

Information Resources and Services on Aqua Sciences and Fisheries in India

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Opines that fisheries is a powerful income and employment generator in India as it stimulates the growth of a number of subsidiary industries. It is also source of cheap and nutritious food besides being a valuable foreign exchange earner. Information is a very important constituent for education, extension, research and development in fisheries sector. Suggests that a Fisheries Information system (FIS) which should generate, collect, organize and disseminate fisheries research information to teachers, scientists and students as well as technical and marketing information to managers, fishermen and other stakeholders to take maximum advantage of the emerging world's trade regime is to be considered a priority item in fisheries development. Evaluates the resources, facilities and services of information units of fisheries related organizations in the region and puts forward suggestions for establishing an FIS and resource sharing network to extract maximum utility of the information resources available in the sector.

0 INTRODUCTION

Fisheries has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries and is also a source of cheap and nutritious food besides being a valuable foreign exchange earner. Today, fisheries are estimated to provide 16% of the world population's protein, and that figure is much higher in some developing nations and also regions that depend heavily on the sea. According to the Food and Agriculture Organization of the United Nations, total world capture fisheries production in 2000 was 86 million tons. The top producing countries were, in order, the People's Republic of China, Peru, Japan, the United States, Chile, Indonesia, Russia, India, Thailand, Norway and Iceland. They accounted for more than half of the world's production; China alone accounted for a third of the world's production.¹

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India has a coastline of above 7000 kms and after the declaration of its Exclusive Economic Zone (EEZ) in 1977, the area of its territorial water covers more than 2 million sq km. The long coast line of India has numerous estuaries and brackish-water lakes and backwaters rich in fish. The brackish water area comes to 1.9 million acres, and includes the Chilka Lake covering about 256 thousand acres; yielding about 3,000 tons of fish annually. Whilst the contribution of the fisheries sector to total GDP is not significant, the sector is important in many coastal areas especially in Kerala. It has been estimated that 6 million people depend on the sector for employment.

Fisheries in India, though under-developed, contribute substantially to the national income. Rich in proteins, vitamins and mineral salts, fish is a valuable protective food. It forms an important constituent of the diet over considerable areas of the country. So it is an important enterprise of agricultural sector. Its development is also a most promising means of improving the diet of the people. Total fishery production of India (2004) is 6 096 809 MT. India is the tenth largest exporter of fish and fishery products to the EU. Total exports in 2004 was worth US\$ 1.50 billion. Main Products are Shrimp, Squid, Cuttlefish, Octopus and wide varieties of fin fish. Major markets include USA, Japan, EU, South East Asia and Middle East. The average annual growth rate for India's fisheries exports to the EU since 1995 stands at 6.2%. The main export products to the EU are frozen shrimp and frozen Cuttlefish/squid.² Many items from India has good demand in foreign countries. An example is Indian tuna. It is a delicacy in Japan where it is relished as sashimi (raw fish). Japan is emerging as the largest consumer of this fish which is very costly. Tuna exports have almost doubled in 2005 and is expected to increase further in the coming years. Tuna is packed in special ice and air lifted. The fresher the tuna the better the price it fetches. The Indian water is abounding in yellow fin and skipjack tunas, with former fetching high price. India faces intense competition in this from South Asian countries like Indonesia, Malaysia and Vietnam. Success depends on applying current technologies for processing, packing preservation etc and watching the market trends which all depend on good information support.³

1 DEFINITIONS AND SCOPE OF FISHERIES AND AQUA SCIENCES

Fisheries and related areas traditionally come under agricultural sciences which cover animal sciences also. Agriculture is closely knitted

with the production of the fundamental elements of man's food, shelter and clothing, which are derived from plants and animals that grow in the land air and water. Hence agriculture is also concerned with the production, conservation and improvement fisheries and the oceans and seas; the environment in which fishes live as well as with their marketing and distribution.⁴

Fisheries and aquatic sciences are classified under sub disciplines of agriculture by Centre for Agricultural and Bioscience International (CABI).⁵ According to their definitions fisheries comes under animal science which is a sub sector of agriculture. Fisheries is an organized effort by humans to catch fish or other aquatic species, an activity known as fishing. Generally, a fishery exists for the purpose of providing human food although other aims like obtaining ornamental fish or fish products such as fish oil are also possible. In Industrial fisheries the catch is not intended for direct human consumption.⁶ The fishing effort is generally centered on either a particular eco region or a particular species or type of fish or aquatic animal, and usually fisheries is differentiated by both criteria. Examples would be the salmon fishery of Alaska, the cod fishery off the Lofoten islands or the tuna fishery of the Eastern Pacific. Most fisheries are marine, rather than freshwater; most marine fisheries are based near the coast. This is not only because harvesting from relatively shallow waters is easier than in the open ocean, but also because fish are much more abundant near the coastal shelf, due to coastal upwelling and the abundance of nutrients available there.

Aquatic or Marine Science is the branch of Earth Sciences that studies the earth's oceans and seas. It covers a wide range of topics, including marine organisms and ecosystem dynamics; ocean currents, waves, and geophysical fluid dynamics; plate tectonics and the geology of the sea floor; and fluxes of various chemical substances and physical properties within the ocean and across its boundaries which is also relevant to fisheries. These diverse topics reflect multiple disciplines that oceanographers blend to further knowledge of the World Ocean and understanding of processes within it: biology, chemistry, geology, meteorology, and physics.

