

DEPARTMENT OF OCEAN DEVELOPMENT**DEMAND NO.91****Department of Ocean Development**

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

		<i>(In crores of Rupees)</i>									
		Budget 2001-2002			Revised 2001-2002			Budget 2002-2003			
Major Head		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
	Revenue	139.60	26.80	166.40	118.00	31.08	149.08	174.00	24.28	198.28	
	Capital	2.40	...	2.40	2.00	...	2.00	1.00	...	1.00	
	Total	142.00	26.80	168.80	120.00	31.08	151.08	175.00	24.28	199.28	
1.	Secretariat - Economic Services	3451	...	1.74	1.74	...	1.66	1.66	...	1.89	
2.	<i>Oceanographic Research</i>										
2.1	Oceanographic Survey(ORV and FORV) and Marine Living Resources(MLR)	3403	2.56	24.08	26.64	1.55	28.48	30.03	7.35	21.41	28.76
2.2	Marine Living Resource and(FORV)	5403	0.40	...	0.40	...	...	...	...	...
	<i>Total</i>		<i>2.96</i>	<i>24.08</i>	<i>27.04</i>	<i>1.55</i>	<i>28.48</i>	<i>30.03</i>	<i>7.35</i>	<i>21.41</i>	<i>28.76</i>
3.	Antarctic Research	3403	19.00	...	19.00	17.00	...	17.00	25.50	...	25.50
		5403	1.00	...	1.00	1.00	...	1.00	1.00	...	1.00
	<i>Total</i>		<i>20.00</i>	<i>...</i>	<i>20.00</i>	<i>18.00</i>	<i>...</i>	<i>18.00</i>	<i>26.50</i>	<i>...</i>	<i>26.50</i>
4.	Coastal Research Vessel	3403	3.94	...	3.94	3.00	...	3.00	5.00	...	5.00
		5403	...	...	...	...	...	...	...	...	...
	<i>Total</i>		<i>3.94</i>	<i>...</i>	<i>3.94</i>	<i>3.00</i>	<i>...</i>	<i>3.00</i>	<i>5.00</i>	<i>...</i>	<i>5.00</i>
5.	Drugs from Sea	3403	2.20	...	2.20	1.70	...	1.70	2.00	...	2.00
6.	Polymetallic Nodules Programme	3403	17.30	...	17.30	11.30	...	11.30	20.00	...	20.00
7.	<i>Other Programmes</i>										
7.1	Assistance for Research Proj,Seminars,Symposia etc	3403	3.50	...	3.50	3.00	...	3.00	3.50	...	3.50
7.2	Coastal Ocean Monitoring & Prediction System	3403	4.05	...	4.05	2.05	...	2.05	2.00	...	2.00
7.3	Exhibition and Fairs	3403	0.45	...	0.45	0.67	...	0.67	0.55	...	0.55
7.4	National Institute of Ocean Technology.	3403	13.30	...	13.30	30.30	...	30.30	23.40	...	23.40
7.5	Marine Instrumentation	3403	0.05	...	0.05	...	...	...	...	...	...
7.6	Direction & Administration	3403	1.50	0.98	2.48	1.50	0.94	2.44	...	0.98	0.98
7.7	Island Development Programmes	3403	0.75	...	0.75	0.53	...	0.53	0.75	...	0.75
	<i>Total</i>		<i>0.75</i>	<i>...</i>	<i>0.75</i>	<i>0.53</i>	<i>...</i>	<i>0.53</i>	<i>0.75</i>	<i>...</i>	<i>0.75</i>
7.8	International Cooperation	3403	0.70	...	0.70	0.50	...	0.50	...	...	...
7.9	Manpower Training	3403	0.60	...	0.60	0.21	...	0.21	0.30	...	0.30
7.10	Continental Shelf	3403	43.00	...	43.00	25.00	...	25.00	18.00	...	18.00
7.11	Integrated Coastal & Marine Area Management (ICMAM)	3403	6.50	...	6.50	5.00	...	5.00	5.00	...	5.00
		5403	...	...	...	...	...	...	...	...	...
	<i>Total</i>		<i>6.50</i>	<i>...</i>	<i>6.50</i>	<i>5.00</i>	<i>...</i>	<i>5.00</i>	<i>5.00</i>	<i>...</i>	<i>5.00</i>
7.12	Ocean Observation & Information Service.	3403	18.70	...	18.70	13.20	...	13.20	25.00	...	25.00
		5403	1.00	...	1.00	1.00	...	1.00	...	...	...
	<i>Total</i>		<i>19.70</i>	<i>...</i>	<i>19.70</i>	<i>14.20</i>	<i>...</i>	<i>14.20</i>	<i>25.00</i>	<i>...</i>	<i>25.00</i>
7.13	Marine Resources Programme.	3403	1.15	...	1.15	1.04	...	1.04	4.00	...	4.00
7.14	Assistance for Research Seminar Symposia	3403	0.15	...	0.15	0.15	...	0.15	0.15	...	0.15
7.15	Information Technology & Computers	3403	0.20	...	0.20	0.30	...	0.30	...	...	...
7.16	Comprehansive Swath Bathymetric Suery	3403	...	...	...	...	...	...	14.00	...	14.00
7.17	Gas Hydrates	3403	...	...	...	...	...	...	8.50	...	8.50
7.18	New Research Vassel	3403	...	...	...	...	...	...	2.00	...	2.00
7.19	Geophysical Study of Laxmi Basin	3403	...	...	...	...	...	...	7.00	...	7.00
	<i>Total</i>		<i>95.60</i>	<i>0.98</i>	<i>96.58</i>	<i>84.45</i>	<i>0.94</i>	<i>85.39</i>	<i>114.15</i>	<i>0.98</i>	<i>115.13</i>
Total - Oceanographic Research		142.00	25.06	167.06	120.00	29.42	149.42	175.00	22.39	197.39	
Grand Total		142.00	26.80	168.80	120.00	31.08	151.08	175.00	24.28	199.28	
C. Plan Outlay	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total	
1.	Oceanographic Research	13403	142.00	...	142.00	120.00	...	120.00	175.00	...	175.00

