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DATA BASE DEVELOPMENT AND COMPUTER APPLICATIONS IN FISHERIES

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INTENSITY of economic activity either in the established sector or emerging sector depends on the level of database of the sector. In the liberalised frame of Indian economy, established sectors such as agriculture have received a big boost resulting in higher production and larger earnings. Database for such sector is strong, built over years. However, there are emerging sectors which are highly productive and money spinning. Fisheries is one such sector having global perspectives. Database for this sector though available now in a limited dimension, is to be enlarged and strengthened for the benefit of entrepreneurs, industry, public enterprises, planners and administrators.

DATABASE

Fisheries encompasses activities including production and utilization of fishery resources. From the production side, three types of activities are there namely, Capture fisheries, Culture fisheries and Capulture fisheries. In the following these activities have been defined. The items that go in under these activities, the characteristics of the resources exploited, the agencies that cover database, the extent of the coverage, the gaps and suggestions to widen the database are also highlighted. The mode of disposal and utilization and the coverage of database and the agencies involved are also indicated.

PRODUCTION

Capture fisheries :

Capture fisheries is one where human interaction with the resources comes only at the time of harvest. It is concerned with the exploitation of wild stocks available in the seas, estuaries, rivers, lakes and reservoirs. This is an age old activity and has remained as a small scale sector till recent times. Of late large fishing companies, fish processing units and exporting houses have also entered in this area of activity yielding annually more than Rs. 3000 crores producing about 3.5 million tonnes of fish. Vast potentials still remain to be tapped to increase production leading to larger area of activity with a vast scope for employment generation.

In the marine sector, at present, narrow regions of near shore areas are heavily exploited by the industrial and machanised sectors. Large trawlers numbering about 150 are also mainly concentrating on inshore shrimp resources. Chartered vessels and foreign vessels do venture in deepsea and highsea fishing. Out of the estimated potential of 3.9 million tonnes of fishery resources only about 2.3 million tonnes are landed and there is scope to increase these landings to 3.9 million tonnes (Anon, 1991). From the estuaries, backwaters and fresh waters the presently exploited fishery resources account for about 1.5 million tonnes.

The Central Marine Fisheries research Institute (CMFRI) the nodal institute for research in marine fisheries, using its well developed sampling scheme, stratified multistage random sampling programme, is covering the data on landings from heavily exploited near shore regions brought by traditional and small mechanized units. The catches by larger trawlers, chartered vessels and other units fishing in deeper and high seas are not at all covered by this scheme. In the CMFRI scheme detailed information on gear wise, species wise, season wise and region wise landings is obtained. To collect information from the large trawlers, chartered vessels etc., it should be made mandatory on these units to supply data to CMFRI for storing, processing and analysis in their National Marine Living Resources Data Centre (NMLRDC). Otherwise CMFRI should be identified by the Central Government to cover these data also by a suitable sampling scheme for which financial provision is to be made to the CMFRI and their staff be strengthened for this purpose.

From the estuaries and fresh water regions, there does not exist a systematic sampling scheme. Central Inland Capture Fisheries Research Institute (CICFRI) is collecting data from small pockets of these areas. For full and effective coverage, CICFRI should be provided enough facilities to collect data from these regions.

In recent times many changes and innovation have taken place in designing craft and gear and motorisation of traditional craft is taken up all over India and to study the impact of such developments on the resources and to suggest ways and means to judiciously exploit the renewable resources, data on craft and gear are required. CMFRI conducting

quinquennial census on marine fisherman population, craft and gear, educational status, available infrastructure facilities etc. at village and landing centre level could not conduct it after 1982 for want of funds. In the interest of the multibillion dollar industry it is the bounden duty of the Government to make available the funds to CMFRI to conduct such census with the collaboration of the concerned State Governments. Similarly for the other segments of capture fisheries sector action should be initiated to conduct census by CICFRI synchronizing with CMFRI survey for facilitating all India comparable data presentation on the entire fisheries sector. This also is better be done in collaboration with the respective State Governments. Resources encountered in capture fisheries depend on their availability in the areas exploited. These resources are affected by controllable and non-controllable factors. Fishery independent factors such as salinity, temperature, weather etc., are non controllable, whereas fishery dependent factors such as fishing effort are controllable.

