Bay of Bengal Programme

Fishing Technology

MANUAL BOAT HAULING DEVICES IN THE MALDIVES

BOBP/WP/71

FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS

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BAY OF BENGAL PROGRAMME BOBP/WP/71
Development of Small-Scale Fisheries GCP/RAS/118/MUL

Manual Boat Hauling Devices in the Maldives

BAY OF BENGAL PROGRAMME
Madras, India
1992

The Republic of Maldives, where fishing is a major industry, has a fleet of about 5500 traditional fishing craft. Most of them are in the *8-15* m range in length. As these craft, built with local and imported timber, are not coated with antifouling paints or sheathed to protect the timber, they are hauled on to the beach at least once a month for scraping of the hull and application of protective oil. Traditionally, the boats are hauled on to the beach by 50-80 men and women pulling the ends of a rope attached to the stern and the sides of the boat.

With labour becoming scarce in the atolls because of migration to tourist resort islands in search of more remunerative work, the Ministry of Fisheries and Agriculture of the Maldives (MOFA) requested the Bay of Bengal Programme (BOBP) to develop simple low-cost manual hauling devices which would help to reduce the hauling .crew. This paper documents the devices developed and the favourable reactions of the local fisherfolk.

This paper is the result of contributions made by MOFA staff, BOBP staff, Varuna Construction and Design Company, Madras, and all those who regularly hauled the boats on to the beach during trials in Madras, and the fisherfolk of the Maldives, both men and women, who participated in the trials.

The Bay of Bengal Programme (BOBP) is a multi-agency regional fisheries programme which covers seven countries around the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka, 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 AGFUND (Arab Gulf Fund for United Nations Development Organizations) and UNDP executing agency is the FAO (Food and Agriculture Organiztion of the United Nations).

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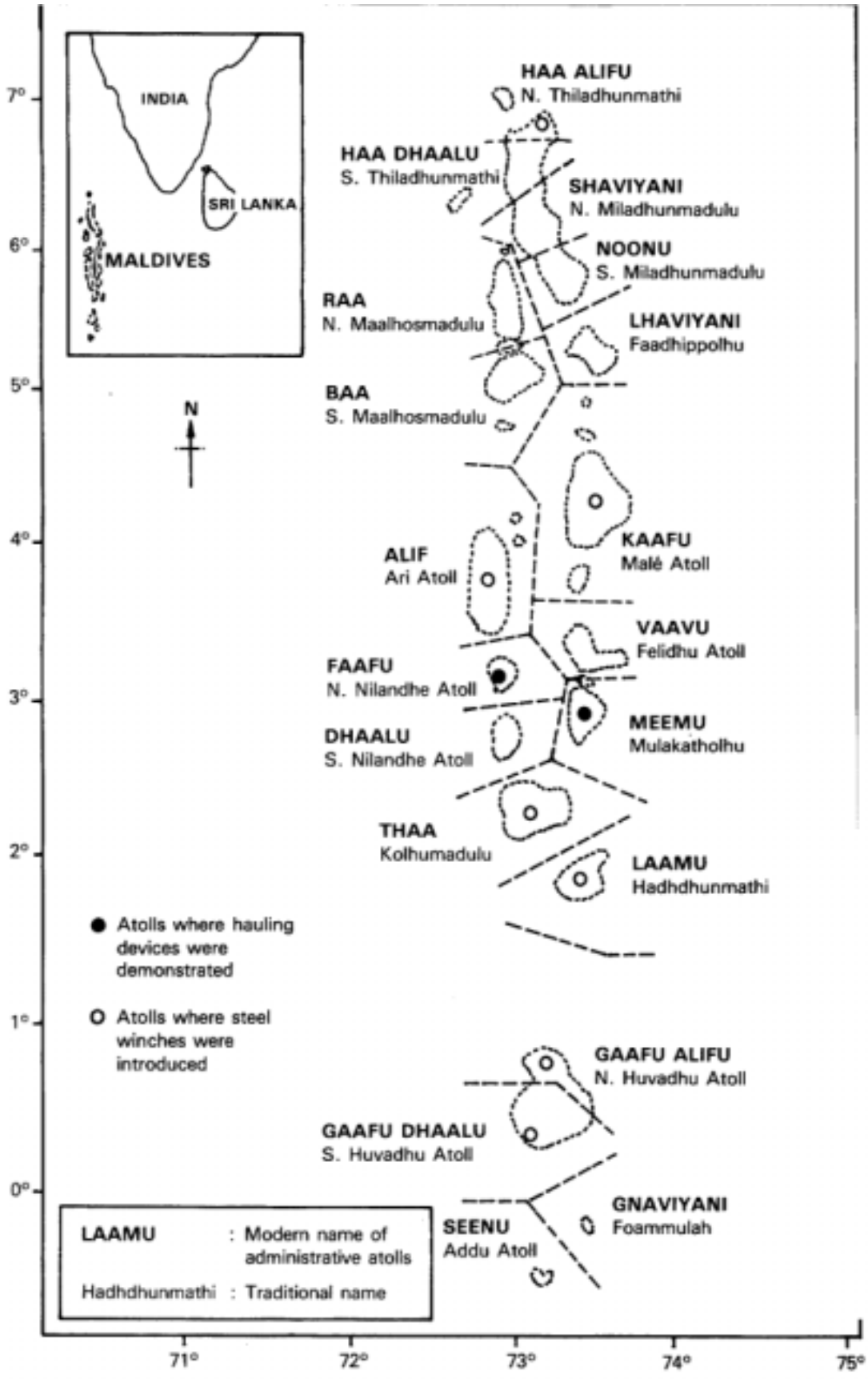
Fig 1: Map of the Maldives



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1. *INTRODUCTION*

The Republic of Maldives consists of about 1200 coral islands grouped into 26 atolls spread over an area of about 460 x 60 n miles (see Figure 1, facing page). Only about 200 of these islands are inhabited.

The approaches to the lagoons surrounding the islands are sometimes difficult because of their shallowness and coral outcrops. Access channels to the lagoons are often made by clearing the coral and sand in two or three locations, thereby offering fishing craft varying depths of water for use in varying weather conditions. Because of the outer reef, most lagoons provide good anchorage, where small fishing craft can take shelter, land their catch and be hauled on to the beach for periodic repair and maintenance. There are only two proper fishery harbours in the country, one in Male, the capital, and the other in Feilvaru, where a cold storage and a canning plant are located.

in 1991, the fleet of fishing craft consisted of three main types

- The 10-15 m long *masdhoni.* There were 37 sailing craft and 1750 with inboard diesel engines. They mainly engage in pole-and-line fishing.
- The 8-10 m long *vadhu dhonis,* about 2700 units in number and comprising both sailing craft and inboard motorized ones. They mainly engage in trolling or handlining.
- The 2-3 m *bokkura.* The 700 such craft include those rowed as well as ones with outboard motors. These fishing craft mainly engage in handlining near the reef. They are also used as tender craft, shuttling between an island and its *masdhoni* anchorage.

A masdhoni *(on top) and a* vadhu dhoni *(above)*

All these fishing craft, which are built out of local and imported timber, are not coated with antifouling paints. Nor are they sheathed to protect the timber from attacks by marine borers. Therefore, they are hauled on to the beach at least once a month for scraping of the hull and application of shark liver oil, mixed with coconut oil, on the outside and inside of the hull.

Traditionally, the fishing boats in remote islands are hauled on to the beach with manpower, using the two ends of a rope attached to the stern and the sides of the craft. Mature pieces of timber are used for the boat to slide on and to prevent it sinking in the sand. Side timber posts and rope to steady the boat and prevent it from falling on its side are also used. Depending on the size and weight of the boat, 50-80 men and women are engaged each time a boat has to be hauled ashore (see Figure 2, facing page).

Due to increases, in size and weight of the hull, inboard motorization of fishing craft and migration of men from fishing islands to tourist resorts for more lucrative jobs, the labour force has been getting scarce in some islands and has made hauling of large *masdhonis* difficult. To overcome this problem, it was believed that simple low-cost manual hauling devices would prove not only useful but also acceptable to the fisherfolk. The use of these devices would reduce the hauling crew to about 20 persons and make the operations easier and less time-consuming.

In November 1987, the Ministry of Fisheries and Agriculture (MOFA) of the Maldives identified simple low-cost hauling devices for large motorized fishing craft *(masdhonis)* as a priority area for development and requested the Bay of Bengal Programme (BOBP) to assist in the initial phase of development and demonstration. The work started in 1988, with the objective of developing and demonstrating low-cost manual devices for hauling of fishing craft and assessing their acceptability by fisherfolk. The BOBP assistance included assessment of the needs for such hauling devices and designing, constructing, testing and demonstrating prototypes. The project was originally planned for a duration of one year but lasted about two years. The sequence of events is given in Appendix I. The understanding was that, should a particular hauling device be found suitable, it would be introduced by the MOFA on a wider scale in islands where hauling aid is required, and has been requested, by fisherfolk.

