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GUIDE FOR ESTABLISHING A NATIONAL OCEANOGRAPHIC DATA CENTRE

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PREFACE

At its seventh session (July 1973) the IOC's Working Group on International Oceanographic Data Exchange (IODE) established a Task Team to prepare a Guide for Establishing a National Oceanographic Data Centre with the following membership:

Mr. Robert V. Ochinero, Chairman (United States of America); Mr. Henry A.C. Jones (Canada); Teniente de Fragata Alfonso Lozano Juliao (Colombia); Mr. Kyell Kloster (Norway); Mr. Suthichai Tamiyavanish (Thailand); Dr. Douglas T. Grossart (United Kingdom); Mr. V.I. Lamanov (USSR); and Mr. D.W. Hagborg (FAO oberserver).

In preparing the Guide, the Task Team generally followed the outline proposed at the seventh session of the Working Group on IODE, but modified the outline occasionally in the interests of clarity and logic.

The term "data/information" as used in this Guide requires explanation. "Data" in general refer to digital or analogue records of marine environmental observations; "information" refers to inventories, catalogues, data products, analyses, selected bibliographies, reports and publications of the data centre or to similar products of other centres or organizations.

The draft Guide prepared by the Task Team was circulated in December 1974 to members of the IOC Working Committee on International Oceanographic Data Exchange* and National Co-ordinators for IODE for comments. The eighth session of the Working Committee on IODE, held in May 1975, reviewed the draft Guide and recommended its publication in the series "IOC Manuals and Guides".

Certain modifications and corrections have been made to the text, in consultation with the Chairman of the Task Team, in order to reflect results of discussions at the eighth session of the Working Committee on IODE, as well as recent developments in the international oceanographic data exchange programme.

* Formerly the Working Group on International Oceanographic Data Exchange.

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INTRODUCTION

The objectives of the Guide for Establishing a National Oceanographic Data Centre are:

1. To provide national authorities considering the creation of an NODC with the background for understanding what elements are generally involved in its establishment, development and operation.

2. To provide individuals in charge of establishing a data centre with a list of recommended logical steps that should be taken prior to its establishment; to provide the basis for selecting the type of organization suitable for the purposes of the individual country, in terms of available funds, existing volumes of data and and requirements both for providing services and for participating in international data exchange; and to establish some basis for long-range planning of the centre's future development and expansion.

MISSION OF A NATIONAL OCEANOGRAPHIC DATA CENTRE

Advances in marine sciences and technology depend to a significant degree upon the effective flow of data/information from the collectors to various types of users. The principal purpose of an NODC is to provide on a long-term continuing basis data/information in a usable form to the so-called "secondary user" community, i.e. to individuals or organizations in the nation which have or will in the future have need for the data, after the primary purposes for which the data were collected have been satisfied.

A generalized scheme illustrating the flow of marine data from operational and research oriented platforms is shown in Figure 1. Though illustrative of procedures usually followed in the United States, it should be applicable to most national efforts.

General - Each centre should be a national focal point for the accessioning and dissemination of oceanographic data and information. (International aspects of data exchange will be treated in a separate section.)

Efficient acquisition, processing, archiving and distribution procedures are needed to provide service not only to the oceanographic scientific community but beyond it to the larger community of governmental and industrial users and to the public and private interests concerned with marine policy and economic development.

