

**Agenda for the 54th meeting of the Board of Scientific and Industrial  
Research to be held on 5th May, 1965.**

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BOARD OF SCIENTIFIC & INDUSTRIAL RESEARCH  
*54th Meeting, BSIR 5th May, 1965,*

1 *Subject*:—Confirmation of the proceedings of the 53rd meeting of the Board of Scientific and Industrial Research held on 28th September, 1964.

2 *Subject* :—**Draft Plan for National Institute of Oceanography.**

I. *Introduction* :

During recent years, interest in oceanic research has increased enormously all over the world with many countries providing substantial support for new institutes and research ships. Among these are included (i) countries which have a long tradition of oceanic work like UK, USA, Scandinavian countries and Japan (ii) the Soviet Union which has entered oceanic research in a big way and (iii) several other countries which are developing oceanography into full-fledged national activity. Expansion in this field is taking place in Australia, Canada, South Africa, France, Scandinavian countries, Yugoslavia, Philippines, Indonesia, United Arab Republic, Pakistan, Brazil and Peru. The largest expansion is in USA, USSR, Japan, Canada and South Africa.

Oceanography in many countries began either in association with the Navy, or with the Fisheries Departments but sooner or later these arrangements were found inadequate because the interests of these organizations were far too narrow for the overall development of all aspects of ocean research. Even countries, where a long tradition of marine research has been associated with the Navy, private research institutions, fisheries institutes and Universities have now found it essential to establish distinct Institutes of Oceanography.

The most striking example in recent times of the recognition of integrated Oceanographic studies is the establishment by Japan of a full-fledged Ocean Research Institute at Tokyo, covering 15 research divisions dealing with the various disciplines comprising oceanography. This is particularly noteworthy because Japan had already the largest number of marine institutes and research ships as compared with any other country in the world. Amongst other Asian countries a vigorous programme with an upto-date research ship has been started in Indonesia while similar developments are taking place in the Philippines.

Ocean research is now entering a prominent place in the world scientific effort. According to an eminent authority, "The most competent forecasts available today indicate strongly

that the remainder of the 20th century will find Americans-and indeed, people everywhere- forced to concentrate upon seven great quests and these are :. the search ifor Security for Living Room, forWater, for Climate, for Resources, for Industry and for Knowledge itself. In ever one of these areas, the sea is proving a crucial element- so crucial that it is difficult to escape the conclusion that the new age into which we are moving is not only the age of the atom, the electron and space; it is also the new age of the sea". This more or less summary the current thinking on the subject of ocean research in most of the advanced countr.es. of the world and this has resulted in more and more increased budgets for the pursuit of this branch of scientific knowledge. The U.S.A. which has, probably, the biggest budget for oceanic studies in comparison with other advanced nations has plans to spend to the tune of \$2300 million over a 10-year period commencing from 1963. The annual budget of Canada for oceanography is about \$ 58 million. In U.K., out of an annual budget of about \$ 10 million for marine research, the National Institute of Oceanography alone spends an amount equivalent to \$2.0 million.

India with a coastline of over 3000 miles and a continental shelf covering several lakhs of square miles (which juridically form Indian territory) should give considerable importance to oceanic studies. Oceanography today provides high dividends in shipping, trade, increased production of food, arrest of sea erosion, safe disposal of harmful pollutants and atomic wastes and more accurate weather prediction.

The International Indian Ocean Expedition has given us the opportunity to get an organized programme in oceanography for the duration of the expedition. The Indian National Committee on Oceanic Research in realisation of this, recommended strongly the establishment of a National Institute of Oceanography in India. While recommending this, the Indian National Committee on Oceanic Research had stated that it will be in the national interest to consolidate the valuable experience derived from our participation in the expedition and the scientific talent at an institutional level having the status of a National Laboratory.

An outline proposal for the Institute of Oceanography was prepared by the Indian National Committee on Oceanic Research and sent to Director-General Scientific & Industrial Research for placing before the Board and Governing Body of the Council of Scientific and Industrial Research at their meetings in March, 1964. The extracts from the proceedings of these meetings pertaining to the proposals on the Institute of Oceanography are given here- under :-

*I. Extracts from the Joint Committee meeting of the Board of Scientific & Industrial Research held on 22nd March 1964*

"The Committee recommended that the project be accepted in principle and its scope of work should also specifically include prospecting for Petroleum and minerals in sea bed. The Committee also desired that the Institute should co-operate with the India Meteorological Department in ocean meteorology. The Committee further recommended that the Indian

National Committee on Oceanic Research with a representative of the Director-General, Scientific & Industrial Research and F. A. to CSIR as additional members should be appointed as Planning Committee for preparation of a Project Report and detailed plans for the Institute. The Planning Committee will also recommend priorities for setting up units of research in the Institute."

2. *Extracts from the meeting of the Board of Scientific and Industrial Research of the CSIR on 23rd March, 1964.*

"The Board strongly supported the proposal to set up the Institute as recommended by the Joint Committee. It agreed with the view of Dr. H. J. Bhabha that in planning the Institute, account should be taken of the facilities at the Naval Physical Laboratory at Cochin and elsewhere in the country. He also suggested that the Institute should grow gradually keeping in view the availability of trained personnel.

