
	Carcharhinus plumbeus (?)	**Sandbar shark**
Triakidae	*Hemitriakis japanica*	**Japanese Lope shark**
	Mustelus manazo	**Star spotted smooth-hound**
Lamnidae	*Carcharodon carcharias*	**Great white shark**
	*Isurus oxyrhynchus . I. hastalis, **	**Shotfin mako**
	I. paucus	**Long fin mako, (?)**
Rhinodontidae	*Rhiniodon typus*	**Whale shark**
Pseudocarchariidae	*Pseudocarcharias kamoharai*	**Crocodile shark (?)**
Alopidae	*Alopias supercilliosus*	**Big eyed thresher shark**
	Alopias pelagicus	**Pelagic thresher shark**
	Alopias vulpinus	**Thresher shark**
Scyliorhinidae	*Cephaloscyllium isabella*	**Draughtsboard shark (?)**
Sphyrnidae	*Sphyrna lewini*	**Scalloped hammerhead**
	*Sphyrna mokarran**	**Great hammerhead**
	Sphyrna zygaena	**Smooth hammerhead**
Squalidae	*Centroscyllium granulosum*	**(?)**
	Centroscyllium spp.	**(?)**
	Centrophorus moluccensis	**Small fin gulper shark**
	Etmopterus brachyurus	**Short tail lantern shark**
	Euprotomicrus bispinatus	**Pigmy shark**
	Isistius brasiliensis	**Cookie cutter shark**
	Squalus japonicus	**Japanese spurdog (?)**
	Squalus megalops	**Short nose spurdog**

Echinorhinidae	*Echinorhinus brucus*	**Bramble shark (/)**
	Echinorhinus cookei	**Prickly shark (?)**

Table A2: Rajiformes - Rays

Family	**Latin**	**English**
Dasyatide	Dasyatis kuhlii	Kuhl's stingray
	Taeniura lymma	Blue spotted stingray
	T. meyeni	Black-blotched stingray
Myliobatididae	*Aetobatus narinari*	Spotted eagle ray
Mobulidae	*Manta birostris*	Manta ray
	Mobula tarapacana	Devil ray

Table A3: Chimaeriformes - Chimeras
Sub-class 2: Bradyodonti (Holocephali)

Family	Latin	English
Chimaeridae	* *Chimaera sp.*	Ghost fish/rabbit fish

Sources for Tables A1-A3: Compagno (1984a; 1984b); Randall et al. (1997); Froese and Pauly (2003); Swamy (2003)

Annex IX: Deep-water fish of Fiji

Common Name	**Scientific Name**
	Bathycongrus guttulatus
Spinycheek lanternfish	*Benthosema fibulatum*
Alfonsino	*Beryx decadactylus*
Garish hind	*Cephalopholis igarashiensis*
	Chlopsis bidentatus
	Chlopsis slusserorum
Mandarin dogfish	*Cirrhigaleus barbifer*
Abyssal rattail	*Coryphaenoides murrayi*
Striped escolar	*Diplospinus multistriatus*
Flame snapper	*Etelis coruscans*
Blackbelly lanternshark	*Etmopterus lucifer*
	Eumegistus illustris
Snake mackerel	*Gempylus serpens*
Sharpnose sevengill shark	*Heptranchias perlo*
Cookiecutter shark	*Isistius brasiliensis*
Escolar	*Lepidocybium flavobrunneum*
	Lucigadus microlepis
Black snake mackerel	*Nealotus tripes*
	Neobythites fijiensis
	Neobythites musorstomi
	Neobythites sereti
Sackfish	*Neoepinnula orientalis*
	Ophichthus exourus
Longsnout soldier	*Ostichthys archiepiscopus*
Cocoa snapper	*Paracaesio stonei*
	Parmops echinatus
Deepwater stingray	*Plesiobatis daviesi*
Lavender jobfish	*Pristipomoides sieboldii*
Oblique-banded snapper	*Pristipomoides zonatus*
Antrorse spined gurnard	*Pterygotrigla multiocellata*
Long-finned escolar	*Rexea antefurcata*
Golden grouper	*Saloptia powelli*
Deepwater scorpionfish	*Setarches guentheri*
Shortspine spurdog	*Squalus mitsukurii*
Black snoek	*Thyrsitoides marleyi*
Tonga escolar	*Tongaichthys robustus*
Spotted tinselfish	*Xenolepidichthys dalgleishi*

