

MINISTRY OF EARTH SCIENCES**DEMAND NO.29****Ministry of Earth Sciences**

A. The Budget allocations, net of recoveries, are given below:

| | | <i>(In crores of Rupees)</i> | | | | | | | | |
|------------|--|------------------------------|--------------|---------------|-------------------|---------------|---------------|------------------|---------------|---------------|
| Major Head | | Budget 2006-2007 | | | Revised 2006-2007 | | | Budget 2007-2008 | | |
| | | Plan | Non-Plan | Total | Plan | Non-Plan | Total | Plan | Non-Plan | Total |
| | Revenue | 438.00 | 37.75 | 475.75 | 341.50 | 189.35 | 530.85 | 417.09 | 196.40 | 613.49 |
| | Capital | ... | ... | ... | 58.50 | 0.60 | 59.10 | 272.91 | 0.60 | 273.51 |
| | Total | 438.00 | 37.75 | 475.75 | 400.00 | 189.95 | 589.95 | 690.00 | 197.00 | 887.00 |
| 1. | Secretariat - Economic Services | 3451 | ... | 7.90 | 7.90 | ... | 7.90 | 7.90 | ... | 11.43 |
| 2. | <i>Oceanographic Research</i> | | | | | | | | | |
| 2.1 | Oceanographic Survey (ORV and FORV) and Marine Living Resources(MLR) | 3403 | 8.00 | 29.85 | 37.85 | 6.00 | 29.85 | 35.85 | 4.00 | 26.59 |
| 2.2. | Antarctic Research / Polar Science | 3403 | 41.00 | ... | 41.00 | 41.00 | ... | 41.00 | 20.00 | ... |
| 2.3. | Coastal Research Vessel | 3403 | 5.00 | ... | 5.00 | 5.00 | ... | 5.00 | 5.00 | ... |
| 2.4. | Drugs from Sea | 3403 | 5.50 | ... | 5.50 | 5.50 | ... | 5.50 | 5.50 | ... |
| 2.5. | Polymetallic Nodules Programme | 3403 | 19.00 | ... | 19.00 | 14.85 | ... | 14.85 | 15.00 | ... |
| 2.6. | Other Programmes | | | | | | | | | |
| 2.6.1 | Assistance for Research Projects | 3403 | 4.00 | ... | 4.00 | 4.00 | ... | 4.00 | 4.30 | ... |
| 2.6.2 | Coastal Ocean Monitoring & Prediction System | 3403 | 2.20 | ... | 2.20 | 2.20 | ... | 2.20 | 2.00 | ... |
| 2.6.3 | Exhibition and Fairs | 3403 | 0.60 | ... | 0.60 | 1.00 | ... | 1.00 | 1.00 | ... |
| 2.6.4 | Assistance for Research Seminar Symposia | 3403 | 0.40 | ... | 0.40 | 0.40 | ... | 0.40 | 1.00 | ... |
| 2.6.5 | Manpower Training | 3403 | 0.30 | ... | 0.30 | 0.30 | ... | 0.30 | 0.20 | ... |
