



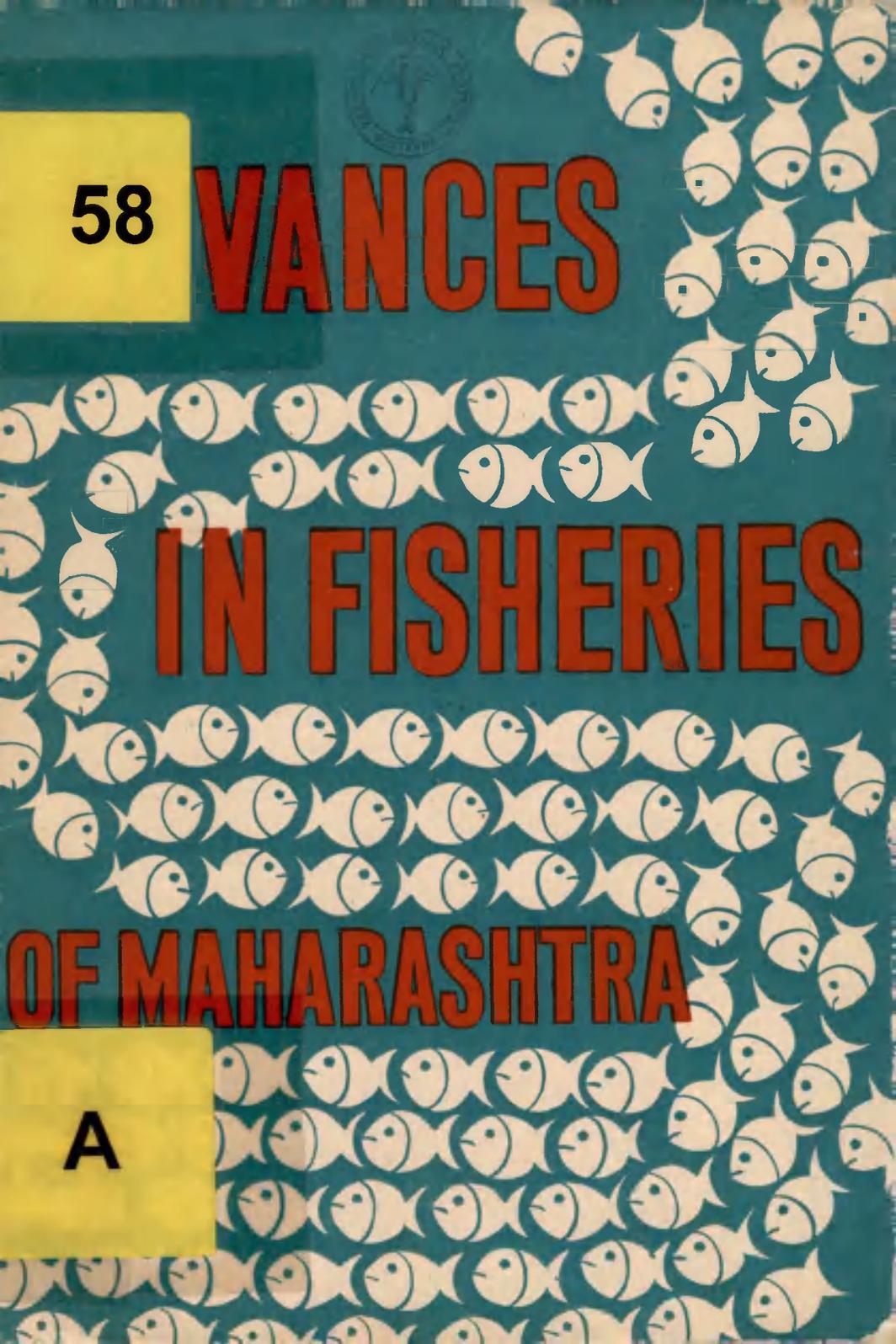
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VANCES

IN FISHERIES

OF MAHARASHTRA

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Eigendom van het
Westvlaams Economisch Studiebureau
Brugge Reeks / Boek

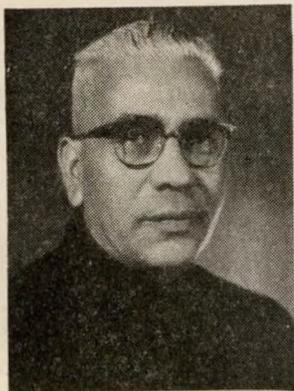


**ADVANCES
IN FISHERIES
OF MAHARASHTRA**

CHIEF MINISTER



MAHARASHTRA



FISH— A VERY VALUABLE FOOD

I AM glad to know that the Fisheries in Maharashtra are making good progress and recent advances are being printed in this brochure. Fish is a very valuable food at all times but particularly now when we are passing through a period of food-shortages. If therefore fisheries, which have great possibilities, are properly developed, it will provide a very nutritious food.

Maharashtra has a long coastline and strong and courageous fishermen. If the fishery resources are developed they would not only help us to increase our food supplies but will also augment our foreign exchange earnings.

At the same time looking after the economic welfare of the poor fishermen is an important function of the Fisheries Department and I am glad adequate attention is paid to the problem.

V. P. Naik

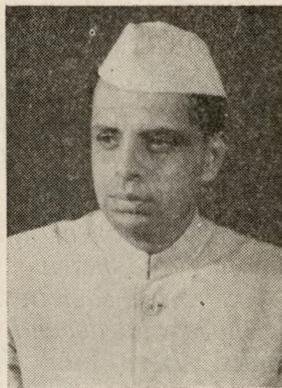
(V. P. NAIK)

10th November 1965



MAHARASHTRA

GREAT POTENTIALITIES OF FISHERIES



FISHERIES is occupying a very vital place today in our country particularly in days when we are passing through great and even grave difficulties in cereal supply due to crop failure and uncertainty of imports.

The potentialities of fisheries production in India are enormous having as we do one of the longest coast-lines among maritime States of the world. We can derive a thick crop of a rich variety of fish in our waters and today's 1.3 lakh tonnes annual production can really be much enlarged and made comparable with some of the best catches of fish in the world like those of top countries like Peru, Japan and others. Inadequate modernization of fishing techniques, including insufficient mechanized fishing craft, is the biggest drawback.

Lack of deep-sea trawlers has prevented exploitation of off-shore fishing grounds, as a result of which lakhs of tonnes of fish are lost to the country both for internal consumption as well as for exports.

About 60 per cent of India's population is fish-eating and if sea-foods are available and at a reasonable price, they would serve as a very substantial supplementary meal. Earnings from exports could also be stepped up with increased production and better canning and freezing facilities. Fisheries could indeed become a sizeable foreign exchange earner.

The development of better cold storage, transport and marketing must necessarily go together with increased production in order to ensure equitable and expeditious distribution. Progress of fishing harbours is another great requirement now being attended to.

The care of fishermen and their families necessitates extending adequate assistance to ensure the best results. Our fishermen being proverbially poor require to be aided by subsidies and loans to improve their lot and their methods.

Promotion of inland fisheries will result both in supplementing the marine catch as well as, through fishermen's co-operative societies, amelioration of economic conditions of those who depend for their livelihood on fishing in lakes, tanks, rivers, etc.

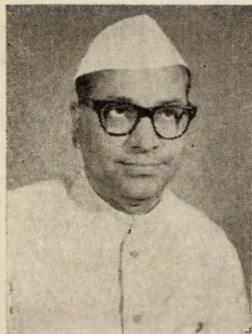
Maharashtra is one of the most leading States in the promotion of fisheries in India, having increased the fish catch from 1·25 lakh tonnes at the beginning of the Plan to 2·20 lakh tonnes. The Third Five-Year Plan of the State began with only Rs. 178·32 lakhs—the fifth largest allocation for fisheries, but will end up by having spent the highest amount physically, estimated at Rs. 256·22 lakhs by March 1966, that is, 143 per cent by end of Plan period. The progress can certainly be considered satisfactory, especially over which our Director, Dr. C. V. Kulkarni, has taken great pains.

The brochure has outlined the salient features of our approach to the development of fisheries of the State—the main emphasis being on increased production of fish and welfare of the working fishermen. Sufficient care is also being taken to survey new fishing grounds and to chalk-out schemes for promotion of export trade particularly in our mechanized fleet where our State has nearly 1,800 such fishing craft or nearly 60 per cent of mechanized boats in the entire country. It is hoped that these objectives will contribute to all-round development of our fishing industry.

HOMI J. H. TALEYARKHAN

Minister for Housing, Printing Presses, Fisheries
Small Savings and Tourism, Government of
Maharashtra, Sachivalaya, Bombay-32

12th November 1965



AUGMENTATION OF FISH RESOURCES VITAL

THIS brochure will give an account of fishery resources of Maharashtra and the steps which are being taken for their development. Procurement of food has assumed such a great importance at the present juncture that any information which will enable augmentation of these resources would not only be helpful to the people in the Fish industry but also to administrators and planners. The booklet indicates the progress made during the recent years, but we are conscious that a lot more is yet to be accomplished to fulfil the nutritional requirements of the people as well as the foreign trade we want to develop. We have, therefore, to devise new means of procurement of more fish from the distant regions of the seas and their proper preservation and storage. This is an up-hill task but with courage and fortitude of our fishermen and guidance of technologists we hope to achieve it. I hope the booklet will serve the purpose of spreading the gospel of increased production.