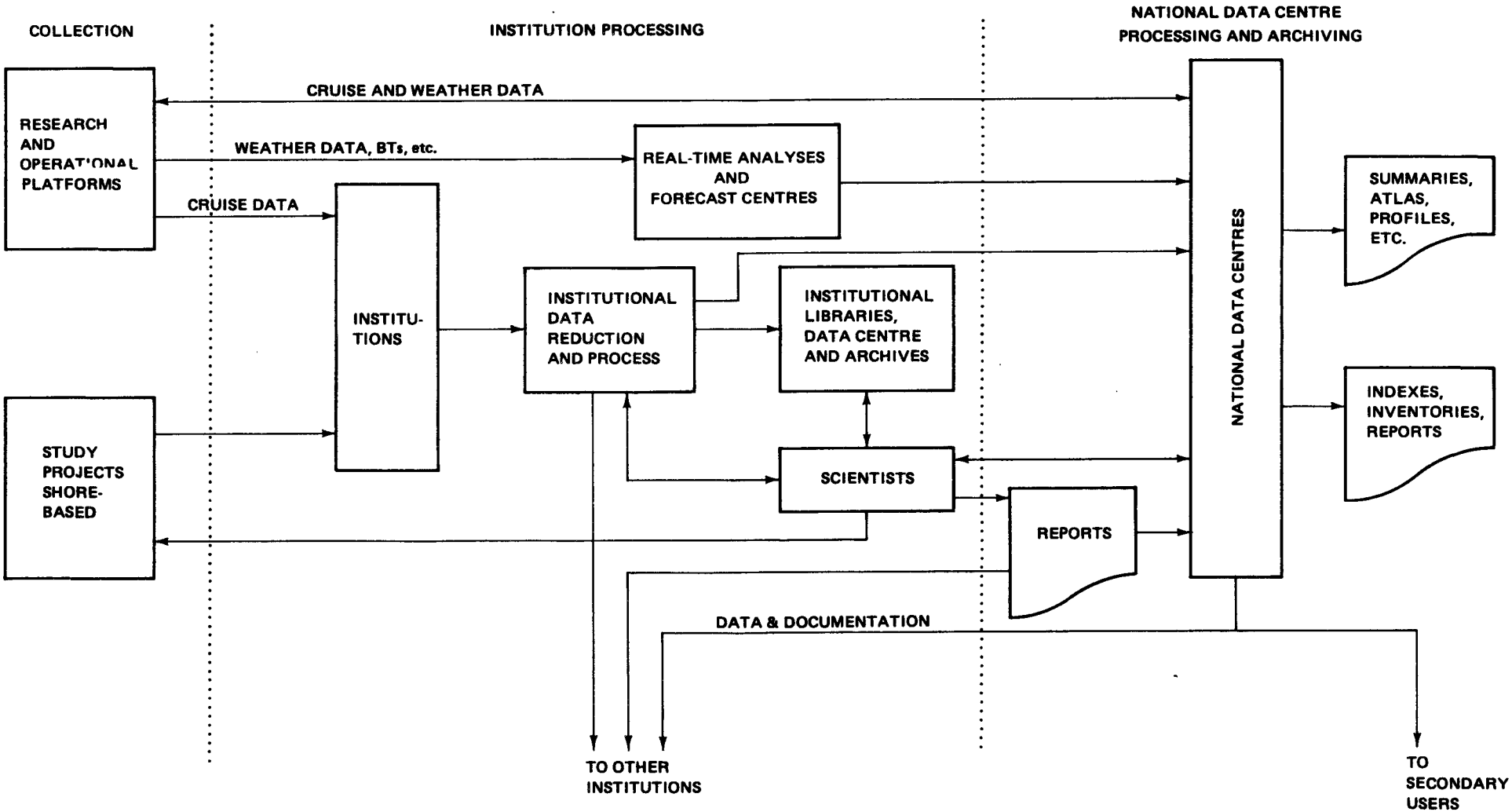
Increases in data flow and in the complexity of data collected pose problems of data management (e.g. archiving and provision of services) which are best solved by professionals in that field. It is increasingly difficult for a data user to know the sources of all the data he may need, and individual institutions collecting data may not have the mission or resources to provide services to secondary users.

A data centre should be equipped to prepare data products tailored to some specific requirements and to present information in a great variety of forms and media - charts, maps, visual displays, analogue or digital records, and where computers are utilized, computer listings, punched cards, magnetic tapes, etc.

Scientific rôle - A data centre should ideally have an adequate base of historical data/information for its area of interest. Such a base is of considerable importance to scientists as it provides additional assistance in verifying the quality of newly collected data. When available it also helps establish trends, extremes, and averages of marine environmental parameters. Furthermore, a suitably large data base is necessary for the statistical manipulation of data, to provide summaries and models for quality control and forecasting purposes. A well-documented base can be used for research; scientists within the data centre, on a full- or part-time basis, can prepare tailored data products for their own use or that of their colleagues.

The importance of a data centre, however, is by no means denigrated by the absence of large data bases; there may be either very poor historical data coverage in the area of interest of the centre, or it may take many years to create these bases through national and international exchange, and to process the data into usable form. In such cases it is still extremely useful to establish an NODC in order to provide all the other centralizing functions mentioned in this Guide, to establish formal arrangements for the archiving of contemporary and future data, and to act as the national point of contact with other NODC's, WDC's for oceanography, etc.

Figure 1. GENERALIZED MARINE DATA FLOW



Source : Study TM-4023/005/00 prepared by System Development Corporation for the U.S. Government, July 1969

Educational rôle - A data centre should be prepared to respond to specific requests for data/information on the marine environment from teachers and students and to assist by providing input to academic studies and theses.

A data centre can also assist in providing a source of oceanographic information as a means of developing a national awareness of the marine sciences and their potential for improving the environment and living conditions through lectures, pamphlets, reports, studies, curricula, etc. This rôle could be of significant importance in supporting many aspects of training in the fields of marine science, technology, industry, etc.