1. **Secretariat Economic Services:** Under this expenditure on account of the Secretariat of the Department of Ocean Development is provided for.

2. **Oceanographic Research:-** Two research ships ORV Sagar Kanya and FORV Sagar Sampada have been carrying out oceanographic surveys and surveys for the exploration of non-living and living resources in the Exclusive Economic Zone (EEZ) and beyond that around Indian Ocean region since 1984. These vessels will continue to be utilised for multi-disciplinary research on the physical, chemical, geological and biological aspects of the Indian ocean. The vessels will also be utilised in campaigns for validating satellite oceanographic data, assessment of marine living resources and for various technology demonstration activities.

3. **Antarctic Research Programme:-** 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. Antarctic is a pristine and natural laboratory which enables the scientists to study, detect and monitor global phenomena, such as the atmospheric patterns and ocean circulation's. Glaciological, geological 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 and isolated conditions. The 21st Scientific expedition with 49 members was launched successfully from Cape Town, South Africa on the 8th January, 2002 reached Antarctica on 17th January, 2002. The launching of the expedition from South Africa has obvious scientific, logistic and economic benefits. This expedition will carry out research in the fields of atmospheric, geological, biological, environmental, medical and engineering sciences and global change. The 25 winter members conducting research around the year would return to India in March 2003.

National Centre for Antarctic and Ocean Research (NCAOR) which was established in 1998 as a Society under the administrative control of Department of Ocean Development with a view to coordinate Antarctic Research in the country as also to undertake ocean studies, would emerge as the first Polar Research Laboratory in the region.

4. **Coastal Research vessel (CRV):** The two indigenously built coastal vessels namely 'Sagar Purvi and 'Sagar Paschimi' of Department of Ocean Development will continue to be operated by National Institute of Ocean Technology (NIOT) for monitoring pollution in the coastal areas, for which they have been equipped with appropriate and modern technological equipment. During 2002-03, these two vessels would undertake cruises for this purpose.

5. **Drugs from Sea:** The project would be restructured to cover exploratory and product development phase with the possible participation of pharmaceutical industries. Pharmacological, toxicological and clinical trials for anti-diarrhoeal, anti-diabetic and anti-cholesterol leads would be continued further. The exploratory phase would be need based under which bulk/repeated collection of marine organisms and bio-evaluation would be carried out to obtain more potential leads.

