MARINE FISHERIES INFORMATION SERVICE

WORKSHOP ON ACQUISITION AND
DISSEMINATION OF DATA ON MARINE
LIVING RESOURCES OF INDIAN SEAS

CMFRI COCHIN OCTOBER 21-23 1982

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PROCEEDINGS OF THE WORKSHOP ON ACQUISITION AND DISSEMINATION OF DATA ON MARINE LIVING RESOURCES OF INDIAN SEAS

ORGANISED BY

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
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PREFACE

Considerable stress has been laid on research and development of marine fisheries in our country since independence and the various schemes formulated by the Government during different plan periods have resulted in an allround progress in this sector. Realising the importance of marine fish catch statistics in the formulation of fishery development plans and management policies, the Central Marine Fisheries Research Institute has been collecting, processing and disseminating data on exploited marine fishery resources over the past three decades. The Institute collects data on biological aspects on a continuous basis for assessment of the fish stocks in the major fisheries and also environmental data for studying interrelationships between different factors. Investigations on the socio-economic aspects in the marine fisheries sector as well as impact studies are also undertaken from time to time.

In view of the data base already built up at the Institute, the Planning Commission has identified the Institute for developing the National Data Centre for Marine Fisheries with a computerised information system and suggested that the Institute conduct an All India Workshop on this theme. Accordingly, the Institute organised a National Workshop on "Acquisition and dissemination of data on marine living resources of Indian seas" from 21st to 23rd October 1982 at Cochin.

The objective of the Workshop is to develop proper modalities for the acquisition, processing and dissemination of data on marine living resources as a national facility.

Altogether 52 delegates representing State and Central Government Departments, the fishing industry, Research Institutes and Universities and public and private sector organisations participated in the Workshop. The Workshop discussed in detail the present status of collection of marine fish catch statistics and dissemination of information relating to the same. The Workshop also discussed the problems and prospects in establishing a more viable marine fisheries information system and made several useful recommendations.

The publication contains the proceedings of the workshop and the recommendations. It is hoped that the concerned agencies will give serious consideration for the implementation of the recommendations. CMFRI will maintain close linkage with the various organisations in the task of streamlining the modalities for acquisition and processing of data and dissemination of information in which the cooperation of all agencies is solicited.

E.G. SILAS
Director

PROGRAMME

		Date	Time
	Registration	21.10.82	9.00 to 10.30 hrs
Session No.			
I	Inaugural Session	21.10.82	10.30 to 11.00 hrs
II	Present status of marine living resources statistics in India	do	11.15 to 13.00 hrs
III	Identification of data requirements of user sectors and standardisation of suitable proformae for collection of data	do	14.30 to 15.15 hrs
IV	Operation of large vessels in the Exclusive Economic Zone	do	15.30 to 16.15 hrs
	Meetings of Working Groups for standardisation of proformae	do 22.10.82	16.30 to 17.30 hrs 9.30 to 11.00 hrs
V	Reports of the Working Groups	do	11.15 to 13.00 hrs
VI	Acquisition and dissemination of data on marine living resources of Indian Seas	do	14.00 to 15.00 hrs
VII	Plenary Session	do	15.15 to 16.30 hrs
	Field trip to Narakkal	23.10.82	07.30 to 12.30 hrs

I. INAUGURAL SESSION

Shri.T.Jacob welcomed the delegates. Dr. E.G. Silas gave the inaugural address

INAUGURAL ADDRESS

As you are aware, fisheries has remained a neglected area as compared to agriculture and livestock. Nevertheless, we have made notable progress during the past 35 years from a mere artisanal activity to an industrial activity. Today we are conscious of the problems and possibilities in fisheries. We talk about the ocean resources, ocean mangement and more so about EEZ under our jurisdiction. There is no denying the fact that we should utilise the resources of this vast area and develop the mechanism for the same. It is gratifying to note that at the policy planning level there is greater awareness that fisheries should be given a better deal. Our fisheries development is in a three tier system. We have the artisanal sector, small mechanised sector and more recently that of large trawlers which are supposed to deliver the goods from the EEZ and the contiguous high seas.

With the introduction of better capture techniques, improved technologies of preservation, processing and storage, discoveries of new fishing grounds, increased utilisation of marine products, development of export markets and implementation of R & D programmes the fisheries sector has emerged as one of the major contributors to the food resources and the national economy. Consequent to this, our marine fish production has gone up from 0.5 million tonnes in early fifties to 1.4 million tonnes in mid seventies. Since then, the catch has more or less stabilised around 1.3 million tonnes and this has focussed attention on the ways and means of augmenting yield by diversification of fishing, utilisation of nonconventional resources and increasing production through coastal aquaculture.

With the declaration of EEZ, greater opportunities and challenges are thrown open to bring in resources hitherto exploited by other countries as well as those unexploited under the national jurisdiction, leading to an eventual increase in the food potential by way of additional catches and in job opportunities in the expanding fishery based industries. Massive inputs and measures by way of introduction of new capture means and development of infrastructure facilities are envisaged. All these call for a continuous and critical study of data pertaining to marine living resources and timely monitoring of information.

The Central Marine Fisheries Research Institute has been functioning as the nodal organisation for the collection, analysis and dissemination of data on marine fisheries and living resources of Indian seas. The Institute developed a stratified multistage probability sampling design to collect information on exploited resources of our multi-species fisheries wherein multiple types of gears are used. Altogether, 90 trained field staff, stationed at 41 centres spread along the coast of India are exclusively engaged in the collection of catch and effort data. This work is carried out throughout the year, and covers about 1,400 landing centres in different maritime states. The field staff are also regularly collecting length frequency data on commercially important species. About 800 species of fish & shell fishes and other living resources of Indian seas have been coded, preparatory to computerisation of these massive data. The present staff is likely to be doubled during the sixth plan period.

About 250 scientific and technical personnel, working at different research centres, are engaged in the collection, processing and analysis of data on various biological aspects such as length, weight, sex and maturity stages of commercially important species and also environmental data. Several case studies on marketing and socio-economic aspects in the marine fisheries sector are being undertaken by the Institute. About 40 scientific and technical personnel are engaged in data processing and analysis. The results of the studies are regularly published in research journals and the Institute's publications.

A policy decision was taken by the Planning Commission at its meeting held on 9.12.'81 presided over by Member (Science) and attended by Advisors of the Planning Commission, Secretaries and Senior Officers of the Department of Agriculture and Co-operation, Additional Secretary of the Department of Expenditure, Director General, ICAR, Directors of Fisheries Institutes and Senior Officers of the Indian Council of Agricultural Research, Director, Department of Ocean Development and Director, National Institute of Oceanography, recommending that there is a need for conducting an All India Workshop on acquisition and
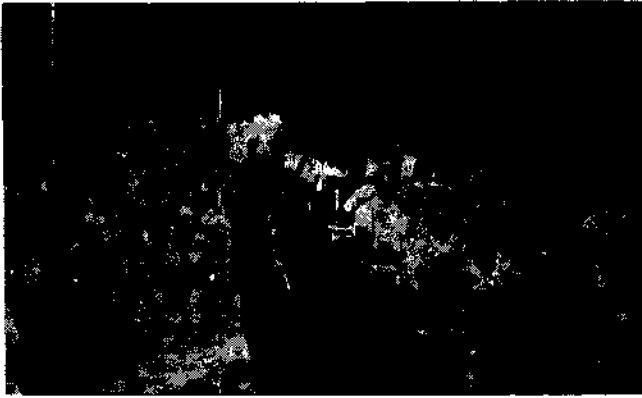
A view of the delegates.

dissemination of data on marine living resources and this should be organised by the Central Marine Fisheries Research Institute (CMFRI) which is the nodal Institute dealing with this subject. Accordingly, the Institute is holding the present Workshop from 21 to 23rd October '82 at Cochin.

The objective of the workshop is to develop modalities for acquisition and dissemination of data on marine living resources as a national facility. The functions to achieve the objective are:

i) To review the present system of collection, collation, analysis and dissemination of data on marine living resources in the country.

ii) To identify data requirements of R & D, artisanal fishery, fishing industry, aquaculture, development planning and other user sectors.

iii) To standardise various proformae for the collection of data from the artisanal and mechanised sectors, exploratory and research vessels and also from culture fisheries.

iv) To review and develop computerised system for rapid dissemination of information for end users.

Information on the production of marine fish and other living resources is a prerequisite for the formultion of marine living resources development and management programmes. Such information is extensively used by various states and national and international organisations. The data relating to catch and effort as well as biological aspects will enable the estimation of vital parameters like recruitment, growth and mortality, the knowledge of which is essential for rational exploitation of the fish stocks. The resources information thus obtained, will be helpful in farming management policies for exploited fish stocks in the EEZ as well as for other marine living resources like mammals, corals and seaweeds. The data relating to price, marketing and other economic aspects are essential to the Government and industry for evolving suitable invest ment and finance management policies.

Keeping in view the above, the proposed workshop will assess the data requirements and review the present system of acquisition of data and dissemination of information so as to bring about changes if need be, in standardising and co-ordinating the same.

The sessions today and tomorrow will be deliberating on some aspects which are essential for the proper data acquisition, processing and rapid dissemination in the field of fisheries. We shall also discuss the needs and requirements of the states for strengthening their statistical wings. We are aware that no system of data acquisition will work properly without dialogues with people from whom you expect to get the information. This Workshop is only a beginning. We hope to have in future periodic dialogues with different sectors at different centres so that the entire system of acquisition, data processing and dissemination would be strengthened in the days to come.

Dr.Silas then announced the names of the Chairman and rapporteurs for each session.

SESSION II

THE PRESENT STATUS OF MARINE LIVING RESOURCES STATISTICS IN INDIA

Chairman : Shri V.Ramamurthy, I.A.S.,
Commissioner of Statistics,
Tamil Nadu.

Rapporteurs: 1. Shri P.V.Krishnam Raju,
Deputy Director,
Department of Fisheries,
Andhra Pradesh

2.Dr. K.Alagaraja,
Scientist S-2,
CMFRI,
Cochin

The Chairman emphasising the role of statistics particularly in the fisheries sector, stressed the importance of fish as a protein-source and said we need to have proper data to derive valid conclusions without which statistical analysis, however sophisticated, may not be meaningful. He brought home this important point by citing some interesting examples. He then mentioned the pioneering role played by CMFRI in fish stock assessment studies and stressed upon the urgent need for standardisation of methodology of collection, processing and analysis of data and dissemination of information. The estimates obtained should reflect the reality to the maximum extent possible, as otherwise major policy decisions could go away. He then called for the lead paper of the session to be presented.

MARINE FISHERIES STATIS ICS IN INDIA-PRESENT STATUS*

From time immemorial fishing has been a traditional occupation for a large section of people, inhabiting the sea coast. However, until the turn of the century much attention was not paid to exploit this wealth from the sea which is a perennial source of protein. Unlike other natural resources like minerals, fish is a renewable resource and for healthy growth of the stock, judicious exploitation is a prerequisite.

For formulating developmental plans and evolving policies for rational exploitation of resources, assessment of the exploited stock forms the basis. The data on catch and effort and biological aspects are the essential requirements for assessing the exploited stock. In advanced countries due to the well organised system, statistics of fish landings are readily obtained from the source and are published at regular intervals. However, in India even though of late there has been a spurt in the off-shore and deep-sea fishing sector, where a data retrieval system could be evolved comparatively easily, fishing is till in a developing phase handled to a large extent by artisanal fishermen employing a variety of crafts and tackles. Landings take place all along the coast line in all seasons during day and night. In such a complex structure,collection of landing statistics becomes a formidable task. The cost, operational difficulties and non-sampling errors of a continuous survey covering all the landing centres would be of very high magnitude. A scientifically planned sampling strategy is the only answer to enable estimation of landings by the large number of indigenous and mechanised boats operating in the coastal belt.

1. Estimates of landings of fish from coastal waters

1.1. Historical background

In India the earliest reference to estimates of marine fish catch is traced in the report of marketing of fish in Indian Union. Data were not collected by any scientifically planned surveys but only by trade enquiries and similar evidences.

Soon after its inception in 1947, Central Marine Fisheries Research Institute made attempts to evolve

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Dr.E.G.Silas introducing, the Chairman Shri V.Ramamurthy, I.A.S., Commissioner of Statistics, Government of Tamil Nadu.

scientific methods of collecting marine fish catch statistics. In the beginning not much information was available on the marine fishing villages, landing centres, fishing crafts and gears which could form a frame for developing sampling plans. Besides, fishing practices differed from region to region and within regions from season to season. Keeping this in view the Institute conducted a preliminary survey to collect such information as was required for formulating a sampling plan. In the formative years limited resource at the disposal of the Institute was another constraint in conducting large scale surveys. However, an attempt was made as early as 1948 to collect marine fish catch statistics in a planned way.

The entire coastline of india was divided into 12 zones after taking into consideration geographical conditions. In each zone, approximately 400 km long, one assistant was posted and through a rapid survey information collected on fishermen population and crafts and gears.

The survey in the beginning was confined to a few important centres and later extended to the entire coastline. Three representative centres were selected from a zone and the selected centres were visited once each in a fortnight. Data were collected from a centre for four to five days consecutively on each visit.

A boat-net combination was taken as a sampling unit. As soon as the enumerator reached the landing centre he would ascertain by local enquiry the number of units gone out for fishing and on its basis he would determine the number of units to be sampled for collecting catch statistics. Five schedules were used for collecting various inventory and production statistics.

All observations were first sorted out as gearwise combinations. In respect of each gear, average catch per operation was worked out. On the basis of daily record the average number of units operated was arrived at. Product of the catch per operation and the daily number of units operated would give estimate of landings by that gear. Similar estimates for all gears added together would give estimated average daily landings.

In the early years, survey programme faced a lot of constraints. Fishermen were reluctant to co-operate with the scheme thinking that the survey was meant to assess their income from their traditional occupation. Many of the landing centres were not easily accessible due to lack of conveyance and road. Allotment of funds towards survey was very much inadequate to facilitate good coverage. With the provision of additional funds, survey programme was considerable expanded in 1957 and the number of zones was increased from 12 to 20, thus expanding the coverage.

Pilot survey was first undertaken along 160 km coast line of erstwhile Malabar. 61 landing centres were grouped into 12 geographical strata. Three-stage stratified sampling design was followed. A landing centre, time interval of 20 minutes and fishing unit formed first, second and third stage units. One centre was selected from each stratum and was kept under observation for one week. Within a day, data were recorded for 14 hours from 05.00 hrs to 19.00 hrs. An hour was divided into 3 intervals of 20 minutes each. One of such intervals which was the same for all hours of the day was devoted for counting the number of units landed during that interval while for recording catch the first unit landed during the remaining two intervals put together was taken. Product of the estimated total number of units operated during the period and the average catch per unit of operation gave estimate of total catch during the period.
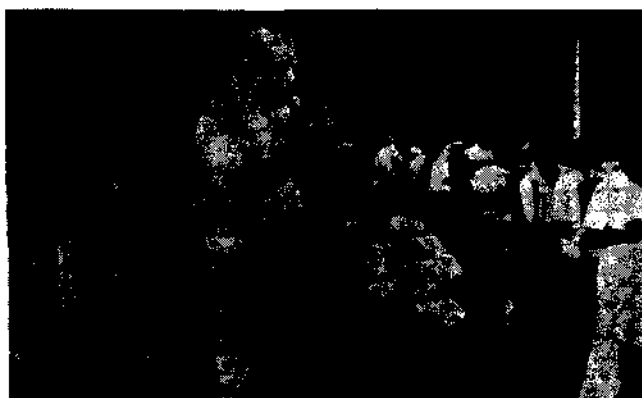
Commodore K.M.V.Nair participating in the discussions.

