SOCIO_ECONOMIC DIMENSIONS AND ACTION PLAN FOR CONSERVATION OF COASTAL RESOURCES BASED ON AN UNDERSTANDING OF ANTHROPOGENIC THREATS

MINICOY ISLAND – UT OF Lakshadweep

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Contents

List of Tables

List of Figures

List of Plates

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Obituary Note

It is with great sadness that we heard the news of the untimely death of Ms. B.B.Amina. B.B. Amina, (aged 40), daughter of Mr. Moosa Manikfan (Dondigothi) and Mrs. Don Manika (Boduganduvar Bouge) was one of the most active members of the team in Minicoy who collected all basic information which went into this report. She showed exceptional skill and sincerity in compiling the section on 'Community services'. In the death of this ever-smiling person, we have lost a good friend and researcher. We dedicate this to her memory.

Glossary of Mahl Terms

Terms used to describe the social environment	
Maliku	Minicoy
Avah	Village
Avarhugé	village house (originally a house meant for men's group activities now used by both genders)
Varhangé	village house for women's group activities
Athiri	village harbour/ landing beach on the western side
Thorhi/Thoshi	reef and also breakwater (bund)
Bodukāka	village head man
Boduthātha	village head woman
Vili	A peer group of young men or women with similar interests who carry out work for the village house
Baemedu	Voluntary labour for work concerned with village house duties
Mahtha gondi	A board game of Minicoy.
Terms used to describe the physical environment	
Bārana/berumathi	The outer reef area
Fasgan	a shallow and sandy area in the lagoon interspersed with sea grass beds at the SW end.
Tharāthére	area in the lagoon full of with massive coral beds adjacent to *fasgan*
Thorhi/Thoshi	reef
Dholi	slope between tharathere and *fasgan* /lagoon slope to sea without reef area
Faru	reef flat where people go for cowry and bait worm collection
Dheraddethéré	Reef flat between Viringili and Minicoy/ meaning reef flat between two islands
Raggan	sand bar in formation
Magu	natural entrance from open sea to lagoon.
Faroli	sand bank exposed during low tide.
Oi	Ocean current
Furuvah	Eastern side beach
Terms used to describe the coral building resources	
Gau	massive Coral
Muraka	branching Coral
Hirigau	coral boulder purplish in color when living in the lagoon
Onahiri gau	Most favids boulder coral
Kudi akiri	small pieces of coral under 1" size (generally acrapora pieces)
Saralu	bigger size of *akiri* used for making lime
Fathigau/rānāgau	flat pieces of coral washed ashore used for building walls
Mula gau	Unevenly rounded shaped pieces of coral washed ashore used for filling building foundations.
veli	Sand
Terms used to describe ornamental shells, mollusks and crustaceans	
Boli	Cowry / conch and round shells
Bodu boli	big cowry
Kudi boli	small cowry
Hudu bodu boli	Cyprea tigris
Kalu bodu boli	Cyprea mappa
Daalu boli	Cyprea arabica
Kalu boli	Cyprea caputserpantis
Kudi boli	Cyprea moneta
Faikala	spider conch
Bōva/boava	Octopus
Iss/ ihi	Lobster
kakuni	Crab
Rono foli fenduge	Sea Cucumber

Terms used to describe boats, fishing activities and nets	
dau	**Net**
Uidau/Laandhaa	Castnet
Lādau	Shoreseine
Hondelidau	net for catching sprats (0.5mm mesh)
Rehidau	net for catching striped blue sprats
Nilamehidau	net for catching blue puller
Odi	sailing vessels (cargo)
Dhoani	Boats
Odijahādhoani/bokkuraa	row boat used for bringing passengers from ship to shore (20 ores)
Jahādhoani	race boat (36 ores)
Fypādu	a type of fishing carried out at dholi taking advantage of the tidal flow
Balajehung	communal drag net operation in lagoon area
Miyavaali	special long line, with attached vertical lines with hooks used for fishing in the lagoon
Firukkung	rod fishing along the beach/line casting method using a fishing pole
Aarubehdung	net fishing at chorumagu
Trees and processed products	
Gus	Tree
Ruh	Coconut tree
Rukurā	The sweet sap juice from coconut trees
Ruku hakuru	Palm jaggery
Koroli	Ball copra
kurumbā	Tender coconut kernal
Kahari/kaashi	Hard coconut kernal
Bambu keu gus	Bread fruit tree
Midili gus	Indian almond tree
Hithi gus	Neem tree
Maarandu	Ceriops tagal (Mangrove tree)
Kandhoo	Brugeria cylindrica Mangrove tree
Fish processed products	
Hiki mus	boiled, smoked and dried fish
Kundi mus	pieces of hiki mas
Valō mus	half dried tuna mas
Rihākuru	The paste, prepared with the solution left in the pot after several batches of tuna fillets are removed for smoke drying

Chapter 1: Introduction

This report is the culmination of Phase-II of the Bio-resources board Project. During Phase I, we carried out a desktop study of the status of bio-resources of Lakshadweep Islands. The aim of phase 1 was to carry out a literature search find out what information on the bio-resources of Lakshadweep was already available and zero in on the gaps that needed to be filled up. This report was subsequently published in 2002. Phase 1 provided a broad picture of the situation in Lakshadweep.

On completion of Phase I, it was felt that there was a need to carry out a detailed study at selected locations within the site, using a community participatory approach, so that a clearer picture could emerge on the resource use pattern and resource dependencies in Lakshadweep. The detailed study had to be followed by an action plan for protecting and enhancing the bio-resources and suggestions for sustainable livelihood opportunities. The selected locations should be representative of the study area, so that the lessons learnt at the site could be applied to the rest of the Study site.

1.1 Study Area Background

The Lakshadweep islands lie between 8° - 12 °3' N latitude and 71°E - 74°E longitude in the Arabian Sea about 225 to 450 km from the Kerala Coast (Figure 1). They comprise 12 atolls, 3 reefs, 5 submerged banks. There are 36 Islands, with a total land area of 32 km^2, and useable land area of 26 km^2. Lakshadweep is considered the smallest Union Territory of India with a population of 60,595 persons (2001. However considering its lagoon area of 4200 km^2, 20,000 km^2 of territorial waters and about 4,00,000 km^2 out of the 8,59, 992 km^2 of Exclusive Economic Zone of the west coast of India, Lakshadweep is a large territory, (Lakshadweep & its people: 1999).

Table 1.1 Lakshadweep Basic Facts

Island	36 (10 inhabited, 1 tourist resort)
Geographical Area	32 sq km
Land Use Area	26.32 sq km
Lagoon Area	4,200 sq Km
Territorial waters	20,000 sq km
Economic Zone	4,00,000 sq km
Location	8°N to 12°N Latitude and 71°E to 74°E longitude
Distance	Kavaratti-Calicut 340 km Kavaratti-Kochi 404 Km Kavaratti-Mangalore 352 km
Population 2001 Males Females Population density	60,595 31,118 29,477 1894/sqkm
Temperature Range	Max: 35°C-38°C Min: 17°C-18°C
Relative Humidity	70-75%
Average Annual Rainfall	1500 mm in northern islands 1640 mm in southern islands

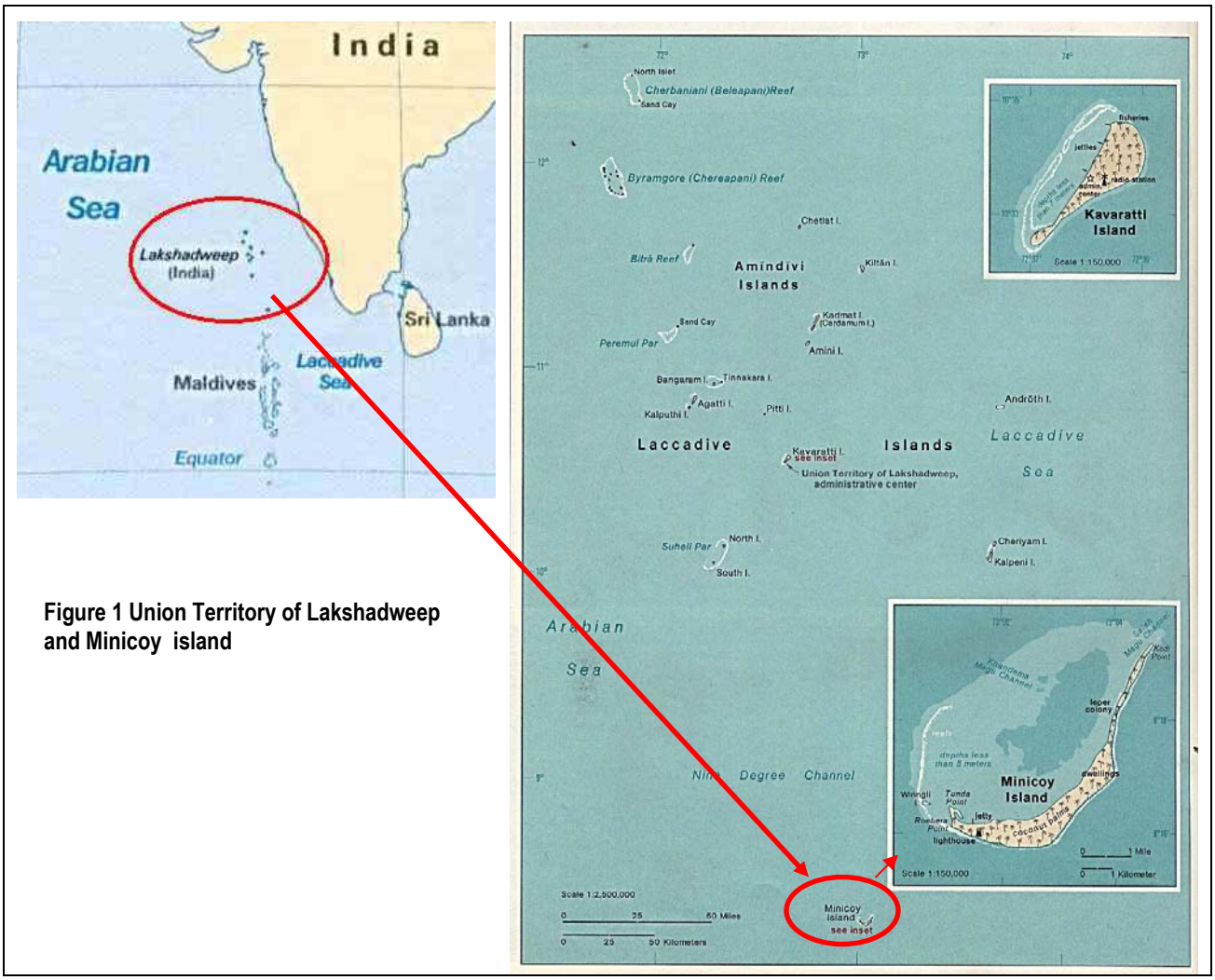
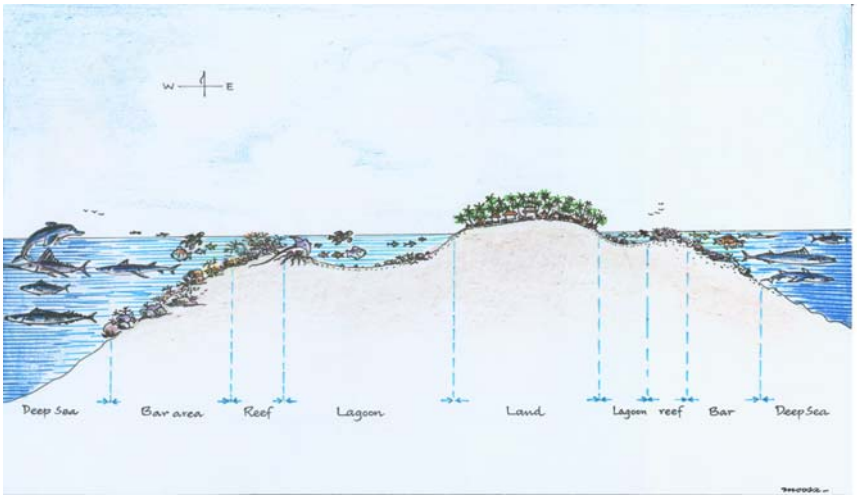


Figure 1 Union Territory of Lakshadweep and Minicoy island

Figure2: Cross-section of the Coral reef Resources



Eleven out of the thirty-six islands are inhabited. These are Agatti, Androtti, Amini, Bangaram, Bitra, Chetlat, Kadmat, Kavaratti, Kalpeni, Kiltan and Minicoy. Kavaratti is the Administrative headquarters and Agatti is the only island with an airport. The islands are linked to Kochi by ship, helicopter and Indian Airlines services.

Owing to its remoteness and difficult access, the Union Territory of Lakshadweep is classified as a Scheduled Tribe area. Only those inhabitants who are born on the islands and both of whose parents are born on the island are considered as scheduled tribes or native to the islands[1]. The main occupation of the people is fishing, coconut cultivation and coir twisting. Tourism is an emerging industry on the islands and is controlled by the Lakshadweep Administration.

Islam is the majority religion; Malayalam is spoken in all the islands except Minicoy where the people speak Mahal the language of the Maldives. Table 1 presents the basic facts about Lakshadweep.

1.2 Selection of the Island for detailed study

All, the inhabited Islands are coralline and have similar physical characteristics, (figure 2). They are isolated and have to be self-reliant especially during the monsoon period when the sea becomes very rough for sailing. The Islanders draw resources from the Island, lagoon, reef, bar-area and the deep sea. Therefore a detailed study of the bio-resources of any island is representative of the other islands in Lakshadweep and will provide insights into the resource dependency in the islands. However, it is important to note that subtle cultural differences are found in each island. For e.g. Mincoy Islanders are the masters in Pole and Line Tuna fisheries, Kavaratti islanders are master octopus collectors and Agatti is famous for its shark hunting.

We held a discussion with the Lakshadweep Administration on Island selection for the detailed study. Minicoy Island was selected for the bioresource study, since it is culturally different from the other islands and is the only island with mangroves. In 2002, we had completed a socioeconomic assessment of reef related activities for Agatti Island, which is culturally akin to the Laccadive and Aminidivi group of islands. Therefore a detailed study of Minicoy would add to the information already available.

1.3 Aims and objectives

The Aim of this study is to understand the human dependencies on both wild and domesticated bio-resources in the Lakshadweep Islands and to prepare an action plan for conservation of selected bioresources.

Specific objectives:

1. To prepare an inventory and assess the status of the wild and domesticated bio-resources available at the study site.
2. To understand the degree of human dependencies on the bio-resources.

[1] This distinction of having to be born in the Islands to avail ST status causes an identity problem for those children who are born outside Lakshadweep territory, despite the fact that both the child's parents may be natives of UTL.

3. Prepare an Action Plan for management, monitoring and enriching the bioresources developed in participation with local stakeholders.

This report is the culmination of a year long project. Four study visits and consultations with the Lakshadweep Administration, Local NGO's, Panchayat bodies, Village headmen and women, village elders, tuna fishermen, cowry collectors, reef fishermen, women groups, coconut climbers and field research units of the CMFRI, CPCRI have gone into compiling this study.

Chapter 2. Methodology of Project Execution

A socio-economic assessment was carried out at Minicoy Island, UT of Lakshadweep to gain an understanding of the way of life and the livelihood dependencies on the bio-resource base of the Island. To ensure the participatory spirit of the project, the Center for Action Research on Environment Science and Society (CARESS) provided training on data collection and supervision to a team of volunteers in Minicoy to collect the data. Supervisors from CARESS and the Minicoy team met four times over the project period to discuss the methodology, data collection and chalk out a work plan.

To achieve the objectives of the project, the research design was structured as follows:

1. A meeting was held at Minicoy to explain the project to the different stakeholders, volunteers and prepare a checklist of work to be carried out.
2. Making a resource inventory, socio-economic assessment and analyzing the resource dependencies, at Minicoy Island using participatory appraisal methods.
3. Validating the data collected by holding a Focused Group Discussion with key Informants.
4. Public Village meetings to discuss the report findings and prepare a community based management plan for sustainable use and protection of the resource base.

2.1 The Bio-resource project Awareness meeting

In December 2002, a meeting was held at Minicoy Island to explain the project to the different stakeholders. Staff from CMFRI, CPCRI, Department of Agriculture, Fisheries, Tourism and Information and Publicity, key informants from the Island, representative of a local NGO - the Maliku Development Society, and Youth Volunteers attended this meeting. The aim of this meeting was to inform the stakeholders about the aims and objectives of the project and to introduce the volunteers to the principles of socio-economic assessment and monitoring of coral reef users.

The participants present at the meeting prepared a checklist of the important land and marine based bio-resources found on Minicoy and discussed some of the issues facing the Island environment. 14 youth volunteers (educated unemployed boys and girls) came forward to help with the data collection. Since the volunteers opted to work in pairs, 7 teams were formed and each team was given the task of collecting information on specific parameters. Mr K.G Mohammad, Mr. H.D Hassan and Mohammad Mudinge officers of the Information, Publicity and Tourism department, agreed to co-ordinate the activity within Minicoy.

The co-ordinating team then prepared a checklist of parameters and sub-parameters for data collection and a list of stakeholders and Key informants to be consulted. (Appendix 2.1)

The data collection team members were then individually trained in participatory methods of data collection and visualization techniques for representing data. A "*learning by doing"* approach was followed, in which the participants were given assignments with time limits to complete. They were free to approach the trainers to have their doubts clarified. The data collection, visualization, validation and tracking were explained through feedback both before and after the participants collected the data.

The deadline to complete data collection on the individual parameters was set for the 20th January 2003. The project supervisor consulted with the team in February, and crosschecked the data, which was then revalidated by the stakeholders.

2.2 Socio-Economic Assessment at Minicoy Island data collection

2.2.1 Data Collection

The Minicoy data collection team spent 10 weeks between December 2002 and March 2003 in carrying out the socio-economic assessments in their respective islands. They consulted with Island elders, Reef stakeholders, tourist resorts and the various government departments. Data was collected from both Secondary and Primary sources.

2.2.2 Secondary Sources

Secondary source of data include government records from the various departments.

Demographic data was collected from the Basic Statistics Handbook published by the Department of Planning and Statistics, Census operations for 2001, and the Health department from the Administrative headquarters at Kavaratti.

Fisheries landings and related information was collected from publications of the Department of fisheries, Minicoy.

Relevant legislations and Notifications for conserving coral reefs were collected from the Department of Science & Technology and Department of Environment & Forests.

Information on blasting dredging and deepening of Navigation Channels was collected from the Harbor works department.

Tourism Statistics and development plans from the department of tourism and SPORTS that is in charge of developing tourism in the Islands and the basic Statistical handbook.

Information on Marketing produce, pricing and quantity marketed was collected from records of the Co-op Society

2.2.3 Participatory tools for collecting Primary data

The Project Team made a list of all the reef related activities. The parameters were reef use pattern, resource governance, island demography, community services, market attributes,(extractive and non extractive), non-market non-use value. The sub-parameters within reef use pattern were activities related to the lagoon, such as cowry collection, tuna fishing, and net fishing in the lagoon; species of fish, their ranking in terms of abundance, tourism, and so on.

Within resource governance we included government laws and acts, traditional/ customary law and the role of Dweep Panchayat.

Community services included markets, transport, the research field stations of CPCRI and CMFRI, the Co-operative society since it provides subsidized consumer essentials, and now includes building material, in return for the coconut and copra produce of the islands. Thereby the Co-operative society also has a role in the services sector.

Once the parameters were selected, the team held focused group discussions and interviewed practitioners of various reef related activities. By doing this they were able to collect information on various related sub-parameters and parameters simultaneously (Folk taxonomy, reef governance, traditional knowledge).

The field data collection methods included:

2.2.3.1 *Inflow-Outflow Analysis:* The inflow-outflow analysis of a household or a community usually gives a chance to understand the flow of materials (and thereby the household economy) into and out of it.

2.2.3.2 *Daily Routine Analysis:* The DRA was done with a select group of women belonging to different economic backgrounds; they included educated employed, self-employed and unemployed, uneducated employed and unemployed. The DRA provides a window to the world of a community through an individual.

2.2.3.3 Semi Structured interviews with approximately thirty key informants for the reef related activities and land based activities.

2.2.3.4 *Oral histories* were collected from elderly traditional fishermen, reef gleaners and coconut tree climbers.

2.2.3.5 Two *Focused Group discussions* were carried out with each reef related activity group. The first was a preliminary discussion to learn about the activity and the second one to Validate the findings:

- Non-Minicoy Islanders activities (Jan, 2003)
- Activities of labour from Tuticorin, Tamilnadu (Jan, 2003)
- Women's Activities, Reef gleaning (Feb & May 2003)
- Traditional Fishermen (February & May 2003)
- Coconut climbers (February & May 2003)
- Socio-economic status (February 2003)
- Customary Practices (February & May 2003)

The team used a variety of Visualization Techniques during these interviews. For example, the traditional fishers were asked to identify the local fish taxonomy, locate key places and fishing spots, particular features on the map. The key informant fishers were also asked to rank fishing grounds and fish to establish their relative importance. Catch data were also used to list species according to % catch composition.

2.2.3.6 *Resource Maps*: Individual resource maps were made for each reef related activity. These maps were consolidated into a single resource map showing all the activities and their overlapping spheres. The various locations for each activity have also been ranked in order of preference. These maps provide a wealth of information on the seasonality of activities. These maps are very useful since we can easily see if more than one stakeholder is utilizing the same location and anticipate conflicts that can arise due the competition for the same resource.

2.2.3.7 *A seasonal calendar* was prepared to show the seasonality of the various activities.

2.2.3.8 *A Time line* was used to show the changes taking place on the island.

2.2.3.9 *Ranking* to show the most important and favored species and fishing grounds.

2.2.3.10 *A questionnaire survey* was used to collect information on income, sources of income and personal values regarding the reef since we were not able to assess the income structure and reef dependency on the islands through participatory methods. 200 households were surveyed on a random basis to collect this data.

Since the team members are Minicoy islanders themselves, they are very familiar with the different reef related activities, as they have participated in all of them at some time or the other of their lives. In some aspects they are also Key informants.

However by carrying out the Socio-economic assessment themselves they developed a pride in learning more about the islands and started questioning every activity with a monitoring perspective.

2.3 Data Validation and preparation of Action Plan

Village Meetings were held at 6 out of the 10 villages in Minicoy. Since only Men participated in the village meetings and there was need to ensure women's perspectives, two separate meetings were held for the women from the villages.

The team and project supervisor met together in May 2003 to finalize the report. They summarized information on each parameter and sub parameter and made some basic calculation to develop a key learning on various issues relating to resource availability and usage and management problems related to reef conservation and future participatory monitoring.

3. A Profile of the Minicoy Island

Minicoy or *Maliku* is the southernmost island in the Union Territory of Lakshadweep, formally known as the Laccadive, Minicoy and Aminidivi Islands. It lies between 8° 15' to 8° 20' N and 73° 01' to 73° 05 E with an area of 4.4 sq km including the attached islet of *Viringli* also known as small pox island. Minicoy is separated from the Maldives by the 8° or *Vangaaru* channel and the rest of Lakshadweep by the 9°channel. It is considered an independent oceanic island that does not belong to either the Maldives or the Lakshadweep bank. (Ellis: 1923) Due to its unique isolated status, the people have developed certain cultural characteristics unique to Minicoy. Table 3.1 provides some basic facts about Minicoy.

This is an atoll Island like the rest of Islands of Lakshadweep that rests on an underwater platform of about 100 fathoms deep. What we see at present depicts millennia of interaction between the submarine bank, tectonic activity and ocean building particularly in the Pleistocene period (S.Jones:1986:No 158:1). The rim of the atoll can grow only to a height, which would prevent the exposure during low tides. The islands are formed by the accumulation of coral sand in the form of a sand bar, which eventually gets stabilized with vegetation, and over the course of time gets compressed into soft sand stone. Generally the height of the land is around 1-2 m above mean sea level.

Table 3.1 Minicoy Basic Facts

Geographical Area	4.4 sq km
Land use Area	4.4 sq km
Lagoon Area	2.5 km at the widest and 15 km long
Location	8° 17" N Latitude 73° 4' E longitude
Distance 1NM=1.852 KM	Minicoy- Thurukanu Island, Maldives 59 NM Minicoy-Kalpeni Island, 114 NM Minicoy-Kavaratti Island 136 NM Minicoy-Kochi 215 NM Minicoy-Calicut 240 NM
Population 2001 Males Females Population density	9495 4616 4879 2163/sqkm
Temperature Range	Max: 35°C-38°C

3.1 Historical background

The people of Minicoy are culturally akin to the Maldives and speak the same language. They refer to their island as *Maliku* while speaking amongst themselves and call it Minicoy when speaking to outsiders. Their language is known as Mahal[2] and they use the *Thaana* script for writing.

Little is known about the history of *Maliku.* The chronicle of the Maldivian sultans informs us that Maliku was detached from their rule, as early as AD 1500. It then came under the rule of the Ali rajas of Cannanore and thereby lumped together with the *Laccadive* and *Aminidivi* group of islands. Historical sources show that, there have always been dealings in trade and even marriage relations between the Ali rajas of Cannanore and the Sultan of Maldives. Maliku has alternatively been under the dominion either of the Maldivian Sultan, the house of Ali Rajas of Cannanore or the *Mammali* (naval chieftains). Pyrad de laval in his diaries dated 1606 has recorded that Minicoy was at one time a part of the Maldivian realm. He has gone on to state that the Cannanore house controlled 30 Islands of the group and that the Ali Raja of Cannanore had married Maldivian Sultans sister. (Rammuny M: 2002:35:43). Officially it

[2] Mahal, is the short form for Mahal diwu, or Maldives. It is reported that when the British asked the people the name of their language, they answered that it was the same language as that of the Mahal diwu (Maldives). The British officer wrote down Mahl as the language of the Maldives. (Kattner, E :2002). In Maldives the language is known as Divehi.

remained under the rule of the Ali Rajas, along with the Laccadive Islands since 1767 and became a dominion of the British Empire in 1905. The Ali Rajas coveted Minicoy for two reasons:

1. It served as their strategic base even in the 15th and 16th centuries for operations against the Sultan of Maldives.
2. The Ali Rajas carried with the help of Minicoyans a thriving trade with Mauritius, the Persian Gulf, Burma and Singapore. While there is no authentic information on this the fact that even today Minicoyans remain the most sought after sailors in the country and serve even on foreign carriers, go to prove that their skill and fame has been acquired in very early times.

This is why, Adi Raja Imbichi Bibi, the last ruler in the line of the Ali Rajas, was reluctant to part with Minicoy during her negotiations with the British for Laccadives. She claimed that it could not be taken into account as common territory, since it was her private property. However in 1905 Imbichi Bibi, finally signed over Minicoy along with Laccadives to the British. (Mannandiar:1977:79). Following which it came under Indian Administration and is now a part of the Union Territory of Lakshadweep, which was earlier known as "The Laccadives, Minicoy and Aminidivi group of Islands.

Like the rest of Lakshadweep, Minicoyans also follow a matrilineal system; property inheritance is through the female line. Men are allowed only a bed to sleep in the house. Minicoy is often referred to as island of females for several reasons. Firstly the matrilineal system of property inheritance, secondly it was ruled by a woman, the bibi of the house of Arakkal and thirdly, the adult male population left the island in search of work with the merchant navy and was away for extended period of time, sometimes years at a time. Many of the folk lore of the Island, especially the "*Thaevaru"* songs revolve around the sorrow of parting from their husbands and sons and not knowing when they would be united once more. It was therefore practical for women to take decisions and administer life on the islands.

3.2 The Physical Profile:

The main physical features of Minicoy can be described as 1. Island, 2 Lagoon and 3. reef and 4. Bar area.

3.2.1 The Island: Minicoy is the southernmost island of Lakshadweep and is oriented from SW to the NE. It is shaped like a sickle or crescent moon and is almost 12 km long and has a geographical area of 4.4 sq km making it the second largest island of the Union territory. The width varies as we move from one end of the island to the other. It is one kilometer wide, at its widest part and only a 100 m wide in the Kodi area, where the eastern and western sea shore are simultaneously visible. The northern tip is called Kodi point and the Viringli Island in the southwest marks the southern boundary. The island is flat and rarely rises higher than 2 m above msl. This island is considered very fertile and supports dense vegetation. Thick growth of Pandanus, breadfruit trees, hard wood trees and trees suitable for making furniture and boats are found here. Coconut trees have been planted all over the island. The island is divided into 4 sections:

1. Bandara (South Pandaram)2. 50/60 Acres, 3. Village settlement area, and 4. Kodi (North Pandaram)

Bandara: As one proceeds from the southwest to the northeast we will traverse, scenic and shallow back waters surrounded by mangroves of two species *Ceriops tagal* and *Avicinea marina* and its associated vegetation. Many migratory sea birds can be seen in this area. This area is far from the main village and relatively secluded. A 20 bedded tourist complex and helipad has been built on the land adjacent to this Mangrove site.