| 2.6.6 | Marine Non-Living Resources Programme (MNLRL) | 3403 | 3.00 | ... | 3.00 | 2.00 | ... | 2.00 | 2.00 | ... |
| 2.6.7 | Integrated Coastal & Marine Area Management (ICMAM) | 3403 | 5.00 | ... | 5.00 | 5.00 | ... | 5.00 | 3.75 | ... |
| | | 5403 | ... | ... | ... | ... | ... | ... | 1.25 | ... |
| | <i>Total</i> | | 5.00 | ... | 5.00 | 5.00 | ... | 5.00 | 5.00 | ... |
| 2.6.8 | Information Technology & Computers | 3403 | 3.00 | ... | 3.00 | 1.75 | ... | 1.75 | 1.00 | ... |
| 2.6.9 | Ocean Observation & Information Service | 3403 | 25.00 | ... | 25.00 | 19.00 | ... | 19.00 | 15.00 | ... |
| 2.6.10 | Ocean Data Buoy Programme | 3403 | 25.00 | ... | 25.00 | 18.00 | ... | 18.00 | 15.00 | ... |
| 2.6.11 | National Institute of Ocean Technology | 3403 | 87.00 | ... | 87.00 | 47.00 | ... | 47.00 | 20.00 | ... |
| 2.6.12 | Continental Shelf | 3403 | ... | ... | ... | ... | ... | ... | 1.00 | ... |
| 2.6.13 | Comprehansive Swath Bathymetric Survey | 3403 | 9.00 | ... | 9.00 | 4.00 | ... | 4.00 | 5.00 | ... |
| 2.6.14 | Gas Hydrates | 3403 | 30.00 | ... | 30.00 | 12.00 | ... | 12.00 | 10.00 | ... |
| 2.6.15 | New Research Vessel | 3403 | 70.00 | ... | 70.00 | 55.00 | ... | 55.00 | 100.00 | ... |
| 2.6.16 | Tsunami and Storm Surge Warning System | 3403 | 95.00 | ... | 95.00 | 56.00 | ... | 56.00 | 35.00 | ... |
| 2.6.17 | National Center for Antarctic and Ocean Research | 3403 | ... | ... | ... | ... | ... | ... | 15.00 | ... |
| 2.6.18 | Indian National Center for Ocean Information Services | 3403 | ... | ... | ... | ... | ... | ... | 35.00 | ... |
| 2.6.19 | Sea front facility | 3403 | ... | ... | ... | ... | ... | ... | 10.00 | ... |
| 2.6.20 | Development of manned submersible | 3403 | ... | ... | ... | ... | ... | ... | 5.00 | ... |
| 2.6.21 | Installation of MCS System | 3403 | ... | ... | ... | ... | ... | ... | 5.00 | ... |
| 2.6.22 | Expedition to Arctic | 3403 | ... | ... | ... | ... | ... | ... | 1.00 | ... |
| 2.6.23 | Desalination Project | 3403 | ... | ... | ... | ... | ... | ... | 10.00 | ... |
| 2.6.24 | National Oceanarium | 3403 | ... | ... | ... | ... | ... | ... | 0.95 | ... |