Economic rôle - A data centre may also contribute significantly to the resource development of a country by providing information for applied research, i.e. in fisheries, aquaculture*, mariculture* and exploitation of mineral resources; providing information on engineering properties of the sea floor prior to the construction of structures, jetties, harbours, pipelines, powerlines, sewage outfalls, other waste facilities, etc. With the world-wide increase in pollution and contamination of the marine environment, centres will be increasingly called upon to collect and disseminate environmental data, to help provide a basis for studies to preserve natural conditions for fishing or recreational activities.

Information rôle - This is an important rôle serving a multiplicity of users, and can be fulfilled in a number of ways, for example, by providing:

- regularly updated or special publications and catalogues of oceanographic data;

- reference services (e.g. microfilm or hardcopy) to oceanographic publications, data reports, etc.;

- referral services:

  (a) to data not available at the centre but held by other national activities;
  (b) to other specialized sources of information;

- graphic products (e.g. charts, plots, etc.) for use in basic research, planning regional development, environmental modifications, preservation or improvement of water quality.

* As used here, "aquaculture" refers to the culture of man-produced and man-controlled bodies of water of small size; "mariculture", to the culture of natural bodies of water.

Survey of user communities and data sources

As a first step, a survey may be made by questionnaires, by visits or interviews, or by both. The purpose of such a survey is twofold: (1) to determine national requirements; and (2) to determine existing national sources of data related information.

Questions concerning national requirements might be phrased as follows:

Do the types of organizations or institutions mentioned in the following section have a present or potential need for marine data or information? If they do, information is needed on the following items:

- types of data, most useful data products
- level of documentation required
- format, medium
- frequency required
- time interval desired between collection of data and subsequent use
- quality requirements
- purpose or use of data
- type of environment of interest (offshore, deep ocean, estuarine, etc.)
- geographical area of interest.

Questions concerning existing sources might be phrased as follows:

Are there data or information collected by types of organizations or institution mentioned below that can be made nationally or internationally available? If so, information is needed on the following items:

- types of data, data products
- level of documentation
- format, medium
- frequency of sampling (occasional, regular, continuous)
- period of record
- degree of reliability
- applicability (to research, engineering, etc.)
- type of environment (offshore, deep ocean, estuarine, etc.)
- geographical area.

At the conclusion of the survey, all answers should be compiled, categorized, and analysed with consideration to:

- validity of stated needs
- costs of data acquisition and services
- adequacy of existing data services to meet user needs.

The following are the types of activities (e.g. educational, research, etc.), related organizations which should be surveyed, and their pertinent applications of oceanographic data/information:

Education - technical schools
universities
lower level schools and training institutes, academic or industrial

Applications: informing, training, teaching about the oceans with or without career-related goals; collection of descriptive information, marine data collection

Research - universities
laboratories
government agencies

Applications: basic research; applied research (e.g. to develop or protect natural resources); marine data analyses

Public information - national and local government agencies

Applications: marine advisory services (e.g. answering questions), education of public in conservation practices, information on sport fisheries, tides

Environmental descriptions - universities
national and local government agencies

Applications: survey of environmental conditions; survey of resources, living and mineral; survey of hazards, natural and man-made

Environmental forecasting - national and local government agencies
consulting firms

Applications: wave, tide and current predictions; estuarine flushing predictions; storm surge and tsunami warnings; in general, statistical support for predictions

Merchant shipping - government agencies
consulting firms

Applications: storm avoidance, optimum routing

Industrial operations - offshore drilling
construction
salvage
utilities
mining

Applications: oil exploration and exploitation; construction of oil drilling platforms, offshore towers, harbours, sea walls, breakwaters; offshore ports; salvage operations; power plant siting; desalinization; minerals exploitation; construction of ships, submersibles, platforms

Fishing industry - national and local government agencies
fishing companies

Applications: fishing gear research and development; acquaculture and mariculture technology; fishing fleet deployment; storm avoidance

Governmental planning and management of resource utilization - national and local government agencies

Applications: conservation monitoring and regulatory policies; preservation or improvement of water quality; shoreline protection against erosion; planning for rational use and exploitation of resources

Recreation - national and local government agencies
museums
private enterprises

Applications: water conditions for sailing, boating, swimming, fishing, live animal exhibits

Pollution control and monitoring - national and local government agencies
consulting firms

Applications: water quality regulations, water analyses, environmental impact statements.

Scope of data centre functions

Advisory bodies can assist in determining the scope of the functions of the data centre, based on national priorities and objectives.

The following are examples of types of advisory bodies and suggested representation:

Marine Sciences Council, with representation from:

- government organizations involved in marine and related (e.g. meteorological) sciences
- universities and the marine research communities
- industry

Data Management Advisory Panel, with representation by:

- data processing specialists from various related groups familiar with environmental data - programmers, systems analysts
- typical users and generators of data from government, industry, academia.