2 INFORMATION AND FISHERIES

Information is a very important constituent for the development of fisheries sector also. Education, extension, research and development related to fisheries require current information. So the sector needs a strong

and efficient Fisheries Information System (FIS). FIS should provide for collection, organization and access in of fisheries research information as well as data collection and management for fishery dependent statistics. FIS can be a portal that identifies the existing fisheries related databases of government and other organizations and provides integrated solutions for effective information sharing. FIS should support fisheries management decisions by developing a virtual application environment and providing integrated solutions and data sources in web interface.

Fisheries Information services have to deal with published literature on fisheries, aqua sciences, and the economic and environmental aspects of fisheries and the oceans. There is a high rate of accumulation of knowledge in fisheries and aqua sciences. Strong FIS is essential to harness information resources generated in fisheries essential to guide the fisheries research and development in the right direction, to frame holistic approach for fishery planning and development, and to assess production potential of prospective technologies for different fishery waters. Fisheries also like agriculture and animal rearing; being climate dependent, the information generated in the region on fishes as well as indigenous technologies related to fisheries is very important. In trade and commerce related to fisheries local information is highly relevant. So the information generated by the institutions existing in the region is of primary importance in fisheries. Such institutions also have information relevant to the region.

The inadequacy and inaccuracy of the existing fisheries information services have been emphasized by several studies. Availability of relevant information in time is essential for research, planning, development and extension activities in fisheries and hence FIS for the sector is to be considered crucial for development.

21 INFORMATION FOR MARKETING FISHERIES PRODUCTS

With the signing of the Marrakech Accord (WTO) in 1994 largest increase in global trade is expected in fishery products also an area where India has a competitive advantage.⁷ The new Export and Import Policy (EXIM) of government seeks to complete the process of India's integration with global economy by removal of various restrictions. It seeks to provide fresh directions to setting up Export Zones for agricultural and fisheries products and providing them special benefits. Such exports will be reorganized on the basis of specific products and specific geographic areas. Focusing specially on areas where there is a convergence of these two

factors will make a beginning. Such zones will be made as Regional Rural Motors of Indian export economy. But many regions of the country including Kerala which is one of the largest fish producing States of India will have constraints in fully participating in International Trade because of various critical gaps including availability of information on technologies, prices, demands, quality, standards etc. Efficient FIS is essential to fill these gaps by transmitting international signals to our fishermen and related professionals and business groups in fisheries sector of the region.

FIS have a crucial role to play in equipping the fishermen and for fisheries development. Kerala's fisheries sector is also dependent on foreign trade. This necessitates an efficient FIS to enable the stakeholders to evolve appropriate strategies and plans for minimization of negative impacts of the new multilateral trade regimes on specific fish items and products. Good understanding about the different aspects of the WTO Regime by all stakeholders in the fisheries sector including fishermen, traders, exporters, scientists and staff of fisheries related departments of State is crucial.

So the State has to establish an FIS, which can support to achieve higher income and prosperity through productivity improvement, quality enhancement, value addition, and fishermen friendly marketing of fish products. Such an FIS should generate and disseminate research, technical and marketing information to scientists, managers and fishermen and other stakeholders to take maximum advantage of the emerging world's trade regime. It should also act as a planning and decision support system to the government for evolving appropriate strategies to take advantage of the dynamic market situation and minimize adverse impact of market fluctuations on the one side and competition from foreign countries on the other.

3 COVERAGE AND RELEVANCE OF THE STUDY

Kerala the southern most State of India is taken as the sample region for the study. It is bordered by Western Ghats on the east and the Arabian Sea on the west. The total land area is 38863 sq.kms. The coastal line of the Arabian Sea sprawling on the west is 590 kms in length. The inshore sea area fattening within the territorial limit of the State (22 km) is about 13,000 sq. kms. The continental shelf area of the sea adjoining the State is 39139 sq. kms. This part of the sea is considered as the most productive portion of the Arabian Sea. Fisheries contributes about 3 percent to the economy of the

State. The current level of Annual Marine Fish Production is to the tune of about 6 lakh tonnes/year. The State is endowed with a significant wealth of inland fishery resources also. The major inland water resources of the State having much fishery importance are the 44 rivers (85,000 ha), 53 reservoirs (42890ha), and 53 backwaters and other brackish water bodies (65213 ha). This inland water resources are also contributing rich fishery wealth. The current level of inland fish production is to the quantum of about 75036 tonnes/year.⁸

The population of fisher folk in Kerala is estimated at about 10.85 lakhs. The fisher people engaged in marine fisheries are dwelling in small houses spread over the coastal areas. The number of fishermen actively engaged in sea fishing is estimated at 2.20 lakhs. The total number of fisher folk dwelling in the coastal area is estimated at 835 thousands. In the Inland fisheries sector about 50 thousand fisher people are engaged in active fishing in various inland water bodies. The total number of fisher folk in active fishing in the inland sector is estimated at 249 thousands. It is also estimated that about 165 thousands people are engaged in fishery-allied activities in the State. The general living conditions and the economic status of the fisher folk in the State is considered not up to the living standards of the general populace of the State.