Similar surveys with varying details were carried out in subsequent years along erstwhile Travancore - Cochin coast, erstwhile Madras coast, Andhra coast, Canara coast and Bombay coast.

The CMFRI initiated collection of marine fish catch statistics through a multi-stage stratified probability sampling design in the west coast of India in 1959. This was subsequently extended to the entire coast in the following years. Vast experience gained by the Institute in the collection of marine fish catch statistics and the results of the pilot surveys conducted by ICAR have gone a long way in the development of the sampling design currently followed by the Institute.

Prof. S.L.Shanbhogue, Fisheries College, Mangalore, participating in the discussions.

1.2. Current procedure followed by CMFRI

A brief outline of the design is as follows:

The design is one of the stratified multistage random sampling, the stratification being over space and time. Each maritime state is divided into several zones on the basis of fishing practices and geographical considerations. A zone is a stratum over space and a calender month over time.

Nine landing centres are selected randomly from a zone. A month is divided into three groups of ten consecutive days. From the first ten day group one day is selected at random from the first five days. Then six consecutive days from the selected day onwards are considered and these six days are grouped into three clusters of two consecutive days each. From second and third groups of ten days three clusters each of two days, are selected systematically with a sampling interval of ten days. These nine clusters are alloted to the nine selected landing centres.

On the first day of observation, data are collected from 12 to 18 hours and the next day from 6 to 12 hours. Data on night landings are obtained by enquiry covering the period between 18 hours of the first day and 6 hours of the next day. Thus a 24 hour period is covered. This forms what is termed as a landing centre day. This is the first stage sampling unit. On the day of observation at the selected centre, if the total number of units landing is ten or less, all the units are

observed. When it exceeds ten, depending upon the total number of boats landing, a sample of boats is selected in a predetermined manner. The fishing units form the second stage units on which data on species - wise catch, effort, types of crafts and gears operated and nature of fishing ground are collected. At the third stage, samples of commercially important species are taken for biological observations.

Based on the information from the selected fishing units, the total landings for the observation period are estimated. By adding such estimates for two six hour period along with night landings, if any, the estimates for a landing centre day are obtained. From these, the monthly estimates for each year on zonal, district and state basis are worked out. Estimates have sampling errors between 4 and 5 percent in respect of annual landings for the country.

The design currently followed differs in details from the designs first implemented in different maritime states of the country. Thus, in Kerala for example a centre - two day group was the primary sampling unit. A day was divided into 4 intervals of 3 hours each as 06-09 hours, 09-12 hours, 12-15 hours and 15-18 hours. On the first day in each centre, observations were made during two intervals 09-12 hours and 15-18 hours and on the second day remaining intervals namely 06-09 hours and 12-15 hours were deveted for observation. Similarly in the east coast, primary sampling unit was again, a centre - two day group while within a day no sampling was done over time. Observations were taken through out the day ie. from 06-18 hours. Stratification also underwent periodic changes in order to cope up with the changing fishery conditions.

Shri M.Swaminath, Director, CIFNET, participating in the discussions.

From late fifties onwards due weightage was given in the survey programme to include landings from mechanised sector. Estimates of mechanised landings

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at some important centres like Sassoon Dock and Versova in Maharashtra and Mandapam in Tamil Nadu were separately arrived at. Progressively this system was extended to some more important centres like Fort Cochin, Munambam and Sakthikulangara, in Kerala and Waltair in Andhra Pradesh.

In the early seventies, there was a spurt in the implementation of mechanisation in the fishing industry, with the result the quantum of data to be collected increased tremendously. The Institute took timely action to give due weightage in covering such centres with suitable modification in the plan and increasing the staff strength. Some of the centres rose to prominence due to heavy fishing acitivies and increased harbour facilities. The concept of single centre zone was developed in this context and today there are 24 such zones.

Introduction of purse seiners in Karnataka and Goa in recent years and of late in Kerala has been a challenge to those responsible for collecting fish catch statistics. Fishing is intensive and the fish caught are by and large transported to the landing centre through carrier boats. Sometimes the mother boats also land the catches. Here again suitable innovations were made in the sampling strategy so as to take care the special features of this fishery.

From 1950 onwards CMFRI has been publishing annual marine fish landings with state-wise and variety-wise composition.

1.3. Statistics collected by State Departments

Fisheries Departments in various maritime states also have been collecting statistics on marine fish landings. States like Maharashtra Gujarat and Tamil Nadu are collecting statistics as per sampling designs either same or similar to that followed by CMFRI. In Maharashtra the main difference is that the centres are selected with probability proportional to size (average catch of previous three years). In some states statistics are collected through Department staff who visit fixed centres and collect the data through enumeration.

Frequent dialogues are made between the representatives of State Departments and CMFRI to examine the estimates and attempts are made to arrive at combined estimates.

2. Frame Survey

The information base on the potentialities of man power involvement, the number of fishing crafts and gears and infrastructure facilities such as fishing harbours, landing jetties, ice plants and cold storage-cum-freezing plants available in the coast of India is a prerequisite for planning developmental programmes in marine fisheries. This also provides the frame for conducting sample survey for the estimation of marine fish production and fishing effort in India. In order to understand the status of the traditional small scale fisheries sector in the changing pattern of fishing industry, periodic frame surveys for estimation of these parameters are vital. Keeping these in view the Institute has been conducting frame surveys at regular intervals ever since 1948-49.

Besides, the National Commission on Agriculture has emphasised in its recommendation that Central Marine Fisheries Research Institute should conduct quinquennial census in order to update the inventory of fishing resources available in the coastal villages with the help of State Governments. This gave a fillip for the Institute to undertake in a short interval an intensive census on a massive scale during May-July 1980.

The major items covered in the survey were family size, educational status, number of active fishermen, number engaged in associated fishing activities, number of mechanised and non mechanised fishing crafts and gears, type of ownership, number of fishermen engaged in aquaculture practices and information on fisheries harbours, landing jetties, transport facilities, number of boat building and repairing yards, cold storages, freezing plants, fish curing yards, peeling sheds, banks and fisherman co-operative societies. The results are published by the Institute from time to time.

Directorate of Economics and Statistics of Department of Agriculture, Govt. of India organises quinquennial live stock census in collaboration with state departments. In this census, information on marine fishermen population crafts and gears available and allied items is collected and published periodically.

3. Fishery economics data

Economic studies in relation to structural changes, production, cost and market research are required to arrive at suitable policies for the management of fisheries taking into consideration physical as well as social benefits. CMFRI has initiated several investigations to collect data on socio-economic conditions of fishermen, impact of introduction of new technologies, economics of fishing operations and behaviour of market mechanisms. Some of the Universities and Research Organisations also collect fishery economics data mostly location based.

4. Data from large mechanised vessels

Apart from the data collected through the sample

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surveys, landings by larger mechanised vessels owned by Govt. of India were made available by the organisations like Exploratory Fisheries Project, Integrated Fisheries Project and Central Institute of Fisheries Nautical and Engineering Training and these were incorporated in the estimates prepared by the Institute.

Only very limited data are available on catch by larger trawlers owned by private industry. In the immediate future fishing industry is going to be triggered to exploit the declared Exclusive Economic Zone. The number of large vessels including those coming under charter agreements operating in this zone is going to increase manyfold and quite a lot of useful fishery data would be occuruing. Modalities to acquire such data and monitor the processed results have to be developed. Such information is essentially required for framing suitable policies for management of the exploited fishery resources.

A note on "Present status of acquisition and dissemination of marine fisheries data in Andhra Pradesh" prepared by Shri P.V.Krishna Raju was circulated to the delegates.

Discussion

After the presentation of the paper the Chairman invited the views of the delegates.

Commodore K.M.V. Nair wanted to know whether the estimates obtained by CMFRI were checked by any other system such as by way of complete enumeration at selected landing centres and whether the CMFRI had evolved any system to collect data relating to culture fisheries particularly in brackish waters. Replying, Shri T.Jacob said that periodic supervisions and checks of survey work are conducted to reduce non-sampling errors and the standard error of estimates of total catch were only 4 to 5%. Intensive coverage is also done in the case of important fish landing centres, such as Sakthikulangara (Kerala), Cochin Fisheries Harbour and the Sassoon Dock in Bombay. Intervening, the Chairman suggested that one of the centres may be selected for monitoring the landings all the days in the year, which was agreeable to Dr.Silas. Shri.R.Sathiarajan recalled his past experience in collection of data on marine fish landings in Tamil Nadu and stated that estimates of CMFRI closely agreed with those of the State Government.

Dr.A.A.Rama Sastry pointed out the importance of advance warnings on weather conditions in reducing the risks of fishermen going for fishing. For this purpose two units of the I.M.D. were in operation – one in Tamil Nadu and the other in West Bengal-to acquaint fisherfolk about sea going risks as these developed. The Chairman observed that All India Radio issues weather bulletins received from the I.M.D. and in the districts the revenue and fisheries officials also take suitable measures to warn the people. He mentioned that sustained and well designed propaganda measures should be developed bringing home the advantages of taking note of weather warnings and the great loss caused by ignoring them.

Dr.S.L.Shanbhogue, mentioned that wide variations existed between the estimates of State Fisheries Department of Karnataka and CMFRI on marine fish landings in Karnataka. Shri B.V.Subramanyan indicated that difference in these estimates were sometimes evident and claimed that Karnataka state was collecting the data on complete enumeration basis and this data suited the department. Shri Jacob stated that cent percent enumeraion did not seem practicable and it was difficult to make comparisons between the data collected by the State and CMFRI data. In earlier meetings the Director of Fisheries of Karnataka State had been appraised of this situation and he had agreed to try the CMFRI sampling design. The Chairman suggested that the State Fishereis Department of Karnataka may select any one centre and collect data by using the sampling method of CMFRI and compare the figures so obtained with their "full enumeration" data.

Shri K.Krishna Rao mentioned that if CMFRI furnish data on catch and effort details for different boat-net combinations it would be useful and also suggested that collection of data on disposition of catches along with catch details may be attempted. Shri Jacob replied that computerisation would help in supplying information in whatever form required and that at present CMFRI was furnishing gear-wise catch details. Regarding the disposition of catches he mentioned that this work would be taken up in due course by the new Fishery Economics and Extension Division.

Shri J.D.Mhaiskar explained that on the basis of the sampling design given by the Bureau of Economics and Statistics of Mahrashtra, his Department was obtaining species-wise and gear-wise data. He also mentioned that data on utilistion of fish, and fishing effort were also collected and the catch estimates were found to show more or less similiar trend as those of CMFRI. At the end of every year, a reconciliation of estimates was being carried out with CMFRI and the reconciled estimates furnished to the Government of India and other agencies. Shri Jacob expressed that it was desirable to collect data by two agencies and this would help to have a cross check.

Shri. R.Srinivasan mentioned the existence of three agencies in Tamil Nadu viz. Department of Statistics, Department of Fisheries and CMFRI, collecting data on marine fish landings. However, these estimates did not differ much, he added.

Regarding supply of data on financial year basis Shri Jacob mentioned that the same will be furnished in addition to estimates on calendar year basis. Shri K.V.N.Rao suggested that the season-wise break of estimates would be useful. It was agreed that quarter-wise information would meet the requirements. Shri Mhaiskar stated that Maharashtra supplies information quarter-wise and furnished annual estimates for the fishing year reckoned from July to June. Dr.Rama Sastry suggested maintenance of daily data on magnetic tapes which would help to retrieve data in whatever form and combination needed.

Shri M.Swaminath wanted to know the system adopted by CMFRI for market survey especially with reference to the domestic market. Shri Jacob replied that already data were being collected to study the price-spread for fish at certain selected centres like Sakthikulangara and Cochin Fisheries Harbour. Trying to find a reason for the downward trend in fish landings, Shri Sathiarajan suggested that this may be due to concentration of fishing effort in search of prawns which yield higher prices. The Chairman said that a properly weighted index was desirable and that

CMFRI may take up a programme to construct one and study the trends which was accepted by Shri Jacob. Dr.P.V.Rao suggested that this workshop might indicate methods to arrive at a single estimate instead of different sets of estimates given by different agencies.

Shri V.Ramalingam, agreeing with the view of Dr.Rao, expressed the difficulties MPEDA experienced with different sets of figures furnished by different agencies and suggested that estimates furnished by CMFRI may be utilised for all purposes as they are based on scientific sampling design.

Dr.Rama Sastry proposed that after studying the variations and the trends, CMFRI may increase the sample size by utilising the services of State Government Departments.

Concluding the session, the Chairman remarked that the objectives with which surveys are designed and conducted should always be borne in mind throughout the process of collecting, compiling, analysing and interpreting data, so as to make the estimates meaningful. He suggested that uniform design in sampling should be adopted by CMFRI and State departments. He thanked the participants for making the session successful and hoped the Workshop as a whole would contribute towards a better awareness of responsibility in compiling and using data, particularly so in a vital area like that of fisheries.

SESSION III

IDENTIFICATION OF DATA REQUIREMENTS OF USER SECTORS AND STANDARDISATION OF SUITABLE PROFORMAE FOR COLLECTION OF DATA

Chairman: Dr.A.A.Rama Sastry,
Deputy Director General,
India Meteorological Department,
Pune.

Rapporteurs: 1. Dr.S.L.Shanbhogue,
Professor, Fisheries College, Mangalore.

2. Shri K.N.Kurup,
Scientist S-1, CMFRI, Cochin

The Chairman in his introductory remarks said that CMFRI has been the pioneer Institute collecting data on living resources of the Indian Seas. A lot of data are available and the methods to improve the availability of such data might be discussed. This Workshop could also discuss the format in which the data are to be collected. Users could be from various disciplines and data requirements could cover wider fields than for which they are generated. Appropriate formats could be developed so that various end users can use the data without difficulty. He then invited Shri S.K. Dharmaraja to present the lead paper.

DATA NEEDS OF USER SECTORS AND AN OVERVIEW OF THE PROFORMAE*

For the assessment of various fish stocks, their judicial exploitation and formulating fishery management policies, the data on catch and effort are essentially required. The various financial bodies, planning organisations and fishing industry also need the data for their developmental plans. The different Departments of Government of India, State Governments, the Marine Products Export Development Authority and the research organisations look for the data for their administrative and other requirements.