H. G. VARTAK
Deputy Minister for Fisheries



Shri C. Subramaniam, Union Minister for Food & Agriculture, and Shri Homi J. H. Taleyarkhan, State Minister for Fisheries, on the occasion of transference of Government of India Fish Meal Plant

RECENT ADVANCES IN FISHERIES OF MAHARASHTRA

BATTLE-FRONT of food is more meaningful to us at present than at any time in the past. Adequate supply of protein food in the diet of our people is the main source of their health and strength. This nutritional requirement demands procurement of sufficient foods of animal origin, both, from land and water resources.

Tapping of living aquatic resources, thereby meaning development of fishery potential has thus assumed greater importance to us, necessitating emphasis on schemes yielding higher production of fish. The Department of Fisheries, in the State of Maharashtra, has, all along, followed this principle and devoted attention to production-oriented schemes, keeping also in view the amelioration of the socio-economic condition of the primary operatives in the fishing industry, namely the fishermen. It is very heartening to note that efforts in different directions in the last 15 years have flowered into a record production of 2,20,000 tonnes in 1964-65. Achievements in fish production, although they have to be linked with the variations in the availability of fish in the natural resources, are also attributed to the purposeful developments undertaken to exploit the natural resources to the maximum advantage.

State of Maharashtra is privileged with the bounties of both marine and fresh-water fisheries in varying abundance, marine fisheries being naturally predominant as the vast Arabian Sea is open to it. Steps taken by Government to develop these resources including technological and socio-economic improvement of fishermen are detailed in the following pages.

MARINE FISHERIES

Resources

The State has a coastline of 700 kilometres, aligning the maritime districts of Thana, Greater Bombay, Kolaba and Ratnagiri. The Sahyadri mountain range runs parallel to the coastline leaving a very narrow strip of land nestling the fishing villages, numbering as many as 210. The

coastline is characterised by small sandy bays and bold rocky capes and is indented by a number of rivers and creeks giving rise to small harbours. Some of the creeks are navigable by small craft up to about 30 miles inland.

Continental shelf, which, in general, all over the world, is considered the richest region of sea in fisheries potentials, is nearly 190 kilometres wide in north Maharashtra and 64 kilometers in south Maharashtra, totalling nearly 32,500 square kilometres. The sea bottom, from the close proximity of the shore out up to the continental shelf margin, consists almost of dark, gray clay mud and sand affording good opportunities for trawling operations.

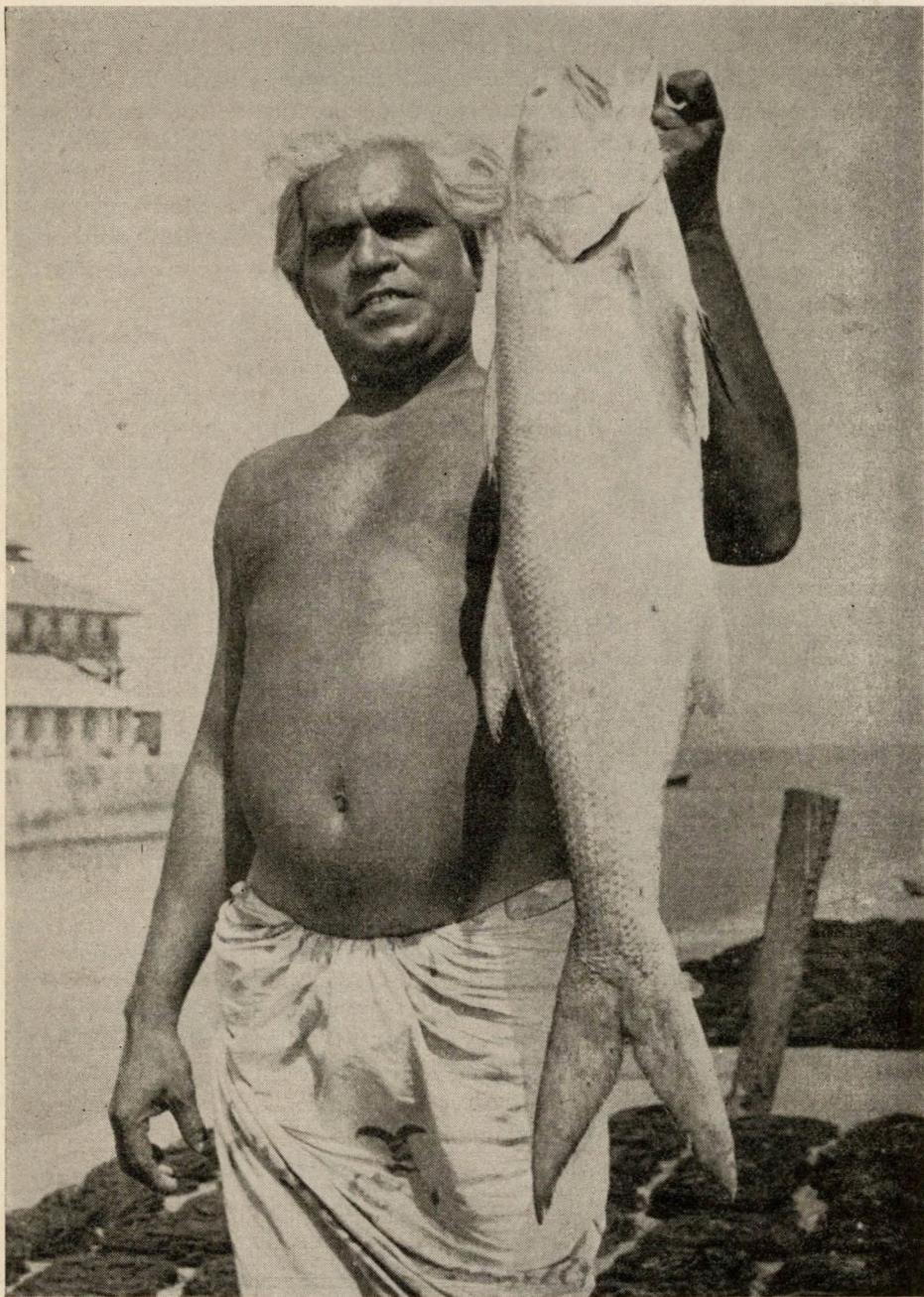
Commercial fishes

The northern region of the Maharashtra maritime is characterised by the fisheries of Bombay Duck (*Harpodon nehereus*), which is caught in large quantities and after meeting local needs is exported, sun-dried, to African and Asian countries ; Dara (*Polynemus indicus*) and Rawas (*Eleutheronema tetradactylum*), the threadfins which grow to about four feet and are highly prized as food ; Pomfret (*Pampus argenteus*), highly esteemed as a table fish ; Ghol (*Pseudosciaena diacanthus*), which grows to over 30 lbs. ; Golden Eel (*Muraenesox talabonoides*) abounding on the muddy bottom and caught in large quantities on the long lines and Catfishes (*Tachysurus spp.*), which readily comes to the hook. The southern Maharashtra is characterised by the fast-swimming denizens of the surface waters such as Mackerel (*Rastrelliger kanagurta*), Seerfish (*Cybium guttatum* and *Cybium commersonii*), Porthole fish (*Scomberoides tala*), Tunas (*Kishnoella tongol*, *Auxis thazard*, *Euthynnus alleteratus affinis*) and Sardines (*Sardinella fimbriata*, *S. longiceps*).

Amongst shellfish, prawns, shrimps and lobsters are the important forms from the export point of view and are found in fairly large quantities along the whole maritime, particularly off the southern Maharashtra, which is also rich with clam, oysters and crabs.

Fishermen

There are about 37,000 fishermen engaged in marine fisheries. They belong to Hindu, Muslim and Christian faiths, some of the fishing communities being the Sonkolis, Daldi, Mangela, Vaiti, Kharvi and Machhi.



Our fisherman with his booty (Dara)

Gear

The State owes more than 50 per cent of the production to the operation of bagnet known as Dol. The net has been evolved by the fishermen with the highest ingenuity both in the way of construction and operation, involving the principles of hydrodynamics. Gillnets or 'Waghra', made of hemp twine, are operated at the bottom for catching Dara ; 'Wavdi' or 'Budichi Jal', another bottom set net made of nylon or cotton twine, is operated for catching Silver pomfrets ; surface drift nets or Ravsi or Daldi, made also of cotton or nylon twine, are operated for catching Black pomfrets, 'Palla', 'Bhing', Tuna etc. Long lines are used to catch eel, catfish, sharks, seerfish and tuna. The 'Rampan' net, a giant shore-seine, is used in the south of Ratnagiri for the capture of mackerel, sardines and other shoaling fish. The other methods of catching fish are the ubiquitous cast net (called Pag), drag nets (Vedi and Gholva), barrier nets (Wada or Wana), lobster traps (Gada and Virat) and hooks and lines.

Craft

The fishing fleet of Maharashtra consists of 9,130 units, out of which the number of boats plank-built and above a ton in burthen are about 4,700; of the latter about 2,530 are above three tons in burthen strongly built in teak wood.

The most important types of boats are the '*Balyav*' of Bassein with a high pointed stem, short keel and rounded stern ; the '*Kotha*' type having square stern and long keel used at Satpati ; the canoe type '*Macchawa*' used all over Bombay and Karanja pointed at both ends ; another canoe type of boat with outrigger employed in Ratnagiri District and lastly small dug-out canoes fishing mainly in creeks and estuaries.