| | | (In crores of Rupees) | | | | | | | | |
|---|------------------|-----------------------|---------------|-------------------|---------------|---------------|------------------|---------------|---------------|--|
| Major Head | Budget 2006-2007 | | | Revised 2006-2007 | | | Budget 2007-2008 | | | |
| | Plan | Non-Plan | Total | Plan | Non-Plan | Total | Plan | Non-Plan | Total | |
| 2.6.25 Demonstration of Shore Protection Measures through Pilot Project | 3403 | ... | ... | ... | ... | ... | 1.00 | ... | 1.00 | |
| 2.6.26 Integrated Ocean Drilling Programme | 3403 | ... | ... | ... | ... | ... | 4.00 | ... | 4.00 | |
| 2.6.27 Ice Class Research Vessel | 3403 | ... | ... | ... | ... | ... | 1.00 | ... | 1.00 | |
| 2.6.28 Head Quarter Building | 5403 | ... | ... | ... | ... | ... | 10.00 | ... | 10.00 | |
| 2.6.29 MLR Vessel, Dedicated berthing and associated facility | 5403 | ... | ... | ... | ... | ... | 0.05 | ... | 0.05 | |
| Total Other Programmes | 359.50 | ... | 359.50 | 227.65 | ... | 227.65 | 315.50 | ... | 315.50 | |
| Total Oceanographic Research | 438.00 | 29.85 | 467.85 | 300.00 | 29.85 | 329.85 | 365.00 | 26.59 | 391.59 | |
| 3. Meteorology * | | | | | | | | | | |
| 3.1 Direction & Administration | 3455 | ... | ... | ... | 13.43 | 13.43 | ... | 13.96 | 13.96 | |
| 3.2 Training | 3455 | ... | ... | 0.54 | 1.95 | 2.49 | 0.54 | 2.03 | 2.57 | |
| 3.3 Research & Development Programme | 3455 | ... | ... | 0.88 | 12.65 | 13.53 | 0.87 | 13.31 | 14.18 | |
| | 5455 | ... | ... | ... | ... | ... | 2.51 | ... | 2.51 | |
| <i>Total</i> | ... | ... | ... | 0.88 | 12.65 | 13.53 | 3.38 | 13.31 | 16.69 | |
| 3.4 Satellite Services | 3455 | ... | ... | 5.36 | 6.85 | 12.21 | 5.72 | 7.08 | 12.80 | |
| | 5455 | ... | ... | 18.06 | ... | 18.06 | 4.28 | ... | 4.28 | |
| <i>Total</i> | ... | ... | ... | 23.42 | 6.85 | 30.27 | 10.00 | 7.08 | 17.08 | |
| 3.5 Observatory and Weather Stations | 3455 | ... | ... | 11.25 | 73.99 | 85.24 | 10.72 | 76.97 | 87.69 | |
| | 5455 | ... | ... | 16.89 | 0.50 | 17.39 | 11.25 | 0.50 | 11.75 | |
| <i>Total</i> | ... | ... | ... | 28.14 | 74.49 | 102.63 | 21.97 | 77.47 | 99.44 | |
| 3.6 Other Meteorological Services | 3455 | ... | ... | 5.25 | 36.65 | 41.90 | 9.10 | 37.09 | 46.19 | |
| | 5455 | ... | ... | 4.20 | 0.10 | 4.30 | 6.00 | 0.10 | 6.10 | |
| <i>Total</i> | ... | ... | ... | 9.45 | 36.75 | 46.20 | 15.10 | 37.19 | 52.29 | |
| 3.7 Other Programmes | 3455 | ... | ... | 1.72 | 1.63 | 3.35 | 1.94 | 1.63 | 3.57 | |
| | 5455 | ... | ... | 1.85 | ... | 1.85 | 8.45 | ... | 8.45 | |
| <i>Total</i> | ... | ... | ... | 3.57 | 1.63 | 5.20 | 10.39 | 1.63 | 12.02 | |
| 3.8 Modernisation | 3455 | ... | ... | ... | ... | ... | 16.00 | ... | 16.00 | |
| | 5455 | ... | ... | ... | ... | ... | 223.62 | ... | 223.62 | |
| <i>Total</i> | ... | ... | ... | ... | ... | ... | 239.62 | ... | 239.62 | |
| Total Meteorology * | ... | ... | ... | 66.00 | 147.75 | 213.75 | 301.00 | 152.67 | 453.67 | |
| 4. Other Scientific Research | | | | | | | | | | |
| 4.1 National Centre for Medium Range Weather Forecasting | 3425 | ... | ... | 7.50 | 2.25 | 9.75 | 5.50 | 2.31 | 7.81 | |
| | 5425 | ... | ... | 17.50 | ... | 17.50 | 5.50 | ... | 5.50 | |
| <i>Total</i> | ... | ... | ... | 25.00 | 2.25 | 27.25 | 11.00 | 2.31 | 13.31 | |
| 4.2 Indian Institute of Tropical Meteorology, Pune | 3425 | ... | ... | 9.00 | 2.20 | 11.20 | 13.00 | 4.00 | 17.00 | |
| Total Other Scientific Research | ... | ... | ... | 34.00 | 4.45 | 38.45 | 24.00 | 6.31 | 30.31 | |
| Grand Total | 438.00 | 37.75 | 475.75 | 400.00 | 189.95 | 589.95 | 690.00 | 197.00 | 887.00 | |