6. **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. Demarcating 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 re-oriented so that the intermediate applications of the technology could be achieved before developing the ultimate system for a depth of 6,000 m. Towards this design, development and testing of mining module complex has been undertaken. A shallow bed mining system developed was tested at a depth of 420 m off Tuticorin in March, 2000. The system successfully pumped slurry from the depth of 420 m. For maneuverability, the system was subsequently tested at about 32 m. This was done under a joint collaborative programme between NIO and University of siegen, Germany. An upgrade version of Remotely Operated Vehicle (ROV), capable of operating up to 250 m water depth has been developed at CMERI, Durgapur. The system earlier has been tested off Chennai coast at 40 meters depth successfully. The system will be tested at 250 m depth soon.

A joint collaborative programme between NIOT and EDBOE, Russia for design and development of unmanned submersibles capable of operation up to 6,000 m is likely to be taken up soon under a MOU between DOD and Russian Academy of Sciences.

A Continuous demonstration pilot plant of 500 Kg/day capacity for extraction of copper, Nickel and Cobalt from nodules is being set up at HZL, Udaipur. The demonstration plant is scheduled to be commissioned by end of May, 2001.

An EIA monitoring cruise is proposed during February, 2001 as a part of continuing studies in the pioneer area for assessing the impact of the simulated mining at deep seabed at the site of nodules occurrence.

7. Other Programmes

7.1 **Assistance for Research Projects & Manpower Training Programme:** 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 centres for excellence on ocean science & technology. Five ocean science & technology cells at Bhavnagar University in marine coastal ecology (west coast), Berhampur University (Orissa) in marine coastal ecology (each coast), Mangalore University, Mangalore in Marine Geological & Geophysics, Andhra University, Vishkapatnam in coastal marine culture system and Goa University, Goa in Marine Microbiology were set up in 1997-98. OSTC in beach placers deposits marine biology, Marine Benthos & Ocean Engineering and under water robotic have also been set up. New projects for research in the relevant fields would be sanctioned for various OSTCs. OSTCs would also continue their ongoing projects. During 2002-03, it is proposed to award research fellowships and continue funding the fellowships awarded in the previous years.

7.2 **Coastal Ocean Monitoring and Prediction System (COMAPS):** One of the basic requirement for controlling pollution is generation of data on levels of the pollutants over a period of time so as to obtain clear picture of pollution. The main objective is to constantly assess the health of India's marine environment and indicate areas that need immediate and long term remedial action. Data on 25 environmental parameters are

being collected at 82 locations with the help of 9 R & D institutions. The Programme along with the modeling component will be continued during 2002-2003.

7.3 Exhibition & Fairs : Assistance for Seminar & Symposia and Information Technology and Computers: With a view to enhancing the knowledge of the general public regarding the oceans around India and to highlight India's effort in the endeavor to explore and exploit these resources for sustainable growth, the Department would continue to participate in variety of fairs/exhibitions. The department would also provide funding for organizing seminar, conferences, workshops etc. for creating of public awareness on oceans. The department would also enhance its existing IT infrastructure.

7.4 National Institute of Ocean Technology (NIOT): The National Institute of Ocean Technology was established in November, 1993 as a registered society under the administrative control of the Department of Ocean Development with a view to developing technology in ocean sector. It was envisaged that in addition to the four core mission activities of Ocean Energy, Deep Sea Mining, Coastal and Environmental engineering and Marine Instrumentation, NIOT would also undertake Hi-Tech consultancy service in ocean related activities. Subsequently, in the year 1998-99, one more project on 'Island Development' was added to the activities of NIOT. The major activities, ongoing and new, that will be undertaken by NIOT during 2001-02 are testing of 1 MW OTEC Plant, design of mining system for depth upto 6000 m, preparation of EIA guidelines for Coastal Ocean management, development of Under Water Marine Instruments and calibration of the same and continuing the project on enhancement of Marine Living Resources.

7.6 Direction & Administration: under this, expenditure on account of the posts created for providing infrastructure support by way of scientific and technical manpower and other supporting staff to review, implement and monitor various programme is provided .

7.7 Island Development Programme: This programme has been merged with NIOT's activities from 1998-99 onwards by amalgamating all the programmes implemented by the Department in the Andaman & Nicobar Islands and renamed as Ocean Science & Technology for Islands. NIOT, which has been identified as the nodal institute for implementation of this multi-institutional and multi-disciplinary programme, has already made a headway in enhancement of marine living resources in the island groups by taking up technology development for breeding, rearing and fattening of lobsters to begin with. The facilities both at the island groups and at the mainland have been augmented for this purpose. It is proposed to expand the activities under this programme to other marine organisms on selective basis and also to coordinate the implementation of all the programmes of the Department in the island groups for the benefits of the island community.