These recommendations were approved by the Governing Body of the CSIR at its meeting held on 24-3-1964.

Since the Director-General and the Financial Adviser to the CSIR are already members of the Indian National Committee on Oceanic Research, the Committee will also function as the Planning Committee for the proposed Institute (vide CSIR letter No. 2/132/63/PC dated 30 May, 1964).

Following this the Indian National Committee on Oceanic Research at its 10th meeting constituted a working party to prepare the detailed project report of the Institute for consideration and finalization by the Planning Committee. The Working Party, consisting of Dr. N. K. Panikkar, Dr. S. S. Srivastava, Dr. D. Lal and Shri C. Ramaswamy (with Shri R. Jayaraman as Secretary to this Working Party) held a number of meetings and discussions and the Project Report prepared by the Working Party has been finalized by the Indian National Committee on Oceanic Research (the Planning Committee for the Institute).

3. The Third Reviewing Committee of the CSIR considered the IIIrd Plan Proposals of the CSIR and recommended that "The Institute of Oceanography should be given a high priority, in view of the long coastline of India and the importance of marine products".

## *II. Units of Research :*

The growth and development of the Institute should be gradual and has to depend a great deal on the available resources, trained personnel and the development of scientific programme. This naturally leads to the corollary that establishment of the Institute and its active functioning will depend upon the work already started and the types of projects initiated. While the Institute as such will start functioning in the Fourth Five-Year Plan, a good deal of preparatory work in the different scientific Programmes needs to be done well in advance, if the Institute is to be based upon a firm foundation of scientific work. In connection with this

preliminary work it is considered necessary to establish units of research towards the closing phase of the Third Plan namely in 1965-66 itself.

Two units are already functioning under the Indian Programme of the International Indian Ocean Expedition (Indian Ocean Expedition Directorate) and these are the Indian Ocean Biological Centre and the Indian Ocean Physical Oceanography Centre, both at Ernakulam. Another unit which is in the process of organization, also at Ernakulam is for the scientific work on the productivity of marine and estuarine communities connected with the International Biological Programme.

The Indian Ocean Biological Centre was established during the early part of the International Indian Ocean Expedition for handling all standard net collections of zooplankton from national as well as international sources with particular reference to the Indian Ocean region. The sorting of these collections into major groups is, no doubt, the major activity of this centre for the present, but, as more and more samples would have been sorted and grouped, more specialized taxonomic and other studies will be undertaken with a view to obtaining full information on the planktonic animals in the Indian Ocean. This work will lead ultimately to the study of the oceanic plant and animal resources at the Institute of Oceanography on a long term basis.

The Indian Ocean Physical Oceanography Centre has been established by the taking over of the former Oceanographic Research Wing of the National Geophysical Research Institute. This centre has already initiated studies relating to coastal erosion and silting in the harbours, wave refraction and tidal investigations, coastal currents and sediment movements. These studies will expand and form a major feature in the physical Oceanographic studies of the Institute.

The Unit for the International Biological Programme concerns itself with problems of research relating to Productivity and Ecology of Marine and Estuarine Communities. The Unit will also study the effects of man-made changes in the environment through domestic, industrial and radioactive pollution on the various organisms.

Another unit which has been organised is the Indian Ocean Data Centre to handle all the data collected during the International Indian Ocean Expedition. The centre is functioning at Delhi at the headquarters of the Indian Ocean Expedition Directorate. The data centre's immediate task is to carry out the quality check on all the data received, have them processed, classified and stored. Data Exchange with the World Data Centres is also being organised at this unit. Publication of catalogues of data held and data dissemination will also be done as part of the work of this unit.

A unit for investigating problems in the geological oceanography of the continental shelf around India is proposed to be organised at Waltair. The studies will mainly relate to sediment distribution and sedimentation processes in the different areas. In setting up this unit,

it is proposed to take advantage of physical facilities available at the geology department of the Andhra University, Waltair. The unit will work in close co-operation with the Marine Geology wing of the Geological Survey of India which is proposed to be established during the IVth Plan period.

A unit for geo-chemical studies with special reference to use of radioactive and stable isotopes in studying largescale oceanic circulations and sedimentation processes is proposed to be set up at the geo-chemical division of the Tata Institute of Fundamental Research, Bombay.

An estuarine research group will be stationed at Calcutta for estuarine hydrological studies of the head of the Bay of Bengal. The Port Commissioners, Calcutta have offered facilities for work on board their Estuarine Reserich Vessel *Anusandhani* for carrying out studies on the Hooghly Estuary and the head of the Bay. Studies on the tidal movements occurrence of tidal bores, sediment movements and shifting of shallow banks, etc., will form the main work of this group.

The work of the various units will ultimately be merged into the various projects listed in the next section on the organization of the Institute.