Source: Fishbase (2003)

Annex X: Documented and anecdotal sightings of whales and dolphins in Fiji

Common Name	Species	Documented	Anecdotal	Likely to be present
Blue whale	*Balaenoptera musculus*			✓
Humpback whale	*Megaptera ovaeangaliae*	✓	✓	
Bryde's whale	Balaenoptera edeni		✓	
Fin whale	Balaenoptera physalus		✓	
Sei whale	Balaenoptera borealis	✓		
Minke whale	*Balaenotera bonaerensis*	✓	✓	
Sperm whale	*Physeter marocephalus*	✓	✓	
Killer whale	*Orcinus orca*		✓	
False Killer whale	*Pseudoca crassides*		✓	
Short-finned Pilot whale	*Gobicephala acrorhyncus*		✓	
Spinner whale	*Stenella chymene*		✓	
Pantropical spotted dolphin	*Stenella attenuata*			✓
Striped dolphin	*Stenella coeruleolba*			✓
Melon-headed whales	*Peponocephala electra*			✓
Risso's dolphin	*Grampus griseus*			✓
Frasers dolphin	*Lagenodelphis hosei*		✓	
Cuvier's beaked whale	*Ziphius cavirostris*			✓
Rough toothed Dolphin	*Steno bredanesis*		✓	

Source: Paton & Gibbs (2002)

Annex XI: Fish species currently used, or with potential for, the aquaculture industry

Species used in aquaculture				
Other Name	Scientific Name	Local use	Status	Use elsewhere
Bighead carp	Aristichthys nobilis	commercial	introduced	commercial
Java barb	Barbonymus gonionotus	commercial	introduced	commercial
Grass carp	Ctenopharyngodon idella	commercial	introduced	commercial
Mozambique tilapia	Oreochromis mossambicus	commercial	introduced	commercial
Nile tilapia	Oreochromis niloticus niloticus	commercial	introduced	commercial
Species of potential use in aquaculture				
Other Name	Scientific Name	Local use	Status	Use elsewhere
Shortfin eel	Anguilla australis australis		native	commercial
Giant mottled eel	Anguilla marmorata		native	commercial
Giant trevally	Caranx ignobilis	never/rarely	native	commercial
Black jack	Caranx lugubris	never/rarely	native	commercial
Bluefin trevally	Caranx melampygus	never/rarely	native	commercial
Brassy trevally	Caranx papuensis	never/rarely	native	commercial
Milkfish	Chanos chanos		native	commercial
Common dolphinfish	Coryphaena hippurus		native	commercial
Common carp	Cyprinus carpio carpio		introduced	commercial
Areolate grouper	Epinephelus areolatus		native	commercial
Orange-spotted grouper	Epinephelus coioides	never/rarely	native	commercial
Brown-marbled grouper	Epinephelus fuscoguttatus		native	commercial
Giant grouper	Epinephelus lanceolatus	never/rarely	native	commercial
Malabar grouper	Epinephelus malabaricus		native	commercial