The principal function of the council would be to establish national priorities in the marine sciences in general, based upon declared national objectives; the principal function of the advisory panel would be to recommend and keep under review the corresponding data centre programmes and systems.

In many countries, the equivalent of a Marine Sciences Council may already exist. The Data Management Advisory Panel might logically be appointed by and answerable to the Council. The terms "council" and "advisory panel" are somewhat arbitrary; local variations in terminology can be expected; e.g. "inter-agency committee", "national committee", "advisory board", "sub-committee" and other terms may be used.

Selection of data types to be archived

Relevancy and usefulness to national objectives and interests

To ensure proper relevancy and usefulness to national objectives and interests, the data centre must be sensitive to the present and potential needs of the users. There must be a continuous dialogue between the data users, identified by the determination of national priorities and the acquisition and services units of the data centre. This can be achieved by seminars at appropriate intervals, grouping together the interests defined above with selected representatives of the data centre and/or its advisory committees. It could also be achieved by questionnaires, interviews, etc.

A useful example showing the correspondence between various marine environmental parameters and "short-life" and "long-life" products, which might also be identifiable as needs, is given in Figure 2.

Applicability

Because of the collection methods or for some other reason, some data may not be usable for pure scientific research. They may still be worth archiving, however, if there are no other data available from that area, as a first approximation of the prevailing environmental conditions.

Requirements for computer support

National requirements for computer support of the data centre will vary, depending on the volume and complexity of the data to be processed and the centre's computational requirements. While small amounts of data may be manually processed, archived, and retrieved, it should be noted that magnetic tapes are increasingly important as a medium for international exchange; therefore, some computer support will probably be necessary, whether it be from an in-house computer or a shared computer facility out of the centre.

Cost effectiveness

The cost of acquisition, processing and archiving of data in those cases where special knowledge or software (computer programmes) is required, must be balanced against their information content, the availability of such data, and the density of observations.

Rare or uncommon data types should be processed only if the information is not otherwise available or is needed for a purpose which can justify the additional expense; e.g. data on pesticide residues may be very rare but would obviously be of great interest.

Geographical area

A data centre should concentrate its efforts on those geographical areas for which there is a current or foreseeable national interest.

Data which originate from areas within the geographical limits of declared national interest but are sparse in coverage, should be accessioned from domestic and foreign sources and archived; however, they may not require much if any processing because of their sparsity.