### *III., Organization & Research Projects :*

The Institute of Oceanography will be located at suitable coastal place with full laboratory and ship facilities and will engage itself in researches on the basic aspects of physical, chemical, biological and geological oceanography. The Institute will also have, an organization for the large-scale handling and processing of Oceanographic data. Regional centres and units will also be developed, besides the headquarters of the Institute, at suitable places to handle specialised problems pertaining to that region. The Institute will develop as the focal point of information relating to the Indian Ocean and its resources. The work at the institute will have direct bearing on problems of defence, fisheries, raw materials from the sea, oceanic transportation, sedimentation and erosion in the coastal areas and harbours along the Indian Coast, prospecting of the continental shelf and deeper areas of the Indian seas, safe disposal of pollutants, radioactive wastes.

The Institute will consist of the following main divisions ;

1. Physical and Dynamical Oceanography,
2. Chemical Oceanography with a unit for raw materials from the sea.,
3. Biological Oceanography—Oceanic Living Resources.
4. Geological Oceanography with a unit for prospecting for oil, ore minerals and phosphates of the continental shelf and deeper areas.

5. Data and Documentation.
6. Oceanographic Instrumentation.

The scope and functions of the various divisions are given below. In this an attempt has been made to give some of the more obvious items of study. The list is by no means exhaustive.

*1. Physical & Dynamical Oceanography :*

This division will handle scientific problems relating to the physics of the seas round India and the investigations will consist of the following. The transmission of light and sound in the sea and its application ; heat budget of the sea and its boundaries ; characterization of different water masses and studies on their horizontal and vertical circulations; study of waves including internal waves; modification of waves in shallow water; wave refraction, instrumentation in wave studies; sea disturbances, seiches, surging in harbours, practical wave forecasting, wave forces on fixed and floating structures, application of wave data to coastal engineering problems; sediment movement, coastal erosion and stabilization; density currents in estuaries; physical factors involved in diffusion and dispersal of pollutants in estuaries, coastal and nearshore areas ; ocean-air interaction studies-dynamic aspects; problems relating to evaporation from sea surface, mutually coupled temperature variations of the sea and the air; separation of electric charges by sea bubbles; wind-induced circulations of the oceanic waters; application of results to improved forecasts of oceanic and atmospheric conditions.

*2. Chemical Oceanography:*

This division will deal mainly with the chemistry of the sea and its application to the study of raw materials from the sea. The work in the division will consist of :

Studies on the distribution and cycling of the important chemicals in the sea; the carbon dioxide in the sea and in the atmosphere and the pattern of circulation and exchanges between the sea and the air; carbon dioxide components and carbonate equilibria in the different areas and their role in calcium precipitation and formation of coral reefs and offshore banks; chemical interactions between the sea bottom and the overlying water; chemistry of marine sedimentation ; composition of organisms and organic constituents of sea water; marine corrosion problems; survey of the distribution of raw-material of industrial importance in the different sea areas and methods of extracting them; problems relating to conversion of sea water to fresh water for agricultural and industrial needs; chemical aspects of photosynthesis and fertility of the sea; chemistry of the estuarine waters with special reference to problems of exchanges and pollution; geochemistry of radioactive and other isotopes in oceanic waters and oceanic sediments; Vertical distribution of trace elements such as Mn, Ni, Fe, Co, Zn, U, Th, Ti, Zr, Mo, Rare earths in sea water; uptake of trace elements in different species of marine life; residence time of radioactive and stable elements in sea water by measuring its concentration in sea water, in sediments of different types and rate of supply from land etc. Radioactive methods for tracing of water and dating of sediments based on  $C^{14}$ ,  $Si^{32}$ ,  $Be^{10}$ ,  $Al^{26}$ , etc.,

the study of the concentration of trace elements in deep water adjacent to the sediment in order to find out the release of vast number of elements by volcanic eruptions and to find out the conveyer mechanism of these elements by organisms and their ultimate deposition in Sediments with a view to elucidating mechanisms of formation of various minerals on the ocean floor:

### 3. *Biological Oceanography* :

This division will mainly handle problems relating to oceanic living resources and productivity of oceanic and coastal regions. The scientific works will consist of: Development, seasonal changes and variations in the population of marine organisms ; transfer of energy and elements through the food well in the ocean; photosynthetic production and biologically controlled distribution of elements in the sea; man-induced changes in the coastal and oceanic areas and their effect on the marine life and harvests from the sea. Marine microbiological investigations with special reference to food cycle in the sea and also with reference to their role in the origin of petroleum.

### 4. *Geological Oceanography*:

The geological oceanography division will concern itself with detailed studies on topographical sedimentological and geochemical aspects of the ocean bottom (with special emphasis on continental shelf and the slopes around India). The main objective will be to, apply the knowledge to prospecting for minerals, obtaining detailed map of the geomorphological features of the ocean basins and studying marine processes governing the bottom features. The work will consist of Physio-graphy of the ocean floor, the occurrence of coral reefs, the location of submarine valleys, ridges and sea mounts, the various marine processes which have shaped ocean basins and coasts; origin, transport, deposition and biogenesis of terrestrial transitional marine sediments; calcium carbonate; physical and engineering properties of oceanic as well as near shore sediments.

