Ten Years of Integrated Ocean Research in India

By

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26th May 1972 marks the tenth anniversary of Integrated Ocean Research in India. The past ten years witnessed the completion of the International Indian Ocean Expedition which paved the way for the establishment of the Indian National Institute of Oceanography in Goa—thus emerged a new chapter in the annals of Indian Science.

Ten years back on 26th May, 1962 Dr. N. K. Panikkar, present Director of the National Institute of Oceanography joined the Council of Scientific and Industrial Research as the Director of the Indian Programme of the International Indian Ocean Expedition. The expedition which was a joint International Venture was coordinated by the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU). It was a significant start to make a composite study of the Indian Ocean on all the aspects of oceanography. In the absence of an Institute, scientific staff was drawn from various Institutes, Central and State Departments of the country, the physicists, chemists, geologists, meteorologists and biologists to work on the Indian Programme of the Expedition. All had only one objective—to acquire maximum knowledge and understanding of the Indian Ocean and its properties in time and space. The exploration of the oceans has been accepted as a basic necessity to ensure the feasibility of the exploitation of the large quantity of mineral and living resources occurring in them; the capacity of oceanic resources is deemed very high. Their distribution, however, is not even and therefore the location of rich areas demands a systematic study of the oceans.

Expedition (1962-65)

Although, the Indian National Committee on Oceanic Research, the planning body of the Indian Programme for the Expedition, was formed in 1960 under late Dr. D. N. Wadia as Chairman and Dr. Panikkar as the member secretary, the actual participation in the expedition with a set programme could be started only in 1962 after INS Sindhu, a naval frigate, was refitted and commissioned for this purpose. On completion of the
Achievements

On the conclusion of the expedition in 1965, the country had much data at hand for further analysis and evaluation. Besides, the International effort brought to light several outstanding characteristic features of the Indian Ocean which was till then considered to be the least known ocean of the world.

The greatest achievement of the expedition is the discovery of bottom features such as ridges, trenches, sea mounts, canyons, abyssal plains, etc. Based on these results the Lamont Geological Observatory, USA have published a physiographic map of the Indian Ocean prominently indicating all these features. A set of atlases incorporating corrected topography of the known features in the Bay of Bengal and the Arabian Sea is being published by the USSR Academy of Sciences.

The next important achievement relates to the location of several areas in the Arabian Sea and Bay of Bengal where the nutrient rich bottom water comes up from subsurface levels and enriches the upper layers by the process known as upwelling. Along the Indian Coast highly productive regions of upwelling were located off Quilon, Mangalore, Ratnagiri, Goa and Bombay. Upwelling off the Somali coast along the western margin of the Arabian Sea has been found to be very intense. The results have also shown that the Arabian Sea, in general, is more productive than the Bay of Bengal. A large number of papers on various aspects of oceanography, based on the IOE data have been published in the past 10 years.
These have been issued by the UNESCO in six bound volumes of collected reprints. More volumes based on this work will continue to come for tens of years.

Besides the scientific papers, a series of atlases on physical, chemical, meteorological properties and planktonic zoogeography of the Indian Ocean, some of which have already been issued, are in the process of publication. The IIIOE atlases on Physical and Chemical Properties have been issued by Professor Wyrtki of the University of Hawaii, USA with assistance of the National Science Foundation of the USA; on Chemical Biology are being issued by Professor J. Krey of the University of Kiel, West Germany; on the Meteorological properties by Professor C. S. Ramage of the University of Hawaii, USA. The IIIOE Plankton Atlases on the Distribution of Total Zooplankton Biomass and also several selected planktonic groups are being issued under the general editorship of Dr. N. K. Panikkar, by the Indian Ocean Biological Centre, the Cochin Regional Centre of the National Institute of Oceanography, Goa.

The proper evaluation of these results and information in terms of their utilization is to be made by those who are directly concerned with this aspect. A fuller appreciation of the results will take several years.

For India the Expedition came as a great opportunity to our young scientists
by the Indian Scientists during the expedition has achieved worldwide
recognition.

National Institute of
Oceanography

The National Institute of Oceanography, India formally came into existence
on 1st Jan 1966. The sound base provided by the tremendous quantity of
data and the material collected during the expedition enabled the new Institute
to forge full steam ahead and kept busy a band of enthusiastic workers for the
next five years. In the initial phase of organisation of the Institute a consider-
able time was devoted towards selection of suitable place to establish
the headquarters and main laboratory buildings, acquisition of land, appoint-
ment of architects for designing the new laboratory buildings, etc. As per deci-
sions taken by the Executive Council, in July 1969 the headquarters of the Insti-
tute along with the Data Centre were shifted from Delhi to the present tempo-
rary laboratory buildings at Panaji (Goa).