2. ALTERNATIVE ***HAULING DEVICES***

A wide range of hauling devices exist to help with hauling fishing craft ashore. Some are primarily manufactured as lifting gear and used only occasionally as hauling devices. Others are specifically designed and constructed as hauling devices and are, therefore, more frequently used. The commonly known and available lifting and hauling devices are

- Rope-tackle;
- Chain hoist;
- Multipurpose lifting and pulling gear;
- Crab winch;
- Manual winch and capstan; and
- Engine driven winch.

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Hauling afishing boat in the traditional way with men and women participating in the operation

Fig. 2. Manual boat-hauling in the Maldives

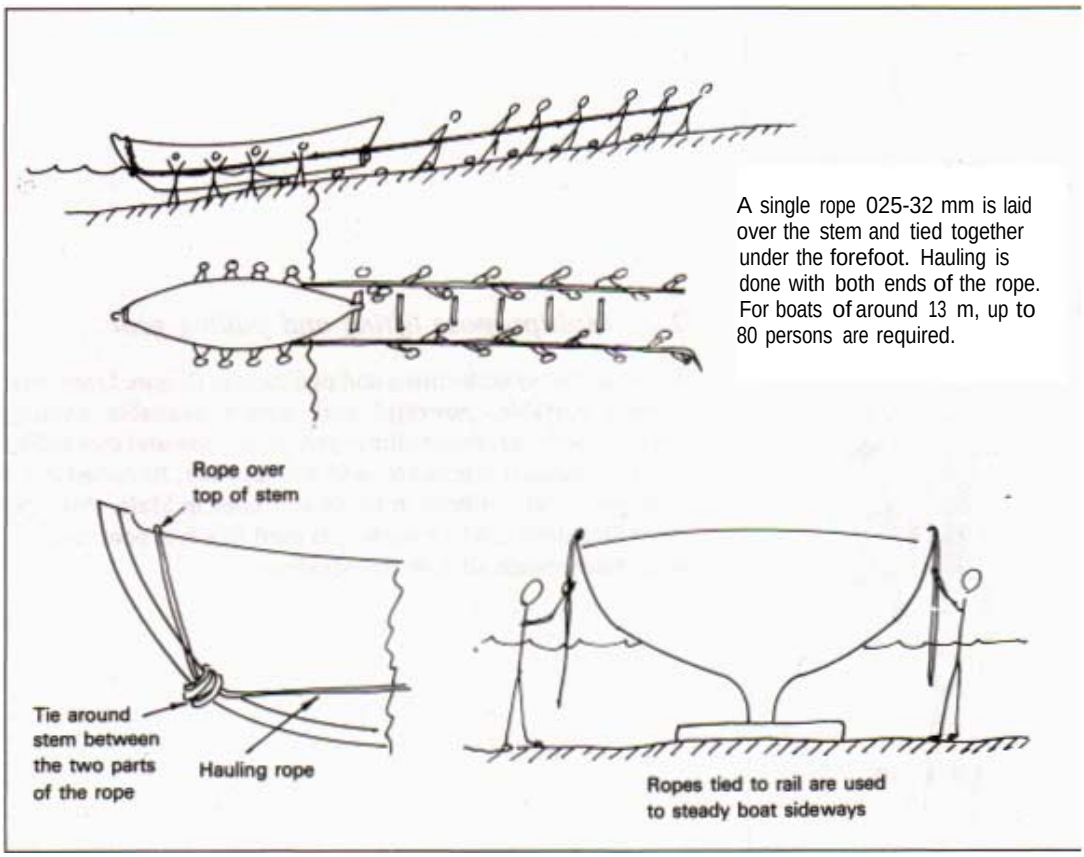

Fig. 3.

2.1 *Rope-tackle*

The rope-tackle (Figure 3) is the simplest, cheapest, most portable and readily available lifting device. It is occasionally used for hauling small craft on the beach and in boatyards. Its pulling power is easily increased by using double or triple blocks for different sizes of rope. However, the pulling speed is low, resulting in limited use for hauling fishing craft onto the beach. It is reported that rope and tackles are used for hauling small *dhonis* on to the beach in some remote islands in the Maldives.

Fig. 4.

2.2 *Chain hoist*

Like the rope-tackle, the chain hoist (Figure 4) is another simple, cheap, portable and readily available lifting device. It is occasionally used for hauling small craft in boatyards and repairs-and-maintenance workshops. Besides its low pulling speed, it easily corrodes and gets jammed when exposed to sea water and sand. It is therefore not appropriate for hauling fishing craft onto beaches.

Fig. 5.

2.3 *Multipurpose lifting and pulling gear*

Modern and versatile lifting and pulling gear (Figure 5) are very handy, portable, powerful and readily available hauling devices. However, their pulling speed is very low and they suffer from corrosion if exposed to sand and seawater. Imported from Singapore and available in hardware shops in Male, this type of pulling device, it is reported, is used in a few boat repairs-and-maintenance sites in the Maldives.

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2.4 *Crab winch*

A crab winch (Figure 6) is either manually driven with one or two rotating handles for two or four persons or is mechanically driven with an engine or electric motor. The pulling speed is considerably increased when driven with engine or motor. This type of winch is centrally manufactured and widely available at relatively low cost, resulting in wide use in small boatyards and repairs-and-maintenance workshops. It should be mentioned that this type of winch has been adapted for hauling large beachlanding craft onto the beach *e.g.* on the southern coast of England. The use of such a winch was not seen or reported in the Maldives.

Fig. 6.

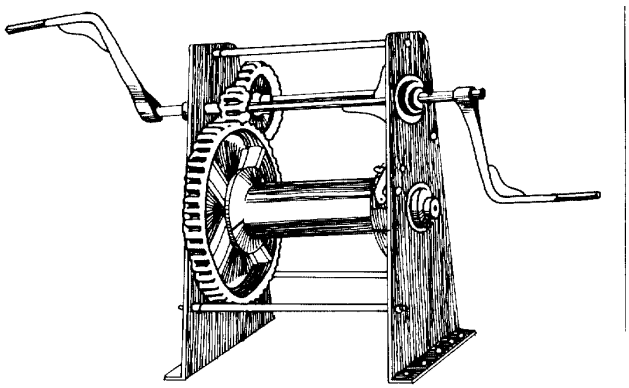
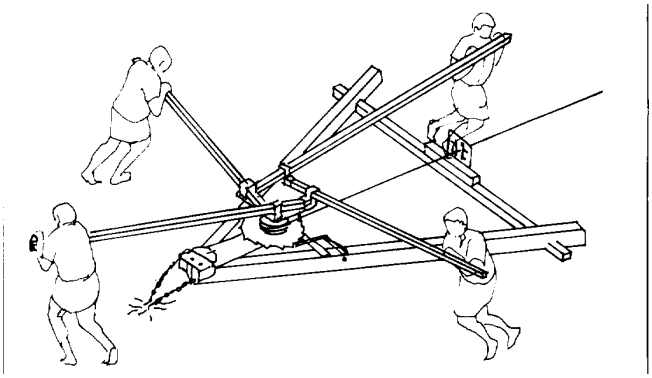


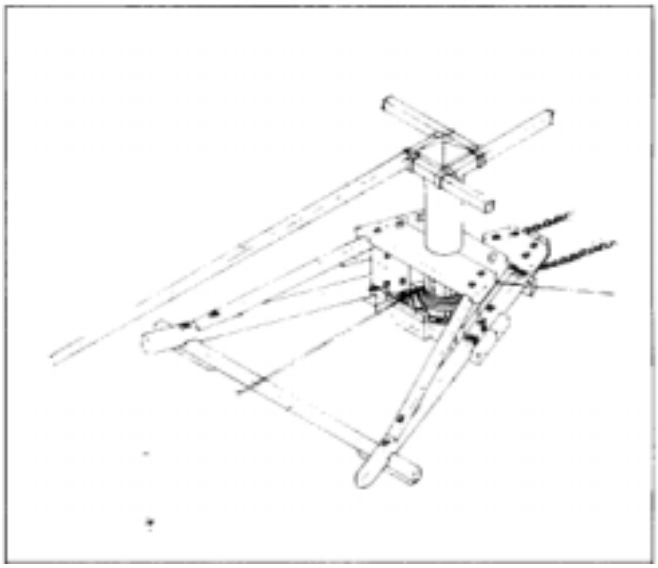
Fig. 7.



2.5 Manual winches and capstans

Manual winches, with a drum for spooling of the wire or rope (Figure 7), and capstans, without spooling arrangements (Figure 8), are the simplest and cheapest purpose-designed devices for hauling of fishing craft. The capstans can easily be made out of wood at village level by carpenters. The steel winch can be made in small workshops equipped with basic equipment. Because of the ease of manufacture and relatively low cost, the wooden capstans are mostly used at repairs-and-maintenance sites and where the sea and surf conditions are light most times of the year.