### 5. *Data & Documentation*:

This division will mainly engage itself in receiving, processing and exchange of Oceanographic data and will function as the national facility for the exchange and dissemination of all kinds of Oceanographic data with particular reference to the Indian Ocean region and the coastal waters of India. This will function not only as the National Oceanographic Data Centre, but also as the Regional Data Centre for the Indian Ocean Region. The division will deal with all unprocessed and semi-processed Oceanographic data from different sources, have them processed and kept stored suitably in punch cards in a form ready for dissemination. One of the means by which the division will disseminate Oceanographic data is by periodically issuing station lists, atlases and charts, information papers etc. This will, thus be the central store house for all Oceanographic information pertaining to the Indian Ocean regions

### 6. *Oceanographic Instrumentation*:

The Instrumentation division will be the chief centre for the fabrication of all types of

Oceanographic equipment suited to the varied scientific needs of the institute and other researchers. The rapid tempo of development in the field of Oceanographic Instrumentation requires that this should be taken up on a research project basis and periodical improvements and modifications in design, fabrication of prototypes, routine types of Oceanographic equipments as well as those for special scientific needs etc. will be the regular feature of work at this division. There will be a section for periodical repairs and servicing of equipment, carrying out the various tests on the equipment used in field and so on. Oceanographic instrumentation is a highly specialized field of instrument technology and so the development of this division will be towards becoming a full-fledged National Oceanographic Instrumentation Centre, for actual fabrication of instruments, advice in regard to Oceanographic instrumentation as well as training in this field. Development of automatic Oceanographic data collection units, telemetering buoys and instrumentation for ocean data service will be some of the activities of this division.

*Project-Oriented Research :*

Although these various divisions will form the main frame work of the Institute and are quite essential from the organizational point of view, the scientific programme of the Institute will be mainly project-oriented and hence will be both interdisciplinary and interdivisional. One of the Chief aims of Institute will be to have a well co-ordinated and planned approach to all the scientific projects in the field of marine science without laying too much stress on the purely disciplinary character of the project. The projects of research that will be taken up initially at the Institute are listed below :

1. Mud banks formation and disappearance off the west coast and their influence on coastal topography and abundance of living resources.
2. Estuarine hydrology of the head of the Bay of Bengal.
3. Beach erosion problems along the various coasts.
4. Coral reef resources of the Indian seas.
5. Physical, mineralogical and petrographical features of the continental shelf and the slope.
6. Upwelling and productivity complex along the west coast of India and in the Laccadive sea.
7. Productivity of the marine and estuarine communities project integrated with the International Biological Programme.
8. Special blooms in the sea—production of toxic substances and mass mortalities in the ocean.
9. Oceanographic Data for improved fishing and navigational charts.
10. Parameters for long range sonar charts.
11. Biogeochemical constituents in the Ocean and Geochemical circulation with special reference to minor constituents and trace elements; large-scale circula-

- tion studies using radioactive and stable isotopes.
12. Sedimentary history of the Indian Ocean basins.
  13. Foraminiferal distribution in marine sediments in various parts of the sea basins around India.
  14. Study of the ocean waves including problems of tides and storm surges.
  15. Prospecting for oil, ore minerals and phosphates.

*IV. Co-operation with other Organizations / Instruments / Universities :*

In view of the fact that Oceanographic knowledge finds its application in a number of fields, one of the tasks of the institute will be to extend full co-operation and provide research ship facilities for other institutions in the country for carrying out any special investigations. Among the facilities which the institute can provide the most important is dissemination of Oceanographic data and information to various individual research workers or institutions. When the Data Centre is well established it is proposed to instal modern data computing machines and initiate computer programmes in regard to the processing of Oceanographic data. The computer programming facility will be extended to other organizations/universities which may be undertaking specialised problems in the field of marine sciences. Another field wherein the Institute can co-operate with other organizations is in regard to providing the necessary advice and help in Oceanographic instrumentation.

In regard to providing the research ship facilities for other organizations, in most of the advanced countries of the world where Oceanographic research has made great strides, this is considered as one of the essential activities of the Institute of Oceanography. In U.K. for example, the facilities for carrying out special investigations are provided on board *RRS Discovery* by the National Institute of Oceanography. Several Universities, Fisheries Research Laboratories, Laboratories of Marine Biological Associations etc. take full advantage of this facility offered by the Institute. Similarly in Canada, the Bedford Institute of Oceanography offers facilities to the Fisheries Research Board of Canada, Universities and other organizations.