Mechanization of fishing craft

Mechanization of indigenous fishing craft has been given the highest impetus by the Government in the development of marine fisheries. It is a matter of pride record that out of 4,000 sailing crafts which can be mechanized, as many as 1,790 have been mechanized so far out of 3,000 in the country. This boost of mechanization programme has now made it possible for the manufacturers in the country to fabricate indigenous marine diesel engines.

Such a large scale development in mechanization has been possible only with Government's liberal financial assistance in the form of loan



A mechanized boat in fabrication—fitting of a diesel engine

and subsidy which has been granted so far to the tune of Rs. 113·26 lakhs and Rs. 82·47 lakhs, respectively. The quantum of subsidy granted per engine, although varies to some extent, is as much as 50 per cent of the cost of indigenous and 40 per cent of the imported engines ; the rest of the amount is paid in the shape of loan which is repayable by instalments in 7 to 15 years. An encouragement by way of 25 per cent subsidy and 75 per cent loan is also granted to the fishermen for construction of new boats to increase the number of fleet in the fishing industry for raising fish production. The rate of interest on loan where assets are insured is only 4 per cent. The interest on loan where assets are not insured has now been reduced from 9 per cent to 7 per cent.

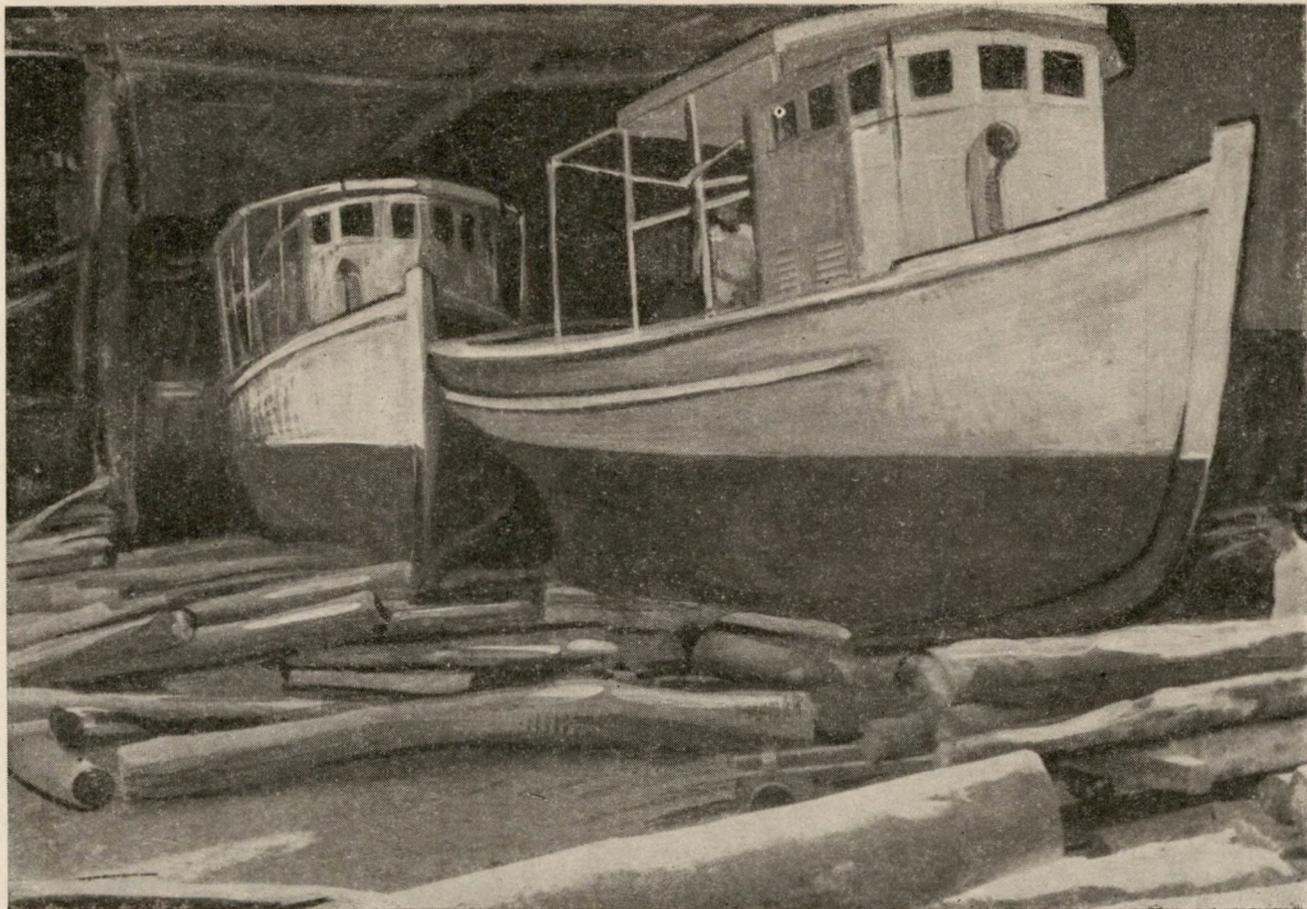
The distinct advantage of mechanization in terms of fish can be evident from the following comparative records of the fish catch during the year 1964-65. It has been estimated that out of the total marine fish production of 2,09,250 metric tonnes, as much as 1,43,000 (68·4%) has been landed by all mechanized vessels including trawlers and only 66,212 metric tonnes (31·6%) has been landed by non-mechanized vessels.

Trawling

Operation of large number of trawlers is a recent trend in the development of fishing industry in the State. Not only that the trawlers give more and consistent production of fish than the other types of craft and gear, but the catch yields appreciable quantities of prawns which is a 'cash crop' in the industry today having the highest demand for export. Origin of this is in the scheme sponsored by Government in 1959-60, under which groups of fishermen were taken on the departmental fishing vessel 'Surmai' for demonstrating to them the details of operating trawl nets and the advantages thereof.

Survey vessels

After these initial demonstrations, came another step to march forward in trawling in the State. A consideration fundamental to the success of the trawling industry is the exploration of suitable fishing grounds, as it is well-known that the grounds are not equally rich everywhere and need proper charting. Moreover, natural obstructions on the trawling grounds are not only hazardous but are also responsible for the possible losses of trawl nets which account for eventual setback in the trawling industry.



Fleet of trawlers under completion at a boat-building yard

The department, not losing the sight of these fundamental features in the trawling industry, undertook the scheme of exploratory fishing with the above-mentioned objects and started operating four survey vessels, namely 'Kundalika', 'Janjira', 'Savitri' and 'Shivneri', in the year 1962. These vessels have been mainly undertaking trawling operations for the purpose of exploration but even while doing so have contributed their share of 1,266 tonnes to the fish production.

So far 8,000 square kilometres of fishing grounds, mainly off Kolaba and Ratnagiri, have been surveyed for their fishery potential, charting at the same time obstructions at the bottom of the sea. Findings of survey work have been made known to the trade by circulating cyclostyled Marathi charts which have served as very useful guide-line to others. The information is also disseminated to the fishermen by holding meetings at important centres.

Having thus provided the background to the trawling industry, the fishermen in the State were encouraged to undertake this type of fishing mainly off Ratnagiri. There are at present as many as 100 trawlers in the private sector.

Besides the four survey vessels, eight 45' trawlers proposed to be operated under the 'Crash Programme' are under construction. In addition, out of seven 36' trawlers, which are also under construction, two will be allotted in a short time to fisheries co-operative societies on hire-purchase basis, two will be operated departmentally and three will be allotted to training centres.

Service stations

The scheme of mechanization has brought in certain problems, the most important of which was the proper maintenance and repairs facilities for marine diesel engines. These facilities were urgently needed in important fishing centres which were away from the cities. The department, therefore, established a full-fledged service station at Satpati in the year 1959 where services pertaining to repairs and overhauling of marine diesel engines are rendered at reasonable rates. This considerably prevented laying off of fishing vessels and has indirectly helped in increasing fish production. As the mechanization programme gathered tempo in Ratnagiri and Kolaba districts, these facilities were also needed there and, accordingly, mobile service stations have been established at Ratnagiri and Alibag.

Training

With the introduction of mechanized fishing vessels, it was imperative on the part of Government to ensure that the mechanized boats are economically operated in the best possible manner. This involved use of various types of fishing gear and methods suitable to local conditions and proper handling and maintenance of engines. These factors contributed significantly to the economic operation of the mechanized boats. The department has tried to overcome the aforesaid problem by providing training facilities in the operation of modern fishing gear and methods and maintenance of marine diesel engines to the fisheryouths. Fisheries training centres have, therefore, been established at Versova, Bassein, Alibag and Ratnagiri. At each of these centres 40 fisheryouths are trained each year. The period of training at these centres is of six months and the trainees get a stipend of Rs. 50 per month. In the allotment of engines, preference is given to such fishermen groups which include trained personnel. Out of the four training centres, those at Bassein and Alibag have been established under the Special Development Programme.

In addition to the six months' training course, the department conducts one month's refresher training course for the benefit of fishermen, working on the existing mechanized crafts. These short-term training courses are conducted during the monsoon period so that maximum fishermen can take advantage of the facility.

Harbour facilities

Well-being of the fishing industry depends on the provision of adequate harbour facilities from the view points of navigational safeties and docking and landing arrangements so as to expeditiously deal with the perishable commodity. Important and urgent though the problem has been, the department could establish a survey unit as recently as in 1963-64. Since then, extensive surveys have been undertaken for provision of following facilities :

- (i) Improvement of navigational channels.
- (ii) Guide-lights at fishing harbours.
- (iii) Suitable jetties for landing facilities.