Development concerned with the above matters in the sector needs an efficient FIS. Traditionally libraries looked after the supply of information in fisheries sector also. In Kerala the libraries attached to various organizations in the sector are responsible to fulfill the information needs of the Fisheries sector in the State. They offer various traditional and modern services to the users. But their efforts are presently individual and isolated.⁹ So the scope, comprehensiveness, coverage and cost effectiveness of their services are limited.

In the above contexts a study of the resources, facilities and services of library and information units of organizations dealing with fisheries in the State and the provisions for cooperation between them to extract maximum utility of the resources available becomes very important and relevant. Present study forming part of a detailed investigation¹⁰ on agricultural information systems and a group of independent studies on its subsystems evaluates the information resources, facilities and services available in fisheries sector of India. The samples covered consists institutions of different sizes in fisheries sector of the selected region working under Kerala Agricultural University (KAU), Indian Council for Agricultural

Research (ICAR), and various State departments as well as some randomly selected out stream institutions.

4 MAJOR ORGANIZATIONS DEALING WITH FISHERIES

ICAR has five major research institutes in Kerala of which two are related to fisheries; Central Institute of Fisheries Technology (CIFT) and Central Marine Fisheries Research Institute (CMFRI) Kochi. KAU has under it a Central Library (KAUC) with collections on fisheries related areas, College of Fisheries (CFISH) and also a few Research Stations on fisheries. Marine Products Export Development Authority (MPEDA) also has a good collection on fisheries. All the universities in Kerala have good document resource collection on fisheries and aquatic sciences. In addition to the above many institutions under Union government, State government, etc engaged in education, research, extension and development activities in the fisheries sector of the State hold related information resources.

4.1 SAMPLE INSTITUTIONS

All the organizations mentioned above have information resources on fisheries. Eight major institutions whose mandate includes education, research and application of fisheries and aquatic sciences is covered in detail by the study. Details about the resource strength of these institutions have been studied.

CIFT at Cochin under ICAR is the only national centre where research in all disciplines relating to fishing and fish processing is undertaken. It conducts basic and applied research to address the problems related to a wide spectrum of marine and inland fisheries activities. Its mandate are; to evolve innovative and cost effective technologies for fish harvest, to develop standards for various aspects of post harvest technologies, to develop technologies for extraction of biomedical, pharmaceutical and industrial products from aquatic organisms and to provide consultancy services and to popularize the innovations for the overall development of the fisheries industry.¹¹ Its mandates related to information management and dissemination are to act as a repository of information on harvest and post harvest technologies with a systematic database, to conduct transfer of technologies through training, education and extension programmes. CIFT has one of the best libraries on fisheries in India.

CMFRI at Cochin under ICAR attend to the regional problems and the national priorities in marine fisheries and sea farming. It has a

multidisciplinary approach to marine capture and culture fisheries. It has the mandate for assessing and monitoring the status of exploited and unexploited fish stocks, waters and ocean in relation to fishery dependent and independent factors and also evaluation of the techno - economics and socio economics of marine fisheries.¹² Mandate also covers development of suitable technologies for sea farming of finfish, seaweeds and other cultivable marine organisms, up gradation of technologies through research and development in frontier areas of biotechnology, nutrition, pathology and endocrinology. Monitoring the health of the coastal eco systems in relation to artisanal fishing, mechanical fishing and marine pollution also comes under its functions. Its education and information related functions include transfer of viable sea farming technologies through extension education, specialized training and consultancy services, and post graduate education and PhD in marine fisheries and marine culture. CMFRI has a very good library and information system.

College of Fisheries (CFISH) at Cochin under KAU has the mandate for development of fisheries sector of the State and the country. It forms the nucleus of the establishment of the Fisheries University in the State to undertake and coordinate active programmes in teaching, research and extension in fisheries. The college offers graduate/post graduate programmes in aquaculture, fishery biology, and processing technology. The college conducts various extension activities to both fresh water and brackish water farmers. The college has an excellent print and non-print document collection on fisheries related areas.

Rice Research Station, Vyttila under KAU concentrates on evolving cropping system and practices by which the annual income per unit area can be increased to the optimum level by adopting integrated farming of rice, fish and prawn in the region's lands and evolving semi intensive cultural practices for fishes and prawn in brackish water ponds.

Fisheries Station, Puduvaippu under KAU imparts practical training on brackish water fish culture. It also conducts research to develop appropriate farming techniques for better production from unit area. Its mandate includes the supply of commercial brackish waterish seed to the farmers and other research institutions. It conducts training programmes on water aquaculture, and utilization of marsh lands for agricultural purposes.

Centre for Development Studies (CDS), an autonomous research institute has the mandate to promote research and teaching in the discipline

relevant to development. Its research concentrates on broader aspects of development at the regional and national levels with special reference to agriculture, fisheries, rural economy, employment and wages. Some of the areas relevant to fisheries in which studies are going on include fisheries production, prices, labor, fisheries economics, health economics and nutrition etc. Kerala forest research Institute (KFRI) has research projects on inland winter fish resources.