Fig. 8.



A wooden capstan was first tried out by BOBP for hauling beach landing craft on the east coast of Tamil Nadu in 1981. Although this capstan worked well, its low pulling speed was considered a serious drawback when it came to hauling the beachlanding craft out of the breaking waves. It was therefore concluded that this type of capstan was only suitable for hauling small fishing craft onto open beaches under light to moderate surf conditions.

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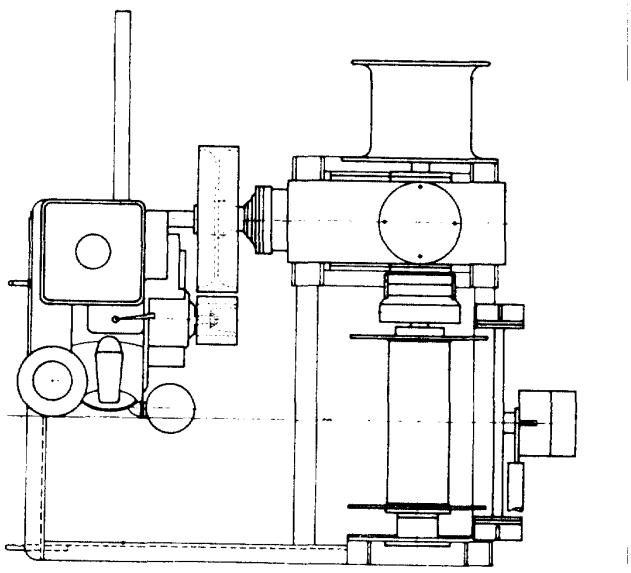
2.6 *Engine-driven winch*

Fig. 9.



Motorized winches (Figure 9) manufactured in well-equipped workshops are rather complicated, and expensive to buy and maintain. They are extensively used in boatyards equipped with slipways and not much as a beach-base hauling device except in few areas such as the southern part of England and the west coast of Denmark.

The Bay of Bengal Programme developed and tested with limited success a diesel engine-driven winch for hauling beachlanding craft on the open beaches of the east coast of India and the west coast of Sri Lanka (See BOBP/WP/5l). After years of trials, it was concluded that the engine-driven winch is

- adequate for hauling fishing craft up to 2000 kg weight in light to moderate sea and surf conditions;
- manufacturable in well-equipped centrally located workshops;
- expensive to buy and maintain;
- too heavy to shift from one location to another;
- in need of good protection and maintenance when kept on the beach; and
- only justified in fishing villages where large numbers of fishing craft are based and light to moderate sea and surf conditions prevail most of the year.

Despite the high cost, similar types of diesel engine-driven winches imported from Singapore by local hardware dealers are available and are being used to haul transport and tourist motorized boats in the tourist resorts in the Maldives.

3. *THE NEED FOR HAULING DEVICES*

To assess the need for hauling devices in the Maldives and select the types which may best address the problems of hauling fishing craft onto the beach, a field visit was made to selected islands by BOBP and MOFA Staff.

The sea and surf conditions in the lagoons formed by the outer reefs in the Maldives are from very light to moderate. The number of fishing craft based on most islands is small. Therefore, there is no need for heavy-duty, fast hauling devices.

The rope-tackle and multipurpose lifting and pulling geat already being available and in limited use for hauling small fishing craft, it is only a matter of time before their use spreads. To facilitate extended use of such simple and cheap hauling devices, MOFA could make use of Radio Maldives or organize on-the-spot demonstrations without any external support.

The engine-driven winch available and used for hauling ashore large transport and tourist craft in the resorts are expensive to maintain and heavy to shift. They are only needed and justified where fast and variable hauling speed is required and where large numbers of fishing craft are based.

The need for hauling devices was, therefore, for small localized fleets of larger *masdhonis* which need to be hauled monthly in light surf conditions onto islands where there is a shortage of men

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Fig. 10. Wooden capstan

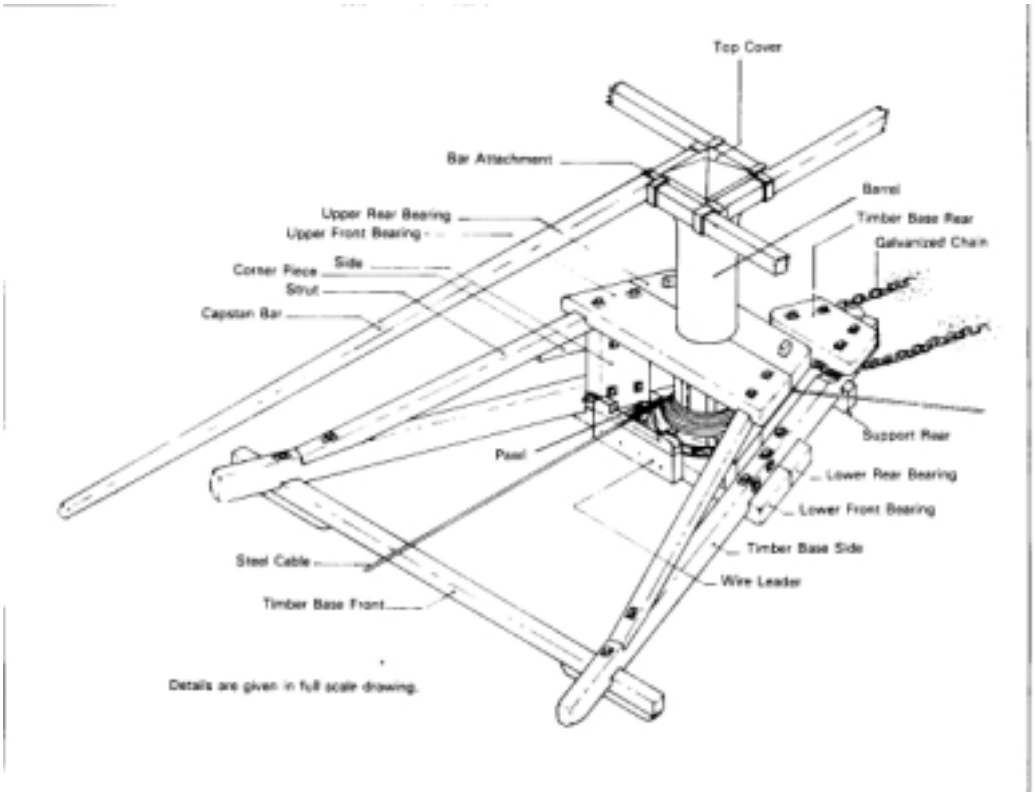
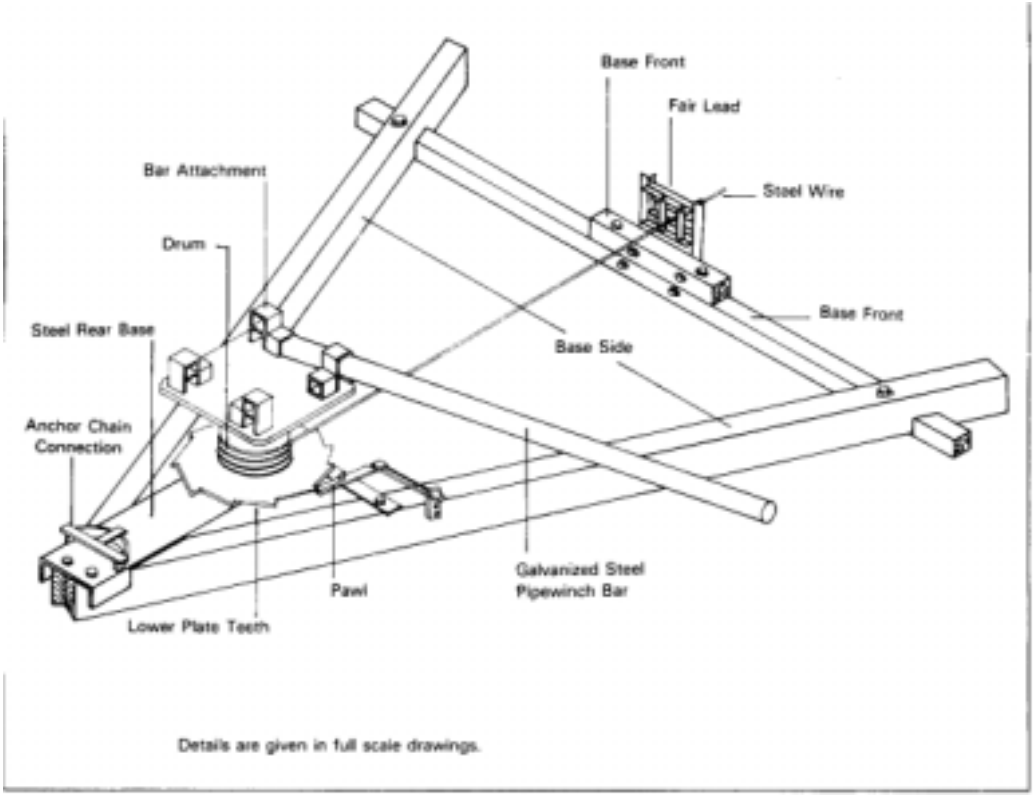


Fig. 11. Steel winch



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and women for such work. This need could be met by manually-operated, capstan- and winch-type hauling devices and crab winches. The capstan and winch were felt more appropriate because they could be made locally. Centrally manufactured gear wheels and other components used in crab winches are not required for manual capstans and winches. They are also types of hauling devices well proven in many places for hauling fishing craft manually.

