

Resource Utilization In and Around Komodo National Park

Prepared by Abu Bakar, Awareness Officer YPAN Komodo Field Office

1996 (re-edited in July 1999 by Peter J. Mous)



Komodo Field Office
Kampung Ujung, Labuan Bajo
Flores Barat, Indonesia
tel. +62-(0)385-41214
fax. +62-(0)385-41225

TABLE OF CONTENTS

Preface	4
1. Introduction	5
2 Communities in Komodo National Park.....	6
2.1 Population.....	6
2.2 Religion	6
2.3 Education	6
2.4 Ethnic groups.....	7
2.5 Social facilities	7
2.6 Livelihood	7
3 Communities around Komodo National Park.....	10
3.1 Kampung Papagarang	10
3.1.1 Population	10
3.1.2 Education	10
3.1.3 Religion	11
3.1.4 Livelihood	11
3.2 Desa Pasir Putih	12
3.2.1 Population	12
3.2.2 Religion	12
3.2.3 Education	12
3.2.4 Livelihood	12
3.3 Labuan Bajo	14
3.3.1 Population	14
3.3.2 Education	14
3.3.3 Livelihood	14
3.4 Desa Warloka	16
3.5 Desa Golomori.....	16
4 Settlements in the Sape District.....	17
4.1 Desa Bajo Pulau	18
4.1.1 Population, religion and education	18
4.1.2 Livelihoods	19
4.2 Desa Bugis	20
4.3 Desa Soro.....	21
5 Analysis	22
5.1 Population.....	22
5.2 Sociocultural background	23
5.3 Institutional sector	23
5.4 Commerce	24

5.5 Lack of knowledge and skills	24
5.6 Capital accumulation.....	24
5.7 Non-existence of financial institutions at village level	24
5.8 Fluctuating income.....	25
5.9 Territorial issues	25
5.10 Fishing grounds	25
5.11 Mariculture activities.....	27
5.12 Community awareness about Komodo National Park	28
6 Conclusions	28
7 Recommendations	29

PREFACE

The prevalent opinion today in regard to efforts to enhance national development is to increase community participation in various forms, for instance encouraging community-based initiatives to be carried out by and for the people. The people can no longer be considered an object accepting everything they are being presented with, but need to be given a position as decision maker in all policies to be enforced.

The initial step in this context of community development is the approach of communities in order to gain an understanding of local customs and sociocultural, socioeconomic and environmental conditions, which in this case was achieved through informal discussion with community leaders, local authorities and existing organizations.

This report is a compilation of information collected during surveys conducted by the field staff of The Nature Conservancy in all villages located in Komodo National Park and its surrounding buffer zone. The basic information and data presented here were gathered through direct observation and discussions with community leaders, local authorities and existing youth organizations.

It is the aim of this report to provide initial information to those wishing to gain a more detailed knowledge of the population of Komodo National Park and its surroundings, or as reference for the development of a management program for Komodo National Park.

The content of this presentation is still far from complete, therefore any comments and/or suggestions from readers would be very much appreciated for the sake of accuracy and comprehensiveness.

Abu Bakar P.

The Nature Conservancy

1. INTRODUCTION

Komodo National Park was established in 1980. The park covers a total area of 171.400 ha, with 58,900 ha of land, consisting of Komodo Island (33,937 ha), Padar Island (2,017 ha), Rinca Island (19,625 ha) and a few other small islands, and 112,500 ha of marine waters. The sole habitat of the komodo dragon (*Varanus komodoensis*), Komodo National Park has great significance as a conservation area, not only on a national level but also on an international level, and has been designated a World Heritage Site in 1992.

Apart from its terrestrial natural resources, the park also sustains a stunning marine biodiversity. A Rapid Ecological Assessment (REA), conducted in April 1994 by The Nature Conservancy in cooperation with the Directorate General of Forest Protection and Nature Conservation (PHPA), showed that the marine waters of the park contain a rich diversity of marine ecosystems, with about 750 fish species and 250 coral species. The rich diversity of coral reef ecosystems found in the park stresses the importance of conservation efforts, which in turn will benefit the welfare of the local population. The coral reefs encircling the islands in the park provide habitats for a variety of marine biota, such as fish, molluscs, shrimps, and sea cucumbers. The marine waters of Komodo National Park provide local fishermen with abundant fishing grounds, which are harvested for both local consumption and commercial purposes.

There are three villages within the boundaries of Komodo National Park, namely Kampung Komodo on Komodo Island, and Kampung Rinca and Kampung Kerora on Rinca Island. The communities inhabiting the park are completely dependent on the marine waters of the park for subsistence, and earn a living as fishermen by collecting marine biota. The area is also frequented by fishermen from the neighbouring regencies (kabupaten) of Manggarai and Bima. Both the communities living in the park and those inhabiting the surrounding buffer zone have to be embraced as a component in support of conservation efforts. This principle is in line with Act no.5 on Conservation of Bioresources and Ecosystems, particularly section IX pertaining to community participation, where it is stated in paragraph 33 that community participation should be extended and stimulated through educational activities and counseling (Sudibyo 1994 PRA). Local communities should perceive the conservation area should not just as a restricted zone, but more as a protected area for juvenile fish and the various habitats it contains, which in turn will help to enhance fisheries and thus render continuous benefits to the welfare of the people.

During the sixteen years since the establishment of Komodo National Park it has not yet been evident that the local communities play an active part in support of conservation efforts. The population in general remains indifferent to the cause, and even presents a potential threat to the ecosystem. This is emphasized by the fact that part of the population is still engaged in the use of destructive fishing techniques, such as the use of explosives and cyanide.

Not only the government but the private sector as well has to assume the task of excite community participation in conservation efforts. Cooperating with the Directorate General of Forestry Protection and

Nature Conservation, The Nature Conservancy began several activities in January 1996, among others a community-development sub-program. The reduction of the local communities' dependence on the park is an issue that has to be given serious thought considering the ever growing demands and needs of the population. This can be achieved through the development of tourism, fisheries, or other options, with the hope that the people will take greater part in protecting their environment.

2 COMMUNITIES IN KOMODO NATIONAL PARK

Today there are three villages in Komodo National Park: Kampung Komodo on Komodo Island, and Kampung Rinca and Kampung Kerora on Rinca Island. It is unknown since when this area has been inhabited, but based on discoveries of neolithic caves on Komodo Island, Blower et al (1977) proclaim the possibility that the island has been occupied since prehistoric times. Obviously people had already been living on the island when it was declared a protected area as part of Komodo National Park. Administration wise the area is divided into two villages (*desa*), namely *Desa Komodo* and *Desa Pasir Panjang*, both part of the District (*kecamatan*) of Komodo, Regency (*kabupaten*) of Manggarai.

2.1 Population

The total population of the three communities in Komodo National Park is 2,310. Kampung Rinca and Kampung Kerora, both part of *Desa Pasir Panjang*, have a population 1,074 and 223, respectively. Kampung Komodo has 1,013 residents.

2.2 Religion

All inhabitants of the three villages within the park embrace the Islamic faith. Local Islamic leaders possess a strong influence on everyday life. Social status is measured from religious points of view, and the fulfillment of pilgrimage duties (*ibadah haji*) is regarded a major goal to be achieved.

2.3 Education

Although education facilities, i.e. elementary schools, are present in each of the villages of Komodo, Rinca and Kerora, the percentage of people having an education is very low, especially the percentage of elementary school graduates. This is caused by the fact that children of school age are already required to help their parents earn a living at sea. Of those who succeed to finish elementary school only very few continue to pursue an education at a higher level.

2.4 Ethnic groups

The settlements within Komodo National Park are occupied by several ethnic groups or tribes. Kampung Komodo is inhabited by people from tribes of Komodo, Bima, Manggarai and Bajo, with the Komodo tribe being the majority group. Although the population consists of people from various ethnic backgrounds there is no discord arising from corresponding differences. An assimilation process is taking place and can be observed through inter-tribal marriages, the language spoken as well as daily life in general. The language used in Kampung Komodo village is a mixture of Komodo, Bima and Manggarai languages, but almost every member of the community is able to understand the individual languages as well.

