

MARINE BIOLOGICAL INSTITUTIONS IN INDIA

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ABSTRACT

This paper lucidly enumerates the various Institutes of the Centre and State Governments, universities, voluntary organisations, etc. in the country carrying out marine biological research and related activities.

INTRODUCTION

MARINE BIOLOGY, branching off from the Natural History and the great science of Biology, had its beginning about 150 years ago. The exposition of the nature, the dynamics and the inter-relationship of the organisms inhabiting the marine region, the great expeditions and surveys mounted to explore the seas and oceans, the scientific and technological advances made since the turn of the century, new techniques, new instruments and new methods of approach introduced in the marine biological investigations and the increasing exploitation of the sea for protein food and other benefits have, over the years, contributed to the development of the subject into a distinct and exact scientific discipline. More recently, the impact of subjects such as physics, chemistry, geology, geography, meteorology and bio-statistics besides the life sciences, and the endeavours to understand the sea and its living organisms as an integral whole, have led to the emergence of marine biology as a multi as well as inter-disciplinary science.

Throughout the Indian maritime activities, the sea has played a significant role - as a source of food, as a means of transport and as ways of commerce. Ample references to sea animals in the Indian mythology, legend, folklore, heraldry, royal insignia and tradition testify

to the early interest and link with the sea. Our knowledge of the Indian seas has been mainly acquired through the great works of British Naturalists who worked in India prior to Independence, and the biologists and oceanographers associated with expeditions such as *Challenger*, *Gazalle*, *Investigator*, *Vityaz* and *Valdivia* during the fall of the last century and those followed during 1900-1948. A wealth of information was also gathered on the fauna, flora and oceanographical characteristics and related aspects of the Indian seas during the International Indian Ocean Expedition during 1960-1964. Exploratory fishery surveys carried out by *Golden Crown* (1908-1911), *William Carrick* (1921-1922), *Lady Goshen* (1927-1930) and by the exploratory fishing vessels of the Government of India after Independence have greatly contributed to our knowledge of fish and other living resources in the continental shelf waters, continental shelf-edge and the slope.

Although collection and cataloguing of animals and plants of the Indian seas, observations on their behaviour, and studies on the ecosystems in which they live were being continued since the middle of 18th century, it was only in the dawn of the present century that concerted efforts were made to establish shore-based laboratories for marine biological investigations on a long-term basis. Thus, the establishment of the Zoological Survey of India in 1916 and the Marine Biological Station at Krusadi in the Gulf of Mannar in 1922 formed

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the land-mark in institutionalised efforts in this direction. The pioneer works carried out at the Zoology laboratory of the University of Madras, Department of Fisheries of the erstwhile Madras State, those at the University of Bombay and at the erstwhile University of Travancore were noteworthy among the earlier contributions made from such shore-based institutions.

The momentum of interest in the ocean and its environment has been growing rapidly ever since the Independence of the country. The population increase and the critical demand for food have attracted substantial interest in the sea as a food source. The seas around India are gaining increasing attention in recent years to meet the energy crisis faced by the nation and in the search for essential elements to supplement the supplies from land. Besides, the advances made in marine science have also indicated great scope and prospects of production of pharmaceutical compounds, and different bioactive material from the marine organisms to serve man and to meet his different vital needs. Recognising these aspects and to provide the necessary R & D support the organisations already engaged in the marine biological investigations were strengthened considerably and several new organisations were established during the post-Independent years.

There are only a few institutions in the country which deal exclusively with marine biological R & D programmes in the strict sense of the discipline. However, it is observed that several organisations whose main objectives and functions are in the other fields of marine Science, are also engaged in one or the other aspects of marine biology as cognate investigations. Endeavour is made in the present communication to provide information on all these organisations. To facilitate presentation, these organisations are grouped under central organisations, regional organisations and registered associations, academies or institutions.

CENTRAL ORGANISATIONS

ZOOLOGICAL SURVEY OF INDIA (ZSI)

Address (Add): Jabakusum House, 34, Chittaranjan Avenue, Calcutta - 700 012 (Director's Office).

Organisation (Orgn): Estd. 20-6-1916; a Government of India Institute; Headquarters at Calcutta; Regional Centres at Shillong, Pune, Jabalpur, Jodhpur, Dehra Dun, Madras, Patna and Port Blair; Field Stations at Solan, Madras, Hyderabad, Kakdwip, Berhampur, Kozhikode and New Itanagar. *Objectives (objectvs)*: Investigations on different aspects of Indian fauna; zoological research; environment monitoring; protection and conservation of wildlife. *Activities (Actvs)*: Research activities organised under 19 divisions. Marine biological research carried out principally at the Madras Station (Estd. 1973) and at the Estuarine Biological Station, Berhampur (Estd. 1970). *Facilities (Fac)*: Possesses well-equipped laboratories and facilities for exploration/survey of fauna; a reference museum and the richest library on zoological literature. *Publication (Publ)*: Records of Zoological Survey of India (Records of Indian Museum). Memoirs, Bulletins, Occasional papers, Technical papers, Zoologiana, Hand books, Fauna of India, Bibliography of Indian Zoology, 251 News, Prani Jagat (Hindi).