Two types of manual capstan- and winch-type hauling devices were, therefore, considered suitable for testing and demonstration at selected fishing villages. They were

- a wooden capstan (see Figure 10, previous page), and
- a steel winch (see Figure 11, previous page).

The wooden capstan and the steel winch were modelled on types already used and proven elsewhere, but included improvements based on the experience of BOBP in India. They were designed to safely haul fishing craft up to 3,000 kg, thus providing a safety margin well above the rated 2,000 kg capacity required for the *masdhonis.* Except for steel fittings, the wooden capstan and accessories were designed for construction with locally available materials by carpenters and fisherfolk based on the island. Alternatively, the steel winches could be made at a central location, say, small workshops in Male, and shipped out in a knocked-down fashion (kit) for assembly on the island.

Varieties of hauling accessories were also designed (sand anchor, wooden rails and rollers, side supports and sledges) for construction on the island selected for demonstration.

As regards crew, a maximum of eight persons are required for operation of the steel winch and 10-12 for the wooden capstan.

4. *CONSTRUCTION AND TESTING OF CAPSTAN AND WINCH IN MADRAS*

The wooden capstan and the steel winch were constructed by carpenters and iron workers under the supervision of BOBP staff in Madras. The construction proved easy for skilled carpenters and iron workers and suggested that their construction would be possible in Male. On remote islands, however, the wooden capstan could only be partially built, as the steel accessories would have to be made in Male.

For reliability and long service life, all mild steel parts and fittings were zinc sprayed or hot dip galvanized against corrosion.

The capstan and winch were also made safe to use with steel wire and synthetic rope. They were fitted with steel pawls to avoid backslip if the crew wanted to stop for rest and fairleads to guide the rope or cable while winding.

The total cost of the construction of the bare wooden capstan and steel winch in Madras, excluding local taxes, were as follows

Wooden capstan	IRs 6500	(US$: 465/-)*
Steel winch	: IRs 7200	(US$: *515/-)*

Testing of the wooden capstan and steel winch was carried out in cooperation with people hauling small trawlers (10-15 t) onto the beach in Royapuram harbour for maintenance and repairs.

The testing was carried out in calm sea conditions on hard sand and with a beach gradient of about 12°. Steel wire (12 mm dia), wooden rails and rollers, mature pieces of timber and sand anchor (a granite post) were also used. To check the pull, a dynamometer (10,000 kg) attached to the bow of the boats was used. While 8-10 men turned the four handles of the steel winch or wooden capstan, 4-6 men handled the boat along the wooden slipway. Over a period of three weeks, several boats were hauled using either the steel winch or the wooden capstan.

Both functioned well during the trials and only minor technical improvements were necessary before the hauling devices were shipped to Male. Of the two types, the steel winch was preferred by everyone.

* US $1 = IRs 14/- appx. (August 1988)

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It proved to be sturdy, reliable and handy to use. Also, in the case of the wooden capstan, there was a preference shown for using it as a winch, with spooling of the wire; it saves the two or three men needed to pull and coil the wire. One more wooden winch was therefore made and tested.

The dynamometer test, with the boat on the wooden slipway, indicated that the hauling devices developed up to 3000 kg pulling power. However, there was a small difference in pulling power when the boat was on timber rollers and rails or on greased mature timber.

From the trials in Madras, it was obvious that the hauling devices offered enough pulling power for the large *dhonis* and that the winch was better suited than the capstan. However, to give the fishermen of the Maldives a choice, it was decided to ship the three hauling devices to Male (the wooden capstan, the wooden winch and the steel winch).

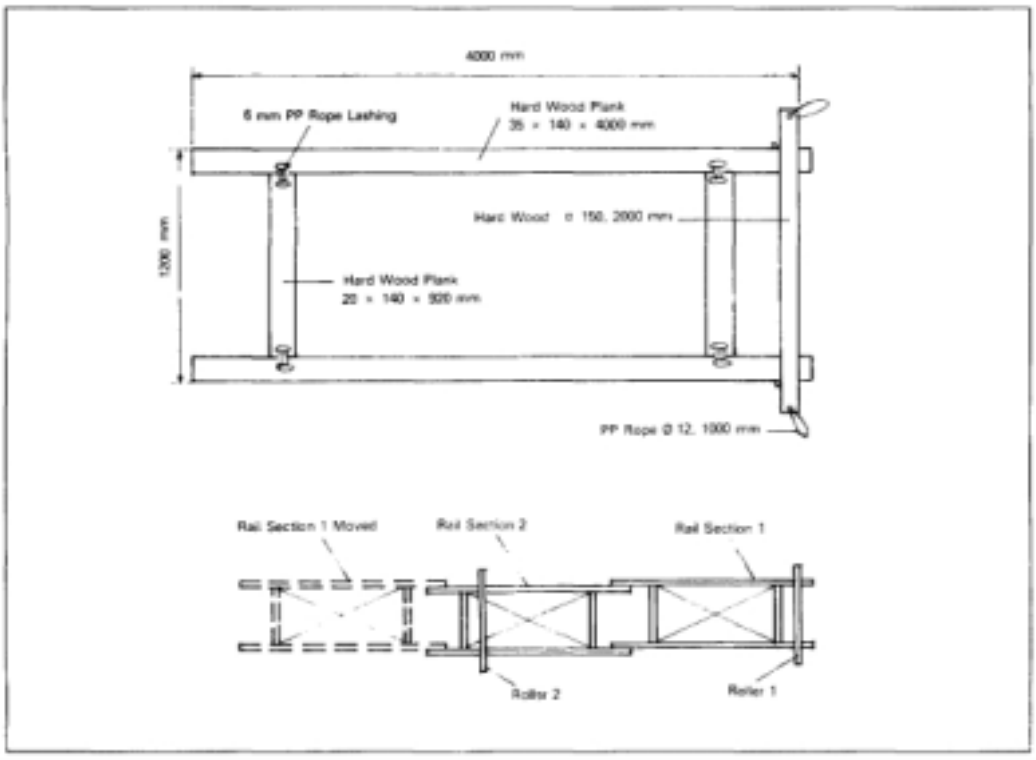
5. DEMONS RATION OF HAULING DEVICES IN THE MALDIVES

With the demonstration of the hauling devices being integrated with the BOBP-supported Extension Project of MOFA, Meemu Atoll was selected for initial demonstrations. This choice enabled the progress of the demonstrations to be monitored regularly during the field visits of the Extension staff.

For the demonstration, the following accessories/equipment (see Figure 12) were made in Male and supplied:

		MRf	US$*
Hardwood *(Balau)* roller and rails	- (10 Nos) - (4 Nos)	2 *550*	274
Coconut wood rollers and rails	- (10 Nos) - (4 Nos)	750	81
Steel wire 10 mm dia	- (100 m)	2, 500	267
PP rope 18 mm dia	- (200 m)	800	86
Triple sheave rope blocks	- (2)	500	54

Fig. 12. Hauling accessories



* US $ 1 = MRf. 9.3 appx. (end 1988).

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The three hauling devices – the wooden capstan, the wooden winch and the steel winch – were first demonstrated on Mulaku Island, Meemu Atoll in February 1989. In May 1989, the wooden hauling devices were demonstrated in nearby Dhiggaru Island in the same atoll. Besides these demonstrations, the use of rope-tackle for hauling small *dhonis* was demonstrated in Nilandhoo Island, Faafu Atoll, in August 1989.

The charges for hauling boats were set according to island practices by the fisherfolk themselves. The charges were fixed as follows:

Fishing *dhoni* of the island	:	MRf 15
Fishing *dhoni* of other islands	:	MRf 50
Other larger boats	:	MRf 100

All the devices were demonstrated in the hauling on to shore of at least 50 boats.