* Schemes transferred from Department of Science & Technology

| C. Plan Outlay**: | Head of Dev | Budget Support | IEBR | Total | Budget Support | IEBR | Total | Budget Support | IEBR | Total |
|------------------------------|-------------|----------------|------------|---------------|----------------|------------|---------------|----------------|------------|---------------|
| 1. Oceanographic Research | 13403 | 438.00 | ... | 438.00 | 300.00 | ... | 300.00 | 365.00 | ... | 365.00 |
| 2. Meteorology | 13455 | ... | ... | ... | 83.49 | ... | 83.49 | 301.00 | ... | 301.00 |
| 3. Other Scientific Research | 13425 | ... | ... | ... | 34.00 | ... | 34.00 | 24.00 | ... | 24.00 |
| Total | | 438.00 | ... | 438.00 | 417.49 | ... | 417.49 | 690.00 | ... | 690.00 |

** Inclusive of works outlay as below

Meteorology

| | | | | | | | | | | |
|----------------|-------|-----|-----|-----|-------|-----|-------|-----|-----|-----|
| Demand No. 99 | 13455 | ... | ... | ... | 3.62 | ... | 3.62 | ... | ... | ... |
| Demand No. 100 | 13455 | ... | ... | ... | 13.87 | ... | 13.87 | ... | ... | ... |
| <i>Total</i> | | ... | ... | ... | 17.49 | ... | 17.49 | ... | ... | ... |

1. Secretariat Economic Services : Provision is for secretariat expenditure of the Ministry of Earth Sciences.

2. Oceanographic Research:

2.1. Oceanographic Survey (ORV & FORV) & Marine Living Resources):- The two major vessels viz Oceanographic Research Vessel (ORV) - Sagar Kanya and Fisheries Oceanographic Research Vessel (FORV) - Sagar Sampada have been carrying out oceanographic surveys and surveys for the exploration of non-living and living resources under the Exclusive Economic Zone (EEZ) (Indian Ocean Region) since 1984. These vessels will be utilized for multi-disciplinary research on the physical, chemical, geological and biological aspects of the Indian Ocean. The vessels will also be utilized in campaigns for validating satellite oceanographic data, assessment of marine (living) resources and for various technology demonstration activities.

Marine Living Resource:- Marine Living Resource (MLR) programme was initiated during IX Plan towards assessment of the fishery resources and explaining the physical and biological interactions that regulate productivity, trophic structure of Indian continental slope area and international waters, with a view to understand and predict the inter-annual, decadal and long-term fluctuations in the marine fishery. These assessment surveys and monitoring activities under the programme are essential to harvest exploitable resources from the Indian EEZ. The provision of this sub-programme forms part of the programme on Marine Research and Technology Development.

2.2. Polar Science (Antarctic Research) :- The Antarctic Research Programme has been designed to take advantage of the unique location and environment of the icy continent for understanding the key global processes which are manifested and controlled by this Polar cap. The Antarctic is a pristine and natural laboratory, which enables scientists to study, detect and monitor global phenomena, such as the atmospheric patterns and ocean circulations. Glaciological and geophysical research provides clue to the geological history and evolution of the earth. In addition, Antarctica provides a singular platform for conducting studies on solar terrestrial interaction, adaptation of organisms, including human beings in the cold land isolated conditions. Antarctic/ Polar research and Antarctic scientific expeditions to Antarctica would be continued during the year 2007-08.

2.3. Coastal Research Vessel (CRV):- The two indigenously built coastal vessels 'Sagar Purvi' and 'Sagar Paschimi' of the Ministry of Earth Sciences (MoES) would be utilized for continuous monitoring of pollution levels in the coastal areas to assess the health of the coastal waters of India. These vessels are equipped with appropriate and modern technological equipment. During 2007-08, these vessels would undertake cruises for this purpose. National Institute of Ocean Technology (NIOT) has been operating these vessels.

2.4. Drugs from Sea:- The programme is servicing ongoing projects at different participating R&D laboratories and inducting new institutions for exploratory and product development phases. After successful completion of clinical trial, the systematic collection, extraction and biological evaluation of sea weeds, sea grasses, mangroves, anemones, sponges, corals starfish, seahorses, poisonous fin-fish and associated organisms etc. would be carried out to identify novel molecule(s) for developing potential drugs.

2.5. Polymetallic Nodules Programme:- The work of survey and exploration is mainly directed towards assessing relative concentration and quality characteristics of nodules as well as seabed topography. Demarcation of grade of nodule deposits in the Central India Ocean Basin is one of the main objectives. Design and development of mining system has been reoriented so that the intermediate applications of the technology could be achieved before developing the ultimate system for a depth of 6,000 m. A joint collaborative programme between NIOT and EDBOE, Russia for design and development of unmanned submersibles capable of operation up to 6,000 m has been taken up under a MOU between MoES and Russian Academy of Sciences. A crawler, insitu samples, and ROSUB have been developed and tested at 410 m, 5200m and 205 m respectively. A continuous demonstration pilot plant of 500 kg/day capacity of extraction of copper, nickel and cobalt from nodules was set up at HZL. Udaipur and campaigns are continuing. EIA monitoring studies in the pioneer area for assessing the impact of the simulated mining at deep seabed is continuing at the site of nodules occurrence.

