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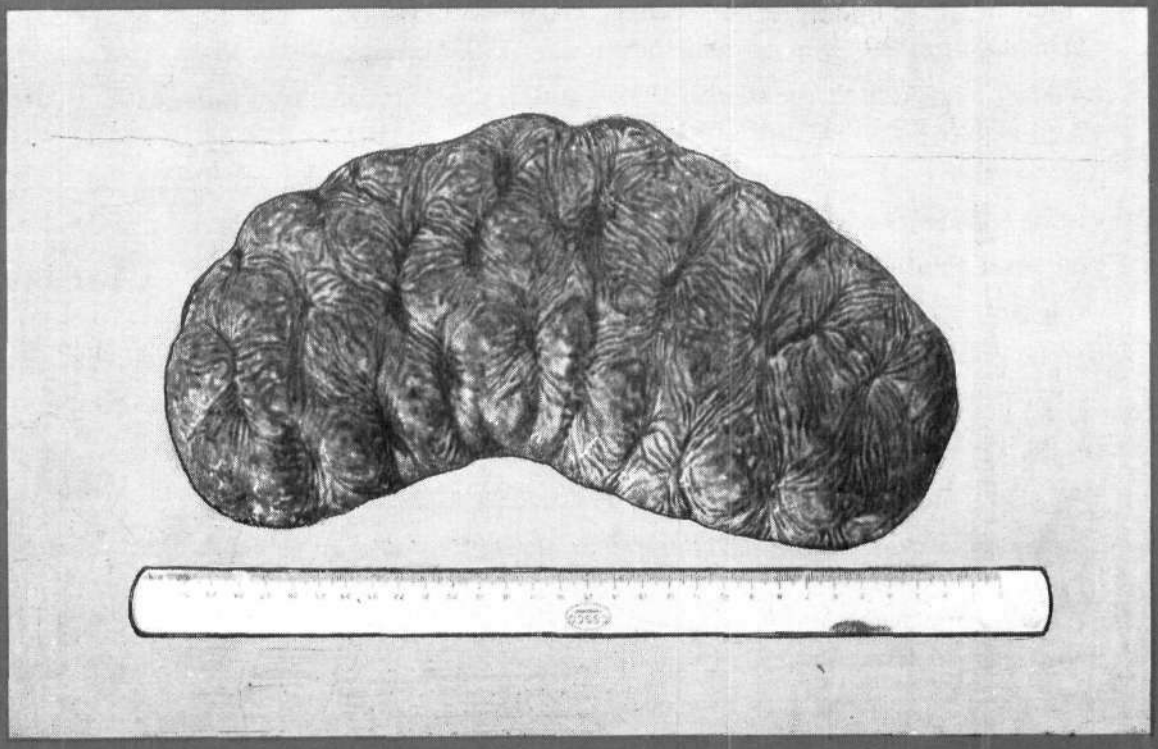

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884 THE NATIONAL MARINE LIVING RESOURCES DATA CENTRE (NMLRDC): PRESENT STATUS AND FUTURE PLANS

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Introduction

A good database is an essential pre-requisite for planning and management of any living or non-living resource. The database needs to be as comprehensive as possible encompassing the various facts of the resource and the related parameters which influence the resource lynamics. Fisheries is no exception. Data on marine living resources in general, and the fishery resources in particular in the seas around India is of vital importance for planning, development and management of this sector. With this in view a Fishery Data Centre was established at the CMFRI. The planning Commission recognizing the strength of CMFRI in fisheries research and management directed that the Fishery Data Centre at the Institute should be strengthened and expanded. The workshop on acquisition and dissemination of data on marine living resources of Indian seas held at CMFRI during 21-23 October 1982, recommended that the Institute should expand its Fishery Data Centre as a centralised National Marine Living Resources Data Centre (NMLRDC). The NMLRDC should be responsible for acquiring, processing, analysing and storing of the data and disseminating the information on the marine living resources and the related aspects. Thus, the NMLRDC came into existence from 1983 with the above objectives.