7.8 International Cooperation: Department would continue to represent India in various International & Intergovernmental organizations/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.

7.9 Manpower Training : Provision to meet the revenue expenditure of the programme

7.10 Continental Shelf: In accordance with the 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) and submit the data for a claim to the Commission of Continental Shelf.

The delineation of the Continental margin in case of India is likely to give a large continental margin extending beyond EEZ. The continental margin is rich in non-living resources and the minerals, including the hydrocarbon resources. The resources of the continental shelf also include the sedentary organisms.

7.11 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 capacity building component is being funded by the International Development Association, through the World Bank. 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. The project activities will be completed in the year 2002-2003. Under the component on infrastructure, training, laboratory and other facilities have been established in the NIOT Campus, Chennai. Determination of Use Classification for Coastal Waters and No Impact zone for selected habitats like coastal lakes and mangroves are in progress.

7.12 Ocean Observation and Information Services (OOIS): Recognizing the need to operationalise the oceanographic services in the new areas of Science & Technology, the Department has implemented the Ocean Observation and Information Services (OOIS) programme from the beginning of the 9th Plan. The objective of the Programme is to provide ocean information services for various applications in the ocean section. OOIS is structured around four major themes namely, Ocean Observing Systems, Ocean Information Services, Satellite Coastal and Oceanographic Research (SATCORE) and Indian Ocean Modeling & Ocean Dynamic (INDOMOD).

The Ocean Observing Systems envisage collection of sea truth data using moored data buoys, drifting buoys, expandable bathythermographs (XBT), current meter arrays and tide gauges, and designed particularly for acquisition of real-time sea surface, meteorological and upper oceanographic parameters from the coastal and deep waters. Validation of the satellite sensors has also been undertaken using the sea truth data generated under this programme. The Data Buoy Programme was initiated in 1996 with partial financial assistance from Norwegian Agency for Development (NORAD) and National Institute of Ocean Technology (NIOT) has been entrusted with the responsibilities for deployment, operation and maintenance of the data buoys. A set of 12 buoys were

procured from M/s OCEANOR, Norway out of which, seven are moored in the coastal waters and five in the off-shore waters. The Data Buoy Centre at Chennai receives data from all the 12 buoys, through INMARSAT, NORAD assisted programme of Data Buoy has been completed successfully on 31st October, 2000. The Data Buoy will continue as GOI programme.

The Ocean Information Service envisages generation and dissemination of ocean data/data products on an operational basis. Data products in the form of Sea Surface Temperature maps, Potential Fishing Zone maps, wind vector maps, mixed layer depth-maps, at least on heat-budget are proposed to be made available. It is also planned to develop and ocean state forecasting system; initially on an experimental basis. Services will be offered in the form of coastal wetland maps, shoreline change maps, close contour coastal area maps etc. which are needed for coastal zone management activities. The 14 National Marine Data Centres will be continued under the Ocean Information and Services. A dedicated Indian National Centre for Ocean Information and Services started functioning (w.e.f. 3.2.1999) at Hyderabad as an autonomous society for efficient development and dissemination of Data products.

The Satellite Coastal and Oceanographic Research

(SATCORE) component envisage development of regional algorithms, data assimilation techniques and operational models which would be transferred to the Ocean Information and Service Centre for operational use. The ocean modeling and dynamics projects addresses basic issues on the ocean dynamic, climate variability, ocean state forecast, sea level variations, ocean flux studies etc. These R&D projects are expected to provide basic models that could explain the dynamics of the Indian ocean and form an essential input in designing system for ocean state forecast

7.13 Marine Resources Programme: This was a programme initiated during 1998-99. A scheme on Assessment of marine living resources beyond 50 meters depth in the India EEZ and ecological correlation has been initiated to have a realistic estimates on the potential marine living resources in the EEZ. Studies on benthic biodiversity, toxic algal blooms and fishery modeling also form part of this programme. This programme is being merged with the activities of FORV Sagar Sampada.

7.14 Seminar & Symposia : Provision for expenditure on providing assistance for Seminar & Symposia.

7.16 to 7.19 Provision of Rs.31.50 crore has been made for these new schemes.