Marine Products Export Development Authority (MPEDA) is a statutory body under Government of India and its mandate covers fisheries of all kinds, increasing exports, specifying standards, processing, marketing, extension and training in various aspects of the industry. Its schemes comes under four major heads; export production capture fisheries, and culture fisheries, inducting of new technology and modernization of processing facilities. It also attends market promotion work programmes and does the registration of infrastructure facilities for seafood export trade. It undertakes collection and dissemination of trade information, projection of Indian marine products in overseas markets by participation in overseas fairs and organization of international seafood fairs in India.

Programme for Community Organization (PCO) is an NGO supporting the establishment of fishermen' marketing societies and coordinating them. The fishermen found marketing their fish catches difficult. The earlier method was beach auctions controlled by merchants and middlemen, and was exploitative in nature for several reasons. Confronted with this, the fishermen, decided to set up their own marketing system, and appointed their own auctioneer. Faced with a determined set of fishermen, the merchants eventually had to yield. This has resulted in setting up the PCO. It works with men, women and young people to focus them on better management of fishery resources and better education, health, sanitation, transportation and housing. Several programmes have been undertaken by PCO to develop leadership and organizational skills of women from fishing communities, enabling them to analyze and respond to their problems and to take part in decision-making processes affecting their lives. PCO has a rich resource of recorded information on fisheries as well as the experience of its workers.

Cochin University of Science and Technology (CUST) has many departments relevant to fisheries sector. School of Industrial Fisheries cover areas ranging from fisheries biology, aquaculture, fishing craft and

gear technology, fish-processing technology, fisheries economics and fisheries management, it has research projects on Fresh Water Fishes of Kerala, Coastal Zone Management and Biodiversity of Backwaters of Kerala. School of Marine Sciences is concerned with coastal zone management and has departments for study on atmospheric sciences, chemical oceanography, marine biology, microbiology, and biochemistry. Department of Applied Economics has fishery economics as a thrust area of research. The Department of Atmospheric Sciences deals with Meteorology, Atmospheric Science Remote Sensing Applications & GIS. The Department of Chemical Oceanography has facilities for research on

Table 1
Library Budget during 1998-99 to 2002-03

Institution	1998-99	1999-00	2000-01	2001-02	2002-03
KAUC	200	150	75	75	99
KFRI	22	21	22	25	25
DFISH	12	13	13	17	17
CDS	22	24	30	29	31
CFISH	14	15	13	14	15
CIFT	18	20	15	20	19
CMFRI	12	14	10	12	11
PCOC	02	02	02	02	02
	302	259	180	194	219

various chemical aspects of the aquatic system. It has contributed valuable inputs into the concerned national databases. University also has facilities for research on Chemical Oceanography (Marine Chemistry) which is the fulcrum for interaction between the various disciplines of Marine Sciences. Department of Physical Oceanography cover land-ocean interaction, sea state analysis, environmental oceanography and GIS. The Department of Marine Biology and Microbiology also conduct research in areas of interest to fisheries. Departments of Ocean Development, Marine Geology, Ship Technology, Integrated Management of Coastal Zones, Mangrove Studies, Monsoon Studies and Rural Development. Appropriate Technology and Economic Policy works on fishery related areas.

The Department of Fisheries (DFISH) in the State is structurally

Table 2: *Budget of Institutions and Allotment for Library Development During 2002-03*

Institution	Total	Library	%	Collection	%	Staff	%	Other	%
KAUC	3500.00	101.00	2.89	90.25	91.34	8.50	13.86	2.25	2.23
DFISH	2500.00	20.00	0.80	10.35	51.75	3.00	15.00	6.65	33.25
CDS	585.00	34.00	5.81	21.77	64.03	9.00	26.47	3.23	9.50
CFISH	385.00	18.00	4.68	12.90	71.67	4.00	22.22	1.10	6.11
CIFT	565.00	27.00	4.78	20.30	75.19	4.00	14.81	2.70	10.00
CMFRI	325.00	16.00	4.92	11.35	70.94	3.00	18.75	1.65	10.31
KAUC	310.00	10.00	3.23	8.12	81.20	1.00	10.00	0.88	8.80
PCOC	105.00	4.00	3.81	2.10	52.50	1.00	25.00	0.90	22.50
Total	8275.00	230.00	2.78	177.14	77.02	33.50	14.57	19.36	8.42

stratified and organized at State, zonal and Panchayat levels. DFISH implements all the development and management programmes envisaged by the Government in the fisheries sector. It carries out programmes for the welfare of the fisher folk. Mission of the Department is the socio-economic development of fisher folk, undertaking various production oriented schemes for development of fisheries sector, serving as agency for sustainable fishery and conservation of fish resources, and extension of fish culture in available water sources. A number of agencies work under the

Table 3
Professional Staff and Qualifications

Institution	Total	Professionals	Others	MLISc	BLISc	CLISc
KAUC	16	07	09	03	04	00
KFRI	06	04	02	03	01	00
DFW	04	03	01	02	01	00
CDS	17	14	03	07	06	01
CFISH	04	03	01	02	01	00
CIFT	05	03	02	02	01	00
CMFRI	03	02	01	01	01	00
PCOC	01	00	01	00	00	00
Total	56	36	20	20	15	01

