THE FISHERIES AND FISHERFOLK OF NIAS ISLAND, INDONESIA

A description of the fisheries
and a socio-economic appraisal of
selected fisherfolk communities
on this island off Sumatera

BOBP For Fisheries Development
BAY OF BENGAL PROGRAMME

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BAY OF BENGAL PROGRAMME
Small-Scale Fisherfolk Communities

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THE FISHERIES AND FISHERFOLK OF NIAS ISLAND, INDONESIA

BAY OF BENGAL PROGRAMME
Madras,
1991

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This paper is a background document for the planning and programming of a Fishing Technology subproject for support by the Bay of Bengal Programme (BOBP). It has been prepared in two parts.

Part I is a brief and factual presentation of data and information on the main features of the small-scale marine fisheries of Nias Island, Indonesia, which is the result of a preliminary field survey undertaken in June and October 1988 by O. Pajot, Senior Fishing Technologist, BOBP. It is based on observations and discussions during field visits to the main fishing villages and on information and data provided by the District Fisheries Service of Gunung Sitoli in Nias Island. In the absence of reliable statistics, some of the data given are estimates and should, therefore, be regarded as orders of magnitudes and trends.

Part II presents data and information on the socio-economic situation of the fisherfolk communities of Nias Island. It is the result of a socio-economic appraisal undertaken by Philip Townsley, a BOBP socio-economist, during the period October 1989 to January 1990 in eleven villages in seven subdistricts of Nias Island.

The preparation of this paper is an activity of the BOBP for the development of fisherfolk communities and has been undertaken jointly with the Provincial Fisheries Service of North Sumatera Province.

The BOBP is a multi-agency regional fisheries programme which covers seven countries around the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The programme plays a catalytic and consultative role it develops, demonstrates and promotes new techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in member-countries. The BOBP is sponsored by the governments of Denmark, Sweden and the United Kingdom, by member-governments in the Bay of Bengal region, and also by UNFPA (United Nations Population Fund), AGFUND (Arab Gulf Fund for United Nations Development Organizations) and UNDP (United Nations Development Programme). The main executing agency is the FAO (Food and Agriculture Organization of the United Nations).

This document is a working paper and has not been cleared by the FAO or the Government of Indonesia.

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(based on a report by Philip Townsley, APO, Socio-economist, BOBP, in 1989-90)

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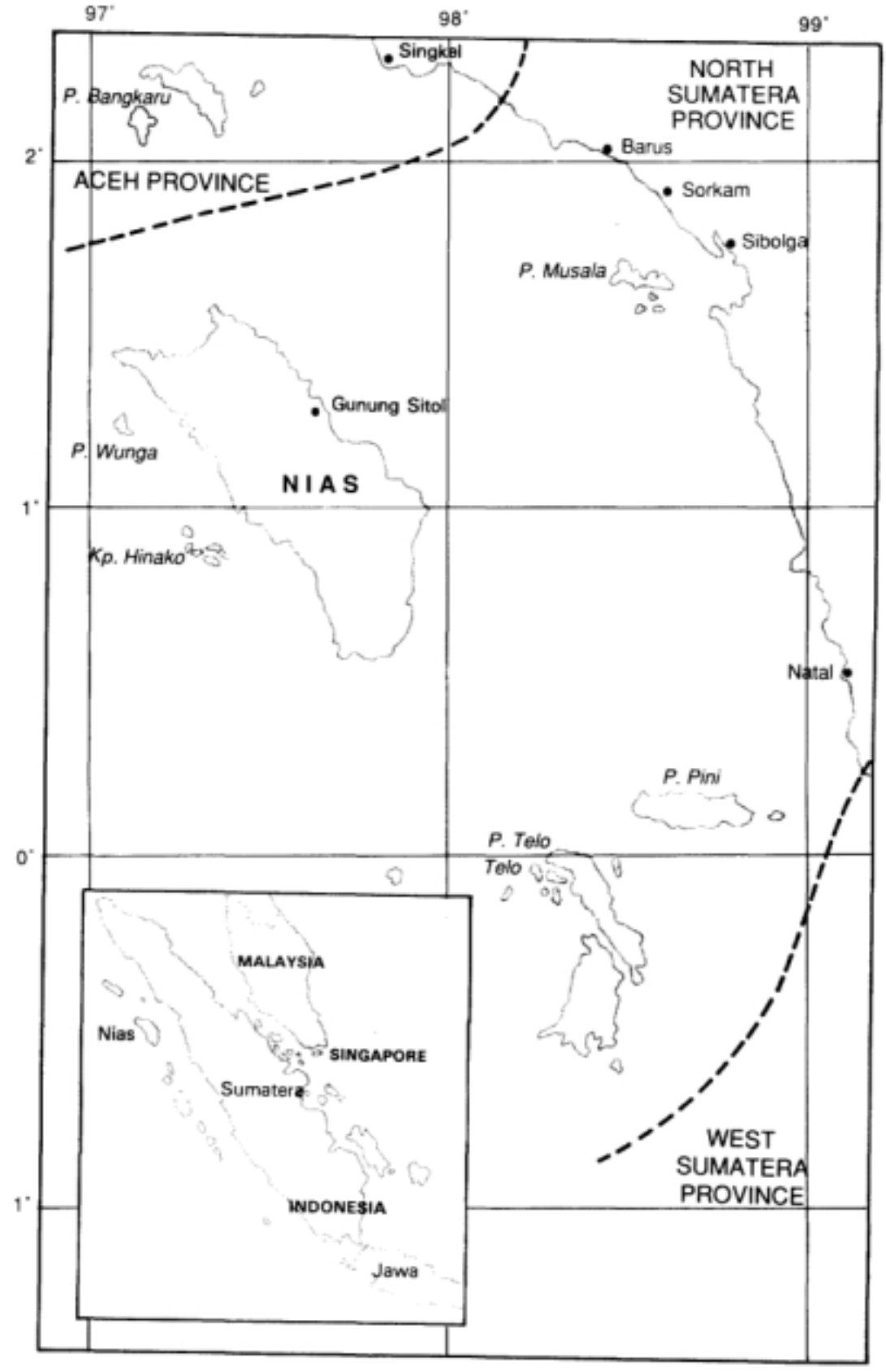
Fig. 1 Geographical location of Nias Island



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PART I
DESCRIPTION OF SMALL-SCALE FISHERIES OF NIAS ISLAND, INDONESIA

(Based on a report prepared in 1988 by G Pajot, Senior Fishing Technologist, Bay of Bengal Programme)

1. *INTRODUCTiON*

Nias is an island situated in the Indian Ocean about sixty nautical miles west of the west coast of North Sumatera province. It has a land area of approximately 4800 km^2 and a population of 528,000. The geographical location of the island is shown in Figure 1 (facing page) and some socio-economic data are given in Appendix I.

Nias District is one of the districts *(kapubaten)* of the province of North Sumatera. It has 13 subdistricts *(kecamatan),* of which twelve are coastal. The subdistricts of Nias Island are shown in Figure 2 (alongside). The subdistrict of Pulau Batutello comprises a group of small islands lying some 40 nautical miles south of Nias Island. Due to its geographical location, this subdistrict is economically attached to West Sumatera Province and a description of its small-scale fisheries is not included in this report.

Fig. 2 The subdistrict of Nias Island

There are about seventy fishing villages scattered along the Nias coastline, of which 26 are located in Gunung Sitoli and Tuhemberua subdistricts. The road network is largely underdeveloped and restricts access to many fishing villages.

Of the total population of Nias Island, some 4000 people are directly involved in fishing, as well as in the handling, processing, and marketing of fish and other ancillary activities. Knowledge of the marine resources in the coastal and offshore zones is limited.

Fishing in Nias Island consists of small-scale fishing activities, except for the fishing operations based at Sibolga and Padang. The private sector plays a major role in all sectors of the fishery. All fishing craft are privately owned. The construction of craft, supply of fishing gear, engines and other requisites are handled by the private sector. The public sector is involved only in the supply of fuel at major fishing centres and in institutional credit at Gunung Sitoli.

There are about 2500 fishing craft operating, mostly in the coastal zone, of which about 96 per cent are very small, non-motorized craft. The effort to motorize the traditional craft and introduce new fishing craft commenced in the early 1980s. The fishing gear are traditional and hook-and-lines predominate.

According to the Provincial Fisheries Service statistics of 1986, the total production of marine products was in the order of 3400 t. This figure, however, does not include the catch of the fishing fleet based at Sibolga and Padang and which operates around Nias Island. Most of the marine catch is consumed in the fresh form. Only a fraction of the total catch is iced or processed into salted, dried fish. A small quantity of high market value shrimps and lobsters is exported to Sibolga. Import of fish from Sumatera Island is in salted, dried form.

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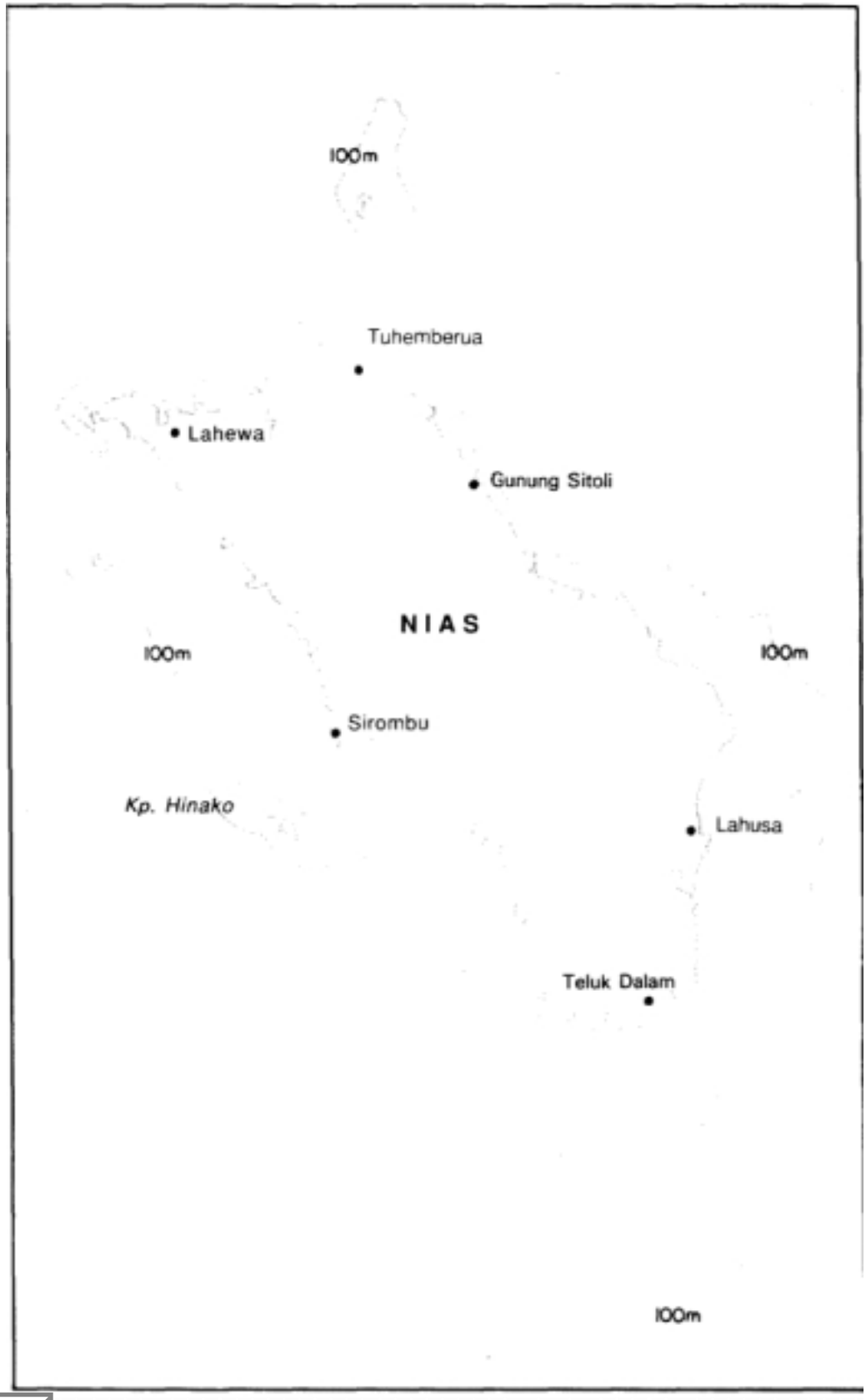
Fig. 3 Map of the continental shelf



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The personnel of the District Fisheries Service come under the authority of the Director General of Fisheries and the provincial government institutions. The policy of the Government is to concentrate on development for more intensive exploitation of coastal, deep water and offshore resources by introducing larger motorized craft, improving fishing techniques and providing better processing and marketing infrastructure, leading to self-sufficiency in marine food products and an improved standard of living for the fisherfolk.

2. *MARINE ENVIRONMENT*

The continental shelf extends from one nautical mile in Gunung Sitoli to about ten nautical miles in most other parts of the coastline. In the north and south, however, it extends in a narrow, tongue-like shape upto thirty nautical miles. The slope shows an abrupt drop in most areas. The shelf area is approximately 5,000 km2. The configuration of the shelf is shown in Figure 3. Coraline outcrops and coarse coraline sandy bottom areas are found in most parts of the continental shelf. Sandy and muddy trawlable areas are scattered along the east and west coasts. Removal of coral outcrops for road and house construction during the past has contributed to erosion of the shoreline in many areas. Coastal erosion is illustrated alongside.

Coastal erosion

The tidal range is very moderate (0.30 - 0.70 m) and the level of water in most small water outlets is almost stagnant. This results in the formation of sand banks, which often prevent or limit access to rivers by fishing craft other man small outrigger canoes ana open planked boats.

The sea condition is generally fair, with a predominance of a gentle breeze which strengthens from September to December.

The climate is affected by insularity and the island's proximity to the equator. The rainy season is from September to December.

3. *RESOURCES*

3.1 *The coastal zone*

3.1.1 Sardine, anchovy, scad, mackerel (rastrelliger), barracuda and flyingfish are the most common small pelagic species found in the near shore area of the coastal zone. These species are

mainly caught by monofilament gillnetting and beach seining. These methods are used within a few nautical miles from the shore.

Considering the level of production of these species and the spatial employment of these fishing methods, there is potential for further increase of production without adversely affecting either the catch rate or the viability of the fisheries.

3.1.2 Snapper, bream, grouper and emperorfish are the most common demersal species caught in the area upto the outer limit of the coastal zone. Reliable data are not available to evaluate the effect of the fishing effort on these resources. The lack of uniformity in the area-wise production, however, suggests that expansion of this fishery is possible without adversely affecting its viability.

3.1.3 Penaeid shrimp species make the biggest contribution to the shellfish fisheries. The main shrimp fishing methods are trawling and, to a much lesser extent, trammel gillnetting. As trawling has reduced considerably since the trawl ban in 1980 – with only some illicit trawling by boats based on Sibolga – it is believed that the potential for increased catches of shrimp by small-scale trammel gillnetting is good.

3.1.4 Lobster are mostly found near reefs and in rocky shallow water in the southern areas. Lobster fishing is mainly carried out in the south by diving and by using bottomset gilinets from small outrigger canoes. This resource is reported as being extensively exploited, even overfished. The lobster are directly exported to Sibolga by private traders. As no catch statistics are available, there is a need to assess the status of the lobster stock in the different areas.

3.1.5 Green mudcrab are found in the mangrove areas of Lahewa and Tuhemberua. Hoopnets are used for their capture. There is no information on the present production and the potential yield, but it is believed that the present level of production can be maintained, if not increased.

3.1.6 Bullet tuna, frigate tuna, king mackerel and dolphin fish are concentrated in the coastal zone, while skipjack, yellowfin, bilifish and shark are less abundant and more widely distributed in the offshore zone. The coastal fishery for large pelagic species is mainly carried out with small, non-motorized and motorized outrigger canoes using trolling lines, droplines and handlines. With the introduction of larger motorized boats, however, large mesh driftnets are also being used for taking these species.

The production of large pelagic species is increasing, without there being any evidence of a reduction in the catch rate. Considering the estimated potential of the resources, and the quantitative and spatial use of fishing craft and gear, it is believed that a significant expansion of this fishery is feasible.

3.2 *The deep water zone*

Large shark are caught in deep waters by the Sibolga based trawler *cum* longliners using bottomset longlines, but there is no information on the production and the potential yield.

Gulper oil shark and finfish, such as grouper and snapper, are known to be available in the deep water zone, but the information available on the potential of these resources and the feasibility of their exploitation is limited.

3.3 *The offshore zone*

Skipjack, yellowfin, bilifish and shark have been identified as the main species available in the offshore zone. These speciesare currently taken by the trollers based on Padang on the west coast and by the recently introduced motorized driftnetters based on Gunung Sitoli, off the east coast. The production of these species is increasing without any evidence of a reduction in the catch rate. Due to the wide distribution of large pelagic species in the offshore zone, there is obvious scope for expansion of the small-scale large pelagic fisheries around Nias Island.

The most common marine species are given in Appendix II.

4. FISHING CRAFT AND GEAR

4.1 *Fishing craft*

The fisheries sector of Nias Island comprises small-scale fishing operations which are responsible for the bulk of the indigenous marine production. There is no medium or large-scale fishing operations in the island. The Sibolga based trawler *cum* longliners, which carry out illicit trawling in the coastal zone, and the Padang based trollers, which operate seasonally in the offshore zone of the west coast of Nias Island, land their catches at their home bases.

With the ban on trawling in Sumatera waters in early 1980, it is believed that the number of trawlers operating in the coastal zone, which was earlier estimated to be 80, decreased to about 20. The latter still carry out illicit trawling together with shark longlining.

The period from the trawl ban, of 1980 to 1988 has been one of new development. Some small indigenous outrigger canoes were motorized in order to extend their range of operation. New plankbuilt outboard and inboard motorized craft were introduced in the coastal and offshore zone.

In 1987, the total production was in the order of 3400 t. Most of the catch was made by small indigenous non-motorized craft using mainly hook-and-lines and, to a small extent, gilinets. The motorized indigenous and newly introduced craft were, however, responsible for only a fraction of the total catch.

The fishing fleet comprises about 2300 fishing craft operating year-round mainly in the coastal zone and, to a much less extent, in the offshore zone. The present composition of the fishing fleet of Nias Island is given in Table I.

Table I

Composition of fishing fleet*

Craft ***type***	***Non-motorized***	*Motorized* ***OBM***	*Motorised* ***IBM***
1. Indigenous craft			
(a) Small outrigger dugout canoes (4-6rn)	2121	67	—
(b) Dugout canoes (6-7m) with or without outrigger	20	4	5
2. **Introduced craft**			
(a) Planked open boats (7-lOm)	—	32	—
(b) Planked half decked boats (8-l2m)	—	—	28
TOTAL	**2141**	103	33

* PFS Statistics, 1986

The different types of indigenous and newly introduced fishing craft are

- non-motorized indigenous fishing craft of traditional design propelled by sail, oars and paddles;
- indigenous fishing craft of traditional design modified for outboard (OBM) and inboard **(IBM) motorization; and**
- newly introduced motorized fishing craft of new design fitted with outboard and inboard engines.

These fishing craft are used in the waters off the entire coastline, but their geographical distributio.n is uneven. The subdistrictwise distribution of the main types of fishing craft is given in Table II.