5.1 Steel winch

The steel winch worked very well. Besides replacement of the wooden handles by G I pipe handles, no other improvements were needed to satisfy the fisherfolk. After extensive trials of the three types of hauling devices, involving the hauling on shore of more than 75 boats, it was obvious that the steel winch was the preferred device. The main reasons for this were:

- Sturdiness of construction;
- Compactness;
- Lightness compared to the wooden capstan/winch;
- Easy winding of steel wire;
- Good pulling force, resulting in locally available, mature but cheap timber being adequate for the sleepers;
- Limited manpower needed for its use;
- Easiness to transport and assemble;
- Rust-proof coating of steel parts (zinc-sprayed);
- Comparable cost to the wooden capstan/winch;
- No desire to construct devices on the island; and
- Can be used to haul in 3 or 4 boats every day.

5.2 Wooden capstan/winch

The wooden capstan and winch functioned well during the demonstration. Apart from a few minor improvements which were done, the fisherfolk liked using them. However, in Mulaku Island, where all three types were demonstrated, the fisherfolk unanimously preferred the steel winch type. The idea of making hauling devices of wood on the island did not appeal to the fisherfolk, as the timber for construction would have to be brought in from Male, where the steel parts would also have to be fabricated and top-coated.

5.3 Rope-tackle

The rope-tackle (triple sheave pulley) worked well, with 20 persons hauling small- to medium-sized *dhonis*. This hauling device is the lightest, simplest and cheapest readily available device and is acceptable to some fisherfolk. It is appropriate on islands where the fleet of *dhonis* is small and where the *dhoni* size ranges from small to medium. The total cost of the rope-tackle, coconut timber rails and rollers was MRf *3250.*

The fisherfolk of Nilandhoo Island, who used this device to haul ashore at least 50 *dhonis,* were receptive to its continued use along with the coconut timber rails and rollers. However, after hearing about the use of a steel winch, some fisherfolk expressed interest in it regardless of the higher cost of the latter hauling device. A smaller, lighter and cheaper version of the steel winch would meet the fisherfolk's expectations here.

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5.4 *Rails and rollers*

To avoid the rollers sinking into the soft sand, wooden rails were found essential as base for the wooden rollers under the boat. Because of its easy availability on the islands, and its low cost, the fisherfolk found the coconut timber rails and rollers more appropriate and cost effective than those made of imported hard timber. The cost of a set of coconut timber railings and rollers was MRf. 1950.

During the demonstration, it was felt that the pulling force requirement with the rails and rollers was reduced by about half of what was needed with mature timber under the boat.

The rails and rollers were very useful during the launching operation. The boat very easily slid down from the beach more or less by itself. The reaction of the fisherfolk to this was somewhat mixed. However, the fisherfolk using the rope tackle found the coconut rails and rollers essential for the beach-hauling devices. The fisherfolk who used the capstan or winch did not see the need for rails and rollers as the pulling power of these devices permitted the use of mature timber which they have been using for decades.

5.5 *Rope and cable*

Rope of 18 mm PP was used for the tackle and the wooden capstan. It worked well, but stretched. When used with the capstan, it made the boat move and stop. With both hauling devices, a harder laid PA nylon rope would work better.

Galvanized steel wire 12 mm and 100 m long, which was used with the winches, worked well. Because of its durability, low stretch and safety it was preferred to synthetic rope. The length of wire used could, on most islands, be reduced to 50 m.

5.6 *Anchor*

The sand anchor, consisting of a galvanized chain 13 mm or PP rope 24 mm diameter, *1.5-2.5* m in length attached to a concrete block or a coconut log 1.5 m long buried 1 m deep in the sand, worked well. However, for safety, galvanized chains should preferably be used.

5.7 *Earnings*

The island population as a whole, and women in particular, have traditionally been involved in the hard and time-consuming task of hauling fishing craft. In spite of the work being hard, these occasions are enjoyed as social gatherings as well as being treated as a joint community responsibility.

The boat-owner has to pay a small charge to the community for hauling the craft onto the beach. Earnings normally went to the Island Development Committee's Fund. This fund was then used for the benefit of different island development activities, *e.g.* the building and maintenance of the mosques.

With the introduction of the hauling devices, a small reduction in the Island Committee's earnings has occurred. What was previously used for island development is now either kept for repayment of the revolving fund loans or for the maintenance of the hauling devices themselves. However, the fisherfolk felt that the financial loss to the community was insignificant, whereas the benefits in terms of efficiency, reduction of labour force and toil itself, and time saving, were considerable.

With the technological changes, the women have not been involved in the boat hauling operations. Yet, this does not seem to have created any resentment among them. On the contrary, they appear pleased that this innovation has released them from an arduous and laborious task. In some cases though, it appears that women's committees would like to remain in control of the boat hauling process.

(Text continues on page 15)

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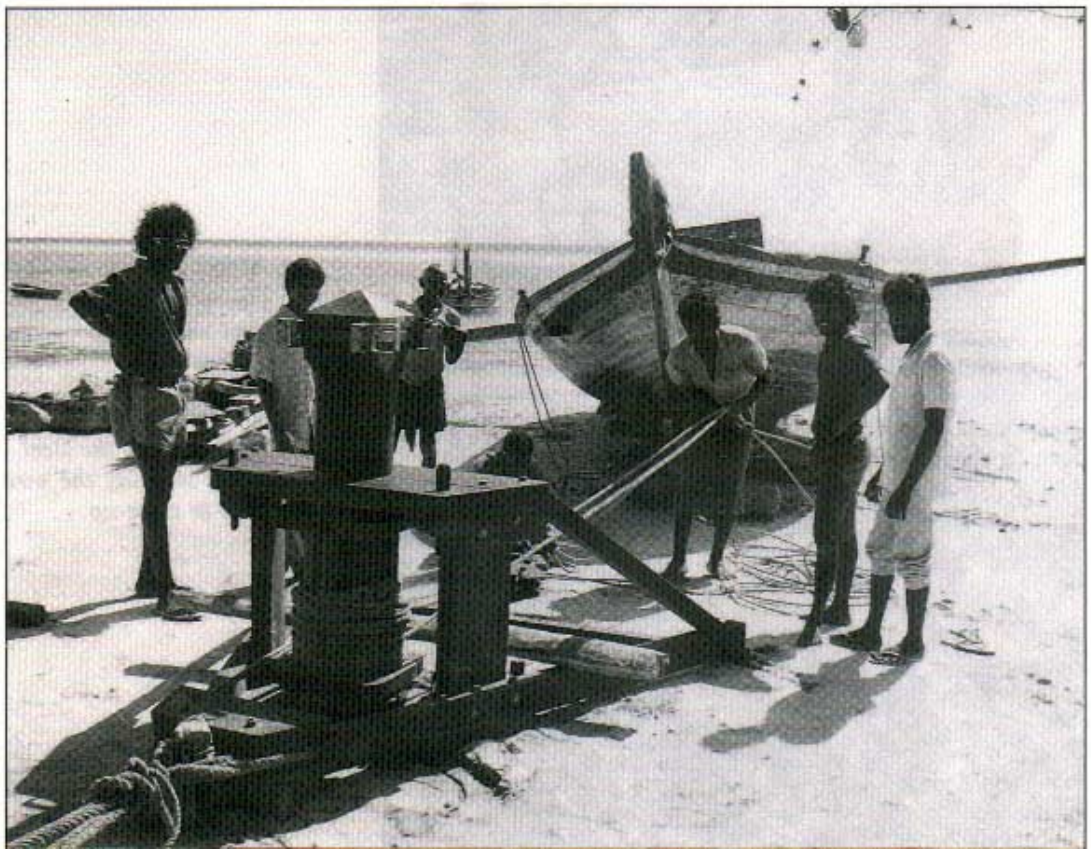
Wooden rails and sleepers are arranged preparatory to hauling ashore a dhoni

The dhoniis *hauled on to the rails and rollers*

The steel wire gets wound on the wooden winch as the hauling operation gets underway



