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Report of the Regional Co-ordinator for the IOC Regional Committee for the Central Indian Ocean

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1. **Name of the Region**

   IOC Central Indian Ocean region (IOCINDIO)

2. **Regional IODE Co-ordinator**:

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3. **Regional Co-ordinator Address (if different from 1)**

4. **IOCINDIO Regional URL**: Regional activities are included in the Institute's URL. The Institute's URL is: http://www.nio.org

5. **IODE Regional Co-ordinator Designation Date**:

   IOCINDIO Regional Co-ordinators appointed on 18 August 1997 through Resolution IODE-XV.4

6. **IOCINDIO Description**:

   The main objective of the IOC Regional Committee for the Central Indian Ocean (IOCINDIO) is to enhance the regional co-operation in marine sciences and to develop the scientific programme in the Central Indian Ocean and adjacent to Seas and Gulfs. IOCINDIO region comprises of several sub-regions. The Committee (constituted) represented by the representatives of the member states of the region are Oman, UAE, Qatar, Saudi Arabia, Kuwait, Iraq, Islamic Republic of Iran, Pakistan, India, Sri Lanka, Maldives, Bangladesh, Myanmar,
Thailand, Malaysia, Indonesia, Australia, UK and France. This covers a wide range and is extremely heterogeneous. The other IOC committee in the region is IOCINCWIO which represented by the members states in the western Indian Ocean region.

7. **IOCINDIO Brief History**:

The IOCINDIO was formally established by Resolution XII-14 of the IOC assembly and its first session was hosted by the Govt. of Pakistan in Islamabad in July 1998. Subsequently, the 2nd session was held at NIO, Goa, India in November 1996 and 3rd session was held at INCO, Tehran, Iran in 1999. The committee adopted a rather ambitious programme during its 1st session. It covered –

- Coastal Water Dynamics
- Integrated Coastal Area Management
- Geological Survey of the Continental Shelf
- Marine Pollution Problems
- Sea Level Observations
- Storm Surge Prediction etc.

The co-operative activities at the regional level had so far been rather limited. Several actions of importance of the programme areas had been implemented at national and sub-regional levels. Some specific actions provided the support for the programme development in the region. They are:

- Development of the regional component of the global coral reef monitoring network for India, Sri Lanka and the Maldives.
- Regional co-operation in the development of GOOS.
- Sea level monitoring and modeling (SGLLMAM)
- Some of the member states contributed to the global programmes such as TOGA / CLIVAR, WOCE and IGBP.

8. **Roles and Responsibilities of the IOCINDIO Regional Co-ordinator**

The main objective of the regional co-ordinator is to co-ordinate the IODE activities with the regional committees and provide necessary information on the regional development to IODE, develop the regional scientific programme, strengthen the IODE system and improve the marine science status in the region for the benefit of the member states of IOC in the region. The terms of references of the Regional Co-ordinators are:

- Keep IOC regional bodies and programmes information on the IODE data policy and rules of procedure;
- Be a link between the IOC regional bodies and the IODE Committee;
- Publicize IODE activities;
- Help the IODE Committee implement regional activities in data and information management by providing advice and establishing necessary contacts.

9. **IOCINDIO Regional Projects and Activities during the Intersessional Period**:

The major activities undertaken during the intersessional period in the region are as follows:
9.1 Marine Research and systematic Observations.

The programme adopted at the first session of the Committee (Islamabad, June 1988) was revised at the second and third session which were held at NIO, Goa, from 22-20 November 1996 and INCO, Tehran, Iran in 1999. The priority to the current main issues in the region are:

- Climate change
- Food from the sea and marine biological diversity
- Coastal Zone Management
- Non-Living Resources
- Tourism

India conducted the survey in the region through questionnaire on the status of marine science in the region and the results were presented at the 2nd session of the Committee. The results based on the response received from 10 countries were highlighted on –

- Human resource and infrastructure development
- Living resources management
- Marine pollution
- Coastal management
- Sea level and climate
- Ocean dynamics etc.

At the 2nd session the Committee appreciated that substantial development of marine research and ocean observations has occurred over the past decade in the Indian Ocean region. The Committee adopted the programme, it covered

- Coastal water dynamics with reference to integrated coastal zone management.
- Oceanography and pelagic living resources with studies of algal blooms
- Geological survey of the Continental Shelf and sediment budget of the Indus Cone
- Marine pollution problem in relation to ICMAM
- Sea level observations
- Storm surge predictions

At the 3rd session, the above programme were further reviewed and modified according to the priority in the region.