Kampung Rinca is also inhabited by people of Komodo origin, but is predominated by the Bajo tribe. Other ethnic groups present are people from Bima, Selayar, Manggarai and Ende. The prevalent language is Bajo. Unlike in Kampung Komodo on Komodo Island, the two major ethnic groups of Kampung Rinca tend to remain separated and occupy their own section of the village, ie Kampung Komodo and Kampung Bajo. The population of Kampung Kerora consists of Bima, Bajo and Manggarai ethnic groups, each using its own language.

2.5 Social facilities

Kampung Komodo has one elementary school, one mosque, one auxiliary rural health *centre* (*puskesmas pembantu*) supervised by a medical aide (*mantri*), one police station and three Komodo National Park guard posts. Kampung Rinca has one elementary school, one mosque, one health service post (*pos pelayanan kesehatan*) and two Komodo National Park guard posts. Kampung Korera has one elementary school and one mosque. A common problem faced by the three villages is the insufficient supply of fresh water. Water for daily use has to be brought in from the island of Flores, in particular for Kampung Rinca and Kampung Kerora.

2.6 Livelihood

Circa 97% of the local population are fishermen, while the remaining 3% are civil servants (teachers) and merchants, most of whom originate from outside the area. A small-scale handicraft industry has developed in Kampung Komodo during the last five years, producing komodo dragon statuettes. Mariculture is still relatively unknown.

The following fishing methods are used in the park:

Bagang boats. *Bagang* is the local name for specially designed motorboats equipped with lift nets and kerosene lanterns. These boats are used at night only to catch squid, anchovies (lure) and sardine (simbula, layang). Currently there are 67 units operating from Kampung Komodo, 43 from Kampung Rinca and 3 from Kampung Kerora. The Komodo, Rinca and Kerora communities depend on squid as their main source of

income. Anchovies and other fish species are regarded as supplementary catch only. Squid is caught from August until May and varies in price between Rp 2,000/kg and Rp 2,500/kg. This commodity is of particular interest to local fishermen since it does not require any post-harvest processing. Buyers are readily found and usually pay an advance as a sign of commitment. The catch is shipped either to Bali or to Surabaya. Each catching period (12 - 15 days a month) provides the owner of a boat and equipment with an average income of Rp 1,500,000. Crew members receive between Rp 200,000 and Rp 400,000. The operation of a *bagang* boat requires a crew of four to six male adults. For the last five years nearly the whole community has been complaining about the decreasing yields. According to the locals, this decline is caused by the steadily rising number of fishermen going after squid and the invasion of fishermen from outside the area, for instance from Sape Bima and other areas in the surroundings of Komodo National Park. This has been confirmed by the Fisheries Services office (*dinas perikanan*) of the district of Komodo.

Gleaning of the reefs (*meting*). All three communities in the park engage in this activity, which is locally known as *meting*. Gleaning of the reefs takes place during low tide and is done on foot by men, women and children. This activity occurs not only during daytime but also at night, with kerosene pressure lanterns providing light. Marine biota collected are sea cucumber, abalone and a variety of molluscs. A nocturnal species, abalone is caught mostly at night. Abalone is sold at prices between Rp 25,000/kg and Rp 35,000/kg, while sea cucumber fetches prices ranging from Rp 6,000/kg to Rp 30,000/kg depending on sort and quality. A gleaning operation may continue for five to seven days in a row, particularly if carried out in remote locations. Each operation requires a budget of Rp 25,000 to Rp 40,000, and may provide participants with an income between Rp 100,000 and Rp 300,000. These gleaning activities have a severe impact on the reef flats because of the trampling of corals and the use of iron bars to retrieve abalone from crevices.

Dragnets (*pukat*). Fishermen living in the park use dragnets to catch fish, especially reef-fish. The total number of dragnets operated by fishermen from the three settlements within Komodo National Park is 75, the majority (50 units) by fishermen from Kampung Rinca. Fishermen from Kampung Kerora and Kampung Kerora operate 5 and 20 units, respectively. A major cause of concern is the use of trawl-nets (currently 12 units) by some fishermen. Dragnets are used in waters ranging in depth from 1 to 10 meters. The catch includes reef-fish and small pelagic fish such as tuna (*cakalang*), anchovies, *sampureang*, as well as shrimp. The use of dragnets is not limited by season. They can be operated both during daytime and at night. After being brought ashore the catch is salted and dried, then sold at prices varying from Rp 1,250/kg to Rp 2,500/kg, either to purchasing agents or directly to local markets.

Other fishing methods. Another fishing method adopted by local fishermen is the hook-and-line method (*pancing*). This use of this method for commercial fishing is limited to the communities of Kampung Rinca and Kampung Kerora. Fishermen from Kampung Komodo show little interest in this method. The catch comprises reef-fish such as *katamba*, *kerapu*, *sunu* and others, and is processed to salted fish. Hook-and-line fishing occurs between periods of main fishing activities, for instance the operation of bagang boats. Otherwise it is employed by fishermen not in possession of other gear. Traps locally known as *bubu* are also in use. They are made of bamboo and are put on reef flats and slopes to catch reef-fish. This type of fishing

gear is used only by fishermen from Kampung Rinca and Kampung Kerora. Currently there are ten Rinca fishermen operating 50 traps, while in Kampung Kerora there is one owner with 4 traps.

Harvesting milkfish larvae (*nener*). Harvesting of milkfish larvae takes place between August and April, and is carried out primarily by women and children, but also by some male adults. The catch is sold either to purchasing agents or directly to Labuan Bajo. This activity generates a considerable additional income for fishermen since milkfish larvae are priced between Rp 20 and Rp 25 a fish. One person can collect 1000 to 2000 larvae a day, thus earning between Rp 10,000 and Rp 30,000.

Other occupations. An income generating opportunity not related to fisheries is the production of souvenirs such as komodo dragon statuettes. This activity is carried out on a small scale by some 25 craftsmen in Kampung Komodo and has yet to spread to the other two communities in the park. The involvement of the local population in the tourism sector is limited to tourist guide activities at Loh Liang. About 15 youths from Kampung Komodo have taken up this profession.

The following table shows income-generating activities carried out by the local population:

Activities	Kampung			Total
	Rinca	Kerora	Komodo	
Liftnets (bagang)	40 units	3 units	67 units	110 units
Dragnets	50	5	24	79
Fishing rods	50 persons	100%	-	75%
Fishing traps	10 (50 units)	1 person	-	11 persons
Gleaning (meting)	80%	100%	95%	92%
milkfish larvae	70%	100%	95%	88%
Diving	1 unit	-	-	1 unit
Handicraft	-	-	25 persons	25 persons

source: survey of settlements

Attempts to cultivate sea cucumbers have been made by inhabitants of Kampung Rinca. These efforts, however, have not yet been successful owing to the lack of knowledge about the methods and techniques of mariculture as well as insufficient support by the relevant authorities.

3 COMMUNITIES AROUND KOMODO NATIONAL PARK

Komodo National Park is located between two large islands, Sumbawa to west and Flores to the east. Sumbawa is a part of the province of Nusa Tenggara Barat, while Flores belongs to the province of Nusa Tenggara Timur.

The area occupied by the Komodo National Park is a part of the District of Komodo, Regency of Manggarai, which in turn is part of the Province of Nusa Tenggara Timur. The district of Komodo is divided into 16 smaller administrative units (*desa/kelurahan*) and consists of large and small islands. The district has a total population of 32,772, with 16,564 male and 16,208 female residents (1996). A large part of the coastline is inhabited by fishermen. Komodo National Park is affected to some extent by these settlements, particularly the marine waters within park boundaries, which are utilized as fishing grounds by the fishermen in the area. The settlements examined in the following section of this report are limited to those bordering Komodo National Park. There are six villages with several hamlets adjacent to the park. Special attention is given to activities related to park territory.