Figure 2. CORRESPONDENCE BETWEEN PARAMETER GROUPS AND DATA PRODUCTS*

DATA TYPE	PHYSICAL								CHEMICAL						GEOLOGICAL AND GEOPHYSICAL						BIOLOGICAL AND FISHERY										METEOROLOGICAL					POLLUTION				ENGINEERING							OTHER				
																					POPULATION								EXPERIMENTAL																					
PARAMETER GROUPS / DATA PRODUCTS REQUIRING PARAMETER GROUPS	PRESSURE, TEMPERATURE, DENSITY	CURRENTS	TIDES	WAVES	SWELL, SURF	DRIFT MEASUREMENTS	FRESH WATER INFLOW/EXCHANGE	MIXING PARAMETERS	SALINITY	NUTRIENTS	BUFFER SYSTEM	DISSOLVED GASES	RADIOACTIVITY	ELEMENTS	ROCK OR SEDIMENT SAMPLES	ROCK OR SEDIMENT DESCRIPTIONS	SEDIMENTARY PROCESSES	DEPTH	BOTTOM PHOTOGRAPHS	GEOPHYSICAL MEASUREMENTS	SPECIMEN HOLDINGS	TAXONOMIC POSITION	OCCURRENCE AND ABUNDANCE	PRIMARY PRODUCTIVITY	COLLECTION DATA	MIGRATION & MOVEMENTS	AGE, GROWTH & MORTALITY	FISHERY STATISTICS	COMPARATIVE PHYSIOLOGY	BEHAVIOUR	POPULATION GENETICS	ENDOCRINOLOGY	AIR CHARACTERISTICS	WINDS	CLOUDS	HEAT BUDGET	IMAGERY DATA	CHEMICAL POLLUTANTS	HEAT & RADIOACTIVITY	MICROBIAL POLLUTANTS	OTHER SOLID WASTES	WAVE CHARACTERISTICS	WIND FORCES	CURRENT CONDITIONS	ENGINEERING PROPERTIES OF BOTTOM	SEDIMENT TRANSPORT & COASTAL EROSION	BEHAVIOUR OF MATERIALS	ACOUSTICS	ELECTROMAGNETICS	OPTICS	SEA ICE	BIOMEDICINE
PRIORITY SHORT-LIFE PRODUCTS																																																
1 HEMISPHERIC WEATHER CHARTS	X																																X	X	X	X	X											
2 WAVE HEIGHT FORECASTS				X	X																												X	X			X											
3 LONG RANGE WEATHER FORECASTS	X																																X	X	X	X	X											
4 COASTAL WEATHER/WAVE FORECASTS	X			X	X													X															X	X	X	X	X											
5 HIGH SEAS WEATHER FORECASTS				X																													X	X	X	X	X											
6 TIDE WARNING BULLETINS			X	X	X													X															X	X			X											
7 TROPICAL CYCLONE ADVISORIES	X																																X	X	X		X											
8 SURF FORECASTS	X	X	X	X	X													X															X	X														
9 TSUNAMI WARNINGS			X	X	X													X		X																											
10 IMAGERY PRODUCTS																																					X											
11 ICE FORECASTS	X	X	X	X	X	X			X																								X	X	X	X	X								X			
12 SEA SURFACE TEMP CHARTS	X																																X	X	X	X	X											
13 THERMAL STRUCTURE FORECASTS	X	X		X				X																									X	X		X											
14 ESTUARINE FLUSHING PREDICTIONS		X	X				X	X										X																X													
15 FISHERY PRODUCTS REPORTS																													X																			
16 FISHERY ADVISORIES	X			X	X																					X		X					X	X	X													
PRIORITY LONG-LIFE PRODUCTS																																																
1 CLIMATOLOGICAL ATLASES																																	X	X	X	X	X											
2 WAVE AND SWELL CHARTS				X	X																													X													
3 SEA SURFACE TEMP. ATLASES	X																																														
4 SURFACE CURRENT ATLASES		X				X																																									
5 ICE ATLASES																																														X		
6 WATER COLUMN PROP. TABLES & ATLASES	X								X			X						X																										X				
7 BATHYMETRIC MAPS																		X																														
8 HYDROGRAPHIC SMOOTH SHEETS			X												X	X		X																										X				
9 NAUTICAL CHARTS															X	X		X																														
10 NAVIGATION NOTICES																		X																												X		
11 OCEAN ENGINEERING HANDBOOKS	X	X	X	X	X		X	X										X	X				X											X	X							X	X	X	X	X	X	X	X	X	X	X	X
12 GRAVITY & MAGNETIC FIELD MAPS																		X		X																												
13 GEOL. & BOTTOM CHARACTERISTICS															X	X		X	X	X																												
14 GEOL. & GEOPHYSICAL REPORTS															X	X	X	X	X	X																												
15 FISHERY & SPORTFISHING ATLASES	X								X	X		X				X		X			X	X	X	X	X	X	X	X																				
16 FISHERY STATISTICS REPORTS																							X		X	X	X	X																				
17 CRUISE AND DATA REPORTS	X	X	X	X		X			X	X		X	X	X	X	X	X	X	X	X				X	X	X	X		X			X			X	X	X								X		X	X		

*Source TM-4023/005/00 prepared by System Development Corporation for the U.S. Government, July [illegible]

Once the types of data that will be processed have been determined, the early organization of the centre can be planned.

The steps to be taken are suggested in the following sequence. (If sufficient manpower is available, more than one step can be taken at a time.)

1. Drawing of a chart showing the logical flow of a given type of data from observing activity to and through the centre to future users.

2. Design of a processing system.

3. Design of an internal accessions inventory control system.

4. Definition of all operations and tasks associated with each one of the major events in the flow diagram.

5. Grouping the operations by functions.

6. Determination of staffing structure and position qualifications, including personal characteristics, required for each type of operation. Certain similar operations (e.g. acquisition and services, or accessioning and archiving) might be carried out by the same person if that individual has the proper qualifications and interests.

7. Determination of special background, experience, and knowledge needed in addition to general qualifications (e.g. an academic degree or kind of experience).

8. Recruitment of personnel whose qualifications and background match those desired. Personnel may be transferred from within the parent organization either permanently (full-time) or temporarily (part-time on an ad hoc basis, while continuing with their present occupation), or they can be hired from outside the organization.

9. Determination of individual short- or long-term training desirable, to meet the requirements of all the tasks inherent to each position; e.g. to develop certain management qualities or orient/reorient technical backgrounds.

10. Formulation of budget, considering the following items:

(a) physical facilities
- rental
- purchase
- construction
- maintenance

(b) equipment
- furniture
- processing equipment (electronic accounting machinery)

- office supplies
- processing supplies (forms, punch cards)

(c) personnel
- salary
- training
- travel

(d) others
- mailing costs
- publication costs
- printing, etc.