A wooden winch and dhoni *on the beach*

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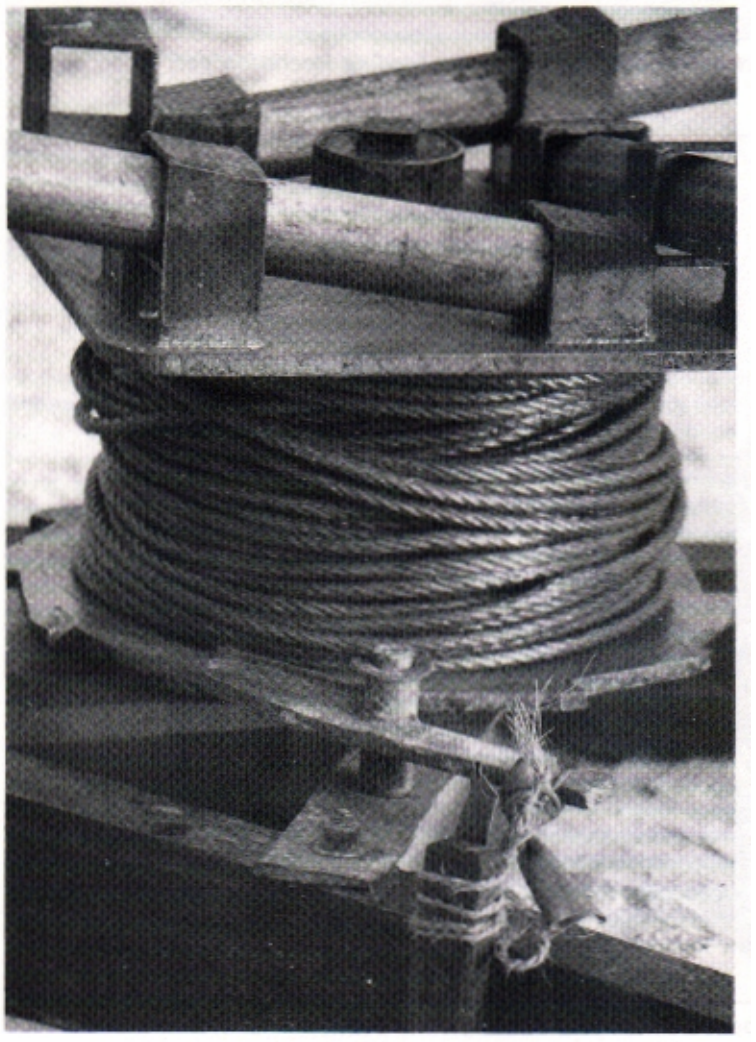

Above:
Operating the steel winch

On left
The drum of the steel winch showing the wire used in close-up

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6. GOVERNMENT INTRODUCTION SCHEME

A good response on the use of the three hauling devices and a preference for the steel winches by the fisherfolk of several islands in a number of atolls prompted the MOFA to issue ten steel winches under a UNCDF revolving fund credit scheme. Because of the lower cost of imported steel winches, they were acquired from Varuna Construction and Design Company, Madras, India, who manufactured the prototype.

The availability of the new steel winches was announced on Radio Maldives in April 1991. Applications were received by the MOFA from 41 island communities. The selection of beneficiaries was done by MOFA. Islands were selected on the basis of the number and size of fishing craft beached on them. The winches were eventually issued to selected fishermen beneficiaries of eleven selected islands in seven atolls. Six of the beneficiaries picked up their steel winches in Male and transported them to their islands in July 1991. They were fisherfolk from:

ATOLL	*ISLANDS*
Thaa	Dhiyamigili
Alifu	Ukulhas
Laamu	Maamendhoo
Gaaf Alifu	Viligili
Gaaf Dhaalu	Thinadhoo
Haa Alifu	Uligamu

A steel winch provided free of cost by the manufacturer and kept in Male for demonstration purposes and the four that were not picked up by the beneficiaries were allocated to the following islands in September 1991.

A TOLL	*ISLANDS*
Gaaf Dhaalu	Gahdhoo
Haa Alifu	Ihavandhoo
Haa Alifu	Dhihdhoo
Kaafu	Viligili

An instruction folder in Dhivehi (the local language) was prepared by the MOFA and supplied with each winch. It contains information on capacity, installation, wire and its upkeep, repairs and maintenance, and safety precautions. See Appendix II.

The terms and conditions of the revolving fund loan were

- The full cost of the complete winch, MRf 11,760, was interest free, but is to be repaid in two years, in 12 instalments of MRf 980 each.
- Hauling priority should be given to the *masdhonis.*
- If so desired, the winch could be moved to another island, but only after two years and full payment of the loan.
- Should these rules not be adhered to, the winch would have to be returned to the MOFA and the amount paid till then would not be refunded.

To maintain the same service charges and, at the same time, meet the MRf 980 instalment every two months over the two years, at least 35 boats, preferably based in one island, would have to be serviced. As boats from other islands may or may not require servicing, the revolving fund scheme can only be viable in an island with a large fleet of home-based *dhonis.*

Extending the repayment period of the revolving fund scheme to four years, while maintaining the traditional hauling charges, would enable the project to be economical with one steel winch servicing a home-based fleet of 15 *dhonis.* If this was permitted, most of the islands with *masdhonis* would, be in a position to acquire the new steel winches.

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Given the estimated service life of a steel winch as ten years, MOFA could be somewhat more flexible with the financing scheme, to help meet the needs for hauling devices in smaller island communities. This would also help generate more income to finance as is traditionally done, the social activities of the local communities.

7. *CONCLUSIONS*

After two years of trials and demonstration with three different types of hauling devices, it can be concluded that the steel winch is most suitable for hauling the fishing *dhonis* and other craft onto the beach in the Maldives. It is also the preferred winch, by far, of the local fisherfolk who see much merit in it.

The good pulling force permits the use of cheap, locally available and traditionally used mature timber instead of more expensive timber for rollers and rails.

The fisherfolk do not wish to build the winches on their islands. They would prefer to buy them readymade.

Local manufacturing in Male is more expensive than importing the winches readymade from India.

The use of this type of steel winch is feasible in most of the inhabited island home bases of fishing *dhonis* and other transport boats.

Besides this type of winch, other simpler, cheaper and lighter hauling devices, such as the rope-tackle, can be used. The rope-tackle is recommended for any island with a fleet of smaller boats.

The introduction of the steel winch has released fisherfolk from hard labour. This has been particularly appreciated by the women.

The small reduction of earnings, in the communities where the hauling devices were demonstrated, was felt to be insignificant. The reduction of hard work and time-saving were more important to these fisherfolk.

The relatively large number of initial applications for the eleven steel winches introduced by the MOFA and subsequent applications indicate that the new steel winch meets a need for such hauling devices.

Engineering drawings of the wooden capstan and steel winch seen on page 7 are available from the Bay of Bengal Programme, 91 St. Mary's Road, Abhiramapuram, Madras 600 018, India

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APPENDIX I

Sequence of events

1988	
FEBRUARY	Assessment of the need for hauling devices by Bay of Bengal Programme Senior Fishing Technologist, Naval Architect Consultant and staff of the Ministry of Fisheries and Agriculture (MOFA)
APRIL	Design of a wooden capstan, a steel winch and accessories by BOBP.
JULY-AUGUST	Construction and testing of wooden capstan and steel winch by BOBP and local workshops in Madras.
SEPTEMBER	Construction and testing of wooden winch by BOBP and local workshop in Madras.
OCTOBER	Shipping of the three prototype hauling devices from Madras to Male *via* Tuticorin by **BOBP.**
	Selection by MOFA of Mulaku Island in Meemu Atoll for demonstration of the prototype hauling devices.
	Construction of accessories (wooden rollers and rails) by local workshop in Male.
NOVEMBER	Due to unforeseen circumstances in the Maldives, the demonstration was postponed till the following February.
1989	
FEBRUARY	Demonstration of all three prototype hauling devices to the fisherfolk of Mulaku Island, by BOBP and MOFA.
MARCH	Selection by MOFA of Dhiggaru Island, Meemu Atoll, for demonstration of the wooden capstan and winch.
	Demonstration of the steel winch in Mulaku Island continues due to the positive response from the fisherfolk. They insisted on keeping it in Mulaku and not transfering it to Dhiggaru.
APRIL	Broadcasting of demonstration of new hauling devices through Fisherfolk Radio Programme by MOFA
MAY	Several enquiries on the use of the steel winch received from fisherfolk. It already seems that this was the preferred hauling device.
	BOBP and MOFA continues to demonstrate wooden capstan and winch in Dhiggaru.
	Assessment on feasibility to construct steel winch in Male is carried out, with negative results.
	Shooting of video film on use of the hauling devices.
AUGUST	Demonstration of triple pulley tackle for hauling *dhonis* in Nilandhoo Island, Faafu Atoll, evokes positive response from the fisherfolk.
SEPTEMBER	MOFA requests quotation for ten steel winches and this is sent to Varuna Construction & Design Company, Madras.
	Preparation by MOFA of UNCDF-sponsored revolving fund project to help with the distribution of the new steel winches.
OCTOBER	Order for ten steel winches placed by MOFA with Varuna Construction & Design Company.
DECEMBER	Evaluation of the demonstration of the hauling devices and reporting on the design, construction and use.
1990	
JANUARY	Preparation of final design of the steel winch by BOBP.
MAY	Manufacture of eleven steel winches by Varuna Construction & Design Company.
SEPTEMBER	Shipping of eleven winches from Madras to Tuticorin.
OCTOBER	Shipping delayed in Tuticorin.
1991	
JANUARY	The eleven winches arrive in Male and are distributed to selected fishermen.
APRIL	Transfer of the wooden capstan from Dhiggaru to Maduvaree Island, Meemu Atoll, where it is demonstrated by the fisherfolk of Dhiggaru.