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Table ft
Subdistrictwise distribution of fishing craft (1986)

Subdistrict	4-7m Outrigger Canoes			7-/Om Open planked OBM boats	8-12m planked IBM boats
	Non-motorized	Motorized OBM	IBM		
Gunung Sitoli	399	—	—	17	10
Tuhemberua	398	4	I	13	2
Gido	90	7	—	—	—
Idano Gawo	104	12	—	—	—
Alasa	30	6	—	—	—
Lahewa	401	—	—	—	—
Teluk Dalam	342	5	—	2	13
Lahusa	124	—	—	—	—
Sirombu	202	37	4	—	3
Lolowau	51	—	—	—	—
TOTAL	2141	71	5	32	28

Indigenous Craft

I. DUGOUT OUTRIGGER CANOES

These craft have small, narrow, dugout hulls with slightly raised hull ends and double wooden outriggers attached to a pair of wooden **arms. The sizes range from 4 to** 5 **m. They are mostly propelled by oars, paddles and/or sail. Some are motorized with 2 hp Suzuki or Yamaha OBM. They are mostly used for hook-and-line fishing and, to a small extent, for net fishing within the coastal zone.**

ii. DUGOUT CANOES

These are larger dugout canoes with an overall length of 5 **to 7m with or without** raised side **strakes** and **outriggers attached to the** hull. They are propelled by oars, paddles, sail and/or petrol **OBM of** 2 **to** 5 **hp or Diesel IBM of** 5 **hp. Those without outriggers are used for beach seining and transport while the others are used for hook-and-line fishing, beach seining and gillnetting** in the coastal zone.

Newly introduced craft

i. PLANKED OPEN BOATS

These are undecked, open, planked boats with wooden frames. Their overall length is from 7 to 10 m. They are mainly used for driftnetting for large pelagic species in the outer limits of the coastal **zone and in the offshore zone.**

They have a planing hull adapted to fishing and are propelled by kerosene and petrol outboard **motors of 15 to 25 hp. An attempt is being made to modify them for motorization with diesel inboard engines.**

ii. PLANKED HALF-DECKED BOATS

These are planked boats with wooden frames, a displacement rangin.g from 2 to 3 **t** and an overall length of 8 to 12 m. They are powered by diesel inboard engines of 10 to 40 hp of various makes (Yanmar, Dong Feng, Kubota, Deutz, Daihatsu). They are owned by small entrepreneurs who use them for driftnetting for large pelagic species in the offshore zone off Gunung Sitoli and Teluk **Dalam.**

The various types of craft may be seen in the photographs on the following pages.

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Non-motorized dugout outrigger canoe (4-5 m)

Non-motorized dugout canoe (5-7 m) used for beach seining

Sail rig of traditional outrigger canoe

Outboard motorized dugout outrigger canoe (4-5 m)

<<

Outboard motorized dugout outrigger canoe (5-7 m)

Inboard motorized dugout outrigger canoe (5-7 m)

<<

Outboard motorized dugout outrigger canoe (6-7 m) used for beach-seining

Outboard motorized planked open boat (7-10 m)

A small inboard motorized half-deck drifinetter (8 m)

A larger inboard motorized half-deck driftnetter (10-12 m)

Padang-based inboard motorized trollers fishing off the west coast of Nias Island

Sibolga inboard motorized trawler--cum-longliner fishing in the coastal zone of Nias Island

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4.2 *Fishing gear*

Hook-and-lines comprise the most important category of fishing gear used by the small-scale fishing sector, and are followed by gillnets and beach seines. While hook-and-lines (handlines, droplines, trolling lines) have been traditional fishing gear used for decades, bottomset longlines, small mesh gillnets, trammelnets and large mesh driftnets were introduced in the early 1980s after the trawl ban.

Seventeen types of fishing gear, belonging to seven different categories, are identified. The identified fishing gear is listed in the Table Ill.

Table III

Types of fishing gear used in Nias island

Category and Type	*Target species*
Surrounding nets	
Beach-seine	Small pelagic.
2. *Gil/nets and entangling nets*	
(a) Drift gillnet (small mesh)	Sardine, flying fish, Indian mackerel.
(b) Bottom drift gilinet	Shrimp and mixed miscellaneous demersal species.
(c) Trammel gill net	Shrimp and mixed miscellaneous deniersal species.
(d) Drift giltnet (large mesh)	Tuna, billfish, shark and dolphin fish.
(e) Bottom set g illnet	Lobster and demersal species.
3. *Hook-and-lines*	
(a) Handline (single and multihook)	Snapper, grouper, bream and other miscellaneous demersal species.
(b) Handline (multihook with artificial lures)	Frigate mackerel, eastertt little **tuna** and other small tuna species.
(c) Trolling line (single and multihook with artificial lures)	Frigate mackerel, seer, skipjack, yellowfin and other tuna species.
(d(Bottom set longline	Snapper, grouper, bream, and other demersal fish, including gulper oil shark.
(e) Angling line	Miscellaneous near shore and river species.
4. *Traps*	
Hoopnet	Mangrove green crab.
5. ***Falling nets***	
Castnet	Mixed small pelagic and demersal species.
6. *Trawls*	
Bottom otter trawl	Shrimp and bottom dwelling species.
7. ***Others***	
(a) Scoopnet	Small mixed species.
(b) Liftnet on stilts used with light attraction	Small mixed pelagic species.
(c) Harpoon	Small demersal species, lobster.

No accurate quantitative information on fishing management units is available. According to the 1986 census conducted by the PFS office of Gunung Sitoli, there are 3774 fishing management units in the small-scale fishing sector of Nias Island. The subdistrictwise fishing management units are given in Table IV.

Table IV

Subdistrictwise fishing management units

Subdistrict	*Hook-and-**lines***	*Gill-**nets***	*Beach-**seine.c***	***Others***	***Total***
Gunung Sitoli	479	37	3	111	630
Tuhemberua	467	27	6	136	646
Gido	135	16	5	25	181
Idano Gawo	153	10	5	32	200
Alasa	44	8	—	5	57
Lahewa	425	50	7	223	705
Teluk Dalamn	432	65		123	620
Lahusa	140	10		43	193
Sirombu	276		—	79	*355*
Lolowau	117	—	—	70	187
TOTAL	2668	223	36	847	3774

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4.3 *Fishing Areas*

4.3.1 COASTAL FISHERIES

The coastal zone is delimited by the continental shelf, which extends from 1-10 nautical miles around the coastline of Nias Island, except in the north and south where the continental shelf extends in a narrow tongue-like area upto 30 nautical miles.

The nearshore belt of upto 5-6 nautical miles, in which most of the indigenous craft using hook-and-lines and small mesh gillnets, as well as the Sibolga based trawlers, operate is the most exploited. With the recent introduction of motorized craft, exploitation of the coastal zone upto its outer limits has been slowly intensified. Considering the size of the coastal fleet, the fishing gear used, the intensity of fishing, and spatial use of fishing craft, however, there is room for further development of the resources.

4.3.2 DEEP WATER FISHERIES

The deep water zone is the area beyond 100 m depth in which bottom dwelling demersal resources are available. The continental shelf area beyond 100 m depth around Nias Island is limited.

The present level of exploitation of the deep water fishery is very low, and very few fishing craft are deployed therein.

The limited experience of this fishery has indicated the availability of large shark species, gulper oil shark and large fin fish, It is necessary to study the feasibility of exploiting these resources using small-scale fishing craft and gear.

4.3.3 OFFSHORE FISHERIES

The offshore zone is the area extending from the edge of the continental shelf upto about 50 miles from the coastline all around the coast of Nias Island.

Before the recent motorization of indigenous craft and the introduction of new motorized craft, fishing for large pelagics within the coastal zone was carried out mainly by indigenous outrigger canoes propelled by sail, oars or paddles. Trolling lines, droplines and handlines were the main gear used for catching tuna and billfish species.

In the early l980s, with the introduction of motorized fishing craft and large mesh driftnets for large pelagic species in Gunung Sitoli and Tuhemberua subdistricts (in the northeast area) and trollers based in Padang on the west coast, the exploitation of offshore large pelagic species increased and the feasibility of fishing these resources in the offshore zone was established.

The limited fishing effort and spatial deployment of the craft suggest that the exploitation of large pelagic resources in the offshore zone could be substantially increased.

The narrow continental shelf and good weather conditions year round permit exploitation of the offshore zone with small-scale fishing craft and gear. Emphasis should be placed on introduction of improved craft and gear in order to obtain the best socio-economic benefit for the fisherfolk.

For better year-round feasibility, there should be greater diversification of the small-scale offshore fisheries by the use of drift gillnets, drift longlines and trolling lines according to availability of species and market demand.

5. *MARINE PRODUCTION*

Prior to 1980, coastal trawling for shrimp and food fish species by trawlers based on Nias Island and Sibolga made the major contribution to the marine fish production of the island.

After 1980, the trawl ban, the introduction of new motorized fishing craft, the motorization of countrycraft, and the introduction of gillnets have all influenced the marine fish production of Nias Island. Consequently, the trawling operations of the Sibolga based trawlers reduced, although they are still illicitly carried out by some 20 trawlers *cum* longliners. Small mesh monofilament gillnets for small pelagic species became more popular and led to a modest increase in the small pelagic catch. Limited use of trammel gillnets for shrimp resulted in a small increase in the shrimp catch of the small-scale sector.

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Motorization of traditional dugout outrigger canoes using mainly hook-and-lines led to exploitation of resources at the outer edge of the continental shelf. Introduction of larger motorized fishing craft and of large mesh, drift gillnets led to increased exploitation of large pelagic species in the offshore zone of the east coast of the subdistrict of Gunung Sitoli.

According to the 1986 statistics of the PFS office of Gunung Sitoli, the estimated total production of the fishing fleet operating from Nias Island is 3406 t. The bulk of the landings are contributed by hook-and-lines, followed by gillnets and beach seines. The catch of the larger trawler *cuin* longliners based on Sibolga and the trollers based on Padang is not recorded and probably exceeds the total production of the Nias Island fishing fleet.

The subdistrictwise production, by category of fishing gear and by species groups, is shown in Tables V and VI.

Table V

Subdistriciwise production, by category of fishing gear

	FISHING GEAR				
Subdistrict	*Beach-seine* (t)	*Gill-net* (t)	*Hook-and-line* (t)	*Others* (t)	*Total* (t)
Gunung Sitoli	28	264	***456***	20	768
Tuhemberua	225	123	243	IS	606
Gido	46	39	45	5	135
Idano Gawo	44	85	128	4	26!
Alasa		35			35
Lahewa	45	115	116	28	304
Teluk Dalani	—	280	281	18	579
Lahusa	—	30	46	10	86
Sirombu	—	—	*547*	18	*565*
Lowlowau	—	—	50	17	67
TOTAL	388	971	1912	135	3406

The catch is composed of a variety of species. The subdistrictwise production by groups of species is shown in Table VI.

Table VI

Subdistrictwise production, by species groups

	SPECIES GROUPS *(catch in* ***t)***								
Subdistrict	*Tuna*	*Seer*	*Shark*	*Queenfish*	*Skate*	*Rockfish*	*Small Pelagics*	*Others*	*Total*
Gunung Sitoli	*35!*	64	35	79	20	54	80	85	768
Tuhemberua	93	52	33	118	17	64	63	166	606
Gido	18	10	19	14	9	14	32	19	135
Idano Gawo	29	38	30	30	19	52	22	41	261
Alasa	—	5	6	9		12	3	—	35
Lahewa	23	34	38	26	2!	82	27	53	304
Teluk Dalam	210	45	14	42	11	76	53	128	579
Lahusa	6	14	20	3	t0	13	6	14	86
Sirombu	316	31	19	2!	3	59	52	64	565
Lolowau	—	5	1	25	2	11	5	18	67
TOTAL	1046	298	215	367	112	437	343	588	3406

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Outrigger canoes on the beach

Newly introduced inboard motorized craft moored in river

6. INFRASTRUCTURE AND SERVICE FACILITIES

There are about seventy fishing villages scattered along the coastline of Nias Island. Each of these fishing villages is a landing centre where fishing craft are generally hauled on to the beach, kept at anchor in a protected anchorage or moored in small water outlets such as at Gunung Sitoli, Lahewa, Sirombu and Teluk Dalam. Outrigger canoes on the beach and newly introduced motorized craft moored in a small river are shown in the photographs on the facing page.

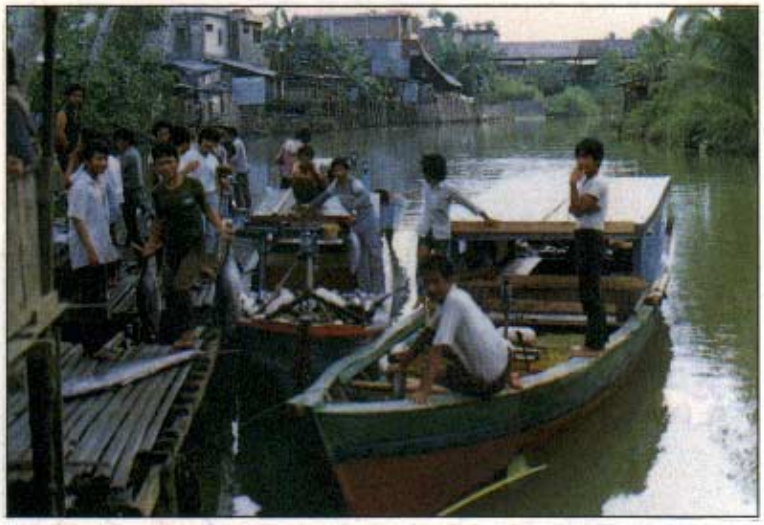
There is no fishing harbour, with proper shore facilities, for large motorized fishing boats. Concrete jetties for small. cargo and passenger boats of up to 300 t, which could occasionally be used to service fishing boats are located in Gunung Sitoli, Lahewa, Teluk Dalam and Hinako.

There are very few private and public jetties for use by small motorized fishing craft. A typical wooden jetty on stilts on the bank of the river at Gunung Sitoli is seen in the picture alongside.

There is only one privately owned ice plant in Gunung Sitoli (see picture alongside). It has a capacity of 4 t/day and is underutilized. Privately-owned home freezers are used by small traders for making a limited quantity of ice in some fishing centres, such as Gunung Sitoli and Teluk Dalam;

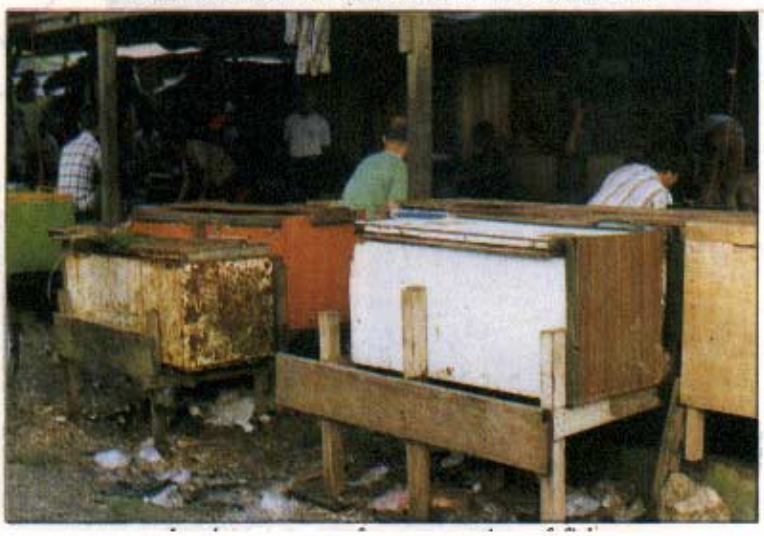
In public markets, such as at Gunung Sitoli, old refrigerators or insulated boxes are used to store unsold fish for sale on the following day. (see picture alongside.)

For retailing of marine products, there are public fish markets available to private traders in Gunung Sitoli, Lahewa, Sirombu and Teluk Dalam (see picture on page 19, for the public fish market at Gunung Sitoli). The locations of infra-structure facilities are shown in Figure 4 (on page 18).



Wooden jetty on stilts by the bank of the Gunung Sitoli river

A privately owned ice-making plant in Gunung Sitoli



Insulated ice box for preservation of fish

Fig 4 Roads, rivers and infrastructure facilities

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There are no established fishing boatyards. Fishing craft are built on site by itinerant boatbuilders. While the local boatbuilders are skilled in construction of traditional outrigger canoes, their knowledge and skill need to be upgraded for construction of newly introduced fishing craft of modern design.

The installation, maintenance and repair of engines are done by local mechanics who have the basic skills.

The public market in Gunung Sitoli

Most of the fishing villages have a good supply of kerosene, petrol and diesel for operating motorized fishing craft.

The supply of fishing gear material is good. The main fishing gear dealers of North Sumatera province distribute their products through local subdealers at Gunung Sitoli, Teluk Dalam and Lahewa. Shopkeepers in the villages buy the required fishing gear material from the latter for retail sale.

Access to Nias Island is good. There is a daily domestic flight (SMAC), with capacity ranging from 8-20 passengers. There is also a daily passenger ferry service from Sibolga to Gunung Sitoli. There is a regular cargo service for the import and export of goods from Sibolga to Gunung Sitoli, Lahewa, Sirombu, Hinako and Teluk Dalam. Smaller boats carrying passengers and goods also link the major coastal towns and villages.

The road network, however, is not well developed (Figure 4, facing page). Narrow suspension bridges, collapsed bridges, gravel roads, earth footpaths etc., considerably restrict development of important areas of the island. The road communications to fishing villages is good in the subdistricts of Tuhemberua and Gunung Sitoli, but unsatisfactory in other coastal subdistricts, where many villages are accessible only by footpaths or by sea. (See pictures on communications overleaf.)

7. HANDLING AND PROCESSING

The non-motorized and motorized fishing craft based on Nias Island, and operating in the coastal and offshore zone on fishing trips lasting less than 24 hours, do not carry ice. They land their catch in the fresh form, the fish being generally removed from the fishing gear and kept out of the sun by storing below the flooring in the bottom of the craft. Large inboard motorized trawler *cum* longliners based on Sibolga and operating in the coastal zone, however, keep the valuable shrimp and food fish species in ice boxes. Miscellaneous varieties of fish are dried on top of the wooden roof. When a good catch is taken with small mesh gillnets, however, fish is often removed from the gillnets on the beach (see picture alongside). The large, inboard motorized Padang-based trollers operating in the offshore zone of the west coast preserve their catch in large ice boxes.

Removing fish from gil/nets on the beach

1

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1. *Gunung Sitoll afrport*
2. *Afrplane linking Medan – Gunung Sitoli*
3. *Passenger ferry linking Gunung Sitoli with Sibolga*
4. *Bamboo raft used as ferry*

5 & 6. Suspension bridges

7 & 8. Collapsed bridges

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Cleaning and icing offish in Gunung Sitoli for transport inland

Marine products landed in the fresh form are generally consumed fresh in the immediate vicinity ofthe landing centres. When landings exceed the demand for fresh fish, however, the excess is salt dried for transport to hinterland areas or iced for later sale in public markets (see picture alongside). Fish is salted and sun dried in fairly hygienic conditions on beaches and backyards on bamboo mats. The main species which are dried are small pelagics (sardine, anchovy, etc.), demersals (snapper, grouper, bream and other miscellaneous species) and shark. Species which are iced are mainly bilifish, tuna and caranx species. Shrimp and lobster are frozen in home freezers for export through Sibolga.

8. *MARKETING AND DISTRIBUTION*

Considering the total production of marine and freshwaterfish, theimport of dried fish and the unrecorded catches sold in the island by Sibolga-based trawler *cum* longliners, the total marine product supply for local consumption is in the order of 5000 **t,** i.e. 10 kg/person. The preference among consumers ofmarine products is generally for fresh fish, in the following order of preference tuna, caranx, Indian mackerel, sardine and bilifish.