3.1 Kampung Papagarang

The administration of Komodo village (*desa Komodo*) covers two settlements, namely Kampung Komodo on Komodo Island and Kampung Papagarang on Papagarang Island, the latter bordering Komodo National Park to the east. The crossing between Komodo Island and Papagarang Island takes approximately 1.5 hours by motor boat.

3.1.1 Population

Based on data issued at the end of 1996 the population of Kampung Papagarang is 1047, with 214 family heads. At first Kampung Papagarang was inhabited only by members of the Bajo tribe, but today its population includes people from various ethnic backgrounds. People of Bima, Komodo, Lombok and Manggarai origins have come to Papagarang Island to earn a living as fishermen and traders, and an assimilation process has been taking place in the form of inter-tribal marriages.

3.1.2 Education

Education facilities in Kampung Papagarang are limited to one elementary school. Unfortunately the school building is in poor condition, which makes it difficult, if not impossible, to conduct classes in a proper way. In spite of this, the number of children attending school is quite high, especially for grades one to three. As is generally the case with fishermen communities, the motivation to finish elementary school, let alone to pursue an education at a higher level, is very low. Papagarang children on the average leave school after grade three or four, since beginning at the age of seven they are already deemed able to help out at sea.

3.1.3 Religion

The majority of the Papagarang population embraces the Islamic faith, the exception being newcomers from outside the area, such as teachers or traders of Manggarai origin. The fulfillment of pilgrimage duties (*ibadah haji*) is of the utmost importance to the community, therefore earnings are set aside for said purpose.

3.1.4 Livelihood

Ninety-seven percent of the Papagarang community are fishermen, utilizing the following methods:

Bagang. Some 80 bagang boats are operated by Papagarang fishermen to catch squid, anchovies, scads and sardines, with a strong emphasis on squid, since this is the most profitable commodity. The squid catching season starts in August and lasts until April. *Bagang* boats are operated at night and require a crew of four to six.

Dragnets (*pukat*). There are 90 people operating dragnets to catch fish in shallow waters. Each unit requires the labor of two to three male adults, who usually are related by blood (sons, brothers, nephews, etc.). The device is used to catch reef-fish to be processed to salted fish.

Fishtraps (*bubu*). This type of fishing gear is produced locally by members of the Papagarang community with raw materials (bamboo) brought in from Flores. Traps are set in reef areas to catch a variety of reef-fish species for local consumption and for processing to salted fish.

Hook and line (*pancing*). The hook-and-line method is also used by the fishermen of Papagarang. Fishing for pelagic species, such as mackerel (*tenggiri*), tuna, etc., occurs on a relatively small scale only. There are several reasons for this, among others the lack of equipment, less favorable market conditions compared to salted reef-fish and the fact that the yield is dependent on season.

Gleaning of the reefs (*meting*). This method to collect marine biota at low tide is carried out by men, women children. The yield includes sea cucumber and abalone along with other mollusc species of economic value. Fifty percent of the Papagarang population engage in this activity.

Tuba (*Derris elliptica*). Tuba is the local name for a poisonous substance derived from the root of the tuba tree, which can be obtained from Flores. Papagarang fishermen use this substance to catch rabbitfish (*baronang/blawes*) during the months of May and June, when there is an increase of the population of said species. The use of tuba may yield fish in great numbers, since fish drugged by the poison can be easily taken with nets.

Aside from exploiting natural fishing grounds, some members of the Papagarang community have already started the **culturing of sea weed** around Papagarang Island.

3.2 Desa Pasir Putih

3.2.1 Population

Desa Pasir Putih has a total population of 1666 occupying two settlements, i.e. Kampung Mesa on Mesa Island and Kampung Seraya Besar on Seraya Island. The crossing between the islands takes approximately one hour by motor boat. Kampung Mesra has a larger population than Kampung Seraya Besar, and is also the seat of the local administration.

The majority of the inhabitants of the two settlements is of Bajo origin. The remainder consists of people from Bima, Selayar and Bugis. The prevailing language is Bajo, but the Bima and Bugis languages are also widely understood.

3.2.2 Religion

Nearly all inhabitants of Desa Pasir Putih embrace the Islamic faith, except for some newcomers such as teachers and traders, as well as temporary residents such as fisherman from outside the area who have come to fish around Komodo. Each settlement has its own mosque.

3.2.3 Education

Despite the presence of adequate education facilities (school building and teachers), most inhabitants of Desa Pasir Putih did not finish elementary school, particularly the inhabitants of Kampung Seraya Besar. The population of Kampung Mesa, however, has already realized the importance of an education and some of its members are attending school at a higher level. There are five junior/senior high school students and two college students.

Mesa Island is a large sand bank and has no fresh water supply. Water for daily use has to be brought in from Labuan Bajo at a price of Rp. 500/jerry can of 30 l capacity. There is a source of fresh water near the settlement on Seraya Island.

No health facilities exist at either settlement. Inhabitants requiring medical care have to go to Labuan Bajo.

3.2.4 Livelihood

The majority of the population earns a living as fishermen. Fishing methods commonly used are:

Bagang. Like most fishermen in the area, fishermen of Kampung Messa and Kampung Seraya Besar operate bagang boats, primarily to catch squid. Seventy-five boats are operated from Kampung Mesa, twenty from Kampung Seraya Besar. Although the two settlements are located outside Komodo National Park territory, the greater part of their fishing operations are carried out in Park waters.

Hook and line. The inhabitants of both Mesa and Seraya Besar use this method to catch live fish, particularly groupers (*kerapu*) and coral trout (*sunu*), which fetch quite high prices and are readily marketed. The price for one kilogram ranges from Rp. 6,000 to tens of thousands of Rupiahs, depending on the species. Fish species not included in the category of fresh fish are dried and processed to salted fish. The Seraya Besar community already engages in fishing to supply fresh fish such as mackerel (*tenggiri*) and tuna. The catch is bought up at a price of Rp. 2,000/kg by buyers at Seraya Kecil.

The population of Seraya Besar also fishes for sharks. This activity is considered more lucrative, since shark fins are sold at prices starting from Rp. 60,000/kg. Shark meat is priced at Rp. 2,000/kg. Fishing for sharks, however, calls for a relatively large amount of capital, since each operation commands a minimum budget of Rp. 500,000. The budget required to fish in far away locations can reach several million Rupiahs. Frequently exploited locations are the waters around Selayar (Sulawesi) and Sumba, among others. The fishing operations generally take between six and twelve months of time.

Diving. Local fishermen utilize compressors (*hoka*) for collecting marine biota in deep waters. Species gathered with this method include sea cucumbers, young pearl oysters, abalone and *tali arus* (a sort of *akar bahar*). Kampung Mesa fishermen operate some 20 compressors, their counterparts in Kampung Seraya Besar only three. High initial and operating costs prohibit the widespread use of this type of equipment. One compressor unit provides air for four to six divers, who receive either a fixed salary or a share of the profit. The introduction of compressors has shown a negative impact on coral reefs, since divers searching for abalone often remove corals with iron bars and thus cause severe damage.

Net-fishing. Fishermen from Kampung Mesa and Kampung Seraya Besar use nets measuring 200 to 300 meters in length and one to two meters in width. These nets are operated at depths between one and ten meters in the waters surrounding Komodo. Net-fishing may provide fishermen with an income from several thousand to tens of thousands Rupiah a day, depending on luck. Operational expenses are between Rp. 10,000 and Rp. 20,000 a day.

Gleaning (*meting*). Gleaning of the reefs requires no special skills and takes place at locations that are not hazardous. Most of the participants are women and children. They traverse reef-flats at low tide to search for marine biota such as sea cucumbers, molluscs and especially abalone, which has the highest commercial value. Lasting for five to seven days in a row, each gleaning session may yield profits in excess of Rp. 100,000. About 90% of the inhabitants of Kampung Mesa and Kampung Seraya Besar engage in this activity.