Honeycomb grouper	Epinephelus merra		native	commercial
Greasy grouper	Epinephelus tauvina		native	commercial
Golden trevally	Gnathanodon speciosus	never/rarely	native	commercial
Spotted seahorse	Hippocampus kuda	never/rarely	native	commercial
Silver carp	Hypophthalmichthys molitrix		introduced	commercial
Barramundi	Lates calcarifer		native	commercial
Common ponyfish	Leiognathus equulus	never/rarely	native	commercial
Spangled emperor	Lethrinus nebulosus	never/rarely	native	commercial
Squaretail mullet	Liza vaigiensis		native	commercial
Mangrove red snapper	Lutjanus argentimaculatus		native	commercial
John's snapper	Lutjanus johnii		native	commercial
Onespot snapper	Lutjanus monostigma	never/rarely	native	commercial
Blubberlip snapper	Lutjanus rivulatus	never/rarely	native	commercial
Russell's snapper	Lutjanus russellii		native	commercial
Indo-Pacific tarpon	Megalops cyprinoides		native	commercial
Largemouth bass	Micropterus salmoides		introduced	commercial
Flathead mullet	Mugil cephalus		native	commercial
Daggertooth pike conger	Muraenesox cinereus		native	commercial
Wami tilapia	Oreochromis urolepis hornorum		introduced	commercial
Marble goby	Oxyeleotris marmorata		questionable	commercial
Orbicular batfish	Platax orbicularis	never/rarely	native	commercial
Striped sweetlips	Plectorhinchus diagrammus	never/rarely	native	commercial
Leopard coralgrouper	Plectropomus leopardus		native	commercial
Striped threadfin	Polydactylus plebeius	never/rarely	native	commercial
Cobia	Rachycentron canadum		native	commercial
Spotted scat	Scatophagus argus	never/rarely	native	commercial
Greater amberjack	Seriola dumerili		native	commercial
Jarbua terapon	Terapon jarbua	never/rarely	native	commercial
Snubnose pompano	Trachinotus blochii		native	commercial

Annex XII: Fiji Biodiversity Strategy and Action Plan recommendations

Community workshops of FBSAP highlighted the following:

MPA's

The following additional areas should be considered for MPA creation

- Tobu ni Nuqa (Nawi island, Savusavu)
- Tobu ni Ura Buta - Red Prawns (Naweni)
- Tobu ni Kaboa (Naweni)
- Protection of some areas at Nasinu, Cakaudrove where the fish Gusurubu is found.

Species conservation

Marine

- **Seaweed** – Vutia and Baka ni waitui
- **Shellfish** – conch shells, Qeqe, Giant Clams, Sici, Vula,
- **Sea cucumbers** – Sucuwalu, Dri, Beach- de- mer
- **Other Species** – Turtles, Mangroves

Freshwater:

- **Reeds –** Kuta,Galo
- **Plants** – Ivi (Tahitian Chestnut), Colaiwai, Dogo ni veiwai, Ota loa & Ota levulevu (Edible ferns) Karisi, Via and Vuta wai
- **Others**– Fish, prawns, moci, ika droka, kai ,qari ni wai, and Vo.

Annex XIII : NBSAP marine priority areas and the rationale for selection

Site	Place	Location	Significance	Reason
1	Kadavu	Great Astrolabe Lagoon		Benefit of long term scientific study
2	Nadi bay	Tai Is	Fringing and offshore reef areas	History of protection through private arrangement and intent by the stakeholders to formalize that protection in legislation
		Vomo Is		
		Vomo Sewa Is		
3	Namenalala	Namenalala	Fringing and barrier reef	Same as above
4	Yadua Taba	Yadua Is	Fringing reef and surrounding waters	Adjacent to a unique wildlife sanctuary
5	Lau Group	To be determined		Represents a proposal by former president Sir Mara for protection of Lau.
6	Ba	Ba delta	Mangrove	?guess its for species richness and abundance???
7	Rewa	Rewa delta	Mangrove	?
8	Labasa	Dreketi delta	Mangrove	?

Annex XIV: National initiatives of conservation relevance

National Framework	*Relevant Targets*
Strategic Development Plan 2002-2004	• Regular surveillance of EEZ undertaken and catches monitored. • A moratorium on reef mining implemented by 2003. • TAC and licensing reviewed by 2003. • Tuna Development and Management Plan implemented by 2003. • Rents from distant nation vessels increased to economic levels by 2003. • Management Plan for customary fishing rights developed by 2005. • Sustainable Development Bill enacted and implemented by 2004. • Marine Pollution Prevention Bill enacted and implemented by 2004. • Fiji Biodiversity Strategy Action Plan endorsed and implemented by 2003. • National Implementation Strategy and First National Communication to the • Framework Convention on Climate Change endorsed by 2003. • National controls on coral harvesting by 2003.Mangrove Management Plan reviewed by 2003. • No litter due to enforcement of Litter Decree by 2003.
Tuna Management Plan	• Limits licenses issued, sets criteria for issuing of license, limits TAC, catch reporting and monitoring.
Tourism Strategic Plan	• 2 marine parks by 2004. • Best practice framework for ecotourism by 2003. • At least 50% of nature based and community based tourism operations meet or exceed ecotourism best practice guidelines and standards by 2004. • Ecotourism awareness education for hosts and guests established by 2005.
Ecotourism and Village based Tourism- A Policy and Strategy for Fiji	• To promote and assist in the conservation of all aspects of the physical and social environment that are of benefit to the peoples of Fiji • Awareness at all levels of society of the importance of env conservation, and of individual and collective responsibilities in ensuring that it remains a key priority in tourism and other forms of development • Facilitate development of ecotourism
Forestry Strategic Plan 2002-2004	• Code of logging practice fully enforced by 2003 • Awareness of conservation and biodiversity issues increased through training programs.“Green certification” attained by 2004. • Rate of deforestation reduced to zero by 2005