Dried fish is consumed when fresh fish is scarce or expensive. It is, therefore, mostly consumed by low-income earners, and in the remote hill areas.

The marketing of marine products is solely in the hands of small private traders. The transport used by them comprises bicycles, motorcycles (see pictures alongside) and private buses. The producer is generally not committed to any particular trader. He negotiates daily sales with the small-scale traders who come regularly to the landing centres. A competitive auctioning system does not exist.

A fish trader and his bicycle

Nias Island: Marketing offish

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The mark-up between producer and retail prices varies with different species and the areas of the island. According to the data available with the PFS, it could be as much as 70 per cent for some species.

Marine product export is believed to be a minimal percentage of the total production in terms of both quantity and value. Shrimp and lobsters are the only two species reported to be exported by private traders. No data is available on the total quantity and value.

The main item of marine products imported is dried fish. According to the PFS statistics for Gunung Sitoli, the total value of dried fish imported in 1986 was Rp 41.26 million.*

9. *COASTAL AQUACULTURE*

Traditional subsistence freshwater aquaculture of carp and catfish is practised in the hill areas. There is, however, no traditional brackishwater and marine aquaculture in Nias Island.

The culture of penaeid shrimp in brackishwater ponds in the mangrove areas has a limited potential on the northern coast of Nias Island. The mangrove area with potential for aquaculture is estimated to be 1200 ha.

The feasibility of culturing penaeid shrimp in ponds in Tuhemberua subdistrict is being investigated by the private sector.

The Provincial Fisheries Service of North Sumatera province is studying through culture trials, the feasibility of seaweed culture in Teluk Dalam.

10. *FISHERIES ADMINISTRATION AND INSTITUTIONS*

10.1 *District Fisheries Service*

The District Fisheries Service *(Dinas Perikanan Kabupaten* – see picture below) comes under the jurisdiction of the Chief *(Bupati)* of the district *(kabupaten)* and the Chief of the Provincial Fisheries

The District Fisheries Office in Gunung Sitoli

* Rp 1000 = US $ 0.50 approx.

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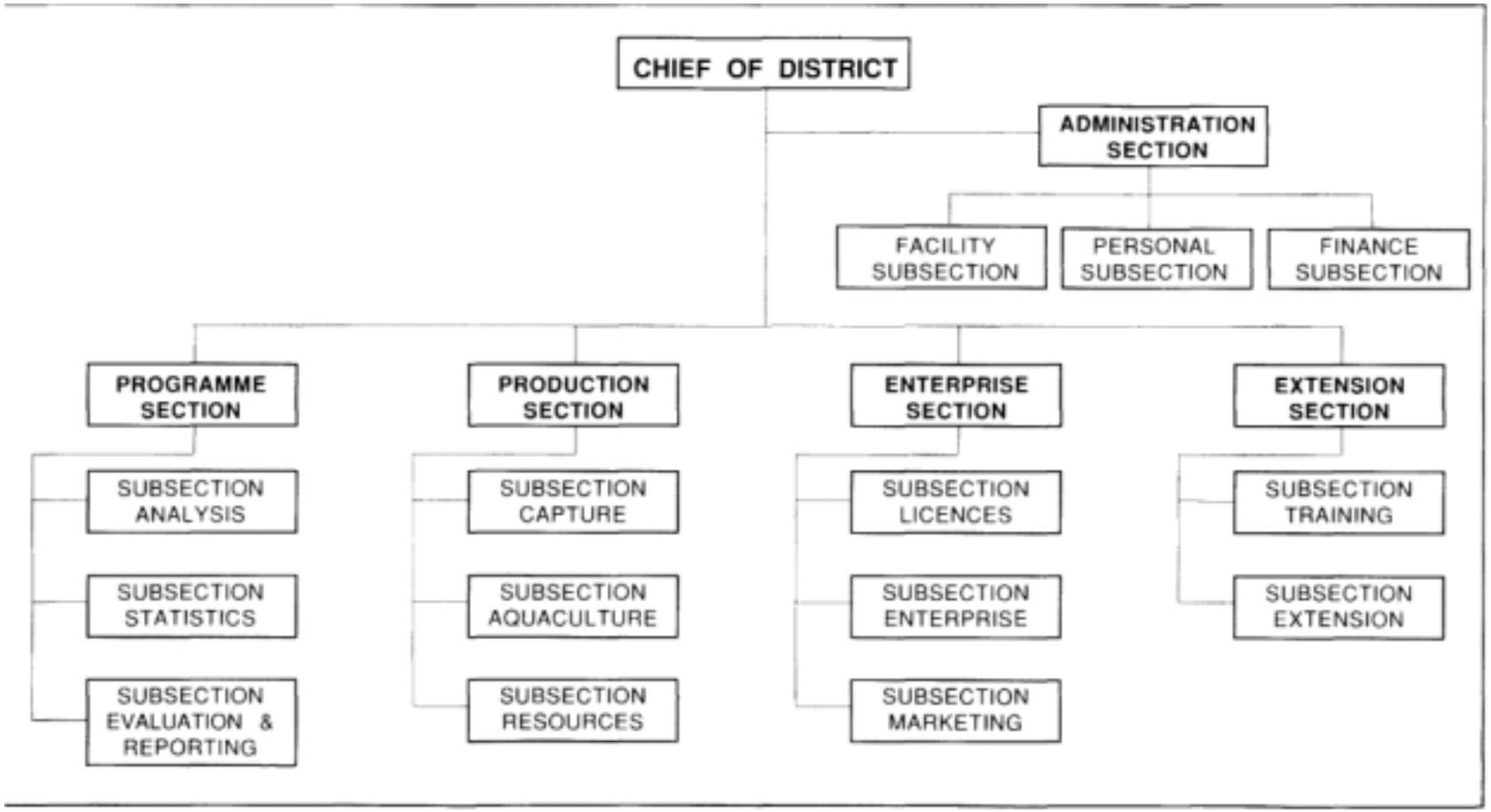
Fig. 5 Organizational set-up of the District Fisheries Service



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Service of the Province of North Spmatera. Its organization is similar to that of the Provincial Fisheries Services. The organizational set up of the District Fisheries Service is shown in Figure 5 (see facing page). The main function of the District Fisheries Service is to manage and coordinate all fisheries-related activities. At the field level, a fisheries office named Resort Perikanan comes directly under the District Fisheries Chief. This office may cover more than one subdistrict.

The District Fisheries Service has a total staff of 15. Several administrative posts are kept vacant. The operational budget of the District Fisheries Service is provided by the district administration *(kapubaten).*

The total operational budget for 1988 was only of the order Rp 2,700,000, indicating the budgetary constraints to which it is subjected.

10.2 *Research, Training and Extension institutions*

The Marine Research Institute (BPPL), the Marine Fisheries Training Centre (BKPI) and the Agency of Agricultural Extension and Training Institute (BPLPP) do not have any significant involvement in the field of fisheries in Nias Island. The Marine Fisheries Technical Implementation Unit (UPPI), which comes under the Provincial Fisheries Service, is involved at the grassroots level in the fields of fishing technology and seaweed culture.

10.3 *Institutional credit organization*

The small-scale fisherfolk of Nias Island have had very little access to credit facilities and most of them have been financing their fishing activities from their own savings. The government owned Rural Bank of Indonesia (Bank Rakyat Indonesia – BRI) is the only source of institutional credit to the fishing community of Nias Island, through its branch *(kaiwil)* at Gunung Sitoli.

Under the MADUNA loan scheme, 23 loans were given to fishermen for such production assets as outrigger canoes and engines. The rate of interest was 12 per cent per annum, and the repayment period two years. Land or house was furnished as collateral. Loan repayments have been far below expectations.

11. *POLICY AND DEVELOPMENT PLAN*

Subsequent to the trawl ban of 1980, high priority has been given by the government to development of the small-scale fisheries sector in Nias Island. The priorities, however, are not reflected in enforcement of the trawl ban or in the financial and technical resources made available to small-scale fisheries. The fisheries policy and development plan are designed to increase the production of crustaceans and fish for local consumption, thereby reducing imports of dried fish, promoting increased exports of high market value fish and crustaceans, increasing consumption per head, raising incomes and living standards of fisherfolk, and maximizing employment opportunities in the fisheries sector.

These targets are planned to be achieved by

- motorization of traditional craft;
- introduction of new, improved designs of fishing craft and gear, leading to expansion of the fishing area and increased efficiency of fishing units;
- improvement of infrastructure for processing, marketing and distribution of fish; and
- credit for productive assets of proven feasibility.

Fig. 6 Locations of the villages surveyed

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PART II
A SOCIO-ECONOMIC APPRAISAL OF SELECTED COASTAL FISHERFOLK COMMUNITIES IN NIAS ISLAND, INDONESIA

(based on a report prepared in 1990
by Philip Townsley, APO, Socio-economist, Bay of Bengal Programme)

1. *INTRODUCTION*

The population of Nias Island, according to the census figures of 1986 is *527,758.* **A breakdown** of the population by subdistrict is given in Table I.

Table I
Subdistrictwise population

Subdistrict	*POPULA TION*		
	Male	*Female*	*Total*
Gunung Sitoli	**41** 661	41 361	83 022
Tuhemberua	**22 555**	**23** *518*	**46 073**
Lahewa	16 948	17 137	34 085
Alasa	**17** 306	**17 900**	***35*** 206
Gido	**33 424**	**34 770**	**68 194**
Idano Gawo	**20 843**	**21 142**	**41 985**
Lahusa	10466	11091	***21557***
Gomo	**16** *825*	**18 321**	**35** 146
Teluk Dalam	**30 657**	**32 694**	**63 351**
Lolowau	**21 321**	**22 088**	**43 409**
Mandrehe	**19 333**	**20** 706	**40 039**
Sirombu	7 **584**	**8** 107	15 691
TOTAL	**258,923**	**268,835**	**527,758**
Percentage	49.06	**50.94**	100.00

The fishing villages are scattered and, in some cases, isolated.

Public amenities, such as fresh water, electricity supply, dispensaries, and roads, are non-existent in many fishing villages. Primary schools **are generally** found in all fishing villages.

The census of fisheries èonducted in 1986 showed that there are *2657* households with 2214 full-time fishermen and 443 part-time fishermen. The number of fishing households is reported to be stagnant. The subdistrictwise distribution of households is given in Table II.

Table
Subdistrictwise distribution of fishing households

Subdistrict	*Full-time*	*Part-time*	*Total*
Gunung Sitoli	**426**	**52**	**478**
Tuhemberua	**418**	**61**	**479**
Gido	97	48	145
Idano Gawo	**116**	**39**	**155**
Alasa	**36**	**9**	**45**
Lahewa	401	51	**452**
Teluk Dalam	**302**	**56**	**358**
Lahusa	**124**	**20**	144
Sirombu	**243**	**32**	**275**
Lolowau	51	**75**	**126**
TOTAL	**2214**	443	**2657**

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The number of persons employed in ancillary activities is estimated at about 900 and is believed to be increasing in the fields of handling and marketing, fishing craft construction and services.

The estimated breakdown of employment in ancillary activities is given in Table III.

Table III

Employment in ancillary activities

Activity	*No. of persons employed (estimated)*
Ice making	**10**
Processing	20
Engine repairs	10
Fish-curing	60
Boatbuilding	100
Marketing	700
TOTAL	**900**

Apart from the main population concentrations around the district capital, Gunung Sitoli, and Teluk Dalam in the south, most of the inhabitants live in villages in the hilly interior of the island. Agriculture is the most important source of income for most of the population. The cultivation of rice, yams, cassava and other vegetables, and the raising of livestock, such as pigs and chickens, is the basis of their livelihood. Cash crops, such as rubber, coconut, cloves and *nilem* leaves (source of the aromatic oil, *patchouli)* are becoming increasingly important as links develop between the island economy and the outside world.

Christianity was introduced by the Dutch who first settled in the island in the 17th Century. It now forms the religion of 80 per cent of the inhabitants. The remaining population is Muslim. Most of the latter live in the coastal areas and the fisherfolk on the island are predominantly adherents of Islam*.

Marine fisheries has generally been relatively marginal to the economy of the island. The preferred sourceof protein for the majority of the population is pork and chicken augmented by freshwater fish and game hunted in the forests of the island. Marine fish only supplements the usual diet. Consumption of fish on the island, at about 10 kg/person/year, is well below the average for the rest of North Sumatera, which stands at over 17.5 kg.

The agricultural orientation of traditional Niha culture and the difference in religion between fisherfolk and the Christian majority, has apparently led to the fisherfolk becoming a distinct community living on the fringes of the mainstream of Niha society.

2. *BOBP ACTIVITIES IN NIAS*

In 1988, the Directorate General of Fisheries of Indonesia requested the Bay of Bengal Programme **(BOBP) to investigate possible technological improvements in small-scale fisheries** in Nias.

Initial observations of the island's fisheries led to identification of the potential for the introduction of motorized small-scale fishing craft with a better operational range and improved carrying capacity. A subproject was prepared with the objective of raising the incomes of small-scale fisherfolk through the design and demonstration of improved outrigger canoes. The designs for the outrigger canoes were based on designs developed in the Pacific and in Sri Lanka. A range of sizes from 6 to 9 m were considered appropriate for the conditions in Nias and were subsequently built by local carpenters on the island. Extensive technical trials were carried out and modifications made as required.

Technical feasibility was eventually established for two larger canoes powered by inboard diesel engines. A smaller, 6 m canoe, using a petrol long-tail outboard motor, later converted to an inboard installation, encountered technical problems and was abandoned as unfeasible. Commercial fishing trials carried out by local fishermen are still underway to establish the economic feasibility of the two remaining craft and their suitability for use by small-scale fishermen.

* Estimate **based on District Fisheries Services Statistics (1986).**

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Based on results up to date, the new canoes appear to have a significant impact on fisherfolk's earnings and their fishing performance has been satisfactory. The use of an improved technology of this type, however, inevitably involves higher levels of investment than those required for traditional fisheries on Nias. Changes in working patterns and organization by small-scale fisherfolk would be entailed if they were to utilize such a craft successsfully. Skills in engine maintenance would need to be developed in those fisherfolk with no previous experience of engines. Further, while the canoes seem to be operating successfully in one area on the north-east coast of the island, it is yet to be established whether the same craft would prove to be feasible in other locations.

3. *SOCIO-ECONOMIC APPRAISAL OF NIAS FISHERFOLK COMMUNITIES*

Except for some anthropological studies of coastal Nias communities, which were inaccessible due to language problems, no information or data specifically relating to fisherfolk communities in Nias is available. In order to decide on a suitable strategy and approach for continuing demonstrations of the craft, and to assist in identifying suitable locations for such trials, however, some information regarding the socio-economic context of fisherfolk communities was required.

The subproject therefore proposed the implementation of a socio-economic appraisal of the fisherfolk communities to collect information which would assist in the planning of activities for the subproject itself and for any eventual extension phase of the activity if the initial trials proved to be successful.

The specific questions to be answered by the appraisal were

- How did small-scale fisherfolk view their problems, needs and potential, both in fisheries and other aspects of their livelihoods?
- What conditions in fisherfolk communities might hinder or assist the introduction of new technology of the sort being developed by the subproject?
- How did conditions of fisherfolk communities differ in different areas of Nias and which areas would be most suitable for the introduction of new fishing technology?
- What was the general socio-economic condition of fisherfolk and what measures would be required to enable them to gain access to new technology?

It was also decided to limit the appraisal to matters directly related to the requirements of the fishing technology subproject, as a more general and in-depth study of the socio-economic conditions of fisherfolk communities on the island was beyond the scope of **BOBP** activities there.

Based on these critical questions and the requirements of the subproject, these immediate objectives were developed for the appraisal

- To obtain a picture of the socio-economic conditions of a sample of Nias fisherfolk communities.
- To obtain a profile of the problems, needs and aspirations of small-scale fisherfolk, in respect of both fisheries and other sectors.
- To identify existing economic activities and the potential for others in the coastal areas of Nias.
- **To obtain a profile of** formal and non-formal institutions in fisherfolk communities.
- **To identify fisherfolk communities amongst whom further** trials, demonstrations and the **introduction of improved outrigger canoes might be feasible.**

The methodology and design of the appraisal, selection of the eleven target villages – Ladara, Botolakha, Afia, Sisarahili Gomo, Fowa, Bozihona, Hilinamoniha, Teluk Dalam Pasar, Lagundhi, Hilinamazihona and Sirombu situated in seven subdistricts – and the implementation of the appraisal in two phases from October 1989 to January 1990 are set out in Appendix III.

4. FINDINGS OF THE SOCIO-ECONOMIC APPRAISAL

The following is a general analysis of the findings of the socio-economic appraisal. Specific information and findings in respect of each village are reviewed in Appendix IV.

4.1 *Definition of fisherfolk communities*

The information gathered during the course of the appraisal shows that the term 'fisherfolk communities' as used in Nias needs some clarification.

The term 'fisherfolk community' almost always refers to a section, often proportionally quite small, of a larger village in which farmers with small-holdings of agricultural and plantation land are usually the majority. There appear to be relatively few coastal villages which can be described as predominantly fisherfolk villages. On the other hand, some fishing activity seems to take place in most coastal villages and the fisherfolk community in such villages generally constitutes a fairly distinct group. In only one of the eleven coastal communities investigated (Hilinamazihona, in Lolowau subdistrict) did the number of fisherfolk turn out to be so small as to be of very marginal importance within the village.

The term 'fisherfolk communities' used here therefore refers only to those sections of coastal communities in Nias where people earn a proportion of their livelihood from fishing.

4.2 *Typology of fisherfolk communities*

The factors mentioned above also have a bearing when attempting to formulate a typology for Nias fisherfolk communities. Various factors relating to fisheries and fishing practice, which could be identified to distinguish fisherfolk in different areas of the island, do not seem to have as significant a bearing on the socio-economic conditions of these communities as two factors relating to shore-based activities. In the simplest terms, the most important factors influencing the socio-economic conditions of Nias fisherfolk communities seem to be

- access to agricultural land, and
- access to markets for fisheries produce.

Agricultural work is the principal alternative, or supplement, to fishing as a source of income for people living in coastal communities in Nias. Even among those who regard themselves as 'fisherfolk', ownership of agricultural land is apparently considered important security for the household. Thus, access to land seems to play an important role in determining the socio-economic conditions of fisherfolk communities.

Access to markets for fisheries produce is an important factor in any community producing a highly perishable product like fish. In a relatively remote area like Nias, it plays a determining role in the standard of livelihood fisherfolk are able to gain from fishing. Access to markets may vary within a community according to the type of fisheries produce available. Thus, high value products, such as lobster and shrimp, always seem to find a market outlet, however remote the location, perhaps because the volumes handled are relatively small. For most Nias fisherfolk, and most fisheries produce, however, access to markets is strongly influenced by location and communications and this appears to play a decisive role in determining the socio-economic conditions of fisherfolk.

On this basis the target villages can be classified as below

Table IV

Classification of sample villages according to access to land and access to markets for fisheries produce

ACCESS TO LAND	ACCESS TO MARKETS	
	Good access	***Limited access***
Land available	**Botolakha** **Afia** Sisarahili Gomo **Fowa**	**Bozihona** **Lagundhi** Hilinamazihona
Limited land available	Ladara	Hilinamoniha Teluk Dalam Pasar Sirombu

Communities on the northeastern coast of the island are generally at an advantage as they have ready access to a good market for fresh fish in Gunung Sitoli and its surroundings and also have land for agricultural activities.

Interestingly, access to land does not as yet seem greatly affected by population density in this area. Although the density of coastal villages in Gunung Sitoli, Tuhemberua and Gido subdistricts is much higher than elsewhere in Nias, there still appears to be space for the expansion of cultivation. Ladara village, however, represents something of an anomaly; it is an exceptionally small community with very limited land area.