Some 20 inhabitants of Kampung Mesa are involved in the **culturing of sea weed** in areas around Mesa Island. Owing to difficulties in marketing, however, these efforts so far have failed to gain favor with the local population in general.

3.3 Labuan Bajo

Labuan Bajo is the capital of the district (*kecamatan*) of Komodo. Compared to other settlements in the district, Labuan Bajo exhibits a more dynamic situation in terms of economic performance and sociocultural conditions. Aside from being the seat of the local administration, the town is also an important hub for air and sea transport, connecting the province of Nusa Tenggara Barat to other areas in the eastern part of the country. Infrastructure for transportation include an airport with flights to the east and west, and a daily ferry service between Labuan Bajo and Sape. The port of Labuan Bajo is also frequented by state-owned PELNI ships. An adequate road network facilitates land travel to destinations on the island of Flores.

Although only a district capital, Labuan Bajo accommodates regency-level government offices such as offices of the tourism service (*dinas pariwisata*), the district attorney (*kejaksaan*) and the assistant to the head of the regency (*pembantu bupati*) as well as the Komodo National Park head quarters. Various district-level government offices of are also present.

3.3.1 Population

Compared to other settlements in the district, Labuan Bajo has a relatively large population with 5,463 inhabitants (1996 data). There are about eight hundred family heads of Manggarai, Bugis, Bajo, Bima, Bejawa, Ende and Selayar origin. The recent progress in the development of the area, especially in the tourism sector, has attracted people from other parts of the country and even some foreign nationals (Chinese). The various ethnic groups have undergone an assimilation process, and today no single group is dominant in terms of language or custom. The everyday language is Indonesian, but members of ethnic groups still use their respective mother tongue to communicate among themselves. The majority of the population embraces Islam, minority groups include followers of Protestantism, Roman Catholicism, Buddhism and Hinduism. All congregations live side by side in harmony.

3.3.2 Education

In terms of education, the community of Labuan Bajo is far more advanced than other communities in the area, since besides having adequate education facilities, the people are more aware of the importance of an education. A great part of the younger generation of Labuan Bajo goes to college in Ujung Pandang, Surabaya, Malang, Bandung and other major cities. Labuan Bajo has education facilities from kindergarten to senior high school and as well as a public health center (*puskesmas*).

3.3.3 Livelihood

The majority of the inhabitants of Labuan Bajo earn a living as fishermen. About 3,500 of the 5,463 inhabitants are engaged in this trade. The remainder consists of merchants, entrepreneurs, craftsmen, government employees and others. The Labuan Bajo community carries out the following income generating activities:

Bagang. There are 100 bagang boats in Labuan Bajo, owned by some 80 fishermen. These boats are used to catch squid, anchovies, scads (*layang*) and *tembang* fish. Squid is considered the most lucrative catch, but is seasonal in nature. After the squid season has ended, some Labuan Bajo fishermen continue to operate *bagang* boats to catch fish species such as anchovies, scads and *tembang*, which are available all year round. The average yield for one operation (one night) is 10 to 30 baskets for scads and *tembang*, which are sold at prices ranging from Rp 15,000/basket to Rp 20,000/basket. A part of the catch is consumed locally, the rest is dried and sold to merchants from Bali or Surabaya to be processed further as fodder.

Fishing with hook and line. The hook and line method is another method employed by Labuan Bajo fishermen, primarily by those with limited financial means who do not possess other fishing gear. This activity is generally carried out in small rowing boats equipped with a sail, and thus limited in range to the waters around Kanawa Island, Monyet Island and Bidadari Island. Except during daytime, fishermen also operate during nights with little or no moon. The catch is usually sold fresh for local consumption or sold at the market. Based on information obtained from fishermen, this activity may generate an average daily income of Rp 5,000 to Rp 10,000. About 50 fishermen in Labuan Bajo use the hook and line method.

Fishing with nets. The total number of nets in Labuan Bajo is 19. Besides nets to catch reef-fish there are also nets to catch tuna (*cakalang*), *rambeng* and sardines (*simbula*). The catch is usually sold for local consumption to the neighbouring community. Abundant yield is shipped to Ruteng, the capital of the Regency of Manggarai. The income from one operation ranges between Rp 50,000 to Rp 150,000. Net fishing requires the labour of two to six people, depending on the type of net used.

Fishing with traps (*bubu*). There are five Labuan Bajo fishermen owning a total of 50 traps. These traps are installed in reef areas to catch reef-fish. The catch is usually dried and processed to salted fish. Traps are left in place for one to two days, and each operation cycle may last for one to two weeks.

Up to date, six people have made attempts to start **sea cucumber cultures**, but without success. This activity is of great interest to the community of Labuan Bajo, and some 100 fishermen have expressed their hope for support from the relevant authorities.

Tourism related activities. Among the settlements in the area, Labuan Bajo is the most likely to benefit from the tourism sector due its strategic location as point of entry to Komodo National Park or other tourist attractions in the eastern part of Flores. Today the town already has several accommodation facilities and restaurants, as well as transportation and tourist guide services. Currently there are 14 hotels and homestays, and the number of restaurants is increasing. Most hotels and restaurants are owned by newcomers with large capital, while homestays are run by natives who set up part of their homes as tourist accommodation. Another tourism related service provided by inhabitants of Labuan Bajo is the provision of motorboats for hire, which take visitors to tourist attractions in Komodo National Park and its surroundings. During low season, these motorboats are used for fishing activities or for transporting merchandise.

3.4 Desa Warloka

Desa Warloka is located adjacent to Komodo National Park. A part of its population lives on the coast of Flores Island and earns a living as fishermen. Others live in the interior of the island and pursue a livelihood as farmers. Warloka has a population of 1,581. Three-hundred-thirty of its inhabitants (18% of the total population) are fishermen who exploit the waters of Komodo National Park.

The population of Warloka is heterogeneous. The inhabitants of the coastal areas are fishermen of Bima and Bajo origins, while the hills of the interior are occupied by farmers from Manggarai. Warloka is a Moslem community and at present has two mosques. Other social facilities are an elementary school, a public health post (*pos pelayanan kesehatan*) and a market, which also provides a meeting place for the people from the villages in the Komodo district. Market day is every Tuesday and fishermen from Warloka and the surrounding area use this opportunity to sell their catch, and thus do not need to take it to other places, for instance to Labuan Bajo. Although education facilities are available, the motivation of the people to send their children to school is still quite low, and the majority of the population has not finished elementary school.

Like fishermen from other settlements in the area, Warloka fishermen operate bagang boats, but on a smaller scale. There are only six such boats in Warloka, which are used to catch squid, anchovies and sardines. Because of the lack of fishing equipment, the locals primarily engage in gleaning activities and the harvesting of bandeng larvae. These activities require little start-up capital and are carried out by 99% of the population.

Some 15 people use fishing rods to catch live fish such as groupers (*kerapu*) and coral trout (*sunu*). The catch is bought up by buyers in the village. Warloka has holding pens (*karamba*) where live fish bought by traders from outside the village are held.

Mariculture efforts, in particular for sea cucumbers, were started in 1995 by some 20 people in the waters fronting Warloka. The results, however, were disappointing because the sea cucumbers held in the growing pens showed little development. Currently the Warloka community is hoping for technical support from parties competent in matters of mariculture in order to ensure better results from future efforts.

3.5 Desa Golomori

Golomori has a population of 1,065. One hundred sixty nine of the inhabitants are fishermen, while the remainder earns a living as farmers. The Golomori community is heterogeneous and consists of people of Manggarai and Bugis origins. The everyday language is the Manggarai dialect. Most of the inhabitants embrace the Islamic faith.