FISHERY SURVEY OF INDIA (FSI)

Add: Botawala Chambers, Sir P. M. Road, Bombay - 400 001.

Orgn: Estd. in 1946 as Deep-Sea Fishing Station; in 1974 the name of the Institute changed as 'Exploratory Fisheries Project' and recently renamed as Fishery Survey of India. A Government of India establishment; Headquarters at Bombay and six bases. *Objectvs*: To survey the marine fishery

resources of the entire Exclusive Economic Zone of India as well as the inland fishery resources. *Acts*: Already completed the demersal fish resources survey upto 70 m depth; surveys are being conducted at present on the resources in the deeper waters of continental shelf, shelf edge and upper continental slope. *Facil*: Has well-equipped fishing vessels for the exploration of demersal, columnar and pelagic fishery resources. *Publ*: Bulletin.

**CENTRAL MARINE FISHERIES RESEARCH
INSTITUTE (CMFRI)**

Add: Post Box No. 2704, Shanmugam Road
P. O. Ernakulam, Cochin - 682 031.

Orgn: Estd. 3-2-1947; formerly it was under the Government of India and now it is an ICAR (Indian Council of Agricultural Research) Institute; Headquarters at Cochin; Regional Centre at Mandapam Camp; Research Centres at Veraval, Bombay, Karwar, Mangalore, Kozhikode, Vizhinjam, Tuticorin, Madras, Waltair, Kakinada and Minicoy; 28 field centres located on both the coasts. *Objectvs*: Assessment and monitoring of the exploited marine fishery resources leading to their rational exploitation and conservation; understanding the fluctuations in abundance of marine fishery resources in relation to changes in the environment, developing suitable mariculture technologies for finfish and shellfish in open-sea to supplement marine fish production and conducting transfer of technology, post-graduate and specialised short-term training programmes.

Acts: R & D programmes organised under 9 divisions; fish stock assessment; estimation of exploited and potential fishery resources, research on fishery biology, fishery oceanography, ecology and mariculture; the National Marine Living Resources Data Centre (NMLRDC) is located in the Institute; marine biological

research is mainly carried out in the Fishery Environment and Management Division. *Facil*: has well-equipped laboratories having sophisticated instruments such as trans-scan Electron microscope, Spectrophotometers including Atomic absorption, Chromatographs, feed analysers, Amino-acid analyser, Scintillation counter, centrifuges and osmometer for research on biology, physiology, nutrition, pathology, and ecology of marine organisms, fishery oceanographic studies, analysis of water quality, pollution, soil and for investigations on primary and secondary production. A running water marine aquarium available at Mandapam Camp. Facilities for field collection include motor boats, motor vehicles, wooden and fibreglass dinghies, mobile laboratory and 107' research vessel. Field laboratory and farms available at Narakkal Cochin, Kovalam and Muthukad near Madras, Mandapam Camp and Tuticorin. Nodal organisation for the operation and management of Fishery Oceanographic Research Vessel 'Sagar Sampada.' Possesses one of the richest libraries in marine sciences with documentation and reprography facilities. *Publ*: Indian Journal of Fisheries; Special publication, Bulletin, Marine Fisheries Information Service; CMFRI News Letter.

**CENTRAL INSTITUTE OF FISHERIES EDUCATION
(CIFE)**

Add: Versova, Bombay - 400 061.

Orgn: Estd. in July 1961; an ICAR Institute; Headquarters at Bombay; subordinate establishments - Inland Fisheries Training Centre, Barrackpore (Calcutta); Regional Training Centre for Inland Fisheries Operatives, Agra and Central Fisheries Extension Training Centre, Hyderabad. *Objectvs*: Education and training at Post-graduate diploma, Master of Science and Ph.D. levels in fishery science. *Acts*: organised under seven departments. Offers a two-year post-graduate Diploma course in

fishery science mainly for Fisheries Officers in service in various States; affiliated to the University of Bombay for offering M.Sc. degree in Fisheries and Ph.D. degree. Subordinate establishments offer junior level training, namely one-year certificate course in inland fisheries development and administration at IFTC, Barrackpore; 9-months certificate course in inland fish culture at RTC, Agra and 10 months course in extension techniques in fish culture at CFETC, Hyderabad. Research activities include environmental studies, aquaculture of fishes and shellfishes, mangrove ecology, fish processing and marketing. *Facil:* Has well-equipped laboratories, class rooms, farm and hostel facilities; four training vessels, equipped for training in marine fishing techniques, fishery biology and oceanography; two field stations, one for brackishwater fish culture at Kakinada and the other for freshwater fish culture at Balabhadrapuram are available. *Publ:* CIFE Bulletin.