Figure 3.1 The Formation Of Minicoy Island

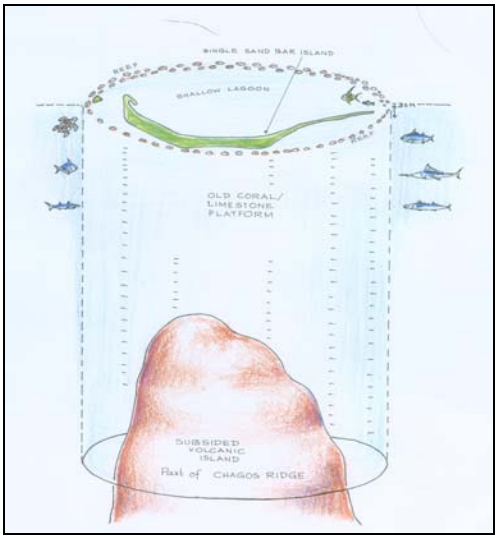
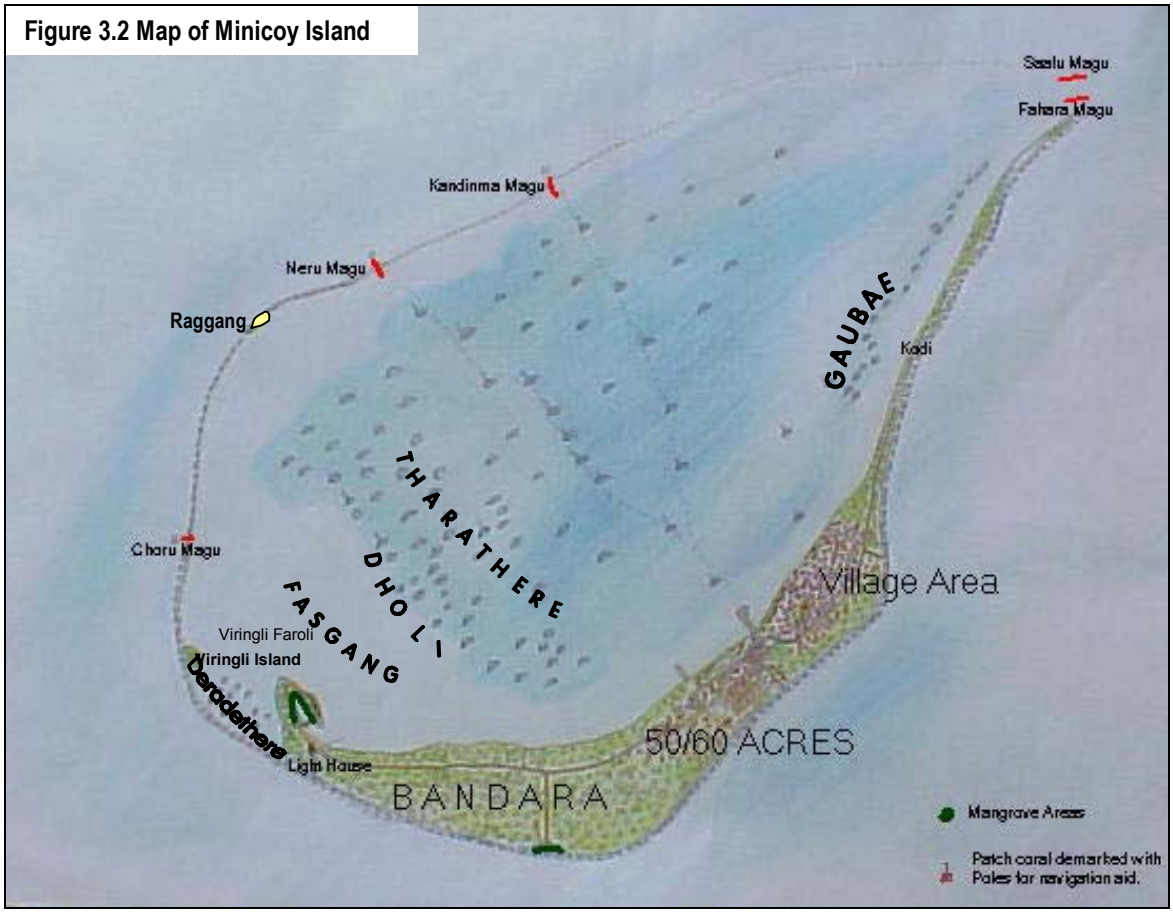


Figure 3.2 Map of Minicoy Island



The famous Minicoy lighthouse built in 1885 is located on the eastern shore close to the helipad. These lands are known as pandaram lands and were distributed amongst the people belonging to the 10 *avahs* or villages in the 1970's. The Bandara lands once densely covered with vegetation, are being cleared since the 1990's. One can still see remnants of the dense screw pine jungle, the dominant species and related flora such as *Scaeveola koenjii,* wild almond etc. Ten concrete roads demarcating each avah's bandara land, now run from west to east joining the eastern shore to the main arterial road of Minicoy.

A second patch of Mangrove of a single species called *Brugeria cylindrica* is located in a 1 ha area close to well number 3. Since 1998, this patch is approachable by a concrete road that runs through it and disturbs the ecological balance.

50/60 Acres: As one move further north one can see a number of government departments such as the harbor works followed by a dairy unit and the Central Plantation Crops Research Institute, Regional Station. There is a burial ground, followed by the Naval detachment, and a housing area for the government servants on deputation to Minicoy. The Navodya Vidyalaya, and a sports stadium are also located here. On the left hand side are the administrative head quarters, canning factory, the Dweep Panchayat office and the Passenger Jetty.

The village area: The island is densely populated in the central region. There are 10 villages in this center each of which has its own harbors for a boat-landing site on the western side. So closely are all the houses packed together that it is difficult to note the boundary of each village. The villages are, *Bada, Aoumagu, Boduathri, Rammedu, Sedivalu, Aloodi, Funhilol, Kudehi, Falessery and Kendiparti*. Each of these villages has a beautiful village house, owned by the people of the village and used for hosting village functions and gatherings. Kendiparti is the last village of Minicoy and the land beyond is uninhabited.

Kodi: This is a narrow stretch of land extending 3 km. It is named North Pandaram by the administration and it lies north of the Kendiparti village. The area experiences very strong winds and therefore the vegetation is not very thick in this area. In the olden days the people used to segregate lepers and the contagiously ill. Lepers were housed in the northern end of the island and the area is named Kodi after them.

Viringli Island: Viringli is an attached islet and lies in the south-west. The people who suffered from small pox were housed in Viringli, hence it is also known as small pox island. It is densely covered with vegetation of coconut trees and screw pines and shrubs. It is attached to the main island by the shallow reef that gets exposed during low tide known as dheraddethéré. Viringli was originally the property of the Juma Masjid and was looked after by the 10 villages in turn for one year at a time. It was taken over by the Indian Government and is now under control of the Indian Navy.

3.2.2 The lagoon and Reef

A beautiful and large lagoon extends on the western side of the island. It is 2.5 km at its widest point east to west and around 15 km in length from North to south. The reef that encircles the lagoon is very strong and exposed during low tide in the southwest up to Neru magu. From *Neru magu* to *Kodi* point the reef is weaker and not exposed even during low tide. The reef has 5 natural entrances locally known as *magu* from where sailing vessels and boats can enter the lagoon.

- *Saalu magu*: located in the NW, serves as the main passage for cargo vessels (manjus & sailing odis). A permanent buoy shows this entrance
- *Fahara magu*: the entrance is also from the NW close to the *Saalu magu*.
- *Kandinma magu*: The entrance is in the west almost to the center of the reef.

- *Neru magu*: This entrance lies to the south of Kandima magu. The Navigational channel merges with the Kandima magu channel at a point. Fishing boats uses this entrance to reach their fishing grounds. The Passenger ship anchors close to the entrance and it serves as the main passage for boats plying between the passenger ships and jetty.
- *Fochan Choru magu*: This is the southern most entrance and is shallower than the other entrances. It is very rarely used because of the danger involved. Choru means thief, and this entrance got its name since once a boat left the island stealthily via this entrance.

During the high tide water exchange takes place between the lagoon and the open sea over the reef. The entrances also serve as water exchange points and as channels for the migratory fish to enter the lagoon.

The lagoon is of varying depth and has distinct physical features. The southwestern part is the shallowest part and supports a coral growth area and sea grass beds. The lagoon is deepest in the center and big boulders called *Uthuru bella, dhekunu bella,* and *medhu bella*, are found along the northwestern shore of the island. Extensive sea grass beds occur on the landward side.

The people describe all these features with different terms.

- **Dheraddethéré:** This is the reef flat, which connects Viringli with Minicoy. This reef flat continues upto the sand bank Raggan. The reef is strongest here and weakens as one moves north beyond *Neru magu*. This is also the reef flat which protects the island from the force of the strong southwest monsoon winds. Islanders can still remember that during their childhood, coral boulders and acropora densely colonized this area so that it was very difficult to walk between the islands without getting scratched by the acropora branches. Today all the branching coral (muraka) is dead and one can run to Viringli.
- **Raggan:** is a sand bank located at the south west of the reef. It is very small in size and the villagers sometimes hold their annual picnic called *ragandadhān* here. The lagoon on this side is popular amongst the net fishers.
- **Faroli:** is a sand bank exposed during the low tide. There are two faroli's in the lagoon. One extends from Viringli island into the lagoon and the other is in the fasgun area. This area is very popular amongst the net fishers.
- **Fasgun:** is a shallow and sandy area found within the lagoon interspersed with sea grass beds and located in the southwest close to the thundi point and beach resort. The islanders use this area to hunt for *vembolu to use as bait. Vembolu* are long white tape like worms measuring 9"-12 " in length and they burrow into the sand. The Fypad type of fishing is popular in this area.
- **Tharāthére:** is the area in the lagoon filled with massive coral boulders. This area lies next to the fasgun and the line that marks the separation between fasgan and Tharāthére is called Dholi. This area has been a popular spot for collecting boulder coral for the construction of bunds.

3.2.3 Bar area

The Bar area locally known a berumathi is the reef area that slopes to the deep sea. It is around 200 m wide and encircles the island. There is a great diversity of species of corals and fish found in this area and the reef fishers, bait collectors and harpooning experts favor this area. The reef fringes the island on the eastern side and so the bar area lies close to the island and is used for fishing during the monsoon.

3.2.4 The ocean

The oceans are abundant with tuna. The tuna shoals follow currents and are found in different fishing grounds associated with these currents. The tuna fishermen fish in a radius of 25 km around the island.

3.3 Climate

Minicoy has a tropical humid, warm and generally pleasant climate. The temperature starts rising in February and reaches its peak in April-May. The average temperature of Lakshadweep ranges from 24°C to 31° C. The air is humid throughout the year and the relative humidity is approximately 70-75%. The islanders divide the climate into two seasons: The fair season and the monsoon season.

Fair season

The fair season lasts from October to April. The seas are calm and the tuna shoals move towards these islands. Skies are clear and temperatures warm (30°C). There is very little rainfall. These six months are the most important period of the islanders life and the island economy. Everything happens in the fair season. It is as if everyone wakes up from the long monsoon slumber and the islands are a hive of activity. Children can be seen playing and swimming in the lagoon. Fishermen rise early in the morning before dawn and go out to fish. Fishing trips can last as long as 14 hours. Copra and fish are seen drying in all the available spaces throughout the island.

The main activities in the fair season are: Deep sea tuna fishing; Fish processing, drying fish and copra, and Construction work

Monsoon Season

The monsoon season lasts from May-September. Very little productive activity can be observed in the islands in this season. It rains most of the time and the islanders remain indoors. They gossip, rest, pray, watch TV and go about the daily round of activities of domestic work and child care. The monsoon season is a very difficult time for the islanders and it is the time they feel their isolation the most. Bad weather can result in the cancellation of ship services. Very little fresh food is available in the islands. Fishing is restricted to the lagoon and on the eastern side with the help of small country crafts. The catch is limited.

3.4 The village and social profile

The Basic communal unit is the household presided over by a senior woman. The households are grouped into villages called *Avah,* wrongly reported *as athiri* in the Lakshadweep Gazeteer *(Mannadiar: 1977)*. *Athiri* is simply the western beach and boat-landing site of each village. Currently, there are ten *Avah* in the island and each one has their own symbolic colour. These are in the order of location: 1.Bada (white), 2. Aoumagu (blue), 3. Boduathiri (yellow), 4. Rammedu (Yellow), 5. .Sedivalu (white), 6. Aloadi, 7. Funhilolu (Yellow), 8. Kudehi (white), 9.Falessery (red), 10. Kendifaaty.

The Avah, is an economically active unit and raises its own income by carrying on tuna fishing and coconut cultivation. The village owns its own tuna fishing boat, country crafts, land and coconut trees. Common feasts are conducted at the village house during the celebration of Eid and other festive occasions. Every fit person belonging to the *avah* is expected to contribute labor towards carrying out the *avah's* economic and other activities. This communal sharing of duties is known in literature as the *baemedu* system. There is division of labor amongst the villagers, which ensures smooth functioning of the villages. There are peer groups of girls and boys of the same age called *Vili*, and each age/gender group is assigned specific functions.

Plate 3.1 The Village House – Avarhugè

The Avarhugè is the pride of the village. It serves as a place for village members to assemble and discuss their duties. Today it also serves, as a multipurpose hall for any kind of gathering from clubs to study centers.

The Avarhugè and Varhangè are unique to Minicoy in Laksadweep

Plate 3.2 The Village House for Ladies – Varhangè

The Varhangè is used as a place where the women assemble together for common tasks such as coir twisting, mas making. In the past lava dance was performed here, during the celebration of Eid. Today only two villages have a Varhangè.

Plate 3.3 Launching of the Jahādhoni.

The Bada village jahādoni (race-boat) named Victor, launched in May 2003, has been built, decorated and launched with labour contributed from Bada village under the *baemedu* system.

Two *Bodukāka* (headman) and two *Bodudātha* (headwoman) administer each *avah*. The first *Bodukāka* looks after internal matters and the second looks after external affairs. They also administer all the male duties such as hauling the boats onshore, fishing, collection of boulders for safe guarding and marking the boundary of the village *athiri*. Similarly the *Bodudātha,* administer all the female duties and are in charge of keeping the village area clean, preparing the village feasts, carrying out all the post harvest tuna work, preparing copra, coir rope making etc. The female duties were carried out in a female village house called *Varhange* and the males had their own space in a common house called *Avarhuge*.

The village assembly is called *baemedu* and an island assembly of all the villages is called *Havaru*. The village head can calls *the baemadu*, but only the *Veringh* could demand an havaruh. An announcement would be made for the islanders to gather together. The gathering could be called for any purpose from hauling or launching of an Odi (*sailing ship*) or announcing an accident/death or to discuss a matter of common concern.

3.5 Community services

(a) Drinking Water: In 1991, the PWD of Minicoy has set up a reverse osmosis plant to supply drinking water to the island. This plant has a capacity of making 50,000 liters of water per day. They are however able to supply 14,400 l/day. The plant is unable to meet the fresh water demand of the entire island and restricts itself to supplying drinking water to the government staff quarters located on 50-60 acres area. Around 50 people collect the water in jerry cans and a variety of containers on a daily basis. Piped water supply is available at 3- 4 water points along CKB road.

Laboratory: A drinking water testing Laboratory was set up on 1987. They take a 10 ml sample of water from 15 houses per day for testing water quality. The laboratory reports that some of the fresh water sources are contaminated and contain a high bacterial count and high percentage of calcium. Therefore they are not suitable for drinking. The contaminated water is mainly found to the east of *Leonu magu* (ie, CKB Road).

(b) Educational Institutions: Formal education started in 1947 with a single teacher school. Today there are 5 government schools including a central government boarding school called Navodya Vidyala and 1 privately run kindergarten. All the schools provide physical education, library and science laboratory for the students. The medium of instruction is English and Malayalam.

Table 3.2 No of Educational Establishments

School	Medium of instruction	Pupil stregnth				Mahl as 2nd lang. Pupils
		Tot	M	F	staff	
Govt. High School 6-12 std (1966-67)	Maly & Eng.	1112	559	426	61	-
Govt Junior basic school 1-5 Std	Malayalam English	318 432	129 261	189 171	29	400
Govt Senior Basic school 1-7 Std	English	467	282	185	25	239
Govt Nursery school (1966-67) 4-6 yrs	Malayalam	239	84	91	6	-
Jawahar Navodya Vidyalaya (1998) CBSE (6-12 std.)	English	187	117	70	28	-
Balavadi for pre KG	Malayalam/ Mahl	50	-	-	2	-
Pvt kindergarten	English/Mahl	84	48	36	7	-

Religious Education: is provided by 4 Madarasas. Three were set up in 1947 to provide education to the children. The Madrasa, located in 50 acres is under the control of the other Islanders. There are 5 teachers called "Moulavies" who teach Arabic, Koran, Mahal, Urdu and Bikh (Dhee-Niyath)

(e) *Religious services:* Twenty three mosques scattered all over the Island, provide an easily accessible place of worship. The Friday (Juma) and Eid prayers are performed in two mosques called Juma Masjid. On Fridays the fishermen can go fishing only after attending the Juma prayers. The religious heads for each mosque is called "Kateeb". He maintains birth and death registers; performs marriages and divorce and offers counseling on all legal matters relating to divorce and property according to shariat. His role includes giving advice to the people during Juma and Eid prayer called (Kutuba). The kateeb has a staff of six. Three females to keep the surroundings clean and wash the dead bodies of women and three men who take care of the funeral rites.*Health services:* The Minicoy Government hospital was inaugurated in 1962. It has a staff of 32 including 3 doctors. It has an X-Ray unit, dental unit, operation theatre, blood testing facility, aids tridot test, ultra sound, ayurvedic dispensary. There is a 20-bed ward with a separate female and male section. Minor operations are carried out here and for major cases the patient is evacuated to mainland by helicopter. Infants are provided immunization and pregnant women given regular check ups. The Medical Health Centre also runs awareness programs for preventable disease likes AIDS, Malaria and focus on cleanliness of surroundings by spraying insecticide for controlling flies and mosquitoes.

(f) *Care for Elderly and children:* The Social Welfare Board department and the social justice empowerment Minicoy Unit are two formalized care Institutions in the Island. The Social justice empowerment Minicoy unit set up an Anganvadi (crèche) in 1979. Every village has an anganvadi with one teacher and helper. They provide nutrition to the children and pregnant women and conduct health awareness programs in conjunction with the hospital. The Board was set up on 26 January 1989 and runs a *balvadi* (pre school) for children in the age group of 2.5 – 6 years from 9-5:00 pm and provides noon meals for the children

Elderly: There are no formal care centers for the elderly. The joint family system provides the safety net for elderly, handicapped and unemployed members. Traditionally women provide this care.

(g) *Sewage:* Lakshadweep public works dept has provided sewage facility to 264 administration cottages 49 other department cottages and 10 villages, almost all the houses in Minicoy have toilets connected to double compartment septic tanks. The waste from these septic tanks is buried in the athiris. A direct sewage pipe from canning factory discharges waste into the lagoon.

(h) *Electricity:* Minicoy received electric power in September 1962. There are six generators with a capacity to generate 1800 KW each from diesel and solar PV. The diesel is stored in barrels kept on the ground. Spillage has lead to groundwater and land pollution.

(i) *Marketing:* The Minicoy Island co-operative Supply and Marketing Society Ltd was first set up in 1962, to facilitate the Islanders by supplying the essential cereals and other important commodities including cooking gas cylinders. They maintain a stock of 1214 gas cylinders and distribute 700 cylinders to the houses per month. Building materials such as jelly, cement, bricks, blocks Iron rods and river sand are also available. The society provides a marketing service to the members by buying their copra and *hikimas* and selling it in Beypore and the Mangalore. The Co-operative society has branches located in Kudehi and Fallessary village and has separate sections for supplying stationary, cloth and ration.

There are around 42 privately owned stores in Minicoy, These include 3 photo studios and 5 photo-copying facilities and 20.multi purpose shops that sell goods such as groceries, provisions, and consumer goods.

(j) *Ration Card:* Currently around 1620 ration carts are circulating in this Island. Ration card holders can purchase kerosene, rice and sugar at a controlled price. Special cards are provided for to the navy (8), boat owners (106), Village house and mosque (29), bakery and tea shops (17).

(k) *Post and Telegraph Office*: A telegram office was established in 1941, followed by a post office in 1958. This building was re-constructed as a model post office in 1993, 18 July. The working hours 9.00 am to 5 pm and they have four full time staff.

(l) *Bank:* The Syndicate bank set up on 1971 is the only bank in Minicoy. In December 2002 there were a total of 6957 deposits which include 898 NRE accounts. The bank provides loans for house construction and businesses. 293 people have availed loans that range between Rs 25,000 to Rs 100,000. The total outstanding Accounts are 20 crores, out of which 8 crore are NRE accounts. The bank does not have a foreign exchange section in Minicoy and while it accepts foreign remittances it cannot change currencies. Around twenty one million rupees are converted from US $ remittances every year. The bank operates from 9.30 am to 1.30 pm on weekdays and 9.30 to 11.30 on Saturday.

(m) *Work shops:* There are four-bicycle and five motorcycle privately run repair shops, five T.V and fridge repair shops. Three saw mills, two furniture-making units.

(n) *Hospitality- Restaurants:* There are two privately owned canteens to provide meals for the non-minicoyan population. Hotel Abu was started on 1958 and Nishad was set up in 1988. They have 40-50 customers on a daily basis and 200 floating customers. There is one ice cream parlor and a bakery. The Women's self help group runs an appamwaadi center which makes and sells short eats. There is a two-bed room lodge near the high school and another lodge near the Hospital.

(o) *Press:* A Government run Mahl printing press was started on 11th april,1982 . They also do book binding and print office stationary, forms and bill books in Malayalam, Mahl and english.

(p) *Canning Factory:* The Tuna Canning Factory was set up on December 1969 with 25 staff. They buy tuna from the fishermen at the rate of Rs. 21/kg. Payment is settled within 3 weeks of receiving the tuna. They have a capacity to collect 2 tons of tuna and Can 500 Kg / day. Freezing facility was set up on 2001 and 1.5 tonnes of tuna can be frozen. These are sold in the mainland and transported by M.V. Amindivi and M.V. Minicoy to Kochi for further processing and export by the LDCL.

(q) *Meterological station*: A Meteorological station established in 1891. The Indian meteorological department took it over in 1951 and upgraded it to class I observatory in 1963. They collect data from surface observation & pilot balloon observation, radio sound/radio wind observation, radiation unit (solar radition and air pollution and seismographic data

(r) *Fire station:* There is a fire station with a single fire engine located close to the canning factory. While the fire fighting facility has been available since 1985, the building for the station was constructed in 2001.

(s) *Communications: Telephone:* The MAX exchange was established in 1973 and gradually upgraded. The exchange has a capacity of 1400 and 1375 connection are made. There is a waiting list of subscribers. There are 12 PCO on the island from where people can pay and make long distance phone calls. Internet facility is only available in a few Govt departments such as the Naval, Sattelite and Telephone and is only used for official purpose. It is possible to have private home connections but no one has it since the connectivity is through Kerala. It is therefore expensive and

unreliable. Fax services are both owned by private shops and Government offices. Telegram facility is only available at the Post and telegraph department.

*Ship shore radio***:** This facility is only available at the port-tower and was set up on 15th Nov,1995. The main facilities available are V.H.F, SSB radio and fax service. The functioning time is 6 am to 10 pm. All the passenger and cargo vessels have VHF radios and can contact the towers. The tuna fishing boats do not have this facility. There are 7 staff working on shifts at the tower.

(t) *Transportation*

- *Marine Transportation:* The port department set up in 1980, manages the marine transportation. There are 4 passenger cum cargo ships that serve Minicoy and connect it with mainland and other island once a week during the fair season (Sep-April). The ships are MV Bharath Seema, MV Tipu Sultan, MV Minicoy and MV Aminidivi. Only 2 ships MV Tipu Sultan and Bharat Seema operate during the Monsoon.

  There are 2 privately owned cargo carrying sailing vessels called odi, which carry cargo from Beypore and Mangalore to Minicoy during fair season.

  The Shipping Corporation of India also manages one oil barge and two cargo barges to bring cargo to the Islands. These barges only transport Government cargo, which includes provisions, stationeries, furniture, fuel, and construction materials such as: bricks, sand, jelly.

  Light House: built by the British in 1885 is the oldest monument in Minicoy. It has a height of 49.5 m and a range of 40NM.

- *Air Service:* There is no airstrip in Minicoy and only a Helipad. The Helicopter is stationed at Kavaratti and operates once a week to Minicoy from Kochi during the monsoon. It is also sent to Minicoy during emergencies and serves as an ambulance for carrying patients to Kavaratti or Kochi.

- *Road Transport:* There are two concrete roads that serve Minicoy. They link the island from South to old Navodya school location in the north. Ten feeder roads running from west to east have been constructed in the Bandara area. The roads demarcate each village's bandara land. They have been built to assist villagers to collect shingle and sand from the eastern shore and also collect firewood from their lands. The total length of the concrete roads and footpath is 20.27 km.

  Motorcycles, scooter and bicycle are the common modes of transport in the island. The school children bicycle to school. Tillers and autorickshaws are used for transporting firewood, boulder, shingle, sand and other goods. There are 907 two wheelers (motorcyles) 193 three wheelers includes Autoricksha-180, pick up Van and department vehicles and 92 four wheelers which includes, Jeeps, tractors, tiller, tempo, Maruthi van and car.

3.5 Research support

CMFRI: The Central Marine Fisheries research Institute established its field research unit at Minicoy in 1956, with a mandate to study the marine resources of Lakshadweep.

- Conduct research on the fishery and resource characteristic of tuna and tuna live baits and assessment of the stock needed to maintain fishery of the maximum sustainable yield level. A tuna landings survey was started in 1956.
- Conduct research on breeding rearing and sea ranching of important tuna live baits and marine ornamental fishes.

- Monitor environmental and hydrographic parameters in relations to fisheries.
- Conduct training programs in marine fisheries and mari-culture.
- Implementation of NATP Programme for augmentation of Marine fish production in Lakshadweep

CPCRI: The Central Plantation Crops Research Institute, Regional station, Lakshadweep previously known as ICAR Research complex for Lakshadweep was established at Minicoy Island in 1976 under the over all administrative control of the Indian council of Agriculture Research (ICAR). The mandate of the station is:

1. To develop location - specific technologies for increasing productivity of coconut and other existing crops in Lakshadweep Islands.
2. To undertake studies on soil conservation, soil restructuring, anti-sea erosion and rain water harvesting methods.
3. To develop suitable backyard system of poultry, dairy farming and to undertake transfer of technology programs including training of farmers and agricultural department officials.
4. Plant protection: Work on biological control of rhinoceros beetle is being monitored. The work is being expanded to other Islands also.
5. Transfer of technology: Realising the importance of transfer of technology for improving the agricultural productivity in the Islands, the extension efforts are being strengthened. Farmer's visit to experimental plots is encouraged and “visit centered programmes" are organized. Kisan mela organized during November, 2000 received encouraging response for Island farmers and farm women. Hybridization between Lakshadweep ordinary and Dwarf palms (Green and yellow) and their reciprocals is being carried out for producing T x D and Dx T hybrids for distribution among the farmers in the Islands

The station has an experimental farm in an area of five hectares; they experiment with spacing of all varieties of coconut and yield, evaluate local cocnut varieties and coconut hybrids released from CPCRI, Kasargod. They also demonstrate inter cropping with different vegetables and fruit crops. Papaya and nendram variety of banana are found suitable and among vegetables chilli, Brinjal, Snakegoured, Ash grourd and Amaranthus were found to be promising.

3.7 Tourism Infrastructure

Tourism is still at its infancy in Minicoy. The tourist season is from October-April. The tourists can opt between a three-day minicoy packages or the 3 islands cruise package. A, 20 bed tourist resort with modern comfort and air conditioning is run by SPORTS. This resort was built in 1998, day tourist have been coming to Minicoy since 1982. There are also three privately owned tourist huts. Water sports offered are boating, glass bottom boat, snorkeling and swimming in the lagoon. Tourists are also taken to the Village to have a taste of Minicoy culture. There are no scuba diving facilities.

The tourist can entail the weekly ship service from Kochi to Minicoy. The direct ship journey takes 16 hours. The M.V. Aminidivi and M.V Minicoy do not have sleeping cabins. The M.V Tipu Sultan is a very old ship and even the first class cabins are not very clean.

Chapter 4: Inventory, Dependencies & Status of the Marine Bioresources

Ever since the Island was inhabited, the people made use of the bio-resources available for their survival and economic livelihood. Coral reefs provide the basis of life in Minicoy, for the very island they live on is built up of corals. The island conditions have given rise to distinct types of flora; the reef around the lagoon protects the island from storm waves. One can safely say that but for the corals, life in Minicoy, as we know it now would not have existed.

The Minicoyan economy currently depends on tuna fishing, coconut cultivation and employment on ships. However bio-resources gathered from nature supplement this cash economy. Building materials are gathered from the reef and other valued resources are cowries, baitfish, reef fish, octopus, ornamental shells and turtles (in the past) from the lagoon area. The vegetation on the land is also used and the trees are used for timber, making boats, furniture etc. The bio-resources and their use has given rise to specific customary laws with regard to resource use, songs, stories and games that are uniquely Minicoyan. This chapter will describe, the dependencies on the resource, activities related to harvesting the resource and the current status of the bio-resource.

Figure 4.1 presents the resource map of the different kinds of reef related activities and Figure 4.2 presents the seasonal calendar and the gender involved for various reef related activities. The seasonal calendar and resource maps were prepared during a focused group discussion with stakeholders presently involved in these activities at Minicoy.

4.1 Reef Related activities

4.1.1 Coral Boulders, Shingle and Sand

Coral boulders, shingle and sand are collected for construction of houses, buildings, walls, lining tanks and making lateral breakwater bunds known as *thorhi/thoshi* to denote and protect the village beach and landing site called *athiri.* This system of each village called *Avah* with its own designated *athiri* is very specific to Minicoy culture and is not found anywhere else in the Lakshadweep.

Boulder collection

Boulders are big and small massive corals. Boulder coral serves as a ground for the coral planuelae to settle and new colonies to form within the lagoon or on the continental shelf of the island. Removal of coral boulder from the lagoon only results in a sand bottom and destroys the habitat for new coral growth to take place and also destroys the habitat for a number of coral associated species such as sponges, anemones and associated fish, eels etc. The boulders are identified by the type, size and purpose for which they are used. They are distinguished as *hiri* and *onahiri.* Both are used for the same purpose to construct breakwaters. Hiri are also used for lining village bathing tanks and are sometimes cut into slabs to make grave stones, Kaburu..

Collection of boulders was a village activity conducted just before the onset of the monsoon. The boulders were used for making break waters along the village's athiri. Sometimes individual house-owners along the western shore also built breakwaters in front of their house to save their homes from erosion. Individuals, had to get permission from the *bodukaka* of the village to build a break water to protect their home.