Computer facilities

With the installation of the computer facilities at the Institute during the later half of 1988, the process of computerization of the data commenced. As a first step, codes for the commercially important species and for the craft and gear employed for harvesting were developed. The computer based analysis of the data to estimate the marine fish landings regionwise, resourcewise and gearwise thus began during 1989. During the last decade the facilities at the computer centre of the Institute had expanded through upgradation of the hardware and software rendering adequate support to the NMLRDC. The software for processing the data on marine fish landings including the analysis, retrieval and preparation of need based tables was developed in-house with the expert support from the scientists and technical staff of the Fishery Resources Assessment Division (F.R.A.D.) of the Institute. Over the years, the scope of the software has been widened to cater to the various needs including the analysis of data for fish stock assessment and application of statistical tools. At present the computer centre has the following facilities not only to serve the needs of the NMLRDC but also for the research projects of the Institute. Besides, the computer centre has also good communication facilities such as the Internet (with e-mail and browsing facility) which is being used by the scientists and the students of the Post Graduate Programme in Mariculture. The NMLRDC also draws the hardware and software support from the Marine Data Centre (MDC) a project of the INCOIS (Department of Ocean Development) and the Agricultural Research Information Service (ARIS) cell of the ICAR at CMFRI.

I ***Computer centre***

UNIPOWER 30 (based on MOTOROLA 68030 processor)

- 4 MB RAM with UNIX operating system
- 4 terminals
- HDDs of capacities 325 and 500 MB
- Magnetic tape drive
- QIC tape drive
- 2 FDDs
- 1 Line printer (600LPM)
- a PC DX 386 with 4 MB RAM and 125 MB HDD 2 FDDs, QIC tape drive
- a PC 286 with 1 MB RAM; 40 MB HDD;

1 FDD

- Two dot matrix printers
- An XY plotter
- Five off-line data entry units

II MDC of INCOIS (DOD)

Pentium 32 MB RAM

- HDD of 500 MB
- QIC tape drive
- 2 FDDs
- Dot matrix printer
- Inkjet color printer
- MES facility for connectivity to NICNET via V-SAT
- a Dial up internet facility (VSNL)

III ARIS cell

- A LAN server (Novell Netware) with 32 MB RAM 4 GB HDD
- 7 Pentiums (16 MB and 32 MB RAM) each with
- 2 FDDs
- HDD ranging from 1.2 to 2.4 GB
- Two CD ROM drives
- Cartridge tape drive (4 GB)
- SUN SOLARIS UNIX server (32 MB RAM, 4 GB HDD, cartridge tape drive and a CD ROM drive)

IV Operating Systems

UNIX, DOS, Windows 3.1 and Windows 95

V Software

MS Office; SPSS; SYSTAT and other in-house developed programmes

VI Languages implementd

C, BASIC, FORTRAN, UNIX Shell, Visual BASIC and Visual C+

Data holdings

- The NMLRDC currently holds the data on marine fish landings from 1989-'97 both in the raw data mode and in the processed mode in about 44,000 files (approximately 6.25 GB). These are stored in magnetic tapes and tape cartridges. The data pertains to the marine fish landings in each zone, monthwise, specieswise and gearwise. Also, the resourcewise and gearwise details of the estimated catch and effort for each district are also available on quarterly basis.
- The processed data for 1984-'88 for each state, districtwise, quarterwise, resourcewise and gearwise are also maintained in about 1,000 files and stored in magnetic tapes.
- The length frequency data used for stock assessment of some of the commercially important resources and the biological samples including the length, weight, sex and maturity status are also stored (Table 1).
- Currently the quarterly data on the fishery and biology of the resources investigated under the various research projects during 1997-'98 are also maintained. The computerization of the same is progressing.
- Details of the price statistics from selected centres.
- Inshore hydrography data collected off Cochin.
- Monthly data on rainfall, atmospheric temperature, relative humidity and mean sea level pressure from a few centres in Kerala from 1961 to 1995.