9.2 Capacity building

IOC capacity building is also covered under the TEMA activities. In relation to the GOOS activities implementation in the region a series of capacity building workshops were organized to identify the need. One such workshop was organized at NIO, Goa during November 1996 for the region and the experts were from IOC, ROPME and the Netherlands had participated. The prioritized of the GOOS modules were identified. These includes : coastal, living marine resources, climate, health of the oceans and marine information services.

The implementation plan for the GOOS modules are as follows:

Coastal module: - Network of tide gauges for sea level observations.
- Destructive nature of storm surges

Living resources: - On coral reefs, mangroves and fisheries

Climate: - Need for a reliable long term observation system
Health of the ocean - Monitoring oil pollution, land-based sources of coastal pollution

9.2.1 Exchange and sharing information

The regional co-operation for scientific information exchange based on the RECOSCIX-WIO model need to develop referral databases at the level of institution, projects, personnel and bibliographic databases using common communication formats and standard software. Such databases should be merged later at national, sub-regional and regional levels.

Indian ocean countries largely depend on the sea. Many countries however lack threshold facilities to carry out systematic and long-term oceanographic research. Since the International Indian Ocean Expedition (IIOE) on major oceanographic programmes have been organized during 3 decades. A widening gap on oceanographic research capabilities is noted and quality of human resources is not involving fast enough to effectively implement regional programmes.

IOC sponsored a course on Monitoring and Modelling of Coastal Marine Processes which were conducted continuously at IIT, Delhi, India in 1996, 1997 and 1998.

9.2.2 Exchange and sharing of data

The Committee suggested at the 2nd session that in order to solve the problem of data exchange, each country of the region should possess or establish a NODC which can be identified as the focal point for the provision of data. IODE established the following new NODC in the region, they are at Madagascar (2000), Mauritius (1999), Sri Lanka (1996), Seychelles (1997) and Mozambique (1997).

Two training courses on Oceanographic Data Management were conducted during the intersessional period in the region. These are conducted at INCO, Tehran, Iran (19-30 Oct. 1997) at Indian NODC, NIO, Goa (17-27 Oct. 1998).

More than 150 JGOFS (India) data CD along with data visualization and retrieval software were distributed to the national and international users on request by RNODC-INDO.

More than 200 data requests were handled by RNODC-INDO and requested data set for the Indian Ocean were supplied to the users during the period.

9.3 Coastal water dynamics as well as regional participation in TOGA, WOCE

Several of the Member States in the region participated in TOGA and are participating in WOCE; some countries are continuing their interest in TOGA-TAO and are also involved with CLIVAR (of WCRP). Other activities specifically addressing coastal zone problems which have been carried out in the region include workshops on integrated coastal zone management (Karachi, Pakistan 1994; Bali, Indonesia, 1994); training course on modelling and dispersion of pollutants in the coastal zone (MAMCOMP, India 1994, 1995, 1996), workshops on coastal erosion, sea-level changes and their impacts (Mombasa, Kenya 1991; Dhaka, Bangladesh, 1992; Zanzibar, Tanzania, 1994); workshop on nutrient studies in tropical marine waters (Mombasa, Kenya 1994).
Training programmes have also been carried out related to analysis of coastal pollution (Goa, India, 1992) and on non-living marine resources (Karachi, Pakistan, 1994). These activities need to be linked to studies on coastal water dynamics.

9.4 Oceanography and pelagic living resources and the study of res tides (algal blooms), OSLR

Several member states from the region are participating in the IOC Harmful Algal Bloom Programme (HAB), including its training courses. Some Member States are also associated with the IGBP project JGOFS which is co-sponsored by IOC and is relevant to the subject. The studies of coastal zone nutrient-levels and marine pollution are important contributions to the area of marine living resources, and several related activities have already been carried out. International conference on long-term environmental effects of the Gulf was held in Kuwait from 18-20 November 1996.

9.5 Geological survey of the Continental Shelf and input of riverine sediments to the Indus Cone (OSNLR)

National studies have been carried out on this subject and the project was discussed in-depth at the 2nd and 3rd session of IOCINDIO. An IOC - Germany advanced training course on bathymetric charting in the western Indian Ocean was organized on board R.V. Meteor from Darban to Cape Town South Africa from 16-30 December 1995.