Culture Fisheries :

Culture fisheries is one where human involvement starts from pond preparation through water management, seeding, feeding, harvesting to marketing. The major inputs are land, water, seed, feed, gear and manpower. Here all factors affecting resources are controllable. Resources are well identified. Seed is available from both the wild and from the hatcheries. No systematic collection of data is done in this sector. The progress made, changes taking place in culturing conventional and non conventional species could not be properly assessed for want of such data. Central Institute of Fresh Water Aquaculture (CIFA) and Central

Institute of Brackish Water Aquaculture (CIBA) should be strengthened to make data from this sector available for the benefit of the entrepreneurs, industry and others involved in culture fisheries.

An estimated 2.25 million ha of ponds and tanks, 1.30 million ha of bheels, gheels and derelicted waters, 2.09 million ha of lakes and reservoirs, 0.12 million ha of canals and channels and 2.30 million ha. of paddy fields part of which usable for fish culture are available for pisciculture. To collect data on specieswise and seasonwise details requires a well designed sampling scheme and a groups of well trained staff. CIFA may be entrusted with this task.

CAPTURE FISHERIES

This activity is one in which the waters are seeded and left for the seed to grow in natural surroundings such as releasing fish seed in reservoirs and capture them later without any intermediary involvement, has been in vogue in many reservoirs in India. Sea ranching of exportable varieties of shrimps in the coastal belts to enrich the coastal waters is another aspect under this sector. In this activity capture and culture aspects are combined in one form or the other. Vast stretches of open seas are now turned into areas for capture fisheries through cage / pen culture.

The major inputs are seed, feed, material used in cage pen culture, craft and manpower. All factors are not controllable. Resources are well identified and introduced for culture. At present there is no agency to collect data on this sector. This sector has vast potentials for growth, production and employment generation. Hence it is high time that action is initiated to cover all aspects of this sector for planning and development.

DISPOSAL

Fish catches are disposed in live, raw, semi-processed and processed forms. Catches are removed from the landing place through head loads, cycle and trucks to various parts of the country. These are taken for subsistence, direct to markets and processing units. Species-wise, season-wise and region-wise distribution of these items are required for a meaningful understanding of the entire fisheries sector. Some State Governments, no doubt collect data on these aspects but not based on any systematic sampling schemes. Suitable sampling has to be evolved and the concerned State Governments may cover these data systematically and regularly so that compilation of such statistics on all India basis becomes a reality. Financial help may be extended to State Governments to fulfill this requirement. State Governments may send the details on these aspects to NMLRDC of CMFRI for compilation and presentation on all India basis.

Product Development : A part of the landings is made into such ready-to-cook products such as puppads, wafers, jelly, jam, pickles, sauce, masmin, sasmi etc. Fish meal and cattle feed are other products. Data, are not available on quality-wise and species-wise that go into these products. The agencies that develop such products are Central Institute of Fishery Technology, (CIFT), Integrated Fisheries Project (IFP) and Fisheries Colleges. Major inputs are species, chemicals and machinery.

Marketing : Domestic markets consume about 90% of the total fish catches. Exports cover the rest. Country - wise, quantity-wise, species-wise exported fish and fishery products are made available by the Marine Products Development Authority (MPEDA). It is the secondary source as MPEDA gets this

information from the Customs. Direct collection of such data from the factories/agencies that export these items would improve the quality of the data base. Data on demand and requirements, regionwise, are also needed for improving and expanding our export base. However, such data on region-wise quantity-wise and species-wise domestically marketed are not available. Market surveys are required for such a detailed study. This study will lead to properly identify the region-wise needs and requirements. This information will go a long way in directing the fish catches to the suitable markets for realizing better prices. Data on demand and supply will help in this process.