Golomori is located on the island of Flores, but until now there is no overland connection to other villages. The settlement can be reached only by crossing the Molo Strait. Social facilities include an elementary school, a mosque and a public health post (*pos pelayanan kesehatan*). Located on a large island, Golomori has adequate fresh water supply since springs are found in the surroundings of the village. In regard to education, the conditions in Golomori are similar to those of fishermen settlements in general, and most of the inhabitants have not finished elementary school.

Golomori fishermen in general use simple fishing gear. Most of them take part in gleaning activities and the harvesting of *bandeng* larvae. There are only five *bagang* boats in Golomori, three equipped with motors and two with sails. Because of the lack of equipment, fishing activities are restricted to angling in the waters adjacent to the settlement. Those not in possession of motor/sailing boats and nets become hired hands for other fishermen, either in Golomori, Kampung Rinca or other fishermen settlements.

Table of activities:

Activities	Village/settlement					Total
	Warloka	Golohmori	Missa	Papagaran	Labuan B.	
Liftnets	6 units	5 units	75 units	100 units	100 units	286
Dragnets	-	-	30 people	90 people	19 people	139
Fishing rods	15 people	90%	50%	90%	30 people	-
Traps	-	-	-	30 people	5/50	35
Gleaning	99%	100%	90%	50%	-	-
milkfish l.	99%	100%	-	50%	10%	-
Diving	-	-	20 units-	-	7 units	27
Mariculture	20 people	-	20 people	50 people	6 people	96
Sero	-	-	-	6	-	6

Source: survey

Comments: The numbers for mariculture refer to so far unsuccessful efforts in mariculture, especially for sea cucumber.

4 SETTLEMENTS IN THE SAPE DISTRICT

To the west of Komodo National Park lies the District (kecamatan) of Sape, which is part of the Regency (*kabupaten*) of Bima in the Province of Nusa Tenggara Barat. The district occupies an area of 618.65 square kilometers and has a population of 69,733. Most of the inhabitants are native Bima people. Coastal stretches and islands in the area are occupied by people of Bugis and Bajo origin. The majority earns a living as farmers, especially those living in the interior. The inhabitants of the coastal areas are fishermen.

Although there are quite many fishermen settlements in the area, this report includes only three villages in the district of Sape that are adjacent to Komodo National Park, namely Desa Bajo Pulau, Desa Bugis and Desa Soro. These villages show a high degree of dependence on the waters of the park and have already been surveyed. The other settlements may be covered in future reports.

4.1 Desa Bajo Pulau

Desa Bajo Pulau is the most eastern point of the province of Nusa Tenggara Barat. It is adjacent to Sumbawa Island and borders directly on the province of Nusa Tenggara Timur. The village consists of three settlements on two islands: West Bajo (Bajo Barat) and Central Bajo (Bajo Tengah) on one island and East Bajo (Bajo Timur) on the other. Central Bajo has the largest population and all social facilities, such as a mosque, the village administration and a school building, are located here.

4.1.1 Population, religion and education

Desa Bajo Pulau currently has a population of 5,046. All of them embrace the Islamic faith. Most inhabitants are of the Bajo tribe originating from South Celebes. According to information obtained, they have been living here since 1935. Minority groups include people from Bima and Selayar who have come through marriage and to earn a living.

Desa Bajo Pulau is a Moslem community, and the fulfillment of pilgrimage duties (*ibadah haji*) is of the highest importance to its inhabitants. People who have made the journey to the Holy Land automatically gain in status and influence. The community takes a more enlightened view towards education than other fishermen communities. This is evident by the fact that quite many members of the community pursue their education to a higher level, such as junior and senior high school (SMP/SMA). Compared to other villages in the Sape District, however, the standard of education in Desa Bajo Pulau is still low. Children attending elementary school generally finish the sixth and final grade, and many continue to junior high school. A contributing factor for this is the proximity of the village to the town of Sape which, besides being the seat of the district administration, has adequate education facilities up to high school level. The everyday language is the Bajo dialect, nevertheless most people are also able to communicate in the Bima dialect. The latter is used only in encounters with people from Bima, for instance when shopping in the market or during other activities outside the settlement.

Social facilities in Desa Bajo Pulau are quite adequate. Electricity is provided by the state-owned power company (PLN) while fresh water is supplied through a pipeline from Sape by the state-owned water company (PAM). At the moment, however, the water pipe is in need of repair, so water for daily use has to be brought in by motorboat from Sape. The town of Sape can easily be reached by motorboat. The boats are owned by inhabitants of Desa Bajo Pulau and are available at any time. The crossing takes about 15 to 20 minutes. One-way fares range between Rp 300 and Rp 500. Other social facilities include a mosque and an elementary school building.

4.1.2 Livelihoods

The majority of the population are fishermen who rely heavily on marine resources provided by nature. Because of the scarcity of fish and other marine biota in the waters around Desa Bajo Pulau and Sape, they tend to direct their fishing efforts to the waters of Komodo and the surrounding area. The following methods are used:

Diving. Half of the fishermen in Bajo Pulau engage in diving to collect marine biota such as sea cucumbers and lobsters. This activity requires a motorboat equipped with a compressor (hoka) and a 200 to 300 metres long hose for air. Currently there are some fifty compressors in Desa Bajo Pulau. Each compressor provides air for a team of four to six divers. Diving for lobster is a lucrative occupation. Divers may receive between Rp 150,000 and Rp 300,000 for one operation, which generally lasts for seven days (one week). Equipment owners may expect a net profit in excess of Rp 500,000. The current price for one kilogram of lobster is as follows: between Rp 9,000 and Rp 15,000 for *udang batu*; between Rp 17,500 and Rp 35,000 for *udang bambu* and *udang mutiara*; and between Rp 35,000 and Rp 60,000 for *udang emas*. Diving with compressors requires a large amount of capital. Each five-to-seven-days operation commands a budget of Rp 500,000 to Rp 1,000,000, and consequently only few people can afford to run these operations. In general they also act as wholesalers who buy up the entire catch. While searching for lobsters, divers also collect sea cucumbers. Dried sea cucumber fetches prices of Rp 6,000/kg to Rp 30,000/kg, depending on sort and quality. The yield of diving operations is bought up by wholesalers in Desa Bajo Pulau and then taken to Bali. Many villagers work as divers. Unfortunately quite many suffer from paralysis due to incorrect diving practices.

Fishing with hook and line. The hook and line method is also popular with local fishermen, especially for catching reef-fish. The catch is usually sold fresh rather than salted at the Sape market, since the sale of fresh fish is considered more profitable. Some 117 fishermen employ this method using motorboats or rowing boats with outboard motors. Earnings from this activity vary between Rp 10,000 and Rp 15,000 a day/night. The waters around Komodo are deemed the richest fishing grounds in the area, and thus attract many hook-and-line fishermen from Desa Bajo Pulau. Types of gear used are *pancing dasar* and multiple feather trolling lines (*pancing tonda*).

Fishing with explosives and cyanide. The fishermen of Desa Bajo Pulau are notorious for their use of explosives and potassium for fishing purposes. There are no data about the number of people using destructive fishing techniques, but local government officials know of six people who still actively employ these illegal practices. Undetected offenders may be even more numerous. Each person is assisted by five to seven helpers (*sawi*). Local fishermen also use potassium to catch lobster and fish. This practice is more widespread than the use of explosives. Use of explosives and potassium occurs in Komodo National Park territory and the surrounding waters. The catch is processed to salted fish and sold at the Sape market. Fishermen usually receive an advance from buyers. These practices have caused several fatal accidents and so far about 10 inhabitants of Desa Bajo Pulau have lost limbs, particularly arms.

Catching of turtles. Although enlisted as protected species, turtles continue to be caught by fishermen of Desa Bajo Pulau. Catching turtles is quite lucrative for fishermen since, depending on size, the price for turtles varies between Rp 30,000 and Rp 45,000 per animal. Currently there are five holding pens in the vicinity of the settlement where caught turtles await shipment to Bali. Each month there are up to two shipments of 500 to 1,000 animals. Except in the waters of Komodo, turtle catching also occurs in the waters around Selayar and Sumba.