Among the villages covered by the appraisal in the south and west of Nias, the pattern of land ownership is less clear. In Hilinamoniha, due to the geographical location of the village and the local topography, very little land suitable for agriculture is available. The indications are that other villages along the southeastern coast face similar problems. Teluk Dalam Pasar is a semi-urban community within Teluk Dalam town and the lack of land is therefore not surprising. In Sirombu, the location of the fisherfolk community within a relatively large settlement may restrict the availability of land, but fisherfolk here also seem to represent a more 'specialized' fisherfolk community compared to others on the island. Thus, the lack of land ownership among Sirombu fisherfolk may reflect a lack of interest in agriculture rather than lack of access to land.

It is clear, however, that fisherfolk communities in this part of Nias face greater difficulties than those along the northeastern coast. Access to good markets for fresh fish seems to be particularly problematical. Even in Teluk Dalam, a relatively large town, the marketing situation for fish is not favourable to fisherfolk. Prices are reported as fluctuating considerably and it is often difficult to find buyers. The main difference in the fish marketing situation between Gunung Sitoli and Teluk Dalam seems to be the more limited export of fish from Teluk Dalam. In Gunung Sitoli, the export of certain species of fish to the Sumateran mainland port of Sibolga creates enough space for local small-scale fishermen to find a ready market for their catch. In Teluk Dalam, this is not the case. While some lobster is exported on a very small-scale, almost all fish caught by local fishermen appear to be sold locally. The lack of commercial ice production or storage facilities and, thus, of any possibility of preserving fresh fish is the main obstacle to enabling greater export of fish from the area.

4.3 *Socio-economic conditions of Nias fisherfolk communities*

Some important features of Nias fisherfolk communities are described below. While some of these features may be common to most of the communities investigated, others are more area- or village-specific.

4.3.1 LOW EARNINGS

Very few of the fisherfolk households interviewed during the course of the appraisal seem to have yearly earnings of more than 900,000 Rp/year. The average earnings from fishing seem to be in the region of 650,000 Rp/year. Income from agriculture is reported to average approximately 200,000 Rp/year, but this does not take account of food grown for household consumption, which probably constitutes the bulk of 'income' from agriculture. An average total annual income of about 850,000 **Rp/year (US $ 460) per household** would appear to be a reasonable estimate.

The range of incomes reported from fisherfolk households in Sisarahili Gomo (Gunung Sitoli) (12 respondents); Bozihona (Idano Gawo) (8 respondents); Hilinamoniha (Teluk Dalam) (20 respondents); and Sirombu (Sirombu) (14 respondents) was from Rp 250,000 to Rp 1,500,000.

These figures can be compared with data collected in 1987-88 during field enquiries in Langkat District on the Malacca Straits coast of North Sumatera. The latter indicate that earnings of between 1,000,000 and 1,500,000 Rp/year seem to be the norm for fisherfolk engaged in shrimp fishing using trammel gillnets, which is the mainstay of the east coast fisheries. It seems that in Nias only fisherfolk close to Gunung Sitoli, along the northeastern coast, can earn incomes approaching these levels; elsewhere the earnings are often significantly lower.

While such information is mainly indicative and difficult to verify, it is clear that household earnings of Nias fisherfolk are comparatively low. The prices obtained for fish catches in Nias are considerably lower for many species compared to those obtained by fisherfolk on the Malacca Straits coast of North Sumatera. The channels for transporting potentially high-value fish to consumer centres on mainland Sumatera are also not yet well developed. Prices for many agricultural commodities too seem to be relatively low on the island.

Comparison of reported earnings and expenditure shows that very little surplus is generated within most villages and that, as a consequence, a large proportion of households live at little more than subsistence level.

4.3.2 LIMITED ACCESS TO CREDIT

Contact of fisherfolk and farmers in coastal communities with formal banking institutions seems to be almost non-existent. Previous credit programmes aimed at fisherfolk have been implemented on a very small-scale in Nias and have, apparently, not performed well in terms of either impact or repayment. Familiarity with banking procedures and facilities among fisherfolk is very limited. Savings activities, whether formal or informal, are also uncommon. Informal credit sources also seem to be very restricted, with very few, or no, fish buyers involved in the provision of credit for fishing activities by traditional fisherfolk.

Correspondingly, indebtedness was not reported to be a major problem and was only mentioned at all in a very few cases. Any indebtedness which occurs seems to be for purposes of consumption and does not appear to lead to obligations which affect the control fisherfolk have over their catches, as is the case in many other parts of Indonesia.

4.3.3 LIMITED DIVERSIFICATION **OF** ECONOMIC ACTIVITY

Beyond fishing and extensive agriculture, there is little diversification of enterprise in the coastal communities investigated. Besides fishing, the cultivation of small holdings of food and cash crops provides most households with their only sources of livelihood. While some expansion and diversification is taking place in the types of cash crops grown in a few locations, most communities seem to have had little exposure to new alternatives.

In fishing, there is a general awareness of the 'traditional' nature of current fisheries practices. These are often compared with unspecified 'modern methods'. There appears, however, to be little diversification or experimentation with new techniques and little impetus to try out new activities.

4.3.4 LIMITED INVESTMENT IN PRODUCTION

With almost no access to credit, with limited surpluses for reinvestment and with little awareness of alternatives, the investment in production is very low. In agriculture, inputs for the improvement of productivity, such as fertilizers, pesticides or improved varieties, are rare, as is awareness of the possibilities for their use. The activities of a more organized agrobusiness sector are just beginning to make themselves felt in Nias, but have as yet had little impact on practices at village level.

Fishing activities are generally carried out at a very low level of investment and require a minimum input of capital and technology. The slightly larger scale operations being carried out from a few centres do not involve many traditional fisherfolk and have not had any appreciable impact on their fishing practices.

4.3.5 LIMITED CONTACTS **WITH, OR ACCESS TO, GOVERNMENT SERVICES**

The familiarity of villagers in coastal communities with government services and programmes is extremely restricted. Contacts with extension staff, or officials beyond very local level, seldom take place. Local government resources for carrying out activities in the field are few and this contributes to the fisherfolk's lack of familiarity with officialdom.

In some cases, particularly among farmers, respondents showed some knowledge of existing extension services, but access remains difficult.

4.3.6 LACK **OF ORGANIZED MARKETING CHANNELS**

Even in those villages where access to centres of commercial activity is relatively easy, it was noticeable that contacts between village-level production and more extensive marketing channels seem to be at the initiative of the producer alone. There appears to be little penetration to village level by the marketing network in Nias. While organized collection of produce is developing in a few areas, it is still relatively in its infancy. The mechanisms which do exist seem to deal mainly with such agricultural commodities as rubber and spices.

A common complaint by fisherfolk is that they lack a 'buyer' for their catches. The need for an individual or collective body to establish links between the village and outside markets is frequently cited as a priority issue.

4.3.7 OWNERSHIP OF THE MEANS OF PRODUCTION

Most households own at least one means of livelihood, either land or fishing craft and gear. Rental of either of these is very rare. While working, as agricultural labour is frequently an additional source of income for fishing households, the incidence of labour for hire in fishing is restricted to a few larger fishing centres. Most fishing activities are owner-operated. Where craft need more than one crew, family members seem to be the most common source for additional crew, although there is some operation of craft on a share basis. In such cases, on traditional non-motorized craft, catches are usually shared fifty-fifty.

4.3.8 EDUCATIONAL LEVELS

The larger towns in Nias, notably Gunung Sitoli, play an important role as centres for secondary education, meeting these needs of the entire island. As a result, relative proximity to these centres seems to be an important factor in fisherfolk's access to education. Communities on the northeastern coastal strip in Tuhemberua, Gunung Sitoli and Gido subdistricts have easier access to schools and invest more in educating their children than elsewhere on the island. While most villages have access to primary schools, children from more remote villages appear to be less likely to continue their schooling beyond primary level. The quite considerable amounts sometimes spent on schooling by households near Gunung Sitoli and Teluk Dalam perhaps indicate an enhanced awareness of the opportunities offered by better education.

Among the older generation in fisherfolk communities, educational levels are considerably lower. Illiteracy is not uncommon, even in the age range 20-40.

4.4 *Problems, resources and solutions as seen by fisherfolk*

While the above description of the principal factors affecting the socio-economic conditions of fisherfolk in Nias is the result of a combination of observations by the coordinator of the survey and BOBP staff, comparison with existing data, and discussions with fisherfolk, this section on problems, resources and possible solutions is based entirely on the views expressed by fisherfolk. It can therefore be regarded as presenting the fisherfolk's view of their conditions and priorities. Inevitably, there is some overlap between the two sections.

Inquiries into the problems, potential and hopes of fisherfolk were carried out in two parts during the course of the appraisal. Respondents were initially encouraged to talk very generally about problems and opportunities which they saw as affecting their communities and their own households. Responses to this part of the interview gives a reasonably good picture of the fisherfolk's own priorities, as they were free to bring up those matters which were of relevance to them.

Subsequently, discussion focussed on specific fisheries issues in order to elicit more detailed responses on such matters as fisheries problems and resources, and problems, potential and solutions in respect of fisheries practices, marketing and motorization.

The analysis below concentrates first on perceptions which seem to be general to the villages investigated and then reviews any other important points mentioned by fisherfolk from specific villages or areas.

Three priority issues seem to be recognised by fisherfolk in all the villages investigated.

4.4.1 LACK OF FINANCIAL ASSETS

In general terms, most respondents regard the lack of financial resources at their disposal as an important constraint. This is expressed in various terms. Most commonly, fisherfolk refer to their lack of assets which would enable them to take up new or improved activities, either in agriculture, fishing or small-scale trading. Others simply complain of low earnings and difficulty in meeting day-to-day expenses for themselves and their households.

Given the low earnings reported, these concerns can be regarded as valid and a primary constraint on development at the village level.

It would appear that the lack of capital is seen as more of a problem by fisherfolk than by farmers. Among farmers, awareness of the use of inputs such as fertilizer and pesticides, which would require increased capital, seems to be surprisingly low. By contrast, fishermen seem to be quite familiar with a range of options, requiring some increase in capital investment, to improve their fisheries

enterprises. While they may not be aware of details, such as the specific types of fishing gear which might improve their performance, they are familiar with alternative technologies in general terms.

Interestingly, there is almost no realization of the linkage between lack of financial resources and access to credit. Awareness of the credit option, either from formal or informal sources, is extremely limited except where some previous government credit schemes have been implemented.

4.4.2 AVAILABILITY OF APPROPRIATE FISHING TECHNOLOGY

A majority of the fisherfolk interviewed during the appraisal complained of the limitations of the fishing technology at their disposal. This is often perceived as being at the root of their low earnings from fishing, poor catches and inability to exploit the fisheries resources fully. This problem is very often defined by using the formulation 'We're only traditional fishermen'. 'Traditional methods' are frequently directly contrasted with 'modern' methods, particularly when discussing fishing gear and motorization.

The technical area most frequently referred to as a problem is that of fishing methods. Ideas concerning possible alternatives in this field, are, however, characteristically vague. Suggestions from fisherfolk tend to concentrate on obtaining unspecified 'modern' fishing gear or merely greater quantities of fishing gear, reflecting a general lack of exposure to, or knowledge about, specific alternative fishing techniques or technologies.

Fisherfolk are more familiar with motorization as a technical option, with many fishermen having clear ideas about specific types of engines which could be used for improved fishing operations. In spite of their greater familiarity with outboard engines, there is a marginal preference for inboard diesel motorization, judging from fishermen's responses. In some areas this can be attributed to unfavourable past experience with the former, while in others it may be due to observation of larger craft operating in the area. The durability and fuel economy of diesel engines are quite widely recognized as positive features.

An interesting feature of the comments of fisherfolk regarding technical options is the relative lack of reference to new or improved craft. Even when they talk about engines which are considerably larger than those existing craft could carry, little mention is made of the need for larger or newer types of fishing boats. Only in Afia village does the suggested introduction of newer, larger craft assume any significance. In a few other villages, such as Fowa, Bozihona, Hilinamoniha and Sirombu, this issue is accorded relatively low priority.

During discussions with fishermen in several villages while following up the appraisal, a general lack of familiarity with alternative types of small craft was apparent. Many stated that craft for offshore fishing had to be at least 2-3 t to be able to operate in open ocean conditions. While the relative unseaworthiness of existing motorized craft in Nias may explain this perception, the need for education on the importance of boat design and construction, as well as motorization, to improve fishing operations, is indicated.

4.4.3 DIMINISHING/LOW CATCHES AND FISHERIES RESOURCES

Fisherfolk in all the villages investigated express concern in varying degrees over the diminishing catches of small-scale operators. In some areas, notably on the northeastern coast, reasons for the changes in catch rates are not stated very specifically. It is often not very clear from their responses as to whether they are concerned about poor catches in general or about changes in the size of their catches. In all the villages in the southern half of the island, however, fisherfolk respondents are much clearer in voicing their worries about a progressive reduction in catches.

Most fishermen who attempt to explain these changes blame larger craft from 'outside' for intruding into areas generally perceived as being the fishing grounds of local craft. Again, it is fisherfolk in the southern part of the island, in particular, who identify this cause. The 'outside' craft referred to seem to be mainly purse-seiners and trawlers from Sibolga which are known to operate in the area. It is perhaps noteworthy that interaction with handliners, which are known to constitute a significant proportion of the Sibolga fleet, is not mentioned as a problem in the context of the appraisal. Independent discussions with fishermen on the northeast coast, however, have indicated that there is considerable interaction with handliners from the mainland.

A significant proportion of the respondents also blame overfishing by small-scale fishermen themselves for the state of local fisheries resources. This is particularly true of villages on the southern

coast of the island. In Sirombu, on the west coast, a few people also suggest that changes in catches may be due to natural, environmental changes.

Few recommendations are made by fisherfolk concerning management or control of these interactions. In one case, involving fisherfolk working with the subproject and, therefore, in close contact with local fisheries authorities, intervention was requested by the former to control apparently illegal fishing activities by craft from outside Nias. Fisherfolk in Sirombu also recommended intervention by the government to control illegal trawling in the area. The general reaction to such problems on the part of fisherfolk, however, seems to be to seek alternative resources themselves in other areas; hence, the importance attached by them to motorization to enable them to exploit new fishing areas.

There is a general feeling among fisherfolk that resources in most known fishing grounds have declined over the last five to ten years. Fish is still generally available, but fisherfolk indicate that considerably more time is required to take the same catch.

A very disparate range of species is listed for further exploitation. The list is, generally, limited to species already present in significant quantities in local catches. If there is any trend in references to resources for expanded exploitation, it seems to be towards rock fish of various kinds, particularly snapper species, in the southern part of the island. Sharks also seem to be regarded as having potential.

Other important issues with a more local focus brought out by fisherfolk are discussed below.

4.4.4 AGRICULTURAL PRODUCTION

An absolute lack of agricultural land was specifically mentioned as an important problem in only one village, Hilinamoniha, in Teluk Dalam subdistrict. This reflects the geographical location of this village on the southeastern coast, where rocky calciferous uplands, immediately behind the shoreline, limit the area available for agriculture. The identification of this problem may also be influenced by difficulties faced by fisherfolk in regard to fishing operations. Local conditions make the beaching of craft very difficult and limit the size of craft which can be used from the village. The lack of alternative income-generating opportunities may be more acutely felt in these circumstances.

Problems linked with agricultural production were otherwise given priority only in Botolakha village, in Tuhemberua subdistrict reflecting the predominance of agriculture as the principal income-generating activity in that village. Farmers and fishermen in the village emphasize the need for improved access to agricultural inputs such as pesticides, fertilizers, better agricultural equipment and the need for irrigation.

Potential for agricultural development is seen as important in Botolakha, Fowa, Bozihona and Lagundhi.

4.4.5 COMMUNICATIONS AND TRANSPORT

While poor communications seem to be a major drawback in many coastal communities, poor access was listed as an important difficulty, and then only by a few respondents in the single most remote village, Bozihona in Idano Gawo subdistrict.

4.4.6 PRICE INSTABILITY OF FISH

Problems in marketing seem to be fairly widespread on the island, although not all villages investigated listed marketing as a priority issue. Fluctuations in prices appear to affect most communities during periods when large catches are landed. The only area that, according to fisherfolk, is partly immune from this problem is the area north of Gunung Sitoli, where there are regular connections with the district town and the fisherfolk themselves often take their catches to the central market, thereby obtaining the best possible prices for their produce.

Elsewhere, particularly in Teluk Dalam Pasar, Lagundhi and Sirombu, price instability is an important problem and indicates the very localized nature of the market for fish almost everywhere outside Gunung Sitoli.

4.4.7 NEED FOR ESTABLISHMENT OF A MARKETING ORGANIZATION FOR FISHERFOLK

Identification of a need for some kind of fisherfolk organization or cooperative to regulate the marketing of fish and ensure stable prices for fisherfolk does not correspond directly with the identification of price instability as an issue. In Afia, near Gunung Sitoli, fishermen suggest the formation of a cooperative to ensure better prices for fish. In contrast, fisherfolk in villages in the southern part of the island see the cooperative as a means of obtaining a guaranteed buyer for catches as well as stabilizing prices.

There does not appear to be any feeling that fisherfolk require such organizations for purposes of representation, in spite of the fact that participation by fisherfolk in village institutions is often very limited. This is further discussed in the subsequent section on institutions.

4.4.8 AVAILABILITY OF **ICE**

Lack of ice is mentioned as an issue in only two villages, Lagundhi and Sirombu. This may reflect, to some extent, an awareness in these two communities of offshore fisheries resources, the exploitation of which would require the use of ice.

4.4.9 FISH PROCESSING

The improvement of fish processing facilities and techniques is suggested only in two communities: in Lagundhi, where it represents one of the most important solutions suggested, and in Sirombu, where it is regarded as a minor priority.

4.4.10 FISHERIES EXTENSION AND TRAINING

A significant number of respondents in Afia alone mention a need for training in fishing methods to complement the introduction of new fishing gear, craft and motorization.

4.4.11 ENGINE MAINTENANCE

Sirombu is the only fishing community where fisherfolk are sufficiently familiar with motorization to raise any specific issues regarding the use of engines. Problems with maintenance seem to be paramount due to poor availability of spare parts and high costs of repairs to outboard motors.

4.4.12 LOCAL FISHERIES RESOURCES

A few specific fisheries resources are mentioned by fisherfolk as having local potential.

Potential for flying fish, along with various other small pelagic species, notably half-beaks, is mentioned in Lagundhi. Billfish are also regarded as potentially important in here and, more extensively, in Sirombu. Other large pelagic species, such as tuna and Spanish mackerel, are most extensively referred to by fisherfolk in Sirombu and Fowa.

Fisherfolk in these three communities, Fowa, Lagundhi and Sirombu, seem to have the clearest ideas regarding fish species which are commercially interesting and might be more extensively utilized. The range of fish species mentioned in these villages is also significantly greater than in other villages.

4.5 Economic activities other than fishing

The relatively narrow range of income-generating options open to people in the coastal communities investigated is a significant feature of the findings of the appraisal.

4.5.1 **AGRICULTURE**

Apart from fishing, agricultural activities are by far the most important source of income. The relative importance of agricultural earnings varies from village to village, depending mainly on the extent of agricultural land available.

In most of the villages a large proportion of fisherfolk households possess small holdings. Where feasible, as in Botolakha and Lagundhi, these plots are utilized for rice cultivation. Rice seems to be the crop of choice as it can be used for household consumption and commands a ready market on Nias, where rice is still imported from the mainland. Most land in the area, however, is suitable only for the cultivation of cash crops such as rubber, cloves, and coconut. Cocoa is a relatively recent introduction that appears to be gaining popularity.