NATIONAL INSTITUTE OF OCEANOGRAPHY (NIO)

Add: Dona Paula, Goa - 403 004.

Orgn: Estd. 1966, a CSIR (Council of Scientific and Industrial Research) Inst., Headquarters at Panaji in Goa; Regional Centres at Visakhapatnam, Cochin and Bombay. *Objectvs:* To develop adequate knowledge related to physical, chemical, biological, geological, geophysical and engineering aspects of the seas around India and to build competence in using the sea for the benefit of the country. *Actvs:* Research projects organised under six divisions and relate to exploration of living resources of the sea, sea farming technology, deep-sea exploration for minerals, bioactive substances from marine flora and fauna, coastal zone management, monitoring of marine pollution. *Facil:* Laboratories for physical, chemical and biological oceanographic studies; two ocean going research vessels - RV *Gaveshini* and ORV *Sagar Kanya*;

TDC-316 and ND-520 computers and desktop microcomputers; sophisticated equipments such as electron probe microanalyser, NMR, X-ray diffractometer, underwater camera, side scan sonar, spectrophotometers including atomic absorption; aquaculture laboratory with continuous circulation of seawater and a geotechnical laboratory; has library facilities. *Publ:* Mahasagar.

CENTRAL SALT AND MARINE CHEMICALS RESEARCH INSTITUTE (CSMCRI)

Add: Gijubhai Badhika Marg, Bhavnagar-364 002.

Orgn: Estd. 10-4-1954, a CSIR Inst.; Headquarters at Bhavnagar, Marine Algal Research Station at Mandapam and at Okha; *Actvs:* Important ongoing research activities of the marine algal discipline cover cultivation of economic seaweeds and utilization of marine algal resources; tissue culture of marine algae; nitrogen fixation by marine microorganisms in general and blue green algae in particular.

NAVAL PHYSICAL AND OCEANOGRAPHIC LABORATORY

Add: Thrikkakara, Cochin.

Orgn: Estd. in 1952 under the Naval Headquarters; in 1958 brought under the Defence Research and Development organisation and is now under the control of Director of Research (Labs.) at the R & D Headquarters, Ministry of Defence, New Delhi. *Actvs:* Research programmes include studies on acoustics, mines, electronics and oceanography that are of interest to Navy. Also deals with oceanographic instrumentation and collection of all data relating to Indian seas.

REGIONAL ORGANISATIONS

Among the regional organisations engaged in the promotion of marine biological

programmes, the Fisheries Departments of the maritime States and maritime Union Territories are significant. In fact, the Fisheries Departments of the erstwhile composite Madras and Bombay provinces have been the oldest organisations in the country contributing significantly to the knowledge of the marine biology of the coastal waters of the respective regions. Similarly the Kurusadi Marine Biological Station under the Department of Fisheries was established as far back as 1922. All these Fisheries Departments have a research and development wing that provides research support to tackle the problem encountered principally in the development of the marine fisheries of the State. Integrated with this, they carry out researches in marine biology in relation to fisheries. They also serve as data base for the development of fisheries of the State.

The following are the other important organisations involved in R & D programme in marine biology at different regions.

Gujarat

GUJARAT FISHERIES AQUATIC SCIENCES RESEARCH INSTITUTE

Add: Port Okha - 361 350, District Jamnagar, Gujarat.

Orgn: Estd. in early seventies; main campus at Okha and outstation laboratories at Sikka, Porbandar and Veraval. *Objectvs:* To undertake research and extension work in different aspects of marine, brackishwater and inland fish culture; processing, quality control and other related activities; to offer consultancy and impart training in the above fields. *Actvs:* Charting of fishing grounds off Gujarat coast; improvement of fishing gears; quality control of marine products; marine, brackishwater and freshwater fish culture; culture of seaweeds; pollution monitoring. The Institute is recognised for

undertaking research programmes leading to Ph.D. degree. *Facil:* For fishery resources survey, studies on marine biology and fish processing available; has a library with moderate collection of books, journals and reprints for above studies.

Maharashtra

KONKAN KRISHI VIDYAPEETH (KKV)

Add: Dapoli, Ratnagiri District.

1. TARAPOREVALA MARINE BIOLOGICAL RESEARCH STATION (KKV)

Add: N.S. Road, Taraporevala Aquarium Building, Bombay - 400 002.