Fishing with nets. Fishermen of Desa Bajo Pulau operate some 24 nets, mostly *jaring klitik* which are used to catch fish occurring in schools such as *cakalang*, tuna and other pelagic fish species. The operation of each unit requires a budget of approximately Rp. 1,000,000 and the labour of 6 to 8 workers, and is usually carried out during daytime in the waters Sape.

Other fishing gear in use by Bajo Pulau fishermen are boats with lift nets (*bagang*) and fish traps (*bubu*). *Bagang* boats are not too popular with the Bajo Pulau community, and only 6 people are in possession of this type of gear. The number of fish traps is about 40. Four villagers have taken up seaweed culturing. The local price for seaweed is Rp 700 to Rp 1,200 per kilo.

4.2 Desa Bugis

Desa Bugis is on the east coast of the district of Sape and has a population of 4,343 of Bugis, Bajo and Bima origins. Several settlements are within the territory of Desa Bugis, i.e. Kampung Gadang, Kampung Gusung and Kampung Bajo Sarae.

A part of the district capital Sape, Desa Bugis is quite dynamic in terms of trade, education and sociocultural matters. Because of its mixed population, Desa Bugis has no distinctive customs of its own, especially in regard to marital rites. Each ethnic group tends to adhere to its particular way of life. The community enjoys *qosidah rebana*, a form of Islam-flavored traditional music with tambourines. Most of the natives are Moslems. Newcomers such as government employees or other officials often are followers of other religions. Despite differences in origin, tradition and religion, the community lives harmoniously without dispute or discord related to such issues. Owing to its proximity to the seat of the district administration, Desa Bugis has an adequate infrastructure. Existing amenities and facilities include state-provided electricity and fresh water, a fish market, means of transportation, houses of worship, and school buildings. The village is a stopover for the Sape-Labuan Bajo ferry and boat-connections are available to the islands in its surroundings.

Most of the villagers are fishermen. Those living near agricultural areas, particularly those of Bima origin, become part-time farmers during the rainy season. Except exploiting the seas, the local community also engages in brackish water pond cultures (*tambak*) for prawns and milkfish.

Local fishermen use the following fishing methods:

Boats with liftnets (*bagang*). Fishing with lift nets is the most popular method in Desa Bugis. Besides squid, local fishermen also catch anchovies and sardines (*simbula*, *tembang*) which do not depend on season and are available all year round. Unlike fishermen from other settlements in the area, Desa Bugis fishers do not concentrate their efforts on squid, due to the seasonal nature of this species. There are approximately 120 lift nets in Desa Bugis. The most commonly exploited fishing grounds, especially for squid, are the waters of Komodo National Park. During squid season some fishermen temporarily reside in Kampung Komodo or other settlements close to the fishing grounds. The catch is usually sold fresh to wholesalers in the village or to buyers in the surrounding area.

Fishing with hook and line. Desa Bugis fishermen, in particular those from Kampung Gasung and Kampung Bajo Sarae, use several forms of the hook and line method. There are 525 units of hand lines (*pancing tangan/dasar*) to catch reef-fish, 18 units of multiple feather troll lines (*pancing tonda*) for pelagic fish such as Spanish mackerel, tunas and skip jacks, and a number of rawai fishing lines. The catch is bought up by wholesalers in the settlement. Hook-and-line fishermen use boats equipped with ice boxes to keep fish fresh. This also enables them to extend the length of their operations. The waters around Komodo are the main fishing grounds for hook-and-line fishermen from Desa Bugis. Each operation lasts for four to seven days and may yield as much as 100-200 kg of fresh fish. Depending on sort and quality, the catch sells for Rp 1,000 to Rp 2,500 per kilogram. Net profits for one operation may reach Rp 300,000 to Rp. 600,000.

Other fishing methods. Fishing methods other than the above mentioned include fishing with nets (*jaring*), trawl nets (*pukat*), traps (*bubu*) and large stationary fish traps (*sero*). These methods are used on a small scale in the waters of Sape and the islands in the district, mainly by fishermen not in possession of motorboats vessel. The catch is sold fresh for local consumption.

4.3 Desa Soro

Desa Soro neighbors Desa Bugis to the South. Its inhabitants utilize the coastal areas for brackish water pond cultures (*tambak*) for milkfish and prawns. The western part of the settlement consists of rice fields. Most of the 5,022 inhabitants are farmers of Bima origin. Four hundred seventy-eight people of Bugis origin (9,5% of the total population) are fishers. The remainder earns a living as merchants, businessmen, government employees and farm hands. The population of Desa Soro comprises Bima and Bugis ethnic groups. The everyday language is the Bima dialect. The prevailing religion is Islam. Situated near the district capital, the village has an adequate infrastructure. Existing amenities and facilities include state-provided electricity and fresh water, a quite well developed transportation network and adequate education facilities. Many villagers have pursued an education at higher levels.

Soro fishers operate 18 boats with lift nets (*bagang*) to catch squid, anchovies, scads (*layang*) and sprats (*temuru*). They exploit the waters around Sape and, in particular during the squid season, the waters around

Komodo. During this period, Soro fishermen temporarily reside in Kampung Komodo or other settlements within the Park.

Besides boats with lift nets, local fishermen also employ the hook-and-line method. They use hand lines (*pancing dasar*) to catch reef-fish like coral trout (*sunu*), groupers (*kerapu*), *katamba* and other species. If the journey back to the village takes less than one day, the fishers can sell their catch fresh. During longer lasting operations, it is processed to salted fish.

5 ANALYSIS

The following is a descriptive analysis of the dependence of communities within Komodo National Park and its surrounding buffer zone (i.e. the districts of Komodo and Sape in the regency of Bima) on the park.

The development of the residing communities as supporting components in conservation efforts is an integral part of the management of Komodo National Park. Exploitation of resources by local communities increases pressure on the environment, and this obvious conflict of interest between park users and park management should be resolved through a holistic approach of management that encourages community participation. It is hoped that this report will prove useful in the development of a framework for management of Komodo National Park, or otherwise serve as reference for future community-based activities.

5.1 Population

There are several coastal communities within Komodo National Park. Settlements also exist on coastal stretches of Sumbawa and Flores that are part of the park's buffer zone. These communities have a considerable impact on Komodo National Park, since most of their inhabitants are fishermen who depend on the marine resources of the park.

Within park territory there are three settlements, namely Kampung Komodo, Kampung Rinca and Kampung Kerora, with a combined population of 2,310. The number of people inhabiting the area around the park is 25,513. The majority of the 27,823 villagers are fishermen who exploit the waters within and around Komodo National Park.

The number of inhabitants within KNP and its buffer zone:

No.	Village/settlement	Population
1	Kampung Komodo	1013
2	Kampung Rinca	1074
3	Kampung Kerora	223
	Total in Komodo National Park	2310
4	Kampung Papagarang	1047
5	Desa Warloka	1851
6	Desa Golomori	1065
7	Desa Pasir Putih	1676
8	Labuan Bajo	5463
	Total in Komodo District	11102
9	Desa Bajo Pulau	5046
10	Desa Bugis	4343
11	Desa Soro	5022
	Total Sape District	14411
	Grand Total	27823

5.2 Sociocultural background

The people living in Komodo National Park are of various origins. There are members of the Komodo, Bajo, Manggarai, Bima, Bugis, Selayar, Ende and other ethnic groups. Despite cultural differences, the community life is peaceful and harmonious, without any one ethnic group being dominant. The everyday language is a mixture of various dialects. An assimilation process is taking place through intertribal marriages, social intercourse and community activities.

5.3 Institutional sector

There are several formal village-level institutions at the settlements in the park and the surrounding area, most notably the village administration (*Lembaga Pemerintahan Desa*) and village council (*Lembaga Musyawarah Desa*) among others. Many of these institutions, however, are not yet functioning as intended, in particular on remote islands.