Productivity in all agricultural production is reported to be extremely low.

Members of many fisherfolk households also seem to work as agricultural labourers on a seasonal basis. Once again, the scope for finding employment in agricultural labour appears to vary from village to village and on the size of landholdings. In Botolakha and Lagundhi, most households seem to be involved in agricultural labour on a regular basis. In most other villages, the opportunities seem to be more limited.

Agricultural work, either on family smaliholdings or on land belonging to others, appears to be particularly important as a source of employment for women in fisherfolk communities.

4.5.2 TRADING

In several villages, a few small-scale fisherfolk families are also involved in trading activities. This usually takes the form of operating small stalls stocking such consumable items as cigarettes, mosquito coils and oil lamps. The preparation and sale of food is also a popular alternative. In both cases, fisherfolk along the northeastern coast, on either side of Gunung Sitoli, seem to be most involved. This may be due to the fact that the principal road in this area closely follows the coast, passing through those parts of villages where fishing communities live; the steady flow of people along this road presents better opportunities for small-scale trading and retail activities.

This is borne out to some extent by the fact that such activities are not taken up in more remote villages such as Bozihona, Hilinamoniha or Sirombu. Although Lagundhi should represent a special case, due to foreign tourists visiting the area, the findings of the appraisal seem to indicate that relatively few active fisherfolk are involved in catering to tourists or seem to regard it as an activity open to them.

4.5.3 SALE OF FISH

In several villages, fisherfolk themselves are active in transporting catches to local markets and selling them. In some locations, fish is sold by fisherfolk at, or near, their landing points. This again is a particular feature of communities along the northeast coast, where the existence of a well-travelled coastal road makes a roadside fish stall a viable proposition.

Where a larger central market is accessible, fishermen often transport fish to the market themselves, usually by cycle. Many fisherfolk in the Gunung Sitoli area choose this option, although there are also fish traders who collect fish at landing points and transport them by cycle or motorcycle to the town.

In the Gunung Sitoli area, the trade in fish seems to be in the process of developing. During the last few years, many locaj fish traders have changed from cycle to motorcycle to transport fish from fishing villages to the market in Gunung Sitoli and other local markets. Several of the fisherfolk contacted during the appraisal in the northeastern part of the island also seem to be in the process of becoming small-scale fish traders. While remaining active fishermen, they earn additional income by collecting the catches of other fishermen and transporting and selling the fish in Gunung Sitoli or other local markets. They often list fish sales as an alternative source of income which significantly increases the earnings of the household.

It is possible to speculate that, at least in the three more densely populated coastal subdistricts of Tuhemberua, Gunung Sitoli and Gido, from which the district town of Gunung Sitoli is accessible, an early stage of development of local fish dealers, such as frequently encountered in other areas of Indonesia, is emerging. Recent developments, such as the commencement of operation of a roll-on, roll-off ferry service from Gunung Sitoli to the mainland may give a significant boost to this nascent fish trade by making mainland markets more accessible. As yet, none of these traders appears to have taken on a role as provider of other fishing inputs or credit, but this may be the next stage in the development of the local marketing system.

Some similar developments may be taking place around Teluk Dalam in the south, but there appears to be less stimulus for such development and marketing, therefore, remains more of a problem for small-scale fisherfolk in that area.

4.6 Formal and non-formal institutions

There are basically three formal village level institutions in Indonesia. First, the Lembaga Musyawarah Desa (LMD), which is a general body for village consultation and decision-making. Second, the Lembaga Keamanan Masyarakat Desa (LKMD), which has a more active role in

organizing village self-help activities *(gotong royong)* and village development. Third, the PKK, or Voluntary Women's Organization, which coordinates activities among village women in a wide variety of fields ranging from health and family planning to income-generation.

In addition, for the purposes of extension activities, farmers and fishermen are organized into groups which act as receiving mechanisms for technical extension provided by the Extension Service and the various Technical Services. These groups are usually organized on the basis of profession. Thus, fishermen, either in general or using a particular fishing technology, might be grouped together, while rice farmers and rubber or clove cultivators might form separate groups.

Looking at the level of reported activity of formal institutions in village development, it appears that effective functioning of such organizations corresponds quite closely to the relative importance of agriculture in the community. It is significant that the communities which report 'active' village institutions include Botolakha, Lagundhi and Hilinamazihona, all of which are villages where agriculture is an important activity and important for fisherfolk households. This would appear to support, to some extent, the commonly held view in Indonesia that farmers are far easier to organize and involve in cooperative action than fisherfolk. This view is further borne out by comments from respondents concerning attempts to organize extension groups. While some groups appear to be functioning in a few villages, notably in Fowa, it is also noted in several cases that 'disagreements' prevent fisherfolk groups from functioning effectively.

In other villages, such as Sirombu and Bozihona, formal village institutions seem to be in place, but fisherfolk's participation in them appears to be very limited. The reasons for this non-involvement are not clear, but the experience of fisherfolk communities indicates that the work patterns of fisherfolk often limit their ability to participate in village meetings and other collective activities.

In the other coastal communities investigated – Ladara, Afia, Sisirahili Gomo and Hilinamoniha and Teluk Dalam Pasar – formal village institutions seem to be largely inactive, or play a very limited role in village life.

In one case, Afia, special mention is made of an informal religious group which plays an important role among fisherfolk and seems to create a certain degree of unity among fisherfolk households in the village. Religious organizations and their activities seem to play an important social role in most village communities in Nias, whether Christian or Muslim. It is known from communities other than those investigated that some Christian missionary groups have also been involved in development activities. Generally, however, religious organizations do not seem to be taking a lead in development work at village level.

In one other village, Hilinamoniha, the role of *adat*, or traditional law, is specifically identified as a potential obstacle to development activities in the village. The appraisal does not go into enough detail to be able to assess the validity of this judgement. It is known, however, that local traditions and, in particular, local power structures based on family ties and clan links are an important factor in Nias culture.

In the past, agencies involved in development activities in Nias have encountered significant problems due to conflicts and jealousies between groups within villages. Such conflicts have been known to actively interfere with development efforts.

4.7 Implications of the findings for future trials, demonstrations and introduction of improved outrigger canoes

The ultimate goal of the appraisal of fisherfolk communities in Nias was to obtain an overall picture of the factors which might influence the success of future trials, demonstration and introduction of improved outrigger canoes in Nias. The factors which can be identified fall into the following categories

- Locations;
- Facilitating participation
- Facilitating access;
- Post-harvest handling; and
- Fisheries management.

4.7.1 LOCATIONS

Three important issues should be taken into consideration when identifying locations for possible further trials and demonstration of the improved outrigger canoes designed by the project.

One is the target group. Taking 'fisherfolk' as a general term to refer to anyone involved in marine fisheries, coastal fisherfolk in Nias seem to show differing degrees of dependence on fisheries as a source of livelihood. Consequently, the potential target group for the activities of a subproject aiming to reach the small-scale fisherfolk in Nias includes fisherfolk households which are also active in agricultural activities. In many communities, it would be very difficult to differentiate 'pure' fisherfolk as a target group from the rest of the community.

If the aim of further trials and demonstrations of the new craft is to involve full-time, 'professional' fisherfolk who see themselves as committed to fisheries as a profession, several of the communities investigated could be regarded as having suitable target groups : Hilinamoniha, Teluk Dalam Pasar, Sirombu, Sisarahili Gomo, Afia, Bozihona and Lagundhi.

If, however, the activity should wish to focus on communities where options other than fisheries are limited, only the first three of these would be suitable, *i.e.* Hilinamoniha, Teluk Dalam Pasar and Sirombu.

In view of the poor communications common to most of Nias and the need for close monitoring of the trials and demonstration phase of the new craft, the relative remoteness of locations for project activities for staff involved in monitoring the project, is an important issue. The only easily accessible locations in Nias are those on the northeastern coast of the island in the immediate vicinity of Gunung Sitoli, where the District Fisheries Service is located and the airport allows easy access for project managers from outside the island. Any other area of the island can be said to suffer from severe limitations in terms of accessibility. Centres such as Teluk Dalam and Sirombu require extended trips of 4-6 hours by road. Isolated villages such as Bozihona are accessible by sea in approximately the same length of time.

If the activity is to be taken up anywhere other than along the northeast coast, near Gunung Sitoli, there are two possible alternatives. Either properly trained staff who can be largely self-sufficient in monitoring must be placed at village level, or those involved in monitoring must be prepared to devote considerable time and effort to travelling between project locations.

A third issue is that of access to fisheries resources. As little precise information is available regarding the state of fisheries resources in Nias, it is difficult to speculate about the best locations in terms of access to suitable fishing grounds.

However, based on fisherfolk's comments regarding their own familiarity with existing resources, these areas which they consider as having a wide range of pelagic and demersal resources are Teluk Dalam Pasar, Lagundhi and Sirombu. It should be noted that these correspond to areas where small-scale fisherfolk are also most familiar with motorization and that greater mobility may have led to wider contact with different resources.

4.7.2 FACILITATING PARTICIPATION

The factors which will influence the willingness or otherwise of fisherfolk to participate fully in activities of the subproject will often be extremely specific to particular villages or even individuals. Three factors identified during the course of the appraisal can, however, be said to have a general impact on the way in which any future activities should be planned.

The first is the institutional structure. The appraisal's findings indicate that most fisherfolk on Nias have very little to do with any formal government or non-governmental institutions which are involved in development work. As a result, the possibilities for organizing fisherfolk participation through the normal channels of village development institutions, such as the LMD and LKMD, seem to be limited. Likewise, the coverage and influence of mechanisms set up by government extension services are very restricted and existing extension groups are largely inactive.

Working with individuals, families or small groups seems to be a suitable alternative. In doing so, there would be a need for care, as it seems, from past experience of other agencies on Nias, that advantage accruing to small sections of the community is often resented by other sections and becomes a source of conflict. This requirement would indicate the necessity for trained staff in place at village level on a permanent basis to monitor activities. Such staff would have to be familiar with the local language and be able to fit in with the local community.

In addition, any trials or demonstrations being started in new locations should take time initially to identify suitable ways of organizing fisherfolk in the community to participate in the demonstration.

A second factor is motivation. Niha fisherfolk widely perceive a series of problems affecting traditional fisheries in Nias and see the introduction of motorized craft as an important element in overcoming some of those problems. The normal patterns of work of fisherfolk, however, are very different from those required to successfully operate a craft requiring a relatively high investment, such as the new outrigger canoes proposed for introduction. Even where fisherfolk are anxious to exploit new resources further afield, they are seldom used to longer fishing trips. In particular, they are not familiar with the necessity for sustained intensive fishing operations in order to ensure the economic viability of their fishing enterprise. Until concrete economic benefits begin to accrue to participating fisherfolk from the operation of new craft, some fisherfolk will inevitably require motivation and encouragement, backed up by repeated explanation and justification, in order to ensure that they operate the craft at the levels required for a viable demonstration.

This again would seem to indicate a need for resident field staff to act as motivators, particularly in view of the lack of any strong institutions or organized groups to exert pressure on individual operators to sustain their fishing effort during demonstrations.

The third factor is that of maintenance and share management. The current level of fishing technology used by the majority of traditional fisherfolk in Nias requires little in the way of maintenance. The shore management required here for typical fishing operations is also of a limited variety. For the conduct of traditional fishing operations, the only consumable inputs requiring routine replacement are fishing lines and hooks, bait and food for the crew for longer fishing trips.

As a result, the type of routine, preventive maintenance necessary to sustain intensive operations of a motorized craft are unfamiliar to fisherfolk. For them to learn and appreciate the need for these new work patterns would require repeated training and monitoring. This would also indicate the need for field staff to be located at village level in order to support such activities.

4.7.3 FACILITATING ACCESS

In the event of successful demonstration of the feasibility of new outrigger canoes on the island, the fisherfolk's ability to gain access to such technology will remain an important problem. Levels of savings and generation of surplus income which could be reinvested in an improved technology are very low and cannot be expected, in the short term, to cover the costs of motorized fishing craft.

Findings of the appraisal also indicate the singular lack of an active credit network in Nias, whether formal or informal. Some form of credit input would be required if the intended target group of small-scale, traditional fisherfolk on Nias are to benefit from the introduction of the new outrigger canoes.

Given the lack of credit institutions at village level, the creation of some kind of village-level mechanism to administer and distribute credit under the auspices of the project may be necessary. The setting up of village revolving funds for the purpose is one alternative. The training and preparation of fisherfolk to run such funds themselves will, however, require considerable training input. Suitable trainers would have to be trained as none are currently available in Nias.

The importance of addressing this problem at the earliest stage of any continuing programme for demonstration of the new craft cannot be overemphasized as the level of awareness concerning the use of credit is exceptionally low in Nias. The preparation in each target village of such village-based credit mechanisms at an early stage of demonstrations, would also enhance the participants' understanding of basic management and would improve their ability to manage the more intensive fishing operations required.

4.7.4 POST-HARVEST HANDLING

In many parts of Nias, post-harvest problems constitute a potentially major constraint to the success of future demonstrations of improved outrigger canoes.

In the southern and western parts of the island, the problems faced by fisherfolk in disposing of their catches might affect their motivation to increase fish production through the use of motorized

canoes. When restricted local markets are already subject to periodic gluts of fish and unstable prices, significantly increased catches from motorized craft might well depress prices further. Consequently, real benefits from the new outrigger canoes will be enjoyed by fisherfolk only if suitable marketing arrangements are made to absorb the higher volume of fish generated.

Fisherfolk in these areas themselves suggest the setting up of special organizations along cooperative lines to handle the marketing of catches. There is, however, no indication that the existence of such organizations by itself would have any real impact on the problem. For marketing cooperatives to have any impact, certain basic facilities, such as better communications, ice supply and consequent access to wider markets, would have to be available. Once such facilities are available, private traders will almost certainly extend the fish marketing network without any need for special organizations or structures. This appears to have already taken place in the area around Gunung Sitoli, where both small entrepreneurs and fisherfolk have been able to benefit from better communications with the mainland and between villages and the supply of ice from one privately owned factory in the area.

The problem for future demonstrations, however, is the lack of a sufficiently active marketing network extending to those parts of southern and western Nias where more extensive demonstrations should probably be carried out. Private buyers are unlikely to start up operations there until they can be assured of adequate fish supply. Fisherfolk may not be interested in increasing their catches until they are assured of a buyer. In this situation, active efforts will be required to attract a buyer during the early stages of further demonstrations and, perhaps, some support should be provided in matters such as ice supply and storage. The project should be prepared for a situation at the start of the trials when fisherfolk using the new canoes will be catching more fish than they can sell and a suitable buyer has not yet been attracted. Some mechanism would have to be identified to prevent such a situation having a negative effect on the fish prices for other fisherfolk in the area.

The improvement of communications and access in the southern part of the island can be regarded as a long-term process which will eventually open up better markets for small-scale fisherfolk. In the short term, marketing can be improved only if means for preserving fish can be made available. Better preservation of fish could be effected either through processing or the use of ice.

The possibilities for expanded processing of fish through drying and salting need further investigation. There is reported to be an unsatisfied local demand for dried fish which is now met by imports from the Sumatera mainland. More detailed information regarding demand, pricing and customer preferences on Nias would be required in order to assess the feasibility of fish drying as a solution to current post-harvest problems. During further demonstrations of craft, the effect of fish drying – and the consequent reduction in value – on the economic feasibility of the craft would also have to be assessed.

Only in one village, Lagundhi, is any significant mention made of processing as an option for fisherfolk; there it is one of the priority issues brought up by the fisherfolk. Improvement of processing, if commercially viable, would certainly be the simplest technical solution to their marketing problems.

The capacity to carry ice is an important feature of the new outrigger canoes being demonstrated on the island. It has apparently, contributed considerably to the commercial success of the craft's operations up to date. But ice is now commercially available only in the Gunung Sitoli area. Its production here is probably made viable by the domestic demand for ice around Gunung Sitoli and the use of ice for exporting fish from Nias to Sibolga. This demand will probably increase with the commencement of the new ferry service from the island. It is noteworthy that none of the craft based in Nias carry ice for their operations.

Conditions which seem to have led to the viability of ice production in Gunung Sitoli do not yet exist in the southern and western parts of the island. Fresh fish is not exported from Teluk Dalam to the mainland and domestic demand is apparently satisfied by home freezers. One local businessman had attempted in the past to set up a storage for ice brought from the mainland, but it did not prove viable. In the short term, this situation is unlikely to change and, for the purposes of the canoe demonstrations alternative arrangements should be explored.

One possible option would be for the project, or a private individual with project support, to take up the transport of ice and collection and transport of fish directly between the villages and Sibolga. Some of the large fishing companies operating out of Sibolga might be interested in this option, as they already have craft fishing in the Nias area. The volume of fish generated, and, therefore,

the number of craft involved, would have to be sufficiently large to justify such operations. Alternatively, fish could be sold directly to ice-carrying fishing craft from the mainland, although the prices obtained would probably be low. Such direct export of catches would also avoid a negative effect on the local market for other fisherfolk.

To summarize, it is clear that the situation on the southern and western coasts of Nias is very different from that in the Gunung Sitoli area. While there is no reason to think that the technical viability of improved outrigger canoes would be affected by moving to these new areas, the marketing problems there might affect the economic feasibility of the craft. The impact of these problems needs to be carefully assessed before undertaking any extensive introduction of craft in Teluk Dalam or Sirombu subdistricts.

4.7.5 FISHERIES MANAGEMENT

The remote location of Nias island does not protect its small-scale fisherfolk from extensive interaction with larger-scale fisheries based elsewhere. Also, because of its remote location and the extensive sea area surrounding the island, effective enforcement of fisheries regulations is extremely difficult.

However, considering the concern expressed by fisherfolk over interaction with outside fishing craft, some effort should be made to assess the extent of the problem. The fisheries which are reported as interacting with the current operations of the traditional fisherfolk are predominantly medium-scale purse-seining, trolling and trawling and small-scale longlining and handlining.

The following are pre-requisites for planning the scale of any future introduction of new motorized outrigger canoes

- a more detailed picture of the fishing grounds being exploited by different categories of fishing craft from outside Nias;
- an assessment of the impact of these fisheries on local resources in general and the catches of small-scale fisherfolk in particular;
- an assessment of the potential increase or decrease of interactions with Nias fisherfolk in the event of introduction of motorized canoes; and,
- identification of resources and fishing grounds not currently exploited by outside fishing operations and which could be utilized by local fisherfolk using motorized craft.