Annex XV: Government committees concerned with environmental management

Committee	Remit
The Environmental Management Committee	Established in 1980 under the Ministry of Housing, Urban Development and the Environment; functions are to coordinate and provide advice on the implications of development proposals
The National Environment Steering Committee	Purpose of committee was to oversee the National Environmental Management Project which began in late 1991 under the Ministry of Housing, Urban Development and the Environment
The Mangrove Management Committee	Established in 1983 under the Ministry of Lands, Mineral Resources and Energy. Its function is to advise the Director of Lands on development proposals which affect mangroves
The National Oil Pollution Committee	Comes under the umbrella of the Marine Department; formed in 1991 for the purpose of coordinating the preparations and the implementation of a national oil pollution response plan
The Consultative Committee on Ozone Depleting Substances	established under the Ministry of Housing, Urban Development and the Environment to supervise the implementation of government commitments under the Montreal Protocol on Ozone Depleting Substances
The Native Land Trust Board Steering Committee	Formed to oversee the implementation of tourism forest park projects in Fiji

Source: ESCAP (2003)

Appendix IV: Stakeholders in the FIME

Government Bodies

Department of Environment
• Consultancy / Advice, Policy, Capacity Building, Education / Training, Sustainable Development, Campaigning / Lobbying, EIAs / Inventories, Monitoring / Control, Ecotourism, Waste management. • Coral Reef Awareness Workshops, NBSAP, Climate Change project, Ovalau Integrated Management Plan?
Ministry of Fisheries and Forestry **Department of Fisheries**
• **Aquaculture farms in Naduruloulou in Kasavu, Makogai Research Station (trochus, Clam, turtles)** • **Sea weed farming in Kiuva in Tailevu, Ono-i-Lau , Namuka-i-Lau, Vanua Balavu, Cakaudrove, Taveuni-5 sites, Serua, in Vunaniu, Shrimp in *Galoa,* Pearl Farm in Savusavu, Live fish Trade-Bua, Labasa, Milk Fish- Dreketi (Maleleau Dawai), Mariculture (Aisake Batibasaqa),Qoliqoli Management Plans, Manava Island** • **Turtle Island, Wakaya Island, Namena Lala Resort,Makogai Island, Tavarua Island**
Ministry of Agriculture, Sugar & Land Resettlement **Land Resources Planning & Development Unit**
• **GIS maps on Land use pattern (areas under different crops), river systems, roads, and forest area.**

Native Land Trust Board (NLTB)
• One of the objective is effective use of native land • Resource management training
Fiji Museum
• Archaeological surveys • Heritage Traditional Knowledge • Ecotourism Management Plan Development national monument site
National Trust of Fiji
• Sigatoka Sand Dunes • Yadua Taba Crested Iguana Sanctuary • Beachcomber Treasure Island Marine reserve • Levuka harbour reserve • National Mangrove reserves • Fauna Data base- National Biodiversity

Development Agencies

Australian Agency for International development (AusAID)
• Poverty reduction through sustainable development • **Capacity Building, Community Development, Traditional Knowledge, Campaigning / Lobbying, Research, Education / Training, Consultancy / Advice, EIAs / Inventories, Monitoring / Control, Policy, Sustainable Development, Species management, Area management, Waste management,Environment Impact Assessment - Marine**
United Nations Development Programme (UNDP)
• **Capacity Building, Traditional Knowledge, Education / Training, Consultancy / Advice, Ecotourism, Sustainable Development, Area management, Waste management.**