RELATED ACTIVITIES

Fisheries sector requires facilities for boat building, net making, processing, hatcheries, feed production, chemical and pharmaceutical units. Database on these items are not complete. Here and there data are available on these items which are neither collected under an approved scheme applicable on national level nor collected under a common time frame so that these statistics could be compiled on national level. MPEDA and State Governments may be entrusted with collection of these data.

Research and Development : It is the major area where involved are ICAR/CSIR Institutes, Government, both State and Central, organisations, Fishery Colleges, Agricultural Universities and non-governmental Organizations. Improved, intensive and extensive database is required to feed the needs of these organizations for arriving at valid conclusions. In capture fisheries, level of effort required for optimal exploitation of the resources to harvest them on a sustainable basis making

use of the renewable characteristics of the resources, craft and gear development for this purpose, continuous assessment of resources are needed. Forecasting the fisheries is another major research area to be dealt within culture and capture fisheries. Hatchery techniques leading to maximum survival and feed development for fast growth genetic manipulation for both are areas requiring concerted efforts in research and development programmes. Processing and product development is another area where R & D efforts are to be directed to improve the shelf life, odour, colour and taste of the end product.

Man power development is another area where database is not strong. Central Institute of Fisheries Nautical Engineering Training (CIFNET), Central Institute of Fisheries Education (CIFE); CMFRI and other ICAR Institutes, Fisheries Colleges and private agencies are giving training at different levels to serve the fisheries sectors. Data on requirement (demand) and supply at different levels are not readily available. CIFE may be entrusted with this work and this Institute may bring out periodic details on level of training, intake capacity and period of training at each organisation.

A vital need for planning and development is a strong database on socio-economics of the people involved in fisheries. As mentioned earlier CMFRI conducts quinquennial census on marine fisheries population and other related items. Similar census is required for other fishery sectors also. CMFRI, CIFE and State Departments may be encouraged to conduct such census periodically and regularly.

Financing : This is the other area for which strong database is required. World Bank, Asian Development Bank (ADB), National Bank for

Agriculture and Rural Development (NABARD), State and Central agencies lend finances for fishery activities. Information on type of loan, amount, interest rate, repayment terms offered by these agencies may be collected and released periodically for the benefit of fishing industry. NABARD may be entrusted with this task.

Consultancy is badly required in capture, culture and capture fisheries sectors. The agencies that offer consultancy in these sectors may be listed with their areas of specialization.

Coastal Zone Management : No proper definition is available for coastal zone. Different definitions are made by different authors according to their needs. The resources that come under this category covers human, physical, biological, hydal, thermal, wind and chemical resources. Human resources involve the fisherman and other populations of the coastal regions. Sex wise, age wise educational and occupational details of marine sector are covered under the CMFRI census.

Under physical resources come the topography of the coastal region, length of the coast, nature of the coast (sandy, cyclone prone etc.), seasonal weather conditions, suitability for health resort, sports, harbour, boat/ship building, fish landing, post harvest facilities, atomic power plants, naval base, mining, oil exploration, coastal aquaculture, research laboratories, shore based industries such as salt plants, plantation (Casurania, coconut and cashew plants) etc. and present state of utilization. Chemical resources involve mineral, oil, gas etc. Data on extent of area and quantity available are required. Biological resources encompass mangroves, coral reefs, sea weeds, fishery resources and other living resources.

Hydal resources involve wave and tidal energy. Thermal resources comprise solar energy on the coast and the energy due to differential thermoclines. Wind energy using wind mills is another resource.

Geo information system (GIS) : Data on all the above aspects are not available. Information in patches is available here and there. For proper development of coastal zone a strong database covering all the above aspects is needed. Geographical information system (GIS) covers this aspect. Since the resources go beyond geographical aspects covering geo-physical, geo-chemical etc. it is better to call this system as Geo Information Systems. (GIS).