Preservation, transport and marketing

Quickly perishable commodity as fish is, it needs immediate care, whether by cold treatment or by sun-drying or by salt curing.



Baskets full of Bombay-ducks

Cold treatment.—Cold treatment of fish necessitates establishment of adequate number of ice factories, preferably with cold storage space. There are at present 66 ice factories and cold storages in the State with cold storage capacity of 1,600 tons.

The State Government took over the Government of India ice factory, cold storage and quick freezing plant at Sassoon Dock on May 1, 1964, and since then it has continued necessary facilities to the fishing industry. Ice producing and frozen storage capacity is proposed to be expanded in the near future.

Recently, the Government established a two-ton ice and 20-ton cold storage plant at Ratnagiri, which was inaugurated on 9th October 1965. Considering the increasing demand for ice and cold storage space at Ratnagiri at present, it is proposed to take immediate steps to increase the ice production capacity of this factory to 10 tons and cold storage space to 50 tons. In addition, a freezing unit of four tons capacity and 100 tons frozen fish storage is proposed to be annexed to this ice factory in response to the recent demand of frozen prawns for the export purposes.

Under the Special Development Programme, a comprehensive provision has been made for establishment of six ice factories along with cold storages and freezing plants at six important maritime centres. These factories when established will produce approximately 40 tons of ice along with 360 tons of cold storage space and four tons of freezing unit. This also includes one flake ice plant, of the capacity of three tons, indigenously manufactured in the State.

Facilities granted for sun-drying.—Sun-drying of Bombay duck, small shrimp, Mandeli (Coilia), Ribbon fish etc. is common all along the coast and provides an inexpensive means of preserving small fish to be sent into the hinterland for sale to the agriculturists as food. Government have issued orders for reserving land for this purpose near fishing villages as it is an essential activity.

Fish curing.—Curing of fish by use of salt is the most convenient and economic way of preservation of fish. The cured fish serves the needs of the poor people, especially agriculturists, in the hinterland. Approximately 7,000 metric tons of fish are cured at 21 Government fish curing yards in Ratnagiri District and one in Kolaba District. At these yards, the salt is being supplied to the fish curers at concessional

rate at any hour of the day and night. The yards, in the past few years, have been provided with cement concrete platforms and some of these are recently provided with superstructures. Fish is cured at the yards under hygienic conditions under the supervision of the yard officers.

Transport.—Quick transport of fish from catching centres to the consuming centres is another important link in the fishing industry. Fish transport system is being mainly handled by the co-operative societies. There are as many as 50 fish transport trucks. Of these, 32 are in the co-operative sector, for purchase of which a total subsidy of Rs. 1.9 lakhs and loan of Rs. 8 lakhs has been granted by Government.

Recent improvement in the fish transport system is the provision of refrigerated vans. Under the Crash Programme, the department has procured two refrigerated vans. Considering the utility of such refrigerated vans, four more refrigerated vans are being imported from Hungary under the Special Development Programme.

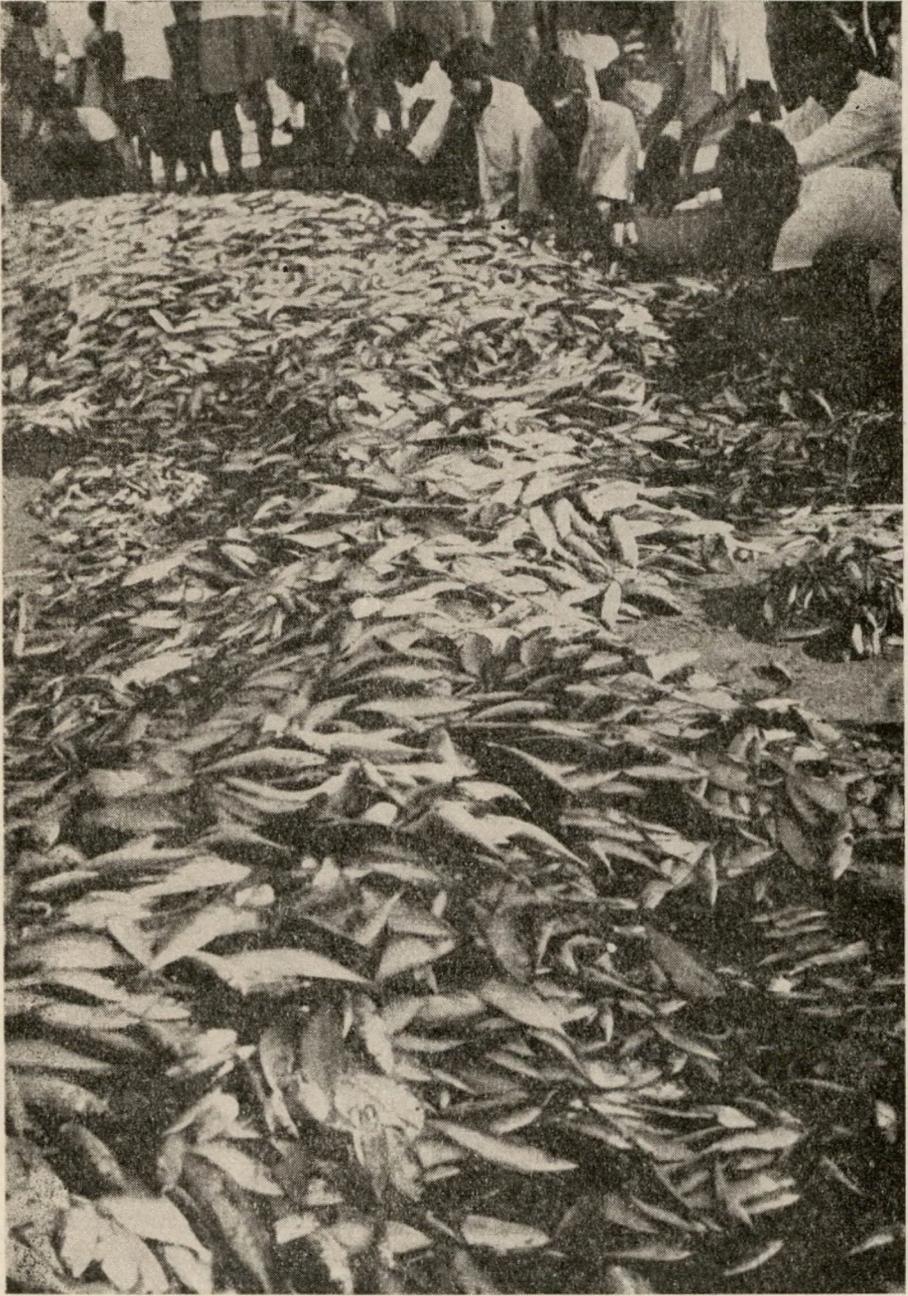
Besides these, there are 20 fish carrier launches in the private sector and one departmental.

Marketing.—Provision of suitable fish markets is also one of the essential considerations. A scheme to grant financial assistance to municipalities and local bodies to construct fish markets in the State on modern lines and to remodel the old ones, has also been framed. As a part of this programme, the Bombay Municipal Corporation has been persuaded to construct a new and well-designed market, nearly four times larger than the present fish-section in the Mahatma Phule Market. Construction of new retail markets is also under consideration.

Private enterprize

Apart from fish merchants and commission agents, private enterprize in actual fishing (production sector), though shy in general, is making headway. The New India Fisheries Ltd., have already been well established with sale proceeds of fish to the extent of Rs. 64,39,856 only in 1964-65. They have also extended to Cochin region and have a total fleet of nine large vessels. They have earned foreign exchange to the extent of Rs. 49 lakhs. Smaller enterprizers are also entering the field.

★ ★ ★



All busy to deal with bountiful catch of Mackerel at Malvan

FISHERIES TECHNOLOGY

TECHNOLOGICAL work on fisheries is carried out at the Fisheries Technological Laboratory, Bombay, established in the year 1946. The laboratory started with a modest aim of utilising sizeable amount of shark livers then going as waste ; the scientific work conducted at the laboratory brought the Shark Liver Oil industry on the proper foundation and later progressed to such a stage that the country could rid itself from the dependence on imports of fish liver oil from abroad. Shark liver oil products, which are being improved both in quality and quantity, are 'Sharkovit', 'Elasmin Liquid', 'Elasmin Pearls' and 'Sharkomalt', and the sale proceeds have increased from Rs. 1,67,000 in 1947 to Rs. 18,20,000 in 1964.

Subsequently, the field of work at the laboratory extended to fish meal prepared from sun-dried trash fish, gelatine, fish glues for adhesive and photo-process work, and pearl-essence, for commercial or semi-commercial application either at the laboratory itself or in the private sector. Scientific work on edible dry fish and dry fish products, salt cured fish, canned fish and canned fish-paste has been initiated from 1961 with a view to undertaking commercial production in the public sector. The possibilities of development of canned fish-paste from unpopular varieties of Sciaenids such as Dhoma and Catfish are being established on a pilot plant scale under the 'Freedom from Hunger Campaign'. Work on production and storage of better quality of sun-dried prawns, so also the work leading to standardisation of quality of salt cured fish has been completed. The laboratory is also working on development of non-defatted flour from tiny sun-dried shrimps ('Javla').