Figure 4.1 Resource Activity Map for Minicoy Island

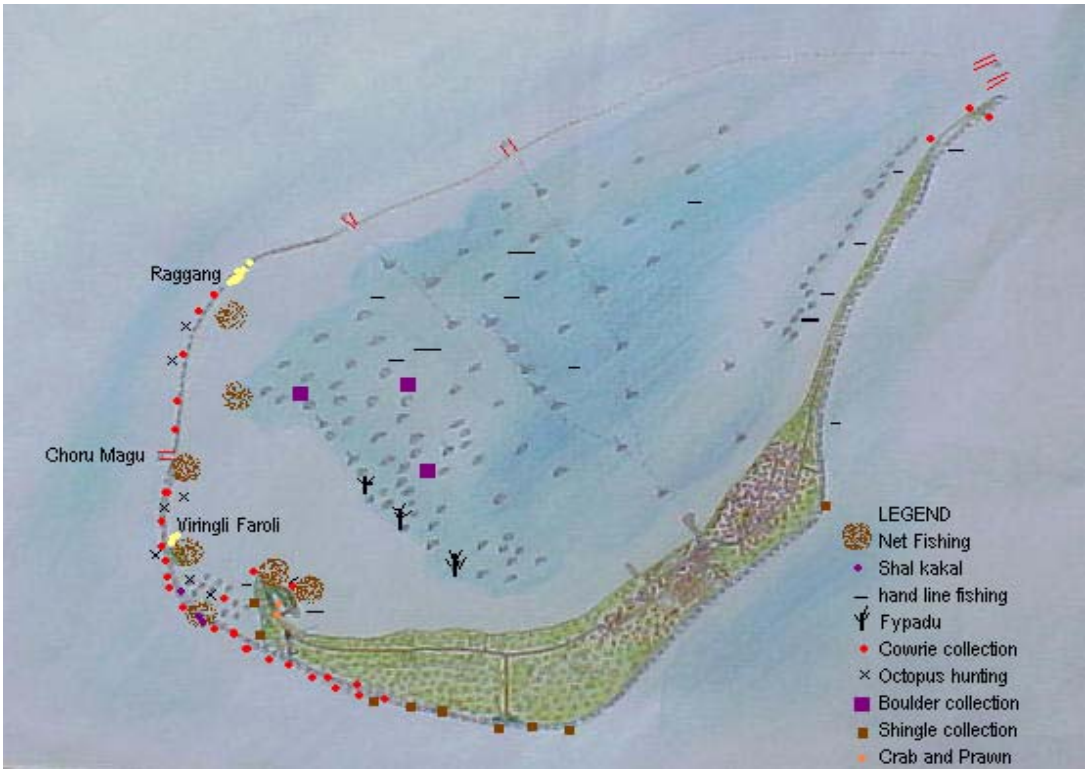


Figure 4.2 Seasonal Calendar for Reef related Activities

Weather condition	**Stormy**		**Wet**			**Calm Season**					**Hot**	
Activity	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Cowry collection					♀♀♂♀♂♀♂♀♂♀♂♂♀♂♀♀♂♀♂♀♂♀♀♂♀♀♂♀♀♂♀							
Boulder collection					♂ ♂							
Shingle & Sand					♂ ♂							
Octopus hunting	♂♂		♂ ♂ ♂ ♂ ♂		♂ ♂							
Cast Netting	♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂					♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂					♂	
Netting(Shal kakal)	♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂					♂ ♂ ♂ ♂			♂ ♂ ♂ ♂ ♂ ♂			
Shore Hand line	♂ ♂ ♂ ♂ ♂ ♂		♂♂♂									
Boat hand line	♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂♂								♂♂♂♂♂♂♂♂♂♂♂♂♂			
Crab and Prawn	♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂ ♂								♂♂♂♂♂♂♂♂♂♂♂♂♂			
Pole & line Tuna						♂♂♂						
Snorkelling						♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂ ♀ ♂						
Source: Focus group discussion with stakeholders December 2002 & May 2003												

Technique: Groups of village people called *baemedu*, specialized in the act of collecting boulders conduct this activity during low tide. They use rowboats that are 30-32' in length and can hold 1.5 - 2 tonnes of material. 5-6 boats would go together. They, haul the boulders into the boat with the help of iron bars and ropes. In Minicoy 50-60 people are engaged in collecting boulders.
Collection area: The most mentioned site is the *tharāthére* area. There is customary prohibition to collect it from the main reef ie. from *Viringili* to *Raggan* since weakening the reef would subject the island to wave action and sea-erosion during the south west monsoon. Boulder collection was at its peak in the 1960's but seeing the adverse effect on the marine life especially bait fish it has now decreased. Boulder collection was carried out as a regulated activity and only by permission of the *bodukaka.*.
Status: It is now an activity prohibited by the Lakshadweep administration and the Ministry of Environment, GoI. The people agree with this prohibition since they have noted the disappearance of a particular type of bait fish called *Nila Mehi* which is associated with branching and massive coral and removal of these causes destruction of fish habitat and reduction in number of the fishes too. It also leads to shore erosion.

Shingle Collection:

Shingles are big and small pieces of massive coral, giant clam shells, washed ashore and found on storm beaches of every island. The large shingle is called *gao* and the small pieces *akiri*. Shingles are identified by their size and shape. The small sized ones (*akiri*) are used for making overhead concrete slabs and the bigger one for concrete flooring (*mula gao, bodu akiri*). Shingle is mixed with cement in the ratio 4:1. One bag of *akiri* (30 Kg) costs Rs. 15/. 1400-1500 bags of *akiri* are required for the construction of a small double storied building.

1) *Fathi gau:* also called *rāna gau* are flat and elongated pieces of eroded coral of similar size. They are used for making walls. They vary in size from 6 –12 inches. They are mainly collected from the eastern beach along the village pandaram land.
2) *Mula gau:* These also 6-12" in length but are uneven and odd shaped They are used for filling the building foundation during construction.
3) *Kudi akiri:* are shingle less than 2" in size and are used for filling up spaces between the bigger shingles both in wall construction and for leveling out the foundation.
4) *Saralu akiri:* these are slightly bigger pieces of shingle less than 6" in size and are used for making lime.
5) *White akiri gao*: these are about the size and shape of a pebble, with a flower pattern on the surface. This *akiri* is collected by the *rukurā* tapping raveri families to make *hakuru* or palm jaggery. Apparently the addition of the lime in the *rukurā* gives it a clear and transparent appearance and does not let the liquid congeal. These *akiri* can be reused until they become smooth and flower pattern on the surface disappears.

Shingle is collected from the beaches and is found in greater quantities on the eastern side and in lesser amounts on the western side. The collection of shingles is also a group activity in which men are involved. Children may also join in this. The group goes to the beach in tillers,armed with spades and empty cement bags. They gather the shingles in heaps with the spades and fill into the bags and place in the vehicle.

Plate4.1: A Thorhi –break water bund

Plate 4.3. A wall made up with fāthigou and Rāna gau in Fallesery Village , Eastern sea shore.

Plate 4.3 Coral shingle used for building walls.

TABLE 4.1: REQUIREMENT FOR CONSTRUCTING A SINGLE STORY HOUSE 9.6M X 10.3 M = 110.44 M²

No	Materials	Area	Season	people involved	Quantity	Price (Rs./bag)	No of units
1	Mula gao	Athiri & Furuvah	Aug-Mar	Male & children	500 gm/piece	-	2000
2	Fāthi gao				250 gm/piece		6000
3	Akiri				15-18 kg/bag	Rs15/bag	1000 bags
4	Veli				18-20 kg/bag	Rs10/-	2000 bags

Status: The ban imposed by the Department of Environment on shingle collection has affected the supply of shingles. People collect shingles now for repairing and maintenance of the building. In place of shingle they use small granite stones called "jelly" which are transported from Mangalore or Beypore.

Sand Collection

Sand collection is a necessity for house construction. Three types of sands can be distinguished by their texture.

1) *Karhiveli*: This is very coarse sand and is used for filling and leveling the foundation of the house. They are also put in wells for filtering the water.
2) *Rālu veli:* This is a medium coarse sand used for leveling and smoothening surfaces.
3) *Himung veli:* this is very fine sand and is used for finishing surfaces such as plastering the walls and floors etc.

Sand collection involves 5 - 20 people depending on the quantity needed. Men and children are involved in the process. The team carries empty cement sacks, pieces of torn bags and spades. They reach the site of collection by tillers, auto pickup vans or tempos. The sand is collected first into the torn pieces of bags, which are laid, on the ground. This is then carried and filled into the cement bags that are loaded in the vehicles and transported to the construction site.

In Minicoy, the sand is usually collected from the beaches on the western side. The village bodukaka (head man) controls the collection of sand from the eastern side beaches called furuvah and the pandaram area.

Shingle and sand collection is permitted only in fair season from Aug-March. One bag of sand weighs 30-35 kg and costs Rs. 10/-. 1000-1500 bags are required for the construction of a double- storied building with 2 bedrooms, kitchen and a small balcony. The sand is mixed with cement in the ratio 1:5 (1 part of cement to 5 parts of sand). This ratio is only used for making walls. The ratio for making concrete is 1:1.

Currently the collection of sand has become tedious because it requires not only the Moopan's permission but also permit from the Department of Environment and Forests. The use of coral sand for house construction is now limited and people use river sand brought from the mainland (Beypore/Mangalore) in privately owned sailing vessels.

4.1.2 Cowry and shells

The reefs around Minicoy are rich in cowries and other ornamental shells that have been collected since time immemorial for their beauty and monetary value. The money cowry was very desirable in the Middle Ages since it was used as money for transactions. Wars have been fought to control the cowry trade in the past. Now these cowries are either a collector's item or used for decorations or counters for board games, or purchased as curios by the tourists. Table 4.2 provides a list of cowry and shells collected on the island and the local perceptions with regard to availability.

TABLE 4. 2 REEF GLEANING SHELLS COLLECTED AND THEIR HABITAT

Mahl name	Scientific name	Description	Cost/value	Habitat/ behaviour	Availability perceptions
Bodu boli (big cowry)					
Kiru boli	C. mappa	Light and reddish	*Rs 20-50 / piece* Given as gifts to visitors. Rarely sold.	Big size in reef area and small in sandy area. They are found in pairs throughout the reef area in deep water from raggan to viringli torhzi, and tara-tare. *Dhala boli* comes out at night in sea grass area. It is lighter than *hudu boli* though they look alike.	Fairly easy to find but numbers have reduced.
Hudu/faru boli /dhāla bodu boli	Cypraea tigris*	Dark with spots			
Kanbayan boli	C. arabica*	Medium sized			
Adun boli or bolu ala boli	*Cypraea talpa/ Talpana falpa	Dark brown around the edge and bottom and has brown stripes on surface.	Used for smooth-ening the embroi-dery called *bou ala* on the tradition-al minicoy dress.		
Kudi boli (Small cowry)					
Kudi boli Dhāla boli Mahtha boli Rihakuru boli	Cypraea moneta*	All are more or less similar in shape and size. Kudi boli is creamish. Dala and mata are yellowish. Mata is the smallest size. Rihakuru is slightly darker and hs an orange ring around the surface.	**Rs85 / kg,** Mata is used as counters for playing a board game *mata gondi*. Kudi boil is also used for making floral patterns on the floor of the Varange.	Reef area, Thoshi Sea grass beds (fasgan). Kudi boli is considered the original. It is heavy and found in reef area. The other look like kudi but are lighter and are found on sea grass beds.	Fairly easy to find them. Though availability is less than before.
Kalu boli	Cypraea caput serpentis*	Dark brown with spots	*Rs 2 for 3 pieces*	Outer part of reef, Thoshi	Fairly easy to find
Kalu ringu boli	Little white Ass	Black rings on white body.	No special use	Every where	Fairly easy to find
Siki boli	Cypraea Pulicania	Khaki coloured with white spots. Medium sized and light.	No special use	Sea grass beds fasgan	Easily available
Other shells					
Alifanboli	Cassis cornuata		These are very large shells used for decoration. They do not trade them. Considered priceless	Northern side near kodi	rare
Rai boli	Cypraecassis rufa	Very big about 10 cm in		Sandy area near reef normally found in pairs or 3 at a time.	rare
Thofi boli/ fenvara boli	Cypraecassis	Very big orangish			rare
Faikala Dola	Lambis lambis* L. truncata	One is reddish and the other whitish.	Rs 50 – 150 size dependent.	Found in coral reef area in the lagoon around viringli.	Less than before but available
Beddii	Tridacna maxima	white	Normally not traded, kept at home in showcase.		
Naeboli (shank)	Clathurella sp	white			Very rare
Dōla	Strombus gigan	white			Very rare
---	Nautilus pompilius*				

Source: Information collected in FGD with cowry collectors, verified by local experts and scientific names provided by Kunhi Koya after referring publications and comparing with the shells provided to him. Feb: 2003 *CMFRI Bulletin No 25 & 43. once again verified against species kept in the Kavaratti Fisheries museum

Plate 4.4 Ornamental shells of Minicoy

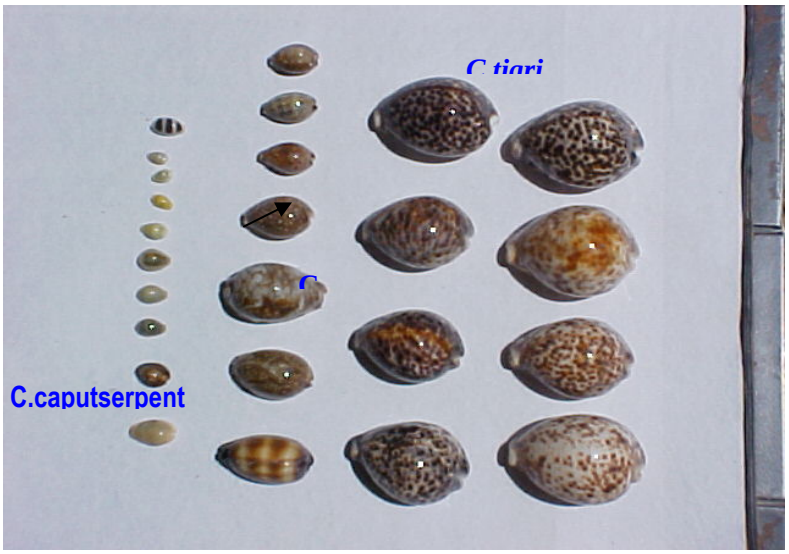
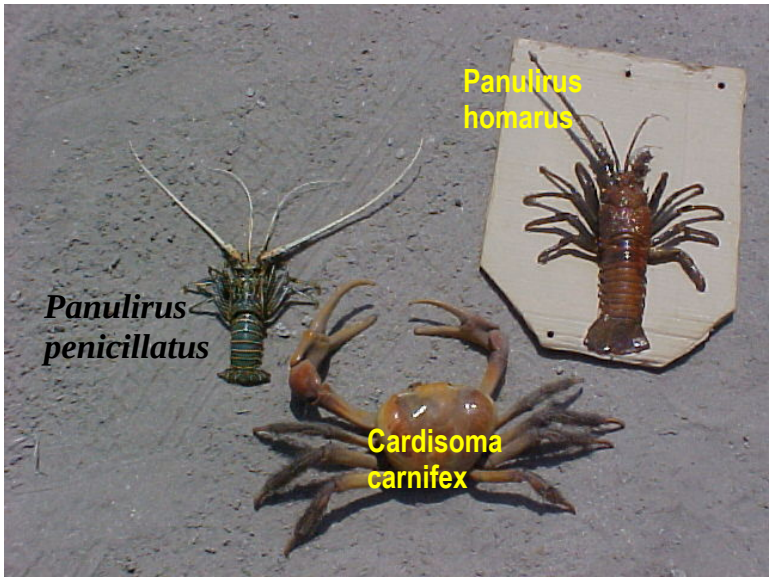


Plate 4.5 Common cowries of Minicoy

Plate 4.6 Lobsters and crab eaten in Minicoy



Collection period: Collecting these cowries was a favorite pastime for women during the low tide periods of the fair season. The peak period for cowry collection is from September to December and the lean period is during the monsoon. Cowry collection is a group activity and men, women and children go for cowry picking during low tide in the reef crest either by boat or by walking for 2-3 hours every day during low tide, 6-8 days every lunar month coinciding with the new moon. The cowries and shells are collected from the coral patches in the lagoon and reef crest. The pickers wear rubber-soled footwear to protect their feet Small cowries lie hidden under the coral stone and the cowry pickers overturn the stone using small iron rods during their search.

The small cowries are collected during the early hours of low tide. i.e when low tide commences from noon onwards. This is because the visibility is best in bright sunlight. However the big cowries such as the tiger cowry only creep out of their hiding place when it is getting dark. So on the days when low tide begins around 5:00 pm the groups set out to collect the larger cowries. The cowry collection time coincides with the tuna-fishing season and is from mid September to April.

Box 4.1

Folk knowledge and perceptions: The Minicoyans are very knowledgeable about the cowry behavior, habitats and where and when to find them.

According to Ibrahim aged 60 " The cowries are fully covered, and not visible during day time. They lie hidden under boulders in daytime and will come out to sand areas at night. They are mostly found in the white sandy area. The flesh of the cowry appears red, green, white or black, with a small projection. Big cowries and giant shells like *rai boli* are always found in pairs, one being slightly bigger than the other. He thinks it is a couple that lives together in the same area. "

According to Amina a 32-year-old experienced cowry collector every type of cowry comes in a minimum of three shades of colour. The small cowries such as the white money cowry, is not easily seen during high tide, as it hides amongst the sea weeds. When the low tide starts and all the water drains away, the area is exposed and the cowry comes out of the sea grass and its outer shell will be covered with white flesh. When we touch the shell, the flesh is slowly withdrawn inside and then we pick it up."

They use different names to describe cowries according to colour and size. Sometimes the same cowry has a different name at the juvenile stage eg. *C. moneta* is called *mahtha boli* when it is juvenile and kudi boli at the adult stage, it is called *rundi boli* when the color is very yellow.

Very large shells such as *rai boli, alifan boli* and *thofhi boli,* lie buried in the sand area only a small portion of the surface is visible and one has to dig them out. They live in pairs and so when one is found they dig the sand around for the next one. Sometimes three will live close together but each one will be slightly smaller than the other.

Cowry flesh is not eaten and they are collected only for their decorative and market value. There are around 50 families in Minicoy who are serious cowry collectors and do so for economic reasons. One collector said that she can make around Rs 7000/year by collecting the money cowry and snake head cowry. This is a good personal supplementary income that she spends on household needs.

4.1.3 Octopus (Bōva)

In Minicoy, Octopus is not a much sought after species. It is the people from other islands, stationed in Minicoy who are involved in octopus hunting for home consumption and also as fish bait. It is an individual activity carried from august to march and to a lesser degree during the monsoon. Octopus is found easily from the main reef or from the *tharāthére* area and also *from Kodikolu* (northern end) near old Navodaya school. There are 3 varieties of octopus in Minicoy. The reddish colored one is seen in *tharāthére* area and *Kodikolu*. The brown colored variety is seen in all the reefs. The third variety is a rare white colored one, which is seen in *fasgan* near Helipad shore. Octopus is caught during low tide from the crevices/burrows in the coral boulders in the reef flats on the lagoon side. The gear for capturing octopus consists 1-1.5 m long iron rods having sharpened edges, sometimes curved at the tip. Once the octopus is located it is pined down with one rod and retrieved with the other. As soon as the octopus is caught, the mantle is turned inward out to remove the ink sac.

Octopus are territorial and live alone in crevices or cavities in the reef. If the home is left intact after capturing, then another octopus will occupy the crevice. They cover the cavity with small white flat stones. This is an identifying feature to locate octopus habitats and expert octopus hunters easily detect them. The legs of the octopus with its button type soft rubbery material are used to attack the enemies.

4.1.4 Squid *(Bovadilamas).* The squid is not targeted for fishing in Minicoy but sometimes gets caught in nets or in a fishhook. When this happens it is either eaten or used as a fish bait.

4.1.5 Crustaceans

Lobster

The CMFRI bulletin No 43, published in 1986 states that there are 3 types of lobsters found in lakshadweep. They belong to the family palinuridae.

a *Ru lis Panulirus penicillatus* - Dark red – common and tastiest

b Nu lis *Panulirus homarus* - green brown also known as painted lobster.

c *Panulirus versicolor* - White with green spots; rarely found

In addition to the above the *Minicoyans* identify a fourth variety that is flat and white[3], but rarely found.

In Minicoy, there are very few people involved in catching lobsters. Mainlanders posted in Minicoy on duty and a few locals catch lobsters for home consumption they are not sold. The lobsters are usually collected from the reefs. They are available in the western side village blocks and can also be found in the eastern and main reef. It is usually caught from August-September to March.

The boulders or irregular coral rock formations in the reef are the favorite habitat of lobsters. Such structures will have one or more entrances and can house several lobsters. They are not solitary by habit and live in groups of 2-3. They do not exude poison but ward off their enemies by the two stick-like frontal appendages, which have sharp edges. There is sexual dimorphism and the females are identified since they carry the eggs.

[3] A CMFRI scientists feels that the description fits the mud lobster which is very rare and so far not been spotted by scientists and until he sees it for himself cannot confirm.

The men who go in search of lobsters carry a sharp edged steel rod (1-2 m long) and a piece of net. The experienced men can identify the cavities where the lobsters live. The nets are put on the seaside of the reef and the rod is pierced into the cavity. On the eastern shore (*furuvah)* lobsters are collected at night with the help of a torch. The light from the torch reflects in the eyes of the lobster (which light up like a spark). A rod is pierced through the crevice to disturb the lobster, which then emerges from the crevice and gets trapped in the net. and it is collected by hand.

The people involved in lobster catching are divided in their opinion about their abundance and availability. Sometimes lobsters weighing 1-2 Kilograms are caught. But some feel that there is a decrease in number of lobsters, which could be due to increase in number of people engaged in lobster catching. Sometimes 40-60 lobsters are caught in a day. The lobsters are caught twice or thrice in a week and are eaten after boiling or frying. Lobster meat is a delicacy.

According to CMFRI publications lobsters are not found in enough quantity to be a commercially viable activity in Minicoy.

Crab *(Kakuni)*

The same people who catch lobsters are also engaged in catching crabs. The men go individually to catch crabs for home consumption. There is no demand for crabs in Minicoy so they are rarely sold and nor are the edible varieties found in great quantities. They are found on the eastern reef at low tide close to the lighthouse and western side close to a small jetty, near the swampy mangrove area during low tide. The crabs are usually 8-10 cm. The crabs go into hiding into their burrows in the mud on seeing enemies. The frontal appendages are toothed and used for attacking.

There are different varieties of crabs. Only one variety is used for consumption. This is the *Cardisoma carnifex*, which is associated with the mangrove patch on the SW of Minicoy. (The other varieties are used as fish bait. Crabs are boiled and roasted before eating. We found only one house in Minicoy where the father and son hunt crabs and eat them. They supplied the specimens for the photograph.

Prawns *(Dinhga)*

Prawns are not in demand in Minicoy. According to researchers from CMFRI there is only one variety ie *Penaeus latisulcatus* which is 4-6 cm in size, found in the mangrove swamp close to Helipad.

According to some fishermen, prawns get accidentally caught in nets while they fish in the lagoon. They remember catching specimens of large size (8 ~10cm) near helipad jetty in 1998 & 1999. This species was seen only during those two years. A small net was used to collect the prawns. The prawns are boiled and fried.

Sea Cucumbers

Sea cucumbers are not in demand in Minicoy and the Minicoyans do not collect and process them for either home consumption or for commerce. Yet sea cucumber populations have declined to the degree that they are rarely seen in the lagoon.

4.1.6 Status of the Bioresources

The Ministry of Environment & Forests through its notification in December 2001 has banned the collection of corals, coral sand and shingles throughout the country. This rule is applicable in Minicoy as well. Nearly all the gastrapods, collected in Minicoy are listed in schedule 1 as endangered wildlife species and there is a government notification dated july 2001 and December 2001 in the Lakshadweep times announcing this. However implementation is weak and cowry collection carries on. Most people are also unable to relate to the notification since the announcement only gives scientific names of species and nobody including the scientists in CMFRI are able to identify the species on sight. Hence if the administration is serious about implementation they need to make this announcement in a manner and language that is understood by all concerned.
Cowries: Around 50 families in Minicoy carry out cowry collection on a regular basis for selling to the mainland and only about 6-8 men are expert in octopus hunting. Nowadays the other islanders based as government staff at Minicoy, the Navy personnel and construction labor are found gleaning the reefs to a great degree in their free time.

The serious reef gleaners say that cowry collection is no longer as lucrative as 15 years ago since they have become scarce. They did not know the exact reason for why they have become scarce. They all claim that there is a general decline in the productivity of the reef. They have observed vast mortality in corals due to siltation and state that It has become difficult to find cowries since sand is aggregating on the reef. They feel that those who collect big cowries do not disturb the reef or corals in any way. But as the collection of octopus and small black cowries increases, the reef and coral stones are disturbed due to the prodding by iron rods and overturning corals. The duration of low tide has decreased and it is becoming difficult to get a suitable time slot for gleaning activities. Because of this, availability has decreased by 50%.

***Crabs*:** A person who has regularly been collecting crabs in the southern side close to the mangrove back waters also reports that there are very few crabs to be found when compared to 10 years ago. They feel that the road bridge that has divided the mangrove backwaters into two parts has disturbed the ecosystem since the water exchange between the seawater and backwater has been reduced.

***Sea cucumbers*:** have also declined and the women in one of the village meetings, remarked that they don't see them any longer when the go for reef gleaning. However other than observing that sea cucumbers are slow growing species and hence should not be disturbed are unable to correlate its disappearance to changes in habitat.

It is noted from the present study that Minicoy does not posses any substantial resources of crustaceans, which can be exploited on a commercial scale. The people also report that the blasting for deepening the channels in the 1980's has adversely affected the ecosystem. Sand is deposited over boulder and branching coral thereby smothering them and preventing new growth.

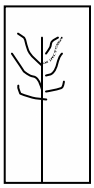
4.2 Lagoon fishing

While tuna fishing is the single most important fishing carried out in Minicoy a number of other types of fishing methods are also practiced for catching lagoon fish. Nearly all these fishing methods have developed around the inflow and out flow of tides and take advantage of natural physical features found around the island. The fishing methods are described below:

4.2.1 Line Fishing

a. Fypādu: This is carried out during the monsoon season along *doli* the slope between *fasgan* and *tharatherè*, close to the mangrove backwaters. This is a shallow and gently sloping sandy area. It gets exposed during low tide to a great distance from the shore. The current flows from the reef around *thundi* point and brings fish.

Gear needed:



1. *Kanigang* – this is a long pole 6-8 ft in height, with branches to hang things conveniently. The *Kanigang* is a branch of either the *Ahi, Uni* or *kandoo* (*Brugeria Cylindica*) tree. These are hard wood trees and are preferred because they are strong and are naturally branching.
2. *Bait* – *Vembolu (*worms), bait bag, bait catching rods and dive mask.
3. Food, food bag, hooks and fishing line.

Method: Preparations begin at low tide; the fishing itself happens around the commencement of the high tide and ends with the high tide. Bags for holding the fish catch, food supplies, bait are hung from this pole for safe keeping.

Step1: Looking for worms called *vembolu* in the shallow sandy area. These are long white tape like worms that live by burrowing in the sand area. The experts use 12-inch long sticks, straightened out coat hangers, cane or colorful plastic rods that are pointed at one end and curved at the other. The fishers look for the worm burrows by swimming and using a dive mask. Once the burrow is sighted, they stick the rod into the burrow, thereby impaling the worm and then dig it out by hand. All this is quickly done under water and often two people go together since one is needed to hold the other and prevent him from floating up while digging out the worm. If the tide is very low and the ground is exposed the second person and snorkel mask is not needed. The fishing operation begins aAfter they catch a sufficient quantity of worms.

Step 2: The pole is stuck into the sandy area selected by the fisherman. Once it is stable, all the bags and fish lines are hung from the branches. Four to five fishing lines with baited hooks are flung into the water at a time. If the fish bites they tug at the line, which automatically rolls. The fisherman then pulls in the line and removes the fish from the hook, attaches another bait and flings it into the water.

The fisherman will continue to fish according to his own stamina and time available but they stop once the tide rises to neck deep water. The fishing is carried out individually,. The catch is composed of different kinds of lagoon fish (*fandombetti, Filolu, fanihandhi, dathi, rondu* etc). On good days they can catch 10-20 fish. Catch composition is different during night and day operation. 60% of the catch will consist of *filolu* during day and 60% will be *fandombetti* during night operation. The night operation is preferred and the favorable period is between 10 -17 day of the lunar month. The best period is considered 12-15 days or the days closest to the low neap tide.

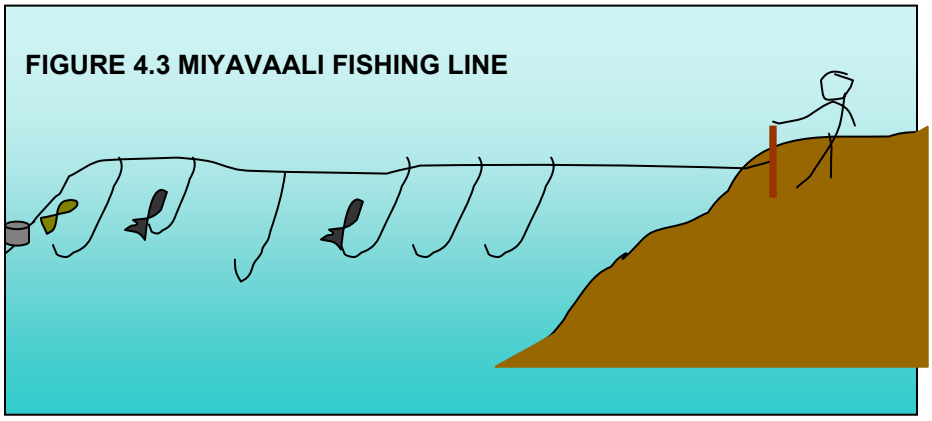
There are around 20-25 experts in this type of fishing from Minicoy Island. The fish is used for home consumption and sometimes sold to other families.

b. Boat fishing in lagoon: Small boats with outboard engine are used for this fishing. Boat owners and their friends usually seamen on vacation pass their time doing boat fishing as a recreation activity. There are roughly around 50-60 small boats in Minicoy. They can be rowed or a outboard engine is attached to it to go a far distance. Usually 3-4 men will go together and carry with them a few handlines, hooks and bait to do the fishing and food and water for themselves. The bait vembolu is caught from fasgan as described in the fypadu operation.

The boats are anchored near a coral boulder along the entrances and the fishers will commence fishing. If the fish don't bite they will move to another spot in the lagoon and try their luck. The ideal fishing conditions occur around sunset and high tide is preferred for navigational safety. The fishes commonly caught are *fandombetti, Reendumas (goatfish, Filolu (emperor bream), fana (blotchy rock cod), Gini (rock cod).* The fishing is considered recreational and usually caught for home consumption and rarely sold.

c. Firukkang: This is a type of rod fishing carried out from the shore. It is very popular among the small boys who stand on the shore or take a small rowboat a little distance away from the shore and practice fishing. They try to catch a small white fish called *Korakali,* which they like to eat.
Older men do shore fishing using a 15-25 m line that has a small hook and weight at the end of the hook to help the line sink. In this case, the catch of fish depends on the tide and type of hook used.

d. Miyavaali *:* It is a type of line fishing using a long line that extends from the shore to the lagoon. In Miyavaali, fishermen use a main line 50 -100 meters long. One-meter long lateral lines with hooks are attached to it at equidistance. The end of main line also has a hook and a weight for anchoring the mainline.



The activity involves atleast two people. One end of the line was staked on the shore and a person would either swim across holding a log or go in a two-oar rowboat and take the other end of the line and anchor it in the lagoon. Any kind of weight that is handy could be used as an anchor. The owner of the *miyavaali* will then periodically go to change the bait and remove the fish caught in the hooks of the lateral lines.

4.2.2 Net fishing in lagoon

a. Dau fahthang: Set net

This is a night time operation and starts around sunset. The net is called *fathi rodi dau*. It around 40 m in length and the mesh size is ½ inch. One end of the net is tied to a pole on the shore and the other end is anchored firmly in the lagoon. There are floats attached to the top and small led weights at the bottom. Two – 3 people (male) operate this net. Around 40-50 families own this gear. The families are mainly from Kendiparty and Fallesery villages. Around 10 people practice on a regular basis. The average catch size is around 10-15 kg and the fish most frequently caught is Theaikandi (goat fish).