Inter-organizational co-operation is, therefore, an activity which should be encouraged and fitted into activities of the Institute. To cite only a few examples, the research ship of the Institute of Oceanography can be made available to institutions like the National Geophysical Research Institute for making special geophysical surveys, or to universities to carry out special fundamental problems of research or to the Atomic Energy Establishments for radioactivity monitoring in the oceanic areas, or for the marine programmes of the Geological, Zoological and Botanical Surveys of India. The Institute will also co-operate with Naval Research Group and Naval Survey and Hydrographic Units in special areas of research in

physical oceanography. These are only a few examples, but the idea is to indicate that such co-operation and extension of facilities is very necessary to promote the growth and expansion of oceanography in the country in complete harmony with the work of the other Indian Scientific Institutions and to bring ocean research in India on a level with other activities in the field of science and technology.

V. 1. *Location :*

It is essential that the Institute of Oceanography is located in a coastal place with full facilities for both inshore and offshore marine studies. While this is a main consideration, there are other important requirements which have to be very critically examined with a view to deciding the suitability of a place for locating the Institute. Some of these conditions are listed below :

1. There should be ample land, preferably in very close proximity to the sea, not only for developing the Institute as a big campus but also to have one or two landing jetties from the Institute premises as far into the sea as possible.
2. The place should have good harbour facilities where the main Oceanographic research ship of the Institute could be berthed and maintained effectively.
3. The Institute and the main research ship should be within easy reach of each other.
4. The part of the coast where the Institute is located should be interesting from Oceanographic research point of view so that some investigations could be taken on a long-term and continuing basis.
5. It would be preferable to have the Institute at a place fairly near to a University and/or Academic Institutions so that scientific contacts could be kept up and the scientists of the Institute will not feel completely isolated from the outside scientific world.
6. There should be good facilities for developing a good residential colony with all the essential amenities for the staff of the Institute.
7. Small and minor ports which have very limited facilities for receiving big ships are unsuitable for locating the Institute.
8. The place chosen should be capable of easy approach by accepted means of transport.
9. It should be close to places where modern workshop and instrumentation facilities are easily available.

The suitability of location of the headquarters of the Institute should be decided on the above mentioned basis and only then it can develop as an active centre of scientific research in the field of marine science.

2. *Land & Buildings :*

These are tentative requirements and the area requirements for the buildings are planned and phased on a ten-year basis.

*Land:*

Estimated land requirements for the Institute approximately 300 acres.

Out of this: (i) 100 acres for the Institute buildings, including workshop and library, Director's Bungalow, Guest-house and possibly quarters for the Administrative Officer and Campus Supervisor ; (ii) 200 acres for the Residential Colony. The Institute campus and the residential colony should be separate from each other but not at too great a distance. Provision for landing jetty approximately 1000 ft. long.

*Buildings :*

(i) Main building of the Institute in about 3 floors having a total floor space of	...	60,000 sq. ft.
(ii) Library Block and Auditorium	...	8,000 sq.ft.
(iii) Workshop and Instrumentation Unit	...	7,000 sq. ft.
(iv) Small building at the seaward end of the Land Jetty for keeping Field Kit, collections from the research ship and routine observational ins- truments for daily observations.	...	1,000 sq.ft.
	Total :	<u>76,000 sq. ft.</u>

*Details of the main building :*

A. *Ground floor:*

(i) Provision to be made for car park, cycle stands, lobby, reception etc.	...	
(ii) Administration, Accounts and Store <sup>9</sup>	...	11,000 sq.ft.

B. *First Floor*

(i) Director's office :		
(a) Director's Room	...	500 sq. ft.

(b)	Director's Personal staff and Ante-Room	...	500 sq. ft.
(ii)	Scientists' Rooms-size of each, ranging from 18' x 10' to 18' x 30'	...	10,000 sq.ft.
(iii)	Laboratories, size ranging from 500 to 1,000 sq.ft.	...	9,000 sq.ft.
(iv)	Conference Room	-	1,000 sq.ft.
<i>C. Second floor (Top floor)</i>			
(i).	Oceanographic Data Centre with Data Processing and storage units	...	10,000 sq.ft.
(ii)	Cafeteria	...	5,000 sq. ft.
(iii)	Laboratories	...	5,000 sq. ft.

#### *VI. Oceanographic Research Ship :*

The most essential requirement of the National Institute of Oceanography engaged in a comprehensive research programme in different disciplines of oceanography is a well-equipped modern research ship. A ship built for scientific research in different oceanic areas should be highly sea worthy, capable of remaining at sea for quite a long time and in all types of weather and should have a high degree of roll and pitch stabilization. The ship should have ample laboratory and working space and good living accommodation for the scientists. Among the many requirements which determine the suitability of a ship for a modern scientific research programme, the most important is that the ship should be highly manoeuvrable at very slow speeds should radiate a minimum amount of noise in the water and should be as free as possible from machinery vibrations. Most of the ships designs for commercial and other purposes do not take these factors into consideration, which are very important from the scientific research point of view especially because many of the instruments designed for the collection of the Oceanographic data are of such a type as would be seriously affected by some of these extraneous factors. In most cases a ship originally designed for completely different duties does not make a good platform for the support or towing of an array of instruments.