Apart from formal institutions for village administration there are also government offices for fishery matters, public health, education, as well as the headquarters of Komodo National Park. The integration and cooperation of the various institutions needs to be increased though, particularly in remote areas. All settlements have their own elementary school. Nevertheless, very few villagers succeed to finish elementary school, let alone pursue an education at a higher level. Awareness about the importance of an education is evident only in settlements close to district capitals.

Public health facilities present in every village are not yet as effective as desired. The reasons for this situation are limited means as well as the people's insufficient understanding about the importance of health care. The lack of fresh water is a problem faced by settlements on small islands. Sanitary facilities are unknown and people commonly defecate on the beach. The awareness about healthy living conditions in general is still low.

5.4 Commerce

The communities in Komodo National Park and its surroundings are still dependent on natural marine resources. So far there have been no initiatives to develop other occupations in order to increase the income and welfare of the local population. The expanding population together with declining natural resources result in fierce competition among the villagers.

5.5 Lack of knowledge and skills

The obvious consequence of poor education is the lack of knowledge and skills needed to gain added value from available natural resources. Due to inadequate post-harvest treatment, for example, processed fish are of poor quality and thus fail to fetch higher prices. The local communities also have not undertaken any efforts to reduce their dependence on natural resources by developing alternative livelihoods, for instance mariculture or handicrafts.

5.6 Capital accumulation

Fishermen communities are prone to the development of lopsided relationships due to capital accumulation by certain groups within the community. In these patron-client type of relationships, capital owners provide fishermen with fishing gear or advance money to gain the right to the entire catch at prices that are far below the prevailing market price.

5.7 Non-existence of financial institutions at village level

Money lenders from outside the community control the financial sector in fishermen settlements to a large extent. They cause the circulation of money to happen outside rather than within in the community. One reason for this situation is the non-existence of village-level financial institutions that could control the flow of money. Another factor is the irrational behavior of the fishermen themselves, who tend to spend their money without regard to future needs.

5.8 Fluctuating income

The yield of fishing operations depends heavily on the abundance of target species, weather conditions and fishing gear used. The average income of fishermen is thus hard to assess. This makes it difficult for fishers to plan their household budgets.

5.9 Territorial issues

There are two territorial issues faced by the communities in and around Komodo National Park. One is the lack of land available for settlement expansion, the other the competition for fishing grounds.

The limited availability of land is beginning to become a problem for settlements in Komodo National Park, especially for Kampung Komodo. The growing demands of a population rapidly increasing through births and migration are at odds with the park management's policy to restrict the expansion of settlements. This problem calls for a multi-disciplinary solution. Outside the park similar conditions exist at Kampung Mesa. Even today there is no free space left for expansion. The community now hopes for the clearance of nearby islands to build new settlements.

5.10 Fishing grounds

The waters of Komodo National Park are rich in marine flora and fauna and include a variety of ecosystems. The abundance of fish and other marine biota attracts fishermen from the entire surrounding area. Some 27,800 local fishermen and many more from Maumere, Ende, Lombok and other settlements outside the area exploit the 112,500 ha of marine waters within park territory. Until today there have not been any studies focused specifically on the ecological impacts of this intensive exploitation, but it is obvious that these practices must affect marine resources to some extent.

The exploitation of fishing grounds can be categorized as follows:

Exploitation of coastal waters. The term coastal waters refers to waters with depths ranging from 0 to 2.5 metres during low tide. These areas are exploited through gleaning activities (*meting*) that involve men, women and children. The participants are low-income fishermen not in possession of boats with lift nets (*bagang*), motorboats or other high-cost fishing gear. They use simple equipment such as traps, spears, metal bars to pry rocks, nets to catch milkfish larvae and large stationary fish traps (*sero*). The catch includes sea cucumbers, sea weed, abalone, mollusks, milkfish larvae and reef-fish. The cost of one operation varies between Rp 10,000 and Rp 50.000, depending on duration.

Exploitation of deep waters. The definition of deep waters in this context is water with depths between 2.5 metres and 30 metres. The exploitation of such areas involves sailing boats and motorboats with the

following equipment: hand lines, multiple feather trolling lines, drag nets, lift nets and diving gear. The catch comprises reef-fish such as coral trout and groupers, as well as pelagic species like mackerels, squid and tunas. These species are caught with hook-and-line, drag nets and lift nets. The collection of lobsters, sea cucumbers, pearl oysters and other mollusks requires the use of compressors (*hoka*).

A map showing fishing grounds within park territory has been drawn in cooperation with local communities. This map also presents information on habitats of marine biota and types of fishing gear used (see Fig. 1).

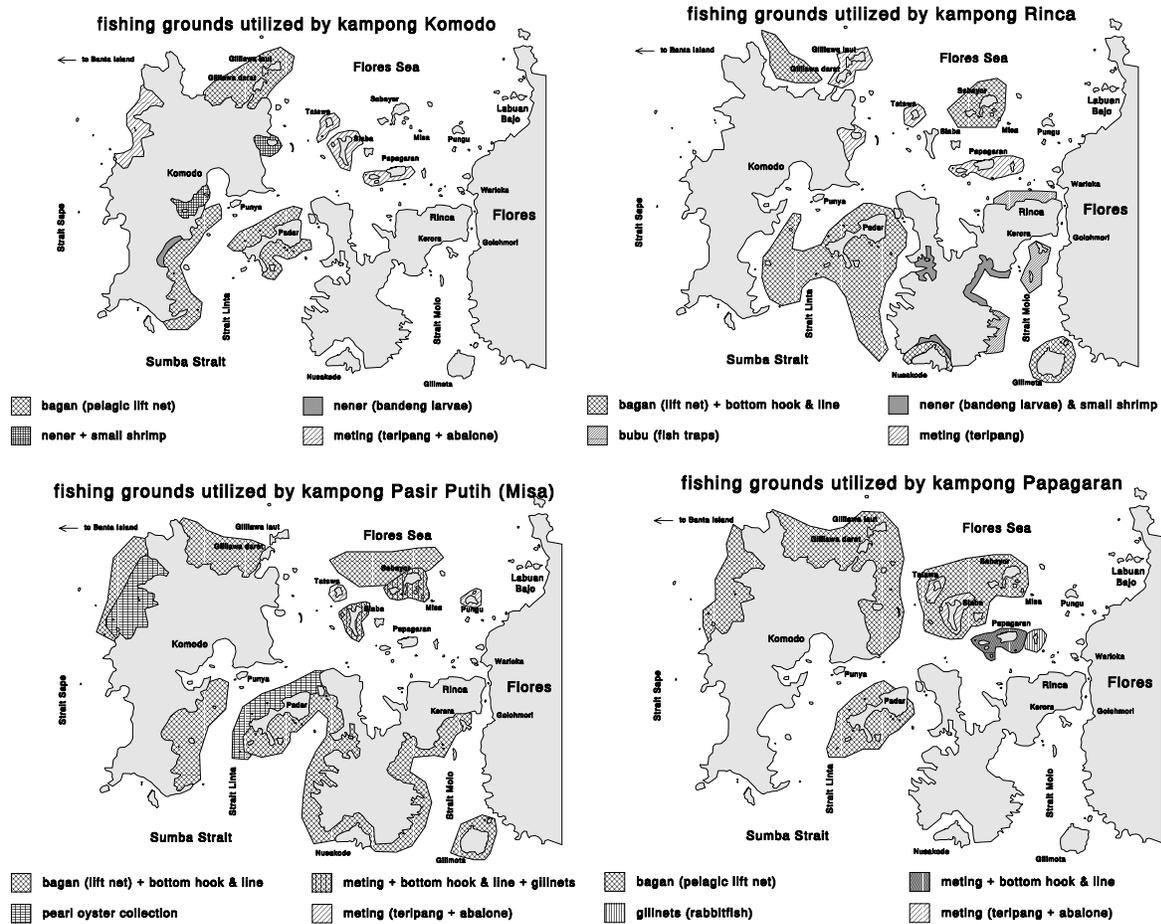


Figure 1a. Resource utilization patterns by communities in and around Komodo National Park (Kampung Komodo, Rinca, Pasir Putih and Papagaran).