11. Development or acquisition of processing tools:

(a) forms for
- accessioning (e.g. data documentation forms, see Appendix 2)
- recording incoming data
- processing
- archiving and retrieving
- inventorying

(b) code for
- country*
- institution
- ship
- parameters

(c) instruction manuals - to implement all the major steps or events incorporated in the processing system.

12. Acquisition of selected national and foreign data and information (including inventory) products, as learned from the previous survey of national data bases, by correspondence, visits, or both. The data/information may be obtained in the form of manuscripts, publications, data forms, computer listings, punched cards, tapes, charts, plots, summaries, etc. In addition, consideration should be given to obtaining relevant bibliographies and compilation of abstracts. To obtain these data, it may be necessary to provide financial, clerical, or technical assistance.

13. Acquisition of international data and information based on the previous survey, through exchange or at cost. Possible sources include the World Data Centres, other data centres (oceanographic and marine-related), sorting centres, documentation centres, universities, laboratories, institutions, private sources, etc.

14. Implementation and participation in inventories of ongoing national marine environmental data collection programmes, through support of first-level (ROSCOP) and second-level (IGGCI, ROMBI) inventory programmes endorsed by the IOC.

15. Indexing activities - the data centre, by means of questionnaires or visits, preferably both (see Survey of user communities and data sources, page 10), should ascertain nationally the existence of data files with pertinent information on:

* An IOC Country Code has been adopted by the IOC's Working Committee on IODE, which also has the responsibility for reveiwing and updating the Code. Other codes are also being developed.

- type of data
- location at which the data were taken
- dates of observations
- purpose of collection and use
- format (arrangement)
- medium and reproducibility
- availability for exchange
- file size
- address of source where data are located.

A sophisticated example of such an activity, the U.S. Environmental Data Base Directory, is described in Appendix 3.

Filing within the centre of above information should permit retrieval by parameter and location. The file may be subject to manual or automatic retrieval or both.

Publication of the above information either partially or in toto may be considered.

16. Preparation of mailing lists for dissemination of information centralized at the centre, to include sponsoring agencies, other data centres, and potential users.

17. Preparation and dissemination of data inventory summaries based on ROSCOP or other inventory programmes (e.g. IGGCI and ROMBI) obtained from national or international sources.

18. Establishment of formal contacts with the Intergovernmental Oceanographic Commission, its Working Committee on International Oceanographic Data Exchange, the WDC's, etc., and initiation of bilateral exchange agreements with other national centres or designed national agencies.

The following is a checklist of operations which a data centre, once established, would be expected to perform:

1. Accessioning of incoming data and publications, and preparation of periodic accession lists of data and publications.

2. Processing of data, including:

   (a) preparation of cruise coding instructions;

   (b) preparation of cruise processing instructions;

   (c) coding and (if applicable) keypunching;

   (d) quality control - plausibility check;

   (e) processing errors check.

3. Archiving and retrieving of data/information.

4. Preparation of a user's guide and national directory to available data/information and services, including those of the centre.

5. Dissemination of above directory either for general distribution or on a selective basis.

6. Answering requests for data/information on a reimbursable or non-reimbursable (exchange) basis, as received from academia, industry, government, the public. Output could be in the form of ad hoc inventories (tabular or graphic), data printouts, punched cards, magnetic tapes, summaries (tabular or graphic), references, referrals, etc.

7. Maintaining statistics on services provided, to indicate the volume and type of data and the customers served.

EXPANDED ACTIVITIES

Expanded activities subsequent to the initial establishment and operation of an NODC should include, in co-operation with its advisory bodies:

1. Periodic reviews of data centre services, based on performance in relation to early and present goals and priorities.

2. Planning for future responsibilities:

- new types of data
- new products based on existing data
- new international agreements or commitments
- recommendations for future budgets
- co-ordination of national efforts in oceanographic data management
- elimination of duplication in the national effort in oceanographic data processing, archiving and services.

Introduction

IOC Resolution VII-25 on Ocean Data Management notes: "The effective international exchange of oceanographic data is essential for international co-operation in the study of the nature and resources of the ocean".

The amount of oceanographic data entering the international data exchange system is increasing and will continue to increase.

Consequently:

- these data should be standardized as much as possible to facilitate their exchange, their intelligibility, and their retrieval;
- these data should be exchanged according to agreed upon principles.

A large number of data repositories within one nation would prove an insurmountable obstacle to the proper preparation and international flow of these data. The existence of an NODC would alleviate these difficulties.