APPENDICES

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Appendix I

SOCIO-ECONOMIC DATA

LOCATION	Nias Island is situated in the Indian Ocean, west of Sumatera		
	Latitude	:	0°32 - 1° 32 N
	Longitude	:	97° 03 - 97° 57E
SIZE	Land area		4800 km^2 ± 5%
	Coastline		400km ± 5%
	Continental shelf		5000 km^2 ± 5%
POPULATION	Total		527,756
	Density		98 per km^2
	Annual growth rate		2.95%
	Birth rate		2.40%
	Mortality rate		0.89%
	Life expectancy (1986 census)		
	Male		58 years
	Female		60 years
EDUCATION	*Literacy rate for population 10 years and above*		
	Total	:	90.02%
	Male	:	94.28%
	Female	:	85.76%
	No of Govt.schools	:	696
	No of pupils (1986 census)	:	91,388
HEALTH	Populaticgi/hospital 139 bed		
	Population/physician 18		
NUTRITION	Per capital calorie 98% intake of requirement		
	Per capital protein 51 gm/day intake		

EMPLOYMENT

Category	*Labour (numbers)*	*(% of force)*
Agriculture	234155	*95.56*
Fisheries	8146	3.32
Service		–
Manufacturing	1564	0.63
Construction	709	0.28
Others	457	0.21
Total	245031	100.00

Rate of unemployment year 1986 : 4.07%

TRADE (1986)

Item	*Exports Value (Rp. million)*	
Rubber	474.600	32.4
Coconut (copra oil)	225.378	15.4
Others (clove, coffee oil for cosmetics, fruit, marine products, etc.)	763.732	52.2
Total	1463.710	100.0

Item	*Imports Value (Rp. million)*	
Food	2302.434	25.71
Investment goods	3283.484	36.88
Intermediate goods	16.513	0.17
Textiles	15.180	0.16
Others*	3316.945	37.08
Total	8934.556	100.00

* Including marine products and dried fish valued at Rp 4l.126m

TRADE BALANCE

	Rp million
Imports	8,934.556
Exports	1,463.710
Balance	– 7,470.846

Appendix II

COMMON MARINE SPECIES

Scientific Name	*Family Name*	*English Name*
LARGE PELAGICS		
Scomberornorus spp	Scombridae	Spanish mackerel (two or more species)
Sphyraena spp	Sphyraenidae	Barracuda (more than one species)
Cornberoides spp	Carangidae	Queenfish (two or more species)
Coryphaena spp	Coryphaenidae	Dolphinfish (two species)
Auxis thazard	Scombridae	Frigate tuna
Auxis rochei	"	Bullet tuna
Euthynnus affinis		Kawakawa
Katsuwonus pelanis		Skipjack
Thunnus albacares		Yellowfin
Istriphorus platypterus	Istiophoridae	Sailfish
Makaira spp	"	Marlin
Xiphius gladius	Xiphidae	Swordfish
Sphyrna spp	Sphyrnidae	Hammerhead
Alopias spp	Alopidae	Thresher shark
Carcharhinus spp	Carcharinidae	Requiem shark
Prionace glauca	"	Blue Shark
DEMERSALS		
Lutjanus spp	Lutianidae	Snapper
Lethrinus spp	Lethrinidae	Emperor bream
Epinephalus spp	Serranidae	Grouper
Pomadasys spp	Pomadasidae	Grunt
Otolithes spp	Sciaenidae	Croaker/Jewfish
Myliobatus spp	Myliobatidae	Skate
Centrophorus granulasus	Squalidae	Gulper shark
Polynemus spp	Polynemidae	Threadfin/Indjan salmon
SMALL PELAGICS		
Rastrelliger Kanagurta	Scombridae	Indian mackerel
Sardinella spp	Clupeidae	Sardine
Stolephorus spp	Engraulidae	Anchovy
Trichiurus spp	Trichiuridae	Ribbonfish (two or more species)
Cypselurus spp *Exocoetus spp*	Exocoetidae	Flying Fish (more than two species)
SHELLFISH		
Penaeus spp *Matapenaeusspp*	Penaeidae	Penaeid shrimp (more than eight species)
Acetes spp	Sergestidae	Prawn (Non-penaeid shrimp – two or more species)
Palinurus spp	Palinuridae	Spiny lobster
Scylla spp	Portunidae	Green mudcrab Brown mudcrab
Octopus spp	Cephalopoda	Octopus (more than five species)
Sepia spp		Cuttlefish (more than five species)
Loligo spp		Squid (more than five species)

Appendix III

FEATURES OF THE SOCIO-ECONOMIC APPRAISAL

1. *METHODOLOGY AND DESIGN*

The methodology and design of the appraisal were determined by the following

MANPOWER	The personnel available in Nias with the skills required for implementing such a survey were very limited and the training of staff would have entailed considerable time and expense. In the event, the subproject was fortunate in being able to employ as an Appraisal Coordinator a local teachers' training college graduate with experience in village-level development work who required little training and was able to assist in the preparation of an appropriate appraisal format. The availability of only one person to implement the appraisal in the field, however, inevitably influenced the design of the activity.
ACCESSIBILITY	Transport to and communications with many coastal areas of Nias were extremely difficult and time-consuming due to the poor conditions of the roads. Several areas were accessible only from the District Town by sea. These factors also influenced the extent of the appraisal's coverage.
LACK OF SECONDARY DATA	Basic data concerning many coastal communities, including village population, economic activities and institutions were not easily available. Statistical information formulated by the local government was available only up to subdistrict level. At village level, such data, which is normally held by the village authorities, were not always readily accessible.

These factors meant that precedence was given to evolving an appropriate appraisal design which had to be practical and could be implemented fairly rapidly by one fuiltime worker. In addition, a format which would permit quick processing of the information collected was also a priority.

Taking these factors into account, a simple format was prepared comprising

- a series of matrices wherein fisherfolk were requested to directly fill the relevant data;
- a short questionnaire on specific topics and sections where fisherfolk were asked to express their own needs, problems and aspirations under a series of topic headings; and
- a village data sheet to be filled in by village leaders giving general information about the village, its people and their problems as seen by local leaders.

The methodology envisaged for implementing the appraisal in each of the selected villages was as follows

- The Appraisal Coordinator would make contact with local village officials and formal and informal leaders to introduce himself, as well as clarify the purpose of his visit. The opportunity would be taken to obtain general information about the community and the leaders' views of the conditions in the village. The village head, or his staff, would be asked to fill in a form giving some of the basic data on the village.
- Assisted by the village head, the Appraisal Coordinator would then circulate in the village, contacting villagers with a view to getting groups of fisherfolk and others together to explain the purpose of his visit, distribute the questionnaire forms and explain how they could be completed. Wherever possible, the Appraisal Coordinator would attempt to enlist help from more educated and/or interested individuals to assist in the distribution of the forms.

- Arrangements would be made for the groups to gather again over the following two or three days so that people could talk about their responses, discuss any problems or important issues and return the forms to the Appraisal Coordinator.
- The Appraisal Coordinator would attempt to meet several such groups in each village, aiming at distributing 15-20 formats per village. Fisherfolk would be the principal target group, but representatives of other occupation groups would be covered as far as possible.
- The distribution, completion and collection of formats would be supplemented by informal discussions with individuals and groups in the community during the three or four days that the Coordinator spent in each village. These discussions and any other findings and observations would be noted by the Coordinator and incorporated in brief village profiles prepared by him for the preliminary report on the appraisal.

2. *SELECTION OF TARGET VILLAGES*

A total coverage of fisherfolk communities along the entire coast of Nias would have required several months of fieldwork due to the problems in communications and access. A sample of fisherfolk communities had, therefore, to be selected, which would represent the principal types of fishing areas on the coast of the island and the main fisheries of the small-scale fisherfolk.

The selection of target villages for the appraisal was undertaken through consultation among local officials of the District Fisheries Service and the District Planning Board, BOBP staff and the Appraisal Coordinator. The experience of local fisheries officers and a description of the fisheries of the island, previously prepared by BOBP, provided a basis for selecting the target villages.

In some areas, where it proved difficult to make a selection from among a group of apparently similar villages, the final selection was left to the District Fisheries Service and the Appraisal Coordinator.

The Appraisal Coordinator was accompanied to the target area by a District Fisheries Service official at the commencement of the appraisal in order to facilitate contacts with local officials and to clarify the purpose of the appraisal. This provided an opportunity for the list of target villages to be finalized based on district observations in the field.

The target villages selected were distributed among seven of the ten coastal subdistricts of Nias island. The final list of target villages, by subdistrict, is as follows

Subdistrict	*Total number of fisherfolk households*	*Number of selected villages*
Tuhemberua	479	Ladara, Botolakha
Gunung Sitoli	478	Afia, Sisarahili Gomo
Gido	145	Fowa
Idano Gawo	155	Bozihona
Teluk Dalam	358	Hilinamoniha, Teluk Dalam Pasar, Lagundhi
Lolowau	126	Hilinamazihona
Sirombu	275	Sirombu

The three coastal subdistricts in which no villages were selected for the appraisal were Alasa, Lahewa and Lahusa. Of these, Alasa subdistrict, situated on the northwest coast, is of very limited importance to fisheries, as there are only two fishing communities, with about 45 resident fisherfolk households. Lahesa subdistrict on the southeast coast is more important, but being difficult of access, it was impractical to include its fishing communities in the appraisal. A more serious omission was a sample of fisherfolk communities from Lahewa

subdistrict, which constitutes one of the most important fishing centres on the island, having approximately 452 fulltime and part-time fisherfolk households. The decision to exclude this area was, again, primarily due to difficulty of access, since Lahewa is accessible from Gunung Sitoli only by boat and the trip is time-consuming. In view of the number of small-scale fisherfolk in this subdistrict, the lack of data on fisherfolk communities therein has to be recognized as an important gap in the general picture of Nias coastal communities obtained by the appraisal.

The breakdown of households eventually interviewed in each village is as follows

Subdistrict Target	*Villages*	*Households interviewed*		*Total*
		Fisherfolk	*Others*	
Tuhemberua	Ladara	8	8	16
	Botolakha	7	14	21
Gunung Sitoli	Afia	16	1	17
	Sisarahili Gomo	12	0	12
Gido	Fowa	18	2	20
Idano Gawo	Bozihona	8	1	9
Teluk Dalam	Hilinamoniha	21	0	21
	Teluk Dalam Pasar	17	0	17
	Lagundhi	18	0	18
	Hilinamazihona			
Lolowau		(only part-time fisherfolk – no households)		
Sirombu	Sirombu	19	0	19
TOTAL	11	144	26	170

As may be seen from these figures, the appraisal ended up with a more significant concentration on fisherfolk households than had been originally envisaged. In the households listed above, those who owned fishing craft and/or gear, or were involved in fisheries operations, have been categorized as fisherfolk. Many of them, however, own land, and their earnings from agriculture or other occupations may constitute a significant proportion of income.

3. *IMPLEMENTATION*

The appraisal was implemented in two phases during the period mid-October 1989 to end January 1990.

During the first phase, a format was developed through consultations among BOBP staff, the Appraisal Coordinator and the District Fisheries Service. This format was pre-tested on a limited scale in Botolakha, in Tuhemberua subdistrict, and in Afia, Gunung Sitoli subdistrict. After some adjustments to the format, these two communities and Ladara in TUhemberua subdistrict were appraised more completely. Prior to this implementation of the appraisal in the field, District Fisheries Service staff supported the Appraisal Coordinator in contacting local officials at subdistrict and village levels in order to ensure their cooperation. The results of this first phase of the appraisal were reviewed and reported on in mid-November 1989.

Based on the experience of the first phase, the second phase was planned in a further eight villages. Modifications were made to the appraisal design, and the work in the field was carried out between early December 1989 and mid-January 1990. As in the first phase, District Fisheries Service officials accompanied the Appraisal Coordinator during the initial contacts with local officials in the target areas and assisted him in the final selection of target villages in Teluk Dalam subdistrict.

In six villages, *i.e.* all three villages in Teluk Dalam subdistrict, Afia in Gunung Sitoli, Botolakha in Tuhemberua, and Hilinamazihono in Lolowau, attempts to obtain basic village statistics, which are normally kept up-to-date by village authorities, were unsuccessful, as such information did not appear to be available. Limitations on the time available for the appraisal made it impracticable for these data to be collected during the appraisal itself.

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Homes and boat 'shelters' in the villages surveyed are seen in these two pictures.

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Appendix IV

VILLAGE ASSESSMENTS

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VILLAGE Ladara

SUBDISTRICT : Tuhemberua

NUMBER OF HOUSEHOLDS INTERVIEWED : 16

LOCATION

32 km north of Gunung Sitoli on the northeast coast of Nias by the main coastal road. Approximately 5 km southeast of the subdistrict headquarters. Good access by 4-wheeled vehicles.

DESCRIPTION

Population	**119**
Households	19
Fisherfolk households	**:9**
Village area	lOha
Land ownership	Most households own small-holdings.
Main crops	Coconut, cloves, rubber, cocoa, rice.
Economic Activities	Fishing, agriculture, small shops, coffee stalls, food manufacture, cycle repairs, manufacture of *nipa* thatch.
Distribution	Most fisherfolk households have supplementary sources of income. One fisherfolk household with markedly greater assets — two houses, rice, coconut and clove cultivation, small shop, 10 m fishing craft.

INSTITUTIONS : **LMD, LKMD, PKK** and fishermen extension group all in place but inactive.

FISHERIES

Craft	All owner-operated *3.5-5* m dugout outrigger canoes. Most fisherfolk families own craft. One plank-built 10 m motorized craft. Two outboard engines owned in the village.
Gear	Predominantly handlines with a few small-mesh gilinets. Two beach seines.
Species	Small pelagics (sardine, anchovy, small tuna, mackerel, half-beak, flyingfish).
Fishing area	Inshore waters close to the village.
Fishing time	20-25 fishing days/month. Morning and/or evening. Little seasonal variation. (Fishermen involved in fish marketing spend less time at sea).
Marketing	Three fisherfolk transport own catch as well as others' by cycle or motorcycle to Gunung Sitoli or nearby markets.

EARNINGS

Fishing : **c.** 2,700 **Rp/day** (c.650,000 Rp/year)

Fish sale : **c. 400,000 Rp/year (additional** income for three fisherfolk families)

Almost all fisherfolk with some additional source of income

Agriculture : cash-crop small-holding : c. 100,000 Rp/year.
rice land small-holding : c. 500,000 Rp/year.

PROBLEMS

General

Low earnings, disease (malaria, fevers, respiratory infections), inactive village institutions,

Fisheries

'Traditional' fishing methods.

POTENTIAL

General

Good communications with district capital.

Fisheries

Rich fishing grounds near village.

SOLUTIONS

Fisheries

'Modern' fishing methods.

<<

VILLAGE		Botolakha
SUBDISTRICT	:	Tuhemberua
NUMBER OF HOUSEHOLDS INTERVIEWED	:	21

LOCATION

Botolakha village is a large village situated approximately 25 km north of Gunung Sitoli on the northeast coast of Nias on the main coastal road. Good access by 4-wheeled vehicles.

DESCRIPTION

Population	Not available
Fisherfolk households	c.40 (small minority of total village population).
Land ownership	Most families, including fisherfolk, own small-holdings of 0.25-3.00 ha.
Main crops	Dryland rice, coconut, rubber, cloves, cocoa, sweet oranges.
Economic activities	Subsistence agriculture, cash cropping, a few small traders and shops, fishing (mainly part-time), government employment.
INSTITUTIONS	LKMD, LMD and PKK apparently active. Farmers' and fishermen's groups 'functioning'; but activities unclear

FISHERIES

Craft	Fisher.folk households mostly own 3-5 m dugout outrigger canoes One 7 m dugout canoe with inboard diesel engine 2 Suzuki 5 h.p. OBMs owned
Gear	Predominantly handlines, a few small mesh gillnets.
Species	Small tuna, mackerel, some demersal.
Fishing area	Inshore waters near village
Fishing time	Reported 10-20 days/month. Morning and/or evening. (data from detailed monitoring of fishing operations in village indicate lower sea time for some fisherfolk : 5-10 days/month).
Marketing	Mostly by fish dealers from Gunung Sitoli using motorcycles. One non-fishing household from village also markets fish.

EARNINGS

Fishing	c. 2.500 Rp/day (c. 400,000 Rp/year)
(motorized craft)	c. 5,000 Rp/day
Agriculture	c. 200,000 Rp/year (cash earnings; does not include food for consumption).

PROBLEMS

General

Agricultural pests and diseases, lack of agricultural implements, lack of irrigation, shortage of labour.

Fisheries

Lack of 'modern' gear, 'traditional' methods, diminishing catches, interaction with outside craft.

POTENTIAL

General

Unutilized land for agricultural development.

SOLUTIONS

General

Provision of pesticides, fertilizers, irrigation and equipment for agriculture; training and agricultural extension; credit.

Fisheries

New gear.

VILLAGE	:	Afia
SUBDISTRICT	:	Gunung Sitoli
NUMBER OF HOUSEHOLDS INTERVIEWED	:	17

LOCATION

About 17 km north of Gunung Sitoli on the northeast coast of Nias by the main coastal road. Good access by 4-wheeled vehicles.

DESCRIPTION

Population	(Not available)
Fisherfolk households	Minority of total village population
Land ownership	Half (9) the fisherfolk households interviewed (17) own small-holdings of coconut.
Main crops	Coconut
Economic activities	Cash cropping, fishing, small shops.

INSTITUTIONS

LKMD and PKK functioning. Fishermen's group inactive. Active cultural group exists in the community, organizing the performance of traditional dancing and music.

FISHERIES

Craft	Most fisherfolk households own *3.5-5* m dugout outrigger canoes. No OBMs.
Gear	Predominantly handlines, with some small-mesh gillnets. One trammelnet owned, which apparently gives significantly better earnings.
Species	Small tuna, small pelagics (sardinella, anchovy), carangids, sea bream.
Time	20-25 days/month, subject to weather.
Marketing	Most catches sold to dealers from Gunung Sitoli who use bicycle or motorcycle for fish transport. One active fisherman involved in fish sale.

EARNINGS

Fishing	c. 2,600 Rp/day (c. 780,000 Rp/year) Trammelnet operator 5,000 Rp/day
Agriculture	c. 150,000 Rp/year (small-holdings) c. 50,000 Rp/month (seasonal agricultural labour)
Others	Three owners of food stalls/coffee shops reported earnings of 70,000 Rp/month

PROBLEMS

General

Low earnings, lack of capital for investment in enterprises, lack of clean drinking water, agricultural pests and diseases.

Fisheries

Lack of gear, 'traditional' methods, restricted fishing range, lack of engines, lack of functioning fisherfolk organization (particularly for marketing).

POTENTIAL

General

Good communications with district capital; agricultural development.

Fisheries

Underexploited fisheries resources (flying-fish, anchovy, squid).

SOLUTIONS

General

Alternative employment opportunities, 'financial assistance', 'training'.

Fisheries

Motorization, larger craft, new gear, training in 'modern' methods, fish marketing cooperative.

VILLAGE		Sisarahili Gomo
SUBDISTRICT	:	Gunung Sitoli
NUMBER OF HOUSEHOLDS INTERVIEWED	:	12

LOCATION

7 km north of Gunung Sitoli on the northeast coast of Nias. Connected by the main coastal road to Gunung Sitoli.

DESCRIPTION

Population		947
Households		182
Fisherfolk households		45
Village area	:	600 ha (200 under cultivation).
Land ownership	:	160 households own land.
Main crops	:	Coconut, cloves, rubber, rice.
Economic activities	:	Cash cropping, fishing, government employment, small trading, carpentry.
INSTITUTIONS		LKMD, LMD and PKK all active. Fishermen's group inactive. Active religious and sports organization, Karang Taruna.

FISHERIES

Craft	:	30 fisherfolk households (out of *45)* own *4-5* m dugout outrigger canoes. 2 Suzuki 2 h.p. OBMs owned.
Gear	:	Predominantly handlines, some smallmesh gillnet.
Species	:	Small tuna, frigate mackerel, trevally, dolphinfish, some snapper, grouper, shark and threadfin.
Fishing area	:	Inshore waters near the village.
Time	:	20 days/month. No seasonal variation.
Marketing	:	Catches transported to market in Gunung Sitoli and sold there by fisherfolk or sold to buyers using motorcycles.

EARNINGS

Fishing	:	c. 3,500 Rp/day (c. 840,000 Rp/per year)
Agriculture	:	c. 200,000 Rp/year

PROBLEMS

General

Low earnings, lack of assets for investment in new activities.

Fisheries

Lack of gear, lack of motorization, declining catches in inshore waters, interaction with 'outside' craft, instability of fish prices.

POTENTIAL

Fisheries

Flying-fish, snapper, 'rock' fish, shark.