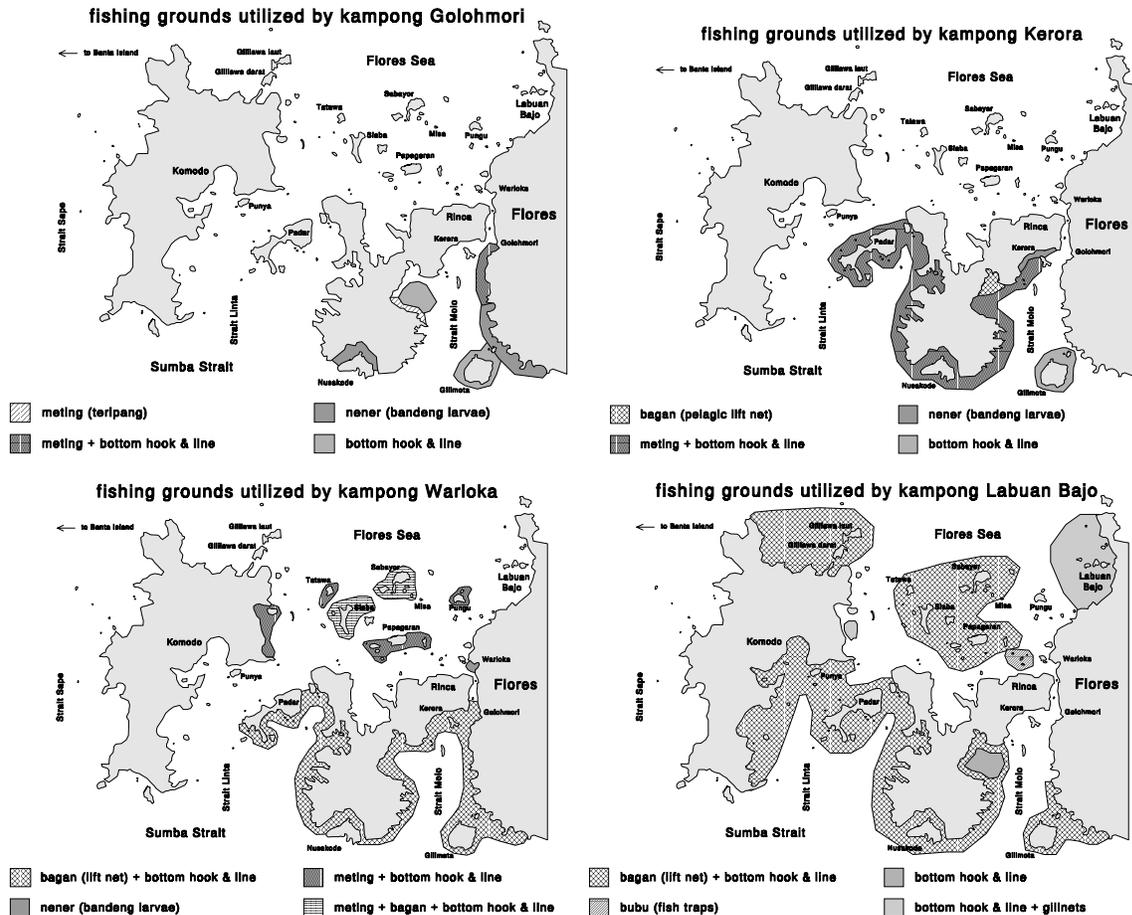


Figure 1b. Resource utilization patterns by communities in and around Komodo National Park (Kampung Golomori, Kerora, Warloka and Labuan Bajo).

5.11 Mariculture activities

Though some communities show interest in mariculture (Fig. 2), none of their initiatives have been successful up to now. There is virtually not a single household in the area that gets its major income through mariculture. Development of mariculture is would probably help to decrease the fishing pressure on the Park's coral reefs.

(planned) mariculture initiatives surrounding villages KNP

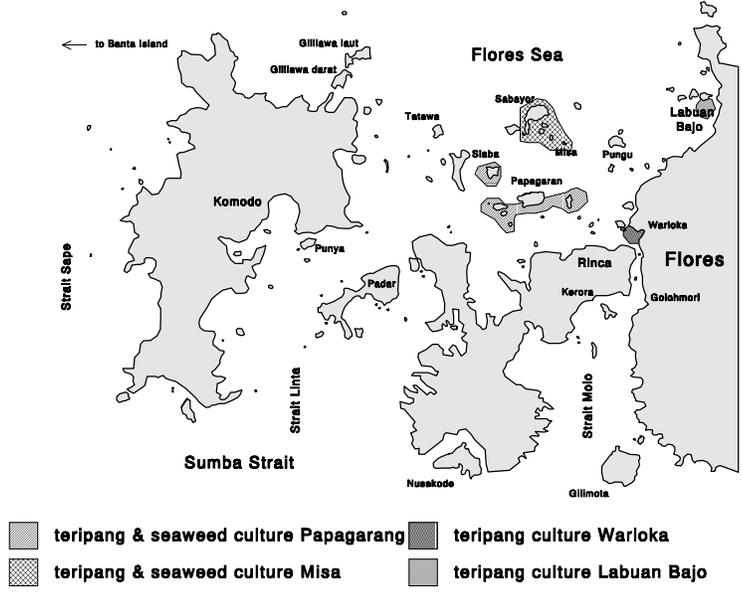


Figure 1.

5.12 Community awareness about Komodo National Park

The local population still perceives the park only as a protected area for marine flora and fauna. The protected area is deemed an imposed regulation that puts constraints on their livelihood. This narrow perspective causes frequent conflicts between park users and park management.

Continual education efforts, extension programs and related activities are needed to expand community awareness on conservation as a means to increase welfare through sustainable fisheries. However, due to the poor level of education of the community, proper methods have to be employed to ensure effective extension of knowledge and information.

6 CONCLUSIONS

The following conclusions can be drawn from the brief discourse above:

The communities in and around Komodo National Park depend heavily on the park, especially on its marine waters, since most of the villagers are fishermen who exploit resources provided by nature.

The growing population and the development of more efficient fishing equipment result in increased pressure and threats to the marine ecosystems within park territory. A common activity in waters in and around the park is fishing for squid with boats equipped with lift nets (*bagang*).

Although education facilities are present all settlements, the local population is still poorly educated and lacks the skills needed to gain added value from fishery activities. Due to inadequate post-harvest treatment, for example, local fishermen fail to get better prices for their catch.

Unsanitary conditions, lack of fresh water supplies and neglect of proper health care are the causes for poor public health. This problem still haunts local communities, in particular the communities within the park.

The income of fishermen is subject to heavy fluctuations due to season, weather and abundance of target species. This makes it difficult for fishermen to plan their household budgets.

The domination of a small number of people in the commercial and financial sectors results in a disproportionate distribution of wealth. The client-patron system is firmly rooted in the fishermen communities. Capital owners commonly provide loans for fishers in order to bind them in unfavorable relationships.

Existing formal and non-formal institutions are not yet functioning as desired. Formal institutions such as cooperatives and banks are still little known in fishermen communities.

7 RECOMMENDATIONS

In order to vitalize community participation in the management of Komodo National Park, the local community must be made to recognize that they are to gain greater benefits from the park if they comply with conservation policies. Efforts to realize those benefits focus on the improvement of skills and the development of alternative livelihoods not in conflict with conservation values.

The local people should also be encouraged to take part in the development of policies, programs and plans pertaining to territorial issues, activities and livelihood. This is to ensure that any policy made represents a consensus between all parties involved, and is thus more easily to enforce.

Efforts should be made to correct the perception of the local communities about conservation. It must be made clear through education and extension that conservation is just a joint attempt to ensure the sustained availability of natural resources for future use.