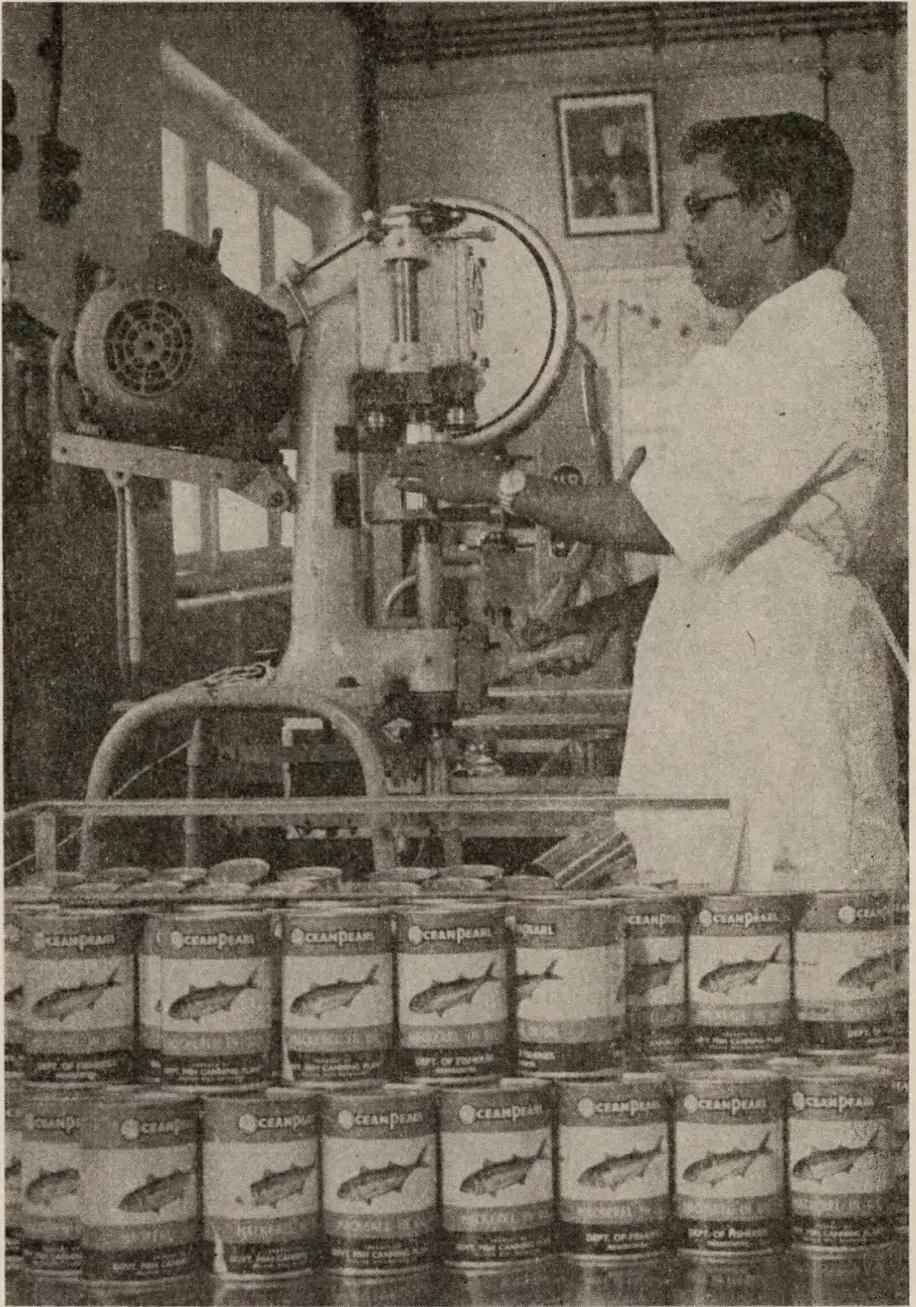
In 1964, after the technological laboratory was authorised by the Government of India for enforcing the pre-shipment quality control scheme for export of fish and fish products from Bombay and Goa ports, a bacteriological unit has been created at the laboratory.

Government Fish Canning Plant, Malvan

Based on the canning work at the laboratory level, a full-scale fish canning plant has been established at Malvan for commercial canning of Mackerel, Sardines and Prawns. The plant was commissioned into operation in October 1964, and despite almost total failure of Mackerel fishery in Malvan last year, put out a production of 20,000 cans in 50 working



Government Fish Canning Plant, Malvan

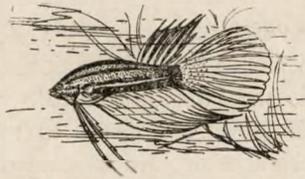


Inside the Government Fish Canning Plant, Malvan

days. The canning establishment is fully equipped with production equipment and a quality control laboratory and can handle 1,00,000 cans per season.

Fish Meal Plant, Sassoon Dock, Bombay

Although the technological laboratory had created a demand for its fish-meal made from sun-dried fish and stepped up the sale from less than ten tons in 1950 to 550 tons in 1964, an important aspect continued to be overlooked in the quality of the product. This was the possible bacterial contamination of the meal which could be harmful to the poultry. The fish-meal plant established by Government of India for the purpose of demonstration was, therefore, taken over in August 1965. The plant is equipped with a cooker-cum-dryer which is capable of heat treating the fish-meal to a temperature lethal to the harmful bacteria. The plant will be run by the Fisheries Technological Laboratory for commercial production of 1,000 tons of fish-meal.



SOCIO-ECONOMIC DEVELOPMENT

IMPROVEMENT of the socio-economic conditions of fishermen has been one of the main objectives of the Fisheries Department. Attention was, therefore, focussed on the formation of **fishermen's co-operative societies** which today number 256 (Primary Societies—250, District or Regional Societies—5, and Apex Society—1), as against 20 in 1947-48, with membership of 43,000 and a total share capital of Rs. 13,88,000. Government grants liberal aid to these co-operative societies in the form of loan and subsidy for establishing organisations necessary for their trade and thus make them independent of other extraneous interests. Loans are also granted for purchase of trucks for transport of fish etc. Fishermen's societies at Versova, Malvan and Satpati have established ice and cold storage units with Government help. A co-operative society at Satpati has established a boat-building yard on modern lines with financial help of Rs. 1.30 lakhs from Government. Allotment of these functions to fishermen's co-operative societies and their successful operation have been the special features of the Government's policy. Instead of managing these organisations departmentally, the fishermen are induced to run these establishments themselves thus enabling them to stand on their own legs and creating a very valuable confidence in their mind that they can themselves manage their trade. The co-operative societies are also encouraged in trade by recommending their applications for import licences for marine diesel engines and fishery requisites such as nylon, hemp twine etc.

Special assistance to co-operatives

One of the main handicaps in proper functioning of the small primary co-operative societies is the lack of adequate resources to undertake activities at an optimum level. In order to overcome this difficulty, the Maharashtra Government decided to contribute towards the share capital of the primary societies to the extent of Rs. 3,000 per society irrespective of the amount owned by the society, provided the society's share capital is not less than Rs. 1,000. Managerial assistance is provided to the co-operative societies by granting subsidy to meet the cost for the first three years. Subsidy on construction of godowns is also provided. Government have also drawn up a special programme for revitalisation and development of 25 selected co-operative societies by raising share capital of each such society to Rs. 10,000, of which Government's contribution will be Rs. 7,500, the rest being collected by the fisheries co-operative society.

Maharashtra Rajya Machhimar Sahakari Sangh, which is an apex organisation of fisheries primary co-operatives, has been assisted by Government with a share capital contribution to the extent of Rs. 6,25,000 to enable it to undertake marketing of fish and fishery requisites such as twine, coal-tar, nylon, fish hooks, diesel oil etc. Its total turnover (1964-65) exceeds Rs. 47 lakhs. It is managed entirely by fishermen, only one member each of the Co-operative Bank, Co-operation Department and Fisheries Department functioning on the managing body.

Twine and net making plant

The first net and twine making factory in the co-operative sector has been established at Mulund, District Thana, by the Maharashtra Rajya Machhimar Sahakari Sangh, the apex body of fishermen. The machinery of the factory was received under the T. C. M. programme and was allotted to the Sangh on loan-cum-subsidy basis. A loan of Rs. 4,58,000 was also granted to the apex for erection of the factory. The inauguration of the factory took place on 27th January 1964. Government sanctions subsidy to the Sangh at 25 per cent on the sale of cotton twine produced in the factory. This concession will be continued for a period of three years on condition that the Sangh passes on the subsidy to the fishermen.

So far, loan to the extent of Rs. 21 lakhs and subsidy of Rs. 5.25 lakhs have been granted to the fisheries co-operative societies for the activities mentioned above. In addition the societies receive credit from Co-operative Banks of over 60 lakhs per annum.

Fisheries schools

The education of fisher-children occupies an important place in the activities of the department. The department has under its control eight fisheries primary schools and one High School in the Districts of Ratnagiri, Kolaba and Thana, the total number of pupils being 4,339. These schools lay stress on teaching of subjects intimately related to fishermen's life and environments such as preliminary knowledge of fishing, navigation, carpentry, knowledge of local types of fishes and nets required for their capture, as well as modern methods of refrigeration, curing and marketing. Instructions in these schools are imparted in the regional language. Text-books and other articles are distributed in the fisheries schools free of charge.