Orgn: Estd. 1951 as a constituent of the Department of Fisheries, Maharashtra; in 1971 transferred to Mahatma Phule Krishi Vidyapeeth and subsequently in 1972 to KKV. *Objectvs:* Education and Research in Fisheries. *Actvs:* Offers facilities for post-graduate research leading to M.Sc. and Ph.D. degree of KKV, Dapoli, Ratnagiri. Current research programmes relate to control of predatory aquatic insects from nurseries; development of biodegradable pesticides from indigenous plants for control of undesirable fishes; biology and culture of zooplankton such as copepods, cladocerans, turbellarians and rotifers. *Facil:* Has laboratory facilities for research in aquaculture, aquatic biology and fisheries; circulating seawater and freshwater aquarium and a library.

2. MARINE BIOLOGICAL RESEARCH STATION (KKV)

Add: Dapoli, Ratnagiri District.

Orgn: Estd. 1958 under the Department of Fisheries, Maharashtra and later under KKV in 1972. Faculty of Fisheries of KKV is located

at this Station. Under this Faculty, a College of Fisheries is functioning since July 1981. *Objectvs:* Education and research in Fishery Science. *Actvs:* Offers a graduate course in Fishery Science leading to the degree of Bachelor of Fishery Science (B.F.Sc); provides facilities for post-graduate research leading to M.Sc. and Ph.D. degrees. Ongoing research programmes relate to culture of crustaceans, particularly penaeid and palaenomid prawns; culture of live food organisms and culture of brackish-water fishes.

ZOOLOGY DEPARTMENTS, MARATHWADA
UNIVERSITY, AURANGABAD-431 004
MARINE BIOLOGICAL STATION, RATNAGIRI

Orgn: Estd. 1970. *Objectvs:* To carry out physiological, biochemical and biological studies of invertebrates of Ratnagiri coast with reference to Mollusca and Crustacea. *Actvs:* Investigations on reproductive biology and physiology of shrimps and edible molluscs; effect of pollution on crustacean and molluscs. *Facil:* For collection of marine fauna and for preliminary studies in the above aspects.

Karnataka

DEPARTMENT OF POST-GRADUATE STUDIES
AND RESEARCH IN MARINE BIOLOGY,
KARNATAKA UNIVERSITY

Add: Kodibag, Karwar-581 303.

Orgn: Estd. 1975. *Objectvs:* Education and research in marine biology. *Actvs:* Offers a 2 year M.Sc. course in Marine Biology and provides facilities for research leading to Ph.D. degree in marine biology. Research activities include studies on physico-chemical aspects of coastal environment, plankton distribution, foulers and borers, intertidal ecology, mangrove ecology, biology of fishes and productivity. *Facil:* Has laboratories for hydrological, sedimentological and pollution studies and a library.

COLLEGE OF FISHERIES
(UNIVERSITY OF AGRICULTURAL SCIENCES)

Add: Matsyanagar, Mangalore - 575 002.

Orgn: Estd. in 1969. *Objectvs:* Professional education in Fishery Science at Bachelor's, Master's and Doctoral levels. *Actvs:* Bachelor's course leading to B.F.Sc. degree is of 4 years duration with 40 students intake capacity per year; Master's degree (M.F.Sc.) is of 2 years duration offering specialisation in Fish Production and Management and in Industrial Fishery Technology, each with an intake capacity of 15 students in an academic year. Ph.D. degree is offered on fish production technology, aquaculture, fishery oceanography and aquatic biology; intake capacity to the programme is 2 each in an academic year. In addition, the College is actively involved in conducting research on different aspects of fishery science by the staff and post-graduate students, participation in extension education, lab-to-land programme, and agricultural production programme. Conducts *ad-hoc* training programme for upgrading the technical and professional competency of personnel in the State Department of Fisheries, private and public sector agencies. Also conducts seminars, symposia and workshops at State, National and International levels in various sectors of fisheries. *Facil:* Has well-equipped laboratories including a fish processing unit; field training facilities for education and research; four mechanised boats (35' to 45') for field data collection; fish farms for demonstration and research. Library of the College currently possesses 13,000 books on fishery science and related subjects and about 250 journals and periodicals.

Kerala

CENTRE FOR EARTH SCIENCE STUDIES

Add: P. B. No. 2235, Sasthamangalam,
Trivandrum - 695 010.