In-house software

As already mentioned, the software for analysis of marine fish landings, retrieval and reporting of data was developed in-house by the scientists and technical staff of the F.R.A. Division. The list of programmes is given in Table 2. These programmes were created by Dr. M. Srinath, Sr. Scientist, Shri T.V. Sathianandan, Scientist, Shri M. Karthikeyan, Scientist (SS) (now with CICFRI, Bangalore), Shri P.P. Pavithran, Tech. Asst. and Kum. Sindhu K. Augustine, Tech. Asst. The feature of the programmes is such that they can easily be adopted to various uses including agriculture, animal husbandry etc. The maritime states can also adopt these programmes by suitably

modifying the source codes to suit their needs. The expertise on the software and statistical analysis will be available for consultancy for any agency concerned with marine fishery research and development including coastal aquaculture and mariculture. Interested parties may contact the Director, CMFRI for further details.

Future plans

- ❖ It is proposed to develop comprehensive data bases for each of the commercially important marine fishery resources such as oil sardine, mackerel, Bombayduck, shrimps etc. The database will include the fishery, biology, distribution, stock assessment and bibliographic references related to the resource concerned.
- ❖ Connectivity to all the research centres, field centres of the CMFRI and all the institutes dealing with fisheries for faster information exchange.
- ❖ Bringing out CDs on important resources.
- ❖ Preparation of fishery atlases.

Thus the NMLRDC which has been catering to the needs of the research and development agencies for over the last decade is poised to expand and extend its activities for a better management of data and catering to the needs of the end users.

TABLE 1. *Details of length-frequency data and biological data available at the NMLRDC*

Name of Species	Centres	Year
N. japonicus	Cochin, Kakinada, Visakhapatnam, Veraval	1982-'86
N. mesoprion	Cochin, Kakinada, Visakhapatnam, Veraval	1982-'86
E. affinis	Cochin, Vizhinjam, Calicut, Verval	1989-'92
T. tonggol	Verval, Cochin	1989-'92
A. thazard	Cochin,	1989-'92
	Veraval	1990-'91
A. rochi	Vizhinjam	1989-'92
Mackerel	Cochin, Calicut, Waltair, Karwar, Mangalore, Mandapam	1984-'88
Stolephorus sp.	Vizhinjam	1970-'83
M. cordyla	Visakhapatnam, Veraval	1984-'88
Loligo spp.	Cochin, Mangalore, Madras	1984-'88
S. aculeata	Cochin, Mangalore, Madras	1984-'88
P. indicus	Visakhapatnam	1984-'88
	Tuticorin, Mandapam	1984-'88
Oil sardine	Vizhinjam, Visakhapatnam, Cochin, Calicut, Karwar	1984-'88
Carangids (*D. dayi, Alepes* spp.)	Cochin, Vizhinjam	1984-'88
M. monoceros	Visakhapatnam, Bombay, Veraval	1984-'88
M. *dobsoni*	Calicut, Cochin, Karwar, Mangalore	1984-'88
L. bindus	Kakinada, Madras, Visakhapatnam	1984-'88
L. dussumieri	Mandapam	1984-'88
L. jonesi	Rameswaram	1984-'88
S. insidiator	Kakinada, Madras, Visakhapatnam	1984-'88
Oil sardine	*Mangalore RC* Baikampudi, Ullal, Malpe, Uppala, Sultan Battery	1964-'80
	Calicut RC Vellayil, Puthiappa, Pudiangadi, Beypore, Quilandy, Badagara, Parappanangadi	1956-'80
	Vizhinjam	1980
Mackerel	Vizhinjam	1965-'68
		1975-'79
	Mangalore	1964-'81
M. dobsoni	Mangalore	1977-'81
	Madras	1962-'63
		1967-'70
		1973-'80
	Mandapam	1970-'76
Trichiurus sp.	Vizhinjam	1979-'81