2.6. Other Programmes:-

Under other programmes Department has an umbrella scheme under the name of **Marine Research and Technology Development**. This covers a set of well defined programmes addressing specifically various R & D aspects of marine science and technology. Besides Marine Living Resources, the Scheme covers programmes like Assistance for Research Projects, Coastal Ocean Monitoring and Prediction System (COMAPS), Exhibition & Fairs, Seminar & Symposia, Manpower Training, Marine Non-Living Resource Programme and Integrated Coastal and Marine Area Management (ICMAM). The details are given below:

2.6.1. Assistance for Research Projects:- The objectives of this programme are to strengthen the infrastructure facilities in selected universities/ institutions to carry out basic research in marine science to create centre for excellence on Ocean, Atmospheric Science & Technology. Nine Ocean Science and Technology centres were set up in universities/IIT. More than 80 projects are continuing to be funded through OSTCs, which are expected to receive funding during the year 2007-08. In addition, projects outside the OASTC system are expected to be taken up on case-to-case basis.

2.6.2. Coastal Ocean Monitoring and Prediction System (COMAPS):- The COMAPS programme has been in operation at 82 locations for collection and analysis of 25 parameters relating to physical, chemical and biological characteristics of water and sediments. Based on the data collected through this project, the areas of concern have been identified and steps are being taken to prevent and control the causes of pollution by supplying the information to the State Pollution Control Boards. The need for strengthening this long term programme arises in wake of the expanding areas of work relating to environmental concern, for example, hazardous substances, management of the marine environment including the risk assessment and environmental impact assessment etc. and emerging areas like mitigation strategies, regulatory toxicology, eutrophication and hypoxia, organics, etc.

2.6.3. Exhibition and Fairs:- Provision has been made for promoting awareness in general public towards oceans around India and to highlight India's effort in the endeavor to explore and exploit these resources for sustainable growth.

2.6.4 Seminar & Symposia :- The Ministry would continue to provide funds for organizing seminars, conferences, workshops, etc. for creating public awareness on oceans and atmospheric sciences.

2.6.5. Manpower Training:- Provisions have been made to meet the objectives of the programme relating to the manpower training in Ocean and Atmospheric Sciences. Ministry would continue to support fellowships to develop specialized manpower.

2.6.6. Marine Non-Living Resource Programme:- Palaeo-oceanographic studies are being carried out in the Bay of Bengal Fan (BENFAN). A cruise is to be undertaken and investigations of cobalt rich seamount crust deep-sea mineral exploration is to be carried out.

2.6.7. Integrated Coastal and Marine Area Management (ICMAM):- The programme has two components, namely (i) Capacity building and ii) Development of Infrastructure for R&D, Survey and Training for ICMAM. The component has four activities, namely, i) Development of GIS based information system for 11 critical habitats in the coastal and Marine Areas in India, ii) Determination of Waste Assimilation Capacity at selected estuaries along coastal areas of India iii) Development of Guidelines for Environmental Impact Assessment, iv) Preparation of Model Integrated Coastal and Marine Area Management Plans. Under the component on infrastructure, training, laboratory and other facilities have been established in the NIOT Campus, Chennai.

2.6.8. Information Technology & Computers:- Provision for expenditure is made to strengthen the Information Technology, computerization as a part of e-governance activities of the Ministry and centres of Ministry of Earth Sciences. IT related communication facilities at Headquarters and other autonomous bodies have been strengthened and office automation software are under implementation.

2.6.9. Ocean Observation and Information Services (OOIS):- The OOIS is designed to acquire time-series data and develop a wide range of ocean atmospheric models. The data acquired through Argo floats, Drifters, XBTs, Current Meter Arrays from the sea around India are being used for various operational and research purposes including forecasting of cyclones and understanding the climate variability. Besides, 122 ARGO profiling floats have also been deployed in the Indian Ocean so far, to acquire real-time measurements of temperature and salinity profiles up to a depth of 2000 m with a view to improve understanding the monsoon variability. Besides real-time dissemination of data to various users, a set of 12 Argo data products are being made available through INCOIS website. The ocean modelling and dynamics projects being carried out by reputed national agencies would address basic issues on the ocean dynamic, climate variability, ocean state forecast, sea level variations, ocean flux studies etc. Some models generated under the programme have already been made operational at INCOIS.