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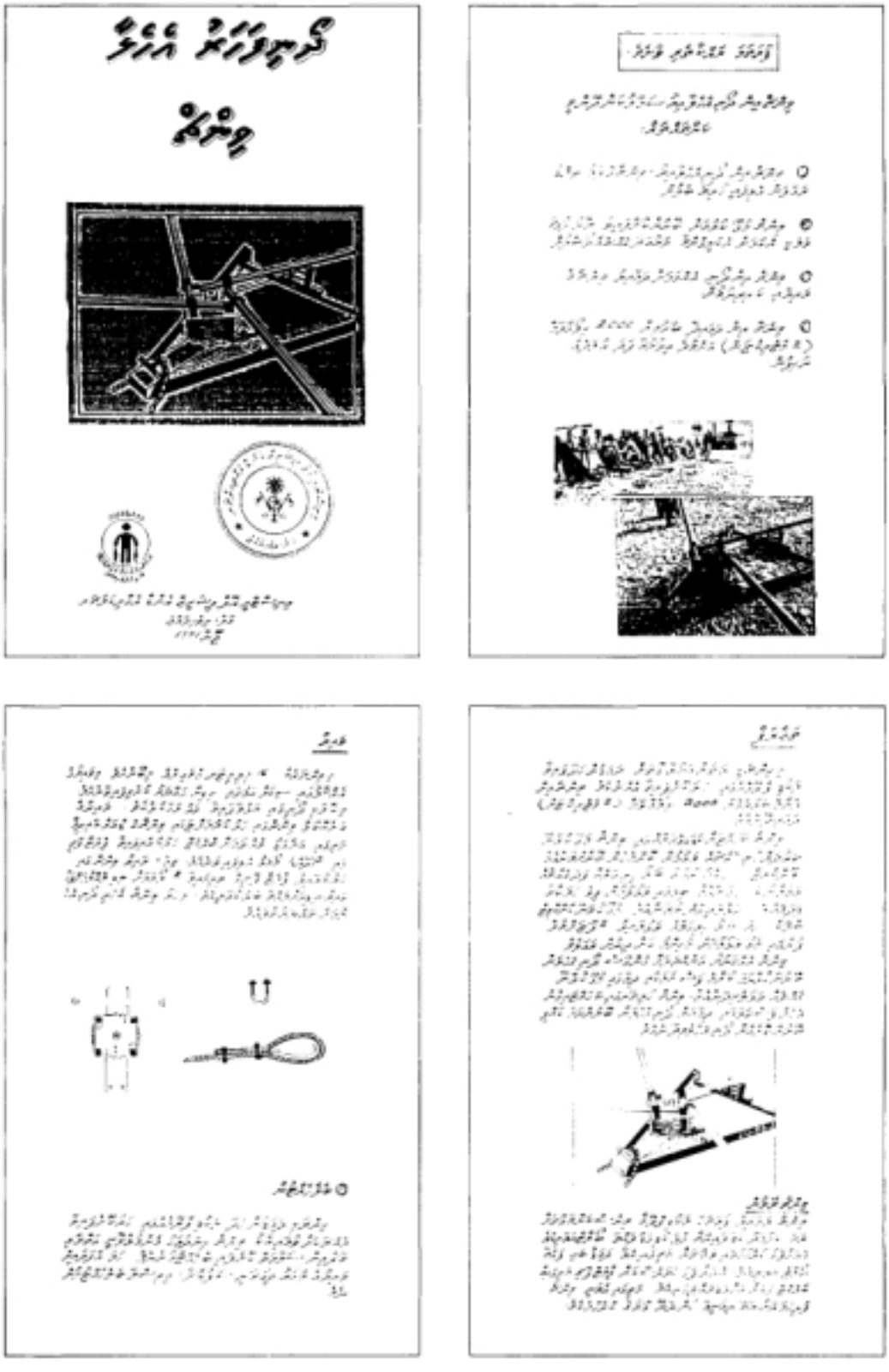
APPENDIX II

The Dhivehi instruction folder



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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.)
26. *Report of the Tenth Meeting of the Advisory Committee.* Male, Maldives. 17-18 February 1986. (Madras, April 1986.)
27. *Activating Fisherwomen for Development through Trained Link Workers in Tamil Nadu, India.* E. Drewes. (Madras, May 1986.)
28. *Small-scale Aquacullure Development Project in South Thailand: Results and Impact.* E. Drewes. (Madras, May 1986.)
29. *Towards Shared Learning: An Approach to Non-formal Adult Education for Marine Fisherfolk of Tamil Nadu, India.* L. S. Saraswathi and P. Natpracha. (Madras, July 1986.)
30. *Summary Report of Fishing Trials with Large-mesh Driftnets in Bangladesh.* (Madras, May 1986.)
31. *In-service Training Programme for Marine Fisheries Extension Officers in Orissa, India.* U. Tietze. (Madras, August 1986.)
32. *Bank Credit for Artisanal Marine Fisherfolk of Orissa, India.* U. Tietze. (Madras, May 1987.)
33. *Non-formal Primary Education for Children of Marine Fisherfolk in Orissa, India.* U Tietze, Namita Ray. (Madras, December 1987.)
34. *The Coastal Set Bagnet Fishery of Bangladesh — Fishing Trials and Investigations. S.* E. Akerman. (Madras, November 1986.)
35. *Brackishwater Shrimp Culture Demonstration in Bangladesh.* M. Karim. (Madras, December 1986.)
36. *Hilsa Investigations in Bangladesh.* (Colombo, June 1987.)
37. *High-Opening Bottom Trawling in TamilNadu, Gujarat and Orissa, India: A Summary of Effort and Impact.* (Madras, February 1987.)
38. *Report of the Eleventh Meeting of the Advisory Committee.* Bangkok, Thailand, March 26-28, 1987. (Madras, June 1987.)
39. *Investigations on the Mackerel and Scad Resources of the Malacca Straits.* (Colombo, December 1987.)
40. *Tuna in the Andaman Sea.* (Colombo, December 1987.)
41. *Studies of the Tuna Resource in the EEZs of Sri Lanka and Maldives* (Colombo, May 1988.)
42. *Report of the Twelfth Meeting of the Advisory Committee.* Bhubaneswar, India, 12-15 January 1988. (Madras, April 1988.)
43. *Report of the Thirteenth Meeting of the Advisory Committee.* Penang, Malaysia, 26-28 January, 1989. (Madras, March 1989.)
44. *Report of the Fourteenth Meeting of the Advisory Committee.* Medan, Indonesia, 22-25 January, 1990. (Madras, April 1990.)
45. *Report of the Seminar on Gracilaria Production and Utilization in the Bay of Bengal Region.* (Madras, November 1990.)
46. *Evploratory Fishing for Large Pelagic Speciesin the Maldives* R.C. Anderson and A. Waheed. (Madras, December 1990.)
47. *Exploratory Fishing for Large Pelagic Species in Sri Lanka.* R. Maldeniya and S.L. Suraweera. (Madras, April 1991.)
48. *Report of the Fifteenth Meeting of the Advisory Committee.* Colombo, Sri Lanka, 28-30 January, 1991. (Madras, April 1991.)
49. *Introduction of New Small Fishing Craft in Kerala.* 0. Gulbrandsen and M.R. Andersen. (Madras, January 1992)
50. *Report of the Sixteenth Meeting of the Advisory Committee.* Phuket, Thailand, 20-23 January, 1992. (Madras, April 1992.)

<<

51. *Report of the Seminar on the Mud Crab Culture and Trade in the Bay of Bengal Region,* November 5-8, Surat Thani, Thailand. (Madras, September 1992.)

52. *Feeds for Artisanal Shrimp Culture in India — Their Development and Evaluation.* John **F** Wood, Janet **H** Brown, Marlie H MacLean and Isaac Rajendran. (Madras, September 1992.)

Working Papers (BOBP/WP/...)

27. *Reducing the Fuel Costs of Small Fishing Boats.* O Gulbrandsen. (Madras, July 1986.)

38. *Credit for Fisherfolk: The Experience in Adirampaltinam, Tarnil Nadu, India.* **R. S.** Anbarasan and O Fernandez. (Madras, March 1986.)

42. *Fish Trap Trials in Sri Lanka.* (Based on a report byT. Hammerman). (Madras, January 1986.)

43. *Demonstration of Simple Hatchery Technology for Prawns in Sri Lanka.* (Madras, June 1986.)

44. *Pivoting Engine installation for Beachlanding Boats.* A. Overa, R. Ravikumar. (Madras, June 1986.)

45. *Further Development of Beachianding Craft in India and Sri Lanka.* A. Overa, **R.** Ravikumar, 0. Gulbrandsen, G. Gowing. (Madras, July 1986.)

46. *Experimental Shrimp Farming in Ponds in Polekurru, Andhra Pradesh, India.* **J. A. J.** Janssen, **T.** Radhakrishna Murthy, B. V. Raghavulu, V. Sreekrishna. (Madras, July 1986.)