Fish stocks are exploited by both indigenous as well as small and large mechanised crafts using various types of gears. In order to collect data from the above categories of crafts and to meet the requirements of the user sectors a number of proformae have been devised for consideration of the Working Groups. These proformae are briefly described here.

1. Indigenous fishing crafts.

The proformae for indigenous fishing boats operated during the period of observation, the number of crafts sampled, the types of crafts and gears used, mesh size, man power employed, duration of actual fishing, number of hauls, distance of the fishing ground, depth, departure and arrival time of fishing crafts, species-wise composition of total catch of each sampled boat and also price statistics of important fis-

hes at landing centres. The environmental factors like state of sea, sky, direction of wind and current have also been added in the proforma.

2. Small mechanised fishing crafts.

In the proforma for the collection of data on catch and fishing effort from small mechanised boats the items of data to be recorded are more or less the same as for the indigenous boats except for the additional data to be collected on length of boat and horse power. The proforma is meant for collecting data from trawlers, gillnetters, long liners, dolnetters and motorised boats using gears like boat seine, gill nets and hooks and lines. In respect of purse-seiners, however, as the effort data are difficult to collect from the landing boats which are mostly carrier boats, additional proforma has been devised to collect effort data by enquiry from the operators of purse-seiners.

3. Larger mechanised vessels

Proformae for trawlers, purse-seiners and tuna long liners have been prepared for the collection of catch and effort data as also additional information on environmental factors and data pertaining to other related items.

*Prepared by S.K.Dharmaraja, K.Balan and K.Vijayalakshmi,Scientists, FRA Division, CMFRI, Cochin and presented by S.K.Dharmaraja.

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a. Trawlers

For trawlers, the items to be recorded are name / code of vessel, voyage particulars, method of fishing, base of operation, date and day of trip as basic data. The other items to be furnished have been divided into 3 major groups viz., fishing conditions, catch details and special observations. The particulars such as fishing area (latitude & longitude), trawling speed, direction of trawling, mesh size, time of trawling, both fishing and bottom depths, sea conditions and current directions are to be recorded under the item fishing conditions.

The catch particulars of differnt species as listed in the proforma are to be furnished under the column - catch details. Special observations, such as wrecks & obstructions, presence of foreign vessel, sighting of whales and dolphins, fish shoals etc as required under item C of the proformae are to be also filled.

The above particulars are required for studying the interrelationship of catch and environmental factors.

Dr.E.G.Silas introducing the Chairman Session III Dr.A.A.Rama Sastry, Deputy Director General, I.M.D.

b. Purse-seiners.

For recording the data on catch, effort and other particulars separate proforma has been drawn for purse-seiners. Under fishing conditions, particulars like size of net, detection-visual/sonar/bird flock, type of school and size, scouting time, time of setting and finish, thermocline top and bottom depth have been included.

C. Tuna long liners.

The proforma for the tuna long liner has got two broad categories of information such as hydrographic data and fishing data. Under hydrographic data, items such as position (latitude & longitude), depth range of operation, bottom depth, directions and speed of wind and current, air and sea surface temperature, top and bottom depth thermocline, sea conditions such as wave direction, scale and water transparency are to be recorded.

Under fishery data, particulars like fishing area, no. of baskets, total number of hooks, baits shooting direction, hours hauling, catch composition of fishes in terms of numbers as well as weight are to be recorded.

Discussion

Commodore Nair wanted clarification of the term larger vessels and asked whether the proformae were meant only for commercial vessels or whether they were meant for those owned by Government of India. Dr.Silas clarified that vessels of size above 17.3 m are denoted by the term larger vessels and said that the proformae are intended for all vessels.

He further stated that proformae have been distributed before Working Groups met, in order to stimulate a prethinking and the resultant individual views on various items discussed.

Shri K.H.Mohamed, Scientist S-3 CMFRI, participating in the discussions.

The Chairman remarked that the information collected through the proformae is of diverse nature and could form cross references for end users. He suggested that some of the items which require high scientific skill at the level of collection may be delinked from the main schedule and may be collected through separate schedules. Shri.K.V.N.Rao remarked that apart from hydrographic data, environmental data like current and wind directions and bottom condition would help in understanding the physical characteristics of the fishing grounds and may be of much help to the fishing industry. Commodore Nair also subscribed to the need for collecting such information and suggested that the same should be disseminated at the fishermen level in the form of charts, atlases etc. The Chairman remarked that some information which are qualitati-

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vely known can be supplied to fishermen. Data which are to be collected by scientifically designed methods could be obtained separately. Dr.Silas said that skippers also make some valuable observations which are important. Information on wind as a source of energy is of much importance. Data on thermocline are required for effective fishing of tuna by purse seiners. Shri Ramamurthy was of opinion that an environmental awareness on the part of fishermen is always desirable and hence in this respect such data would help in a long way. Dr.C.Hridayanathan suggested that details regarding winch may also be included in the proformae. Lt.A.J.Lucose remarked that information on current, wind etc. are available already in navigational charts. However, it is desirable that maximum data are collected by vessels operating in various areas and the data are made available at a central place so that other agencies can obtain them.

The Chairman in his concluding remarks said that it should be ensured that the data collected are accurate and reliable. It is desirable that all data are accompanied by a note giving its accuracy and limitations.

SESSION IV

OPERATION OF LARGE VESSELS IN EXCLUSIVE ECONOMIC ZONE

Chairman: Shri R.Sathiarajan, Director, I.F.P., Cochin.

Rapporteurs: 1. Dr. M.Deveraj, Professor, Central   2. Shri. K.Balan, Scientist S-1,.
Institute of Fisheries Education, Bombay.   CMFRI, Cochin.

In his opening remarks, the Chairman stressed the importance of 'Charter Policy' of the Government of India in the development of fisheries including the training of personnel in the operations of fishing vessels. He then invited Shri B.B.Lal to present the views of Government of India in respect of the policy on Chartered Vessels.

Shri Lal, briefly outlined the 'Charter Policy' of the Government of India. He stated that although the country has formulated its charter policy soon after the declaration of the EEZ, there has been many areas which needed further improvement. He mentioned that in the current policy, there are about 30 terms and conditions which a company chartering foreign fishing vessels is required to comply with. They include major items like (1) the company should have a minimum capital of Rs.5 lakhs (2) the strength of the Indian crew on the chartered vessel should be at least 20% of the total crew (3) the foreign crew will be allowed to be employed only after due concurrence of the Government (4) there is a basic requirement on the part of the foreign counterparts to train the Indian crew on the fishing techniques employed by the chartered vessel (5) initially the charter would be for three years, but could be extended further depending on individual merits, (6) one applicant wil be allowed to operate only 5 vessels for one particular type of fis-

hing but this condition is not binding on the State Fisheries Corporations, Fishermen cooperatives, State Fisheries Departments and the public sector undertakings (7) the company shall provide bank guarantee for Rs.2 lakhs and pay a licence fee of Rs.10,000 per vessel per annum (8) the chartered vessels will not engage themselves in oceanographic sureys of any kind in the territorial waters or for that matter in any part of the EEZ (9) the chartered vessels should allow Indian Scientists on board and facilitate collection of scientific data (10) the vessels shall call back to the ports once in 30 days (11) they should engage themselves in fishing for which they are authorised (12) all data on fishing, catch, effort and economics including export earnings shall be furnished to the Government and (13) violation and lack of compliance with the conditions may even entail cancellation of the licence. Shri Lal added that the present policy aims at providing maximum encouragement to the entrepreneurs in the fisheries sector in the operation of chartered vessels.

The Chairman thanked the speaker for his brief and effective presentation of the charter policy. He remarked that apart from many conditions and clauses in the charter policy, there are two major aspects in the policy namely scientific aspect and defence aspect which require careful considertions.

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Shri B.B.Lal, Asst. Commissioner Fisheries (Statistics), Department of Agriculture, New Delhi, explaining the 'Charter Policy'.

Opening the discussion on the topic, Commodore Nair mentioned that no Indian understudy for skipper is posted in any of the chartered vessels. Inspite of the fact that both pair and bull trawling are going on for the last 8 months or so, there has not been any data coming forth to the national agency resulting in a tremendous loss of very valuable data. It was also pointed out that scientists have also not gone on board in any of these vessels. Even in respect of the Indian crew participation, in many cases it is found to be very negligible. The vessels seldom report their position in the sea. Shri B.B.Lal reported that the Ministry of Agriculture is setting up a cell to monitor the effective implementation of the Charter Act. The Chairman did not agree with some of the points raised by Commodore Nair. He pointed out that data sheets of the chartered vessels are passed on to the Ministry and there is no difficulty to pass them further on to CMFRI. In at least 2 of the vessels, for which he has first-hand information, there are 4 Indian crew each a Skipper trainee, an Engineer trainee and two Deckhand trainees against 16 foreign crew. However, he did not have any information in respect of scientists' participation and any existing deficiency could be rectified. If there is a violation to the requirement of position reporting, it should be seen that this practice is not continued any more. He hoped that the Ministry representative will take care of all these aspects.

Shri K.V.N.Rao suggested that log sheets may be handed over to the representatives of the National data agency when the vessels call on the ports. He also suggested that the coast guard could inspect the vessels and see whether the terms and conditions are fully complied with.

The Chairman mentioned that in cases of vessel endurance exceeding 30 days, there should be provision to allow port calls according to endurance. He also said that occasionally naval vessls do visit and monitor the performance of the vessels in sea. Shri V.Ramamoorthy suggested strict enforcement of legal provisions incase of any violation of conditions under Charter agreement.

Shri P.Sulochanan indicated that the chartered vessels should have their names in a language (English or Hindi) easily comprehensible to the Indian authority. Shri Lal said that this is one of the terms of the Charter policy and the company is obliged to comply with it. Commodore Nair suggested that the best mechanism of collection of information is through the Indian crew. Communications between vessels are very difficult since the Government conditions are so very stringent on this matter.

Shri K.H.Mohamed wanted to know whether there has been any specific case of chartered vessel violating the Government conditions and due punishment accorded. Shri Lal replied that he was not aware of such violations.

Dr.K.Alagaraja, Scientist S-2 CMFRI, participating in the discussions.

Dr.P.V.Rao enquired whether there is any constraint being experienced by the Government for data acquisition. The Chairman replied that data are regularly coming forth, but there is as yet no mechanism for checking the validity of the same. Commodore Nair supplemented that the fishing vessels are not provided with any proformae and the understudy (who should preferably be a qualified skipper) should be in charge of data collection.

Mr.R.Sreenivasan wondered why there should be any restriction of a particular mode of fishing to just 5 vessels for each company. This is particularly a restraining factor when viewed against the Government target of 350 deep sea vessels by the end of the Sixth Five Year Plan.

Shri Lal mentioned that of the 36 applications received so far for charter, 19 have been cleared. The other applications have not yet been cleared for the

reason that they have not yet been able to execute the proper documents. Regarding the restrictions of 5 vessels for the one type of fishing by each company, the Chairman remarked that this was meant to encourage diversification of fishing.

The Chairman concluded the session by thanking the delegates for their active participation in the discussion.

SESSION V

STANDARDISATION OF PROFORMAE

Chairman: Commodore K.M.V.Nair,
Tata Oil Mills, Madras.

Rapporteurs: 1. Shri V.Ramalingam,   2. Shri T.Jacob,
Joint Director,   Scientist S-3,
MPEDA, Cochin.   CMFRI, Cochin.

In order to standardise the proformae for collection of data from nonmechanised boats, small mechanised boats and larger vessels(more than 17.3m),draft proformae developed by Central Marine Fisheries Research Institute were entrusted with 3 working groups of the delegates under the following leadership for each group.

Group	Group Leader	Member Secretary
1. Non-mechanised boats	Shri R.Srinivasan, Joint Director, Fisheries Department, Tamil Nadu.	G.Venkataraman, Scientist S-3, CMFR Institute, Cochin.
2. Small mechanised boats	Shri V.Ramamurthy I.A.S., Commissioner of Statistics Tamil Nadu.	Dr.K.Alagaraja, Scientist S-2, CMFR Institute, Cochin.
3.Large vessels	Commodore K.M.V.Nair, Tata Oil Mills, Madras.	Shri T.Jacob, Scientist S-3, CMFR Institute, Cochin

The Working Groups had their deliberations from 21.10.1982 evening to 22.10.1982 morning 11 A.M. The reports of these Working Groups (Appendix 1) were considered at this Session

The Chairman made some general observations on the proformae. Each proforma should have a number which indicates the broad type of craft eg. '1' for non-mechanised boats, '2' for small mechanised boats, '3' for large mechanised vessels and '4' for culture fisheries. The numbers should have suffixes (wherever applicable) to indicate the type of operation eg. 'A' for trawl 'B' for purse seine 'C' for long lines etc.

Each proforma should clearly indicate the frequency of reporting eg. daily, each voyage or each operation. Items which CMFRI has to fill in (eg. code number) should be clearly specified perhaps by printing in different ink. Meterological and oceanographic data required in the forms (wherever applicable) should be of standard pattern. Eg. State of Sky-Blue/cloudy/............ etc. and Nature of Bottom-Muddy/Sandy .... etc. The directions for filling the proformae should be given at the end of the proformae pad.

The Chairman who was also the group leader for standardising proformae for large mechanised vessels viz. trawlers, purse seiners and long liners presented the report.

First the Chairman took up the proformae on trawlers (Form 3 A) and made the following suggestions. Fishing area should relate to the position at the

time of shooting of net. The direction of trawling should be in three digits. As for example N.E.405 and S.W.225. In the place of spread at mouth, length of head rope may be recorded. The columns 'Time of shooting from – to' and 'Time of hauling from-to' may be replaced by 'Time of completion of shooting' and 'Time of starting hauling'. A column mentioning length of warp may be inserted above that of 'bottom depth'. A new column to denote atmospheric pressure may be added. Under composition of catch, names of fishes may be omitted and instead blank columns may be provided to fill in species of prawns, cuttle fish, squids and fishes.

Shri R.Srinivasan, Joint Director, Department of Fisheries, Government of Tamil Nadu presenting the report of the Working Group on proformae for non-mechanised crafts.

Initiating the discussion Dr.Rama Sastry pointed out that the size of the log sheets should not be unwieldy to which Commodore Nair replied that data are recorded first in rough sheets and subsequently transferred to proformae. Lt.A.J.Lucose suggested that tidal corrections should be made at the time of recording bottom depth. For this Commodore Nair mentioned that when sophisticated instruments are available, this work may be undertaken. Shri P.Sulochanan suggested the desirability of recording the length of the horizontal and vertical opening of the head rope. Shri S.K.Dharma Raja stated that it would be helpful if automatic copying log sheets are provided. Commodore Nair mentioned that proformae for summary details may be deleted. However, fuel consumption for each voyage may be given. Regarding the proformae on long liners (Form 3C), the chairman stated that the committee suggested that the hydrographical and meterological data may be given both at the commencement of shooting and the end of hauling. Under depth range, the minimum and maximum depths of hooks may be recorded.