International exchange

Oceanographic data may be exchanged internationally in two general ways: (1) bilaterally, e.g. between organizations or individuals in one country and their counterparts in another country; and (2) under internationally sponsored auspices, i.e. in accordance with the procedures outlined in the IOC's Manual on International Oceanographic Data Exchange (third edition, 1973). The World Data Centre system is an internationally sponsored exchange system*. National co-ordinators for international oceanographic data exchange are the key contacts in each nation for encouraging and conducting both bilateral and internationally sponsored exchange of oceanographic data (see Appendix 1).

Data exchanged under international auspices include those resulting from Declared National Programmes, international co-operative expeditions and programmes, and other oceanographic programmes of international interest. Declared National Programmes are lists of oceanographic cruises or projects either planned for a certain period of time ahead or already implemented in the past; these lists are communicated to the IOC Secretariat in a prescribed format (cf. paragraph 3.1 of referenced IOC Manual on International Oceanographic Data Exchange). One of the important functions a national centre performs is to assist in the compilation of the nation's Declared National Programme and to assure that copies of data approved for inclusion in the programme are transferred to the WDC's or other centres in accordance with provisions of the IOC Manual. Another international activity in which a national centre may participate is to act as a regional centre for an international co-operative expedition (see regional data centres or Responsible National Oceanographic Data Centres (cf. page 25)).

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* Established under the guidance of the International Council of Scientific Unio Responsibilities and operation of the World Data Centres are described in the third consolidated "Guide to International Data Exchange through the World Data Centres" (ICSU, Panel on World Data Centres, December 1973).

The IOC Manual lists over 30 countries in which there are NODC's or national agencies designated for data exchange. Many of these contain data mainly acquired by national institutions of the country housing the centre. Others, however, such as the U.S. NODC, may contain additional data acquired from the WDC's and other international depositories, or data acquired on a bilateral (country to country) exchange basis, outside the WDC system.

If a country plans to restrict the exchange of their data, the data may not be accepted in the WDC system; however, they may be bilaterally exchanged, in which case it is not required that the data be provided to the WDC's.

The methods of exchange to be adopted should be considered in the light of national interests and requirements. In many cases the centre may find it advantageous to use both general approaches; for example, exchange data bilaterally with foreign national centres or agencies, and deposit data in the WDC's. In negotiating bilateral exchange agreements, consideration must be given to the types of data, the format and medium of exchange, and the respective geographical areas of interest.

If a potential contributor of oceanographic data has a national centre or designated national agency, he should offer the data to them. If he finds the data suitable for international distribution and access through the WDC system, he may additionally request the national centre to further deposit the data in the WDC system.

A scientist in need of data should first approach his national centre or designated national agency. If they do not have the data, his request may be referred to a WDC or other pertinent depository, such as the FAO or Permanent Service for Mean Sea Level.

Various suggestions for modifying international exchange procedures which would assign additional responsibilities to the national centres are under study by the Working Committee on International Oceanographic Data Exchange of the Intergovernmental Oceanographic Commission.

International Oceanographic Commission activities

Data/information, management activities of the IOC are described in the following paragraphs:

The Intergovernmental Oceanographic Commission is an arm of the United Nations Educational, Scientific and Cultural Organization (Unesco). An Assistant Secretary of the Commission is responsible for, and acts in support of, a standing Working Committee (formerly Working Group) on International Oceanographic Data Exchange (WD-IODE)*. The Committee, with the Secretariat, provides strong focal points for:

(1) international exchange of data among the 86 Member States of the IOC;

(2) relationships with the International Council for the Exploration of the Sea (ICES), the International Hydrographic Organization (IHO), and specialized agencies of the United Nations system (e.g. FAO, WMO, IMCO, WHO, UNEP, Unesco); and

* A more detailed description of the functions and activities of the Working Committee on IODE is contained in the "IODE Handbook". It includes the terms of reference of the Working Committee, resolutions of IOC Governing Bodies, recommendations of the Working Committee concerning data and information management, as well as information on membership, subsidiary bodies, oceanographic data centres, national co-ordinators for IODE and IODE-related publications and documents.

(3) relationships with the international marine science community through the International Council of Scientific Unions (ICSU), the ICSU advisory bodies and the ICSU Panel on World Data Centres (WDC's).

The IOC Secretariat, the World Data Centres for Oceanography, the IODE Working Committee, and the ICSU Scientific Committee on Oceanic Research (SCOR) have worked together to ensure that the IOC's revised Manual on International Oceanographic Data Exchange (third edition, 1973) is in essential agreement with the update of the ICSU Guide to International Data Exchange through the World Data Centres (third edition, 1973). The Manual and Guide are essential references for every oceanographic data centre.

The IOC Secretariat, assisted by the World Data Centres (Oceanography) and by the Kuroshio Data Centre in Japan and ICES in Denmark, maintains an International Catalogue of Ocean Data Stations, published as Vol.2 of the series "IOC Manuals and Guides" in 1975. It will be regularly updated in Unesco upon receiving additional information from Member States through the above centres.