COMPUTER APPLICATIONS

Inflosion :

World is shrinking day by day due to expansion of computer and conveyance facilities. In other words the size of the universe is inversely proportional to speed of communication and conveyance. Use of computers covers from cradling the crying baby to reaching distant galaxies. Information covered and collected is expanding so fast that compilation, processing, analysis and quick communication of results demand the services of computers. In the earlier pages the data-base, indicated under different items of fisheries activities, has led to information explosion called 'inflosion'. To manage 'inflosion' suitable software packages have been developed and more and more user-friendly softwares are being brought out to meet our new demands.

Generally people think that the role of computers comes only at the time of processing and analysis. In fact computers play dominant

role in collection of data also. In fisheries, vessels equipped with computers locate fish shoals. Remote sensing is profitably used to collect data on sea conditions to relate them to the availability of wild stocks for forecasting fisheries. Computers play a very vital role in collection of basic data for this purpose. In culture fisheries data on temperature, conditions of water, DO, pH, etc. are regularly monitored by computers to successfully manage the culture systems. Well developed softwares are available for this purpose to monitor the level of these parameters to indicate whether these parameters are within the acceptable range; if not, the computer screen indicates suitable action to be taken to regulate these parameters. Cage/pen cultures practised in distant waters heavily depend on computers to take timely action for judicious management of these systems. But for computers such practices are not possible and heavy losses for delayed activities could not be avoided.

In the processing and analysis side, the role of computers is well known. Massive data collected on the marine fish landings in India by the CMFRI are successfully processed and analyzed under different combinations for studying the inter-relationships of various factors that play their role in the outcome of the fish landings. Region-wise, species-wise, gear-wise and season-wise landing details are made available for research purposes. Evaluation of exploited resources to study the impact of effort on catches for their sustainable and optimal exploitation could be done by computers in the shortest possible time. To maximize the carrying capacity of a water body in any culture system many factors are simultaneously studied through computers. For fixing levels of seeds,

suitable size for introduction in composite fish culture, feed schedules and levels required for fast growth could be studied through the help of computers only.

Another major area of application of computers is storing the vast data at global level. The storage facilities available in computers alone have the capacity to contain 'Inflosion', the ever expanding database. Net work linkage helps a lot in this direction.

Systems operating in fisheries are many. MARSIS (Marine Remote Sensing Information System), NOIS (National Ocean Information System) and GIS (Geographic Information Systems / Geo Information System) to mention a few are some of the systems which use computers intensively and exclusively. Mapping and super imposing as a decision-making tool are the areas where computers are successfully used.

Assessment of exploited resources, species identification, contouring of layers of living and non living resources and preparation scientific reports are all done through various software packages such as ELEFAN (Electronic Length Frequency Analysis) and WORD PERFECT.

To conclude, database management and computer applications should go hand-in-hand for any successful activity. Fisheries differ from other resources on many aspects particularly these resources are not available for direct observation and what is below a sheet of water is any body's guess. To assess resources and to come out with purposeful development programmes, information on large number of items is required. For easy accessibility, it is better all such information is stored at a place

accessible to the interested workers. Since various organizations are involved in collection of data on different aspects of fisheries, duplication of information collected, want of uniformity in the collection procedure and lack of a common time-frame in collection of data are major hurdles in compilation of information on a national level. At present research Institutes engaged in fisheries research are not able to attend to collection of fisheries data as per the demands of the various research projects for want of financial support. Least interest is

shown in collection of vital information on scientific basis when budget limitations crop up. Quinquennial census could not be conducted by the CMFRI regularly for want of funds. In order to avoid such lapses and to maintain uniformity, regularity and systematic approach and to cover all aspects of fisheries, it is high time that a Central Institute of Fishery Statistics is established to avoid omissions and duplication in coverage and to maintain high standards in the scientific sampling of the activities.

REFERENCE

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