On the proformae for purse-seiners (Form 3 B) a few changes were suggested. The mesh size may be given at the top. Scouting time may be changed to scouting period. Regarding size of net, both length and

depth may be recorded separately. The Chairman stated that the suggestions made on the proformae for trawlers which are relevant to purse-seiners and long liners may also be taken into consideration while finalising these proformae.

The Chairman then requested Shri. R.Srinivasan to present the report of the Working Group on non-mechanised boats. Shri Srinivasan stated that the proformae was unanimously accepted by the Working Group except for some minor changes. Instead of boat, the word craft may be substituted. (Form 1).

Dr.S.V.Bapat presented the report of the Working Group to standardise proformae for small mechanised boats (Form 2). Two major changes were suggested viz. i) introduction of a number of columns in the body of the proformae for collection of data on state of sky, state of sea, wind and current direction so that from each sampled boat the information on the same could be collected and (ii) introduction of a column for fuel consumption to be collected from each sampled boat.

During the discussion it was generally felt that while information on state of sky, direction of current etc., for each boat and, strictly speaking, for each haul is useful, practical difficulties in getting such data from small mechanised boat operators are too many and the dependability doubtful. As such it was agreed that the general features as in the proformae for non-mechanised boats only need be kept. If feasible separate data forms with all the additional details may be supplied to selected skippers to collect such information on an experimental basis.

Shri P.Sulochanan, Deputy Director, EFP participating in the discussions.

Regarding fuel consumption, it was agreed that since skippers in general would find it difficult to provide this information on daily trips and would be reluctant to part with any such data, the item may be dropped. However, considering the importance of stu-

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dying the economics of fishing operations which include fuel consumption, it was felt desirable to take up case studies on selected boats from which the relevant data could be collected over a period by specially trained investigators. In the case of purse - seiners, the group suggested separate proformae for carrier boats and mother boats which land catches (Form 2 A-H). These suggestions were accepted.

The Chairman then stated that taking into consideration the requirements for transferring the data to cards/tapes/disks CMFRI may recast the format keeping in view the agreed decisions.

SESSION VI

PROCESSING AND DISSEMINATION OF DATA ON MARINE LIVING RESOURCES OF INDIAN SEAS

Chairman :   Shri C.Vijay Ranchan I.A.S.,
Commissioner of Fisheries, Gujarat.

Rapporteurs : 1. Shri K.Krishna Rao,   2. Shri M.Srinath,
Scientist S-2,   Scientist S-1,
CIFT, Cochin.   CMFRI, Cochin.

The Chairman in his opening remarks stressed the importance of catch and effort data in fishery research and development and laid emphasis on collection of data relating to economic aspects of fishing operations. He pointed out the necessity for quick dissemination of information on biological aspects such as variations in stocks, spawning behaviour etc. to those who are actually engaged in fishing. He then requested Shri G. Venkataraman to present the lead paper

PROCESSING AND DISSEMINATION OF DATA ON MARINE LIVING RESOURCES OF INDIAN SEAS BY CMFRI*

Introduction

Estimates of marine fish catch landed and the effort expended as well as the data on biological aspects are essential prerequisites for the assessment of fish stocks along the Indian coast. With this objective in view, CMFRI has been collecting data on catch, effort and biological aspects over the past three decades. The processed data are published and made available to the Central and State Governments, fishing industry and various national and international agencies. Besides CMFRI, some of the state governments also collect marine fish catch statistics in their respective state. A brief review on the acquisition and dissemination of data by CMFRI on marine living resources of the Indian seas is given.

Acquisition

1. Data from Indigenous Boats and Small Mechanised Vessels.

About 100 field staff stationed at 42 centres,

spread over in the 8 maritime states and 2 union territories, have been collecting catch, effort and biological data from about 1400 landing centres based on multistage stratified sampling design. Work programme for each month are sent to them from headquarters sufficiently in advance. Each field assistant makes observations for 18 days in a month. He collects data on the total number of boats landed and on species-wise and gear-wise catch and effort expanded from a sample of boats. He also collects biological data from subsamples of commercially important species. Recently the field staff have been instructed to collect data on the prices of different varieties of fish. He records the field data in the prescribed proformae for both the indigenous and mechanised crafts.

The field staff send the data in the prescribed proformae for the particular month during the first week

*Prepared by G.Venkataraman, K.N.Kurup and M.Srinath, Scientists, FRA Division, CMFRI, Cochin and presented by G.Venkataraman.

of the succeeding month. The data received at the Headquarters of CMFRI are scrutinised and processed at the computing laboratory in the Fisheries Resources Assessment Division of the Institute. Estimates of species-wise marine fish landings and also fishing effort in terms of number of operation of different gears and the fishing hours in the various maritime states are obtained.

Before publishing the processed data, discussions are held with those state governments who collect marine fish catch statistics. During the discussions, the estimates arrived at by CMFRI and those by the states concerned are compared and pooled estimates are made as and where there are some differences.

Dr.S.S.Pillai Joint Director IASRI presenting the invited paper on information system.
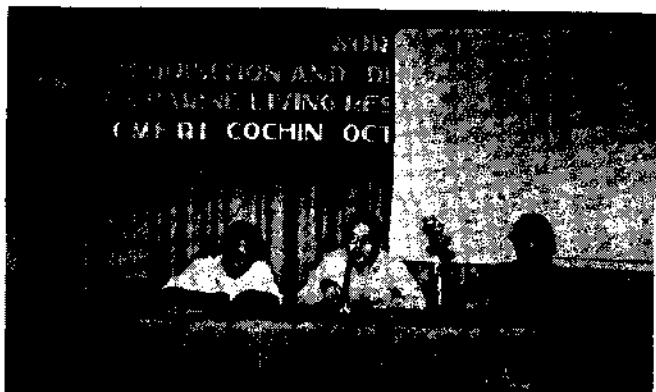
Chairman: Shri Vijay Ranchan, I.A.S., Commissioner of Fisheries, Government of Gujarat.

The work of the field staff at the landing centres is supervised periodically by the field officers and the scientists stationed at the different research and field centres so as to ensure proper identification of species and collection of data. Refresher courses are organised at Headquarters and different research centres to keep the field staff abreast of the latest developments in the identification of the different species. Workshops are organised once a year to review the previous year's work and to discuss matters concerning collection of data and ways and means of improving the same. Updating of landing centres, review of any change in the fishing pattern and also special features like fuel shortage or natural calamities are taken note of for necessary action.

2. Offshore Data

Data on catch of fishes obtained from the vessels operated by the EFP and IFP are received at the Headquarters of CMFRI and they are analysed in terms of species-wise depth-wise and area-wise occurrence. Data from very few larger private trawlers operated by Indian companies and also from some vessels working on a charter basis are received and processed.

3. Census Data

Information in respect of the number of fishing villages, landing centres, fishermen population, fishing crafts and gears and infrastructure facilities available is essential for planning of development programmes in the marine fisheries sector. Updating the list of marine fish landing centres is required for the estimation of marine fish catch. With this objective in view, CMFRI has been conducting marine fishermen census periodically from 1947 onwards. In 1980, a fresh census was conducted within a short period of less than a month on an intensive and massive scale availing the services of 1500 persons employed locally under the direct supervision of 165 scientific and technical personnel of the Institute. About 2000 marine fishing villages were visited covering nearly 3 lakh households and information on the fishermen population and the available infrastructure facilities was collected in specially designed comprehensive proformae. In this venture the Institute received active support from all the State Fisheries Departments.

4. Biological and Environmental Data

During the last three decades the scientific and technical personnel of the Institute have been collecting data in suitable proformae on morphometric and meristic characters of commercially important fin and shell fishes besides on food, migration patterns, sex ratio and stages of maturity.

Environmental data relating to physical oceanographic aspects such as currents, tides, wind direction and upwelling as also on chemical oceanographic parameters such as salinity, oxygen content, phosphates, nitrates and silicates are being obtained.

There is immense scope to augment fish production by mariculture in our country which has vast areas of lagoons, backwaters and bays suitable for this purpose. In the field laboratories and demonstration

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farms, the scientists of the Institute have been making studies on the stocking density, rate of growth, food and feeding and induced breeding and the data on the same have been recorded.

Dissemination

After processing the data, the estimates of species wise total marine fish landings of the different maritime states and union territories are published in the *Marine Fisheries Information Service* (MFIS) as well as in the annual reports and special bulletins published by the Institute. From the year 1981 onwards, estimates of landings along with the effort (unit operations) by mechanised and non - mechanised sectors are also being given separately. Estimates of fish catch landed at some of the major fisheries harbours in the country have also been furnished.

Some changes have been effected in the species - wise presentation of catch data from 1981. The existing 27 groups of fishes have been revised with a view to bring in the related genera and species of fishes under the relevant headings. Under some groups further categorisation is done on the basis of their commercial importance. For instance, the pomfrets have been categorised into black, silver and chinese pomfrets. Based on the data on catch, effort and biological aspects collected by the Institute, stock assessment of some of the commercially important fishes have been made and the results published in MFIS, *Indian journal of Fisheries* and special publications. Addtional information relating to marine fish catch is also furnished to the extent possible to the various agencies both Governmental and non - Governmental bodies on request.

The processed census data collected in 1980 were published in MFIS No.30 (August 1981) giving district - wise details on the distribution of marine fishermen population, their educational status, number of fishermen actually engaged in fishing and various types of crafts and gears.

The Institute has been carrying out case studies pertaining to socio-economics and also on impact of mechanisation. Special investigations to assess the losses caused by calamities such as cyclone and fire of great magnitude have also been undertaken and published.

Future Plan

The existing strength of field staff engaged in the collection of data will be doubled during the Sixth Plan period increasing the coverage from the present 2.0% to 3.5%. With the greater coverage, it would be possible to furnish district-wise, quarter-wise and important gear-wise estimates with greater precision. It would also be possible to give estimates of fish catch landings for all the important fisheries harbours in the country.

With the declaration of Exclusive Economic Zone the area of fishing has increased manyfold from 0.1 million sq. km. to 2 million sq.km. Surveys carried out by the vessels of EFP., IFP., and the erstwhile PFP showed that there exists in abundance in our coastal waters a diversity of species such as oil sardine, mackerel, other sardines, whitebaits *(stolephorus spp)*, ribbonfishes, catfishes, silverbellies, horse mackerel and scads whose landings are being augmented by newer methods of fishing like purse seining. These surveys have also revealed the existence of vast non-conventional fishery resources beyond 50 m. depth in the continental shelf and upper continental slope. This has led to the possibility of increased landings, among others, of deep-sea fishes, squids, lobsters and prawns. The landings of oceanic species such as tunas and bill fishes are expected to increase considerably with the operation of our vessels in the high seas.

Consequently, quantum of data received at the Data Centre of CMFRI will considerably increase in the coming years. For quick processing of the voluminous data and the rapid dissemination of the information, it is essential to develop a computerised system at this centre. It has been rightly pointed out by the Planning Commission that the National Fishery Data Centre should be developed at CMFRI with a computerised system. Such a system will facilitate bringing information in a detailed manner and carrying out in-depth sutdies for developing suitable fishery management policies.

With this objective in view, advance action for the computerisation of the data has been taken. The common marine living resources of the Indian Seas have been classified under different groups such as fin and shell fishes, marine turtles, marine mammals, sponges and seaweeds and code numbers have been given to the genera and species falling under these groups. Altogether 922 species have been listed, of which 671 species come under fin fishes and 112 species under shell fishes. Codes have also been given to the various maritime states, districts, zones, landing centres and types of fishing crafts and gears. The existing proformae have been recast to accommodate codes and the process of filling the coded data has been initiated.

This Institute, with the expanded programme of acquisition and idssemination of data on living resources of Indian seas, will be of greater service to the end users in the coming years.

Discussion

Commodore Nair expressed the need for delineation of fishing zones exploited by artisanal fisheries, small machanised boats and large vessels. Shri.G.Venkataraman replied that dilineation would be possible once detailed depth-wise analysis is· made and the acquisition of computer would facilitate this task. The Chairman said that there is a need for proper utilisation and coordination of available manpower for collection of catch statistics. At present catch data are collected by both CMFRI and the respective state agencies. He felt it would be better if the states were asked to collect catch data and CMFRI concentrates on case studies and certain specialised studies. Shri.T-

.Jacob and G.Venkataraman were both of opinion that the catch and effort data at micro level are essential to link up the biological· observation for assessment of stocks. Dr.K.Alagaraja remarked that in a large scale survey of population exhibiting wide variations it is advisable that more than one agency is involved in collection of statistics. He also emphasised the need for following uniform sampling design for data collection by all the agencies concerned and added that CMFRI would certainly be able to help in formulating such a design.

The Chairman then invited Dr.S.S.Pillai, Joint Director, IASRI, New Delhi to present his paper.

PROBLEMS AND PROSPECTS IN ESTABLISHING MARINE FISHERIES INFORMATION SYSTEM*

1. What is Data Processing?

Statistical data collected through surveys, censuses, experimental observations or from official records are usually very voluminous. They have to be processed, classified, condensed and summarized into few statistics in order that the information contained in them may be comprehended. The systematic execution of these operations on the data to achieve this is known as 'data processing'. The basic data collected in source documents are the primary 'input' to the data processing system. These data are subjected to various operations like scrutiny, conversion into machine readable form, if machanical processing is done, editing, cleaning, sorting, merging and tabulation to produce 'output'. The nature of processing will depend on the volume of input data and on the equipments and methods·used. The number of processing functions will be many, whatever be the method adopted. The final outputs are generally tables, results of statistical analysis, functional relationships, estimated values and projections based on hypotheses. There can however, be intermediate outputs which are stored for further processing at a subsequent stage. Processed data is referred to as "information" because the result of processing is often used for making policy decisions.

2. Steps in data processing

The work of data processing starts when proposals for collection of data are formulated. The method of processing envisaged, the type of personnel availa-

ble to do the work, methods to be adopted for analysing the data, and method of distribution of the output to the users will have to be considered at this stage itself. The design of the proformaes in which basic data are to be collected depends upon the processing methods and equipments used. By suitable designing of the forms considerable savings in processing time, economy and increase in efficiency can be achieved.

3. Coding

If data collected from the field are entered in the forms in terms of numeric (or alphanumeric) codes, processing of such data will become more easy then when description in words are entered. Description in words has drawbacks like:

(i) For entering data into cards or other storage media more space will be required.

(ii) Variation in spelling will lead to multiple classification of the same item.

(iii) Processing will be more time consuming than when coding methods are adopted

3.1. Coding Principles

The preparation of codes is done keeping in view the way in which data will be processed and the type of machines on which processing will be done. Codes are better prepared by group of subject matter specialists when the classification is extensive. Given in Appendix is a list of codes used by Food and Agriculture Organisation to classify documents relating to

aquatic animals in the creation of their information system for agricultural Sciences and Technology. Codes of this kind are so designed that they can be expanded to add more classifications. It will also be possible to make breakdowns into sub - classes when required. A good coding system should produce codes which are simple, as short as poossible and convenient to use. When the number of codes is very large the field workers are supplied with printed list of codes, preferably in coloured pages, different colours being used for specifying codes for the different items.