TARAPOREVALA AQUARIUM

TO this metropolitan city of Bombay, which was once only a fishing village with maritime traditions, there could be no better and more befitting monument than the establishment of a public aquarium which has sprung up on the very edge of the sea. Built at the cost of Rs. 9,00,000 including a donation of Rs. 2,00,000 from late Shri and Shrimati V. D. B. Taraporevala, the aquarium was declared open to the public on May 27, 1951, by the then President of India, Dr. Rajendra Prasad. The aquarium has, since then, been one of the most popular educational and recreational centre in the city. More than 6,20,000 persons, both young and old, visit the aquarium every year, including children from kindergarten schools, students from primary and secondary schools and University colleges, and tourists from India and abroad. A visit to the aquarium is invariably on the itinerary of dignitaries who visit the city as State guests.

Exhibited at the aquarium are marine and fresh-water animals in attractive settings, mostly fishes of indigenous and exotic varieties. The Institute is unique in Asiatic countries and has been serving a useful purpose of creating interest in the public mind about fish life and fisheries.

The aquarium in Bombay has been a source of great inspiration not only to local people in making the hobby of keeping aquarium fish in home, so popular as it is today, but also to other States and local bodies which approached the department for help for putting up aquaria in other parts of the country. Besides, the display of shell-craft articles from all parts of the world in the aquarium has given birth to not only an indoor hobby but to a new cottage industry, thousands of people, young and old, collecting shells from the seashore for making attractive articles. To some, it has become a source of livelihood.

The hobby of home-aquarium-keeping has also created employment potential, several making a living by fabricating aquarium tanks, aquarium gadgets, breeding aquarium fish and collecting various fish foods. Some foreign exchange is also earned by export of indigenous aquarium fishes.



RESEARCH AND INVESTIGATION

THE department has two research stations, one at Bombay and the other at Ratnagiri. Research work carried out at these research stations is mainly in connection with fisheries of regional importance and certain aspects of marine biology which have a direct bearing on fisheries. This includes studies of marine plankton, biology and fishery of important fishes and other animals, nutritional physiology of fishes, water-pollution and induced spawning of fresh-water fishes :

Provided at these research stations are up-to-date facilities in the way of equipment as required of any marine biological or fisheries research station. Arrangements are made for supply of running sea and fresh-water and aeration. Research workers are provided with special tanks, where live animals are studied under controlled conditions. However, some of the arrangements are pending completion at the research station at Ratnagiri.

The research station at Bombay is affiliated to the University of Bombay for post-graduate studies in Zoology. The Director of Fisheries and the Senior Scientific Officer are recognised teachers and guide students for M.Sc. and Ph.D. degrees.



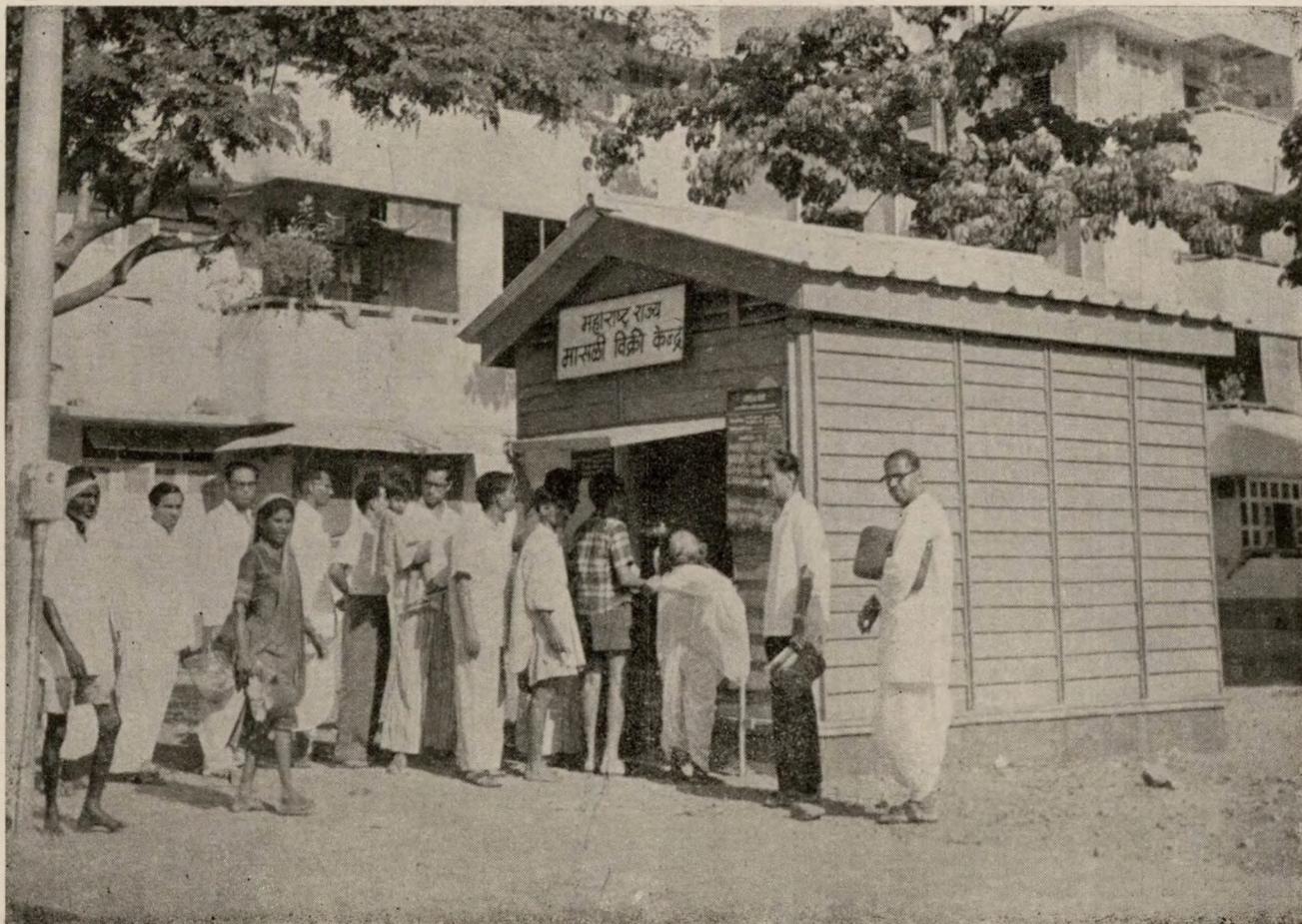
CONSUMERS INTEREST

THE object of fisheries development in general is to provide more and better fish to the consuming public. In addition to this, the department, keeping in view the interest of the consumer, has undertaken a new scheme from 1962 of installing fish stalls in the city of Bombay so as to make fresh fish available outside market's limits and to acquaint the public in purchasing fish on weight-basis. There are at present 13 fish stalls situated in the city.

Fish and chips stall

The provision of this stall is an extension service to the consuming public by affording prepared dishes of fish, particularly from those varieties of fishes which are so-called unpopular. The dishes are served at a very reasonable rates. This stall has proved very popular.





Customers at one of the Government Fish Stalls, Bombay



Fish and Chips Stall in the Taraporevala Aquarium premises—a novel idea in Bombay



Administering pituitary injection to Rohu—Minister for Fisheries keenly observing it

FRESH WATER FISHERIES

FRESH-WATER resources comprise nearly 3,200 kilometres of rivers mainly constituted by the river systems of the Tapi, Godavari, Krishna, Penganga, Wainganga, Manjra and Purna, and 3,00,000 acres of ponds, lakes and reservoirs.

The riverine fisheries are not of any notable magnitude, owing to the geographical position of the rivers which form merely the upper reaches in the State and absence in them of important carps like Catla, Rohu and Mrigal. Commercial fishes which constitute the riverine fisheries are mainly Murrel, Tambir, Mahseer and other varieties of minor carps and catfishes.