2.6.10. Ocean Data Buoy Programme:- The programme is designed for strengthening the Data buoy network in the Indian Ocean to acquire real-time data on surface meteorological and upper ocean parameters for various operational purposes viz., weather forecast, improve monsoon prediction capability, coastal and offshore developmental activities. The programme is expected to deploy 40 moored buoys in selected locations in the seas around India by end of 10th Plan. Under the programme,

the buoys would be produced indigenously by NIOT with possible private partnership. The work includes deployment; operation and maintenance of buoy network including dissemination of data in near real time to the potential users.

2.6.11. National Institute of Ocean Technology (NIOT):- The NIOT was established in November, 1993 with a view to develop technology in ocean sector. In addition to the four core mission activities of Ocean Energy, Deep Sea Mining, Coastal and Environmental Engineering and Marine Instrumentation, NIOT would also continue to undertake consultancy service in ocean related activities, Ocean Science & Technology and enhancement of marine living resources, development for breeding, rearing and fattening of lobsters to begin with for Andaman & Nicobar Islands.

2.6.12. Delineation of Outer limits of Continental Shelf:- In accordance with provisions of the Convention on the Law of the Sea, India is entitled to delineate the outer limits of the continental shelf beyond (200 nautical miles) Exclusive Economic Zone (EEZ). The necessary geophysical data (over 33,000 line km) required for submission of claim has been acquired successfully. The delineation of the Continental margin in case of India is likely to give a large continental margin extending beyond EEZ. The work on data interpretation and report preparation in respect of geophysical surveys is completed .

2.6.13. Comprehensive Swath Bathymetric Survey (Topographic surveys):- The area of our Exclusive Economic Zone is over 2 million sq.km. having various living and non-living resources. This programme entails scientific mapping of this area to have an inventory of potential resources and to identify the causes of hazards.

2.6.14. Gas Hydrates:- Gas hydrates have the potential of providing total energy security to our nation. The programme consists of both scientific & technology development for gas hydrates. The Department, in association with CSIR and other laboratories, would focus on scientific research with special emphasis on resource extent evaluation and environmental impacts and development of technology for detection and qualification of gas hydrates in sediments.

2.6.15. New Research Vessel:- The Ministry's focus in the next 5 years will be to develop sustainable technology for the exploitation of various non-living resources. Suitable platform is required to replace the vessels and crafts chartered by the MoES at present for technology services and demonstration. The construction of vessel is in advanced stage which is expected to be delivered by end of 2007.

2.6.16. Tsunami and Storm Surge Warning System:- The objective of the project is to establish a warning system for the oceanogenic disasters caused by tsunami and storm surges. The project is being carried out with participation of other concerned departments such as Science and Technology (DST), Scientific and Industrial Research, Space over a period of 30 months. The project is expected to strengthen the 7 seismic observation station of DST, establishment of 8 -10 DART Observation Network, Installation of real time tide gauge monitoring stations, 24 hours monitoring of the systems for generation of timely warning, etc. An interim tsunami warning centre has been set up at INCOIS Hyderabad and 17 tide gauges and 3 bottom pressure recorders have been installed as a part of this programme.

2.6.17. National Centre for Antarctic and Ocean Research (NCAOR):- NCAOR is an autonomous society of the Ministry which coordinates the Indian Antarctic Research programme. Following the commissioning of a state of the art ice core archival and analytical facility at NCAOR, the Centre has embarked on a major programme on analytical studies of ice-cores retrieved from Antarctica. Carbon and pigment analyses of sediments samples collected from lakes of Antarctica are being done. This was earlier included in the Polar Science Programme.

2.6.18 Indian National Centre for Ocean Information Services (INCOIS):- The primary mandate of INCOIS is to generate and disseminate user-oriented ocean data/data products on an operational basis. Data products in the form of Sea Surface Temperature maps, Potential Fishing Zone maps, Ocean State Forecast, wind vector maps, mixed layer depth-maps, at least on heat-budget are being made available on operational basis. INCOIS is also responsible for implementation of Projects like Early Tsunami Warning System. A suite of ocean related data and data products are being made available through its web site. This was earlier included in the Ocean Observation and Information Services Programme.