Table 4.3 Set Net catch composition on 23/2/03:
Normal average catch 10-15 kg

Yellow striped goat fish	Thelakandii	98
Lethrinus mahsena snapper	Filolu mas	1
Bulls eye snapper	Ammaasa bodhi	2
Holocentrus laevis	Digu barihi	4
Squid	Bova dilhamas	1
Flat fish	Effung madi	1
Diadon hysteric	Korakali	1
	Total	108

Location: *Thundi, fasganmahthi* and *Viringli.*

Catch composition: table 4 shows the catch composition during the net operation on 23/2/03. The fishermen say that the composition will vary from location to location. Goatfish and snappers are the most common and the composition will depend on which shoal swims into the net. In this catch we caught a squid and squirrelfish. The fishermen explained that the squirrelfish is poisonous and if the bone pokes us then it will pain and itch for a couple of hours. On another day when the net was set near *Viringli* eight juvenile reef sharks (*sooraakutti*) measuring between 18-22" in length had got entangled in the net.

Operation: The net is set and anchored on both sides. The shore anchor is often a pole or branch. It is spread out like a fence against the current, as the tide begins to recede. The fishermen sit on the shore and wait of 1-2 hours. After the two hours are over, they wade into the water and start hauling up the net. The net is never dragged but the fishermen walk along the net folding it along with the fish until they reach the anchor. The anchor is then removed and the fishermen take their catch and go home. The catch is rarely sold and is normally distributed amongst the extended family and friends.

b. Shal kakal

Shal kakal is a Malayalam word and a reef fishing method practiced in Agatti and other northern group of islands wherever there is a natural small entrance into the lagoon. The literal translation is stealing from the shal. Fishermen from other islands who are posted in Minicoy on job transfers carry this out. They said that the reef in Minicoy does not have natural *shals* as found in Agatti Island. Therefore they have created an artificial *shal* on the reef flat between Minicoy and Viringli, by re-arranging the boulders to form a funnel shape. It is broad at the sea-facing side and narrow like a channel on the lagoon side. A net is placed at the end of the channel and two fishermen hold this net.

Timing: This is a nighttime operation and the ideal conditions occur when the low tide coincides with the new moon. Two days before and after the new moon are considered perfect. During this low tide period the fishermen go to the shal and get their gear ready. They fix the net and wait for the high tide to commence. As the tide commences water will flow over the reef toward the lagoon. Shoals of fish will swim in with the tide. These fish will be trapped within the shal and forced into the channel and ultimately the net

where the fisherman will catch them and haul them to the shore. There are around 10-15 people from the other islands holding government jobs in various departments who participate in this activity. About 8-10 Kg of fish is caught during a single operation.

c. Aarubaddam

This is a type of stake-net fishing practiced at *chorumagu and derahdhethere.*. It is similar to *shal kakal.* The difference is that here natural conditions are found to capture the fish and so the boulders are not rearranged to suit the fishermen. Hence it is less harmful. Here also the fishermen consult tides and go out by boat and wait at an appropriate spot on Neru magu and catch the shoal that enters the lagoon in a net. 2-4 men are needed and the average catch per effort is around 10-12 kg.

d. Balajahang

This is a type of drag net operation that was carried out as a village exercise involving the entire physically active population of the village. It was normally carried out for catching lagoon fish for the *Id* feast. The net used for *balajahang* is 500-600 m in length and has large mesh size and was originally made from very fine coir ropes.

Gear needed: a very large dragnet. A long rope with coconut leaf fronds attached to it used as a fish scaring rope and 2 boats.

Method: 20-30 people stand in the shallow side of the lagoon holding the net to be circled around the shoal. A second group of 10-20 men and boys row out to the reef area carrying the scaring rope. They then swim over the coral patches in the lagoon holding this rope and scaring the fish out of their hiding places into the direction of the net. The group holding the net would circle the fish and enclose them in the net. The fish is then speared and collected in the boat.

Catch size: would vary between 100-200 kg and would be composed of all types of lagoon fish especially *Filolu (emperor bream), Landae (parrot fish), Gonu (box fish), Rondu (trigger fish) Uniya (Mojjara)*. The fish catch is distributed between all the households after keeping the quantity required for the village feast.

This was one opportunity for the women and children to see all the types of fish that inhabit the lagoon. This especially the women never venture into the lagoon and snorkeling is not a common pastime in Minicoy. Only the people of the Bada village currently carry out, *Balajhang*. It is a smaller operation than in the past.

e. Bait fishing

Baitfish is different kinds of tiny lagoon fish that live in groups and move in shoals, which makes them an easy to target. The fishermen catch these fishes during the fair season (September-April) as tuna bait. The first step to tuna fishing is baitfish collection, for only when they have sufficient baitfish can the fishermen start tuna fishing. Table 1 provides a list of tuna baitfish and their habitat. This information was gathered by interviewing a number of expert fishermen. A final focus group discussion was held to validate the information collected.

Gear used for Bait fish catching

i. Net: this will differ according to the target sp. *Hondelidau, Nilamehidau or Rehi*dau.
ii. Rihthandu – 2 long (digu dandi) and 2 small poles (kuru dandi) made from specially shaped coconut tree.
iii. Ropes: 8-10 ropes, out of which two are used for towing the bait searchers

iv. Bait: paste made from tuna or any big fish.
v. 25-35' long boat fitted with live bait tank.
vi. Dive mask and strainer for chucking out baits from tank.

Table 4.4. Names of bait fish and their habitat and rank

Sl	Local name	Common name	habitat	rank	abundance
1.	**Pomacentrids** **Nilamehi**	**Damsels** *Chromis caeruleus/ C.termatensis*	Branching coral around Thara-there. Vanished due to destruction of corals. Found in small quantities in outer reef.	2	Rare
2.	Bureki	Fusilier damsel/Anthia spp	Lives outside reef found in berumathi in the eastern reef.	3	Rare
3.	Rai bureki	Slender demoissile		3	
	Caesio spp	*fusilier*			
4.	Mugurang	*Gold band fusilier*	Found in deep places around boulders. Near the bellas close to old Navodya school. Northern part of lagoon.	3	
5.	Kekurimugurang	*Caesio.corulaureus*		3	abundant
6.	Dhanali Muguram	*Caesio tile*		3	
7.	Hussein fani	*Pereocasio pisang (darkband)*	Sandy area close to dead coral	3	
8.	Husseinmugurang	*p.tile (slender fusilier)*		3	
	Pemfridae	**bulls eye sweeper**	Associated with corals		abundant
9.	*Ammaasa Bhodhi*	Pempheris ovalensis			
	Apogonids	**Cardinals**	Live around boulders 7-8 m depth. Juveniles of some bodhis are targeted as bait. They are easily caught just before sunrise. Since they feed out at night and return in thick layers, to their hiding places in boulders at dawn. Muraki lives inside crevices of dead boulders just inside reef. Dhon Bodhi lives everywhere even grassy patches. Dhigu lives in *tharāthére*		
10.	Bhodhi	*Ostorhynchus apogonides*		2	
11.	Rehi Bhodi	*Archamia sangiansis*		1	abundant
12.	Muraaki Bhodhi	*Pristiapogon fraenatus*		2	
13.	Rai bhodhi	*Archamia fucata*		2	
14.	Dhon Bhodhi	*Ostorhynchus moluccensis*		2	
15.	Dhikkuri Bhodhi	*Ostorhynchus novemfasciatus*		2	
16.	Dhigu Bhodi	*N.A*		2	
17.	Gandakōli bodhi	N.A		2	
				2	
	Sprats		Rehi is is found in deep waters of salu magu and kandima magu and is associated with coral boulders. Hondeli is found in scattered shoals in sandy areas in the south western part of lagoon		abundant
18.	Rehi	Striped blue sprat		1	
19.	Hondeli	Blue black sprat		2	
20.	Reendhu Hondeli	*N.A*		2	
	Khandu Hondeli	N.A		2	
21.	Garahitha	*N.A*	Deep area like *dholi* which slopes the migrate into the lagoon.	3	sometimes
22.	Ali garahitha	Lined		3	
23.	Kura	*Dipterygonolus leucogrammaicus*	Lives anywhere ass. Deep water boulders.	3	Rare
24.	Eiduge Dhari	*N.A*	Inner reef between kandima and salumagu channels.	3	abundant
25.	Boddali	N.A	Outside of Berumati, eastern and western reef. Baddali is normally found in Kanduvadiumthang. (A place where the deep sea makes a cove into the bar area.	3	abundant
26	Fufali	*N.A*		3	abundant
27	Dandi Feemaru	*Herklotsichthys quadrimaculatu*		1	sometimes

Source: interview with key informants and focus group discussion to verify information collected from Tuna fishermen held in February 2003. Scientific names taken from CMFRI published bulletins and Lakshadweep fisheries department.

Figure 4.4 locations of different kinds of Bait Fish in Mnicoy Lagoon

Ranking: The tuna fishermen rank *Rehi, Dandi* and *Rehi Bhodhi* as the tastiest bait for tuna. The rest of the *Bhodhi's* and *Hondeli's* come second and if these are not available any of the other bait in the table will do.

Method: In bait fishing the fishermen target a certain type of bait and go after it. Therefore the time for catching the fish depends on the species to be caught. For e.g. Bhodhi sp, move away from their coral boulder in the night and return in thick layers just before sunrise. If bhodhi are targeted, the fishermen set out by 4:00 am. *Rehi* and *Hondeli* are easier to catch after sunrise and the fishermen can leave after sunrise.

Local fishermen have intimate knowledge of the lagoon and the places associated with different baits. Once they come closer to the site they will begin to look into the lagoon. Two fishermen dive into the water wearing dive masks and start looking for the bait. Sometimes the boat tows them, while searching a vast area for the bait. Once the bait is sighted the boat is anchored and rest of the fishermen will chuck the nets down and around the shoal. Four poles are kept on either side of the net to keep it steady. The net is hauled up and the bait transferred to the live bait tank, which is full of seawater.

They can catch 1000's of bait in one operation and this weighs 4-5 kg. Usually the same species are targeted for a single fishing operation and they prefer not to mix different varieties of baitfish. The also have a preference as to which bait to target. They will first look for sprats *rehi* or *hondeli*. If sufficient quantities of these sprats are not found they will continue the search. In case another kind of baitfish is found they will collect it but keep it in a separate section of the tank. *Rehi* should never be mixed with any other species not even *hondeli,* since it is the most vulnerable and every other fish attacks it. This is one reason why the live bait tank is divided into two sections.

4.3 Open sea fishing

4.3.1. Pole and Line Tuna Fishing

Tuna fishing is the main stay of the economy of Minicoy and is intimately connected with their culture and the economic and social thread of their life.

The pole and line tuna fisheries has been known in Minicoy from time immemorial and the technique was popularized to the other Islands of Lakshadweep by the fisheries department in the late 1960's, exclusively with the help of expert fishermen from Minicoy.

The Tuna fishing boats can be owned by the Village house and individually (Table 4.5). The boats are operated by a kelu, (boat captain) who is in charge of boat operations and maintenance. The Kelu is selected before the fair season and it is his responsibility to find a permanent crew for the season.

Table 4..5 Ownership of Tuna fishing boats

SL	Village	No of Village boats	No of Pvt boats
1	Bada	2	11
2	Aoumagu	2	2
3	Boduathiri	1	0
4	Rammedu	1	1
5	Sedivalu	1	3
6	Aloadi	0	4
7	Funhilolu	1	5
8	Kudehi	2	1
9	Fallesary	2	3
10	kendiparti	1	1
	Total 44	13	31

Gear used

i. A 25 –35 ft tuna fishing boat, fitted with a platform to stand, a live bait tank and water sprayer. Some boats even have a GPS and a cordless telephone with a 25 km range.

ii. Tuna fishing poles: these are 6' long bamboo poles. The lines are nylon monofilaments. Each boat carries 10-12 poles

iii. Hooks: A local tuna hook is made of iron. The blacksmith shapes it at a very high temperature after which it is coated with lead and costs Rs.10/-.

iv. Fresh water and drinking water for the crew.

v. Live bait for the tuna

vi. Binoculars, Caps and umbrella to shade from the sun, during rest periods.

Operation: Pole and line tuna fishing requires a team effort and involves 10-14 people. Ten work as crew on the boat and 4 have to carry out various duties on the land. It is very important that the team understands and respects each other duties. The first step to tuna fishing is catching the live bait in the lagoon. After the bait is caught the boat leaves for the deep sea.

At the sight of the vast ocean the fishermen start looking for the tuna shoals. They use binoculars to look for the fishing birds that are associated with tuna shoals. Once the birds are sighted the boat is propelled to this area. The speed is reduced and they start throwing baitfish into the water. The crew team then gets ready to perform the various tasks. Six men are needed to use the pole and line. One person gets into the bait tank to chuck the bait and the boat driver and captain keep the boat steady. Earlier two people were needed to throw water on either side of the boat but now a motorized water sprayer has been fitted onto the boat and it sprays water as the boat moves.

The activity begins in real earnest when the tuna starts biting and the co-ordination between the six pole and line fishermen standing on the boat platform is remarkable, The fish are caught with great dexterity and speed and they never entangle each others line. When the fish is caught the line is whipped toward the boat and the fish automatically falls of the hook and the line is thrown into the water to catch the next one.

Table 4.6 Important Tuna Fishing grounds

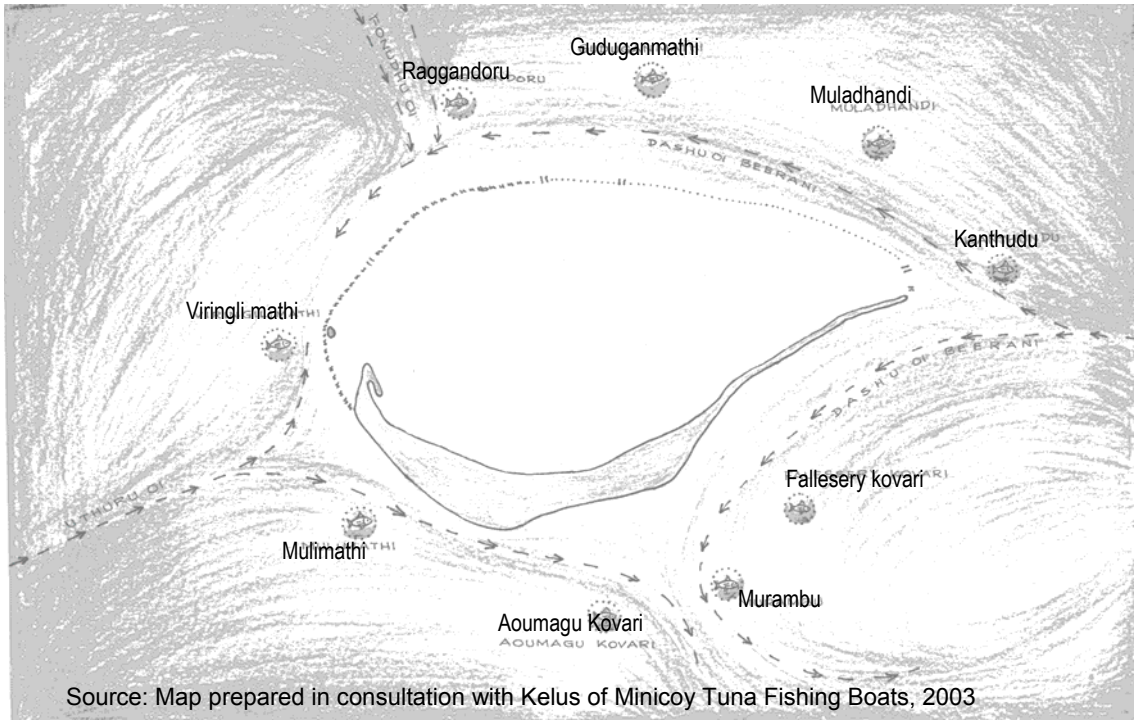
Fishing ground	**LOCATION DIRECTION**	**ASSOCIATED CURRENT**	*Rank*
1. Kanthundu	North form Kodi	Dashuoi beeraani	1
2. Muladhandi	NW from Kodi pt	Dashuoi beeraani	2
3. Guduganmahthi	NW from Kandima magu	Dashuoi beeraani	3
4. Fallessery Kovari	East from Fallesery Village	Dashuoi beeraani	3
5. Murambu	East from Murambu pt.	Dashuoi beeraani	
6. Raggandoru	W from Raggan pt	Fonuduoi	2
7. Viringlimathi	SW from Viringli	Uthuruoi	1
8. Mulimahthi	S E from lighthouse	*Uthuruoi*	1
9. Aoumagu Kovari	East from Char bathi	*Uthuruoi*	3

Fishing ground: Tuna is caught in different places all around the islands but within a 25 km radius. Important tuna fishing grounds and the associated currents are listed in table 4.6.

The general opinion is that tuna fish availability is closely associated with the direction of the currents and therefore there is no particular best spot or worst spot, though individual boats may have thir favorite spots.

Plate 4.7 Pole and Line Tuna Fishing

Figure 4.5 Currents that affect Tuna Fishing



Source: Map prepared in consultation with Kelus of Minicoy Tuna Fishing Boats, 2003

Plate 4.8 Woman waiting to collect tuna share

Plate 4.9 Hikki Mus being sundried

The fishermen consult the Maldivian calendar (Nakkai) to correlate the direction of the current and the decide on which fishing ground to go to. The main currents associated with Tuna availability in the grounds are:

1. *Uthuru oi*: This current moves from Maldives to the direction of Minicoy and at lighthouse it divides into two branches and moves along both sides of the island. One stream goes up to Murambu Pt and turns back. And the second moves toward Viringli.
2. *Dashuoi beeraani*: This current moves south from Lakshadweep and on reaching Kodi point it divides into two branches and moves along both sides of the island.
3. *Fonudhu oi:* This is a less important current and flows from the west towards *Raggandoru.* (Nakkai) to correlate the direction of the current and the decide on which fishing ground to go to.

There are certain special instances when two migrating currents from different directions will meet. In this period the tuna fishing will be excellent. The distance the boats travel to reach the fishing ground is also associated with how far the current is moving alongside the Island. When the current moves alongside the reef, tuna is available along the barana itself. In such times the same boat makes two and even three fishing trips. For example on the 25/2/03 the *Dashuoi beeraani* moved very close to the Island almost alongside the *barana (outer reef).* The boats reached the shoal within an hour of leaving the Island shore and returned with a boat full of tuna by 8:30 am. They unloaded the boat and set out again and returned by lunch time and set out for a third trip by 1:00 pm. Where as for most of the month the boats that set out early in the morning would return only by 9:00pm and even 10:00 pm at night and were too late to unload their catch at the Tuna canning factory.

The fishing experts also said that there is a change taking place in the currents direction and time of flow and very often the currents flow at a great distance parallel to the island and rarely flow close to the Island. Mr. Ibrahim Donmalimeege, married in Athirigothi remembered that when he was young, they would fish with the sailing Odi and the fishing grounds were closer to the reef area and the currents would be very regular. Now there is a change in the wind and weather and fishing has become unpredictable. There are days that fishing is excellent and bait easily found. But at other times when the tuna will not bite, despite the availability of bait and he can find no explanation for these changes.

Sharing the catch :

There are two types of catch sharing currently in vogue in Minicoy.

1. The boat owner gets 50% and the crew gets 50%
2. The catch is shared at the ratio of 1:2 in which the boat owner gets 1/3 and the crew gets 2/3.

However the sharing does not end here, for the catch has to be shared between the boat crew, boat owner and the shore team. A very elaborate procedure is followed for sharing the catch. The share among the crew and shore team is not equal, since the 2 people who look for bait, the boat driver and captain *(kelu)* get one extra share. And before the catch can be shared amongst the crew it has to be distributed to the shore helpers. If the boat owner gets the major share then the shore helpers get the share from him and when the share is 1:2 then the shore share is given out of the boat crew's

share. If the boat owner takes 50% then the shore share is given out of his share. An example of how the catch is shared is provided in table 4.3.3.

Table 4.7 An example of sharing the catch – Catch size 107 tuna

	Boat owner	35	33%	1	Boat crew Captain (4+4)	8
1	**Shore crew & obligation** Mosque	2		2	Driver (4+4)	8
2	Kamburu (hook maker)	2		3	Bait diver (4+4)	8
3	Odi maker (carpenter)	2		4	Bait diver (4+4)	8
4	Dou - Net maker	2		5	P& L fisherman	4
5	Vaidonnaka (wake up call)	2		6	P& L fisherman	4
6	Raveri (hauling the boat)	2		7	P& L fisherman	4
7	Village house	2		8	P& L fisherman	4
8	Boduthatha/ Bodukaka	2		9	P& L fisherman	4
	Total shore obligations	**16**	**15%**	10	P& L fisherman	4
	Total crew	**56**	**52%**		**Total**	**56**
	Total	**107**	**100%**			

In Minicoy most of the boats follow the ratio 1:2 sharing and make it a point to provide a share to the mosque, poor person etc. This sharing applies both to the boats owned by the village house and privately owned. When the village house owns the boat the profits go to the village house and are spent on the common village activities and village celebrations.

Changes in Gear: While the pole and line for catching tuna and the method of bait collection have remained the same, some safety measures have been added to the boat. Many boats now use a GPS and VHS sets for communication with the island. A recent innovation has been the addition of a water sprayer that sprays water around the boat platform. Using a mechanical water sprayer means a reduction in crew since that the two members who earlier had to spay water are no longer required. The Fisheries department tried to popularize this sprayer in 1998 but it did not work efficiently. A local innovator and boat owner (Hassan of *Athirige,* Bada village), made some changes and added a second motor to run the sprayer. It then worked efficiently and today thanks to him all the tuna fishing boats have adopted this sprayer system and it is also becoming popular in the other islands of Lakshadweep.

Waste disposal: *Once the catch is divided amongst all the people concerned. It becomes the responsibility of the shareholders to clean and gut the tuna. The tuna guts are removed at the landing site and some boat teams take the trouble to bury the waste in a pit on the shore, but most of the boat teams simply throw the waste into the lagoon. This makes the lagoon in front of the village landing site very green and nasty.*

Post harvesting: After sharing the catch, the women take the tuna to their homes. The women start the process of tuna preservation. Tuna is consumed fresh and converted into 4 products for long term preservation:

1. hiki mas: Prepared for market in mainland price Rs 90-110/kg.
2. valomass: locally consumed ½ dried tuna

3. khundi mass: pieces of dried tuna, kept by family or sold at Rs 20/kg
4. Rihakuru: The solid paste in the pot after repeated boiling of batches of tuna

Steps in preparing hikimas:

The tuna is cut and cleaned. It is kept in a big bowl. It is cooked in huge vessels with salt water for 2-3 hours. After boiling the tuna it is removed from the pot and arranged on the raft above the fire and smoked over night.

The next day in bright sunlight the tuna is sun dried until it turns hard and brown. It is then called *hiki mass* .

The *hikimas* is then packed and sent to markets in Mangalore and Calicut. The market price for dried tuna mass ranges from Rs 90-110/kg.

Post harvesting share:

Tuna serves as currency in Minicoy and payment for work is often given in tuna. Very often the boat owner is unable to process his share of the catch in his own household. This could be because there are not enough women in the house or the catch is more than they can deal with. In this case women from other households will come forward to prepare the *hiki* mass for the boat owner. These women are paid in the ratio of 2:10. That is for every ten *hiki* mass they can take two for their labour (refer Box 2). The women are paid 3 hikimas for every 12 that they prepare since 2003.

Box –2

The Athrigothi household (Manikfans) of Aloadi Village has a special working relationship with the Kunhumatige household (Raveri) of Fallesery village. This relationship has gone down several generations now. The former owns a tuna fishing boat, but are a small household with only one daughter, who is unable to process the boats share of fish catch. The Kunumathige is a large extended family with five adult women. These ladies do the fish processing and preparation of hikimas for the Athirigothi. In turn they receive 2 hikimas for every 10 processed. They are pleased with this relationship since they are not boat owners and by this working relationship they get regular supply of tuna for their house and can earn a personal cash income by selling their share of hikimas.

4.3.2. Deep-sea fishing during the monsoon

Deep-sea fishing is carried out on the eastern side during the monsoon using country craft with outboard engines. A wide variety of fish such as *seer, perches, sharks, tuna, garfish* and *carangids* are also caught from the outer reef and open sea areas. The boats almost always have the Island in sight. 2-4 men form a unit and the gear used in the open sea is mainly troll line and long line without live bait. 8-12 troll lines are dragged along the boat as it moves. Tuna is the main catch during the day and carangids form the main catch at night. The catch per unit effort in Pole and line fisheries varies between 200-300kg/cpue and by trolling it is only between 20-28 kg for tuna. (*Pillai. PP, et al:2001*). There are around 20 country crafts in Minicoy but only around 5-10 boats go fishing on a daily basis during the monsoon. In the monsoon of 2002 a shortage of fuel for the outboard engine prevented many boats from fishing and only around 4-5 boats operated on a daily basis.

Fish is not available during the monsoon since very few boats go fishing. There is a high demand for fish and all the catch is marketed locally. Fishermen have standing orders from people and can make a good profit by fishing during the monsoon.

Status of the bioresource

The Lakshadweep sea is estimated to have an annual fishery potential of about 90,000 tonnes while the present yield is only about 6000 tonnes (Pillai, P.P et al:2001). These estimates are based on fisheries catch data and are not based on the ocean system i.e currents, lunar cycle, climate, weather conditions, wind, upwelling etc. They therefore don't seem to provide an accurate picture of the real potential. The local fishermen say that these conditions are equally important as the bait availability. There have been instances when a shoal can be seen close to the boat, bait is chummed but the fish will not bite. Neither fishermen nor scientists seem to have an explanation for this phenomenon. Nor is there any explanation as to why sometimes the currents move close to the island and sometimes far away.

We have seen a variety of fishing techniques followed by the people for catching these resources. Tuna fisheries are the most important and dependent on live bait, which comprises of both resident and migratory species. The fishermen have reported that the year 2002-2003 has so far been a very good year for tuna fishing. Live bait has been available and the fish shoals have big sized fish.

Reef and lagoon fisheries are beginning to be important in Minicoy as well as some families like to vary their diet by including lagoon fish. A number of net operators carry out net and line fishing in the lagoon for personal consumption. This catch data is not reflected in the fisheries departmental catch data, since they concentrate only on boat landings.

A healthy coral ecosystem will provide greater biodiversity and fish availability as certain fish enter into the lagoon to lay eggs and the juveniles grow in the shelter of both the mangrove backwaters and the lagoon. The destruction of the *tharāthére* and the *bellas* has caused a change in the behavior of the fish as well.

Chapter 5. Inventory, Dependencies and Status of Land Bioresources

Minicoy Island is a gift of the corals and even today if it were not for the protection provided by the reef, the island would erode into the sea. Minicoy island itself is a marine resource, which has been colonized by various plants, trees and other creatures over millennia to form the land bio-resources of Minicoy.

The warm temperate climate and fertile land have been conducive to good plant growth. The island is rich in plant biodiversity and the people have depended on both the marine and land resources for their survival. The resources on land are both domesticated and wild resources, which are used by the people for food, fodder, fuel, timber and medicines. Fresh water, the most important resource for survival is trapped as a lens, between permeable and impermeable strata on the island.

5.1 Fresh Water

Availability of drinking water is the most essential requirement for the colonization of the islands. A sandstone substratum forms an aquifer into which the freshwater is trapped. Only those islands that have the fresh water lens are inhabited and those in which the sand stone substratum is absent remain uninhabited.

The ground water is replenished every year by rainfall. The rainfall averages around 1640 mm for Minicoy. The rainiest period is between June to September, with June receiving the maximum amount of rainfall. The rainwater sinks into the porous sand to form a subsurface layer of fresh water lens, which is utilized, by digging wells. Fresh water is found at a depth of 1-2.5 m. Because of the unique nature of the geomorphology of the island, it is not advisable to disturb the hard strata that protect the fresh water lens.

Status:

Every house has its own shallow well and either hand draw or use 0.5 hp motor pumps to supply piped water to the house. Over drawing water has caused the fresh water to turn saline in some sections of the island. This water lens is being contaminated by:

- Sloppy storage of diesel, needed by the powerhouse to generate electricity, which leaches into the substrata.
- Breaking of the hard strata for planting horticulture crops especially banana and using chemical fertilizer and pesticides to protect these crops.
- Leaching of the toilet soak pits into the soil.

The Centre for water Resources Development and Management (CWEDM) based in Calicut has started a program by which rainwater is harvested into Ferro cement tanks. This project has surveyed and tested the various freshwater sources in the island. Ferrocement tanks are allotted to the people whose wells have poor water quality. The Government provides a 50% subsidy to the interested party. Some of the village houses in Minicoy also have built these tanks for rainwater harvesting. While this program maybe unable to meet the entire demand for fresh water it certainly will help in reducing the load on the fresh water lens.

Plate 5.1 Spillage from Diesel barrels

Spillage from diesel barrels soaks into the ground and contaminates the ground water

Plate 5.2 Planting by breaking the hardstrata

This technology introduced by mainlanders is both contaminating and depleting the fresh water lens

Plate 5.3 Concrete Road bridge through the Fringe mangrove ecosystem.

This concrete bridge with its bundlike structure and inadequate openings, blocks intertidal water exchange

Plate 5.4 Concrete Road cutting across the overwash Mangroves

The road has disturbed the ecosytem as an entity and provides easy access to the Mangroves and the eastern sea shore.

5.2 Island Flora

A survey conducted in 1996, under the MSSRF, Agro biodiversity corps project, listed 188 plants found in Minicoy. These include hardwood trees, soft wood trees, shrubs, medicnal herbs and fruit trees. The botanical plants do not seem to be endemic to Lakshadweep with the genus widely found all across Southeast Asia. The plants have to adapt theselves to the coral island attributes and grow taller or shorter as the case maybe. The coconut varieties Lakshadweep ordinary and Lakshadweep micro are endemic to Lakshadweep. These have bee widely used in hybrid coconut breeding programs for developing new varieties, and people visiting the island have also taken coconut germplasm from here to grow on the mainland. All the plants are valued since they are useful in some way or the other. Some are useful for shore protection; others are useful for fencing, medicine, timber, boat building, making implements, shelter etc. The Minicoy islanders, the agriculture department and the CPCRI have also introduced ornamental and horticulture plants from the mainland.

In this section we have a made a list of all the plants valued by carpenters (boat, furniture, implements etc.), hakims (medicines) women (food) and scientists for (shore protection). The resources used are classified as wild and domesticated resources. It must be noted that while Minicoy has a wide diversity of plant resources, the quantity of each species is limited and cannot be harvested commercially.

5.3 Wild resources

5.3.1. Mangroves

Minicoy is the only Island in the UT of Lakshadweep that has Mangroves. Mangroves are plants within the intertidal zone. They are highly adapted to seawater and have unique characteristics and growth habits allow them to survive in harsh environments. Mangroves appear to be useless swampy areas and people regard them as nothing more than a source for firewood, but in reality they have important ecological functions as well as economic uses. These include the following:

- Protection of shoreline, sea grass beds and coral reefs, since they act as a deposition area and are effective binders of sediments. Thereby protecting live corals and sea grass beds from deposits of suspended sand.
- Nursery and spawning ground for some fishes, shrimps and mudcrabs.
- Food and sanctuary for other marine life.
- Support coastal fisheries through the export of excess nutrients to near by water as dissolved and particulate organic matter, which becomes feed for reef organisms.