SOLUTIONS

Fisheries

New gear, more gear.

Motorization

Preference for inboard diesel (Yanmar). Reasons: long-lasting, fuel economy.

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VILLAGE		Fowa
SUBDISTRICT	:	Gido
NUMBER OF HOUSEHOLDS INTERVIEWED	:	20

LOCATION

17 km southeast of Gunung Sitoli on the east coast of Nias. Well connected to the town by road. Situated 8 km from the subdistrict town.

DESCRIPTION

Population	:	*556*
Households	:	60
Fisherfolk households	:	40 (declining)
Village area	:	268 ha.
Land ownership	:	Most households own 0,25-1 .00 ha of land.
Main crops	:	Coconut, clove, cocoa.
Economic activities	:	Cash cropping, fishing.

The housing in the village is predominantly of wood and bamboo. All the fisherfolk households interviewed had *nipa* leaf roofing on their houses. Facilities in the village include a market, which is, however, controlled by outsiders rather than local villagers. There is also a Puskesmas, or rural health centre, in the village.

INSTITUTIONS

In contrast to many other coastal villages, the village institutions in Fowa appear to be quite active. Most respondents mention regular activities of the LMD, LKMD and PKK. Fishermen's and farmers' groups are also active in the village, although their coverage is apparently limited.

The village leadership complained of lack of cooperation and awareness among 'certain sections of the community', this apparently being a source of some tension. There are also apparently some problems in the village regarding 'immigrants' from other villages who are not yet legally resident in Fowa.

FISHERIES

Craft	:	Most fisherfolk households own dugout outrigger canoes.
Gear	:	Predominantly handlines, some small mesh gillnets, one trammelnet.

The craft used in Fowa are all small canoes of the 3-5 m range. No craft are reported as being motorized, although Fisheries Service records for 1986 do mention a small number of OBMs in use in Gido subdistrict. While handlining constitutes the dominant fishery, small mesh gillnets are also widely used. At least one trammelnet is also in use in the village.

The main species caught are small tuna, mackerel and other small pelagic species along with some threadfin bream.

Fishermen claim to fish between 15-25 days/month, but a few appear to be only seasonally involved in fisheries. Information obtained regarding marketing is limited, though the presence of a market in the village may indicate that many fishermen directly sell their catches to consumers. One respondent mentioned sales of fish, apparently locally, as an additional source of income.

EARNINGS

Average earnings from fishing are around 2,200 Rp/trip, though the range of reported earnings varies from Rp. *1,500* - 3,000. Following the pattern of other villages where earnings are apparently underestimated and fishing days overestimated, an earning of 2,500 Rp/trip/person for 17 fishing days/month would give an income of 510,000 Rp/year. This lower earning compared to villages further north might explain the reported decrease in the numbers of local fishermen.

Earnings from fisherfolk's land holdings are generally reported as being quite sizeable, the average being 200,000 Rp/year. Agricultural earnings supplement most fisherfolk's incomes. Opportunities for further income from agricultural labour also appear to exist.

Expenditure is largely devoted to daily needs and seems to be in the region of 1,200,000-1,250,000 Rp/year/household. Schooling also absorbs a relatively high proportion of expenditure, averaging almost 8 per cent. This is apparently reflected in the large numbers enrolled in secondary schools.

PROBLEMS

General

The predominant problem, as in many other communities, is lack of assets which can be used to expand enterprises or take up new activities. Almost half the respondents list this as a major concern. In addition, five households interviewed feel that there are few alternative employment opportunities in the village.

Fisheries

By far the most commonly noted problem in fisheries is a steady decrease in catches. Reasons for this decrease are not clear. Three out of twelve respondents who mention this problem identify interaction with gillnetters from 'outside', particularly Gunung Sitoli, as being responsible. One respondent says that there are simply too many fishing craft including local boats operating in the area.

Almost as important is a lack of appropriate fishing gear, which ten respondents identified as a problem. This is often linked to the use of 'traditional' methods. The contradictions between increasing fishing effort when catches are already declining is not apparently realized.

Only five respondents link the poor catches with limitations in range and lack of motorization.

Comparatively many respondents identify problems in the post-harvest sector. Six households complain of unstable prices. This appears to be mainly in the form of periodic gluts of fish, leading to low prices. Several of the same respondents see the lack of a marketing cooperative as part of the same problem.

POTENTIAL

General

The principal opportunities available to Fowa fisherfolk seem to be the potential for developing trading enterprises, mentioned by seven respondents, and the exploitation of unused land, which six people identify as a resource. The village leadership feels that the area holds tourist potential. Relatively easy access to Gunung Sitoli is also advantageous.

Fisheries

Several fisheries resources are identified as having potential, the most important being tuna species and snapper. Shark, ray and billfish are also mentioned, as well as sea turtle and dugong which are apparently encountered quite frequently in the area.

SOLUTIONS

General

Altogether, seven respondents feel that the best opportunities for development lie outside capture fisheries, either in small trading activities, including fish dealing, or in agricultural activities. With one exception, these respondents are fairly consistent in seeing limited scope for development in fisheries.

Fisheries

In fisheries, the introduction of new fishing gear together with motorization are seen as the principal avenues for development. No respondents specify the type of gear that might be introduced. Regarding motorization, there seems to be a slight preference for inboard diesel engines and respondents generally seem to be familiar with Yanmar engines. However, several also mention Suzuki OBMs of 2-5 h.p. as suitable propulsion units. While a few fishermen seem to value fuel economy in diesel engines, the most important criteria for choice of engines appear to be durability, local availability and power, in that order. Few respondents appear to link the use of new engines with the introduction of new craft.

Five respondents also felt that the setting up of a marketing cooperative would improve the conditions of fisherfolk.

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VILLAGE		Bozihona
SUBDISTRICT	:	Idano Gawo
NUMBER OF HOUSEHOLDS INTERVIEWED	:	8

LOCATION

47 km to the southeast of Gunung Sitoli on the eastcoast of Nias. 10 km northeast of the subdistrict town, Telehosi. Access by land is only by two-wheeled vehicle and is often difficult during wet weather.

DESCRIPTION

Bozihona is a predominantly fishing community of 171 households in a very isolated location. Access is effectively only by sea and there are regular boat connections to Gido. The total population of the village is reported to be 950 individuals.

The village covers a large area of 1500 ha, of which 1090 ha are under cultivation. Five of the eight fisherfolk households interviewed appear to own land and the area available for development is considerable. The interest of fisherfolk in agricultural activities is reported to be increasing. The exact pattern of land ownership for the agricultural area of the village is not clear. Given the relatively sparse population found on the coast of this area of Nias, some land holdings may be larger than the norm.

Housing in the village is predominantly of wood with *nipa* roofing. There appears to be little variation in living conditions among the inhabitants of the village.

While fishing appears to constitute the major source of income for most of the fisherfolk households interviewed, it seems that many fisherfolk in Bozihona are increasingly involved in agriculture. Of the land-owning fisherfolk interviewed, not all appear to be utilizing the land at their disposal.

Another feature of the village is that the number of fisherfolk is said to be decreasing, as is the population of the village as a whole, due to outflow to the town. A *Puskesmas* functions in the village, although many villagers are reported to use a traditional healer, particularly during childbirth.

INSTITUTIONS

The LMD, LKMD and PKK organizations are all in place in the village and apparently active. **The LMD** is involved in the construction of a school and in improving road conditions. PKK activities do not seem oriented towards improvement of earnings. A fishermen's group exists in the village, but is not active and has received little or no extension support from local extension staff.

FISHERIES

Fisheries in the village are limited to very small-scale operations using 4 m dugout canoes powered by sail. All fisherfolk appear to own craft and gear. Some households seem to own several craft and ownership of small mesh gillnets as well as handlines is quite common. Fishing methods are limited to handlining and small mesh gillnetting. One beach seine is reported to be operating in the village. No motors are in use, although some fishermen have had past experience of motorization through the Kepres 39 credit scheme during the early 1980s.

Fishing activity is limited to the immediate vicinity of the village. Most fishermen seldom venture more than 5 km from Bozihona to fish. The target species of local fishermen are sardine, flying-fish, small tuna and mackerel, as well as a variety of rockfish, such as grouper and snapper.

Most fishermen claim to spend approximately 20-25 days per month fishing. Marketing of fish is apparently to local dealers who transport it inland and sell it locally, although these arrangements are generally perceived by fisherfolk as being unsatisfactory. No fisherman who was interviewed reported any involvement in fish marketing.

EARNINGS

Fisherfolk report earnings lower than average from fishing in Bozihona. The isolation of the community and distance from the major consumer markets on the island may well affect the prices obtained for fish. Average earnings/fishing day are reported as in the region of Rp. 2,000. At 20 days fishing/ month this would yield an income of approximately 500,000 Rp/year.

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Those fisherfolk owning land and utilizing it appear to obtain reasonable additional income as well as food for home consumption, as land holdings are extensively devoted to food crops as well as cash crops. Reported income from agriculture for the three households interviewed who own land is about 250,000-300,000 Rp/year. Land holdings seem to average 1-2 ha.

Reported average expenditure is also appreciably lower than in many other villages and reasonably consistent with the reported earnings. The average figure seems to be between Rp.900,000-l,000,000. Proportionally less expenditure seems to go on basic daily needs such as food. This perhaps indicates more of a subsistence orientation towards both fishing and local agricultural activities and a more limited circulation of cash in the village economy. Expenditure on schooling is also very limited.

PROBLEMS

General

Apart from the low earnings and lack of productive assets mentioned by most respondents, the isolation of Bozihona is perceived by many villagers as a major constraint on its development. The village leadership identifies the increasing outflow of villagers towards the town as another problem. In addition, village unity and cooperation in addressing development problems is seen to be limited. Some skepticism among fisherfolk regarding the usefulness of community action is apparently due to negative past experience.

Fisheries

Problems perceived in fisheries by local fisherfolk fall essentially into two categories. First, in regard to technology, the lack of motorization is seen to limit the fishing range and access to certain resources. All eight respondents specify lack of engines as a priority problem. Limitations in the fishing gear currently used are also mentioned by some fisherfolk.

The second major problem area in Bozihona seems to be in marketing. There appears to be a real problem, with price fluctuations during seasonal gluts of fish. Even finding a buyer is referred to as being difficult at times. In this regard, some fishermen lament the lack of a fishermen's cooperative in the village.

POTENTIAL

General

Given the abundant underutilized land in the area, it is not surprising that agricultural development is seen by many respondents as having potential. In addition, certain individual skills, such as carpentry, are mentioned by certain respondents.

Fisheries

Reports that fish catches are actually increasing as fisherfolk move away or take up agriculture seem to indicate considerable fisheries potential in the area. Respondents were not, however, very forthcoming regarding species which could be further exploited. Resources of rockfish appear to be abundant though requiring motorization to enable their exploitation. Billfish, mackerel and small pelagic species are also mentioned.

SOLUTIONS

General

Beyond the opening up of agricultural land, the provision of more intensive extension support in agriculture is seen as necessary by several respondents. The improvement of communications with the village, through the completion of the road currently under construction from Bozihona to Tetehosi, is widely hoped for.

Fisheries

The most crucial input required in fisheries, according to almost all respondents is motorization of craft. Fisherfolk appear to appreciate the requirement for new craft to maximize the benefits of motorization. Preference regarding engine types appears to be divided between Yanmar diesel IBMs and Suzuki OBMs, although the assessment of the h.p. required is more realistic in Bozihona than in other villages such as Fowa. Various factors are regarded as important in engine choice, durability and easy maintenance being commonly regarded as important.

Two respondents also hope for the establishment of a more active fishermen's group. However, the exact role of such a group in assisting fisherfolk is not specified or clear.

VILLAGE		Hilinamoniha
SUBDISTRICT	:	Teluk Dalam
NUMBER OF HOUSEHOLDS INTERVIEWED	:	21

LOCATION

Approximately 15 km northeast of Teluk Dalam on the southeast coast of Nias. Accessible from Teluk Dalam by 2-wheeled vehicle along a very rough coastal road that is subject to sea erosion.

DESCRIPTION

A large Christian community, entirely devoted to fishing activities and with very limited land available for agricultural purposes, live here. The area around the village is made up of rocky calciferous uplands which descend directly to the seashore, leaving little land suitable for cultivation. The seashore is also heavily eroded and landing places for fishing craft are very limited.

A relatively large proportion of houses in the village are made of cement with zinc roofing, while others use combinations of wood, cement and *nipa* thatch.

A few fisherfolk own very small plots of land where they cultivate coconut and some cloves. Few other economic activities are reported in the village. A few wives of fishermen are involved in fish vending and several others in cultivating the family smallholdings, but most households appear to depend almost entirely on fishing for their livelihood.

The average family size is apparently somewhat above the norm in Hilinamoniha, being 6.5/household among the 21 interviewed.

INSTITUTIONS

While the standard village institutions, such as LKMD, LMD and PKK, are all in place in the village, their activities appear to be occasional and not oriented towards developmental ones. The LMD is described as inactive.

FISHERIES

Hilinamoniha fisherfolk generally own their craft, which are all dugout outrigger canoes. The usual size for canoes in this village seems to be marginally larger than in most other locations, the average canoe size being around 5 m. All canoes in the village are sail-powered and no engines are in use.

The only fishing gear used in the village appear to be handlines and harpoons. The latter are used for catching lobster and rockfish in reef areas along the shoreline.

Hilinamoniha is notable for the range of species mentioned by fisherfolk as frequently caught. Besides the small tuna, mackerel and flying-fish frequently targeted by small-scale fishermen almost everywhere on Nias, varieties caught include snapper, grouper, various carangids, scad, bilifish, shark and pornfret.

Most fishermen appear to fish in an area about 5-7 km from the village, described as 'three hours' sailing'. Some also practise harpoon fishing from the rocks lining the shore around the village.

Almost all fishermen reported their average monthly fishing days to be around twenty. No fishermen appeared to be involved in fish marketing, although other household members sometimes market catches from the village.

EARNINGS

Fisherfolk report fishing earnings of approximately 2,500 Rp/day. There seems to be a fairly consistent relationship between amount of gear (handlines) owned and reported earnings. Several fishermen who own ten handlines claim to average up to 5,000 Rp/day. Most fishermen apparently use about five handlines at any one time and report an average of Rp.2,500. This would yield an average income of approximately 600,000 Rp/year. Given the lack of agricultural land to support subsistence farming and the lack of any other income-generating opportunities , this figure seems rather low. Fisherfolk reported much higher than normal expenditure on repair and maintenance of fishing craft. This may reflect the difficult and rocky conditions encountered in the area for beaching craft.

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Those who earn some additional income from the land report maximum income of 120,000 Rp/year.

Reported expenditures is in the region of 1,100,000 Rp/ household/year and certainly exceeds reported incomes. Levels of schooling appear to be very low to judge from the expenditure allocated on education.

The discrepancies between expenditure and income noted in Hilinamoniha may be due to under reporting of other income-generating activities.

While Hilinamoniha itself has little land at its disposal, other villages further south have extensive cultivated areas and irrigated rice fields which may provide opportunities for employment to people from nearby villages, including Hilinamoniha. On the other hand, rather difficult access from the village to fish markets in nearby Teluk Dalam, although the distance is not far, may adversely effect the prices obtained for fish.

PROBLEMS

General

Three serious problems identified by respondents are: the lack of cultivable land around the village, the lack of alternative employment opportunities, and a lack of capital for investment in new activities.

It is also apparent that this village is extremely 'traditional' in the sense that old customs and beliefs seem to play a greater role in people's lives than in many other coastal villages. The extent to which this might affect people's receptiveness to new ideas is not clear.

Fisheries

No less than 76 per cent of the respondents state that their catches are diminishing. This seems to be attributed as much to overfishing by local fishermen as to activities of outside craft. Interaction with gillnetters certainly takes place, but presumably affects only certain fishing areas utilized by fishermen from Hilinamoniha. Several respondents state that fishing grounds near the village are being depleted, but other areas further off still have potential.

A lack of diversified fishing gear is also regarded by some as a limitation. However, the most important technical problem faced by fisherfolk is stated to be the short range of craft and lack of motorization. Marketing of fish does not seem to pose any great difficulties in the village.

POTENTIAL

General

Fisherfolk in Hilinarnoniha were unable to identify much in the way of unexploited physical resources outside fisheries. Few fisherfolk appear to possess skills, apart from fishing, which could be exploited.

Fisheries

Fishermen in the village seem to have a very clear image of themselves as 'professional' fishermen and this is reflected in the identification, by many of them, of their fishing skills as an important resource.

In terms of fish species seen as having potential, the most frequently identified ones are a variety of species of rockfish, particularly snapper.

SOLUTIONS

General

Given the limited land-based resources available to people in Hilinamoniha, it is not surprising that few solutions are envisaged through the development of activities outside fisheries. Some would like to see access to agricultural land opened up, but possibilities for this are very limited.

Fisheries

The most important single input in fisheries, overwhelmingly identified by 75 per cent of respondents, is motorization of craft. A need for new craft is mentioned by some fishermen, but increased mobility is generally seen as the key requirement for fisheries development in the area.

Most respondents identified Yanmar diesel inboard engines as the most appropriate propulsion unit. The qualities most valued were durability and power. The latter was reflected in the suggestions that suitable engines be in the range of 12 h.p.

Responses to enquiries about motorization indicate a little familiarity with the use of engines. Aspects such as fuel economy were given rather low priority.

Among the OBMs mentioned, Yamaha seems to be the brand most familiar to local fishermen.

VILLAGE		Teluk Dalam Pasar
SUBDISTRICT	:	Teluk Dalam
NUMBER OF HOUSEHOLDS INTERVIEWED	:	17

LOCATION:

An urban community located on the seafront area of the town of Teluk Dalarn on the south coast of Nias. Teluk Dalam is the most important town and harbour on the island after Gunung Sitoli and is the centre of commercial activity for the southern part of the island. Regular bus services run between the town and Gunung Sitoli, the 160 km trip taking about six hours. Direct boat services also connect Teluk Dalam to Sibolga on the Sumatera mainland. Kepulauan Batu to the south and Padang in West Sumatera.

DESCRIPTION

Teluk Dalam Pasar constitutes the principal settlement of fisherfolk in the town, but is spread along the seafront outside the main urban area. As would be expected in an urban setting, the community is a mixture of fisherfolk, other professional groups and immigrants to the area from other surrounding rural communities who have come to Teluk Dalam for work and education. There is no agricultural land in the village area although some families own coconut trees.

In spite of its urban setting, the standard of housing in the village is quite low. There is a predominance of bamboo and wooden structures, many with earthen floors. Relatively few families have built with cement or brick.

While few of the respondents reported additional incomes outside of fishing, many household members are clearly working in other sectors, including small-scale food manufacture and sale of this produce by women.

INSTITUTIONS

Of the formal village institutions, the LKMD and LMD are said to be active, although participation by the community seems to be limited. No fishermen's group is reported in the village.

FISHERIES

The location of the village in an important trading and fishing centre naturally give rise to a rather different pattern of fisheries and employment than that encountered in other villages surveyed. Teluk Dalam, besides being a trading port, is also developing as a centre for small to medium-scale fisheries similar to those encountered in Gunung Sitoli. The ownership of these fisheries is in the hands of local entrepreneurs, who are generally not from the fisherfolk families but are small traders who have invested in fishing.

While labour opportunities do exist for fisherfolk in these fisheries, it seems to be seasonal and uncertain. Many of the small gillnetters and longliners operating out of Teluk Dalam are crewed by fishworkers usually from mainland Sumatera. Teluk Dalam also serves as a base for fishing craft from Sibolga, Padang and even further afield, which are involved in handlining, longlining, trawling and various other specialized fisheries that take place in the area.