3.2. Self-Coded schedules

It is always easy, both in manual and automatic data processing, to analyse data if entries in source documents are classified with preassigned codes. For instance in a sample survey meant for estimating the animal life in the sea the processing of the data will be more easy if the forms used in the field are designed as in the table given below:

Number of animals caught

Type	Code	Number
Fish	1	
Crustaceans	2	
Molluscs	3	
Reptiles	4	
Other aquatic invertebrates	5	
Other aquatic vertabrates	6	
Any other aquatic animals	7	

The field workers are only required to enter the count of each of the species against the required classification.

This will reduce errors at various stages of tabulation and facilitate quicker summarisation of data. In many cases classification of qualitative and quantitative characteristics can be incorporated in the proforma at the design stage in this manner. The classification has however to be done very carefully and the person collecting the data should not have any difficulty in choosing only one of the alternatives provided under each item of enquiry.

The proforma used for collecting data should be got printed in such a manner that while transferring the data into punch cards or other data storage devices, all the data required to be stored in a record is available in a page of the proforma.

Preparation of data for mechanised tabulation takes considerable time, and lot of errors can occur in data transference. The proper organisation of recording of information helps in reducing the errors and speeding up the operations.

4. Editing of Data

Data collected through enquiries, or from documents are likely to have errors at various places. These errors occur due to incomplete and wrong response to enquiries wrong record of information by the field worker, lack of knowledge on the part of the respondent, etc. The errors in the document should be corrected by 'editing' it before the tabultions and analysis is taken up. When computers are used for tabulation of data, the editing work can be done with the help of suitable computer programmes. Editing is based upon comparisons of the values for their range and consistencies between different fields. For correcting errors reference to the field for cases where discrepanies cannot be solved logically will be required.

5. Preparation of tables.

Once the data are corrected of all errors, tabulation can start. Tabulation will consist of sorting the data according to desired classifications, and totalling of quantitative information in the classes. Totals and counts are often made for meaningful sub populations and pooled over to get the global tables.

6. Methods of processing data using manual methods

When the data to be processed is relatively small and the computations required to be done on the data elements are few and simple, manual methods are more economical and faster than mechanical procedures. In manual tabulation sorting is done by handling of individual records, and the classified documents are counted. The quantitative information in various classes are totalled mentally or by using simple calculating machines to make the tables.

7. Mechanical Tabulation methods.

In order to use machines for data processing the information collected will have to be transferred to machine readable recordes. A variety of machines are used for processing, like key punches, mark sense readers, optical character readers, magnetic ink character readers, sorters, collators, tabulators and elctronic computers for doing the processing. A description of the various mechanical aids used as follows.

7.1. Punch-card Machines.

The obstacles in machine processing of documents are (i) the original documents are generally of varying size, shape and thickness; (ii) one source document like a filled up proforma contains a large

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number of entries and tabulation of some or all of these entries will be required; and (iii) the entries made by field workers and clerks in the documents are in varying styles of handwriting and inks. A machine which can cope-up with mechanical processing of data contained in media of such complexity cannot be made. The solution which was found for this is to have standard cards of uniform size and thickness and to have a predetermined and unique pattern for encoding data on them. The most common medium for entering data is the 80 column punch-card. Holes punches in cards using punching machines, in a standardised pattern are used instead of the normal methods of recording data. The process of recording data is known as key punching. The data entered in the cards will have to be verified to ensure that mistakes have not entered. This is known as verifying.

There are some variations in the mode of recording data on punch cards based on the pattern of holes made for representing different characters. The most commonly used of the methods are punching Binary Coded Decimal (BCD) and Extended Binary Coded Decimal Interchange Code (EBCDIC) formats. In both cases digits, alphabets and other characters normally used in science and business are represented by one, two or three holes in the concerned columns.

7.2. Processing punch cards

Separate machines are used for punching data into cards and for verifying the punched cards. Two machines and two operators are thus required in comparison to only one direct entry or key-to-magnetic medium machine needed for converting source data into machine readable form. For processing punched cards, sorters, collators, reproducing punches and tabulators continue to be used in many offices in India.

8. Key-to-tape-devices

The punched card machines described above have been in use for more than three decades in data processing. When cards are used as input medium for computers it was observed that the transfer rate was quite low due to limitation of reading speeds, and mechanical problems like read-checks, jamming of cards, etc. A solution that worked well was to transcribe data on to magnetic tapes by using off line devices, and then read the tapes. Though this method was satisfactory the basic problems associated with the cards remained, viz.; (i) cards once punched cannot be reused (ii) cards are costly (iii) cards require lot of space for storage (iv) strict control over environment was necessary to ensure good operating condition. Key-to-tape, Key-to-disk, Key-to- diskette and key-to-cassette devices came into vogue which eliminated most of these drawbacks.

In key-to-tape device the data keyed on the keyboard similar to the keyboard of punching machine is held in a buffer. When a record is completed the operator can display the contents of the buffer and make corrections. While typing data the operator can back--space to correct an error committed by wrong depression of a key. Once the contents of the buffer are checked for correctness, the entire record is written on the tape. In key-to-cassette and key-to- diskette devices the technique used is the same except that the recording takes place on casette or floppy disks to be transferred later on to standard magnetic tapes. In some installations the data preparation devices are connected directly to a computer which, in multi-programmed environment, will co-ordinate data entry from multiple key-to-disk stations. Due to low cost of data preparation per character recorded, reusability of the recording medium, greater flexibility in record size, reduction in requirements of storage space and greater productivity key-to-disk, key-diskette and key-to- tape devices will gradually replace punch card devices.

9. Electronic computers

9.1 Unlike unit record machines mentioned in previous paragraphs, the electronic computer is a versatile general purpose machine capable of processing large amount data at very high speeds. The computer is self controlled and operates by executing instructions stored in its main storage (memory). A modern computer is characterised by its ability to access very large amount of data stored in auxiliary storage devices. Such devices may be located either in the centre where the computer is installed or elswhere. Computers can also communicate with each other when they are connected in a network.

9.2 A computer has basically the functional units given in figure.1. The capability of the computer depends on the number and capacity of each of these functional units. The choice of a computer and peripherals for an organisation depends upon the type of data processing it has to do. For statistical work in which data collected from censuses and surveys are to be tabulated, large direct access storage is required for efficiently sorting data in order to prepare different kinds of reports. Back up storage devices will be required to record and preserve the original data and / or tabulated results for future use. The commonly used direct access storage device in microprocessor based computers in the floppy disk and the winchester disk. In big systems large capacity removable diskpacks are used for direct access storage. Magnetic tapes are used for long term storage of data.

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        Direct
        access                              Input
        storage                             Divices

              ↖                         ↗

                      ┌─────────────┐
                      │   Central   │
                      │  processer  │
                      │  & memory   │
                      └─────────────┘