TABLE 2. Programmes developed in-house at the NMLRDC

Sl. No.	Programme name	Syntax	Purpose	Input	Output	Remarks
1.	fish4	fish4 <file name>	to analyse and estimate species wise and gear wise landings using the data provided in the input file in a standard format.	An input file containing name of the output file and the data on species wise gearwise marine fish landings on the selected day at the related centre for a given period.	Written into a file name (given in the input file) with an extension "SCZ" and same file name as that of input file in capital letters. Output is in a standard format which forms the input for tabulation programme.	Data from 1991 onwards contain depth details and those upto 1990 is without depth. The equivalent prigramme for analysing data without depth details is "fish 89".
2.	tabu4	tabu4	To make two-way tables (species x gear) of estimated landings for data with depth.	"SCZ" files created after analysis using 'fish4' programme.	Two-way table will be created and stored in an output file with a name given after prompted for titles of the table.	Programme for similar application in case of SCZ files without depth is 'tabu'.
3.	tabsat4	tabsat4<SCZ file>	To make two-way tables (species x gear) of estimated landings for data with depth.	'SCZ' files generated after analysis using "fish4".	A two-way table will be created with same name as that of input file with the extension changed to "OUT."	The corresponding command for data without depth is "tabsat".
4.	cull4	cull 4<SCZ file> code1 code 2	To display gear-wise estimated landings for selected groups indicated by the species codes for data with depth.	SCZ file name.	Displayed on the standard output which can be redirected to printer or files.	The corresponding command for data without depth is "cull".
5.	peldem4	peldem4 <SCZ file>	To display landings estimated separately for pelagic and demersal groups of gear wise species data with depth.	SCZ file name.	On standard output two-way table (species x gear) can be redirected to printer.	"peldem" for data without depth.

Sl. No.	Programme name	Syntax	Purpose	Input	Output	Remarks
6.	tabud-ep	tabudep<SCZ file>	To make depth-wise estimates of landings of the zone using the input file used for SCZ files with depth details.. i.e. data from 1991 onwards.	SCZ file name.	On the standard output. Two tables (i) species x depth wise and (ii) gearwi-sex depth tables on VDU or can be redirected to printer.	
7.	tabold	tabold <file name>	To make species wise table for old data files. i.e. files before 1985. These data files will have extension 'OLD'.	Old data files having extension "OLD" - 43 groups only.	On standard output. Group wise estimates.	
8.	mer4	mer4	To merge different SCZ files with depth (1991 onwards). Program will prompt for file names and gear to be merged.	SCZ files with depth.	Output file name will be prompted and has to be given another name (with an extension SCZ other than the input file name).	If the output name is given as that of an existing SCZ data file, the existing file will be replaced. For data without depth the programme "mersat" has to be used.
9.	mersat	mersat<SCZ file1> <SCZ file2>.....	To merge two more SCZ files gear-wise.	SCZ files with depth.	Merged data will be displayed on the standard output and can be redirected to a file with the required name and extension "SCZ".	The programme "lstgrs" should be executed before executing this programme. The arguments (name of SCZ file) should be exactly same for both the programs. Care should be taken while redirecting. An equivalent command for data without depth is "mersato".

Sl. No.	Program name	Syntax	Purpose	Input	Output	Remarks
10.	merkri	merkri	To merge SCZ file with and without depth.	SCZ files with or without depth.	Output file name will be prompted - A proper file name should be given with extension SCZ.	
11.	merm-on4	mermon4 <SCZ-JAN> <SCZFEB>.....	To merge different months estimated landings and make an SCZ file for species x month landings estimates for data with depth information.	SCZ files for different months as arguments separated by space.	Output file name will be asked - A proper file name (other than the existing file name in the directory).	Equivalent command for data without depth is "mermon".
12.	newlst	newlst	To display 83 species groups and their codes. These are the groups used in SCZ files.	Nil.	Display on standard output.	
13.	oldlst	oldlst	To display species codes and species names of species used in OLD data files.	Nil.	Display on standard output.	
14.	convd-ep	convdep <SCZ file>	To convert SCZ files without depth information to SCZ file with default depth information (useful for merging).	SCZ files without depth information.	File name will be prompted and written to the file.	
15.	chksri	chksri <filename>	To check the errors and mistakes in raw data files.	Data files fed through data entry units in the standard format.	Nil, error message if any will be displayed.	
16.	dentry	dentry	To enter data in SCZ format for 83 groups.	Through keyboard.	SCZ file name to be given when prompted for.	
17.	oldent-ry	oldentry	To enter old data in OLD format for 43 groups.	Throgh keyboard.	File name has to be given when prompted for.	