Table 4
Resources in Major Agricultural Institutions

Institution	Scientists	Electro Ds	Books	Journals	Online Sub Th/Rp/Mp/	
KAUC	30	520	13381	320	04	1200
KFRI	07	30	12175	76	02	200
DFISH	70	50	12000	27	00	230
CDS	05	120	14230	41	02	570
CFISH	40	28	4014	30	00	39
CIFT	42	30	4127	70	01	65
CMFRI	27	20	2899	55	00	00
PCOC	20	15	2733	35	00	140
Total	241	813	65559	654	9	2444

department, Matsyafed, the Keraia State Co-operative Federation for Fisheries Development is the apex federation of 654 primary fishermen co-operative societies spread over 10 districts of Kerala 340 in the Marine sector, 183 in the Inland sector and 131 Women Co-operatives. Its main objectives are ensuring total development - economic, social and cultural of fishermen community, implementation of various schemes, promoting production, procurement, processing and marketing of fish and fishery allied products. Matsyafed toils for enhancing fish production in marine and inland fisheries sector, augmenting income of producer fishermen through the beach level auction system by eliminating middlemen, providing infrastructure facilities for procurement, pre-processing and marketing of fish and fishery requisites, providing marketing and technical support for enhancing capture and culture fish production, ensuring forward and backward linkages in the sector, improving inland fish production through scientific aquaculture practices, providing opportunities for occupational diversification through self-employment programmes, etc. Kerala State Fishermen's Welfare Fund Board, Agency for Development of Aquaculture, Kerala, Fish Farmer's Development Agency, Brackish water Fish Farmer's Development Agency (BFFDA) etc also work in association with the department.

5 INFORMATION AND RELATED RESOURCES

Fisheries sector of the State rely on fishery data/information collected/generated by the above mentioned organizations to make decisions

Table 5
Detailed Subject Representation in Collections

Institution	Agri	Vet	Fisheries	Forest	Ag Eng	Ag Eco
KAUC	10255	537	32	500	237	620
KFRI	550	125	50	10250	500	450
DFVV	2475	325	50	8500	150	275
CDS	5475	1255	500	500	1075	5250
CFISH	152	132	3492	10	48	97
CIFT	70	81	3751	07	37	106
CMFRI	30	48	2786	05	10	00
PCOC	61	81	2300	27	44	75
Total	19068	2584	12961	19799	2101	6873
Percentage	30	04	20	31	03	11

regarding the stewardship of the Nation's living marine resources. Those in fisheries sector also rely on current information to make decisions regarding their participation, investment in, and use of commercial fisheries. In addition, fishery statistics can be used to measure how effectively governmental agencies are meeting stewardship goals and objectives. The quality of resource stewardship decisions and the predictability of the outcomes are strongly dependent on the quality of the data information being used. The present study has evaluated in detail the

Table 6
Books and Journals on Aquatic Sciences and Fisheries

Institution	Books	%	Journals	%
KAUC	32	00	02	02
KFRI	50	00	02	02
DFISH	50	00	03	03
CDS	500	04	02	02
CFISH	3492	26	14	15
CIFT	3751	28	27	30
CMFRI	2786	21	22	25
PCOC	2300	17	16	18
Total	12961		88	

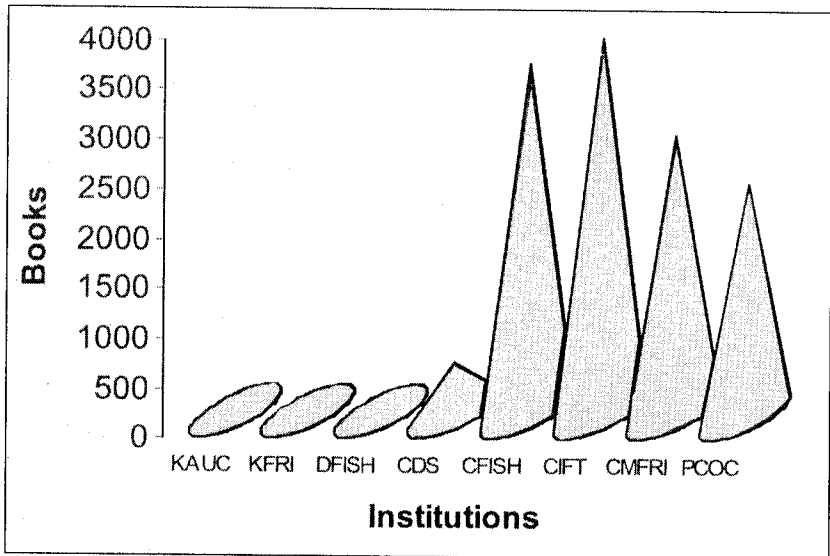


Fig 1 Books on aquatic sciences and fisheries in sample collections

available information resources and services covering budget, staff, ICT equipments, books, journals, electronic documents and online subscriptions in the sample libraries, as well as the provision for resource sharing existing between them. The data on CUSIT is not used because these resources remains spread over different divisions.

51 FINANCE

Sufficient allocations for information resources and services in the budget is very important for planned development of information systems. Budget allocations for library development in institutions 13-18 covered by this study during a five year period are given in Table 1.

Data on the total budget of the institution, percentage allotted to library, and the spread of library fund among different aspects in the library are presented in Table 2. The data presented in Table 1 reveals that allocation for library development in most of the institutions is fluctuating from year to year. The data presented in Table-2 reveals that of the total allotment to the 8 libraries with collections on fisheries; an average of 77% goes to collection development, 33 % goes to staff and 19% for other expenses.