              ↙                         ↘

        Backup                              Output
        storge                              Devices
```
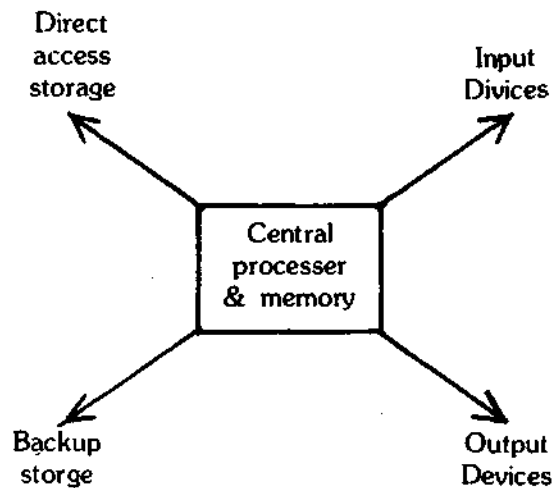
9.3. Software

Modern computer systems operate under the control of a master programme known as the Operating System (OS). The Operating System looks after management of the resources available in the computer system. Besides the O.S, there are programming language compilers for compiling and executing user written programmes in languages like FORTRAN, COBOL, PASCAL, PL/I, BASIC and ALGOL. Statistical work can be easily and efficiently programmed on computers which have FORTRAN, BASIC, PL/I or ALGOL compilers. Languages like COBOL and PL/I are suited to process data in which much of computation are not involved, but most of the work is manipulation of data files and text-material to produce reports. A number of utility programmes are also usually included in the software supplied by manufactures of computers.

9.4. Information systems

Most of the work done by scientists, administrators and office workers result in production of enormous amount of textual information. This paper work explosion is an ever increasing phenominon in our society. Modern office equipment industry has provided word processors, copiers, printing and dictation equipment which contribute to multiplication of paper work at a faster rate. It is estimated that more than 60% of the time of office staff and scientists is spent on merely searching for information scattered in different files or documents. Even when relevant papers are located, considerable amount of collation and summarisation of data is required to produce the desired information.

9.5. Computer based information systems are designed to store data in suitable data structures so that retrieval of desired information is easy. The stored data in the computer system is known as "DATA BASE". In order to establish a data base, the computer system should have large Direct Access Storage Devices, besides the software (generally known as Data Base Management System Software) for creating the data base and for compiling programmes written in the "host language" for retrieval of information. Many microprocessor based computers provide data base software. Due to limited direct access storage available on these systems, these can be used only for developing information systems of relatively small size.

Computer based information systems are created in applications where constant changes take place in the attribute values of the entities in the system, a very frequent analytical summaries are required by a number of persons. Such systems are implemented in manufacturing and distributing concerns, universities, groups of libraries etc. Data base management-systems used in such business environment are known more generally as Management Information Systems (MIS). MIS helps in taking decisions on various actions like type and quantity of goods to be manufactured advertising strategies to be adopted, price fixation and clearance of accumulated goods, DBMS implemented,

in Universities, help in managing different courses, class rooms, allocation of work to faculty members, following progress of students, preparation of transcripts and so on.

9.6 For creation of an information system the first step is to do an extensive analysis of the physical system and design procedures for collection of data on the attributes of all the entities in it. The collected data are defined and stored in the computer system using DBMS software. The file structures used depend upon the relationships between entities in the physical world. The responsibility for deciding what data to be stored in the system and the way in which data are stored vests with the Data Base Administrator. Thereafter application programmers prepare retrieval programmes to be used by the users of the data base. The advantages of storing data in a Data Base are:

(i) Datum relating to a specie attribute is stored only in one place in the system. This ensures that consistent reports are generated, even after any number of updates.

(ii) The way in which data are stored in the devices is not of any importance to the programmer who desires to develop retrieval programmes.

(iii) The structure of the data base can be changed by the Data Base Administrator without affecting the existing application programmes.

A mechanism has to be built into the data base set up so that changes taking place in the real world are incorporated in the data base as and when the changes occur. Unless this is done meticulously the information system developed on the data base will not be of any use.

10. Computerised fisheries information system

It is the context of what was discussed about the present day information systems that we examine the prospect of implementing a fisheries information system. A complete inventory of the living resources of the sea can never be done. Data can be collected only through sample surveys. Similar is the case with the resources that are exploited. When sample surveys are conducted, the data collected can be analysed extensively and all meaningful tables made and presented in printed reports. Changes taking place in the resources cannot be ascertained easily. Moreover, it is not likely that a number of users will like to use the data for analytical purposes very frequently.

10.1 The use of computers in processing and dissemination of data on living resources of the sea will

therefore, consist of analysis of voluminous data collected through censuses, surveys, meteorological workers, scientists and technical staff. The surveys may be on fish catch, boats and gears used, fishing population & their living standards, marketing and economic data etc. A fast computer system which can process extensive data with large direct access storage, adequate memory for statistical data processing and magnetic tape units (for storage of data over long periods) is required for this. Adequate software for statistical data processing should be available on the computer so that detailed analysis could be done effortlessly.

11. Existing information systems.

There are a few information systems, which deal with fisheries, implemented by international organisations. The international Information System for Agricultural Science and technology (AGRIS) sponsored by the Food and Agriculture Organisation of the United Nations (Rome) is a bibliographic data base with international coverage. All aspects of agriculture including Forestry, Veterinery Sciences, Fisheries and Human Nutrition are covered in this. The system provides references to documents (books, articles, films, standards, patents, conference papers ... .) on the topic mentioned above. Magnetic tapes containing entries in the data base from 1975 onwards are available from AGRIS co-ordinating centre of the FAO. Another information system of interest particularly to workers in Fisheries is the Aquatic Sciences and Fisheries Information System (ASFIS) implemented by the United Nations (New York), FAO of UN (Rome) and the Inter Governmental Oceanic Commission (Paris). Magnetic tapes containing this data base are also available from F.A.O. This is also a bibliographic information system containing abstracts of documents in biological and living resources, ocean technology and policy as well as non-living resources. The system monitors abstracts of about 15000 documents each year. Two other data bases of interest are the World Catch Data Base (FSHDB) and Marine Environmental Data Referral System (MEDI) both of which are developed by UNESCO. Any computer system aquired for processing fisheries data must be capable of using these data bases.

SESSION VII

Plenary Session

Chairman: Dr. E.G.Silas, Director,
CMFRI, Cochin.

Rapporteurs:1. Shri R.Srinivasan,   2. Shri G.Venkataraman,
Joint Director,   Scientist S-3,
Department of Fisheries, CMFRI,
Tamil Nadu   Cochin.

The Chairman stated that based on the discussions in the earlier sessions the recommendations were drafted by a Committee comprising of Dr. E.G.Silas, Shri. V.Ramamurthy, Commodore K.M.V.Nair, Dr. P.V.Rao and Shri T.Jacob and placed the draft recommendaions before the house for discussion and adoption.

DISSCUSSION ON DRAFT RECOMMENDATIONS

Constitution of an advisory committee (Ref. Rec.1.2)

Shri.C.Vijaya Ranchan said that what was needed was not an advisory committee with large number of members meeting frequently but a smaller expert committee to see the system working.

Shri.B.B.Lal stated that there is need to integrate the different methods of data collection by the States and CMFRI should see to the enforcement of the system.

Shri.K.Krishna Rao suggested the need for a coordination committee which would be constituted in this workshop itself. Commodore Nair stated that to get over the teething trouble, constitution of committee represented by CMFRI and States was thought of.

The Chairman agreeing with the above suggestion said that an expert committee could be constituted which would meet periodically to review the problems connected with collection of catch data, with CMFRI as the coordinating body. The term of the committee could be for a period of two years.

Organising of National Marine Living Resources Data Centre at CMFRI (Ref. Rec. 1.1).

Shri.Vijay Ranchan said that the recommendation may cover dissemination of other related data also.

Strengthening of data collection units in States (Ref. Rec. 2.).

Shri.M.K.Sankaran Kutty suggested that in the place of State Fisheries unit, State departments collec-

ting fishery statistics may be incorporated in order to cover concerned agencies.

Shri.Mhaiskar suggested that the structure of the statistical cell may be defined.

Shri.Vijay Ranchan said that the word 'desired coverage' is vague and an expected coverage may be specified, for which Dr.Silas stated it could be 5%. In regard to provision of funds for 5% coverage, Shri. B.B.Lal mentioned that the States need not depend on the centre for the same. The Chairman stated that the states should strengthen their staff for a coverage of 5% to begin with and the centre, as recommended by National Commission on Agriculture, may render some financial assistance towards achieving the above objective.

Data collection pertaining to small scale fisheries by States (Ref. Rec. 3.1)

Shri.J.D.Mhaiskar said that Maharashtra Government are collecting data based on their own design which is slightly different from that of CMFRI. Shri-Vijay Ranchan said that states can follow the designs formulated by them with the provision that they should be collected in the proformae standardised by CMFRI. In this connection Shri. T.Jacob pointed out the advantages of having a common design particularly for arriving at comparable estimates.

Data Collection pertaining to small scale fisheries by CMFRI (Ref. Rec. 3.2)

The recommendation was approved without any change.

Catch statistics (Ref. Rec. 3.3)

Regarding the acceptance of estimates brought out by the National Marine Living Resources Data Centre by all agencies, Shri.Lal said that the estimates arrived at by CMFRI should be reconciled with those obtained by the States and common estimates should be arrived at and furnished to the Ministry. He also added that now the Ministry is insisting the State Governments to send reconciled figures.

Dr.Silas said that there is time lag in publishing the annual catch figures as they have to be reconciled with that obtained by the states. The process of reconciliation has to be speeded up so that the annual catch estimates can be published without delay and in this he sought the cooperation of the states.

Shri V.Ramalingam, Joint Director MPEDA participating in the discussions.

Data acquisition of other fishing operations including the larger fishing vessels (Ref. Rec. 4.1)

Shri.Vijay Ranchan observed that it should not be made obligatory on the parties engaged in offshore fishing to give the data to CMFRI as compulsion may not yield desired resutls. Commodore Nair stated the mandatory clause was introduced as the response was generally very poor from the owners of the chartered vessels. Shri R.Sathiarajan stated that the owners of the chartered vessels should be impressed upon that the data obtained by CMFRI will be used for resource assessment studies only and not for any other purpose. Shri.K.H.Mohamed suggested that the confidentiality of the data supplied by the companies should be maintained. Dr.P.Vedavyasa Rao felt that the supply of data by larger trawlers operating in off-shore waters should be made obligatory as at present we have no reliable estimate of fish caught by them. Shri.M.Swaminath stated that in the case of chartered vessels the Ministry has made it obligatory for them to furnish the fish catch data obtianed by them. He further observed that the furnishing of data by vessels other than the chartered ones need not be made obli-

Shri J.D.Mhaiskar, Statistical Officer, Department of Fisheries, Government of Mahrashtra participating in the disclussions.

gatory. Dr.Alagaraja suggested that it should be obligatory for not only chartered vessels but also for all the vessels to supply the data. Commodore Nair stated that participation of the scientists in cruises of the chartered vessels will be useful. Dr.Rama Sastry suggested that data from all the large vessels should be sent to CMFRI and the Ministry should take appropriate measures to ensure the same.

The Chairman said that two differing views were expressed by the delegates, one supporting the view that the supply of data should be made obligatory on the part of chartered vessels, the other view being that it need be made voluntary. The Chairman observed that some amount of persuation and goodwill is necessary to obtain the data from the companies operating large trawlers.

Modus operandi of data supply (Ref. Rec. 4.2).

The recommendation was accepted.

Data processing and storing (Ref. Rec. 5.1)

Dr.S.S.Pillai suggested that CMFRI, in addition to processing of data received through their own staff, may also undertake processing of data received from the States. Shri.Jacob, stated that at present the Institute has a large quantum of data for processing for which a computer is essential.

Dissemination of data (Ref. Rec. 6)

Dr.Silas stated that consultancy service is given by CMFRI and this service would be strengthened in the coming years. In this connection Shri.M.Swaminath suggested that inclusion of the findings of other National Fishery Institutes may be considered wherever necessary.

Shri.V.Ramalingam wanted that a time limit should be fixed in the publication of yearly fish catch statistics. The Chairman explained that the delay is due to the need to reconcile the estimates obtained by

CMFRI with the figures obtained by concerned State Governments. He sought the cooperation of the State Governments in speeding up the reconciliation process so that the catch figures are published much faster.

Environmental and meteorological data (Ref. Rec. 7.1).

Dr.Rama Sastry stated that IMD can render free specialised information service meant for the benefit of fishermen and the various State Fisheries Departments on request. He also added that IMD will be in a position to provide some required meteorological instruments to the larger vessels for recording important parameters. The Chairman appreciated the gesture of the IMD.

Endangered species (Ref. Rec. 7.3)

Dr.Silas referring to data collection by CMFRI emphasised the importance of collecting data relating to the capture of endangered animals like whales, dugong and turtles in the Indian seas. Their resources are fast dwindling because of their indiscriminate slaughter and hence their capture is banned under the Wild Life Protection Act. In this context, the Chairman said collection of catch statistics on these animals will help the Government in monitoring their resources in our waters. He said that a suitable recommendation will be prepared in this connection.

In conclusion Dr.Silas stated that he was happy to note that the recommendations were by and large accepted and mentioned that whatever modifications required will be made in the recommendations, taking into consideration the suggestions made by the delegates. He further said that the modified recommendations will be sent to them in a week's time and comments if any might be communicated to CMFRI in about 15 days time so that further action could be taken.

In his concluding remarks, Dr.Silas said that this is the first time that an all India Workshop on acquisition and dissemination of data on marine living resources of Indian Seas was held and it has underlined the importance of national effort in this process and the necessity for the information to be made available to the Centre, States, fishing industry and enterpreneurs in the fisheries sector at the shortest possible time.

He further stated that the proceedings of the Workshop would be published shortly. He thanked the Chairmen of various sessions, Group Leaders and Rapporteurs of the various sessions for the hard work they had put in and also the delegates for their active participation in the workshop.

The session came to a close with vote of thanks proposed by Shri.G.Venkataraman.

RECOMMENDATIONS

The critical population/food dilemma facing the country has stimulated substantial interest in the sea as source of food and raw material. The central theme of this Workshop has been to enlarge and improve the system of acquisition, processing, analysis and storage of data, and retrieval and dissemination of information on marine living resources, both exploited and exploitable, in general and fishery resources in particular. Before one launches into exploitation and management of these resources, this Workshop has stressed the imperative need to recognise the basic requirements of resources data and to find out ways and means of organising the data system with a view to fostering greater understanding of the resource status, complex exploitation problems faced by the artisanal, mechanised and industrial sectors, and the socioeconomic structure. On the strength of such knowledge would one be able to call the attention of the policy-makers and administrators to ensure judicious exploitation, management and conversation of the

resources. Having deliberated the pros and cons of data acquisition and the corollary aspects of dissemination in the light of the opportunities and challenges available in the context of new ocean regimes, the Workshop makes the following recommendations for effective implementation by the concerned agencies While making these recommendations the Workshop recognises the paramount benefits of an integrated centralised system of data acquisition and information dissemination with its complementaries to the end user in various spheres and to the nation.

I.POLICIES AND PRIORITIES

1.1. The Workshop

realising the vital importance of data on marine living resources in general and fishery resource in particular in the seas around India for planning development and management of this sector, and

considering the long coastline of the country including the Island territories, various types of crafts and gears employed in the exploitation, the nature of landings, the large number of landing places, and the socioeconomic aspects,