2.6.19. Sea Front Facility:- The Ministry is implementing various oceanography research related programmes (both scientific and technology development). The technology development work being mainly carried out by NIOT, Chennai needs various sea-front facilities for creation of integration bay, test ponds, test bed for tow vehicles, mariculture and research labs, etc.

Accordingly, NIOT is proposed to create a sea front facility to meet the research requirements of various programmes. This was earlier included in National Institute of Ocean Technology Programme.

New Programmes:-

2.6.20. Development of manned submersible :-The project is envisaged to develop a tool which will put India at par with developed nations having under water intervention capabilities. The system (manned submersible) would help in scientific research in the area of hydrothermal sulphides, cobalt crust, gas hydrates, marine living resources and inspection of offshore installation, pipelines, platforms etc.

2.6.21, Installation of MCS System:- The requirement of multi-channel seismic facility has been felt on board over any research vessels due to growing demand of seismic survey for major programmes like Gas-Hydrate Studies, inter ridge Programme, limits of continental shelf programme etc.

2.6.22. Expedition to the Arctic:- The understanding of climatic changes in the Arctic region and their consequences on global climate changes has relevance to Indian subcontinent as well. It is therefore proposed that during the ensuing XI Five Year Plan concrete efforts need to be made to launch the First Indian Scientific Expedition to the Arctic and future emphasis would be laid on bi-hemispheric approach in understanding the vital issues related to environment/climatic changes. Accordingly efforts will also be made to initiate scientific programmes in the Arctic realm in consonance with the international endeavours in the Arctic being mounted under the Svalbard Treaty, SCAR etc.

2.6.23. Desalination Project:- NIOT has developed, and demonstrated commercial scale Low Temperature Thermal Desalination plant. A land based 0.1 million liter per day (MLD) LTTD desalination plant was commissioned at Kavarratti, in May 2005. In order to meet demand of major coastal cities of India, it is important to upgrade LTTD technology to develop larger scale plants up to 500 MLD capacities, which could be multiples of several basic modules of 25 – 50 MLD plants. Towards this end a 1 MLD barge mounted demonstration plant was taken up and commissioned in April 2006. During the XI plan, NIOT would take up a scheme to design, develop, and demonstrate the large scale desalination plants (25-50 MLD). The ultimate goal of the endeavour will be to establish such desalination plants along the coast and island territories of India to alleviate drinking water problem of coastal region

2.6.24. National Oceanarium:- The main objective of this programme is to make learning about the oceans a family experience by means of promoting science tourism so that young children are motivated to opt for an ocean career later on as adults. The government would provide seed capital and the expertise to the interested parties under this scheme.

2.6.25. Demonstration of Shore Protection measures through Pilot project:- During X plan, the projects on Shoreline Management and Management of Tidal Inlets to understand the cause of erosion and siltation were initiated at inlets along the Indian coast. The project will be implemented through pilot project at selected sites along the Indian Coast and its performance is monitored.

2.6.26. Integrated Ocean Drilling Programme (IODP) :- The objective is to develop a science plan and initiation of deep-drilling through the IODP, in at least three scientifically significant sites, one each in the Arabian Sea, the Bay of Bengal and in the western Andamans. It is envisaged that the initiative for Indian involvement in IODP would start during 2006-07 and that the formalities would be completed before the start of the XI Plan period. Concurrently with this initiative, the Initial Science Plan document would be readied.

2.6.27. Ice class Research vessel: With the proposed plans for undertaking multidisciplinary scientific programmes in the Southern Ocean, initiation of activities during establishment of a new permanent Indian base in the Larsemann hills and plans to expand Indian scientific endeavors to the Arctic region/northern hemisphere, it is felt that its time for India to have her own Ice class research vessel which will (a) serve as a medium for transportation of men and material to Antarctica; (b) serve as a platform for the Indian scientists to undertake oceanographic studies in the sub Arctic and sub Antarctic regions and (c) serve the needs of the Indian scientific community year-round in the tropical waters as well as in the sea-ice conditions of the polar regions.