Until recently in most of the countries of the world, old, converted ships were being used for Oceanographic research and surveys. But considerable difficulties were experienced by all these countries using converted ships for Oceanographic work as these ships had very frequent breakdowns resulting in considerable loss of ship time. Also the capabilities of ships for carrying out varied Oceanographic investigations were found to be very limited. In this connection, it may be stated that scientific work in a comprehensive Oceanographic research programme, ranges between the geological and geophysical programmes in the deepest parts of the ocean using very heavy and highly specialized pieces of equipment and the comparatively simpler

biological and hydrological studies in the nearshore areas and on the continental shelf. It is, therefore, necessary that research ship intended for Oceanographic research should be able to meet these extreme requirements. Apart from this, the rapid tempo of developments in the field of Oceanographic instrumentation often places very heavy demands on these research ships and these certainly cannot be met except by a well designed research ship. It is some of these considerations that have made most of the countries change over from the idea of using converted ships to building ships specifically for scientific research purposes.

It is only appropriate that the Institute which is planning and carrying out research in the different fields of oceanography should have its own ship and only by this will it be possible to get the maximum scientific output. Some of the essential conditions that should be fulfilled in order to make the ship most useful to the scientific work of the Institute are listed below :

1. The officers and crew of the ship should be responsible to the Head of the Institute.
2. There should be continuity in the tenure of the officers and crew of the ship.
3. The number of men on board the ship is to be decided on the basis of the ship programme for scientific research.
4. Efficiency and achievements of the individual officers and crew are to be judged and decided by the Institute.
5. Ship's movements may have to be executed at short notice and with least possible delay. Cruise plans and ship operations are to be decided by the Institute.
6. Ship's scientific equipment are to be kept at the maximum level of efficiency and prompt and immediate attention is required to set right any instrumental failures.
7. Inter-communication between the research ship and outside world should be quick and efficient.
8. The ship should give the maximum number of days at sea for scientific work.

Outline specifications of a ship considered suitable for different disciplines of research under Indian conditions have been prepared. The Principal features of the vessel are as follows:

**Outline Specifications of the Proposed  
Oceanographic Research Ship — (Provisional)**

- |                     |                          |
|---------------------|--------------------------|
| 1. Class            | — 1000 - 1500 ton class. |
| 2. Length (overall) | — 65-70 meters.          |

3. Beam — 11-12 meters.
4. Draft — 5.50 - 6.00 meters.
5. Maximum Cruising speed — 11.5- 12.5 knots.
6. Minimum speed — 1.0-2.0 knots.
7. Cruising range — 6000 - 7000 Nautical miles.
8. Endurance — about 30 days.
9. Laboratories and other facilities for scientific work on board. — 4 to 5 Laboratories for different disciplines including Meteorology & Geophysics. (Laboratories will be airconditioned).

*Services :* (i) Hot and cold fresh water

(ii) Circulating sea water

(iii) Distilled water supply

(iv) Cold room for keeping geological samples and biological specimens in fresh conditions.

(v) Vibration free table for delicate scientific equipment.

(vi) Dark room for photographic work.

10. Main Engine — Diesel Powered, about 1500 H. P. capable of being geared down to very low speeds.
11. Auxliary Engine — About 400 - 550 H. P. for running generator for generating 300-400 KW of electric power to provide a 220 - 230 volt. A. C. supply and also to work a number of electrical and electronic equipment.
12. Navigational and Sounding equipment — All modern navigational aids, including gyrocompass, electronic position finders, echosounders, Precision Depth Recorders, Radars etc.
13. Oceanographic, Meteorological and Geophysical equipment. } — All essential equipment and winches capable of carrying out the lightest and heaviest operations in deep waters.
14. Other Scientific facilities. — (i) Fishing using longlines in oceanic areas.  
(ii) Deep ocean trawling for fishes and other animals.

(iii) Deep ocean dredging for mineral deposits.

(iv) Deep sea photography.

15. Scientists and ship's staff (Aproximate No.)— (i) \* 15 scientists—(5 Senior and 10 Junior)

(ii) 12 Ship's Officers.

(iii) † 30 ship's crew.

16. Anti-rolling device, Bow-propeller and Lifeboats are included.

*Note:—*\* This will include permanent provision of two meteorologists (one senior and one junior) for operating a weather radar (Selenium radar). There should be maximum accommodation for 4 or 5 more scientists in a few cruises.

† Some of the members of the crew will be trained to become specialists in some branches of work, so that they can provide effective assistance to scientists.