recommends that as directed by the Planning Commission, the Central Marine Fisheries Research Institute (CMFRI), the premier Institute in the country responsible for providing research and development support for the exploitation, management and conservation of these resources, should immediately strengthen and expand its Fishery Dat. Centre as a centralised National Marine Living Resources Data Centre (NMLRDC) and that, the NMLRDC be responsible for acquiring, processing, analysing and storing of data and disseminating the information on the marine living resources and related aspects.

Action to be taken by: Indian Council of Agricultural Research; CMFRI.

1.2. The Workshop,

observing the deep involvement of States, Department of Agriculture of Union Government Central Government organisations, Indian Council of Agricultural Research, public and private organisations in the development and exploitation of the marine living resources of the country

noting that resources information is the essential basic prerequisite for all the R & D programmes,

emphasising that there should be a coordinated and integrated approach to the entire system of data acquisition and dissemination of information and

feeling keenly the necessity of a body to coordinate the entire system in the country through the NMLRDC at the Central Marine Fisheries Research Institute,

recommends that an Expert Committee to guide the modalities of functioning and to foster linkages with various organisations in the initial stages may be constituted for a period of two years by the Union Department of Agriculture, and that the Expert Committee, to be set up immediately, be comprised members representing the States, Central Government organisations, ICAR, and public and private Sector organisations with the Director CMFRI as Convenor, and

further recommends that this Expert Committee meets periodically and discusses the pro-

gress and constraints in the field and provides guidelines and advice for an effective and functional system for resources data collection and dissemination of information

Action to be taken by: Department of Agriculture, Government of India; Indian Council of Agricultural Research; CMFRI.

2. STRENGTHENING OF DATA COLLECTION UNITS IN STATES

The Workshop,

noting that the States are primarily concerned with fisheries development within the territorial waters and that the major portion of the exploited fishery resources is produced at present by the small-scale fisheries sector, the data on which are collected by the concerned Departments in the states,

recommends that the State Departments collecting marine fishery statistics be strengthened for this purpose with adequate administrative, technical and financial support so as to ensure a coverage of at least 5% of landing centre-days for data collection and their further analysis.

Action to be taken by: Departments of Fisheries / Statistical Bureaus, Governments of maritime States and Union Teritories.

3. DATA ON SMALL-SCALE FISHERIES (ARTISANAL AND SMALL MECHANISED FISHERIES)

3.1. Data collection by States

The Workshop,

observing the complex and diversified nature of fishing opertions, wide fluctuations in landings and constraints encountered in complete enumeration of data and

noting that the staff engaged in the resources data collection in the States require periodic training and orientation in the data collection and recording system and

further noting that reliability of the data basically depends on the system of collection,

recommends that a system of data collection based on tested statistical design developed by CMFRI be followed by all the States and that the data are recorded and maintained in the accepted proformae drawn up for the purpose in this Workshop; and

further recommends that the field staff in the

State Departments engaged in this work are periodically trained in the tested data collection system and that the CMFRI may arrange and provide such training to the desired staff.

Action to be taken by: Departments of Fisheries / Statistical Bureaus, Governments of maritime States and Union Territories; CMFRI.

3.2 Data Collection by CMFRI

The Workshop,

noting that one of the major objectives of CMFRI is to assess the fish stocks of various species in different regions and furnish this information to be the planners, development agencies and the fishermen/fishing industry, and

considering that it is necessary to monitor the exploited fish populations more intensively and obtain related biological and environmental data to work on stock assessment,

> *recommends* that the concerned Division of CMFRI be strengthened to acheive a coverage of 5% of landing centre-days by the end of the Sixth Five Year Plan.

Action to be taken by: Indian Council of Agricultural Research; CMFRI.

3.3. Catch Statistics

The Workshop,

observing that there are differences in the estimates of resources exploited in the small - scale fisheries sector and that there is considerable delay in finalising the estimates with the concerned Departments of States and

stressing the need for speedy and reliable estimate

> *recommends* that the estimate brought out by the NMLRDC after consultations with the States be accepted as the national estimate and that the said estimate be made available reasonably quickly.

Action to be taken by: Department of Agriculture, Government of India; Departments of Fisheries / Statistical Bureaus, Governments of maritime States and Union Territories; CMFRI.

4.DATA ACQUISITION OF OTHER FISHING ACTIVITIES INCLUDING THE LARGE FISHING VESSELS IN THE EEZ

4.1. Supply of data

The workshop,

appreciating the diversification and extension of fishing operations in the Exclusive Economic Zone to exploit the resources through the operation of different types of gears by the large fishing vessels, including chartered fishing vessels and those operating under different bilateral or multi - lateral arrangements, as also the vessels engaged in exploratory resources surveys, experimental fishing and training,

stressing the importance of acquisition of data on the resources exploited, identified or assessed by those vessels for the development of fisheries of the country,

> *recommends* that all the parties engaged in the above fishing activities shall furnish the data on the exploitation to the NMLRDC at CMFRI; and

> *further recommends* that the Fisheries Division in the Department of Agriculture, Union Ministry of Agriculture may take appropriate measures to ensure that all the larger fishing vessels operated by the Industry, Government, public sector, individual entrepreneurs, chartered vessels and those operating under bilateral and multilateral agreements furnish the data to the NMLRDC and

> *appeals* to the owners of fishing vessels to comply and cooperate in this national effort.

Action to be taken by: Department of Agriculture, Government of India; Public and private sector organisations/companies engaged in marine fishing directly /through charter.

4.2. Modus operandi of data supply

The Workshop,

observing that there is no mechanism at present to obtain these data not withstanding its importance in the national context,

> *recommends* that all the vessels engaged in fishing activities referred to in the recommendation 4.1, should record the data in the prescribed proformae drawn up for differnt types of vessels/operations and accepted in this Workshop which is represented by the Central and State Government representatives, public and private sector organisations, parastatal organisations and research institutes and supply the same to the NMLRDC immediately on conclusion of each voyage and

> *further recommends* that the NMLRDC at CMFRI should make adequate arrangements to supply the required proformae to the fishing oragnisations.

Action to be taken by: Department of Agriculture,

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Government of India; public and private sector organisations/companies engaged in marine fishing directly/through charter; CMFRI.

5. DATA PROCESSING AND STORING

5.1. Data processing, storage and retrieval

The workshop,

stressing that the fishery data obtained from various sources should be properly processed without much time lag for immediate and future use,

observing that it is essential to store the procesed or semi-processed data at the NMLRDC for future use and to retrieve the same as and when required by the user agencies, and

noting that enormous data acruing from different kinds and areas of fishing operations are to be subjected to in-depth analysis.

reiterating the Planning Commissions recommendations that CMFRI should develop a computerised information system,

recommends that the CMFRI be immediately equipped with appropriate electronic computing system to facilitate quick processing of data, their storage and retrieval of information.

Action to be taken by: Indian Council of Agricultural Research; CMFRI.

5.2. Maintaining the confidentiality of data

The Workshop,

noting that different parties are involved in the exploitation of the resources, and

observing that it is essential to maintain the confidentiality of the data/information furnished on the resources exploited by each of the parties,

recommends that the identification particulars be coded to ensure confidentiality.

Action to be taken by: Public and private sector organisations/companies engaged in marine fishing directly/through charter; CMFRI.

6. DISSEMINATION OF DATA

The Workshop,

stressing the importance and need for providing information to the planning and developmental agencies, fishing industry and fishermen on production trend, status of fish stocks, technology, management, and forecasting of fishery prospects,

recommends that the NMLRDC should develop an effective and functional system of disseminating the information periodically and provide consultancy service to all sectors.

Action to be taken by: Indian Council of Agricultural Research; CMFRI.

7. OTHER ACTIVITIES.

7.1. Environmental and meteorological data

The Workshop,

noting that data on environmental parameters such as temperature, atmospheric pressure, wind speed, and other meteorological conditions should not only facilitate successful fishing operation but also aid in forecasting of weather conditions at sea,

recommends that the India Meteorological Department (IMD) may consider providing required meteorological instruments to larger fishing vessels to record these parameters useful to forecast the weather and climatic conditions over sea, and the IMD may provide the necessary advice and specialised service to facilitate fishing operations of these vessels.

Action to be taken by: India Meteorological Department; Public and private organisations / companies engaged in marine fishing directly /through charter; National Institute of Oceanography.

7.2. Data on coastal aquaculture/mariculture.

The Workshop,

observing that there is an increasing awareness among the fishermen on the prospects and potentials of aquaculture in coastal saline waters and several of them are entering into this field either on full time basis or part-time basis along with their traditional avocations and

noting that the data on the aquacultural activities taken up by the coastal fishermen and the entreprenuers would be immensely useful to study the impact on the economy of the coastal villages and to study the trend in the development of the fisheries of the region,

recommends that the NMLRDC, besides collecting data on marine fisheries, also collects and analyses the data on coastal aquaculture its economics and social impact.

Action to be taken by: Department of Fisheries, Governments of maritime states and Union Territories; Fisheries Institues of Indian Council of Agricultural Research; Agricultural Universities; Aquaculturists.

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Shri T.Jacob, Scientist S-3, CMFRI presenting his lead paper.

Shri G.Venkataraman, Scientist S-3, CMFRI proposing vote of thanks.

7.3. Endangered and rare species

The Workshop,

noting that the populations of certain valuable species in the sea are showing decreasing trend due to exploitation, mortalities and other reasons and some of the endangered species such as the dugong, lesser cetaceans including dolphins and the turtles occur as incidental catch in fishing operations,

stressing that it is essential to conserve those species showing declining population structure through appropriate management and conservation measures,

recommends that all data/information pertaining to resources, exploitation and mortalities due to strandings and incidental catches in fishing operations of endangered marine mammals and turtles be collected and made available to the NMLRDC for analysis and action.

Action to be taken by: World Wildlife-India; Departments of Fisheries, Governments of maritime States and Union Territories; Bombay Natural History Society; Public and private sector organisations / companies engaged in fishing directly/through charter; National Institute of Oceanography; Naval Physical Oceanograpic Laboratory; CMFRI.

APPENDIX

Codes used in AGRIS for commodities connected with Aquatic Sciences and Fisheries

8000	Aquatic Animals-general		8790	Aquatic animals-other
8100	Fish-General		8800	Various animals utilized by man-general
*8105	Freshwater fishes-Gen.		8810	Game animals
8100	Carp		8860	Pet animals
8120	Eels		* ---	Dogs, use 5400
*8126	Perchs		* ---	Cats, use 5500
8130	Salmon and trout		8890	Various animals utilized by man-other
*8134	Tilapia		*8891	Other animals (i e.species categorized
*8145	Brackish-water fishes			in POO)
*8150	Marine fishes-general		*8115	Catfish
*8151	Anchovies		*8124	Milkfish
*8154	Haddock		*8128	Pike
*8161	Herrings		*8133	Sturgeon
*8166	Mullet		8140	Freshwater fishes-other
*8172	Sardines		*8153	Codfish
*8174	Soles-flatfishes		*8160	Halibut
*8182	Turbot		*8165	Mackerel
*8195	Marine fishes-other		*8170	Plaice, flounders
8200	Shellfish-general		*8173	Sharks
8300	Crustaceans-general		*8180	Tuna
8310	Shrimps and prawns		*8190	Whitings
8330	Lobsters and crayfish		8320	Crabs
8400	Molluscs-general		8390	Crustaceans-Other
8410	Clam		*8415	Gastropods (Snail-like-molluscs)
8420	Mussels		8430	Octopus and squid
8440	Oysters		8490	Molluscs-other
8499	Shellfish-other		*8520	Frogs, toads
8500	Reptiles and batrachians-general		*8527	Snakes
8510	Crocodiles and alligators		8590	Reptiles and batrachians-other
*8525	Salamanders		8620	Coelenterates
8530	Turtles		8640	Marine worms;
8600	Various aquatic invertabrates-general		8690	Various aquatic invertebrates-other
8610	Bryozoa		*8715	Dugongs, manatees
8630	Echinoderms		*8750	Various aquatic vertebrates-other
8650	Sponges		8830	Laboratory animals (except insects and
8700	Various aquatic vertebrates-general			mites reared for biological control use 7300)
*8710	Whales, porpoises, dolphins		*	Rabbits, use 5600
8720	Seals, sealings, walruses			

After the presentation of the paper, the Chairman elicited discussions from the delegates. In answer to the enquiry by Commodore Nair about the type of information system which could be adopted by CMFRI, Dr.Pillai Suggested that CMFRI should initi- ally go in for a medium type fast computer which can grow as per requirement. As the data input increases in volume, necessary modifications could be made to the computer for developing a proper information system.

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN - 18.

DAILY RECORD OF CATCH AND EFFORT OF NON - MECHANISED FISHING CRAFTS - SHORE SEINES/OTHERS

State ....   District ....   Zone ....   Centre ....

Date   Period ....   No. of shore seines other units landed ....   No. of units selected ....

State of sea ....   State of sky ....   Direction of wind ....   Current ....

Serial No.	Allotted No. of selection of units examined	Type of craft		Type of Gear		Length of craft (m)	Absence from shore		Duration of absence (Hrs)	Fishing ground			No. of hauls	Duration of actual fishing (hours & minutes)	Man power employed	Name, Code and Weight (Kg) of fish landed										Total
		Name	Code	Name	Code		Dep: Time & Date	Arr: Time		Distance (Km) from the shore	Direction from L.C.	Depth (m)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

Special attention: Report incidental catch / strandings of cetaceans and turtles with details.

Price per Kg.

Remarks:

Name & Signature of observer:

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN - 18.

DAILY RECORD OF CATCH AND EFFORT OF SMALL MECHANISED FISHING CRAFTS* EXCLUDING PURSE SEINERS

State .... [ ]   District................ [ ]   Zone .... [ ]   Centre.................. [ ]

Date [ ][ ][ ]   Period.......................... [ ]   Number of units landed..................... No. of units Selected ....

State of sea .... [ ]   State of sky .... [ ]   Direction of wind .... [ ]   Current .... [ ]

Serial Number	Allotted No. of selection of units examined	Name and/or craft number	Type of craft		Type of Gear		Length of craft (m)	Horse power	Absence from shore			Fishing ground			No. of hauls	Duration of actual fishing (hrs. & minutes)	Man power employed	Av. Trawling speed in case of trawler (km/hr.)	Name, Code and Weight (Kg) of fish landed										Total
			Name	Code	Name	Code			Dep. Time & Date	Arr. Time	Duration of absence (hrs)	Distance (km) from the shore	Direction from L.C.	Depth (m)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Special attention: Report incidental catch stranding of cetaceans and turtles with details.

Price in Rs. per Kg:

Remarks:

Name & Signature of observer:

*Trawler (A) Gill netter (B) Long liner (C) Dol netter (D) Country craft with O.B. (E)

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN - 18.

DAILY RECORD OF CATCH AND EFFORT OF PURSE SEINE BOATS

State .... District .... Zone............... Centre ....

Date .... Period .... Number of boats landed .... Number of boats selected ....

Fishing Conditions: State of sea ..... State of sky .... Direction of wind. .... Current ....

Serial Number	Allotted no. of selection of units examined	Name and or/craft number	Type of craft		Length of craft (m)	Horse Power	Absence from shore		Duration of absence (hrs)	Fishing ground			No. of hauls	Duration of actual fishing (hours & minutes)	Man power employed	Name, Code and weight (kg) of fish landed										Total
			Name	Code			Dep. Time & Date	Arr. Time		Distance (km) from the shore	Direction from the landing centre	Depth (m)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

Special attention: Report incidental catch/strandings of cetaceans and turtles with details.

Price in Rs. per kg

Remarks:

Name & Signature of observer:

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (ICAR), COCHIN - 18

DAILY RECORD OF CATCH LANDED BY CARRIER BOATS (FROM PURSE SEINE BOATS)

State............. District .... Zone........... Centre ....

Date Period .... Number of boats landed .... Number of boats selected ....

Serial Number	Allotted no. of selection of units examined	Name and or craft number	Type of craft		Length of craft (m)	Horse power	Absence from shore		Man power employed	Name, Code and Weight (Kg) of fish landed										Total
			Name	Code			Dep. Time	Arr. Time												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
										Price in Rs. per kg										

Special attention: Report incidental catch, strandings of cetaceans and turtles with details.

Remarks:

Name & Signature of observer:

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR). COCHIN-18.

DAILY RECORD OF EFFORT EXPENDED AND CATCH DATA ON PURSE-SEINERS

FISHERY SURVEY FORM 2 H

By enquiry:

State .... District .... Zone .... Centre.............

Date Period .... Number of purse-seiners operated ....

Serial Number	Name and or craft number	Gear particulars		Length of craft (m)	Horse power	Absence from shore			Number of hauls	Fishing ground			Duration of actual fishing (hours & minutes)	Man power employed	Name, Code and Weight (Kg) of fish landed						REMARKS
		Length (m)	Mesh size (mm)			Dep. Time & Date	Arr. Time	Duration of absence (hrs)		Distance (km) from the shore	Direction from the landing centre	Depth (m)								Total catch	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

Special attention: Report incidental catch/strandings of cetaceans and turtles with details.

Name & Signature of observer:

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN-18

LARGER MECHANISED VESSELS-TRAWLER
LOG FOR DAILY FISHING OPERATIONS

Name/Code No. of vessel(s) .... [   ]   Voyage No. ....   Method of fishing .... [   ]

Base of operation .... [   ]   Date ....   Day of Trip ....

(a) Fishing Conditions

| HAUL NO | Fishing area (Shooting point) | | Trawling speed | Direction of trawling | Length of head rope (m) | Mesh size – cod end (mm) | Length of warp (m) | Fishing depth (m) | Bottom depth (m) | Time of | | Nature of sea bottom M/S/C/ | State of sky B/C/BC/.... | State of sea R/S/.... | Wind | | Current | | Temperature sea surface (°C) | Atmospheric pressur |
	Latitude	Longitude								Completion of shooting (hrs & mts.)	Commencement of hauling (hrs. & mts.)				Force	Direction	Speed	Direction		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Data / Code																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

(b) Catch Details (kg)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Prawns						Cephalopods		Fish														
Name of species →							Cuttle fish	squids															
Code / Haul No.																							Total
1																							
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
Total																							

(c) Special observations (to be amplified under remarks): Wrecks & obstructions (   ) presence of foreign vessel (   );
Sighting of whales (   ); dolphins (   ); fish shoals (   ); plankton blooms (   ); bird flocks (   );
floating of weeds (   ); pollution (   ); other observation (   )

(d) Fuel consumption: LSD (lit) .... HSD (lit.) .... Lubricating oil (lit.) .... others ....
(to be given at the end of the voyage)

(e) Date of start from base .... Date of return to base .... (to be given at the end of the voyage)

(f) Remarks

Name and signature of skipper

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN-18

LARGER MECHANISED VESSELS-PURSE SEINER

LOG FOR DAILY FISHING OPERATIONS

Name / code No of vessel(s) .... [   ]   . Voyage No..................   Mesh size (mm) ....

Base of opertion .... [   ]   Date ....   Day of Trip ....

(a) Fishing Conditions:

HAUL NO	Fishing area (setting position)		Size of net		Detection V/S/BF	Type of school	Size of school	Scouting period (hrs)	Time of setting (hrs. & mts)	Time of finish (hrs. & mts.)	Fishing depth (m)	Bottom depth (m)	State of sky B/C/BC	State of sea R/S	Wind		Current		Temperature sea surface (°C)	Thermocline		Atmospheric pressure
	Latitude	Longitude	Length (m)	Depth (m)											Force	Direction	Speed	Direction		Top depth (m)	Bottom depth (m)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Data Code																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

(b) Catch Details (kg)

Name of fish	Skipjack	Albacore	Yellow fin																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Code / HAUL NO																						Total
1																						
2			,																				
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
TOTAL																							

(c) Special observaions (to be amplified under remarks); Wrecks & obstructions (   ); presence of foreign vessel (   );
Sighting of whales (   ); dolphins (   ); fish shoals (   ); plankton blooms (   ); bird flocks (   );
floating of weeds (   ); pollution (   ); other observations (   )

(d) Fuel consumption: LSD (lit.) .... HSD (lit.) .... Lubricating oil (lit.) .... others .... (to be given at the end of the voyage)

(e) Date of start from base .... Date of return to base .... (to be given at the end of the voyage)   Name and signature of skipper.

(f) Remarks:

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN-18

LARGER MECHNISED VESSELS-TUNA LONG LINER

FISHING DETAILS FOR EACH OPERATION

Name of vessel ....   Voyage No........................

(a). HYDROGRAPHIC DATA

1	Date	Time	Position Latitude	Position Longitude	Depth of hooks Maximum (m)	Depth of hooks Minimum(m)	Bottom depth (m)	Temperature Air (°C)	Temperature Sea surface (°C)	Thermocline Top depth (m)	Thermocline Bottom depth (m)	wind / Direction	wind / Speed	Current Direction	Current speed	Sea condition Wave Direction	Sea condition Wave Height (cm)	Water Transparancy (m)	Other observations (specify)
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Commencement of Shooting																			
End of hauling																			

Number of baskets	Total No. of hooks	Baits	Shooting			Hauling		Observations on lines	Catch composition* (Name, code and number of fish)																	Total number	Total Weight
			Direction	From (hrs)	To (hrs)	From (hrs)	To (hrs)		Yellow fin	Skipjack	Albacore																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

*Details to be given in separate proforma no (b-2) attached

(c) Special observations: (to be amplified under remarks): Wrecks & obstructions ( ); presence of foreign vessel ( );
sighting of whales ( ); dolphins ( ): fish shoals ( ); plankton blooms ( ); bird flocks ( );
floating of weeds ( ); pollution ( ); other observations ( )

(d) Fuel consumption: LSD (lit.) ....HSD (lit.).............. Lubricating oil (lit.) ....others .... (to be given at the end of voyage)

(e) Date of start from base................. Date of return to base .... (to be given at the end of the voyage). .

(f) Remarks:

Name and signature of skipper

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN - 18

LARGER MECHANISED VESSELS - TUNA LONG LINER

FISHING DETAILS FOR EACH OPERATION.

(b.2). CATCH DETAILS

Basket Sl. No.	Branch No.	Name of fish	Body length	Weight (kg)	Group Weight (kg)	Remarks

NATIONAL MARINE LIVING RESOURCES DATA CENTRE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, (ICAR), COCHIN - 18

LARGER MECHANISED VESSELS - TUNA LONG LINER

FISHING DETAILS FOR EACH OPERATION.

(b.2). CATCH DETAILS

Basket Sl. No.	Branch No.	Name of fish	Body length	Weight (kg)	Group Weight (kg)	Remarks

APPENDIX - 1

Report of the Working Group for standardisation
of proformae for larger mechanised vessels.

The following members participated in the discussions

Commodore K.M.V.Nair, Tata Oil Mills Ltd., Madras, Group Leader.

Dr.A.A.Ramasastry, Deputy Director General, India Meteorological Department, Pune.

Shri.Patabhiraman, Gujarat Agro Industries, Visakhapatnam.

Shri.B.B.Lal, Assistant Commissioner (F.S),New Delhi.

Dr.S.L.Shambhogue, Professor, University of Agri. Sciences, Mangalore.

Shri.P.Sulochanan, Deputy Director, EFP, Cochin.

Shri. P.Ramanujan, Instructor (General), C.I.F.N.E.T.

Lt.Abraham ,J.Lucose, Asst. Hydrographer, Dehradun.

Shri.C.K.B.Kurup, Scientist., N.P.O.L.,Cochin.

Shri.K.K.P.Menon, Tata Oil Mills Ltd., Cochin.

Shri.K.H.Mohamed, Scientist S-3, C.M.F.R.I., Cochin-18.

Shri.K.V.N.Rao, Scientist S-3, C.M.F.R.I. Cochin-18

Dr.P.P.Pillai, Scientist S-2, C.M.F.R.I., Cochin-11.

Dr.K.Radhakrishna, Scientist S-2, C.M.F.R.I., Waltair

Shri.T.Jacob, Scientist S-3, C.M.F.R.I., Cochin, Member Secretary.

The draft proformae were considered one by one. The additions/deletions/modifications required to be incorperated in the draft were discussed and finalised. The details are as follows:

I. The draft proforma for *trawlers* was taken up first. The suggestions approved are given below.

1. The proforma should contain (a) an identification number and the frequency of recording on top. (b) The body of the proforma should contain, length of head rope, time of completion of shooting and commencement of hauling, the force and direction/of wind and the atmospheric pressure. Also the location of the area should correspond to the time of shooting.

2. For nature of bottom (muddy/sandy etc), state of sky (B/C/BC/etc) and state of sea (rough / smooth etc.) different alternative should be given to facilitate quick recording of the needed data.

3. In each details, only 2 or 3 major species are to be named under each category. Enough blank spaces may be given to accommodate the rest.

4. Special observations should be retained. The fuel consumption for the voyage should be recorded in the proforma on the last day of the voyage after completion.

and

5. The summary proforma may be dropped.

II. The draft proformae for tuna *long-liners* were taken next.

1. It was agreed that the proforma should contain (a) the frequency of recording (b) place,date and time of departure and arrival and (c) the hydrographic data both at the commencement of the shooting and end of hauling.

2. Col. heading 'date' and 'fishing area' should be dropped.

3. In the second proforma giving catch details 'sl.no.' could be deleted and instead 'Basket sl. no.' should be given. The col. headed 'Basket no.' may be deleted.

and

4. Information under special observation and fuel consumption is to be recorded as in the case of trawlers. Summary proforma may be dropped.

III. The draft proformae for *purse-seiners* were considered.

1. It was agreed that the proforma should contain (a) size of net (length & depth) (b) detection (visual / sonar/bird flock) (c) type of school (d) scouting time (e) time of setting and finishing and (f) thermocline (top depth & bottom depth). and

2. Information on 'state of sky' etc. 'special observation' and 'fuel consumption' is to be recorded as in the case of trawlers. Summary proforma should be dropped.

IV. General

1. The details regarding H.P., length etc. should be obtained by CMFRI by contacting D.G.Shipping / MPEDA/Ministry of agriculture.

2. The proforma should be recast taking care of these observations and also the requirements for transferring data to cards/tapes for feeding in the computers.

(T.Jacob)
Member Secretary

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Report of the Working Group for standardisation of proformae for smaller mechanised vessels.

The following are the members in the committee

Shri.V.Ramamurthy, I.A.S., Commissioner of Statistics, Tamilnadu, Group Leader.

Shri.Vijay Ranchan, I.A.S., Commissioner of Fisheries, Gujarat.

Dr.M.Devaraj, Professer (FB) C.I.F.E. Bombay.

Shri.H.Krishna Iyer, Scientist S-2, C.I.F.T., Cochin.

Shri.B.V.Subramanyan, Asst. Director of Fisheries, Karnataka.

Dr.Kuruvilla Mathew, Lec. Dept. of Industrial Fisheries, University of Cochin.

Dr.S.V.Bapat, Joint Director, C.M.F.R.I., Cochin-18.

Dr.M.J.George, Scientist S-3, C.M.F.R.I., Cochin-18.

Dr.A.V.S.Murthy, Scientist S-3, C.M.F.R.I., Cochin-18.

Dr.K.Alagaraja, Scientist S-2, C.M.F.R.I., Cochin-18, Member Secretary.

While leading the discussions the members suggested the following.

1. Atleast 10 units should be observed, once the number of units landing is more than 10. In case of 10 and less than 10 units landing, all units are to be observed as usual.

2. In form-1A, the following modifications may be incorporated.

    i. In the third horizontal line from the top, information on state of sea etc is required. This mens that this information is supposed to be the same for all units landing on that day which may not be true. Though variations in the above said information may be there for the same unit from haul to haul, atleast an over all idea on the condition of sea etc.for a unit can be had instead of for the centre as a whole. Hence Shri. Ramamurthy suggested that this row can be brought down columnwise against each unit observed. Members also agreed for this change.

    ii. The title for column 2 may be rewritten as 'allotted number of selection of units examined'

    iii. Under column 13 the title may be modified as "Distance (km) of fishing ground and direction".

    iv. Duration of actual fishing may be indicated in hours and minutes under column 16.

    v. In the place of 'man power employed' in column 17 'No. of persons on board' may be substituted.

    vi. Extra columns for noting down oil consumption for each boat indicating name of oil and quantity

(I) consumed for the trip may be given.

3. Regarding Form-1B meant for both mother boats (Purse-seiners) and carrier boats, it is suggested that separate forms for mother boats 1 B and carried boats 1 C may be maintained. For this purpose in the new form 1 B meant for purse seine the changes suggested in form 1 A may be carried out, and the term 'for mother boat' may be excluded. New form 1 C for carrier boats has been prepared by Dr.K.Alagaraja, member secretary and placed before the working group on 22-10-'82 which was accepted. And

4. The earlier form 1 C meant for collection of data on effort on enquiry for Purse seine operations has been numbered as form 1 D. For this form also, the suggestions made for earlier forms are to be incorporated.

On 23-10-'82, when the points discussed in the final session for concurrence of all members, it was decided that status quo for the 3rd row about fishing conditions in form 1 A and 1 B may be maintained and due to the hardships faced at present by the field staff in collecting data, extra burden for collecting data on fuel consumption need not be given. All the other suggestions have been recommended and on this basis Forms 1 A, 1 B, 1 C & 1 D were prepared and enclosed.

(K.Alagaraja)
Member Secretary

Report of the Working Group for standardisation of proformae for non-mechanised crafts.

The following members participated in the discussion.

Shri.R.Srinivasan, Joint Director, Dept. of Fisheries, Madras, Group Leader.

Shri.P.V.Krishnam Raju, Deputy Director, Andhra Pradesh.

Shri.M.G.Naik, Research Assistant (Stat.) Union Territory of Goa, Daman & Diu.

Shri.S.G.Dalal, Scientist N.I.O., Goa.

Shri.M.K.Sankaran Kutty, Asst. Director (Statistics) Dept. of Statistics, Tamilnadu.

Shri.K.Koya, Statistical Assistant, Govt. of Lakshadweep, Kavarathy.

Shri.Mhaiskar, Senior Statistical Officer, Dept. of Fisheries, Govt. of Maharashtra.

Dr.P.V.Rao, Scientist S-3, C.M.F.R.I.,Cochin.

Dr.B.Krishnamoorthy, Scientist S-3, C.M.F.R.I., Madras.

Shri.G.Parasuraman, Assistant Director of Fisheries, Tamil Nadu.

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Shri.G.Venkataraman, Scientist S-3, C.M.F.R.I., Cochin-18, Member Secretary.

Shri.K.Krishna Rao, Scientist S-2, C.I.F.T., Cochin.

The working Group formed to examine the proforma meant to record details of catch and effort of non-mechanised fishing crafts considered the form in detail and unanimously approved the proforma with the following modifications/details.

1. In col.3 and col.7 the word 'boat' may be substituted by 'craft'

2. Additional column can be given to indicate the fishing ground and properly coded.

(R.Srinivasan)
Group Leader.

APPENDIX- 2

COMMITTEES CONSTITUTED FOR THE CONDUCT OF THE WORKSHOP

1. Transport and Accommodation Committee

Shri.S.K.Dharma Raja-Convener.

Members: S/Shri.R.Sathiadas, M.Srinath, U.K.Sathyavan, Varughese Jacob and P.K.Mahadevan Pillai.

2. Secretarial Committee.

Shri.T.Jacob-Convener.

Members: S/ Shri.K.N.Kurup, K.Balan, M.Srinath, K.K.Datta and Smt.Krishna Srinath and Smt.K.Vijayalekshmi.

3. Conference Hall Amenities Committee

Shri.G.Venkataraman-Convener.

Members: S/Shri.D.B.S.Sehara, K.K.P.Panikkar, C.R.Shanmughavelu, S.Natarajan, G.Balakrishnan, V.Rajendran, P.Sivaraman and Haja Najeemudeen.

4. Finance Committee

Dr.K.Alagaraja-Convener

Members: S/Shri.K.Balan, R.Sathiadas and K.C. Yohannan.

APPENDIX - 3

PARTICIPANTS

Sl.	Name	Designation and Address.
1.	Abraham J. Lucose	Asst. Hydrographer, Naval Hydrographic Office, Dehra Dun.
2.	Alagaraja, K.	Scientist S-2, C.M.F.R.I., Cochin- 18.
3.	Balan, K.	Scientist S-1 C.M.F.R.I., Cochin-18.
4.	Bapat, S.V.	Joint Director, C.M.F.R.I., Cochin-18.
5.	Dalal, S.G.	Scientist, N.I.O., Goa.
6.	Desai, A.D.	Asst. Director of Fisheries, (Statistics), Government of Gujarat, Ahmedabad.
7.	Devaraj, M.	Professor, C.I.F.E., Bombay.
8.	Dharma Raja, S.K.	Scientist S-2, C.M.F.R.I., Cochin-18.
9.	George, M.J.	Scientist S-3, C.M.F.R.I., Cochin-18.
10.	Hridayanathan, C.	Lecturer, Dept. of Industrial Fisheries, Cochin-16.
11.	Jacob, T	Scientist S-3 C.M.F.R.I., Cochin-18.
12.	Kartha, K.N.K.	Scientist S-2, C.M.F.R.I., Cochin-18
13.	Koya, K.	Statistical Assistant, Govt. of Lakshadweep, Kavarathy.
14.	Krishna Iyer, H.	Scientist S-2, C.I.F.T., Cochin-29
15.	Krishnamoorthy, B.	Scientist S-3, Officer-in-charge, Madras Research Centre of CMFRI, Madras.
16.	Krishnam Raju, P.V.	Deputy Director of Fisheries, (Statistics), Dept. of Fisheries, Government of Andhra Pradesh, Hyderabad.
17.	Krishna Rao, K.	Scientist S-2, C.I.F.T., Cochin-29.
18.	Kurup, C.K.B.	Scientist-C, N.P.O.L., Naval Base, Cochin-4
19.	Kurup, K.N.	Scientist S-1, C.M.F.R.I., Cochin-18.
20.	Lal, B.B.	Asst. Commissioner, (Statistics)

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		Ministry of Agriculture, New Delhi.	37.	Rao, K.V.N.	Scientist S-3, C.M.F.R.I., Cochin-18.
21.	Mathew, K.	Lecturer, Dept. of Industrial Fisheries, Cochin-16.	38.	Rao, P.V.	Scientist S-3, C.M.F.R.I., Cochin-18.
22.	Menon, K.K.P.	Tata Oil Mills Ltd., Cochin.	39.	Sastry, A.A.R.	Deputy Director General, I.M.D., Pune-5.
23.	Mhaiskar, J.D.	Statistical Officer, Dept. of Fisheries, Govt. of Maharashtra, Bombay-2.	40.	Sankaran Kutty, M.K.	Asst. Director of Statistics, Govt. of Tamil Nadu, Madras-6.
24.	Mohamed, K.H.	Scientist S-3, C.M.F.R.I., Cochin-18.	41.	Samuel, C.T.	Professor, Dept. of Industrial Fisheries, Cochin-18.
25.	Murthy, A.V.S.	Scientist S-3, C.M.F.R.I., Cochin-18.	42.	Sathiarajan, R.	Director, I.F.P., Cochin-16.
26.	Naik, M.G.	Research Assistant, (Statistics) Directorate of Fisheries, Govt. of Goa, Daman & Diu., Panaji, Goa.	43.	Sehara, D.B.S.	Scientist S-2, C.M.F.R.I., Cochin-18.
27.	Nair, K.M.V.	Tata Oil Mills Ltd., Madras	44.	Shahul Hameed, M.	Reader, Dept. of Industrial Fisheries, Cochin University, Cochin-16.
28.	Nair, N.V.	Asst. Director of Fisheries, Govt. of Kerala. Trivandrum.			
29.	Parasuraman, G.	Asst. Director of Fisheries, (Statistics), Govt. of Tamil Nadu, Madras-6.	45.	Shanbhogue, S.L.	Professor, College of Fisheries, Mangalore.
30.	Pattabhiraman, C.	Operations Manager, Gujarat Agro Marine Products, Visakhapatnam (A.P.)	46.	Silas E.G.	Director, C.M.F.R.I., Cochin-18.
			47.	Srinath, M.	Scientist S-1, C.M.F.R.I., Cochin-18.
31.	Pillai, P.P.	Scientist S-2, C.M.F.R.I., Cochin-18.	48.	Srinivasan, R.	Joint Director, Dept. of Fisheries, Govt. of Tamil Nadu, Madras.
32.	Pillai, S.S.	Joint Director, I.A.S.R.I., New Delhi.			
33.	Pillai, V.N.	Deputy Director, I.F.P., Cochin.	49.	Subramanyan, B.V.	Asst. Director of Fisheries, (Statistics) Govt. of Karnataka, Bangalore.
34.	Radhakrishna K.	Scientist S-2, Officer-in-charge, Waltair Research Centre of CMFRI, Waltair.	50.	Sulochanan, P.	Deputy Director, E.F.P., Cochin.
			51.	Swaminath, M.	Director, C.I.F.N.E.T Cochin-16.
35.	Ramalingam, V.	Joint Director, M.P.E.D.A., Cochin-16.	52.	Venkataraman, G.	Scientist S-3. C.M.F.R.I., Cochin-18.
36.	Ramamurthy, V.	Commissioner of Statistics, Govt. of Tamil Nadu, Madras-6.	53.	Vijay Ranchan,	Commissioner of Fisheries, Govt. of Gujarat, Ahemadabad.