Unlike the luxuriant riverine mangroves found in other parts of India, the Minicoy Mangroves are in a formative stage. They are small in size and belong to the overwash type and fringe type of Mangroves that are normally found on small islands. There are two patches of Mangroves of one hectare each within this Island.

1. The Patch on the eastern side lies close to close to well No: 3 and adjacent to the 50/60 acres area. It represents the overwashed type of Mangroves and is constituted of a single species Brugeria Cylindrica.
2. The second patch is located in the southwestern side of the Island near the helipad. Here the dominant species is *Ceriops tagal* with three trees of Avicennia marina. This patch represents the fringe type of Mangroves.

Status: The CMFRI has a field office in Minicoy and scientists from CMFRI have been conducting research on these mangroves. They have set up a research quadret for sampling litter fall and growth of the mangroves at well no 3 since the 1990's. They report that the Minicoy Mangroves were free from human interference until 1998.
The Minicoyans themselves have lived in harmony with the mangrove patches. They don't go to this area much because of its swampy nature makes it inconvenient to walk it. A ghost is supposed to live in this patch and people are afraid to go here. Infact most of them do not see any direct benefit to themselves. How ever as one resident put it:

> " Personally I don't know of what use are the Mangrove trees – We don't use the wood for making boats or implements. But Allah has made them and located the patch in Minicoy, surely it is of some use in creation and we should not harm these trees."

Several other residents told us that the Administration of Lakshadweep has banned the felling and disturbance of the Mangrove patches in Minicoy. However while the residents of Minicoy are conscious about the protection being afforded to the Mangrove patch, the PWD Department seems to not value this ecosystem.

The destruction of the overwash mangroves near well number 3, started in 1998, when the Public Works Department constructed a concrete road through the heart of mangrove patch, going through the CMFRI research quadret. The purpose of the concrete road is unclear as it only traverses the mangrove patch and the rest of the road is unpaved. Nobody lives in this area and as mentioned before the Minicoyans do not have any particular use for mangroves. This concrete road has made it possible to reach the eastern shore made up of coral boulders and shingle. Tillers can now go down this road and collect coral boulders for building construction. This is also a banned activity! The long and short of this is that there is an increase in human interference and the destruction of the patch has started and already several trees have been cut down.

The arguments posed by the Junior Engineer of the Public Works Department are that the road was necessary to enable the villagers to cut firewood from their land. According to the chairperson of the Dweep Panchayat, this road is needed to enable VIP's to view the mangroves. These arguments defeat the very purpose of Mangrove protection.

The Fringe type mangroves found near the Helipad are also struggling for its existence. A newly constructed concrete bridge that has replaced the scenic wooden bridge that connected the main road with the helipad and 20 bedded beach resort.

This bridge has divided the ecosystem into two sections and disrupted the tidal flow from the lagoon to the mangrove backwaters. Instead of building a bridge on pillars that would have facilitated water exchange, they have built a dam like structure leaving only two small openings for the purpose of water flow. This leads to the change in direction and the speed of the water flow. Sand is being deposited at the bar mouth and it will gradually close the mouth leading to a stagnant lake where no exchange of water takes place with the open sea.

The mangroves will lose their habitat as the lake becomes stagnant and dries up gradually. Many migratory birds also visit these swampy patches every calendar year between June- October. Some of them are the grey heron, pond heron, curlew, whimbrel and common sand piper. With the destruction of these mangroves the migratory birds will also vanish.

The PWD argues that it was necessary to replace the earlier wooden bridge with this concrete bridge for the road safety of tourists. The Tourism officer also said that there

are plans to deepen and widen this backwater so that tourists could go boating and enjoy the serene environment of the mangroves. Why anyone would want to leave the lagoon that surrounds Minicoy and go boating in this inland backwater of less than a hectare defies imagination. But plans such as this will ensure that this unique ecosystem will disappear. Tourism should only be allowed if it is in harmony with the environment. Digging and dredging of these backwaters will lead to complete destruction of these Mangroves and associated flora and fauna.

Conservation and Management: A national committee on wetlands, mangrove and coral reefs was constituted in 1993. The ministry of environment and forests has recommended certain guidelines for management of mangroves. Some of those recommendations are applicable to the Minicoy Mangroves and if implemented would help in preserving this unique-ecosystem**.**

The Mangrove area of Minicoy, which are presently under the jurisdiction of government departments or private ownership, has to be transferred to the concerned agencies for protection and preservation. The Mincoy Mangroves should be declared as protected area thus preventing any modification or alteration. The local people and students need to be educated about the importance of Minicoy Mangroves through the media, lectures, exhibitions, posters etc.

5.3.2. Medicinal plants

We had a semi-structured interview with two traditional healers in Minicoy and a focus group discussion with housewives to find out the plants that are regularly used for healing. We found that the housewives used both ingredients found locally and also brought from Kerala for curing common ailments.

They said that earlier there used to be a variety of medicinal plants in the Bandaram area. But now after it has been cut up into plots, the plant diversity and numbers have decreased. Hittala – a tuber plant has vanished from the island. Earlier they used to supply tubers to the other islands but now those in need of Hittala get it from friends in Kavaratti where some people cultivate it. Table 5.2 presents some of the medicinal plants, their use and status today.

Table 5.1 Wild plants used for medicinal value

	plants	Common or scientific name	Use	Status Pastt/ present
1	Hihthala	Tacca pinnatifida	The tuber is dried and powdered and is used to relieve chest pain and baby food.	Plentiful in the past but now rarely found people have been getting it from Kavartti.
2	Bilei	Piper betel	It aids in digestion and also used to relieve breathlessness.	Domesticated creeper grown around coconut tree
3	Ruvā	Calotropis gigantea	Leaves and bark have medicinal value used for curing hernia.	On shores
4	Thohbhada	*Papiloncceae family* Canavalia virosa	The leaves are made into a paste and then applied to the part of the body in pain.	Grows as a ground creeper near thundi
5	Binglima	*Launea Pinnatifida*	Leaves and flowers have medicinal value for stomach ailments.	Small shrub grows inbeteeen shingles
6	Rai ammanaka Nu ammanaka	*Riccirun communis*	Medicinal value and seeds are used for making oil. Rai has a red vein in the leaf and Nu has a green vein.	Found in Kodi.
7	Hoduhu Philagus		The bark is used for making agruel and the leaves are used for placing on sores.	Very scarce, found inj bandara

5.3.3. Other trees

We conducted a focus group discussion with a group of Minicoyan boatmakers, carpenters and householders to find out which trees they valued and for what reason. The people explained that every tree and plant in Minicoy was valuable and should be protected. They gather firewood, medicinal plants and trees for timber and boat building from their lands in the Bandara and Kodi area.

The people gather resources from the Bandara area. Earlier Bandara used to be collectively owned by each village but now the villagers individually own it. The landowner has right to the trees and plants on his/her land. This land is now being cleared for a variety of reasons that include farming, house construction, tourist resort, road construction etc. leading to loss of wild plant biodiversity.

Table 5.1 provides a list of trees that are most valued and commonly used by the people of Minicoy. These plants are now found mainly in the north and south bandara area. The valued trees that can grow by coppicing are planted as fencing around the homes. Plants and trees that are protected and allowed to propagate are wild almond, breadfruit and neem. There are not sufficient trees to meet the timber demand on the island and as a result timber is imported from Kerala for making household furniture, implements and even boats.

Table 5.2 Important trees used for by boat makers, carpenters and toy makers

	trees	Common or scientific name	Use	Status Past/ present	Wood Properties light/heavy hard/soft	Is it grown by coppicing or seed
1	Ruh *Dambu ruh* *Rai ruh* Nu ruh *Rath ruh* *Kahari goboli* *Kui ruh* *Teeri ruh*	Cocos nucifera L. Micro L.ordinary L.ordinary L.ordinary	Food, oil, fuel, timber for making boats, furniture, house construction frames. Poles for boat, oar handle and bait net. Leaves use dfor weaving thatch and covering for boats. Kahari goboli, is considered a leader of all coconut trees and should not be cut there are 12 trees on the island	Every where. Kaharai goboli are male infertile trees 10-12 found on island. Kui ruh kernal is very sweet and rath ruh shell is very red. Both are rare1:1000	Heavy Medium hard	Seed
2.	Dihgaè gus	Hibiscus tiliaceus	For toys, models, stools and implements, legs for small kitchen implements. knife handle.	Abundant and best found in Bandara	light	coppice
3	Rannika gus	Ficus bengalensis	Small implements, rolling pin, knife handles etc.	Abundant and best found in Bandara	Heavy and hard	coppice
4	Kandu gus	*Hernandia peltata*	Parts of boats, implements, toys, coconut scraper. Leaves used applying paste medicine on body and for cooking shorteats (anything that needs to be held together while baking).	Abundant and best found in Bandara	Light and soft	Seed
5	Kauni gus	**Cordia subcordata**	Toys, boat models, decorations on boat railing	Abundant	Light & soft	Seed
6	Midili gus/maduh gus 2 kinds 1 varieties wood is reddish	*Termanalia catappa* Wild almond	Parts of boat, paddle blade of oar, Ornamental tree, used in boat making, root used as stirrer in cooking. They eat fruit and kernal.	Bandara and 5 big trees in front of dak bunglow.	Heavy medium hard	Seed

Table 5.1 Continued

	trees	Common or scientific name	Use	Status Pastt/ present	Wood Properties light/heavy hard/soft	Is it grown by coppicing or seed
7	Hiti gus	*Azadirachta indica* (Neem)	Furniture, doors, tool handle, medicine	Abundant in 50/60 acres	Heavy & hard	Not sure
8	Bambukyo gus	Artocarpus incisa Bread fruit	Furniture, doors, knife handle & sheath, fruit used as vegetable	Abundant & a grove near JB school.	Light & soft	coppice
9	Nala mundrika	Muntingia calabura	Furniture, doors	Compounds	Light & soft	Seed
10	Phunā gus	Calophyllum inophyllum	Boat , non-edible oil is taken from seed, flower has medicinal value	Eastern side	Heavy & hard	coppice
11	*Dugedhi*	*Clerodendron ternatea*	Labarhi, handle for tools, legs for stools.	Near thundi, Bandara	Heavy & hard	coppice
12	Teerāni gus	Thespesia populnea	Wood used for making furniture and the tree sap, flower, seed and bark have medicinal value	Planted around house compound	Heavy & medium hard	coppice
13	Uni gus	*Guettarda speciosa*	Fypādu pole, the root, bark, leaf, flower & seed have medicinal value	Wet areas, planted in compounds.	Heavy & hard	coppice
14	Kuredhi gus	Pemphis acidula	Used for making nails to join wooden planks in boats. Tool for removing copra from shell.	Shore mainly rahbheru area.	Very hard & heavy	coppice
15	Ahi gus	Morinda citrifolia	Fypādu fishing land stake, fuel wood.	Near shores and beaches	Heavy & medium hard	coppice
16	Hirandhu gus	Thespesia populnea	Furniture, boat	Marshy places	Heavy and hard	coppice
17	Mārandu gus	Ceriops tagal	Fypādu pole, lathe work, furniture Propogule has medicinal value.	Small patch near the helipad where tidal exchange of water takes place.	Heavy and hard	propogule
18	Kanđhoo	*Brugiera cylindrica*	Fypādu pole,decorations, propogule has medicinal value.	Marshy place	Heavy and hard	propogule
19	Ma-karhikeu gus	Pandanus	Tender part of fruit and kernal are eaten,	Pandaram and Viringli	--	seed
20	Handi-karhikeu gus	Pandanus odoratissimus	Fuel wood, roof frame, fencing, betel vine frame called *madhoo*. root & seed has medicinal value, The inner black seed is boiled and the water drunk for de-worming. Flower has aroma and is used to spread a nice smell in the room.	There was a thick forest in the past but is being cleared in Pandaram.	--	seed
21	Dumburi gus	Ochrosia borbonica	Kitchen stirring tools, furniture	Any where	Heavy and hard	coppice
22	Bohori gus	Tournifortia argentea	Lathe models	Shore	Heavy	coppice
23	Kudehi gus	Ficus tsiela	Light furniture	Eastern side	Heavy	coppice
24	Löess	Pisonia morindifolia	Coffin, support for boats	shore	Light and soft	coppice
25	Magu	Scaevoela Koenjii	Fuel and fodder, leaves also have medicinal value	Easter and southern shore	light	Coppice

5.4 Domesticated resources

5.4.1 Coconut: Coconut is the most important crop in the islands. It is a non-irrigated crop. The land-based economy revolves around the coconut palm. Every part of the coconut tree is utilized. The coconut kernel is processed into copra and provides the islanders with cooking oil, hair oil and cash income. The husk is used for producing coir as well as for smoking tuna. The coconut shell is used for fuel and for making handicrafts. The fronds serve to thatch roofs and weave hats and mats. The haft and mid-rib are used for fencing around houses and making stands for drying fish and copra. The trunks of fallen trees provide rafters and posts for house construction. Nectar (*meera*) from the coconut trees is collected to make palm jaggery and vinegar.

There are five types of coconut palms commonly found in all the islands. The islanders plant all five varieties all the time. These varieties are identified by their colour and size. Table 5.3 provides a description of these coconut varieties. The Lakshadweep ordinary is the preferred variety for copra and the dwarf varieties are important since they contain plenty of water and the Ramzan fasts are broken only by drinking coconut water.

Box 5.1: Case study of a Raveri (Coconut Climber) February 2003

Mariam and Ali kaka are a husband and wife team whose main income source is from tending coconut trees. They are residents of Kendiparti Village and have 4 children, their oldest daughter Shamina aged 20 is married to a seaman and the younger children are still at school. They are hoping that their son will be a seaman after he completes school. Maraim and Ali kaka live in Kandigothi and share the home with Mariam's extended family of several sisters their spouses and children. All the men in the house can tend and climb coconut trees. The women assist by making hakkaru (palm jaggery), copra, and hikki mass (dried tuna). They are still a traditional family that lives from the land.

Ali Kaka has an understanding with a Manikfan family in Divehi ganduar and takes care of their coconut plantation. He estimates that he has the responsibility to care for approximately 500 coconut trees on the northern side of the island. Ali plucks the coconuts and he gets 3 coconuts in payment for every 10 plucked. While Ali finds it difficult to give an exact count of coconut s plucked he feels that it will be around a 1000 / month. With the payment of nuts they are able to get enough coconut cooking oil for their family for the whole year. They also sell some oil at Rs 65/kg and the remaining coconut is converted to copra and sold to the society.

Eight coconut trees are designated every year for meera collection and the trees are rotated. *Meera* is collected continuously from the tree for six months. Once the new flower blossoms *meera* collection from the tree is stopped and another tree is designated for *meera* collection. Properly managed *meera* collection helps in enhancing the tree growth and the people believe that the coconut yield will increase. Best *meera* is tapped from October-May He taps *meera* twice a day. In the morning he taps meera from 8 trees for an hour between 7:00 and 9:00 am. In the evening he taps *meera* for less than an hour between 4: to 6:00 pm. He can collect 6 lt of *meera* in the morning collection and 3 litres in the afternoon. The *meera* collected in the morning is of better quality than the afternoon. From this *meera* they make roughly 2 kg of hakkaru in the morning and ½ kg in the evening on a daily basis. *Hakkaru* sells for Rs 150 per Kg. He has plenty of orders and has no problem with marketing. They can make Rs 6000/month from making *hakkaru* in the fair season.

There are approximately 20 active *meera* tapping families and coconut climbers (all over 45 years old). 16 live in fallesary and kendiparty, 2 in Bada and 2 in Aoumagu.

The case study in box 5.1 describes the current situation with regard to the coconut tending occupation. Despite it being lucrative the younger generation do not want to take up this occupation since it is considered a low caste associated derogatory occupation. There is however a great dependency on coconut in their daily life since it is needed for a variety for uses from food to furniture. Therefore they continue to plant coconut trees and today it is not uncommon to see labour from Kerala and even Tamilnadu work as coconut climbers and replace the raveris.

5.4.2 Other domesticated resources:

The other fruit trees being cultivated in Minicoy include banana, drumstick, lemon, sapota, curry leaf and betal leaf. Cultivation is restricted to one or to trees in their gardens. Banana is however being grown on bigger proportions in the 50-60 acres area. This has now been banned by a government order in May 2003, since it is adversely affecting the fresh water lens.

5.4.3 Animal husbandry: The animals raised are goats, cows and poultry. These are mostly a nondescript variety and are raised for slaughter during marriage or festival feasts.

5.5 Conclusion

Biodiversity management of plants in Lakshadweep are really the story of coconut management. Infact most of the loss of plant biodiversity on the islands has been due to clearing land to plant coconut trees. Thick forests of Pandanus hyave also been cleared to extend housing for government servants, school buildings and helipad.

The CPCRI complex in Minicoy has used the germplasm of the Lakshadweep ordinary and dwarf varieties to produce new popular hybrid varieties called DxT and TxD. This is because the lakshadweep varieties have the properties of being good ovule and pollen parents. These varieties are widely available in almost all the coconut reearh stations under ICAR, and the TNAU situated in Aliyar nagar also utilizes the seed materials of all such varieties. Pure stands of Lakshadweep varieties are also being grown in these research stations for research and hybridization purposes.

Chapter 6: Stakeholder Characteristics

In this study we are concerned with the relationship between stakeholders and the impacts of human activity on the reef related resources.

The Minicoy stakeholders are represented by

1. The Lakshadweep Administration, which has absolute authority to administer the islands and the seas surrounding it.
2. The Minicoy Islanders who occupied these Islands several centuries ago and now hold *scheduled tribe status*.
3. The Government servants including other islanders posted on duty at Minicoy.
4. The Contract labourers, who come to Minicoy on a contract as construction labour, for 10 months at a time from Tamilnadu (Tuticorin/Tanjavur) and Kerala.
5. Institutions/organizations.

6.1 The Administration

The Lakshadweep Islands have always been controlled and administrated by rulers from the mainland of India. In the early days, when the UT of Lakshadweep was known as Laccdive, Minicoy and Aminidive group of Islands, a two-tired system of governance was followed in which an Amin locally called *Veringh* and his deputy called *Gifty* and a council of 6 people called *kursivalas* administered the island population. The Island was divided into villages and each village was administered by a bodukaka and bodudhatha. They had the responsibility to settle disputes, maintain law and order in the island. In extreme cases a *Kacheri* was held in the island whereby written complaints were received and put for settlement.

The British appointed an Amin to represent them in local governance. In the post-independence period, the administration created a Block Development Committee followed by a Citizen's Council comprising 15 members from each island in 1958-59. This was replaced by an Island Council in 1990. All these councils/committees had no real administrative powers and their members were appointed by the administration. In 1997, a *Dweep Panchayat* was formed with democratically elected leaders. The Dweep Panchayat represents the political party in power and assists the administration. Welfare, employment schemes and Science and Technology projects are routed through the *Dweep Panchayat*.

The Administration has changed hands with the decline and fall of empires, however the direction of economic development continues to come from the mainland of India. The same bureaucratic model as the rest of India is also followed in the UT of Lakshadweep. Around 54 departments govern the people of Lakshadweep. Earlier most of the staff employed came from the mainland; today Islanders themselves fill several of the department posts.

Today the top Administration staff comes on a posting to the Islands with tenure for 3 years. The top administration comprises:

1. Island Administrator
2. The Collector cum Development Commissioner
3. The Superintendent of Police
4. The Secretary Environment

Islanders fill the other posts as far as possible. Key posts such as the director of fisheries, tourism, science and technology often remain vacant. They are managed by a deputy director or acting director, who is usually an Islander. Frequently one department head holds an extra charge of another department.

6.2. The Minicoy Islanders

6.2.1. Socio-cultural and social status

Today Minicoy has a fairly egalitarian society where every body is treated as equal. In the past a caste system based on occupation, used to prevail here, where the Manikfans formed the aristocracy, followed by the Thakrus, boat builders and sailors and the Raveris, coconut climbers. The *Raveri's* were dependent on the *Manikfans* for work and often working relationships developed between *Manikfan* households with those of the working class, for eg. a particular *Raveri* family would look after and process the coconuts and fish owned by a *Manikfan* family and receive payment in kind. Traces of this working relationship can still be seen among a few households between the Aloadi Village and Fallessery Village. Owing to the affirmative action schemes of the Government of India, people of the lower caste have prospered. They have taken to higher education and secured government jobs. On the surface there is no longer a caste differentiation, however during arranged marriages, an alliance is sought from a family of the same caste status. (for details of social culture and village system refer Chapter 3)

6.2.2. Land Tenure

Earlier the bandara lands were under the collective ownership of the village. The individuals had usufruct rights and the bandara belonged to the community. Once the Lakshadweep Administration started to function, this land was brought under the ownership of the government since individuals did not hold title to the land but only had usufruct rights to collect wild resources from the land. The collective ownership of land by the community was disregarded. In the 1970's, the land was divided village wise and parceled out as patta to individuals belonging to the village.

6.2.3. Demography

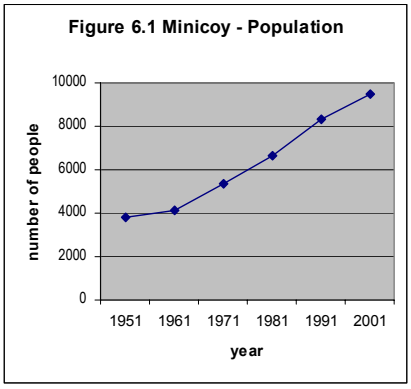
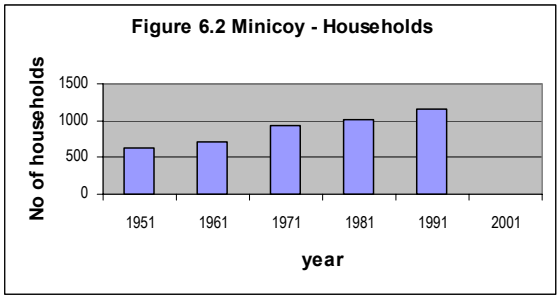


Figure 6.1 and Figure 6.2, show that Minicoy has a steadily growing population. The decadal increase of population has dropped to 14.12 in 1991-2001 from 24.96 for 1981-91. The 2001 census reports that the population of Minicoy is 9495, with 4616 males and 4879 females. This includes 300 laborers from Tamilnadu and 670 government staff from other islands and Kerala.

Minicoy has registered the highest sex ratio of 1057 females per 1000 males as against 947 in Lakshadweep. The birth rate is 7.13 and death rate is 5.79. The Infant Mortality Rate and Maternal Mortality rate is 0. Literacy rate here is 93.01 %. Out of the total literate population of 7781, females are 3926 and Males 3855. All these demography rates show a high Human development index as compared to the rest of India. (Source: Directorate of Medical Services, Kavaratti).

The population density in 2001 is 2163/ km^2 as against 1895 / km^2 in 1991 and 839/ km^2 in 1951. The rise in population has led to an increase in the number of households, which have doubled since 1951. The 1991 Census reports a total number of 1165 households in Minicoy Island. [4]



6.2.4 Household survey & Daily Routine Analysis

The total number of households in Minicoy are said to be 1200 according to the Dweep Panchath. We conducted a household survey of 15% to assess gender values, reef dependency; main and supplementary sources of Income; and Income distribution across the island population. According to the household survey, the Joint families are the rule and it is common to find three and even four generations living under one roof. The average household size is 8.75. The largest household surveyed consisted of 26 members and the smallest a nuclear family of two.

6.2.5 Status of women

Women enjoy a special status in a matrilineal society being the house owners. This system is still firmly in place. 98 % of the households surveyed reported that the house they lived in belonged to their mother. Gender equality is seen, in that each village has a headman and headwoman. Women partake in all aspects of traditional economic sphere. They take care of the tuna processing into *hiki mus smoked and* dried tuna fillets. Boat owners who do not have enough women in the family are forced to give out the tuna to households with many women, who can process the tuna for them.

The bridegroom has to provide all the household furniture and ornaments to the bride during marriage. Women are free to take up higher studies and work. Women are pampered and taken care of, by the men, yet they aspire for government jobs and their own independent incomes. However income-earning opportunities are few on the island and therefore it is difficult for a single woman to be economically independent.

The daily routine analysis throws light on the emerging changes in attitudes to work and time use that community has. This exercise carried out with women from different age group, marital status and educational status showed a marked variation in attitude towards traditional work and therefore the time spent on various activities.

The uneducated women in an extended family spends 90% of her time in activities of common interest such as cleaning the house, washing, collecting firewood, child care and care for the elderly. Apart from the prayer sessions, she was found to be involved in different chores till 1:00 am. Educated self employed and educated unemployed women spent more time on leisure activities such as watching T.V, socializing and sleeping.

The individual variations in temperament and motivation are obvious through this exercise. For example some of the unemployed educated woman had the initiative to self employ themselves by conducting tuitions, tailoring or joining Self Help groups. Others whiled away their time waiting for an employment opportunity in a government job. The uneducated woman who didn't have the option of getting a government job

[4] The Minicoy Dweep Panchayath office gave 1200 as the total number of households during the study period.

made herself useful in the household activities and traditional fish processing activities, that ensured that the family had a regular supply of fish.

6.2.6. Pattern of employment and sources of Income

In Minicoy the traditional income source came from pole and line tuna fishing, tuna fish processing and the products derived from the coconut tree − copra, jaggery and coir. External income came from serving on ships as seamen.

They had a well-developed trade based economy where the island produce of coir, coir rope, copra and tuna *mus* was exported to the Malabar coast, Tamilnadu, Srilanka and Bengal. While the men caught the fish, climbed the trees and sailed the Odams, it was women who did all the processing of fish and copra and made the coir ropes.

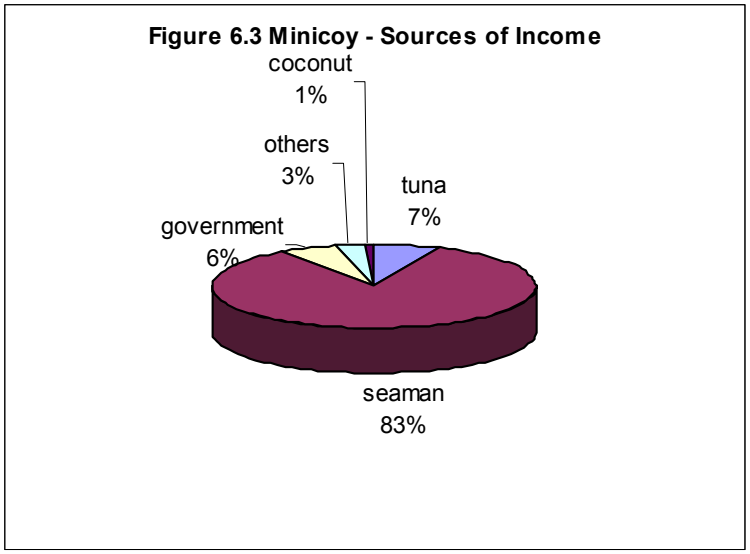
The women lost a self-employment activity with the decline in demand of coir rope. Commercial exploitation of the marine resources started in the 1960's with the introduction of mechanized fishing boats and the promotion of deep-sea fishing as an Income generating activity by the Government of India.

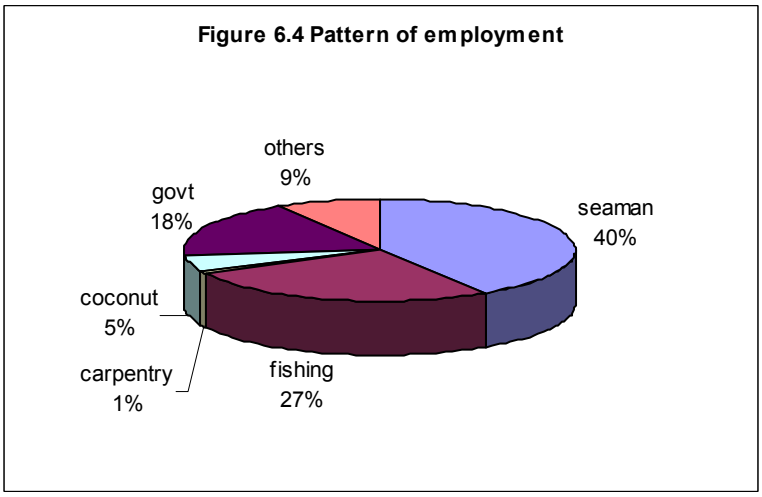
The main sources of income now are from working on ships as seamen, tuna fishing, government jobs, coconut work and others (self employment in businesses such as carpentry, grocery shops, and repair workshops). Most of the households including the non-Minicoyan, tend to supplement the basic income with reef related activities such as cast-netting, line fishing, cowry and shingle collection. 35% of the households rear a few goats, hens or grow vegetables as a dietary supplement. During the household survey 50 % of the non-Minicoyan households reported that they enjoyed collecting cowrys, octopus, net or line fishing in the lagoon and eastern shore. 40% of Minicoyan households reported that they enjoyed line fishing with boat in the lagoon. They regarded this as a recreational activity. Approximately 30 households from Fallesery and Kendifaaty villages carry out serious net fishing.

As can be seen from figure 6.3 and 6.4, seamen jobs are the most lucrative income earners. 40% of the households have at least one person employed as seamen on both domestic and International ships. They contribute 83% of the total Island income. 36% of the households have at least one person employed in tuna fishing either as boat owner or crew. These make up 27% of the total employed persons on the island. They contribute toward 7% of the island income. 18% of the employed persons or on a government pay scale they earn 6% of the total income generated in the Island. 10% of the gainfully employed people report self-employment in carpentry, construction, workshops and grocery shops. They contribute to 3% of the total island income. 5% of the employed persons earn their basic income from coconut cultivation or harvesting. This contributes to 1% of the total Island income.

6.2.7. Distribution of Income and standard of living

Most of the households surveyed have multiple sources of income. The usual combination was Seamen/fishing/agriculture and outside employment. Since seamen work for only 6-9 months a year, they employ themselves in fixing their homes, boat, carpentry work or tuna fishing when on the island. Because of the earnings from seamen, the average percapita income in Minicoy is much higher than the other islands of Lakshadweep.





A household with more than two men employed as seamen is considered a well to do house. The young men aspire to be seamen since they can earn incomes compared to government officers and start earning immediately after competing high school. Seamen earn roughly 15,000-30,000 per month. On the down side they have an employment term of 6-9 months during a year with no guarantee that they will be employed the next year. Income is related to the ability to earn and be gainfully employed. Seamen jobs are becoming more competitive and a CDC training certificate is required before one can get a job. This training costs between Rs 75,000/- to 100,000/- and also means that the young man has to be supported while he completes his training on the mainland. Earlier one only needed to complete 8-10 years of schooling on the island.