Orgn: Estd. in March 1978 by the Government of Kerala as an autonomous Research Institution. *Objectvs:* To promote researches on earth sciences for an overall development of the country with special emphasis on Kerala. *Actvs:* The Centre's research programmes include various branches of earth sciences such as geophysics, geography, marine sciences and atmospheric sciences, thus covering the broad spectrum of the land, ocean and atmosphere. Also serve as a data storage and retrieval centre in these aspects. Centre is recognised by the University of Kerala for conducting research leading to Ph. D. degree. *FacI:* Being multi-disciplinary institution, has developed geo-chemical, nuclear, petrology, fluid inclusion, palaeontology, mineral beneficiation, sedimentology, geophysical, cartographic and electronic laboratories and for coastal zone investigation. Besides, possesses field survey facilities and a good library.

DEPARTMENT OF AQUATIC BIOLOGY AND
FISHERIES

Add: The Aquarium, Trivandrum.

Orgn: Estd. in 1938 by the erstwhile University of Travancore, since 1940 housed in the Aquarium at Trivandrum. *Objectvs:* Research and education in aquatic biology and fisheries. *Actvs:* Studies on different aspects of marine biology, such as plankton, bottom fauna, bottom deposits, hydrology and ecological aspects of coastal waters, fisheries, fouling organisms and on different groups of invertebrates and vertebrates; offers education in Marine Biology leading to the degree of Master of Science and facilities for post-graduate research for Ph. D. degree. *FacI:* Has adequate facilities for research and education in marine biology and cognate subjects. *Publ:* Bulletin of the Department of Marine Biology and Oceanography.

COCHIN UNIVERSITY OF SCIENCE AND
TECHNOLOGY

Add: Cochin University P. O., Cochin-682 022.

Orgn: Estd. in July 1971. *Objectvs:* Development of higher education with particular emphasis on post-graduate studies and research in applied sciences, technology, industry and commerce. Functions as a federal type. In the Ernakulam campus, the school of Marine Sciences, Environmental studies and the Department of Industrial Fisheries are located.

1. *The School of Marine Sciences* has been an offshoot of the Department of Aquatic Biology and Fisheries discussed above. In 1962 this laboratory which was temporarily housed in the Naval Base at Willingdon Island at Cochin was shifted to the present building at Ernakulam. At present offers M.Sc. (Marine Biology), M.Sc. (Marine Geology), M.Sc. (Oceanography), M.Sc. (Meteorology), M. Phil. (Chemical Oceanography) degree courses; also offers facilities for post-graduate research leading to Ph.D. degree of the Cochin University of Science and Technology in these subjects. Besides, conducts researches on different aspects of marine sciences. Has laboratory facilities for biological, physical and chemical oceanographic studies, ecological and physiological investigations; possesses a marine aquarium, a good reference library, research vessels for training and for field collections. *Publ:* Bull. Dept. of Marine Sciences.

2. *The School of Environmental studies* established in 1964, offers post-graduate diploma and facilities for carrying out research for Ph.D. degree. The major areas of research relate to environmental pollution; air, water, land resource utilisation, interaction of environmental impact of pollution on plants and animals.

3. *The Department of Industrial Fisheries* established in 1976, offers 2 year M.Sc. course in industrial fisheries and facilities for Ph.D. programme. The important areas of research interest of the Department are fisheries resources, fishing craft and gear technology, fish processing technology, quality control of sea products, fisheries economics, fisheries management, parasites and fisheries.

COLLEGE OF FISHERIES, KERALA AGRICULTURAL
UNIVERSITY

Add: Panangad, Cochin - 682 506.

Orgn: Estd. 10-10-1979; *Objectvs:* To impart education and practical training in different aspects of fisheries to produce professional graduates and post-graduates in fisheries; to train paratechnical staff and in-service personnel engaged in fisheries development programmes; to conduct research on finfish and shellfish culture, integrated farming, hatchery production of fish seed and on fishery biology, ecology, processing, craft and gear technologies, fishery engineering and fishery management; to undertake extension education. *Actvs:* Fisheries faculty activities organised under 7 departments; offers a 4 year course leading to Bachelor's degree in Fishery Science (B.F.Sc) and a 2 year Master's course (M.F.Sc) with specialisation in Fishery Biology and Aquaculture - intake capacity of the former course is 20 per year and for the latter 4 in each discipline. The fisheries faculty is involved with several research programmes on aquaculture; has research and extension units at Vytilla, Kumarakom, Moncompu, Vellayani, Pattambi and Mananthy in Kerala. *Fac:* a quality control lab, microbiology lab, fishery biology lab, chemistry lab, fresh and brackishwater ponds; one 43.5' fishing vessel for training, a library.

Tamil Nadu

CENTRE OF ADVANCED STUDY IN MARINE
BIOLOGY, ANNAMALAI UNIVERSITY

Add: Parangipettai - 608 502.