2.6.28 Head Quarter Building: The present requirement is of full-fledged Building with a campus in Central Delhi of about 10000 sq. m.

3. Meteorology

3.1 Direction & Administration: It provides expenditure for Administration of India Meteorology Department (IMD).

3.2. Training : The training sections at Pune, New Delhi and Calcutta impart training in meteorology and in operation, maintenance and servicing of radio meteorological instruments and telecommunications. The meteorological training unit at Civil Aviation Training Center, Bamrauli serves the training requirements of the air traffic personnel of the Civil Aviation Department.

3.3. Research and Development Programme: The Research and Development activities of the department cover experimental work and research on basic and applied meteorology and seismology including design and development of the instruments.

3.4. Satellite Services (Space Meteorology): IMD participated in space programme since the launching of the first Indian National Geo-stationary Satellite IA by ISRO in 1982. Valuable data & cloud imageries are being received since then. With the deployment of second generation INSAT II A in August 1992 there has been much improvement in the quality of data and cloud imageries. Secondary data utilization center have been established to receive and process satellite cloud imageries directly at the other main forecasting offices from Main Data Utilization Centre, New Delhi. A total of 250 numbers disaster warning receivers under different programmes using INSAT had been deployed so far at the cyclone prone coastal stations to forewarn public & other agencies against impending bad weather including cyclones. Another 100 Disaster Warning Receivers utilizing digital transmission technology installed during 2002-03 have been fully functional.

3.5. Observatories and Weather Stations: The activities consist of recording of observatories and equipping ships, maintenance of inland and overseas meteorological telecommunication network for quick exchange of weather information reception of satellite weather. Information to user interests like aviation, shipping, agriculture and flood control, issue of warnings against cyclones, etc. for protection of life and property.

3.6. Other Meteorological Services (Including Agro-Meteorology): The activities consist of manufacture, supply and maintenance of meteorological instruments and production of hydrogen gas at Departmental Workshops and supply of these to the upper air observatories. Provision also includes expenditure for agro meteorological units and facilities.

3.7. Other Programmes (Seismology & Seismic Hazard & Risk Evaluation and Externally Aided Projects) :- These include payments of India's annual contribution to World Meteorological Organization and the International Seismological Center, Earthquake Risk Evaluation Centre and External Aided Projects .

3.8 Modernization of IMD: The objective is improvement of weather forecast and climate prediction including the Indian monsoon. It is proposed to break the project of Modernization of IMD into various sub projects such as Doppler Weather Radars, Automatic Rain Gauge Network, Automatic Weather System, MFI, etc.

4. Other Scientific Research:

4.1 National Centre for Medium Range Weather Forecasting: The aim of the programme is to develop global circulation model for preparing weather forecasts upto three days in advance. Towards this objective a National Centre for Medium Range Weather Forecasting with super-computing facilities has been established. This institute will work on various atmospheric modeling aspects such as Global Modeling and Data Assimilation System, Mesoscale Prediction System, Extended-Range/Seasonal Prediction System, Computer/Network Infrastructure and Services, Satellite Radiance Data Assimilation System, Climate Modeling System, Environmental Prediction System and Computer/Network Infrastructure Upgradation.

4.2. Indian Institute of Tropical Meteorology, Pune: This institute will carry out primarily the research in atmospheric sciences including long range prediction of seasonal mean monsoon and extended range prediction of active/break spells, regional climate model, quantification of uncertainty in estimation of monsoon climate under climate change scenarios and study of sensitivity of the estimate of monsoon climate under climate change.

International Cooperation/ Obligation: Ministry would continue to represent India in various International & Intergovernmental organization/ bodies such as Antarctic Treaty System, Scientific Committee on Antarctic Research (SCAR), Council of Managers of National Antarctic programme (COMNAP), Standing Committee on Antarctic Logistic Operations, (SCALOP), Commission for Conservation of Antarctic Marine Living Resources (CCAMLR), Intergovernmental Oceanography Commission(IOC), Regional Seas Programme, International Sea Bed Authority and International Tribunal on Law of the Sea and Indian Data Buoy Programmes, Partnership for Observation of Global Ocean, etc.