47. *Growth and Mortality of the Malaysian Cockle* (Anadara granosa) *under Commercial Culture. Analysis through Length-frequency Data.* Ng Fong Oon. (Madras, July 1986.)

48. *Fishing Trials with High-Opening Bottom Trawis from Chandipur, Orissa, India. G.* **Pajot** and B. B. Mohapatra. (Madras, October 1986.)

49. *Pen Culture of Shrimp by Fisherfolk: The Experience in Killai, Tamil Nadu, India.* E. Drewes, 0. Rajappan. (Madras, April 1987.)

50. *Experiences with a Manually Operated Net-Braiding Machine in Bangladesh.* B. C. Gillgren, A. Kashem. (Madras, **November** 1986.)

51. *Hauling Devices for Beachlanding Craft.* **A.** Overa, **P. A.** Hemminghyth. (Madras, August 1986.)

52. *Experimental Culture of Seaweeds* (Gracilaria *Sp.) in Penang, Malaysia.* (Based *on* a report by M Doty and J Fisher). (Madras, August 1987.)

53. *Atlas of Deep Water Demersal Fishery Resources in the Bay of Bengal.* T. Nishida and **K.** Sivasubramaniam. (Colombo, September 1986.)

54. *Experiences with Fish Aggregating Devices in Sri Lanka.* K.T. Weerasooriya. (Madras, January 1987.)

55. *Study of Income, Indebtedness and Savings among Fisherfolk of Orissa, India.* **T.** Mammo. (Madras, **December** 1987.)

56. *Fishing Trials with Beachianding Craft at Uppada, Andhra Pradesh, India.* **L.** Nyberg. (Madras, **June 1987.)**

57. *Identifying Extension Activities for Fisherwomen in Visakhapatnam District, Andhra Pradesh, India.* D. Tempelman. (Madras, August 1987.)

58. *Shrimp Fisheries in the Bay of Bengal.* **M.** Van der Knaap. (Madras, August 1989.)

59. *Fishery Statistics in the Bay of Bengal.* T. Nishida. (Colombo, August 1988.)

60. *Pen Culture of Shrimp in Chilaw, Sri Lanka.* D. Reyntjens. (Madras, April 1989.)

61. *Development of Outrigger Canoes in Sri Lanka.* Gulbrandsen, (Madras, November 1990.)

62. *Silvi-Pisciculture Project in Sunderbans, West Bengal: A Summary Report of BOBP's assistance.* **CL.** Angel!, **J.** Muir, (Madras, September 1990.)

63. *Shrimp Seed Collectors of Bangladesh.* (Based on a study by UBINIG.) (Madras, October 1990.)

64. *Reef Fish Resources Survey in the Maldives.* **M.** Van der Knaap, **Z.** Waheed, **H.** Shareef, **M.** Rasheed (Madras, April 1991.)

65. *Seaweed* (Gracilaria Edulis) *Farming in Vedalai and Chinnapalam, India.* Ineke Kalkman, Isaac Rajendran, Charles L Angell. (Madras, June 1991).

66. *Improving Marketing Conditions for Women Fish Vendors in Besant Nagar, Madras.* K. Menezes. (Madras, April 1991.)

67. *Design and Trial of ice Boxes for Use on Fishing Boats in Kakinada. India.* 1.J. Clucas. (Madras, April 1991.)

68. *The By-catch from Indian Shrimp Trawlers in the Bay of Bengal: The potential for its improved utilization.* Ann Gordon. (Madras, August 1991).

69. *Agar and Alginate Production from Seaweed in India.* **J.J.W.** Coppen, **P.** Nambiar, **(Madras, June** 1991.)

70. *The Kattumaram of Kothapatnam-Pallipalem, Andhra Pradesh, India — A survey of the fisheries and fisherfolk.* Dr. K. Sivasubramaniam. (Madras, December 1991).

71. *Manual Boat Hauling Devices in the Maldives* (Madras, November 1992.)

72. *Giant Clams in the Maldives — A stock assessment and study of their potential for culture.* Dr. JR. Barker. (Madras, **December 1991.)**

73. *Small-scale culture of the flat oyster* (Ostrea folium) *in Pu/au Langkawi, Kedah, Malaysia,* Devakie Nair and Bjorn Lindeblad. (Madras, November 1991).

74. *A Study of the Performance of Selected Small Fishing Craft on the East Coast of India.* Gardien El Gendy. (Madras, August 1992).

75. *Fishing Trials with Beachlanding Craft at Thirumullaivasal, Tamil Nadu, India. 1989-1992.* **G.** Pajot. (Madras, November 1992.)

76. *A View from the Beach — Understanding the status and needs of fisherfo/k in the Meemu, Vaavu and Faafu Atolls of the Republic of Maldives.* The Extension and Projects Section of the Ministry of Fisheries and Agriculture, The Republic of Maldives. (Madras, June 1991).

77. *Development of Canoe Fisheries in Sumatera, Indonesia.* **O** Gulbrandsen and *G* Pajot. (Madras, April 1992).

78. *The Fisheries and Fisherfolk of Nias Island, Indonesia. A description of the fisheries and a socio-economic appraisal of the fisherfolk.* Based on reports by **G** Pajot and P. Townsley. (Madras, December 1991.)

79. *Review of the Beche De Mer (Sea Cucumber) Fishery in the Maldives* by Leslie Joseph (Madras, April 1992.)

80. *Reef Fish Resources Survey in the Ma/dives — Phase Two* by **R C** Anderson, Z Waheed, M Rasheed and **A** Arif (Madras, April 1992)

81. *Exploratory Fishing for Large Pelagic Species in South Indian Water.* Jean Gallene and Robert Hall. (Madras, November 1992.)

82. *Cleaner Fishery Harbours in the Bay of Bengal* (Madras, April 1992)

83. *Survey of Fish Consumption in Madras. Marketing and Research Group, Madras, India.* (Madras, October 1992).

Manuals and Guides *(BOBP/MA G/...)*

I. *Towards Shared Learning: Non-formal Adult Education for Marine Fisherfolk.* Trainers' Manual. (Madras, June 1985.)

2. *Towards Shared Learning: Non-formal Adult Education for Marine Fisherfolk.* Animators' Guide. (Madras, June 1985.)

3. *Fishery Statistics on the Microcomputer: A BASIC Version of Hasselblad's NORMSEP Program.* D. Pauly, N. David, J. Hertel-Wulff. (Colombo, June 1986.)

4. *Separating Mixtures of Normal Distributions : Basic programs for Bhattacharya's Method and Their Application for Fish Population Analysis.* **H.** Goonetilleke, **K.** Sivasubramaniam. (Madras, November 1987.)

5. *Bay of Bengal Fisheries Information System (BOBFINS) : User's Manual.* (Colombo, September 1987.)

8. *Extension Approaches to Coastal Fisherfolk Development in Bangladesh: Guidelines for Trainers and Field Level Fishery Extension Workers. Department of Fisheries, Ministry of Fisheries and Livestock, Government of Bangladesh and Bay of Bengal Programme.* (In Bangla). (Bangladesh, July 1992.)

10. *Our Fish, Our Wealth.* **A** guide to fisherfolk on resources management. — in 'comic book' style (English/Tamil/Telugu) Kamala Chandrakant with K. Sivasubramaniam and Rathin Roy. (Madras, December 1991.)

Information Documents *(BOBP/INF/...)*

9. *Food and Nutrition Status of Small-Scale Fisherfolk in India's East Coast States : A Desk Review and Resource investigation.* V. Bhavani. (Madras, April 1986.)

10. *Bibliography on Gracilaria — Production and Utilization in the Bay of Bengal.* (Madras, August 1990.)

11 *Marine Small-Scale Fisheries of West Bengal: An Introduction.* (Madras, November 1990.)

12. *The Fisherfolk of Puttalam, Chilaw, Galle and Matara — A study of the economic status of the fisherfolk of four fisheries districts in Sri Lanka.* (Madras, December 1991.)

13. *Bibliography on the Mud Crab Culture and Trade in the Bay of Bengal Region.* (Madras, October 1992.)

Newsletters *(Bay of Bengal News)*

Quarterly

Other Publications

Artisanal Marine Fisherfolk of Orissa : Study of their Technology, Economic Status, Social Organization and Cognitive Patterns. U Tietze. (Madras)

Studies on Mesh Selectivity and Performance: The New Fish-cum-Prawn Trawl at Pesalal, Sri Lanka. BOBP/MIS/3. M.S.M. Siddeek. (Madras, September 1986.)

Motorization of Dinghy Boats in Kasafal, Orissa. BOBP/MIS/4. S. Johansen and Gulbrandsen. (Madras, November 1986.)

Helping Fisherfolk to Help Themselves: A Study in People's Participation. (Madras, 1990.)

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