> To quote an elderly seaman: “we earn from the water (sea) and the earnings are also spent like water”

This household income and percapita income is not evenly distributed. Several people within an apparently rich household have no personal income and are dependent on the earning members to satisfy their needs. Seven percent of the households surveyed, earned less than 15000/annum and were below the poverty line. This included 3 households with no income at all. These households do not have an able-bodied

gainfully employed male. No one starves simply because as members of a village (*avah*) the other well to do households support them.

The inflow outflow analysis carried out for 20 households in Minicoy revealed a consumerist attitude. Inflow from the island consisted of coconut oil, coconut and fish. Hence they were able to meet their dietary protein needs from island resources. As the standard of living is high, most households had brought labor saving kitchen appliances from the mainland and were dependent on basic cereals and a variety of processed foods from the mainland. The outflow is limited to those households that still made dried fish *hikimas* and *copra*. The inflow rate is higher than the outflow rate and a high purchasing power is needed to maintain this lifestyle.

The overall impression is that the people live and eat well, a survey of goods available in the grocery stores, shows that the people have purchasing power and can afford premium quality cereals and other basic household goods. 96% of the households surveyed possessed basic assets, such as a Colour T.V, telephone, electricity connection, kitchen appliances and some mode of transportation.

6.3. The Government servants

The Government servants posted on duty at Minicoy include the Navy and special police forces. They come from the other Islands and mainland. Their entry into the Islands is comparatively recent and today they number has grown to 670 families. These people have a regular salaried income, are provided quarters in the 50/60 acre area and live separately from the Minicoyans. While these people have brought with them their own values, attitudes and technologies for harnessing resources, they do not have an understanding of the fragile ecology of Minicoy Island.

The other islanders, who come from a similar ecosystem understand the value of the reef resources and desire to collect these resources to supplement their income, despite their assured salary income. 50 % of the government servant's household surveyed said that they partook in reef related such as fishing and cowry collection activities for recreation. 60% said that they cultivated a small vegetable garden and owned goats or hens for home consumption.

Some of the harmful activities are banana cultivation by breaking the hard strata to plant the banana. This helps the banana to thrive but, depletes and contaminates the fresh water lens. They have introduced alien methods of fishing such as *shal kakal, nets and* octopus hunting which have a harmful effect on the corals. Cultural conflict with regard to bioresource use comes into play here, since these people do not respect Minicoyan traditions towards resource use.

6.4. Contract laborers from Mainland

There are three hundred laborers from the mainland who are in Minicoy on contract and work in various private and government construction sites. These laborers are single men who live together as a group. They earn around Rupees six thousand a month and live very austerely so that can make savings. Some of them have been here since 13 years and are content with their life here because of the calm atmosphere, the cultured attitude, lack of hierarchy and timely payment of wages by the employers, their inclusion into events like marriages, festivities and being able to save money, to send back home in Tamilnadu.

The contractor arranges their permit, which lasts for a maximum of 10 months, after which it has to be renewed. The people are mostly from Tanjore -Tuticorin area in Tamilnadu or the Vypeen Island, Kochi and Calicut areas in Kerala.

The Tamilnadu labourers live in rented houses in South Bandara area. The people from Tamilnadu (with whom a focus group discussion was conducted) basically belong to the landless agricultural laborer class. They have been displaced due to drought, land use changes and inadequacy of rains. The laborers from Thanjavur, expressed ignorance to use the marine resources surrounding the islands, but the ones from Tuticorin are familiar with coral reef resources.

The group from Kerala appeared more aggressive and can interact more easily with the island population since most Minicoyans understand rudimentary Malayalam. They were experimenting with reef – lagoon fishing and had the attitude to do so because they came from coastal zones like Calicut and Kochi.

6.5. Other organizations

The other organizations that have a stake-hold in Minicoy Island comprise, research Units of the Indian Council for Agricultural Research such as the Central Marine Fisheries Research Institute (CMFRI) and Central Plantation Crop Research Institute (CPCRI) and the Lakshadweep Development Corporation Ltd., Tuna Canning Factory.

CMFRI: the CMFRI research station established in 1956 carries out studies on Marine resources of Lakshadweep, including Mangrove, coral reef and sea grass ecosystems. They also have programs for augmentation of Marine fish production, Mari-culture and ornamental fish culture.

CPCRI: the CPCRI regional station in Minicoy established in 1976 has the aim of evolving location specific technologies for increasing coconut productivity, poultry, dairy farming, plant protection and introducing horticulture crops such as banana, lemons and vegetables.

LDCL: The LDCL has taken over the Tuna factory, which was established in 1969 and was set up to address the marketing needs of the tuna fishermen.

All these institutions occupy fairly large areas of prime land and have been in existence for more than 30 years.

6.6 Relationship between Stakeholders

The relationship between stakeholders in Minicoy is based on the dependence and attitude towards the islands bioresources. All the stakeholders have variations in their interaction with this, which in turn determines the inter-stakeholder relationship.

The Minicoy islanders have a two-pronged relation with the islands resources. They have lived here the longest and have developed a keen understanding of their ecosystem. They are dependent on the marine resources for their livelihoods and survival. They shared the resources amongst themselves and protected overuse through their village institutions and customary laws.

The non-Minicoy islanders and mainlanders (who are posted here as employees in Government departments) represent not only the bureaucracy, but are seen as people who do not respect the island tradition, nor do they pay heed to the Administration notifications with regard to schedule 1 of the Wildlife act. They have an extractive attitude towards island resources and this has influenced adversely their relationship

with the Minicoyans. There is a feeling that what the Minicoy islanders have conserved with prudence is now freely available for indiscriminate consumption by others

These resources have become threatened due to ignorant and wrong decisions made by the government administration in the past in the name of economic progress. For example blasting the coral boulders to deepen the navigation channel in the 1980's and breaking the hard strata to plant horticulture crops.

The decadal increase in population has increased the dependence on the bio-resources in terms of sheer numbers and similarly the increase in the number of non-Minicoyans has added more stress on the ecosystem due to indiscriminate resource use.

Protection of Natural resources is seen as the duty of the department of Science and Technology and the Department of Environment, personnel only. The other departments argue that you cannot stop development activities for the sake of the environment. Awareness programs, and an informing and influencing strategy, is needed to ensure that every person and government department in Minicoy should feel responsibility towards protection and conservation of natural resources. And not single out the personnel of the department of Science and Technology and Department of Environment to carry out this mammoth task.

For optimum conservation and management of bio-resources priority has to be given to the usage patterns of the local community, whose subsistence livelihoods are dependent exclusively on the bio-resources. A licensing system can be introduced for the lagoon and reef dependent fishing activities, whereby only the reef dependent Minicoy families are provided licenses for net fishing.

Legislation needs to be passed that people on posting to a particular island should respect local culture and not carry out agriculture, reef gleaning and net fishing activities. These activities adversely affect the Island eco-system and compete with the subsistence livelihoods of the local people.

Chapter 7: Resource Governance

7.1. Customary Laws and Practices

We held focused group discussions and individual interviews with village elders, headmen and women to discuss customary law, practices and traditions in the Minicoy Island. Subsequently two focused group discussions were held with knowledgeable fishermen to learn about customary practices on resource usage and sharing. The aim was to find out whether the Minicoy Islanders had developed any customary laws or practices in relation with the usage of reef resources and fishing. The resource persons were given a set of key questions and subjects that needed to be discussed with reference to the customary laws of their society.

The elders explained that in the early days, when the UT of Lakshadweep was known as Laccdive, Minicoy and Aminidive group of Islands, a two-tiered system of governance was followed in which an Amin locally called *Veringh* and his deputy called *Gifty* and a council of 6 people called *kursivalas* administered the island population. They were responsible to settle disputes, maintain law and order. In extreme cases a *Kacheri* was held in the island whereby written complaints were received and put for settlement.

The Basic communal unit is the household presided over by a senior woman. The households are grouped into 10 villages called *Avah,* wrongly reported *as athiri* in the Lakshadweep Gazeteer *(Mannadiar: 1977.* Two *Bodukāka* (headman) and two *Bodudātha* (headwoman) administer each *avah*. The first *Bodukāka* looks after internal matters and the second looks after external affairs. They also administer all the male duties such as hauling the boats onshore, fishing, collection of boulders for safe guarding and marking the boundary of the village *athiri*. Similarly the *Bodudātha,* administer all the female duties and are in charge of keeping the village area clean, preparing the village feasts, carrying out all the post harvest tuna work, preparing copra, coir rope making etc. The female duties were carried out in a female village house called *Varhange* and the males had their own space in a common house called *Avarhuge*.

The village assembly is called *baemedu* and an island assembly of all the villages is called *Havaru*. The village head can calls *the baemadu*, but only the *Veringh* could demand an havaruh. An announcement would be made for the islanders to gather together. The gathering could be called for any purpose from hauling or launching of an Odi (*sailing ship*) or announcing an accident/death or to discuss a matter of common concern. Clearly a native Minicoyan had to perform several formal obligations.

1. To the island – perform Island duties at the bidding of the Veringh.
2. To the A*vah* – perform village duties at the bidding of Village heads.

To the family unit. – perform home duties at the bidding of the matriarch.

A demand for their time could come from any source and they are obliged to perform their duties. In turn all three units looked after the individual. The customary laws of Minicoy followed Individual rights and communal sharing.

***7.1.1 Property rights*:** As per the customs, the house goes to the female members of a family but a male member has the right to a “Cot” in that house till his death.

Land is inherited according to *shariat* law and in the absence of a will 2/3 of the land will go to male heirs and 1/3 to female heirs. But only a few families follow this.

The carpentry equipments (hammer, chisel) are given to the eldest male in the family, but on his death it can be given to both the male and female members. The household articles like utensils and *'fattaru'* goes to the female members. The yield (Coconut or Banbukun) from the land is given to the female members and their family.

7.1.2 Water: The people took great care to protect the fresh water source. They did not dig wells in the Pandaram lands, because they considered this as their water reservoir. People took care not to break the hard strata that covered the fresh water lens.

Drinking water is collected from special wells located at selected places, such as, Juma Masjid. Women fetch water for the home in decorative drums and pots called *tappu* and *bandiya*. Today they have been replaced by plastic buckets. Every house has an open well from which water is hand drawn or pumped out.

'Bodu valus' are bathing and washing tanks in the inhabited area with well framed steps around 4 sides. There were separate *bodu valus* for males and females in every village. The village head maintained cleanliness through the *baemedu* system.

7.1.3 Land use rights: Since land was held as a common village property a series of customary practices were prevalent to maintain discipline and equitable sharing of resources on the island. Some of these practices are:

- *Badhi:* This relates to the usage of coconut trees. A person can rent a certain number of coconut trees for a fixed period from another decided by a '*karar*' (agreement). Payment can be made in cash or kind (fresh fish or mus)
- *Mathiruh:* is an agreement by which a person who needs to cut down a particular coconut tree belonging to someone else can exchange it with a tree belonging to the other person. The person whose tree is cut will have a right over the exchanged tree till it falls & dies.
- A person can lease land for cultivation and in return share the 50% of the yield with the land owner**.**
- *Usufruct rights:* the fallen parts of coconut tree (like coconuts and leaves) can be collected by any person from any where as long as it is not a property of the mosque.
- The mosque has special cultivated plots of land on the island. The yield goes to the person who takes care of the proceedings of the mosque.
- *Olu* are the small ponds for soaking the coconut husk for making coir. A person can dig an *'Olu'* in some other person's land with his permission. He has temporary rights over the '*Olu'* till that purpose of coir making is completed.
- "*Hunivalus"* are pits used for making calcium carbonate (lime) for house construction and chewing with betel leaf. These are also governed by the same rules as 'Olu'.

7.1.4 Customary practice before the partitioning of Bandaram *:* Earlier the bandara lands were under the collective ownership of the village. The individuals had usufruct rights while the Bandara belonged to the community. When the Lakshadweep Administration started to function, this land was brought under the ownership of the government since individuals did not hold title to the land but only had usufruct rights to collect wild resources from the land. The collective ownership of land by the community was disregarded. In the 1970's, the land was divided village wise and parceled out as patta to individuals belonging to the village.

Table 7.1 Customary practices in Minicoy Island

Past	Present	Remarks
Land rights		
The villages are set close to each other and village families owned their own property within the village area and the Pandaram lands belonged to each village unit. The village members were responsible for maintaining these lands and had usufruct rights on the produce of these lands. Similarly Viringli island belonged to the people of MInicoy and it was the duty of every village in rotation to care for the Island and maintain it. In the past small pox patients were kept here and looked after by the designated village.	Pandaram lands are owned individually. Each person has the right to all the resources of trees etc. on his/her own land and is free to do what he/she likes on the land. Such as farm, build houses, clear the vegetation mine the ground etc.	When the administration-changed hands, the new administration did not take into account customary understandings and declared the unoccupied land as no mans land and hence government land. This land was re-alloted as individual property to each islander present on the island at that time, regardless of gender and age. Thereby weakening both the matrilineal system and the hold of the Village head on administering the well being of the property. Viringli island comes under the jurisdiction of the Indian Government.
Property rights		
The family house is inherited through the female line succession. And the male members only have a right to a bed in the house. It is their responsibility to earn money to maintain the house and the mother and wife administer the spending.	The system is still in place. Though in some cases the Male members have started acquiring their personal property. In these cases the *Shariat* is applied for property division.	Most people still agree that property should be inherited through the female line only.
Fresh water		
The people took great care to protect the fresh water source. There were no wells in the Pandaram lands. People took care not to break the hard strata that covered the fresh water lens.	With introduction of agriculture and advice from the agriculture experts, the hard strata has been cut to plant trees especially banana in the 50-60 acres, government quarters area. This has led to unsustainable use of the fresh water lens.	The holy book says that water is a commodity the value of which will appreciate with time. But people feel that this generation wastes a lot of water and do not use it prudently. Breaking of the hard strata for planting bananas has led to contamination and over use of the ground water lens
Law and order		
The Veringh & Kursiwalas maintained law and order on the Island. The Bodukaka and Boduthatha maintain law and order in the village, with simple unwritten rules. For e.g 3 knots tied on a coconut leaf meant STOP – don't proceed further. No one even thought about disobeying this practice.	This system is no longer in vogue, though people still remember it. Now there is a police force, Island Administration and Dweep Panchayath. Laws are regularly broken. Stealing an unknown crime has begun.	People feel that the eroding of customary practices has led to an erosion of values also. The people on posting do not have any obligation to follow minicoy practices even when it applies to Island resource and lagoon usage.
Lagoon usage		
A strict code of conduct was followed in fishing within the lagoon, taking maximum care not to disturb the bait fishing grounds. Net fishing is not allowed in the village harbor areas.	This code is still followed by the Minicoy tuna fishermen. But lagoon fishery no longer remains completely under the control of the Minicoy people.	Other islanders and mainlanders on posting in Minicoy also use the lagoon and have introduced a variety of fishing practices. These do not pay respect to the Minicoy Code of conduct and has raised a number of problems.

During the period when the pandaram was owned collectively by the village, the male and female members went to the Bandaram on special separate days for collecting coconut, firewood and other trees. The Bodukāka managed the land resources and decided on the time people could go for resource collection known as *sabilla*. Governance was simple and everyone obeyed the rules. Three knots tied on a coconut leaf – meant that no one could proceed further and when released it meant people could go for resource collection to their allotted areas.

The firewood is collected in bundles from the allotted areas. Mothers who were feeding the children were allotted Bandaram lands closest to the village so that it would be easier for them to reach back home. Each village has its own area identified by special roads or paths leading to it. The bundles are collected and kept in special places to be brought to the village athiri by rowboats. The families can identify their part of the firewood by making a special marking in that part of the coconut leaf attached to their bundle. Later these markings were replaced by the alphabet denoting house names. It was the bodudātha's responsibility to check that the fuel wood bundles only contained fallen twigs and dead wood and no living branch had been taken. Individuals could not take the tree stumps, as they were needed for carpentry works in the village house.

7.1.5 Miscellaneous

- *Birth and Death:* The Veringh or Kateeb kept a register of birth and death in earlier days. People did not note the birthday but kept a relative record of the birth and death with some special occasions or related to another person's death or birth.
- *Marriage and Divorce:* Muslim law applies to Marriage and divorce. However in accordance to the matrilineal society, the husband moved into the wife's house after marriage. Extra marital affairs were frowned upon and people having illicit relations were publicly shamed by exposing them at *Kandi arhi.*
- *Health Care:* The extended family takes care of the elderly and sick. E*duru dātha* or the local midwives took care of the pregnant women and the baby's delivery. She would live with the pregnant woman two months prior to delivery and leave after taking the mother for a sea bath 3 days after the baby's delivery. This is when the family could officially celebrate the birth of the child. In return, the family would provide food and clothes to the *eduru dātha*.
- *Barter System:* A barter system was followed by which islanders would exchange coconut jaggery, coir rope, copra, fish or dried fish for essential rations of cereal, kerosene and sugar at the shops. This kind of barter is in vogue even now since tuna is accepted as currency. A person who carries out work for a tuna fisherman is likely to be paid in fish.

7.1.6 Marine - Lagoon Usage

7.1.6.1 Bait Fish collection in the lagoon: Pole and Line tuna fishing is dependent on bait availability from the lagoon area. The Minicoyans divide the baitfish into two types 1. Resident baitfish & 2. Migratory baitfish. They are conversant with fish behaviour and explain that *Bodhi* lives close to coral patches and feeds around coral boulders. They are caught easily in the dark. The bait fishers go to the boulder before dawn and wait for the bait to return to the boulder. They place a net circumbulating the boulder, at sun rise the bodhi start moving towards the boulder and are caught in the net and immediately transferred to the bait tank on the boat.

Nilamehi lives around branching coral which was very plentiful in the southern reef. This area was destroyed in the late 70's when the port and harbour works department blasted coral boulders in the lagoon to dredge and deepen the navigation channel. Now *Nilamehi* can no longer be found in the lagoon as in the words of a minicoyan fisher "its home has been destroyed so it has vanished and has no place to live in the lagoon'

The Minicoyans have developed a series of management actions/ customary laws with regard to lagoon usage to ensure that the pole and line tuna fisheries do not collapse.

There are two laws that the people of Minicoy recognize for bait fish collection.

- *Marking individual bait fish grounds:* Baitfish is generally available around boulders and sandy areas close to coral boulders. Tuna fishing boats are allowed to select a boulder exclusively for their own baitfish collection. It is a free for all situations in unmarked boulder sites.

  To give an equal access to all boulders to all boat owners, this boulder selection is held every year. All the 45 boat captains meet and discuss the bait collection area issue. There is an agreement that all the boat owners must identify their location within a three-day period. Disagreements are settled on the 3rd day and after that all boat owners abide by the decision for the entire year. The Shabaz boat owners have marked a boulder site in Kadinma magu for the past 25 years with agreement from the other boat captains.

  The boat captains and crew mark the chosen boulder with wooden poles (kani) and other waste material such as tube lights to identify their spot. This serves a double purpose since besides being a bait collection place marker it also serves as a navigation aid for other crafts sailing in the lagoon.

- *Bodhi Bait fish collection:* The Bodhi is a resident baitfish associated with coral boulders. Since the fishermen realize that the spawning grounds for this fish is within the lagoon they do not capture through out the tuna season. There is closed period for *Bodhi* collection from May-November 15th. In 2002 the Tuna fishing season started on the 1st of September. The fishermen started to collect *bodhi* only after the 15th of November**.**

7.1.6.2 Boulder Collection for Village demarcation: There are 10 villages in Minicoy, with their own landing site called *Athiri*. The Minicoyans have built breakwaters using coral boulders collected from the lagoon to demarcate individual athiri sites. These boulders were collected from *Tharāthéré* a site in the southern lagoon adjoining Viringli. In the late 1980's the people realized that removal of boulders from *Tharāthéré* was adversely affecting the baitfish collection for a resident baitfish called *Nilamahi, which* is associated with branching coral locally called *Muraka*. The village head persons called a meeting and took a decision to stop collection of boulder coral from *Tharāthéré*.

The customary laws and practices are still in vogue, but only the native Minicoyans understand and obey them. Minicoyans complain that the erosion of these practices is leading to unsustainable resource use. The other islanders and mainlanders on posting do not have any obligation to follow Minicoy practices even when it applies to Island resource usage, since the Administration of Lakshadweep now carries out the Island administration. This has led to some bitterness between Minicoyans and other Islanders.

7.2 Applicable protection Acts and Current legal status

Several acts provide for regulation of activities potentially influencing coral reefs and associated flora and fauna in UT of Lakshadweep. These acts are presented in Table 7.2. It can be noted that until 1972 all the laws and notifications addressed the settlement and land issues in Lakshadweep.

Table 7.2 Laws applicable to Land regulation and Biodiversity in Lakshadweep

Dates	Laws
1959	1. Laccadive Islands & Minicoy Regulation an Rules 2. Survey and Boundary Regulations – this was modified in 1976 and 1979 supplementary rules were published.
1965	The Laccadive, Minicoy and Amindivi Islands land revenue and tenancy regulations. To provide for the settlement and assessment of land revenue rights relating to land in the UT of Lakshadweep. By ministry of law (department of legislative) New Delhi – 15th July 1965
1968	The Laccadive, Minicoy and Amindivi Islands land revenue and tenancy regulation rules.
1973	Laccadive Minicoy & Amindivi islands (Alternation of name) Act – renamed as Lakshadweep by ministry of Home affairs, GoI, New Delhi – 15th October, 1973.
1979	Survey and Boundary Regulations Supplementary Rules.
	Biodiversity/Coast Management
1972	Wild Life Protection Act
1973	1. Wild (Life Transactions& Taxidency) Lakshadweep rules 2. Lakshadweep Wild Life (Stock declaration) Rules. By Ministry of Agriculture, GOI, New Delhi – Nov, 1973.
1991	Coastal Zone Regulation by Ministry of Environment and Forests, GOI, New Delhi 19th Feb,1991 This regulation financed under section – 3 (1) and section – 3 (2) of the Environment (protection) act 1986 and Rule – 5 (3) of DoE (Protection) rules, 1986. Declaring coastal stretches as Coastal Regulation Zone (CRZ) and regulating activities in the CRZ.
1996	Coastal Zone Management Plan for UT of Lakshadweep by DSTE, Kavaratti 20th Nov, 1996.
1998	Lakshadweep Protection of Corals By-laws. Published by the UT of Lakshadweep Administrtaion (DST&E), Kavaratti 4 Aug, 1998. For protection of the coral to preserve the environment of Lakshadweep Island. This law framed on basis of the regulation 82 (1) (g) of Lakshadweep Panchayat Regulations, 1994) Lakshadweep Protection of Corals(Amendments) to By-laws. Regarding collection of coral shingle, boulder and sands etc. and declaring coastal stretches as coastal regulation zone (CRZ) and regulation of activities within the CRZ. Lakshadweep Sanitation Conservancy By-law. Prohibiting the use of Non biodegradable wastes hazardous to the Islands.
2000	The Lakshadweep Marine Fishing Regulation no 3 of 2000 published by the Ministry of law Justice and Company Affairs (Department of Legislatives) New Delhi: 21st September, 2000. This regulation provides for the regulation of fishing and fishing vessels in the lagoon and sea around the UT of Lakshadweep.
2001	The Lakshadweep Marine Fishing Regulation & Rules by Lakshadweep Administration (Department of fisheries) Kavaratti – 24th February, 2001. According to this fishing by a ship or boat fitted with mechanical means of propulsion may be regulated, restricted or prohibited in any specified area under clause (b) of the sub- section (1) of section - 4. Notification by the Ministry of Environment and forest banning collection of corals & molluscss.Volxxxvii. No 53, Friday December 21, 2001

The 1972 Wild life Protection Act was first to include corals as a protected species. This act has been amended in 1974, 1986 and 2001 to include more species from coral reefs under schedule A, for protection.

In 1991 a coastal zone regulation Act of 1991 that declared coastal stretches as Coastal Regulation Zone (CRZ) and regulated activities in the CRZ was passed for all India coverage. The Lakshadweep Administration modified the CRZ in 1996 since the islands are very small in size that if the CRZ was to be strictly followed no one could inhabit or carryout any activity in Lakshadweep. The 1996 CRZ notification states that:

> "coral stones, shingles / boulders and sand from the beaches and coastal waters are not allowed to be removed or disturbed. (The collection of corals is allowed for scientific studies / for museum specimens with specific permission from the competent authority)". A note was attached which said
>
> " Note: Till such time an alternate building material is available collection of shingles from the beach in regulated manner is allowed with specific permission from the competent authority of Lakshadweep Administration."

The Lakshadweep Administration modified the 1996 ruling that banned the use of coral for building material. The notification number 17/2/98 says that while boulder collection is banned, people can collect shingles by obtaining a permit from the environment wardens. Non-permit holders would be regarded as offenders. The environment wardens have the duty of issuing permits and punishing offenders. In 1998 another notification was issued, stating that people desirous of collecting shingle need to apply for a permit and remit Rupees 5/- per 20 kg bag of that they wished to collect.

At the National Development Council meeting in January 1997 the Lakshadweep administrator declared, " The corner stone of all policies in the 9th plan is going to be ecology and environment".
This declaration is based on the realization that the long-term survival of the Union Territory depends upon the protection, preservation and conservation of its unique and extremely fragile eco-system. All development plans in the islands have to be ecologically compatible and must avoid ecological stress. In pursuance of the above policy, the following management action plans were initiated.

1. The Department of science, technology and environment prepared an Environment Impact Assessment report of the 9th plan document in which Environment Impact statement in respect of each of the departmental schemes has been prepared.
2. Building Material Board: To reduce the pressure on coral shingle, boulder and sand collection the housing board and co-operative society supplies construction material from the mailland at susbisdised cost.
3. Action initiated to ban plastic / polythene materials. A draft notification has already been published inviting suggestions from public.
4. Other environmental actions include promoting the use of renewable energy and rain water harvesting.
5. Environmental wardens and Wildlife wardens have been appointed in each of the inhabited islands. They have been given scuba diving training. Their duty is to see that no coral shingle collection takes place and the islanders do not fish endangered marine animals. In 1999 one chief conservator of forests has been

allotted a post in the Administration of Lakshadweep to develop a management plan for the coral reefs of Lakshadweep.

7.3 Compliance with governance

Orders are passed and notifications are issued but this does not result in action. One has seen that despite an order being passed that Mangrove ecosystem should be protected. It was a government department that pleaded ignorance and went ahead with road and bridge building that disturbed the ecosystem. This could have been avoided if the bridge had been built on pillars rather than the bund like structure and the other road was built 500 m to the south of where it is located now.

Despite the corals being included in schedule 1 of the Wildlife act, people particularly the ones who are posted here on duty continue to use the reef for recreation and pluck out new formations of *Accropora*. They also rearrange the coral boulders on the reef to make artificial channels as in shal kakal.

The Administration has issued several notices every decade to stop breaking the hard strata for banana cultivation in the 50-60 acres area. However banana cultivation continues.

7.4 Local efforts

Local efforts in Lakshadweep are in reality only the government endeavor to protect the reefs. Traditional customary laws in Lakshadweep deal only with harvest sharing and there appear to be no customary practices towards reef protection. This despite the fact that every citizen of Lakshadweep knows that the islands are a creation of corals and that the reef protects the islands from storm damage and wave erosion.

The Maliku Dweep Society an NGO conducts awareness campaigns on the natural habitat of Minicoy and has issued appeals to the public to not hunt birds, not break the hard strata and keep the beaches clean.

Lakshadweep Coral Reef Monitoring Network: An initiative to monitor the health and socio-economic impacts on coral Reefs has been started in 2000 and is co-ordinated by the Department of Science and Technology and the Department of Environment. They monitor the degradation of corals both inside and outside he reef by regular diving and to employ protective measures to prepare a master plan for the conservation of corals.

Chapter 8: Issues, Strategy and Action plan

We have seen that Minicoy Island has had its own characteristic democratic village system with space for individual and collective discussion and solving of problems. This tradition gives Minicoy a unique position in the scenario of emerging trends in problem mitigation and solving through participatory decentralized means.

The programme (project) envisaged a series of public dialogues in the villages in the form of village meetings to understand the mindset of the islanders and also sense their response to issues. Separate sessions were held with men and women to ensure that the gender perspectives were included. These sessions were held with a specific aim of searching out the perceptions of people about bioresources directly connected to their lives, its current status, problems and measures for protection.
A synopsis of the bioresources of Minicoy together with the issues that had come up in relation to this was presented at every village interaction.

The island was divided into major habitats and indicator species (resources or elements) were identified in each, which had a direct bearing on the life of the islands. The group was motivated to respond to the inherent issues in each.

The Habitats were divided into the following ecosystems:

1. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
2. Lagoon – corals, sea grass, octopus, fish, bait fish, holothuria
3. Mangroves - not considered an important economic resource by Minicoyans
4. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
5. Deep sea – tuna, shark, deep sea fish

The participants in the meetings were asked to identify the single most important resource, which had to be protected so that the individual bioresources would also automatically be regenerated.

8.1 Outcome

The Issues and strategies, which emerged from this discussion, throw light on the Minicoy Islanders consciousness about the crisis vis a vis bioresources. The Minicoy Island culture itself is characterized by prudent and judicious use of resources (see section on customary laws) like water, trees and fishery resources. The influx of outsiders into Minicoy as part of administration reorganization, the take over of common property resources, the insensitivity to Minicoy traditions and the imposing of alien and extractive resource use has been highlighted as major causes for the present depleted situation. The major issues, which came up in each habitat, were varied.

8.1.1 Reef

The participants at these village meetings felt that the reef building corals are the most important resource of Minicoy. Destruction of the reef ecosystem would mean the eventual destruction of the island itself. They identified the reef stretch known as *derethethere* as the most vulnerable area as it provides vital protection to Minicoy Island. This reef mitigates the effect of the strong SW monsoon winds, which blows from this direction. Weakening of this area will surely lead to shore erosion on the western-side. They were very concerned that (muraka) branching coral was dying and that lagoon pollution was on the increase. This has lead to depletion and disappearance of associated species.