The majority of local fisherfolk interviewed still rely predominantly on traditional fishing methods using dugout outrigger canoes of 3m length. Some Sm plank-built craft are being used, particularly with outboard engines. Although more outboard engines are encountered than in many other locations, most craft are still sail-powered.

Handlining and small-mesh gilinetting are the main fishing methods in use, although at least one fisherman is experimenting with a small longline. One owner of three larger fishing vessels was also contacted. His 4GT and 8GT craft are both currently involved in bottom longlining for oil shark, while his larger 1SGT boat is doing multiday handlining operations.

The main species reported by fishermen are small tuna, Spanish mackerel, billfish, shark and garfish, along with a variety of rockfish such as snapper and carangids.

The average fishing time reported is 20 days/month. No fisherfolk seem to be involved in fish marketing.

EARNINGS

Fisherfolk's earnings from marine fishing activities are reported as being in the region of 3,000-3,200 Rp/fishing day. Yearly income is probably in the region of 770,000 Rp/year. Two fishermen owning 6 and 8 h.p. outboard engines reported considerably increased net earnings of 5,000-7,500 Rp/fishing day in spite of the high petrol costs apparently incurred by these engines.

The very imprecise information provided by the one boat-owner interviewed makes it difficult to calculate the earnings of fishing labourers working on larger craft.

The expenditure reported by fisherfolk in Teluk Dalam is marginally higher than that in other villages, as would be expected given the lack of agricultural land for subsistence needs. The average annual expenditure seems to be in the region of Rp.l,350,000, the high figure being mainly due to higher expenditure on food. Schooling consumes only about 4 per cent of annual expenditure.

PROBLEMS

General

Few problems outside of fisheries are highlighted by those interviewed in Teluk Dalam. Lack of capital to invest in improved fishing operations is mentioned by four respondents.

Fisheries

Two problems seem to dominate fisherfolk's thinking in Teluk Dalam. The main difficulty faced is claimed, rather surprisingly, given its location in an urban centre, to be in marketing. Twelve respondents mention lack of stability in prices for fish as being an important problem, often linked to the lack of a regular buyer. Several fisherfolk feel that this problem is, to some extent, due to the lack of a cooperative or fishermen's organization to take care of marketing.

The other main problem is diminishing catches, blamed on both overfishing by local fishermen and outside vessels. The activities of gillnetters and purse-seiners, the latter from Sibolga are particularly mentioned.

A lack of suitable gear to exploit available fisheries resources, along with too short a fishing range to reach new fishing grounds where more commercial species are thought to be available is also felt to be a limitation by some fishermen.

A small number of respondents also feel that fisherfolk are not unified enough to enable them to act collectively to protect their interests.

POTENTIAL

General

The good communications between Teluk Dalam and the mainland is felt by several fisherfolk to be a major advantage for future development. It is also noted that there is no shortage of manpower to take up new activities in the area.

Fisheries

As in other fishing communities in the southern part of Nias, fisherfolk in Teluk Dalam appear to identify themselves as skilled fishermen and regard this as an important asset. Interestingly, while others regard marketing as a problem, at least two respondents feel that there is good market potential in the area for fish, particularly in export.

Fisherfolk interviewed were not very forthcoming regarding particular species which might hold potential for increased exploitation. Scope for shark fisheries is mentioned, along with various small pelagic species such as fusilier, rainbowrunner and sardine.

SOLUTIONS

General

Those interviewed seem to foresee little scope for development outside fisheries. Alternative employment is apparently not regarded as a serious alternative.

Fisheries

In fisheries, the most important avenues for change are seen to be in the post-harvest field. Some kind of marketing cooperative is felt to offer a solution to problems of price instability, and many respondents feel that there is considerable scope for fish processing. Given the current imports of dried fish to Nias from the mainland, this seems to be a reasonable option.

Several fishermen also suggest the introduction of new, 'modern' gear to increase productivity of small-scale fishing operations.

VILLAGE		Lagundhi
SUBDISTRICT	:	Teluk Dalam
NUMBER OF HOUSEHOLDS INTERVIEWED	:	18

LOCATION

Lagundhi is located 12 km west of Teluk Dalam on the south coast of Nias. The village is connected by road to Teluk Dalam.

DESCRIPTION

A large, predominantly Muslim community live in this village located by a sheltered bay and backed by extensive cultivable lands. The edges of the bay have some mangrove and nipa swamp areas. The inhabitants of the village are mixed fisherfolk and farmers, with most households owning some land.

Housing in the village is predominantly of woven bamboo, wood and nipa thatch.

Lagundhi is developing as a tourist area, attracting a small but steady stream of western tourists who come for the beach, surfing and to use it as a base for trips to nearby ancient Nia villages. Numerous small 'losmen', or guest houses, have sprung up to accommodate these visitors. Not many, however, appear to be owned by fisherfolk.

Most fisherfolk households appear to divide their labour between agriculture and fishing. Average landholdings range from small plots of 0.1 ha of land suitable for rice to as much as 3 ha of plantation land devoted to cloves and coconut.

INSTITUTIONS

While formal village institutions, such as the LKMD, LMD and PKK, are all reported to be active in the village, it is apparent that the fisherfolk do not participate fully in their activities.

A fishermen's group also exists in the village, but is not active due to reported disagreements among its members.

FISHERIES

Fishermen in the village generally their own 4-5 m sailing canoes, which are used for handlining. Some fishermen also own drift gillnets. Although none of the respondents reports owning an engine, several small outboard engines are known to be operating in the village.

A wide range of species are reported as being caught by local fishermen. Among pelagic species, tuna, Spanish mackerel, mullet, flying-fish, scad, sardine, halfbeak, pomfret, and billfish are reported. Among demersal species, snapper, carangids, grouper, seabass, and some shrimp are taken.

Most fishermen seem to fish regularly up to about 22 days/month and a significant number make two fishing trips/day, morning and evening. Although most fisherfolk households also own land, it generally appears that those members of the households who fish do so full-time, while other family members concern themselves with agricultural activities.

No fisherfolk mentioned involvement in marketing of fish. However a small market is available in the village and provides an outlet for catches. Marketing there is apparently carried out by family members there.

EARNINGS

Average reported earnings from fishing are about 2,500 Rp/day. A significant number of fisherfolk involved in handlining and making two fishing trips per day consistently reported higher earnings of about 3,000 Rp/day. This would give an income range (at the reported frequency of fishing) of between 660,000 and 800,000 Rp/year.

Reported earnings from agriculture, averaging about 80,000 Rp/year, seem low, given the relatively large landholdings of many fisherfolk. However, several fisherfolk own only small plots of paddy land, apparently used for subsistence agriculture, and therefore earn very little by way of cash income.

Only one respondent, who owns a small guest house, reports any earnings from tourist-related activites. However, direct observations indicate that many fishermen boat-owners do earn some additional income from transporting tourists to and from surfing locations and from other small tourist services. Tourist traffic is still quite limited and the contribution to fisherfolk incomes may not be very significant, but it could seem that some income sources may not have been reported.

Reported daily expenditure is also somewhat high due to consistently high estimations of amounts spent of food. This figure may well be overestimated since most fisherfolk have access to land for subsistence crops. The average family size among respondents is actually somewhat lower in Lagundhi than in other villages studied. The reported figure of about 1,200,000 Rp/year can be considered a maximum figure.

PROBLEMS

General

No particular problems are mentioned in the village with regard to agricultural production or general conditions. It is felt that fisherfolk in the village do not participate fully in the various village decision-making forums. A problem of debt among fisherfolk is also mentioned, this being the only village among those investigated where the problem is mentioned. Shortage of capital for investment in new enterprises is referred to by many respondents as a limitation.

Fisheries

Fisherfolk in Lagundhi seem to feel that the fisheries resource situation in the area is deteriorating. This is attributed mostly to an excessive number of small-scale fishermen, although the operations of larger craft from other areas is also seen as responsible.

On the other hand, fisherfolk seem to feel that exploitable resources exist but are not accessible using existing craft and gear. Lack of suitable fishing gear and restricted range of operations, due to lack of engines, are frequently identified as important problems.

Lagundhi is one of the few villages investigated where some fishermen also mentioned distinct seasonal variations in fishing. Several respondents indicated that fishing operations are restricted during the period of the west monsoon.

In post-harvest issues, the lack of an organized and regular buyer seems to be the principal problem, giving rise to unstable prices. Several fisherfolk also mention the lack of ice supply as a restriction, this being the only community where this factor is mentioned.

POTENTIAL

General

It is clear that many fisherfolk in Lagundhi see the development of land-based enterprises as an important avenue for development. A majority of respondents identify existing agricultural land as an important resource at their disposal. Several respondents obviously regard themselves as skilled in both fishing and farming and would like to see both activities develop side-by-side. In spite of the tourist developments in the area, only three respondents seem to regard this as having potential for the improvement of their own conditions. This would seem to indicate that the fisherfolk are not taking part in the development of tourist services in the community.

Fisheries

Lagundhi fishermen identify several fisheries resources which might have scope for further exploitation. In particular, they seem to be familiar with resources of shark, flying-fish and some other small pelagic species. Billfish potential is also mentioned.

SOLUTIONS

General

As indicated above, development of agriculture, through bettertraining and extension, is regarded as a priority for development. One respondent, the only one in any of the communities under consideration, mentioned that the encouragement of savings among fisherfolk would assist their development.

Fisheries

The preferred option in fisheries development is overwhelmingly motorization of craft to enable access to new fishing areas and resources. A strong preference for outboard motorization is indicated, the Yamaha 5 h.p. OBM apparently being the engine of choice. The main reason for this is apparently its availability on the local market. It is also regarded as a long-lasting engine. Several respondents indicated a familiarity with Yanmar inboard diesels as a viable option. The need for new craft is apparently not regarded as a priority issue.

Fish processing as a means of overcoming current marketing problems is also considered important. Given the lack of any ice-making facilities in the area, this may be a viable option.

VILLAGE : Hilinamazihona

SUBDISTRICT : Lolowau

LOCATION

About 50 km northwest of Teluk Dalam on the southwest coast of Nias. Approximately 30 km to the south of the subdistrict capital of Lolowau. Connected by unpaved road to both locations.

DESCRIPTION

A primarily agricultural community located along the open beach and spreading over the immediate hinterland of the west coast. This village has been selected as the planned location for a major tourist development in the future and its inclusion in the appraisal was at the request of the local Planning Board, BAPPEDA.

This village is rather remote from any centre and the level of education is generally very low.

Agriculture is the principal activity of the villagers, with extensive land under rice cultivation and plantations of clove and coconut. Fishing is a very limited; it is a supplementary activity for a few households in the village and, so, individual household investigations were not carried out during the appraisal.

INSTITUTIONS

The formal institutions in the village, such as the LMD, LKMD and PKK, seem to play an active role in village development activities.

FISHERIES

Very limited fisheries activity takes place in Hilinamazihona. It is limited to basic handlining from small sail and paddle-powered dugout canoes. People involved in fisheries in the village appear to have little expertise or knowledge about fisheries and are mostly agriculturists who have taken it up to supplement the household's diet, rather than as an income-generating activity.

No one appears to have any familiarity with any kind of boat engine.

EARNINGS

No information is available on earnings or expenditure of villagers.

PROBLEMS

The principal problems faced in the village appear to arise from its isolated location. This situation may improve as the planned tourist development begins to function. While the village is situated on the main road and bus route from Teluk Dalam to Gunung Sitoli, the road is unmetalled, and in poor condition and has little traffic.

The agricultural methods used are apparently very traditional and yields are very low.

POTENTIAL

Beyond the existing potential of the area as a tourist location, there is much undeveloped land in the area which could be used for agriculture.

Fisheries potential may also exist in the area, particularly in the Kepulauan Hinako which are relatively nearby. However, all landings are on an open beach exposed to surf which would be difficult to negotiate using existing types of craft. The remote location would also pose major problems in marketing the fish.

SOLUTIONS

An important role was suggested by villagers for agricultural extension agents to improve agricultural methods in the village.

Some people felt that the introduction of motorized fishing craft might facilitate further development of fisheries in the area.

VILLAGE		Sirombu
SUBDISTRICT	:	Sirombu
NUMBER OF HOUSEHOLDS INTERVIEWED	:	19

LOCATION

90 km southwest of Gunung Sitoli and about 80 km northwest of Teluk Dalam on the west coast of Nias. Connected to both towns by road. The fishing community is located about 2km from the centre where the subdistrict headquarters is situated.

DESCRIPTION

A mixed Muslim and Christian village of 123 households and a total population of 630. Just under half the households in the village earn their living primarily from fishing. Others are farmers, traders and government workers. Sirombu is the only major centre of trade on the west coast of Nias. As such, it is an important service centre for central western Nias and the Kepulauan Hinako, about 20 km off the west coast. Sirombu is connected by regular boat services to the Kepulauan Hinako and to Sibolga *via* Teluk Dalam. The shelter offered by its wide bay is also used as a base by some outside fishing craft involved in handlining, longlining, trawling and purse-seining in the west coast area.

While 35 households are reported to be those land-owning farmers, only two of the fisherfolk households interviewed reported any landholdings. Fisherfolk in the village appear to be specialized and relatively more 'professional' than in many other coastal communities in Nias.

Housing in the village is predominantly of wood, with nipa thatching. Many of the brick and cement structures in the commercial area of the village were destroyed in a recent fire and are slowly being rebuilt.

Several traders play an important role as middlemen for local produce. Usually such traders are not specialized but appear to handle various commodities, including some fisheries products.

INSTITUTIONS

While formal village institutions, such as the LKMD, LMD and PKK, are in place in the village, the participation of fisherfolk in such institutions seems to be minimal.

FISHERIES

Fisheries in Sirombu is particularly notable compared to other areas of Nias, as most small-scale fishermen own OBMs, although it would appear that many of these are not operational. Another notable feature is the high proportion of fisherfolk households not owning their own craft. The craft used in the area are also generally larger than in other areas, being in the 5-7 m range. The higher price of these units may explain the number of fishing labourers working on other people's craft. The OBMs used are mostly Suzuki 2 or 5 h.p. Twentythree small craft were reported to be operating from the village, although numerous other nearby communities have fishing craft. Thus the subdistrict total for small craft is over 200.

Two larger craft are also used, powered by Yanmar and Kubota diesel inboard engines. In both cases, these craft represent second boats for their owners, supplementing their traditional outrigger canoes.

Handlining is generally the main fishing method among small-scale fishermen. The species caught off Sirombu show a greater predominance of demersal species compared to other areas. Among pelagic species, scad mackerel dominates catches although some little tuna, Spanish mackerel and billfish are also taken. Otherwise, a variety of rockfish, such as snapper, grouper and carangids make up the bulk of catches.

The fishing grounds exploited by Sirombu fishermen are consistently identified as located around islands in the Hinako group, approximately 7-8 nautical miles from Sirombu.

Fishermen report fishing days in the region as 15-20 days/month.

Most fish, except for shrimp and lobster, seems to be sold on the local market. While marketing facilities exist in Sirombu, facilities for proper handling of fish are limited. A considerable amount of fish is dried in the village.

EARNINGS

Reported earnings from fishing in Sirombu are relatively high, about 3,000 Rp/trip. The generally higher income may be the result of motorization, but it is noticeable that the earnings of motorized small craft on the northeast coast of Nias, based on detalied monitoring of catches, seem to be

considerably higher. Under-reporting of earnings may be a factor, although the problems encountered in marketing of fresh fish from Sirombu is probably the single most important limitation on fishermen's earning capacity.

Average fishing income would be in the region of 600,000-700,000 Rp/year as reported. Very few fisherfolk households appear to have other sources of income apart from fishing. One respondent earns extra income as an outboard engines mechanic.

Reporting of expenditure in the community is very varied and rather inconsistent. Estimates range from 1,000,000 Rp/year to over Rp.3,000,000. Lack of agricultural land at the disposal of fisherfolk might push up their expenditure on food, and the remoteness of Sirombu may effect other prices in the village. An average yearly expenditure of Rp.l ,500,000 is reported. It seem likely that respondents failed to report income generated by women in their households.

PROBLEMS

General

Low earnings and consequent lack of assets to reinvest in productive activities is the main problem outside of fisheries identified by respondents.

Fisheries

A high proportion of respondents in Sirombu identified interaction with purse-seiners and trawlers and its effect on their catches as a major problem. Identification of outside fishing effort as a cause seems to be clearer here than in other locations in Nias.

The other major difficulty faced by local fishermen is in marketing. The relatively remote location of Sirombu certainly limits the marketing possibilities, and fishermen complain of low prices received for their catches as a result. It appears that outside buyers do not come to Sirombu, and the one trader who sends frozen fish in small quantities out to Teluk Dalam handles only shrimp and lobster, which are not readily accessible to small-scale fisherfolk.

Fishermen have also experienced difficulties with their outboard engines, many of which are not operational. Spare parts and proper servicing are apparently difficult to obtain in Sirombu. As a result of technical problems with engines, many fishermen's range of operations is limited.

POTENTIAL

General

No non-fisheries potential is identified by Sirombu fisherfolk.

Fisheries

The principal resources identified are shark, billfish and, to a lesser extent, tuna. Notably, fishermen in Sirombu express greater awareness of large pelagic resources in the offshore area, It is generally felt that, in spite of reductions in catch, rich resources of fish exist, given the proper gear and mobility for exploiting them.

The familiarity of most fisherfolk in the village with engines and the problems and potential of motorization is, in itself, an important resource.

Transportation and communications to Sirombu are steadily improving. A more direct road link, which will considerably reduce the transit time to Gunung Sitoli, is awaiting completion.

SOLUTIONS

General

Respondents identified possible improvements only in the fisheries sector.

Fisheries

The replacement of engines is mentioned as a priority step by most respondents. Past experience seems to have turned fishermen in Sirombu against outboard motorization as an option and most now regard inboard engines, such as Yanmar, as a more suitable solution. Durability and fuel economy are seen as the major advantages of such engines.

Some scope for improvement of gear and introduction of new gear is also seen, as well as potential for improved processing of fish. Since much fish is even now dried in the village, due to the lack of ice, it is perhaps surprising that more respondents do not mention this last option.

In marketing, more emphasis is given to the need for a dealer to handle fishermen's catches or the setting up of a marketing organization.

Government intervention to control illegal trawling in the area is also mentioned.

Life in the villages surveyed

PUBLICATIONS OF THE BAY OF BENGAL PROGRAMME (BOBP)

The BOBP brings out the following types of publications

Reports (BOBP/REP/...) which describe and analyze completed activities such as seminars, annual meetings of BOBP's Advisory Committee, and subprojects in member-countries for which BOBP inputs have ended.

Working Papers (BOBP/WP/...) which are progress reports that discuss the findings of ongoing BOBP work.

Manuals and Guides (BOBP/MAG/...) which are instructional documents for specific audiences.

Information Documents (BOBP/INF/...) which are bibliographies and descriptive documents on the fisheries of member-countries in the region.

Newsletters (Bay of Bengal News) which are issued quarterly and which contain illustrated articles and features in non-technical style on BOBP work and related subjects.

Other publications which include books and other miscellaneous reports.

A list of publications from 1986 onwards is given below. A complete list of publications is available on request.

Reports (BOBP/REP/...)

23. *Summary Report of BOBP Fishing Trials and Demersal Resources Studies in Sri Lanka.* (Madras, March 1986.)
24. *Fisherwomen 's Activities in Bangladesh A Participatory Approach to Development.* **P.** Natpracha. (Madras, **May** 1986.)
25. *Attempts to Stimulate Development Activities in Fishing Communities in Adirampattinam, India.* P. Natpracha, **V.** L. C. Pietersz. (Madras, May 1986.)
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