## NATIONAL INSTITUTE OF OCEANOGRAPHY

## BUDGET

A : Recurring :

( Rs. in lakhs )

Budget Sub-Head.	Particulars	Ist Yr.	IInd Yr.	IIIrd Yr.	IV Yr.	VYr.	Total
P—1	Pay of officers and						
P—2	Pay of Establishments	5.10	8.96	10.66	12.48	14.20	51.40
P—3	Allowances & Honoraria	2.40	3.58	4.50	4.80	5.60	20.88
P—4	Contingencies	1.50	2.50	2.50	2.65	2.75	11.90
P - 6	Maintenance	0.74	1.34	1.59	1.87	2.09	7.63
P—7	Scientific equipment. Chemicals etc.	1.25	2.00	2.00	2.50	2.00	9.75
TOTAL:		10.99	18.38	21.25	24.30	26.64	101.56

B : Capital

( Rs. in lakhs )

Budget Sub-Head	Particulars	Ist Yr.	IInd Yr.	IIIrd Yr.	IV Yr.	VYr.	Total
P—5	(1) Land and building	8.00	12.00	5.00	3.50	2.50	31.00
	(2) Services	0.50	3.50	0.50	0.25	0.25	5.00
	(3) Oceanographic Research Ship & equipment	30.00	30.00	40.00	3.00	2.00	105.00
	(4) Miscellaneous :						
	i) Furniture.	0.50	0.50	0.75	1.00	1.00	3.75
	ii) Library.	0.50	0.60	0.70	0.60	0.30	2.70
	iii) Others	0.30	0.35	0.40	0.50	0.50	2.05
	Total :—	39.80	46.95	47.35	8.85	6.55	149.50
	Staff Quarters, Guest-House etc.	6.00	14.00	10.00	8.00	5.00	43.00
GRAND TOTAL :—		45.80	60.95	57.35	16.85	11.55	192.50

(ii)

Running expenses for the  
"Oceanographic Research Ship"  
(1200 tons)

—

@ Rs. 4000 per day (excluding  
the salary of officers and crew  
which are included under pay  
of officers and staff). This will  
work approx. Rs. 1000/- per day.

For 200 days per year for 3 years, commencing  
from 3rd year onwards :

Rs. 24.00 lakhs.

*Grand Total :*

(i) Capital	—	—	Rs. 192.50 lakhs
(ii) Recurring (Laboratories)	—	—	Rs. 101.56 „
(iii) Recurring (Research Ship)	—	—	Rs. 24.00 „
			<u>Rs. 318.06 lakhs</u>

Originally proposed

@ 31.806 million  
27.500 million

Excess :

4.306 million

Rs. 4.30 million more than the original estimate.

## STAFF REQUIREMENTS

Sr. No.	Post	Total	Yearwise Phasing				
			1	2	3	4	5
<i>Scientific &amp; Technical</i>							
1.	Director	1	1	—	—	—	—
2.	Scientist F-E	9	3	2	—	2	2
3.	Scientist C-A	60	24	10	8	12	6
4.	Scientific and Technical staff	101	42	10	24	8	17
5.	Class IV Tech. Staff	21	11	—	10	—	—
<i>Director's Staff</i>							
6.	P.A. (Tech.) to Director	1	1	—	—	—	—
7.	P.A. to Director	1	1	—	—	—	—
<i>Engineering, Workshop and Instrumentation</i>							
8.	Officers	3	1	1	1	—	—
9.	Technicians	11	9	—	—	2	—
<i>Charts, Photographs etc.</i>							
10.	Cartographer	1	—	1	—	—	—
11.	Draughtsman and Photographic Assistants	6	5	—	1	—	—
<i>Museum and Reference Collection.</i>							
12.	Curator	2	1	1	—	—	—
13.	Museum Assistant	1	1	—	—	—	—
<i>Library and Documentation Services.</i>							
14.	Library and Documentation Staff	5	4	—	1	—	—
<i>Administration</i>							
15.	Gazeted Officers	4	4	—	—	—	—
16.	Office Staff	48	30	10	7	1	—
17.	Class IV	33	19	—	7	7	-

(ii)

Sr. No.	Post	Total	Yearwise Phasing				
			1	2	3	4	
<i>Motor Transport.</i>							
18.	Driver	7	3	4			
19.	Cleaner	2	2	—	—	—	—
<i>Estate, Building maintenance and Security:</i>							
20.	Supervising and security staff	10	7	—	3	—	—
<i>Welfare</i>							
21.	Medical Staff	3	3	—	—	—	—
<i>Canteen and Guest House</i>							
22.	Chief Steward	1	—	1	—	—	—
23.	Guest House Chowkidar	2	—	2	—	—	—
<i>Oceanographic Research Ship.</i>							
24.	Officers	12	—	12	—	—	—
25.	Crew	30	—	30	—	—	—
<i>Landing Jetty Cabin.</i>							
26.	Caretaker	1	—	1	—	—	—

## COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Proceedings of the 54th meeting of the Board of Scientific and Industrial Research held on 5th May, 1965, at 9.30 A.M. at Vigyan Bhawan, New Delhi.