Table 8.1 Issues, problems and solutions

Habitat	Resource	Problem/ Issue	Solution	Remarks
Reef	Corals	The blasting of coral patches in the lagoon to widen the navigation channel by harbor works. Led to the disappearance of accropra patches. Replacing Kani poles by planting buoys on top of the massive corals on the onset of the fair season and removing them at the onset of the monsoon season. Scant respect by non-minicoy islanders, Navy special police and others who use the reef for recreation. Building of artificial entrance on the reef by rearranging coral boulders to trap fish.(shalkakal) Destroying the reef surface and the octopus hiding places by searching for cowries and octopus and poking them out with iron rods.	Orientation programs for government servants on duty in Minicoy about customary laws, traditions and do's and don't's while living in Minicoy. Bioresource awareness targeted to inform and influence all stakeholders. Reef-related activity monitoring should be initiated on the south west side and Kodi area of Minicoy. Reef restoration and Remediation program Legislation, which issues permits for legitimate fishermen with threshold numbers for licences.	The people are aware of the restriction on of breaking coral boulders and collecting shingle. The people are not aware of notification protecting bio-resources such as mollusks, shark, coral & placing them in schedule 1. They are aware of the ban on turtle hunting & protection of mangroves. The rules and notifications of the Dept of S&T, and E&F and the placement of garbage bins has only had minimum impact. The use of local examples to create awareness about protecting bio-resources, customary laws and significance of each to be carried out. Sustainable livelihoods to be encouraged in culture fisheries of permissible species for aquarium trade, scuba diving and culture tourism.
Lagoon	Fish, mollusks and octopus	Decline in lagoon fish due to pollution and disturbance of reef habitat. Pollution from garbage and effluents from mooring vessels. Reef habitat destruction (see reef has created dearth of niches for fishes and octopus.	Garbage removal to be privatized with involvement of Dweep panchayats. Port department has to conduct a surveillance of the polluting vessels. Mooring vessels will have to pack all their waste on shore under local supervision and take it back to the mainland.	
	Sea cucumber	Decline in population due to collection and processing of sea cumbers by permit holders (non minicoyan)	Legislation enforced has stopped the collection process.	Permits were issued by the Lakshadweep administration to collect the sea-cucumber in Minicoy.
Land	Fresh water	Breaking of hard strata by non-Minicoy Islanders to plant banana. Contamination and depletion of groundwater, especially in 50/60 acre area. Pumping of freshwater with more than 0.5 hp pumps. Offenders include government employees, who also indiscriminately water their banana plants and vegetables.	Strict enforcement of laws banning the destruction of hard strata. Implementing bans constant awareness, which includes reminders about customary laws and traditional methods of water use.	Since 1982, 4 orders have been passed (last one on 20.5.03) but to no avail.

	Land	Acquisition of common property for government buildings, Naval quarters, research institutions and so on. Leading to loss of vegetation. Quarrying of sand for construction of 20-bedded resort. Sweeping clean raggan of shingles in the 1980's for construction of government buildings.	Strengthen the village administration system instead of eroding it in the name of Panchayath Raj.	
	Timber	Other islanders cut hardwood trees (Kuredi, Kanni) convert them to planks and take them away.	Awareness about unethical nature of resource use by other islanders.	
	Medicinal plants	Depletion of Medicinal plant diversity	A comprehensive program to protect this resource.	Hithila a tuber plentiful in Bandara has vanished.
	Mangroves	The PWD department who has built concrete bridges and roads through the patch in the name of development has done Maximun disturbance of the two mangrove patches.	Governmnet departments to get clearance from department of environment.	The local community is aware that the Mangroves are protected but the government departments are insensitive to the protection order.
Deep-sea	Fish	Decrease of availability of fish.	Fish aggregating device (FAD) to be located at tuna fishing grounds at 20 km away from reef.	The 2 buoys that had been placed in the sea for data collection has been functioning as FAD and tuna boats regularly catch tuna shoals here.

8.12 Lagoon: The pollution of the lagoon, depletion and disappearance of bait fish, holothuria, octopus etc. were cited as main problems and were linked with habitat destruction and bad net fishing practices.

8.13 Mangroves, destruction of the unique Mangrove Habitat in both areas has also emerged as an area of concern since it leads to loss of biodiversity and habitat for associated species such as water birds, crabs, breeding grounds etc.

8.14 Land: In the land category, fresh water, its use and abuse, its availability, emerged as major concern. The decrease in diversity of trees and medicinal plants together with accumulation of garbage was listed in retrospective. The root of the problem was analyzed as taking up of common property land by the government for various activities including house construction for government quarters. The indiscriminate breaking of the hard upper strata of the soil by non–Minicoy islanders to grow banana has caused a drop in the quality and quantity of fresh water lens. Together with this is the removal of hardwood trees by the other islanders who convert them into wooden planks and take them to their own island. The densely vegetated 50/60 acres area is now on the verge of total destruction because of these activities.

8.15 Deep-sea: In the deep-sea *category,* the depletion in fish resources was listed as an issue. There has to be efforts to re-install the traditional sustainable prudent attitude of wise use of resources rather than the aggressive modern methods.

Events that have led to the present situation:

1. In the late 1960's and through the 70's, Raggan sandbar and Viringli were swept clean of all the coral debris deposited on them by the Administration to use for

the construction of buildings. Several big boulders were blasted and broken down to debris and distributed to the people as construction materials.

2. In the 1980's Harbour works blasted the big boulders within the lagoon in the Northside to widen the navigation channel from saalumagu and fara magu. All the problems had begun then and the ecosystem has not been able to make a recovery. The blasting was regular and it shattered and weakened all the fragile accrapora branching coral that by the end of the 80's accrapora more or less vanished from the lagoon. Siltation took place on top of the branching coal in the southwest and destroyed them. Areas, which once boasted a thicket of accrapora, are now completely flat and sandy areas. Even the other boulders were stressed and the surfaces have not recovered

   Now they are concerned that the Harbour works have a new scheme of planting buoys on top of big boulder corals that are a navigation hazard during low tide. These buoys have replaced the Kanigana (Poles) that the island people had placed on the boulders of their own initiative to provide safe passage to the boats.

   These buoys are being removed at present for the start of the monsoon and are being hauled ashore. This means that these huge buoys are going to be placed on these boulders on the onset of the fair season and remove during the monsoon. The elder fishers are worried that the continuous removal and placing of the buoys will further weaken the coral patches within the lagoon. The other problem is that the poles (Kanigana) have been removed and now with the onset of the monsoon there is nothing to warn the fisher and other sail boats of the danger.

3. In the 1980's the Lakshadweep Administration provided permits to mainlanders to collect sea cucumbers and process them to beche de mer and export it out of the islands. This is not an activity that is followed or interests the people of Minicoy, but now they are worried that the lagoon has been depleted of sea cucumber, which was earlier ubiquitous, and one could not wander in the lagoon without having the discomfort of stepping on them or being scratched by the Murakka. Even starfish has vanished and they feel all this will have repercussions on the loss of biodiversity on the island.

4. Other islanders who are posted on government duty to Minicoy have brought with them unsustainable fishing and agricultural practices. Chief among them is the breaking of the hard soil strata for planting bananas and net fishing on the reef, by rearranging the coral boulders on the Derahdethere to make an artificial entrance channel to catch fish. They have introduced octopus hunting and reef gleaning, using long iron pole and hooks that poke and prod the coral boulders which provide hiding places for these animals eventually destroying the hiding place and the boulder and further adding stress to the south west reef area. This is an area that was managed with great self-discipline on the part of the Minicoyans who only stressed on tuna fishing and ignored all the other marketable species found within the lagoon and reef. In a sense their restraint has provided an untapped resource for the other islanders who have always carried on reef fishing. All these activities especially when it involves government servants should be strictly prohibited.

5. Cargo vessels that enter and dock in the lagoon, conduct the cleaning within the lagoon and dump wastes within the lagoon.

6. Disposal of Non biodegradable waste. While the government has passed notifications banning plastic and have schemes for disposal of waste none of them seem to work. Public continue to throw their garbage (old clothes, plastic bags, fish waste) on the western shore and made the beach unsightly. The problem was that while they saw all this unsightly waste on the shore they never ever saw the offender.
7. The Minicoyans feel that the problems have intensified due to the scant respect given to Minicoy Customary laws with regard to reef and lagoon use by non-Minicoyans who were posted in Minicoy on duty. This includes other islanders, mainland people employed by the Administration, Navy, special police etc.

   The problem of the damage caused by Government employees needs to be addressed. They should be properly briefed and a strict code of conduct needs to be applied on the use of the resources.

In lieu of the above discussion the member suggested the following action program:

To sum up, the challenge that has emerged from this study and discussions with the various stakeholders groups is to create mechanisms by which the management authority – The Lakshadweep Administration – is able to work with the other stakeholder groups rather than in conflict. The action plan envisages an informing and influencing strategy which includes a series of awareness programmes, legislation, reef remediation and restoration, community led monitoring and management of the bioresources and entrepreneurship training for developing micro enterprises programs and creating market linkages.

Step 1: **Orientation Programs** for the government servants posted on duty in Minicoy about respecting Minicoy customary laws, traditions, the fragility of the island, dos and don't's while living in Minicoy.

Step 2: Bioresource awareness programs/campaigns targeted to inform and influence all the stakeholders (government servants, students, teachers, women, fisher, public etc.) Awareness campaign should include information on legislation protecting bio-resources, customary laws of Minicoy, significance of each resource. They felt it would help if local examples could be given to drive home the point.

Step 3: Consensus building through continuous public meetings and awareness campaigns involving all profesions, age, and gender groups. We must take an island stakeholders participatory approach for: a) assessing resources, b) fixing levels of exploitation c) imposing size regulation, d) periodic closure during breeding season of sensitive species to permit recovery and e) establishing Zoning – demarcation of areas for different uses including one undisturbed core area for every island.

Step 5: Joint management of the island resources: A joint management action should be taken in which both the administration and the local community have a role. They also felt that it was not morally correct for non-Mminicoyans who do not have long term stakes on the islands to freely collect natural resources of Minicoy. Legislation followed by joint management efforts by all stakeholder departments and local community to restrict and protect the *derethethere* area that is the reef extending from lighthouse to Neru magu. Action should be taken to strengthen the village administration system and not erode it in the name of

panchayathi raj. The port department could conduct a surveillance of polluting offences by viewing vessels anchored close to Minicoy or entering the lagoon with the help of binoculars from the viewing tower.

- **Supporting a community bio-diversity (read coral reef) monitoring programme**. Regular monitoring of reef related activity at the two uninhabited ends of the island. The monitoring should be community based or a joint govt-community monitoring for joint management action. Administration should support and recognize local efforts.
- **Supporting a coral reef remediation and restoration programme**. We should review best practices in other parts of the world where such programs have been successful and involve the local community in the reef recovery program.
- **Legislation:** Just as all the Tuna Fishing boat are registered with the fishing department, a fishing permit could be introduced for all interested fishermen, (anglers, net fishers etc.) These fishermen should apply for a fishing license and only they would be permitted to fish. A threshold number should be set beyond which licences should not be given. Non-Minicoyans and tourists would have to purchase a fishing licence if they wished to fish in the lagoon.

Step 6: Sustainable livelihoods:

- **Fish aggregating devices (FADs)** should be located at the tuna fishing grounds at suitable locations along the ocean currents, about 20 km away from the reef. This would help them get a good catch. They pointed out that the two buoys that had been placed in the sea for data collection also served as fish aggregating devices and their tuna boat had regularly caught big shoals of tuna here in the past few months.
- **Medicinal plants:** the people listed some of the important medicinal plants that were earlier plentiful on the island but had now disappeared and felt that a programme to protect and enhance these resources was needed. They particularly named the Hithala plant; a tuber that grew wild in the Bandara had now become scarce. A community maintained nursery for important medicinal plants needs to be maintained, so that interested people could purchase the seedlings and plant them in their compounds.
- **Culture of clamshells (Tridecna)** for aquarium trade – Technology is available from CMFRI and a woman's self Help group could be encouraged to take this up as a micro enterprise.
- **Community led culture and dive tourism:** Minicoy has a unique culture and excellent dive locations along the southwest entrances. Interested youth could be trained as dive instructors and provided loans to set up a dive school. The current permit system could be relaxed to allow international tourists to visit Minicoy.

- **Vocational courses:** A seaman training certificate course could be offered at the Island itself for boys who are interested in taking up this vocation.

The discussions concluded on the note that everyone, the Government and the local population should support each other in making a joint management effort for enhancing and protecting the bioresources of Minicoy for future generations.

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Appendix 1: Key Informants

	Parameter/sub parameter	Information Source Key Informant/stakeholder	Technique
1.	Reef Related activity and stakeholder perceptions regarding habitat status		
	Boulder collection Sand Collection Shingle collection	D.G Mohammad (52) of Ramedu Village Ali bebe (68 yrs) of funhilol village Ibrahim (28 yrs)Funhilol village Random people at construction site and Athri	Semi structured interview, observation and discussion at construction site, mosque tanks and village athri. Resource map to mark location
	Cowry collection	Ibrahim (60) Sedivalu Amina (32) South Pandaram Farida, Fathima Datifanuge aouge Kunhi Koya (CMFRI)	Semi structure interview and resource map to show location. Ranking. Seasonal calander, Observation, specimens were compared to publications and identified with scientific names.
	Bait fish collection Tuna fishing Customary laws relating to lagoon use and bait collection.	Mohammed Edurukage Ali Edurukage Moosa Kambogothi Ibrahim Donamalimeege Hassan Hawathage Ibrahim Kudagoyyagothi Moosa Alimange Ali donfanduge Mohammad Datifanuge Aouge Hassan bebe Datifanuge Aouge K.P Said Koya CMFRI.	Focus group discussion at athri gothi, Semi structure interview, observation and participating in activity, resource map, seasonal calendar.
	Lagoon fishing	Aboobacker (JE) of agatti village Ismail K.D & Moosa of Fallesery village	Focus group discussion, observation, and resource map to show area of operation. Participating in net operation.
	Octopus, lobster, prawns, turtles etc.	Hussain Boduge- 40yrs. (Ramedu village) Kunhi koya: CMFRI F.A. Hussain Manikfan (58) - Sedivalu. Mohammad 40 yrs (Datifanuge aouge)	Semi structure interview and resource map to show area of operation.
	Boating, swimming	SPORTS,	Observation and interview with random people at Athiris.
2.	Land resources & stakeholder perceptions regarding status		
	Mangroves	K.P Kunhi Koya & Rahul Pandey Hassan bebe,(70) Datifanuge aouge	Secondary information, observation and site survey.
	Coconut trees	Alikaka of kendiparti village, scientists at CPCRI and agriculture department	Secondary published information, semi structures interview and discussion at random with islanders and in village houses.
	Other trees	Carpenter in Funhilol	Secondary information, observation
	Medicinal plants	Hussain bebe 65 datifanuge aouge)	
4	Island stakeholders Island demography Literacy Occupation Percapita income	200 survey Informants	Secondary published data and household survey
5.	Organization and resource governance Govt laws and acts Customary laws	Ibrahim and Mohamad of Shabaz boat for lagoon related laws. K.G Mohammad Sr Publicity officer	Secondary published government notifications. Semi structured interviews for customary laws
6.	Community services	Department officers	Secondary published information, site visits and interview with officers.

Table 2. List of Focus group discussions and people present

1	Aloodi Village Meeting	18/5/03	Mohammed Edurukage, Ali Edurukage Moosa Kambogothi, Ibrahim Donamalimeege Hassan Hawathage, Ibrahim Kudagoyyagothi Moosa Alimange, K.G Mohammed, Vineeta Hoon
2	Fallesary Village Meeting	19/5/03	Ali Damuge, Ismail Hinfaluge Ali Aouge, Ali Malamathige Moosa Gabuligothi, Ibrahim Bumaruge Mohhamad Umburumange, Hussain Kilaugandige Ibrahim Maluhussankage, Ismail Donfanduge IsmailGandige Bidarge, Hassan Donbadage K.G Mohammed, Vineeta Hoon
3	Funhilol Village Meeting	20/5/03	Moosa Moonimauge (Kelu), Ali Ruvage (kelu) Ismail Kafgouge (carpenter), Ismail Ruvage (kelu) Mohammed Kaludathagothi (retd.kelu) Ibrahim Donfathige (Kelu), Ali Heenafurikage (fisher) Mohammed Thulavaluge (teacher) Ali Dhihamathrige (fisher driver), Dr. KK Donthakuru (dentist) K.G Mohammed, Vineeta Hoon
4	Kudehi Village Meeting (Women)	20/5/03	Kadeeja K, (25), Naseema K, (26) Fathima V (38), Fathima DD (40), Aysha G (40), Amina B (38), Fathima M (50), Aysha KGB (38), Fathima K (33), Fathima ED (40), Havva KB (39), Kadha MRG (32), Havva KB (40), Aysha KB (39), Aysha NL, (32) Amina KD (40), Aysha KF (44), Naseema V (23)
5	Aoumagu Village meeting	21/5/03	Ali Edukagothi (1st Bodukaka) , Ibrahim Sifage (2nd Bodukaka) Mohammed Undogothi (Fisher), Ismail Muthegothi (Fisher) Ibrahim Hajjigothi (Fisher), Hassan Kamburu Ali gothi (Fisher) Ibrahim Edukagothi (Fisher), Ibrahim Edugothi Athirige (Fisher) Hussain Edugothi Athirige (Fisher), Ali Athrige (Fisher) Ali Donkafogothi (Fisher), Hassan Donkafagothi (Fisher) Ismail Bodumukagothi (Fisher), Hassan Karage (Fisher) Ismail Bidarugothi, Ali Donkafogothi (Fisher) Hassan B (Ex chairperson), Moosa Kaunidathagothi (Fisher) Ali Moosahajigothi (Fisher), Mohammed Hajikagothi (Fisherman), K.G Mohammed, Vineeta Hoon
6	Bada Village meeting (Men)	22/5/03	Mohammed Hayogothi (1st Bodukaka) Mohammed Thambuuganduge (2nd Bodukaka) Hassan Badage, Hassan Athrige Ibrahim Handikagothi Athrige, Ibrahim Badage Ibrahim Fanagoth, Moosa Badage, Ali Thamburugandige K.G Mohammed, Vineeta Hoon
7	Bada Village meeting (Women)	22/5/03	Kuduge Bidharuge Kadha, Badage Dalekha, Kudage Ayesha Malege Athirige Aysha, Kadhthage Aysha Karage Fathima, Badadorugothi Bedhurge Fathima Samanugothi Amina, Heukagothi Kadha Hassan HD, Vineeta Hoon

APPENDIX 2 : MALDIVIAN CALENDAR

S.No.	Name	Date		Total Days
		Starting	***End at***	
1.	Uturuhala	January 6th	January 18th	13 days
2.	Huvan	January 19th	January 31st	13 days
3.	Dinara	February 1st	February 13th	13 days
4.	Hiya Viha	February 14th	February 26th	13 days
5.	Fruba Duruva	February 27th	March 11th	13 days
6.	Faba Duruva	March 12th	March 25th	14 days
7.	Reva	March 26th	April 7th	13 days
8.	Assida	April 8th	April 21st	14 days
9.	Burunu	April 22nd	May 5th	14 days
10.	Kethi	May 6th	May 19th	14 days
11.	Ronu	May 20th	June 2nd	14 days
12.	Miaheli	June 3rd	June 16th	14 days
13.	Ada	June 17th	June 30th	14 days
14.	Funos	July 1th	July 14th	14 days
15.	Fus	July 15th	July 28th	14 days
16.	Ahuliha	July 29th	August 10th	13 days
17.	Manakay	Agust 11th	August 23rd	13 days
18.	Fura	Agust 24th	September 6th	14 days
19.	Uthuru	September 7th	September 20th	14 days
20.	Atha	September 21st	October 3rd	13 days
21.	Hitha	October 4th	October 17th	14 days
22.	Hae	October 18th	October 31st	14 days
23.	Viha	November 1st	November 13th	13 days
24.	Nora	November 14th	November 26th	13 days
25.	Dora	November 27th	December 9th	13 days
26.	Mula	December 10th	December 22nd	13 days
27.	Furuhala	December 23rd	January 5th	14 days

Appendix 3 : Local efforts to protect birds

F.No.07/94-95/IUM
Information Publicity & Tourism Unit
Minicoy. Dated. 30.11.2002

PLEASE DON'T HUNT BIRDS

Birds are part of the environment. Certainly they are pretty, they adorn the nature in their own way.

Different types of birds, small and big, visit our island. Most of them are sea sonal and migratory.

Should we not allow these winged visitors to return to the island every year.

Unfortunately some naughty boys have again started hunting the innocent birds using locally made traps.

Please Remember : Hunting birds and taking their eggs are prohibited.

Let us protect birds. Let us give them freedom to visit , also to nest and breed.

Senior Publicity Officer
Minicoy

To
All the Village Moopans with a request to advise young boys to abstain from hunting birds.

Copy to : 1. Deputy Collector, Minicoy
2. The Chairperson, Village (Dweep) Panchayat, Minicoy.
3. Station House Officer, Police Station, Minicoy.
4. Technical Assistant i/c, ST&E, Minicoy
5. Principals/Headmasters of all schools in Minicoy

Copy submitted for kind information :
1. Director of Information Publicity & Tourism, Kavaratti.
2. Dy.Director, S&T, Kavaratti
3. Dy.Conservator of Forests, Dept.of Environment,Kavaratti.

Appendix 4 : Notice Against Growing Banana

F.No.19/4/2003-DC(Genl)

Office of the
Deputy Collector, Minicoy
Dated the 20th May 2003

ORDER

In his weekly visit to various places of Minicoy Island, the Deputy Collector has found that in the premises of Government Quarters in 50 Acre and 60 Acre the Banana plantation has been done in a commercial manner. Taking in to account the peculiar conditions of Minicoy Island's scarcity of water, the Administrator in his monthly review meeting held during February 2003 was very much against such a move and ordered the Deputy Collector to take a stringent measurers to tackle this problem of commercialization of banana plantation. On the other hand the Administrator encourage to grow papaya plants which requires very little water.

Therefore in the Departmental Co-ordination meeting with Deputy Collector this month a resolution was taken to uproot all the banana plants in the premises of the government quarters allowing only 2 sapplings per quarter in the interest of the island. It is therefore requested to all the government quarter occupants to uproot all the banana plants in your premises by the end of May 2003 leaving only two plants of your choice. The two banana sapplings left should be fed with the kitchen and bath room waste water only. No extra water shall be pumped from any source what so ever for these two saplings saplings. If any quarter is found with more than two sapplings strict action shall be taken against the quarter. With in two days of my inspection , power supply shall be disconnected to the quarter and fine shall be collected per each extra plant. The sapplings shall be uprooted by the inmates of the quarter itself by the end of this month. The uprooted plant shall be further cut in to pieces and dumped in their compound premises only. The PWD and the Panchayath will be engaged in removing this cut plants to the near by the Agricultural Farm, where they will be burried for creation of natural manure. The Departmental Heads are requested to go and physically verify that their employees occupied in government quarter shall strictly follow the above orders and give a report to Deputy Collector, Minicoy before 05th of June 2003.

Head of Departments are requested to take Xerox copies of this Order and supply to their staff residing in Government Quarters and take their acknowledgement. Further the Head of Departments have to maintain a Register for this purpose exclusively and monitor the Government Quarter premises regularly on monthly basis. Deputy Collector, Minicoy will inspect all the Quarters with the Assistance of Science and Technology Department, Panchayath and PWD once in two months. Any relaxation from any side will be viewed very seriously.

21/5/03

(K.C.SURENDER RATHOD)
Deputy Collector

To, All Head of Departments

Appendix 5 Minutes of the village meetings

Aloodi Village Meeting on 18/5/03 9:30-11:30 pm

People present
Mohammed Edurukage
Ali Edurukage
Moosa Kambogothi
Ibrahim Donamalimeege
Hassan Hawathage
Ibrahim Kudagoyyagothi
Moosa Alimange
K.G Mohammed
Vineeta Hoon

Vineeta Hoon and K.G Mohammed presented a synopsis of the bioresources of Minicoy and presented some of the issues that had come up with relation to the bioresources and bioresource habitats in Minicoy.

The Habitats were divided into the following ecosystems:

6. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
7. Lagoon – corals, octopus, fish, bait fish, holothuria
8. Seagrass- not considered an important economic resource by minicoyans
9. Mangroves - not considered an important economic resource by minicoyans
10. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
11. Deep sea – tuna, shark, deep sea fish

The members present were asked to identify the single most important resource which had to be protected so that the individual bioresources would also automatically be regenerated.
The members present felt that the reef building corals were the most important resource of Minicoy and destruction of the reef ecosystem would mean the eventual destruction of the island itself. They explained that the reef to the SW which extended from The lighthouse to Vriringli, raggan point and upto Neru Magu provided the most important protection to Minicoy. They said that it was interesting that the south west monsoon winds blew strongly from this direction and the reef was also strongest and coral growth was greatest in this area called tharathere so as to mitigate the effects of the waves that reached island. Weakening of this area would surely lead to shore erosion on the westernside.

This was one of the reasons that the people of Minicoy themselves did not glean the reef on a regular basis and occasionally would have village picnics on raggan and viringli. They felt the problems have intensified due to the scant respect given to Minicoy Customary laws with regard to reef and lagoon use by non Minicoyans who were posted in Minicoy on duty. This includes other islanders, mainland people employed by the government and posted on duty with the administration, Navy, spl police etc.

These people look at the SW area as a place for recreation and swim and trample the area during low tide. People from the other island who have similar habitats and have the skill to fish and reef glean carry on with fishing and gleaning both to supplement their income and diet with fresh fish. Their activities are so intense that they have built an artificial entrance on the reef by rearranging the boulders and trapping the fish during the beginning of high tide. They are also unskilled octopus collectors and destroy the holes and crevices that the octopus hides in by poking and prodding with iron poles in their eagerness to hunt for octopus.

These people did not stop at fishing they also continuously break the hard strata on the island to plant banana trees, which eventually led to the contamination and depletion of the fresh water source. It was also common for the other islanders to cut hard wood trees (Kuredi, Kauni etc.) found on Minicoy and take them

to saw mills convert them to wooden planks and transport them to their home island. The tragedy is that the Government permits all this to happen.

They feel that the island natural resources are not managed properly and that it is important that a joint management action should be taken in which both the administration and the local community had a role. They also felt that it was not morally correct for non minicoyans who were merely guests on the islands to freely collect natural resources of Minicoy.

When informed that the Ministry of Environment had placed corals, cowries and all other mollusks in schedule 1species list – which offered the greatest protection to these bio resources, they said they were not aware of this notification. They felt the government may not be serious about implementing it since no awareness activities to this regard had taken place in Minicoy. So far they said they know that turtle hunting was banned, mangroves are protected and that corals should not be collected but did not know about he ban on cowry collection.

In lieu of the above discussion the member suggested the following action program:

1. Monitoring and awareness building for management. They felt that a reef related activity monitoring should take place I the southwest side of Minicoy since this was the most used area and hence most threatened area of Minicoy. It was also strategically the most important area to protect since the safety of the island depended on the health of this area.
2. Legislation: Just as all the Tuna Fishing boat are registered with the fishing department, a fishing permit could be introduced for all interested fishermen, (angelers, net fishers etc.) These fishermen should apply for a fishing license and only they would be permitted to fish. A threshold number should be set beyond which licences should not be given. Even non minicoyans and tourists would have to purchase a fishing licence if they wished to fish in the lagoon.
3. Protection of shoreline on the western athris : They felt that the perpendiular thorshis that were demarcating the athris did not serve any purpose other than being a garbage trap and have suggested that a break water thorshi should be built parallel to the shore at a 100 mt distance, extending from old Navodya to the passenger Jetty. Some of the members felt that all the boulders etc which ha been piled up perpendicularly could be taken as building material for the parallel breakwater. They felt that this would serve two purposes.
   a) a cleaner shore since the garbage etc. piled up on the athri would stop and also the current would flow parallel to the island.
4. Sustainable livelihoods: They suggested that Fish aggregating devices (FADs) should be located at the tuna fishing grounds at suitable locations, about 20 km away from the reef. This would help them get a good catch. They pointed out that the two buoys that had been placed in the sea for data collection also served as fish aggregating devices and their tuna boat had regularly caught big shoals of tuna here in the past few months.

Fallesery Village Meeting on 19/5/03, 21:30 – 24hours

People present

Ali Donfandge
Ali Damuge
Ismail Hinfaluge
Ali Aouge
Ali Malamathige
Moosa Gabuligothi
Ibrahim Bumaruge
Mohhamad Umburumange
Hussain Kilaugandige
Ibrahim Maluhussankage
Ismail Donfanduge
IsmailGandige Bidarge
Hassan Donbadage
K.G Mohammed
Vineeta Hoon

Vineeta Hoon and K.G Mohammed presented a synopsis of the bioresources of Minicoy and presented some of the issues that had come up with relation to the bioresources and bioresource habitats in Minicoy.

The Habitats were divided into the following ecosystems:

1. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
2. Lagoon – corals, octopus, fish, bait fish, holothuria
3. Seagrass- not considered an important economic resource by minicoyans
4. Mangroves - not considered an important economic resource by minicoyans
5. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
6. Deep sea – tuna, shark, deep sea fish

The members present were asked to identify the single most important resource, which had to be protected so that the individual bioresources would also automatically be regenerated. They were also asked to name other resources belonging to any of the above habitats that they felt were important for their livelihood and that needed regeneration, protection or conservation.

The members brought up the following issues:

1. Decline in Lagoon fish: this was attributed to pollution and disturbance of the reef habitat. A) plastic, cloth and all other wastes are regularly being dumped into the lagoon. B) the harbour works had blasted several big coral boulders and pinnacle within the lagoon in the 1980's, all the problems had begun then and the ecosystem has not been able to make a recovery. Siltation took place on top of the branching coal in the south west and destroyed them completely. Areas, which once boasted a thicket of accrapora, are now completely flat and sandy areas. Even the other boulders were stressed and the surfaces have not recovered. In 2003 they have noted some improvement in the berumathi area were muraka is growing. Muraka is trying to grow in the deeper section of the lagoon but after it reaches a certain height of say 20-30 cms it dies. They could not understand what was causing this problem and presumed it must be the pollution.

2. Disappearance of Sea cucumber (fenduvvi from the lagoon: Minicoyans do not eat sea cucumber and never used to collect it. There was plenty of sea cucumber in the lagoon even upto a decade ago. All of a sudden it has disappeared. One of the members present said that about 5 years ago a couple had come to Minicoy and collected all the sea cucumber, with local help for processing and drying it. While blaming the outsiders they were unable to tell how many locals were involved and only stressed the point that the locals were paid a pittance of the value of the processed sea cucumbers. Some of them said that they had seen the couple loading 15 crates of 2cubic feet containing the dried and processed sea cucumbers on the ship.

3. Disposal of Non biodegradable waste. While the government has passed notifications banning plastic and have schemes for disposal of waste none of them seem to work.

4. Introduction of unsustainable fishing practices by other islanders: There are a number of Government servants posted on duty on Minicoy, these people have brought with them destructive fishing practices that disturb the reef, involves poking and prodding of corals with sharp iron poles and reef walking. They also change the habitat to create entrances on the reef for net fishing. They are a law unto themselves and do not require any permission to carryout these harmful practices.

5. Breaking of hard strata: These non minicoyans posted here on Government duty do not stop in the lagoon. They have been given staff quarters in the 50/60 acres area. This was the area were the ground water was of very good quality until a decade ago. It is now turning saline. But now with population increase in 50/60 acres, the people have started planting banana trees breaking the hard strata to dig pits so that he banana, which is a water loving plant can grow using water from the fresh water lens directly, thereby disturbing a precious water resource that is now getting both polluted from artificial nutrients and salinity.

6. Their question was why do government servants posted here on duty have the liberty to disturb and harm the island ecosystems. These people have come here on salary and have permanent employment, but they spend their time consuming local natural resources for free as if it was their birth right and paid scant respect for minicoy local customary traditions to manage these resources.