Orgn: Estd. in 1952 as Marine Biological Station of Annamalai University; conferred the station as a separate department of the University in 1955 and recognised as the Centre of Advanced Study in Marine Biology in 1963. *Actvs:* Imparts 2-year (Non-semester and Semester) M.Sc. course in Marine Biology and Oceanography. Offers facilities for post-graduate research for M. Phil. and Ph.D. degrees. The research activities organised under five divisions, namely Physical and Chemical Oceanography, Biological Oceanography (inclusive of marine botany, fishery science, marine physiology, biochemistry), Microbiology, Marine ecology and coastal Aquaculture. *Fac:* Has specialised and well-equipped laboratories for research on different aspects of marine biology, oceanography, estuarine ecology, ecology of mangroves, physiology, microbiology, biochemistry and fisheries and for fundamental research. Has museum, library, hostels and other infrastructural facilities for visiting scientists. For field collection, two mechanised boats (33'), dinghies with outboard motors, canoes are available.

ZOOLOGY DEPARTMENT,
UNIVERSITY OF MADRAS

Add: Madras - 600 005.

Orgn: Estd. 1857. One of the oldest zoological education and research organisations in the country. *Objectvs.* Education and research in zoology and related subjects. *Actvs:* Teaching Zoology at graduate and post-graduate levels. Facilities are provided for research leading to Ph.D. degree under different schools/units

such as school of pathobiology, invertebrate reproduction and environmental sciences. *Facil*: pedagogical facilities, laboratories and library available. *Publ*: Madras University Bulletin.

CENTRE OF ADVANCED STUDY IN BOTANY,
UNIVERSITY OF MADRAS

Add: Guindy campus, Madras - 600 025.

Orgn: Prior to 1964, the centre was functioning in the Botany Department of the University of Madras. In 1964 organised as a Centre of Advanced Study. *Objectvs*: Promotion of research and teaching in the fields of plant pathology, physiology, microbiology, mycology and algology. *Actvs*: Conducts researches on bioaccumulation and degradation of heavy metals in algae, microbiological studies, taxonomy and ecology of fungi, mangrove ecosystem, collection and identification of diatoms and macroalgae, culture of economically important seaweeds. *Facil*: Has well-equipped laboratories including equipments such as Transmission electron microscope, Atomic Absorption spectrophotometer, spectrophotometers, ultracentrifuges, refrigerated centrifuge, lyophilizers, GC, GLC, HPLC chromatogram, gel scanner, Sonicator and photomicrography unit. A library with over 9000 books and 80 journals is also available.

SCHOOL OF BIOLOGICAL SCIENCES
MADURAI KAMARAJ UNIVERSITY,
MARINE SCIENCE STATION, TIRUCHENDUR

The Station is proposed to be established this year at Tiruchendur near Tuticorin to provide collection and observation facilities for faculties of Madurai Kamaraj University; to provide working and training facilities for research scholars from Science Departments and to establish a marine museum for public education and entertainment.

COLLEGE OF FISHERIES,
TAMIL NADU AGRICULTURAL UNIVERSITY

Add: Tuticorin.

Orgn: Estd. 1977. *Objectvs*: To impart professional education and training in fishery science. *Actvs*: Offers a 4-year and 2-year course leading to Bachelor of Fishery (B.F.Sc) and Master of Fishery Science (M.F.Sc) respectively. Intake capacity of B.F.Sc. course is 20 per year and that of M.F.Sc. is 5-6 per year. Conducts researches on freshwater, brackish-water and marine fish culture, *Artemia* culture, fishery biology of selected fisheries; socio-economic aspects, microbiology, pollution, craft and gear and reservoir fisheries. *Facil*: Has laboratories for education and research, one research vessel, a library with 30,000 holdings, motor vehicles, hostels for students/research scholars.

Andhra Pradesh

DEPARTMENT OF MARINE SCIENCES,
ANDHRA UNIVERSITY, WALT AIR

Add: Visakhapatnam - 530 003.

Orgn: Estd. 1926. The Department of Marine Sciences offers 2-year M.Sc. course in marine Sciences. Besides, the Departments of Geology and Centre of Assistance in Marine Geology, Zoology, Geophysics, Meteorology and Oceanography, Post-graduate centre in Zoology at Guntur carry out researches on different aspects of marine science in addition to offering post-graduate degree courses in the respective subjects.

REGISTERED ASSOCIATIONS/SOCIETIES/
ACADEMIES

BOMBAY NATURAL HISTORY SOCIETY

Add: Hornbill House, Shahid Baghat Singh Road, Bombay - 1.

Orgn: Estd. 1883; Managed by a Executive Committee; *Objectvs:* to promote natural wealth of India through exchange of notes and observations on fauna and flora, protection and conservation of fauna and flora of the country. *Actvs:* Offers facilities for research in natural sciences; organises training courses on identification, conservation and management techniques on wildlife wealth of India; offers facilities and advices for collections of zoological material; possesses and maintains a large reference collection of mammals, birds, reptiles, insects and other animals. *Publ:* Books on Indian fauna and flora; *Journal of Bombay Nat. Hist. Soc.*, nature series.