The shifting of the Headquarters while marking the end of the initial phase of
oceanographic development under the Council of Scientific and Industrial
Research, also heralded the most exciting phase of bringing ocean science to this
most beautiful Union territory. With this, the phase of reorganisation of the
research divisions was started with provision of temporary laboratory and
working facilities for the existing and new entrants to this field of study. Logistic
considerations, however, led to the limitation of studies to the nearshore
and coastal waters off the coast of Goa. The construction of the first phase of the laboratory building, Scientists' Hostel and Staff quarters was also started in Goa.

As regards the implementation of decision on organisational aspects, the Institute faced many difficulties. The reasons for this have been varied. Most of it arose from the fact that all facilities including hired accommodation which was then not available, had to be developed and working conditions improvised—a very slow process in a centre far away from well developed cities.

Findings

The scientific staff of the Institute who had been previously engaged in the expedition work, subsequently kept themselves busy with the writing up of the results and todate they have published more than 150 scientific papers. The publications of IIIOE Plankton Atlases showing distribution of several important groups of zooplankton in the Indian Ocean can be taken as an achievement of the Institute. While the collection of large number of zooplankton samples from all over the ocean has been possible due to the cooperative efforts of the ships from several countries which had participated in the expedition, the processing, preparation of maps and the issue of publications has been a post-expedition activity which the Institute could rightly be proud of.

Although the extensive exploration of the continental shelf planned by the Institute could not be materialized due to non-availability of an ocean going research vessel, the scientists in Cochin and Goa expanded much effort to understand the beach erosion processes, transportation of sediments particularly in the harbours, environment of the backwaters, estuaries and their productivity in greater detail. These composite and inter-disciplinary efforts led to the understanding of these waters to answer many questions which may be asked for during the exploitation and aquaculture in these nearshore waters.

Besides the Institutes own programmes, the scientists undertook specific projects on the request of other organizations. The physical oceanographers
and geologists of the Institute carried out investigations on the transport and settlement of sediments in Moplah Bay to help the Indo-Norwegian Project in the planning and construction of a breakwater for the fishing harbour at Cannanore. They conducted hydrographic surveys in the waters off Greater Bombay to locate the sites for laying sewage pipelines in the sea on request of the Bombay Municipal Corporation.

The knowledge acquired about circulation of water in Mandovi and Zuari Estuaries system will help industrial complex coming up in Goa to locate areas where to discharge the industrial wastes to avoid pollution of these waters. The results also indicate that the fishery of shrimps and crabs can be intensified in the estuaries during monsoon months and the culture in these waters is feasible.

The Institute has recently started the survey of the living resources of the central west coast of India and the programme is being continued.

**Prospects**

One of the most important requirements of an ocean scientist is that he should be quite sea-worthy and a seasoned sailor and should be able to carry out his work on board research and other ships in any kind of weather. Very often a scientist on board is required to carry out all kinds of jobs, some of them could be even of the menial type. It is for this reason that the availability of oceanographers has been scarce. Among the highly qualified personnel required to understand the problems, only few prove to be adventurous enough to take up challenges of the arduous life at sea and accept oceanographic research as their profession.

A well-equipped and sea-worthy vessel facilitates and helps scientists in the smooth implementation of their programmes. Although the purchase of a full-fledged research vessel for the Institute has been approved, the extension of the projects and research programmes to be taken up in future depends upon the time when the vessel will be acquired by the Institute. Broadly speaking the programmes will extend our knowledge of the known conventional resources in the new areas and also locate new and unconventional resources which may be available in various areas of the Indian Ocean.

However, the problems connected with the coastal management such as pollution, harbour, protection of beaches and the coastal land, etc., will form one of the important aspects of the coastal oceanographic research in the Institute.

A new programme to be taken up in the coastal zone is on the marine aquaculture on experimental basis and exploring possibility for its extension in the estuaries and mangrove swamps.

The first phase of the Laboratory buildings is expected to be completed in the year 1973 along with the residential facilities for about 75 families and research scientists.

Once the basic facilities for work are achieved in the Institute's own building and the research laboratories are set up, new avenues for ocean research will develop at a faster speed and the Institute will be able to contribute much to the location of marine resources, living and non-living, and the utilization of ocean wealth in a more rational manner.