NGO's

Pacific Concerns Resource Centre (PCRC)
Live & Learn Environmental Education
Coral Cay Conservation
• Biological surveys of Mamanucas • Surveying around Qalito), the North section of Malolo, the inner barrier reef around Castaway and the nearby Honeymoon Island. Some surveys on the Malolo outer barrier reef. Pilot phase- 9 habitat types recorded >have 7 habitat types just on the reefs of Qalito Island alone. Local community education program . These include a Project with the local school at Solevu village, and hopefully to expand to other villages. A Divemaster workshop as conducted in the Pilot Phase, a Resort Talk where an environmental talk is given to guests and also to local staff, working at resorts in the Mamanucas.
Greenforce
• **Biological surveys around Yadua Taba**
Women & Fisheries Network
• Research, Education / Training, Consultancy / Advice, Waste management
Partners in Community Development (PICD)
• Capacity Building, Community Development, Project Funding, Ecotourism, Sustainable Development • Coral Garden Project- Cuvu and Tuva Tikina, Coral restoration ,MPA-community awareness, Tabu areas,Threat elimination • Ovalau ecotourism project • Natural Resource Conflict Management • Coral Aqua-culture • Turtle Conservation

International Marine Alliance
• In 2001- completed a fishery resource and socio-economic assessment in Fiji's Lau Islands (recently been opened to the live reef food fish trade). Based on this assessment, IMA, the Secretariat of the Pacific Community and local partners are working with the Fisheries Division to devise and implement an appropriate management and conservation plan. • Assisting with coral monitoring and assessment in aquarium fish and coral trade collection areas, and promoting development of market incentives that will reward sustainable collection practices for both the ongoing aquarium trade and the incipient live reef food fish trade. • Setting up a series of sites to monitor coral reef conditions and trends over time, and to implement community-centered coral reef conservation efforts, also helping school authorities develop appropriate curriculum packages to improve awareness about the importance of conserving Fiji's valuable coral reef ecosystems.

Interregional Organizations-Council of Regional Organizations in the Pacific (CROP)

South Pacific Applied Geoscience Commission (SOPAC)
• Topographic maps-1:50000, 1:250,000 • Satellite maps of Suva, Pacific Harbour, Nasinu and Lami and Nausori area • Information on seabed configurations; mineral deposits; vents; troughs, marine and coastal habitats
University of the South Pacific (USP)
Marine Studies Programme,USP
• Capacity Building, Community Development, Traditional Knowledge, Research, Education / Training, Consultancy / Advice, EIAs / Inventories, Monitoring / Control.
Global Coral Reef Monitoring Network (GCRMN)
• To improve management and sustainable conservation of coral reefs for people by assessing the status and trends in the reefs and how people use and value the resources. It will do this by providing many people with the capacity to assess their own resources, within a global network, and to spread the word on reef status and trends**.**
Institute of Applied Science
Community Development, Traditional Knowledge, Research, Education / Training, Consultancy / Advice, EIAs / Inventories, Monitoring / Control, Policy, Ecotourism, Sustainable Development, Habitat management, Species management, Waste management
Department of Geography
Capacity Building, Community Development, Traditional Knowledge, Research, Education / Training, Consultancy / Advice, EIAs / Inventories, Monitoring / Control.
Department of Biology
ORSTOM Ecotrop Program • Resource Economics And Environmental Costing
South Pacific Regional Environment Program (SPREP)
• To build nation capacity to protect and improve the environment of the region for the benefit of Pacific island people now and in the future • Capacity Building, Community Development, Traditional Knowledge, Campaigning / Lobbying, Research, Education / Training, Consultancy / Advice, EIAs / Inventories, Monitoring / Control, Project Funding, Policy, Ecotourism, Sustainable Development, Habitat management, Species management, Waste management
Forum Fisheries Agency (FFA)
• To enable member countries to manage, conserve and use the tuna resources in their Exclusive Economic Zones and beyond, through enhancing national capacity and strengthening regional solidarity.

Industry

Fiji Divers Association
• Reef Protection Awareness • Marine Reserve Trail Establishment mobile reef unit training kit development