The available data reveals that; the allotment to the libraries in most of the departments and institutions in agriculture sector is not anywhere near

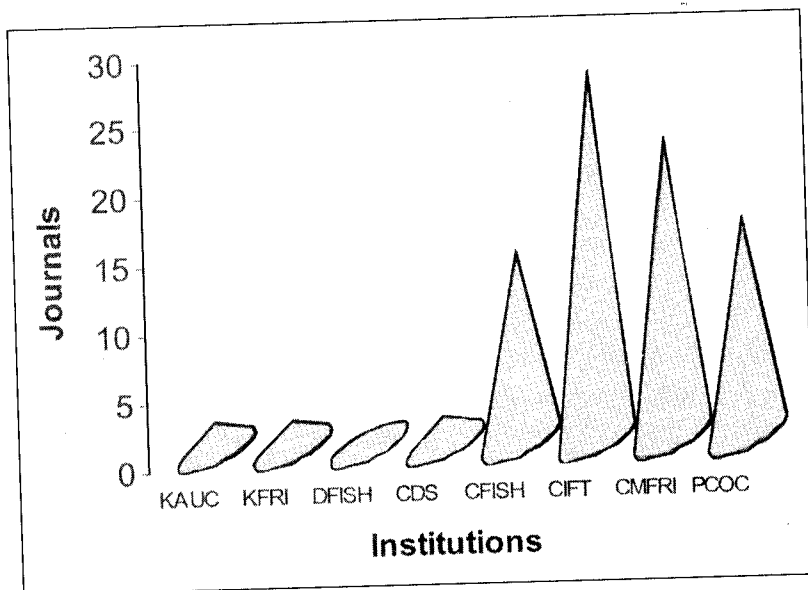


Fig 2 Journals on aquatic sciences and fisheries in sample collections

Table 7
Indian and Foreign Journals subscribed

Institution	Indian	Foreign	Total	Cost
KAUC	121	199	320	35
KFRI	46	30	76	14
DFISH	19	08	27	03
CDS	20	21	41	14
CFISH	17	13	30	07
CIFT	39	31	70	11
CMFRI	40	15	55	07
PCOC	20	15	35	01
Total cost	322	332	654	92

to the percentage recommended by UGC Library Committee, Agricultural University, and Library Commission etc. which is 6% of the institutions budget. But of the institutions specializing in fisheries; CMFRI spends 4.92, CIFT 4.78 and CFISH 4.68 which are some what satisfactory.

52 STAFF

Present staff strength of the selected agricultural libraries is shown in

Table-3. The data reveals that the sample libraries have sufficient information professionals to attend to information services on fisheries. There are 21 professionals with post graduation in library and information science and 14 staff with bachelor's degree in the subject. There is 36 professional staff in the 8 selected libraries dealing with fisheries. Of this 20 have MLISc and 15 have BLISc and one CLISc.

53 COLLECTION

Documents in printed or other media form the most important resource or input for information services. Traditionally such collections consists of relevant recorded knowledge in the form of books, journals, reports, microfiche, cassettes, floppy discs, CD ROMS, video films etc. They form the basis for providing information services. In libraries of the fisheries sector also the collections contain a wide variety of materials like, books, video films, CD ROMs, posters, theses maps etc.

Table 8

Details of Journals costing more than Rs. 25000 Duplicated by Selected Institutions

Title	Institutions	C	Cost Rs.	Net Cost Rs.
Aquaculture	CFIS, CIFT, CMFR	3	154850	464550
Aquaculture Research	CFIS, CIFT, CMFR	3	150000	450000
Aquaculture International	CFIS, CMFR, CIFT	3	125000	375000
Journal of Fish Disease	CFIS, CIFT, CMFR	3	64720	194160
Fish Physiology and Biochemistry	CFIS, CIFT, CMFR	3	50719	152157
Marine and Fresh Water Research	CFIS, CIFT, CMFR	3	35000	105000
Ecologist	KFRI, CDS, CWRD	3	30427	91281
Fisheries Science	CFIS, CIFT, CMFR	3	24750	74250
Austasia Aquaculture	CFIS, CIFT, CMFR	3	24000	72000
Aqua cultural Engineering	CFIS, CIFT	2	21953	43906
Journal. Fish Biology	CIFT, CMFR	2	18300	36600
Environmental Conservation	KAUC, CAE, CFISH, IISR	4	17280	69120
Total			716999	2128024

The resources available at the major Institutions covered by the study are presented in Table 4. The documents cover fisheries as well as agriculture and related areas of interest to the concerned institution. Scientists, who include extension workers and teachers, are also to be considered as information resource in fisheries sector. They act as a major source of information to administrators, planners and farmers. Hence their strength is also listed as resources. Size of the collection of information recorded in various media in the libraries covered varies in quantity from 2000 to above 15000. The libraries together have a collection of 65559 books. These, reports, maps, microforms etc together comes to 2444.

531 Books

Data related to the representation of major subjects under agriculture and related areas in the book collections of the selected institutions are presented in Table 5.

The survey reveals that, of the books available in the selected institutions 30% is general agricultural books. Books on agricultural economics 11% and fisheries come to 20%. In other subject groups also there may be documents of interest to the fisheries sector. Data related to books and journals on fisheries available at the selected institutions is provided in Table 6.