Sl. No.	Program name	Syntax	Purpose	Input	Output	Remarks
18.	comp4	comp4 <SCZ file1> <SCZ file2>	To compare the landings of different groups for different periods or years.	SCZ file with depth.	Difference in landings and % change will be displayed on the standard output.	The equivalent command for data without depth is "comp".
19.	floppy	floppy	To transfer files fed using data entry units to the main system.	From floppy inserted in the main system.	Will be created in the present working directory.	Shell script written in UNIX.
20.	prtfl	prtfl	To print raw data on printer in two columns of 132 characters width.	File name to be printed.	Printer.	Shell script written in UNIX.
21.	fishgrp4	fishgrp4 <file name> <group code>	To estimate species-wise landings of different species belonging to a group of the 83 classified species groups for data with depth information.	Raw data files with depth information.	Estimated landings will be stored in a file with same name and additional extension. "s<spcode>".	A species code (standard code) detail file must be created in "/usr/spcode" directory before executing this programme. An equivalent command for data without depth is "fishgrp".
22.	tabuper	tabuper <SCZ file>	To tabulate % landings of different species.	SCZ files without depth.	The table will be displayed on standard output.	
23.	infish	infish - (I t a e) <data file>	Programme for manipulation of inland fish landings.	Data files for inland fish landings with extension "INF".	Will be produced on stdout.	I for data entry, t for making table, a to add states and e to edit/correct data.
24.	world	world (I t) year 1 year 2	To create and tabulate world production database.	Files with extension "PRM"	On stdout with flag 't'.	

Sl. No.	Program name	Syntax	Purpose	Input	Output	Remarks
25.	biobase	biobase	A menu driven software for data entry, data checking, tabulation of biological information like length, weight, sex, maturity etc.			
		Statistical applications. I. Time series.				
26.	arimax	arimax <input file> <output file>	To estimate parameters of a scalar ARMA time series model.	In standard format in files.	On file	
27.	autoco	autoco <input file> <output file>	Compute autocorrelations upto a given lag for a scalar time series.	-do-	-do-	
28.	crscor	crscor <input> <output>	Compute cross correlation matrix of given lag for a vector time series.	-do-	-do-	
29.	pautoco	pautoco <input> <output>	Compute partial autocorrelations upto a given lag for a scalar time series.			
30.	pgram	pgram <input> <output>	Compute periodiagrams for a scalar time series.			
31.	tstfit	tstfit <input> <output>	Test the goodness of fit of an ARMA model.			
		II. Multivariate analysis				
32.	cormat	cormat <input> <output>	Correlation matrix for a multivariate data set.			

Sl. No.	Program name	Syntax	Purpose	Input	Output	Remarks
33.	pathco	pathco <input> <output>	Compute path coefficients for multivariate data set.			
34.	princo	princo <input> <output>	Principal component (PC) analysis of multivariate data.			
35.	shape0	shape0, <input> <output>	Initial PC analysis of Truss network data for racial studies.			
36.	shape1	shape01 <input> <output>	Sheared PC analysis for racial studies - using truss network data - continuation of shape0.			
		III. General purpose				
37.	tapsat	tapsat	A menu driven utility for magentic tape manipulations like storage, retrieval tabulation etc. block by block.		A UNIX shell programme.	
38.	eignall	eignall <input> <output>	Program to computer eigen values of a non-symmetric square matrix.			
39.	eigtrsym	eignsym <input> <output>	Program to compute eigen values and eigen vectors of a symmetric matrix.			
40.	INBASE	INBASE	Marine fish landings statewise, yearwise.			Developed by Ms./ Sindhu K. Augustine in FOXPRO for DOS environment. It is a menu driven user friendly programme.