7. All the very difficult work that involves voluntary labor is given to the village headmen, but when it is question of payments and contracts it is entrusted to outsiders. They gave the example of a task that involved locating a buoy on the eastern side. Apparently they had asked for the payment of Rs 100,000. to carry out this job. The payment was declined, but the government has purchased a large crane for Rs 40,00,000 to do this work and since they installed it incorrectly they needed to turn it around. To do this they, used the old crane which is worth 12 lakhs and broke it in the process and had to pay bpth, repair charges and freight charges to send it to the mainland for repair and bring it back. They said that the administration was determined to erode the power of the Village head persons. It started with the formation of the island council in 1985, that the voice of the Bodukaka and Bodudatha became quiet and now with the dweep panchayats they have become silent. At present, there is no pro-active peoples participation in making rules but only orders from the government.

Kudehi Village Meeting with Women's group 20/5/03 2:30-5:00 pm

1. Kadeeja K, (25),
2. Fathima DD (40),
3. Naseema K(26)
4. Aysha G (40),
5. Fathima V (38),
6. Amina B (38),
7. Fathima M (50),
8. Aysha KGB (38
9. Fathima K (33
10. Kadha MRG (32),
11. Fathima ED (40),
12. Havva KB (40),
13. Havva KB (39
14. Aysha KB (39),
15. Aysha NL, (32)
16. Amina KD (40),
17. Aysha KF (44),
18. Naseema V (23)
19. Ayesha (boduathiri
20. Vineeta Hoon

Vineeta Hoon and K.G Mohammed presented a synopsis of the bioresources of Minicoy and presented some of the issues that had come up with relation to the bioresources and bioresource habitats in Minicoy.

The Habitats were divided into the following ecosystems:

7. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
8. Lagoon – corals, octopus, fish, bait fish, holothuria
9. Seagrass- not considered an important economic resource by minicoyans
10. Mangroves - not considered an important economic resource by minicoyans
11. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
12. Deep sea – tuna, shark, deep sea fish

The members present were asked to identify the single most important resource, which had to be protected so that the individual bioresources would also automatically be regenerated. They were also asked to name other resources belonging to any of the above habitats that they felt were important for their livelihood and that needed regeneration, protection or conservation.

The women said that the single most important resource to protect is the reef extending from Derehethere to Neru Magu.

They said that this area was the most stressedded area because too many people were now involved in reef gleaning activities, hunting octopus and that even the reef fishing activities with nets disturbed the reefs since people needed to walk on the reef to reach their desired spot and they they used sticks and iron rods to overturn the coral or poke the holes in them to drive out the octopus.

They felt that it would be best to protect this area and prevent people from disturbing the Derehethere.

We then went on to discuss what resources were collected from different habitata:

Reef: cowries and building material

Lagoon: fish preferred filolu, dathimas, thilakandi and fanihandi

Land: fuel wood, (coconuts (husk. Oil, jaggery, vingar, copra and water), timber, medicinal plants and water.

Ocean: tuna

They were asked if they new of any popular songs, folklore concerning Minicoy and they said they only knew of thevary. Thevaru described occaisions of death, clothes, headcover and departure of seamen. The girls then recieted a thevaru which dscribed a wifes sorrow on the departure of her husband to work on foreign ships.

Funhilol Village Meeting on 20/5/03, 9:30-11:30 pm

People present

1. Moosa Moonimauge (Kelu)
2. Ali Ruvage (kelu)
3. Ismail Kafgouge (carpenter)
4. Ismail Ruvage (kelu)
5. Mohammed Kaludathagothi (retd.kelu)
6. Ibrahim Donfathige (Kelu)
7. Ali Heenafurikage (fisher)
8. Ali Dhihamathrige (fisher driver)
9. Mohammed Thulavaluge (teacher)
10. Dr. KK Donthakuru (dentist)
11. K.G Mohammed
12. Vineeta Hoon

Vineeta Hoon and K.G Mohammed presented a synopsis of the bioresources of Minicoy and presented some of the issues that had come up with relation to the bioresources and bioresource habitats in Minicoy.

The Habitats were divided into the following ecosystems:

1. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
2. Lagoon – corals, octopus, fish, bait fish, holothuria
3. Seagrass- not considered an important economic resource by minicoyans
4. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
5. Deep sea – tuna, shark, deep sea fish

The members present were asked to identify the single most important resource, which had to be protected so that the individual bioresources would also automatically be regenerated.

Reef and Lagoon

The members present felt that the reef building corals were the most important resource of Minicoy and destruction of the reef ecosystem would mean the eventual destruction of the island itself. They were very concerned that (muraka) branching coral was dying and that lagoon pollution was on the increase. The death of corals has lead to depletion and disappearance of certain important bait fish.

They related the pollution problems to the following causes:

1. Cargo vessels that entered and docked in the lagoon, conducted the cleaning within the lagoon and dumped wastes within the lagoon.
2. Public threw their garbage (old clothes, plastic bags, fish waste) on the western shore and made the beach unsightly. The problem was that while they saw all this unsightly waste on the shore they never ever saw the offender.

They related coral destruction problems to the following causes:

1. Bad fishing practices of other islanders posted in Minicoy. The islanders posted in Minicoy, have brought with them intensive reef gleaning, octopus collection activities and reef fishing. All these activities are harmful to the reef since it involves walking on the reef overturning coral boulders to pick up cowries, poking and prodding crevices on the corals with iron poles to seek out the octopus from the hole. Ultimately destroys the hiding place and the coral boulder. They have also rearranged coral boulders on the Derahdethere to make an artificial entrance channel to catch fish. All these activities especially when it involves government servants should be strictly prohibited.

Actions taken: They are aware that the Department of Science and Technology and Environment department of the Lakshadweep administration have made rules and regulations banning plastics and throwing garbage. Garbage bins were also placed in different location of the islands. The Dweep Panchayat has been entrusted with the task of garbage removal but despite these measures garbage disposal continues to be a problem on the island.

Solution: They felt garbage removal could be privatized. The mooring vessels would have to collect all their waste on the shore under supervision of a local person who would help in repacking and sending it back to the mainland for further disposal. A fee could be charged for this service.
The port department could conduct a surveillance of polluting offences by viewing vessels anchored close to minicoy or entering the lagoon with the help of binoculars from the viewing tower. The Dweep Panchayat could involve the local community but due acknowledgement and appreciation should be given to the people involved.

3. Bioreource awareness campaign aimed at women, fishers, villagers, students, teachers and Govt servants. Awareness campaign should include information on legislation protecting bio-resources, customary laws of minicoy, significance of each resource. They felt it would help if local examples could be given to drive home the point. An orientation for the government servants posted on duty in Minicoy about respecting Minicoy traditions, the fragility of the island, dos and donts.
4. Regular monitoring of reef related activity at the two uninhabited ends of the island. The monitoring should be community based or a joint govt-community monitoring for joint management action. Administration should support and recognize local efforts.

Land Resources
Fresh water sources: the members present were extremely worried about the depletion of the ground water. They said that Minicoyans were dependent on the fresh water lens for their water supply. This lens was found between two impermeable strata and hard strata on the surface protected the ground water. Any disturbance to the surface hard strata would lead to a collapse of this lens. NEERI has even submitted a ground water potential report to the administration and the significance of the problem is well recognized within the administration. Bans on cutting the hard strata for banana tree cultivation purposes have been made by the administration several times since 1982. The order passed by the DC today is the 4th such orders in the last 20 years. They were skeptical about the implementation of this order because un restricted banana cultivation cutting the hard strata has been continuing despite previous bans and has now reached a state of alarm.
They also mentioned that while there is an order against the use of pump higher than 0.5 hp for pumping water, the government departments were the worst offenders and disobeyed this law. They felt that the Administration and all its employees should set an example by adhering to their own rules and regulations. Implementation of bans was also very important.
Medicinal plants: the people then listed some of the important medicinal plants that were earlier plentiful on the island but had now disappeared and felt that a programme to protect and enhance these resources was needed. They particularly named the Hithala plant, a tuber that grew wild in the Bandara had now become scarce. This tuber is used for controlling stomach ailments, heart burn by mixing a spoon of the powder in a glass of coconut water and baby food.
The meeting concluded on the note that everyone, the Government and the local population should support each other in making a joint management effort for enhancing and protecting the bioresources of Minicoy for future generations.

Aoumagu Village meeting 21/5/03 9:30-11:00 pm

People present

1. Ali Edukagothi (1st Bodukaka)
2. Mohammed Undogothi (Fisher)
3. Ibrahim Sifage (2nd Bodukaka)
4. Ismail Muthegothi (Fisher)
5. Ibrahim Hajjigothi (Fisher)
6. Hassan Kamburu Ali gothi (Fisher)
7. Ali Athrige (Fisher)
8. Hussain Edugothi Athirige (Fisher)
9. Ibrahim Edugothi Athirige (Fisher)
10. Ibrahim Edukagothi (Fisher)
11. Hassan Donkafagothi (Fisher)
12. Ali Donkafogothi (Fisher)
13. Hassan Karage (Fisher)
14. Ismail Bodumukagothi (Fisher)
15. Ali Donkafogothi (Fisher)
16. Ismail Bidarugothi
17. Ali Moosahajigothi (Fisher)
18. Hassan B (Ex chairperson)
19. Moosa Kaunidathagothi (Fisher)
20. Mohammed Hajikagothi (Fisherman)
21. Vineeta Hoon
22. K.G Mohammed

Vineeta Hoon and K.G Mohammed presented a synopsis of the bioresources of Minicoy and presented some of the issues that had come up with relation to the bioresources and bioresource habitats in Minicoy.

The Habitats were divided into the following ecosystems:

6. Reef – corals, boulders, - reef building coral, cowries, octopus, fish, crabs, lobster
7. Lagoon – corals, octopus, fish, bait fish, holothuria
8. Seagrass- not considered an important economic resource by minicoyans
9. Land – trees, timber, fodder, firewood, medicinal plants, mangroves, crabs
10. Deep sea – tuna, shark, deep sea fish

The members present were asked to identify the single most important resource, which had to be protected so that the individual bioresources would also automatically be regenerated.

Reef and Lagoon

The members present felt that the reef building corals and the fresh water lens on the land, were the most important resource of Minicoy. Destruction of the reef ecosystem would mean the loss of biodiversity and eventual destruction of the island itself. Destruction of the fresh water lens would lead to making the island uninhabitable.

a) They identified the reef stretch known as derethethere – which stretched from the light house to viringli to raggan and till Neru Magu provided the vital protection to Minicoy Island.

b) The fresh water lens that is located in the 50/60 acres and beyond was densely covered by forests and used to provide pure drinking water. This resource has always been guarded and conserved.

c) They were concerned that over the last 3-4 decades due to uninformed development actions this reef has been so weakened that it is having a recovery problem.

<u>Events that have lead to the present situation.</u>

8. In the late 1960's and through the 70's, Raggan sandbar and Viringli were swept clean of all the coral debris deposited on them by the Administration to use for the construction of buildings. Several big boulders were blasted and broken down to debris and distributed to the people as construction materials.
9. Harbour works blasted the big boulders in the Northside to widen the navigation channel from saalumagu and fara magu. The blasting was regular and heavy in the 1980's that it shattered and

weakened all the fragile accrapora branching coral that by the end of the 80's accrapora more or less vanished from the lagoon.

Now they are concerned that the Harbour works have a new scheme of planting buoys on top of big boulder corals that are a navigation hazard during low tide. These buoys have replaced the Kanigna (Poles) that the island people had placed on the boulders of their own initiative to provide safe passage to the boats.

These buoys are being removed at present for the start of the monsoon and are being hauled ashore. This means that these huge buoys are going to be placed on these boulders on the onset of the fair season and remove during the monsoon. The elder fishers are worried that the continuous removal and placing of the buoys will further weaken the coral patches within the lagoon. The other problem is that the poles (Kanigana) have been removed and now with the onset of the monsoon there is nothing to warn the fisher and other sail boats of the danger.

10. In the 1980's the Lakshadweep Administration provided permits to mainlanders to collect sea cucumbers and process them to beche de mer and export it out of the islands. This is not an activity that is followed or interests the people of Minicoy, but now they are worried that the lagoon has been depleted of sea cucumber, which was earlier ubiquitous, and one could not wander in the lagoon without having the discomfort of stepping on them or being scratched by the Murakka. Even starfish has vanished and they feel all this will have repercussions on the loss of biodiversity on the island.

11. Other islanders who are posted on government duty to Minicoy have brought with them harmful fishing practices, netfishing on the reef, which involves rearranging the boulders. They have introduced octopus hunting and reef gleaning, using long iron pole and hooks that poke and prod the coral boulders which provide hiding places for these animals eventually destroying the boulder and further adding stress to the south west reef area. This is an area that was managed with great self-discipline on the part of the minicoyans who only stressed on tuna fishing and hence ignored all the other marketable species found within the lagoon and reef. In a sense their restraint has provided an untapped resource for the other islanders who have always carried on reef fishing. To make matters worse they laugh at the Minicoyans and say that these people don't know how to use the lagoon and reef and so when we put a net in the lagoon we catch a lot f fish.

Land resources (Fresh water lens)

12. The administration in their wisdom transfers government employees periodically to different islands. This has created a special problem in Minicoy because of their unique culture and customary practices. Unlike the other islands were the individual housing is scattered all over the island and therefore land is clearly owned by the individuals, in Minicoy the people divided the island space as communally owned rather than Individually owned. Only the houses and coconut trees were individulaly owned. The forested lands to the North and south of the village land and Viringlii island were owned and managed by all the villages and members of the village could enjoy usufruct rights on these lands. The villages had an elaborate system of managing the lands that have been described in the customary practices chapter. A point to be stressed here is that it was not common property resources but property of the 10 villages held for use by members of each village.

    The British took the common property of the village as nobodys property and they therefore said that this land now belongs to the British crown and the people only owned their own housing in the village. This system continued after India became a republic and then came the need for development, land was demarcated for the Navy detachment. The 50/60 acres were acquired as government land for government housing, office buildings etc. and other Central research center such as CMFRI and CPCRI. Sand was mined in this area and used for construction. The administration even now continues to do whatever it bans by using loopholes in the law and get

away with everything. The laws appear to apply only on the native population and not the government servants.
Even recently the 20 bedded tourist resort was built using locally quarried sand and the pits made were leveled with waste and coconut tree planted on top to show that nothing has been disturbed.
The situation now is that this non-minicoyan population has grown in geometric proportion and they being government servants do not pay any attention to Minicoy customary practices in managing the bioresources of the island. They dig the hardstrata of the island indiscriminately to plant bananas. Thereby irreparably destroying the freshwater lens.
Fresh piped water is supplied by the water supply to the government housing. These people use the water indiscriminately for watering their gardens etc.

Action Taken by Administration

Every time the people complain and it takes several years of complaining for the administration to react. The administration issues Notification and ban orders for an activity. For example Ban orders for cutting the hard strata for cultivation purposes, particularly banana trees has been a burning issue on the islands. The first ban order was issued in 1982, following periodic bans and culmination in the D.C's order on 20th May, 2003. They are waiting to see if this order is followed by implementation.
Similarly there is a ban on coral boulder, sand and shingle collection but this continues regardless.
They were unaware of the December 2002, environment and forests notification.

Solution

- Joint management of the island resources with the local community , giving due respect to Minicoy traditions. Action should be taken to stregnthem the village administration system and not erode it in the name of panchayathi raj.
- Awareness programme targeted to inform and influence all the stakeholders (govt, students, women, fisher, public etc.)
- Supporting a community biodiversity (read coral reef) monitoring programme.
- Legislation followed by joint management efforts to restrict and protect the derethethere area that is the reef extending from lighthouse to Neru magu.

Appendix 6: Government Notifications

ADMINISTRATION OF THE UNION TERRITORY OF LAKSHADWEEP

Kavaratti – 073 555, dated the 4th March, 1983

CIRCULAR

Sub: Union Territory of Lakshadweep – conservation of corals and other fauna and flora—Orders issued.

F.No. 48/1/83-Fy.: The Lakshadweep archipelago is formed of coral atolls and, therefore, the very existence of these islands depends upon the coral reef and coral growth. The corals support a variety of animal and plant life forming an ecosystem of its own, the disturbance of which will alter the balance and adversely affect the entire aquatic life in the lagoon and the area outside. This will be disastrous for the fishery of the area which depends mainly on the live balt resources of the lagoon and reef around. The destruction of the coral habitat also destroys the beauty of the colourful lagoons. Due to indiscriminate destruction of the corals in recent times, already much damage has been caused in the lagoon life, rendering a desolate look, Therefore, in order to ensure the very existence of these islands and to preserve the beauty and ecosystem of the lagoons for the future generations of the inhabitants of Lakshadweep in particular and for the country in general the following restrictions are imposed with immediate effect.

Destruction and collection of corals, whether dead or living, from the lagoon of any island or from its reef or outside the reef by any individual or institution, are completely banned except with written permission of competent authority in special cases, after satisfying that such collection will not have adverse affect.

Collecting and selling corals as …. By individuals are completely prohibited. In the case of Handicraft Societies, however, limited and restricted collection and sales will be allowed on written permission after assessing the resources in each island.

Tourists on no account will be allowed to destroy or collect corals from anywhere in Lakshadweep.

Fishing with in the lagoon is allowed only for domestic consumption and is permitted to only the inhabitants of Lakshadweep.

Fishing inside the lagoon and on the reef which include catching fish, collection of see shells, weeds and any other aquatic life is completely banned for tourists. However, they will be allowed fishing outside the reef for sports.

The blasting and removal of corals and boulders by the Lakshadweep Harbour Department will hereafter be only in consultation with the Administration.

The above orders apply to all the inhabited and uninhabited islands of the Union Territory of Lakshadweep.

Sd/-.
(OMESH SAIGAL)
Administrator

The Lakshadweep Gazette

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Vol.xxxiv. No. 31, Friday 30th October, 1998 / 8th Karthika, 1920 (SAKA)

MINISTRY OF ENVIRONMENT AND FORESTS
ADMINISTRATION OF THE
UNION TERRITORY OF LAKSHADWEEP
(DEPARTMENT OF SCIENCE TECHNOLOGY & ENVIRONMENT)
Kavaratti island, dated : 29.10.1998

NOTIFICATION
LAKSHADWEEP PROTECTION OF CORALS (AMENDMENT)
BYE- LAWS, 1998

F.No. 17/2/98 – ST & E: In exercise of power conferred to Administrator, Union Territory of Lakshadweep by regulation 82 (i) 9g) of Lakshadweep Panchayath Regulation, 1994: the Administrator, Union Territory of Lakshadweep hereby makes the following bye-law.

1. (1) This bye-laws may be called "Lakshadweep Protection of Corals (Amendment_ bye-laws, 1998

(2) It shall come into force with immediate effect

2. In Section 4 of the Lakshadweep Protection of Corals bye-law 1998 (hereinafter referred to as CF principal bye-law)

(1) Sub-section (a) shall be omitted

(2) After clause (a) of the principal bye-law the following clause shall be inserted.

(b) The Wild Life Wardens Chief Wild Life Warden on being satisfied of the bonafide requirement may issue a permit after inspecting the site of collection for a maximum of 15 bags with each bag weighing not more than 20 kg. On payment of permit fees of Rs.5/- (Rupees Five) only per bag.

3. For Section 6 of the principal bye-laws, the following shall be substituted, namely:

4. Cognizance of offence

The court of Judicial Magistrate shall take cognizance of offence under this bye-laws in their respective jurisdiction on a complaint made by Wild Life Warden / Technical Assistant / Environment Warden of the Department of Science, Technology and Environment, Lakshadweep or any officer authorized in this behalf by the Administration by notification.

Sd/-
(RAJEEV TALWAR)
Administrator

The problem of collection of coral shingles has been discussed at various form in the Union Territory. It was recommended that loose coral shingles lying on the shore should be allowed to be collected for the purpose of construction. It was recommended that these could be mixed with cement to form blocks and thereby replace bricks which have to be imported from the mainland. This would reduce the cost of construction of permanent houses in the islands. This recommendation has been made by wise and experienced islanders in super session of the ban to dig coral shingles along the shore. Hence taking into account the advice of District Panchayat Members, village Panchayat members and Scientists like Dr. Ali Manikfan, it would be appropriate to ban the digging of coral shingles, but to allow collection of loose shingles that lie around the edges of the islands.

In order to reduce digging up of the shore and consequent damage to the coral shore line, e.g. on the western side of the Coast Guard land, the Deputy Conservation of ……the Chief Wild Life Warden (which activity also covers preservation of the environment and ecology) may delegate such powers to the Police so as to stop any indiscriminate digging up on the shore line and transportation of coral singles in bulk.

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ADMINISTRATION OF THE UNION TERRITORY OF LAKSHADWEEP DEPARTMENT OF SCIENCE, TECHNOLOGY & ENVIRONMENT

F.No. 17.2.98-ST&E: WHEREAS the coral has to be protected to preserve the environment of Lakshadweep Islands.

NOW, therefore, the Administrator U.T. of Lakshadweep in exercise of the powers conferred by Regulation 82 (1) (g) of Lakshadweep Panchayat Regulations 1994, hereby makes following bye-laws namely:

1. (1) These bye-laws may be called Lakshadweep Protect of Corals Bye-Laws, 1998.
   (2) They extent to the whole of U.T. of Lakshadweep.
   (3) They shall come into force w.e.f. 01.10.1998.

2. No person shall excavate or cause to be excavated corals in any form including coral boulders, pebbles, shingles, sands without permit issued by Wild Life Wardens / Chief Wild Life Warden, Lakshadweep Administration.

3. No person shall use or cause to be used any corals in any form including coral boulders, pebbles, shingles, sands for construction or for any other purpose except as permitted in the duly issued permit.

4. (a) For obtaining permit to excavate corals in any form for a bonafide use, application in the prescribed form as in the enclosed schedule shall be moved before the Wild Life Wardens / Chief Wild Life Warden.

(b) The Wild Life Wardens / Chief Wild Life Warden on being satisfied of the bonafide requirement may issue a permit after inspecting the site of excavation for a maximum off 5 bags with each bag weighing not more than 20 kg. on payment of permit fees of Rs. 100/- Rs.5/- each bag.

5. Whoever fails to comply with or contravenes any provision of these bye-laws or directions issued there under shall in respect of each such failure or contravension be punishable with a fine which may extent to Rs. 100/- and shall be liable for the seizure of the corals in any form excavated or in his possession.

6. **Cognizance of offence:**

The Court of Judicial Magistrate shall take cognizance of offence under these bye-laws in their respective jurisdiction on a complaint made by the Wild Life Warden, Lakshadweep Administration or an officer authorized in this behalf by the Administrator by Notification.

7. **Compounding of offence:**
An offence under these bye-laws may be compounded on payment of a fince of Rs. 100/- by the offender for each of the offence.

Sd/-
(RAJEEV TALWAR)

Administrator

(To be published in an extraordinary issue of Lakshadweep Gazette)
Administration of the Union Territory of Lakshadweep
Directorate of Science, Technology & Environment
Kavaratti, dated 17.7.1998

NOTIFICATION

F.No. 17.2.96-ST & E : Whereas, to ensure that non-biodegradable waste is deposited only in the garbage bins eliminating litering, as also to minimize generation of non-bio-degradable waste hazardous to the islands prohibiting the use of polythene / plastic materials for packing and carrying consumer goods, draft bye-laws viz. Lakshadweep Sanitation and Conservancy bye-laws was published in the Lakshadweep Times of 27th May 1996 inviting comments to reach the Deputy Director (S&T) on or before 24th June, 1996).

And Whereas the comments so received have been only considered.

Now, therefore, the Administrator, U.T. of Lakshadweep, in exercise of the powers conferred by section 82 of the Lakshadweep panchayats Regulations, 1994 hereby makes the following bye-laws, namely:

These bye-laws may be called Lakshadweep Sanitation conservancy Bye-Laws, 1998.

They extend to the whole U.T. of Lakshadweep

They shall come into force on such date as notified in the Official Gazette and different dates may be appointed for different islands.

In these bye-laws, unless the context otherwise requires:

Definitions as given in Lakshadweep Panchayat Regulations 1994 shall be applicable.

The "Prohibited substance" means substance prohibited by notification in the Official Gazette, under bye-law 4.

Non-bio-degradable rubbish means waste which does not degrade by natural biological process and includes polythene, plastic, glass, tetra wastes.

Bio-degradable rubbish means waste which is degradable by natural biological process and includes food leftovers, tree leaves, coconut husk and pith paper waste but exclude human excreta.

No person shall dispose off or cause to be disposed off non-bio-degradable waste in any place or manner except into garbage bin when provided for collection of bio-degradable waste.

No person shall dispose off or cause to be disposed off bio-degradable waste in any place or manner except into garbage bin when provided for collection of bio-degradable waste.

Administrator may be notification in the Official Gazette prohibit use of non-bio-degradable substance to the extent as may be specified in such notification.

On and from the date specified in the notification issued under sub-section (1) no person shall use such prohibited substance to the extent specified therein.

Penalty for contravention of the bye-laws, whoever fails to comply with or contravenes any provision of this bye-laws or directions issued there under shall in respect of each such failure or contravention be punishable with a fine which may extend to Rs. 100/-

Cognizance of offence : No court shall take cognizance under these bye-laws except on a complaint made by the Environment Warden of Dept. of Science, Technology and Environment, Lakshadweep Administration or an officer authorized in the behalf by the Administrator by notification in the Gazette.

Compounding of offence : An offence under these bye-laws may be compounded on payment of fine of Rs. 100/- by the offender for each offence.

Sd/-.

(RAJEEV TALWAR)

Administrator

To The Manager, Lakshadweep Govt. Press (2 copies) for publishing in extra-ordinary issue of Lakshadweep Gazette.

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MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 11th July, 2001

S.O.665 (E):- In exercise of the powers conferred by Sub-section (1) of section 61 of the wild Life (Protection) Act, 1972). The central Government, being of the opinion that it is expedient so to do, hereby makes the following further amendments in Schedule I and schedule III of the said Act with effect from the date of publication of this notification in the Official Gazette, namely:-

1. In Schedule 1 to the said Act:-

(a) in Part II A relating to "fishes", after entry 1, the following enteries shall be inserted, namely

"2. Shark and Ray (All Elasmobranchii)
3. Sea Horse (All Sygnathidians)
4. Giant Grouper (Epinephelus lanceolatus)";

(b) after part IV, relating to Crustacea & Insects, the following Parts shall be inserted, namely:-

"Part IV A – Coelenterates

1. Reef Building Coral (All Scleractinians).
2. Black Coral (All Antipatharians).
3. Organ Pipe Coral (Tubipora musica)
4. Fire Coral (All Milipora Species).
5. Sea Fan (All Gorgonians)

PART IV B – Mollusca

1. Charonia tritonis	27. Turbo marmopratus
2. Lambis truncata	28. Trochus niloticus
3. Lambis chiragra	29. Xancus pyrum
4. Lambis chiragra arthritica	30. Harpulina lapponica.
5. Lambis millepeda	31. Harpulina arausiaca
6. Lambis crocea	32. Tudicla spiralis.
7. Lambis scorpius	33. Cypracsis rufa
8. Conus bengalensis	34. Cassis cornuta.
9. Conus malne-edwardsi	35. Murex palmrosae.
10. Conus textile.	36. Murex haustellum
11. Conus nobilis	37. Murex ramosus
12. Conus geographus	38. Strombus plicatus sibbaldi
13. Conus marmoreus	39. Strombus listeris
14. Cypraea lamancina	40. Fasciolaria trapazium.
15. Cypraea cribaria	41. Fusinus longicaudus
16. Cypraea tigris	42. Mitra mitra
17. Cypraea mappa	43. Mitra papalis
18. Cypraea talpa.	44. Cymatium pileare
19. Cypraea carneola.	45. Nautilus pompilius.
20. Cypraea mauritiana	46. Tridacna maxima
21. Cypraea onyx	47. Tridacna squamosa.
22. Cypraea argus.	48. Hippopus hippopus.
23. Cypraea testudinaria	49. Piter erycina.
24. Cypraea moneta	50. Pteria brevilata.
25. Ovula Ovum	51. Placenta placenta
26. Volva volva	52. Paphia ala-papilionis."

Part IC C-Echinodermata

Sea Cucumber (All Holothurians)

2. In Schedule III to the said Act, after entry 19 relating to Wild Pig, the following entry shall be inserted namely:-

"20 Sponges (All Calcareans)."

[F.No. 1-4/95/WL-I]

S.C. ShARMA, Addl. Director General of Forests (WL).

Note: The entries in various Schedules of the Wildlife (Protection) Act, 1972 have been amended from time to time. The last notification in this regard was issued vide S.O. 474 (E) dated the 29th May, 2001

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Vol.xxxvii. No. 53, FRIDAY, 21st DECEMBER, 2001/30th AGRAHAYANA, 1923 (SAKA)

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 211th decembe,, 2001

S.O…… (E):- In exercise of the powers conferred by Sub-section (1) of section 61 of the wild Life (Protection) Act, 1972) (53 of 1972), the Central Government, being of the opinion that it is expedient so to do, hereby makes the following further amendments in Schedule I and schedule III of the said Act with effect from the date of publication of this notification in the Official Gazette, namely:-

3. In Schedule 1 to the said Act:-

(a) in Part II A relating to "fishes", for serial number 2 and the entry relating thereto, the following serial number and enteries shall be substituted, namely

"2. Shark and Ray

(i) Anoxypristis cuspidate
(ii) Carcharhinus hemiodon
(iii) Glyphius gangeticus
(iv) Glyphius glyphius
(v) Himantura fluviatilis
(vi) Pristis microdon
(vii) Pristis zijsron
(viii) Rhynchobatus djiddensis
(ix) Urgymnus asperrimus."

(b) For Part IV B, relating to Mollusca and the enteries there relating to, the following Part IVB and the entries shall be substituted, namely:-

1. Cassis cormuta
2. Charonia tritonis
3. Conus malne-edwardsi
4. Cypracsis rufa
5. Hippopus hippopus.
6. Nautilus pompilius.
7. Tridacna maxima
8. Tridacna squamosa.
9. Tudicla spiralis.

2. In Schedule IV to the said Act, after serial number 18 and the entries relating thereto, the following serial numbers and entries shall be added, namely:-

"19 Mollusca

(i) Cypraea lamancina
(ii) Cypraea mappa
(iii) Cypraea talpa.
(iv) Fasciolaria trapazium.
(v) Harpulina arausiaca
(vi) Lambis chiragra
(vii) Lambis chiragra arthritica
(viii) Lambis crocea
(ix) Lambis millepeda
(x) Lambis scorpius
(xi) Lambis truncata
(xii) Placenta placenta
(xiii) Strombus plicatus sibbaldi
(xiv) Trochus niloticus
(xv) Turbo marmopratus

(S.C. ShARMA,)
Additional Director General of Forests (WL).
To the Government of India
(F.No.1-4/95 WL-1)

Note: The various Schedules of the Wildlife (Protection) Act, 1972 were amended from time to time and the last notification in this regard was issued on 12th July, 2001 vide S.O. 665 (E) dated the 11th July, 2001