In the areas of fisheries institutions having major collections on fisheries in Kerala are CFIS, CIFT and CMFRI which are under KAU and ICAR. Departments of Fisheries under Government of Kerala has book collections at some divisions/offices but is not organized for service. Then there is an NGO named Programme for Community Organization (PCO), which has a strong information resource base on fisheries in Kerala. Fisheries related information resources available at the 8 major institutions is presented in Table 6. CIFT holds the largest collection of books (3751) on fisheries and allied areas which comes to 28% of the total collection. CFISH hold the second largest collection on fisheries i.e. 3492 books coming to 26 % of the total books on the subject available in the sector.

As per the data presented in Table 6 among the 8 major institutions dealing with fisheries and related areas CIFT subscribes to 27 journals which is the largest group coming under fisheries (25%) of the total journals on fisheries in agricultural sector.

The book collections on fisheries as well as journals on fisheries and

Table 10
Fisheries Related Databases in CD ROM Subscribed in Duplicates in Kerala

Databases in CD ROM	Institutions	No	Cost	Total cost
AGRICOLA	KAUC	1	24000	24000
AGRIS: 1975-2002	KAUC	1	30000	30000
Aquatic Biology, Aquaculture & Fisheries Resources	KAUC, CIFT, CFIS,	3	175000	525000
ASFA -Aquatic Sciences & Fisheries Abstracts	KAUC, CIFT, CFIS,	3	140000	420000
Biological Abstracts	KAUC	1	225000	225000
CAB Abstracts: 1972-2003	KAUC, KFRI,	3	1200000	3600000
Current Contents -Agri Biology and Environmental Sciences	KAUC	3	125000	375000
Current Contents -Life Sciences	KAUC	1	145000	145000
Food and Human Nutrition 1971-2000	KAUC	1	85000	85000
		17	2149000	5429000

related areas subscribed by 8 institutions specializing on concerned areas are graphically presented in Fig 1.

54 JOURNALS

The data related to the journals subscribed by sample institutions is presented in Table 7. In March 2003 they together placed 354 subscriptions. The journals subscribed consist of duplication of many titles between these institutions. Total annual subscription cost of the journals in selected institutions comes to Rupees ninety two lakhs. Of these 332 are foreign periodicals and 322 are Indian periodicals. Of the 654 journal subscriptions 88 subscriptions are on journals of aquatic sciences and fisheries related areas.

A comparison of the collection strength of journals on aquatic sciences and fisheries related areas subscribed by major institutions specializing on that subject is graphically presented in Fig 2.

Data presented in Tables 6 and 7 reveal that CIFT subscribes to 70 journals of which 27 are on fisheries. This comes to 30% of current journals on fisheries subscribed by the sample institutions. CMFRI subscribes to 22

journals on fisheries related areas which come to 25% of the total subscriptions and it comes in second position in regard to collection strength of journals on the subject. PCOC and CFISH also have 16 and 14 journal subscriptions respectively.

541 Duplication of Journals

The survey of the journals subscribe by sample institutions reveal that even though they together place 88 subscriptions on journals related to aqua sciences and fisheries it consists of only 27 titles. 61 subscriptions are for duplicate copies. Details of the journals costing above Rs. 15000 of interest to fisheries sector subscribed by the selected institutions are provided in Table 8. The cost of journals and data bases are the average of the cost met by different institutions for the same title as requested by them.

From the data collected it is found that of the 8 sample institutions three subscribes to three journals costing above Rs. One lakh at each institute. The total cost of one subscription to these three journals comes to Rs. 429,850. But the total cost met by the institutes for duplicating these journal subscriptions is Rs. 1,289,550. By a resource sharing programme in the case of these three journals itself the institutes can save Rs. 8,59,700. In the case of 12 journals costing more than Rs. 15000 subscribed at the selected institutions the cost of single subscription to these 12 journals comes to Rs. 716999. But the total cost met by these institutions for duplicate subscriptions is Rs. 2,128,024. The amount spent for duplicate copies of the journals comes to Rs. 1,411,025 which can be saved and used for other titles if the institutions under fisheries sector implements a resource sharing programme.

Presently the journals subscribed by an institute are available for use only in the institution which subscribes the concerned title. All the above institutions are presently not having all these 12 titles. They only five or six titles at their institute from the above list. Under a resource sharing programme all these titles can be made available for use in all the 8 institutions as well for all those in fisheries sector of the region beyond the selected samples presently not subscribing to any of these titles so that each institution gets resources worth Rs. 7 lakhs.

55 ELECTRONIC DOCUMENTS

The survey revealed the libraries covered have a significant collection of digitized documents and audio visual resources like journals and books

in CD ROMs, back files of abstracting journals in CD ROMs, theses in CD ROMs, video lectures in video tapes, video lectures in CD ROMs, microfilms and fiche, maps, posters etc. Many libraries have also access to online journals and databases kept in the servers of the publishers.

Data provided in Table 4 reveals that the libraries together have a collection of 813 electronic documents. Theses, reports, maps, microforms etc together comes to 2444 documents. The sample libraries subscribe to 9 online journals and databases in total. Even though these collections are at institutions like KAUC, KFRI, CDS etc which are not very specific to fisheries in their specialization the documents are related to agriculture and hence have relevance to fisheries sector also.