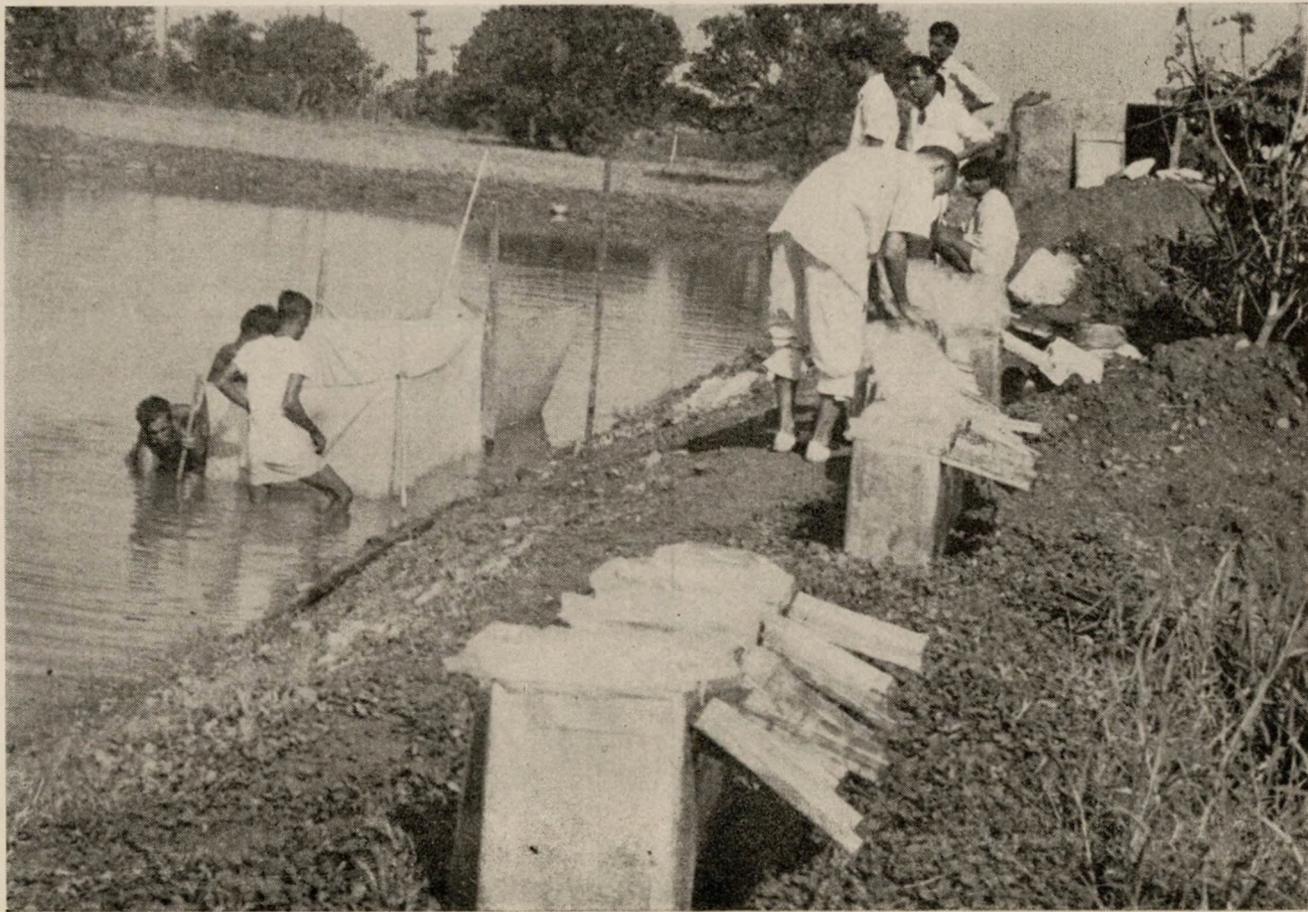
There are about 20,000 fishermen, some of whom are part time in the inland areas.

Major carp fishery, particularly their culture, which has assumed the foremost aspect of development in the country, has also been given a prime place in the development of fresh-water fisheries in the State. Rivers being mainly devoid of these fishes, procurement of 'fish seed' or fish babies, called spawn and fry, from the natural resources in the State has been a considerable handicap. Despite this handicap extensive pisciculture has been undertaken in the fresh-waters of the State. To meet the requirements of fish seed, fry of major carps is being mainly imported from West Bengal. This demand for fry has increased from four lakhs to one crore during the last ten years, suggesting the corresponding expansion of activities which has taken place in pisciculture in general.

The production of 'fish seed' within the State has been undertaken as a measure of investigation in the last four years. The progress in this effort has been very encouraging and the spawn-yield of major carps by breeding them with pituitary hormone injections has increased from 4,00,000 in 1960-61 to 1,30,00,000 in the year 1964-65. The work of breeding major carps by administering hormone injections is being carried out at the fish farms and departmental tanks and nurseries. A Stage has now reached, whereby a partial requirement of fry of major carps, is being met from the indigenous production of 'fish seed' and a energetic drive is undertaken towards the attainment of self-sufficiency.

Deep tank fishery

The main reservoirs in the State, covering the total water spread area of 1,25,000 acres are stocked with fingerlings of major carps every year with



Packing of 'fish-seed' produced in the State by hormone injections

a view to establishing possible sources of their natural breeding to become a source of supply of fry.

Pond culture

Approximately 2,00,000 acres of water spread have been surveyed out of which 1,38,765 acres of water have been exploited for development of culture fisheries. The fish grown in these waters provide valuable source of fresh fish to the public in the interior.

Rural pisciculture

Several Grampanchayats and Municipalities, which have suitable tanks under their control, have taken keen interest in fish culture. This helps the local bodies to keep the tanks clean, provides food and employment to some people and at the same time serves as a source of revenue to them. Tanks in Community Development projects and National Extension Service areas are also stocked by the department with fry of major carps.

Fish farms

The department has established three fish farms in Bhandara, Kolaba and Poona Districts and 30 nursery units. One more farm is being established at Siddheswar in Parbhani District. At these farms, breeding stocks of major carps are maintained for production of fish seed. Stocks of an exotic fish, *Cyprinus carpio*, are also maintained at the farms. Artificial breeding of *Cyprinus carpio* has been undertaken fairly on a large scale considering the demand of their fry for piscicultural purposes in the State. In the year 1964-65 as much as 50,00,000 of spawn of this fish was produced. In addition stocks of other exotic fishes such as Giant Gourami, Tilapia and Grass Carp are also being maintained at the fish farms and other departmental tanks.

Rehabilitation of migrants from East Pakistan

A scheme for rehabilitation of 157 families from East Pakistan based on returns from tanks stocked with suitable varieties fish and river fisheries has been under implementation in Chandrapur District.

Financial assistance to inland fishermen

Subsidy on the gear material such as nylon and other synthetic fibres, cotton twine, fish hooks is given on the same basis as of their brethren in the marine fisheries.

Incentives to fish farming have been proposed in the Special Development Programme in consideration of the fact that fish farming has not gained as much effective popularity as it should. It is considered that by affording sufficient incentive to fish farmers by way of granting subsidy on the following items, it will be possible to extend the area of cultivation to increase fresh-water fish production:

- (i) Fry— $33\frac{1}{3}\%$ to co-operative societies; 25% to private fish farmers.
- (ii) Construction of rearing tanks—20%.
- (iii) Desilting of tanks, wire-netting of outlets—25%.

Conservation

Conservation of resources is an important aspect in the development of fisheries. As elsewhere, indiscriminate fishing during the breeding season is not uncommon in this State. There was, therefore, an urgent need for enactment of legislation to enable promulgation of rules and regulations, thereunder. The Maharashtra Fisheries Act, was, therefore, passed in 1960. According to this Act, destruction or capture of fish in any waters including marine waters by use of explosives or noxious material has been prohibited. Other sections of the Act provide measures for conservation of fish.

Export promotion

With a view to intensifying the export drive, the Government of Maharashtra have recently set up a State Board for Export Promotion, consisting 43 non-official and 12 official members, under the chairmanship of the Chief Minister of Maharashtra State. Director of Fisheries is official member of the Board. Fishery products worth about Rs. 40 lakhs are being exported from this State. Ninety-two exporters from Maharashtra State have already registered themselves under Marine products Export Promotion Council of Government of India. Formerly, the main items of export were dried Bombay duck and dry prawns, fish maws and shark fins, but in recent years the export of frozen prawns, frog-legs and lobster tails is gradually developing with the provision of processing facilities. On account of high freight charges for transport of frozen products to foreign countries, the State Government have formulated a scheme for grant of subsidy equal to $33\frac{1}{3}\%$ per cent of the freight charges to the fisheries co-operative societies.

Fisheries development in coastal blocks

A special scheme for intensifying the fisheries development in ten coastal blocks in this State has been taken up for implementation, on the suggestion of the Ministry of Community Development and Co-operation, Government of India. Under the scheme, it is proposed to supply engines to the fishermen for mechanizing their boats and also to grant subsidy on fishery requisites.

Maharashtra State Fisheries Advisory Board

In accordance with the recommendation of the Central Board of Fisheries, the Maharashtra State Fisheries Advisory Board was set up by the Government of Maharashtra, under the chairmanship of the Minister for Fisheries, in 1961-62, consisting of members representing all aspects of the fishing industry. The Board holds meetings twice a year and the recommendations made by it are considered by Government for implementation.

Package programme in Bhandara District

The Package Programme for intensifying agricultural production has been taken up in Bhandara District and fisheries development on intensified scale has also been incorporated. Under the scheme, fast growing varieties of fish have been introduced in the tanks in Sakoli, Tumsar, Amgaon and Tiroda units in Bhandara District for increased production of fish.

Applied nutrition programme with UNICEF aid

A special scheme has been undertaken for implementation in one marine block, i.e. at Bassein in the Thana District, and another in inland block at Brahmapuri in Chanda District. Object of the scheme is to increase fish production in Community Development Blocks and to make it available for distribution to the under-nourished children and mothers.

Eight mechanized boats fully equipped are proposed to be supplied to a fisheries co-operative society at Bassein on the condition that the co-operative society will make arrangements to supply five tons of fish per boat per annum, free of cost, to the Block Development Officer for distribution to the aforesaid vulnerable groups in the community.

The equipment such as engine, nylon, machinery for ice plant, etc., will be supplied by the UNICEF authorities and the local cost on the boats, construction of building for ice factory and cost of operation of the scheme will be met by the State Government.

Similarly, fisheries co-operative societies are assisted in undertaking fish culture in eleven tanks in Brahmapuri Block on the condition that the society will make arrangements to supply a fixed quantity of fish to the Block Development Officer for distribution.

Third Five-Year Plan

Against the total plan provision of Rs. 178 lakhs for the Fisheries Third Five-Year Plan, an amount of Rs. 197 lakhs has already been utilised so far and it is expected that the expenditure up to the end of the Third Five-Year Plan will be about Rs. 250 lakhs.

Due emphasis has been given to the aspect of fish production and about 80 per cent of the total expenditure will be utilised for the schemes which directly increase fish production, such as mechanization of fishing craft, stocking of tanks for fish culture, supply of fishery requisites, etc.