9.6 Marine pollution research and monitoring (GIPME-MARPOLMON)

A workshop on regional aspects of marine pollution was held in Mauritius, 1990; a training course on analysis of marine contaminants was organized at NIO, Goa, India in 1992; and a training course on modelling and dispersion of pollutants in the coastal zone was organised in 1994, 1995 and 1996 at the IIT, Delhi, India.

In the ROPME Sea Area, studies and assessments of marine pollution with emphasis to petroleum hydrocarbon pollution were organized by IOC after the Gulf War. Also a Workshop on oil spill monitoring and modelling in ROPME sea was organized in Bahrain from 15-7 February 1998.

9.7 Sea-level observations in the framework of the IOC global sea level observing system (GLOSS and GOOS)

This subject area may be seen as a gradual development of a regional component of the Global Ocean Observing System (GOOS). A regional workshop on capacity building with respect to GOOS was organised here in Goa preceding this session of IOCINDIO. Data exchange and data management policy are intimately linked with the development and establishment of operational oceanography, which essentially is GOOS. This matter includes awareness creation of the importance of data management and the retrieval of relevant ocean data. Two training courses on oceanographic data and information management were held at INCO-ROPME, Tehran, Iran from 19-30 October 1997 and at NIO, Goa from 17-27 Oct. 1998.

The GLOSS project has developed steadily over the last ten years since its inception in 1985. Several activities have been carried out in this region. These include a workshop on sea-level observations in relation to coastal problems; training courses in sea-level measurements and analysis; analysis of impacts of sea-level changes on coastal zones; and support to the establishment and maintenance of sea-level observing stations.
9.8 Coral Reef Monitoring and Related matter.

The progress made on coral reef and related activities in the region during the intersessional period are:

As a Phase I of the Global Coral Reef Monitoring Network (GCRMN) for South Asia region comprising of three countries i.e. India, Sri Lanka and Maldives began in 1997. The main objective was to collect the data on biophysical and socio-economic factor. As a part of the Phase I activities a series of training programmes and workshops were conducted in the region on Biophysical and Socio-economic Surveys. These programmes were conducted at Maldives (1998), Lakshadweep (India) (1988), Andaman (India) (1997) and Gulf of Mannar (India) (1988).

A Pilot coral reef exercises, intended to familiarize the participants with survey techniques and data collection were conducted at Andamans (India), Lakshadweep (India), Gulf of Mannar (India) and at two sites in Sri Lanka and Maldives during the intersessional period.

Under the Phase II, a training course on Design of Survey method was conducted at Chennai (India), May 2000 and a workshop on Coral Reef Database Management was organised at Colombo Sri Lanka in July 2000.

GCRMN will be participating in the ninth International Coral Reef Congress at Bali, Indonesia in October 2000.

10. Products and Services Developed and / or Made Available during the intersectional Period:

The IODE system is well developed in the region Three are six NODCs and one RNODC have been established. But still there are many gaps exiting in the region. IODE must give priority to establish a new NODC / RONDC in the region. Some data products developed for the Indian Ocean are:

- An Atlas of Chlorophyll a and primary productivity for the Indian Ocean, April, 1999, pp. 1-60. (Institutional publication, not printed)


- JGOFS (India) CD was developed for the international users along with the data visualisation and retrieval software. The CD containing data on physical, chemical, biological parameters collected from the international waters of the eastern Arabian Sea. More than hundred copies of the CD have been distributed to the IOC/ IODE centres, JGOFS centres and individuals on request.

- An interactive Graphic software for XBT data quality control and visualisation was developed for window user in visual C++. Quality control module of the system incorporated various quality checks such as land-sea position, speed of the vessel, invalid date / time, duplicates and station sounding at inventory level. Data quality module involves test surface transient, temperature inversions, fall rate and depth reversal. Data check also involves visual inspection of the profile for features caused by wire stretch, wire break, bowing and nub in the mixed layer.
11. Comments:

Our understanding of the oceanographic processes of the Indian Ocean as a water body is still inadequate. There are huge gaps in data availability. Basin scale studies within the collaboration, co-operation and contribution from the Indian Ocean RIM countries are needed.

Countrywise development in the region are quite promising. Some countries have even attained global dimensional in oceanographic pursuits. Co-operation in the region needs to be intensified to bring the other countries to a suitable level in oceanographic science and services. The top priority of the area for capacity building are manpower and infrastructure development. Other priority areas in the region are Marine pollution monitoring, coastal zone management, storm surge studies, climate research etc. Many developing countries in the region also needs financial support from the developed countries for capacity building.

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