551 Duplication of Databases

Databases in agriculture, biosciences and allied areas which also cover aqua sciences and fisheries are very costly items of information resource held by sample institutions. These databases are mainly published in CD ROM by international organizations or other agencies; they are subscribed by only a few of the institutions in fisheries or agricultural sector. They have also their printed equivalents in full or as different sub subject sets. The major databases that cover fisheries also subscribed by the sample institutions covered by this study are listed in Table 10.

Table -10 shows the extent of duplication in subscription to Databases in CD ROM of interest to fisheries sector. Against a total of 17 subscriptions costing approximately Rs. 54 lakhs the libraries received only 9 titles costing Rs.21 lakhs. A total of 8 subscriptions are for duplicate copies. There is a net wastage of Rs. 32 lakhs due to this duplication. These databases are costly and consume considerable foreign exchange. All the sample libraries and most of the libraries in fisheries sector require these reference sources at one time or other. These databases are highly relevant to all the institutiof1s dealing with fisheries research. But due to their high cost they are not affordable to all. Due to official restrictions and lack of facilities such titles subscribed by a few institutions are not presently accessible to users from other institutions. Even of the 8 major institutions covered by this study only 4 are having these resources. And they can individually provide their clientele access to only three or four of these titles subscribed by the concerned institution. By a resource-sharing programme the libraries can subscribe to all the 9 titles at 50% less financial commitment. All the eight institutions will in the place of present three or

four titles get access to all the 9 titles worth Rs. 21 lakhs.

56 ICT EQUIPMENTS AND TOOLS

Computers, communication equipments, reprographic equipments and network hardware have become very important for any information service system. The data collected for this study revealed that most of the libraries are having computers and modems required for a minimum connectivity to Internet so that information from out side sources also can be accessed at the libraries concerned. Libraries like KAUC are having highly sophisticated systems like juke boxes, CD Servers, hubs, Internet servers, and other LAN equipments. With this they have the power to provide web-based services through a wide geographical area where divisions and stations of the parent organization are spread through.

57 INFORMATION SERVICES

The libraries surveyed offer different types of services to the students, teaches, scientists, extension workers, administrators and fishermen. All the 8 libraries selected follow, open access system. All provide normal library services like reference, loan, photocopying and Selective Dissemination of Information in an informal way. They provide various types of Current Awareness Services; bibliographic services etc. but except the PCO Centre none of the institutions have a system extending the information services to the coastal areas and make them easily accessible to the fishermen.

6 FACILITIES FOR RESOURCE SHARING

The survey revealed that no resource sharing programmes exist among any group of libraries functioning in the fisheries sector of Kerala including the sample libraries of which three major ones are located in the same city of Cochin. All the sample libraries have reported that they do not facilitate use of their information resources to those from other institutions. These institutions are not participating in any resource sharing or networking activities. This reveals that the rich resources available in the institutions are not becoming useful to those beyond a small group inside each institution. The Department of Fisheries, of the Government of Kerala is not having an efficient Library and Information System to serve fisheries sector. The State also fails to extract even minimum utility of the costly information resources built up in the major libraries due to lack of a resource sharing programmes.

7 NEED FOR RESOURCE SHARING

The present study has revealed that there is substantial duplication of costly resources like journals and databases in the fisheries sector of Kerala. These items are very costly and their price is going up year after year. More than that they cost our foreign exchange. Library budget shrinks year after year forcing libraries to cut the titles from subscription list. But number of journals and databases reporting research and development in fisheries increase day by day. So it is very important to implement a resource-sharing programme. Without that even with improved allotment for journals and databases the institutions cannot continue all titles subscribed at present. The duplication has become necessary because each institution operates in isolation and they attempt to become self-reliant in providing information support to its users. But in these days of information explosion, flooding of documents and use of different media and methods for information recording, storage and dissemination, self-reliance is only a myth. So instead of spending such huge amount for duplication, the institutions can pool and share their resources.

8 CONCLUSION

An analysis of the information resources available at the eight major institutions selected for the study revealed that the information resources at their disposal taken together are sufficient for reliable information services in fisheries sector. It will be essential to digitize some data collected and make it accessible over the web. But when any individual library is taken resources at its disposal is not adequate, full or reliable. In the small libraries like those of government departments, research stations etc resources are far from satisfactory. There is no provision for them or fishermen to access information stored in resource research institutions.

To overcome these an FIS covering fisheries institutions in the State should be established. It should be a State level network intended to strengthen information management within the sector. It should have an integrated view of information system and content. The system should be a common one to support, managing and making available for use information and documents meant for different activities like planning administration, research, education, extension and development. Networking facilities offered by government agencies like NIC should be utilized for extending the service of FIS to the coastal areas and also to get the management and technical experience of NIC. Every fisheries

institute's library should establish information service outlets in the coastal areas itself for extending services to fishermen. Such outlets should contain information materials repacked for the non technical user. Preferably that should be in regional language. Interactive multimedia programmes, videos and poster as well as facilities for using and presenting them should be available in such outlets. Internet connectivity should be provided to them. There should be facilities for fishermen to present their innovations as well as for recording and preserving traditional knowledge obtained from them.

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