### PRESENT

1. Shri Lal Bahadur Shastri	<i>President.</i>
2. Shri M.C. Chagla	<i>Vice-President.</i>
3. Dr. H.J. Bhabha	<i>Member.</i>
4. Dr. S. Bhagavantam	”
5. Shri D.C. Bajjal	”
6. Shri B.V. Baliga	”
7. Prof. S.N. Bose	”
8. Dr. T.R. Govindachari	”
9. Shri P.C. Kapur	”
10. Dr. A.R. Kidwai	”
11. Prof. R.C. Mehrotra	”
12. Dr. S.K. Mukherjee	”
13. Dr. Y. Nayadumma	”
14. Dr. B.R. Nijhawan	”
15. Dr. B.P. Pal	”
16. Prof. Santi R. Palit	”
17. Dr. A. Ramachandran	”
18. Dr. M.S. Randhawa	”
19. Prof. M.N. Rao	”
20. Maj. Gen. J.R. Samson	”
21. Shri Darbari S. Seth	”
22. Dr. T.S. Subramanian	”
23. Col. B.L. Taneja	”
24. Prof. B.D. Tilak	”
25. Dr. A.R. Verma	”
26. Dr. D.N. Wadia	”
27. Dr. S. Husain Zaheer, DGSIR	”

Shri C. Subramaniam also attended the meeting.

The following members had regretted their inability to attend the meeting : —

1. Dr. Amarjit Singh
2. Dr. Satish Dhawan
3. Dr. D.S. Kothari
4. Dr. A. Nagaraja Rao
5. Dr. T. Sen
6. Shri K. Sreenivasan
7. Dr. M.S. Swaminathan

The following members could not attend the meeting :—

1. Dr. Gurbaksh Singh
2. Prof. P.G. Mahalanobis
3. Shri P.R. Ramakrishnan

Before taking the agenda for the meeting into consideration, the Director General, Scientific & Industrial Research, mentioned that in accordance with the rules and regulations of the Council of Scientific & Industrial Research the Board had been reconstituted and, as recommended by the Third Reviewing Committee, its membership had been somewhat reduced and certain new members appointed to it. He welcomed the new members and also introduced them to the President.

**Item No. 1 :**

*Confirmation of the proceedings of the 53rd meeting of the Board of Scientific and Industrial Research held on 28th September, 1964.*

The Board confirmed the proceedings of the 53rd meeting held on 28th September, 1964.

The Board took into consideration the other items on the agenda and endorsed the recommendations made on each item by the Sub-Committee which had met on 4th May 1965 subject to the following further recommendations and modifications :-

**Item No. 2 :**

*Draft plan for National Institute of Oceanography.*

Dr. D. N. Wadia, Chairman, Indian National Committee on Oceanographic Research, who had been specially invited to attend the meeting of the Board, briefly outlined the importance of setting up this Institute in view of the large resources of food, both animal and vegetable, minerals like Manganese, Chromium and Cobalt which lie at the bottom of the Arabian Sea and the Bay of Bengal. He also drew attention to the larger potential for work for this Institute in meteorological research and stated that long range forecasts may bring to light certain facts about monsoons and such forecasts may be of considerable help to farmers in the raising of food crops. He also drew attention to the fact that during the last four years a large number of Indian Post-graduate students had been trained in various

disciplines of oceanography both in the Indian Ships and in foreign ships taking part in the Indian Ocean Expedition and these students had given a very good account of their training. The adoption of modern scientific methods with the assistance of this trained band of workers would enable a speedy exploitation of the Ocean resources and prove of considerable benefit to the country. He, therefore, strongly urged that the Institute should be set up without any undue delay.

The Vice-President, while strongly endorsing the recommendation of the Sub-Committee, mentioned that he was particularly happy that the effort of organising an Indian Ocean Expedition which was mooted when he was in Washington had yielded fruitful results. He added that it was essential that we should now take steps to set up this Institute early so that the tremendous potential in food and other resources may be utilised for the benefit of the country.

The Board there upon endorsed the recommendation of the Sub-Committee.

*[ Please also see G.B., C.S.I.R.'s decision ].*

**Item No. 5 :**

*Integration of the National Laboratories and Institutes with User Organisations--Note by Dr. T. S. Subramanian, member BSIR & GB, CSIR.*

The Board recommended that the resolution as proposed in the agenda item by Dr. T.S. Subramanian be accepted in principle and Director of each National Laboratory/Institute requested to plan and take necessary steps towards achieving the objective envisaged and report the progress achieved to the Executive Council from time to time.

**Item No. 10 :**

*Sanction of new research schemes and renewal of grants for research schemes etc. for the year 1965-66.*

The Board endorsed the recommendation of the Committee in regard to the continuation of existing Research Schemes, Ad-hoc Fellowships and new Research Schemes for the year 1965-66.

On the question of the procedure of awarding fellowships in universities etc., there was considerable discussion in which many members participated. The consensus was that the amounts of fellowships should be made uniform for all the organisations which award the fellowships and the procedure of making awards should be so devised as to enable science students to take up the fellowships soon after the university results are announced and the university sessions start. It was also generally agreed that as long as a student possesses the basic qualifications and the head of the department or other investigator incharge can accept him, the fellowship should be awarded to him. The Vice-President stated that he would take steps to set up a Committee of the representatives of CSIR, UGC, ICAR and ICMR to go into the question of the procedure for making the awards and suggest how it can be simplified so as to avoid delays and to enable students possessing the necessary qualifications to take up research.

*[ Please also see G.B., C.S.I.R.'s decision ].*