MARINE BIOLOGICAL ASSOCIATION OF INDIA

Add: CMFRI Campus, E.R.G.Road, Post Box No. 2673, Shanmugham Road P.O., Ernakulam, Cochin-682 031.

Orgn: Estd. December 1958. Registered under law, managed by an elected Executive Committee. *Objectvs:* to promote the causes of marine science in the Indian region. *Actvs:* organises lectures, symposia and seminars on specific subjects; offers requisite information to research workers and students undergoing training in marine biological sciences; awards fellowships and studentships; aids expedition; institutes prizes to be awarded in recognition of outstanding contribution towards advancement of marine biological science for research workers. *Publ:* *Journal of mar. biol. Ass. India*, occasional memoirs and monographs, Proceedings of Symposia.

INDIAN SOCIETY OF ICHTHYOLOGISTS

Add: C/o Zoological Survey of India, 100, Santhome High Road, Madras - 600 028.

Orgn: Estd. 1975, an academic and professional organisation; *Objectvs:* Development of fisheries

and its utilisation for food. *Actvs:* Promotion and encouragement of research in all branches of ichthyology; organisation of seminars, lectures, symposia; acquaint and assist research and developmental needs of fisheries industrialists; stimulate scientific interest in ichthyology through award of research grants, fellowships and prizes. *Publ:* 'Matsya.'

ACADEMY OF ZOOLOGY

Add: The Khandari Road, Agra - 2.

Orgn: Estd. 1954. Registered scientific body. *Objectvs:* Promotion and advancement of studies on animals, popularisation of zoology, establishment of contacts among zoologists. *Publ.* Annals of Zoology, Memoirs.

INDIAN ASSOCIATION OF SYSTEMATIC ZOOLOGY

Add: C/o. Zoological Survey of India, 34, Chittaranjan Avenue, Calcutta - 12.

Orgn: Estd. 1947, a scientific society. *Objectvs:* Encouraging research on systematic zoology and dissemination of knowledge through meetings, lectures, seminars and symposia. *Actvs:* Organisation of lectures and symposia. *Publ:* Bull. of Systematic Zoology, Memoir.

INDIAN NATIONAL SCIENCE ACADEMY

Add: Bahadur Shah Zafar Marg, New Delhi - 110 001.

Orgn: Estd. 1935, as National Institute of Sciences, renamed as Indian National Science Academy in 1970; affiliated to Inter Council of Scientific Union (ICSU) on behalf of Government of India; managed by a Council. Local Chapters, at Madras, Calcutta, Bombay, Hyderabad, Poona and Bangalore. *Objectvs:* promotion of scientific knowledge and its

Practical application for the welfare of the country; acting as a body of scientists for promotion of scientists' interest and representing scientific work in international areas; promotion of scientific work of national and international importance; maintaining liaison and co-ordination between scientific academies, societies, institutions and Government scientific departments and services; publishing proceedings, Memoirs and other publications. *Actvs*: organises symposia, seminars and summer schools, institutes various academy awards such as Chandrakala Hora, Megnadsha, Shanti Swarup Bhatnagar, Sunderlal Hora and Silver Jubilee commemoration medals; provides grants to Scientific Societies, offers research fellowships; assists and supports research in basic science and scientific expeditions. *Publ*: Proceeding series, Transactions and Monographs. *Indian J. Mar. Sci.* and *Indian J. Exp. Biol.* (published by Publication & Information Directorate, CSIR, New Delhi in association with the INSA).

INDIAN ASSOCIATION OF BIOLOGICAL SCIENCES

Add: Department of Zoology, Banaras Hindu University, Varanasi (UP).

Orgn: Estd. 1965. *Objectvs*: Promotion and advancement of biology at all levels. *Actvs*: Biological research; organising seminars and symposia and exchange programmes. *Publ*: IARS Bull. and Memoirs.

INSTITUTION OF MARINE TECHNOLOGISTS

Add: C/o, Erieson and Richards, 32, Nicol Road, Ballard Estate, Bombay-1.

Orgn: Estd. 1952, a registered scientific society. *Objectvs*: Promoting and fostering scientific and practical development of marine science and technology, promotion of research in marine science. *Actvs*: Organisation of symposia,

seminars and lectures, represented in the Marine engineering and Ship building sectional committee of ISI. *Publ*: Journal of the Institute and Memoirs.

INDIAN FISHERIES ASSOCIATION

Add: Taraporevala Aquarium, Netaji Subhash Road, Bombay - 400 002.