The second important category of the schemes includes those aiming at increasing amenities to the fishing industry such as establishment of ice factories, cold storage plants, service stations, fish curing yards, etc. Performance of these schemes has been satisfactory, except for the scheme for provision of landing and harbour facilities, mainly because of non-availability of suitably qualified staff for implementing the scheme.

Though there was some shortfall during the initial period of the Third Five-Year Plan, the important work of survey of fishing ports could be completed during the last three years of the plan after appointing the necessary staff. The projects pertaining to training and demonstration, fisheries research, investigation and survey progressed as per schedule. Following are some of the important achievements during the plan period :

1. Distribution of 490 marine diesel engines and 155 boats for mechanization of fishing craft.
2. Assistance for purchase of about 51,000 Kgs. of nylon and 3,39,000 Kgs. of hemp twine.
3. Financial assistance for establishing twine and net making plant in the co-operative sector.
4. Establishment of full-fledged Fish Farm at Seonibandh in Bhandara District.
5. Stocking of tanks with about 5.12 crores of fry and raising of additional spawn by induced breeding method to the extent of 3.5 crores.

6. Establishment of ice and cold storage plants at Versova, Ratnagiri and Alibag and additional ice making and freezing unit at Satpati. Taking over of quick freezing, ice and cold storage plant of Government of India.
7. Establishment of a new fishermen's training centre at Ratnagiri.
8. Establishment and operation of 12 fish stalls and one fish and chips stall.
9. Establishment of fish canning plant at Malvan.
10. Survey of fishing ports and improvement work.
11. Establishment of seven shark liver oil extraction units.
12. Establishment of two fisheries schools and one fisheries high school.
13. Survey of fishing grounds off Ratnagiri and Kolaba Districts.
14. Operation of experimental monsoon fishing vessel specially designed for the purpose.

Special development programme in fisheries

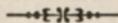
In addition to the implementation of the schemes taken up under the Third Five-Year Plan, the following six new schemes are proposed to be undertaken under the 'Crash Programme' :

(Rs. in lakhs)

Name of the Scheme	Total outlay of the scheme (revised)	Amounts approved by Govt. of India, Ministry of Food & Agri. for 1964-65, under letter No. 26/64-FY (D), dt. 21-1-1965
1. Additional incentive for fish farming.	3·48	0·94
2. Operation of fishing boats . .	44·33	7·88
3. Establishment of ice factories, cold storages and quick freezing plants.	31·82	10·76
4. Operation of refrigerated vans . .	5·06	2·53
5. Establishment of Government fisheries training centres.	5·09	2·55
6. Construction of approach roads	8·00	4·10

Under the scheme 'Additional incentive for fish farming', it is proposed to give incentive in the form of subsidy for purchase of fish seed for stocking, for purchase of manure, for desilting and improving the tanks for fish culture. Under the scheme of operation of fishing boats, it is proposed to operate eight 45' trawlers. It is also proposed to establish six ice factories and cold storage plants and provide refrigerated transport facilities.

Construction of approach roads to important fish production centres is also contemplated. In order to provide additional training facilities to the fishermen for operating mechanized boats, two more training centres have been established, one at Alibag and another at Bassein. Some of the schemes are in the initial stages of implementation and efforts are made to implement them to the extent sanctioned.



CONCLUSION

THE foregoing notes provide an account of recent advances in the fisheries of Maharashtra in different aspects of development. Marine fisheries are no doubt predominant with a large number (1790) of mechanized vessels. They have made a substantial contribution, but the fishing techniques have yet to be further improved. Similarly, though the size of the fishing vessels is improving, they need modern facilities. Concurrently harbour development for larger vessels had also to be planned and provision made for extension of existing refrigeration services.

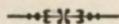
Inland fisheries resources appear limited, yet scope exists for further expansion. Moreover though good progress has been recorded in fish seed production considerable augmentation is necessary.

Approach in the field of corporation and socio-economic welfare of fishermen, has been sound but further progress is desired in transport, marketing and distribution in this sector.

It would thus be seen that though praiseworthy progress has been accomplished, lines are open for further expansion and consolidation so as to build up the industry in all its aspects.



FISHERIES—A GLANCE



RESOURCES MAN-POWER AND INVESTMENT

Length of the coastline			700 kilometres or about 450 miles
Length of rivers			3,200 kilometres
Area under ponds, lakes and reservoirs ..			3,00,000 acres
Number of fishing villages (marine)			210
Number of active fishermen			57,000
Marine ..	37,000		
Inland ..	20,000		(Some part-time)
Total number of fishing boats			9,130
Below 3 tons ..	6,600		
Above 3 tons ..	2,530		
Number of boats mechanized			1,790 (out of 3,000 in the country)
Number of carp fry used for pisciculture per annum			1,20,00,000
Number of spawn produced by induced spawning.			1,80,00,000
Investment in fishing trade—			
Value of boats .. ..	..	..	} Rs. 2,89,71,000
Value of engines .. ..	..	..
Value of nets .. ..	..	..	Rs. 1,46,09,000

PRODUCTION AND PRESERVATION

Total catch of fish (1964-65)			2,21,000 tonnes
Marine ..	2,09,000 tonnes		
Inland ..	12,000 tonnes		
Value of the catch to producers (1964-65) ..			Rs. 8,89,00,000
Value of export of fish products through Bombay port (1964)			Rs. 37,17,000

Value of export of frog legs through Bombay port (1964)	Rs. 4,07,000
Fish-eating population (60 per cent of the State's population)	2,37,00,000
Availability of fish per capita (on the basis of fish-eating population)	9.3 kg.
Number of fish curing yards	22
Average quantity of fish cured at Government yards	7,000 tonnes
Number of ice factories and cold storages in the State	66 (highest for any one State).
Production of ice per day in the State (part of it is available for fisheries)	900 tonnes

CO-OPERATION AND EDUCATION

Number of co-operative societies	256
Total number of members of co-operative societies	43,000
Total share capital of co-operative societies ..	Rs. 13,88,000
One apex society (Maharashtra Rajya Machhimar Sahakari Sangh) has a turnover of (1964-65) ..	Rs. 47,68,000
One district society (Thana Jilla Machhimar Sahakari Sanstha) has a turnover of ..	Rs. 14,00,000
Number of primary societies running ice and cold storage plants	3
Primary society running a fishing boat building yard	1
Number of transport trucks operated by primary societies	35
Twine and net making plant operated by an apex society	1
Number of fisheries schools	8
Total number of pupils in the fisheries schools ..	3,921
Number of fisheries high schools	1
Number of pupils in fisheries high school ..	418
Fisheryouths' training centres	4
Number of fisheryouths being trained per year ..	160

BY-PRODUCTS

Quantity of neat shark liver oil manufactured (1964-65)	.. .. .	27,910 litres
Sale proceeds of shark liver oil products (1964-65)	.. .. .	Rs. 13,76,922
Sale proceeds of sardine oil (1964-65)	.. .. .	Rs. 6,051
Sale proceeds of fish meal produced departmentally (1964-65)	.. .. .	Rs. 4,45,039
Net profit in 1964-65	.. .. .	Rs. 80,752
Fish maws and shark fins	.. .. .	93 tonnes
Quantity of fish manure produced	.. .. .	7,000 tonnes
Quantity of fish canned in private sector	.. .. .	2,67,000 cans
Capacity of Government fish canning plant at Malvan	.. .. .	1,00,000 cans or 50 tonnes

FIVE-YEAR PLANS AND PROGRESS

First Five-Year Plan provision	.. .. .	Rs. 15·98 lakhs
Second Five-Year Plan provision	.. .. .	Rs. 105·52 lakhs
Actual performance II Plan	.. .. .	Rs. 139·90 lakhs
Third Five-Year Plan provision	.. .. .	Rs. 178·32 lakhs
Performance in the first four years	.. .. .	Rs. 183·05 lakhs
Annual total budget of the Fisheries Department, 1965-66 (inclusive of receipts, expenditure and loans)	.. .. .	Rs. 1,59,97,100
Total number of the Fisheries staff as on 7th July 1965	.. .. .	976

OTHER DETAILS

Total loan given to the fishermen up to 1964-65	.. .. .	Rs. 1,78,81,998
Total subsidy given to the fishermen up to 1964-65	.. .. .	Rs. 1,10,56,371
Total quantity of fish sold in Bombay city	.. .. .	35,000 tonnes
Number of fish markets in Greater Bombay—		
Wholesale markets	.. .. .	2
Retail markets	.. .. .	60

Number of retailer fisherwomen	3,200
Percentage of fresh fish marketed through co-operatives	20 per cent
Volume of dry-fish trade (worth)	Rs. 4,00,00,000
Number of auctioneers and fresh fish merchants ..	51
Number of dry-fish merchants	50
Number of visitors to the Taraporevala Aquarium (1964-65)	6,20,292
Number of post-graduate research workers (1964-65)	9
Number of vessels operated departmentally [four survey vessels (multi-purpose boats), two training boats, one demonstration boat and one research vessel]	8
Departmental trawlers under construction ..	15
Number of fish transport vessels	21
Number of Govt. (a) Fresh fish stalls ..	13
(b) Fried fish and chips stall ..	1
Number of large bull trawlers operated in private sector	2
A nylon yarn and twine making plant in private sector	1

Government of India institutions—

1. The Deep Sea-fishing Station.
2. The Marine Fisheries Research Sub-Station.
3. The Central Institute of Fisheries Education.





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