Orgn: Estd. 1968. *Objectvs*: to promote scientific character of fisheries and its selected subjects and to bring together those interested in these pursuits. *Actvs*: Organising seminars, lectures and symposia, bring out reports and proceedings of the Association and link up with other societies devoted to the objective of the Association.

SOCIETY OF FISHERY TECHNOLOGISTS (INDIA)

Add: C/o. Central Institute of Fisheries Technology, Willingdon Island, Matsyapuri P.O., Cochin - 682 029.

Orgn: Estd. 1963. *Objectvs*: To promote the cause of fisheries in general and fisheries technology in particular in all its aspect. *Actvs*: providing a forum for discussion, exchange of information, finds and experience of Fishery Technologists; encouraging original investigation on fisheries technology, instituting prizes in recognition of outstanding contribution to the advancement of fishery technology. *Publ*: Fishery Technology.

OTHER INSTITUTIONS

In addition to the above organisations, several other institutes whose main objectives and functions relate to the concerned field of specialisation for which they are established, also touch upon one or the other subjects included in Marine Biology. Similarly, with an increasing interest in the development of marine biology

and cognate subjects several Universities are also now offering marine biology, fish and fisheries as a subject of specialisation for the post-graduate degree courses. The details of such organisations are given below.

Institute	Activities
Department of Biosciences, South Gujarat University, Surat - 395 007, Gujarat.	M.Sc. and Ph. D. degree course in Bioscience.
Department of Biosciences, Sourashtra University, Rajkot - 360 005.	Research on marine Science
University of Baroda.	Offers M.Sc. course and facilities for research leading to Ph.D. degree in Marine Biology.
Physical Research Laboratory, Navrangpura, Ahamadabad - 360 009.	Physical and Chemical Oceanography.
Space Application Centre, Indian Space Research Organisation, Ahamadabad and Indian Institute of Remote Sensing, No. 4, Kalidas Road, P. B. 135, Dehra Dun - 248 001.	Application of remote sensing in marine living resources; development of methodologies for extraction of information related to marine living resources survey from remote sensor data.
Health Physics Division, Babha Atomic Research Centre (BARC), Bombay - 400 085.	Biological, chemical and physical oceanography; radio ecology; pollution and instrumentation.
Institute of Science, 15, Madame Cama Road, Bombay - 400 032.	Research on biological oceanography and marine resources.
University of Bombay.	M.Sc. degree in Biology, Lifesciences, Fisheries Management, Microbiology.
Shivaji University, Kholapur.	M.Sc. and Ph.D degrees in Aquatic Biology.
Indian Institute of Tropical Meteorology, Pune.	Marine meteorological research.
Department of Biosciences, Mangalore University, Mangalagangothri - 574 109.	Research on marine and estuarine resources.
Central Institute of Fisheries Technology (CIFT), ICAR, Matsyapuri - P. O., Cochin - 682 029.	Instrumentation for fishery hydrographic investigations and for behaviour studies on marine animals; conducting ad-hoc training courses on the application of these instruments.
Integrated Fisheries Project (IFP), P. B. No. 1801, Cochin - 682 016.	Fisheries resources; marine engineering.
Central Institute of Fisheries, Nautical and Engineering Training (CIFNET), Dewan's Road, Cochin - 682 016.	Fisheries resources and training of operatives such as skippers of fishing vessels, engine drivers of fishing vessels, gear technicians and RT operators.
Vatsyana Centre, Department of Zoology, University of Calicut, Calicut.	Reproductive biology and physiology of marine and estuarine invertebrates.
Ocean Data Centre, Centre for Water Resources, College of Engineering, Anna University, Madras - 600 025.	Ocean resources and management.
Department of Marine Zoology, S. V. University, P. G. Centre, Kavali - 524 202.	Research on marine resources.
Department of Marine Sciences, Berhampur University, Bhanja Bihar, Berhampur Ganjam, Orissa.	Research on marine resources.
Department of Life Sciences, Regional College of Education, Berhampur.	Research on marine resources..
Susamadevi Chodhurani, Marine Biological Research Institute, P. O. Bamankahali, 24, Parganas, Sagar Island, West Bengal.	Biological Oceanography.

Institutes	Activities	Institutes	Activities
Department of Marine Sciences, Calcutta University, 35, B.C. Road, Calcutta - 700 019.	Research on marine Science.	Naval Hydrographic Office 107 A, Rajpur Road, P. B. 75, Dehra Dun-248 001.	Instrumentation, oceanographic data, bottom topography.
Marine Geology Division, Geological Survey of India, 'B' Block, 4, Chowrungi Lane, Calcutta-700016.	Chemical Oceanography.	Indian Meteorological Department, New Delhi.	Marine meteorology; Sea surface temperature data.