The discipline-oriented World Data Centres were originally established by ICSU to support the archives being generated by the activities of the International Geophysical Year (IGY). WDC-A (United States of America) and WDC-B (USSR) for Oceanography have been accepted by the Commission as the focus of the data exchange system for the international oceanographic community.

The oceanographic sciences are represented on the ICSU Panel on World Data Centres by the ICSU Scientific Committee on Oceanic Research, the International Association of the Physical Sciences of the Ocean and a representative jointly nominated by the Commission and Unesco*.

The nucleus of the IODE Working Committee (originally Working Group) was informally constituted during the organizational session of the Commission in 1960. IOC Resolution I-9, adopted at the first session of the Commission, prescribed that:

> "The mission of this working group shall be the facilitating of exchanges of oceanographic data, the standardization of forms for reporting and coding data, the encouragement of the preparation of data catalogues, and the assistance of development of national oceanographic data centres".**

The WC-IODE owes much of its strength to the fact that most Member State delegations include directors of national data centres, designated national agencies, or national co-ordinators. Since the Working Group's establishment in 1960, 14 Member States have established National Oceanographic Data Centres and a substantial number have prescribed a national responsibility in a Designated National Agency (DNA) or in a National Co-ordinator for International Oceanographic Data Exchange.

A number of inventory forms and data exchange formats have been recommended to Member States by the Working Committee on IODE, either for experimental or regular use. They are the following:

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* The Chairman of the Working Committee on IODE is, ex officio, a member of the ICSU Panel on World Data Centres.

** In 1973, the eighth session of the IOC Assembly decided to expand the terms of reference of the Working Committee to include matters relating to information management.

Inventory forms: "Report of Observations/Samples collected by Oceanographic Programmes" (ROSCOP)
"Results of Marine Biological Investigations" (ROMBI)
"International Geological/Geophysical Cruise Inventory" (IG/GCI)

Data formats: "IOC General Data Exchange Format" (GF-2)
"Data format for International Exchange of Marine Geological Data".

The WC-IODE maintains a close liaison with the Service Hydrographique of the International Council for the Exploration of the Sea (ICES) and its Marine Data Management Panel. Similarly, a continuing working relationship through the IOC Secretariat and the Committee exists with the Secretariats or key working groups or commissions of other United Nations specialized agencies.

On an operational level, the Commission and its members share research, resource, and data centre responsibilities, often with added co-ordination through the WC-IODE. Examples include: ICES-FAO-IOC Co-operative Investigation of the Northern Part of the Eastern Central Atlantic (CINECA); function of the ICES Service Hydrographique as a regional data centre since long before the WDC system (and still a major data contributor to the WDCs). National data centres sometimes function as regional oceanographic data centres supporting IOC Co-operative Studies. For example: the national centre in Japan supporting the Co-operative Study of the Kuroshio (CSK), the national centre in the United States supporting the Co-operative Investigation of the Caribbean and Adjacent Regions (CICAR), and the national centre in the USSR support the Co-operative Investigation of the Mediterranean (CIM). The rôle of a regional centre is to facilitate the archiving, control and dissemination of project produced oceanographic data; collect and make available historical data for the study area, and provide inventories and catalogues. Regional data centres assist in the design of data formats, provide data processing assistance, maintain a regional data base, assist in or provide data syntheses and analyses and their related products, and prepare these data for international exchange.

The reporting, formating, product preparation, and archiving services related to the IGOSS programme (see below) are being carefully worked out with the assistance of the WMO and its Technical Commission. Similarly, the IOC is developing a programme for the Global Investigation of Pollution in the Marine Environment (GIPME).

Much of the WC-IODE's work is carried out between sessions by two types of groups (in addition to the efforts of its Chairman and the IOC Secretariat): ad hoc groups, which are standing groups and may be perpetuated over a number of sessions; and Task Teams, which are generally expected to complete their work within one intersessional period*. Currently active ad hoc groups, Task Teams and recommended groups of experts of the IOC Working Committee for international oceanographic data exchange are listed in Appendix 7.

It appears certain that programmes of the Commission will continue to highlight interdisciplinary aspects. The International Decade of Ocean Exploration (IDOE) programme, as the acceleration phase of the Commission's Long-Term and Expanded Programme of Ocean Exploration and Research (LEPOR), is still quite young, but subprogrammes relating to the quality of the global environment are already achieving priority consideration. Many recommendations of the recent United Nations Conference on the Human Environment (UNCHE) are of specific concern to the Commission and are currently under study. Recommendations 91 and 101 emphasize the development of international provisions for interdisciplinary data/information management and referral systems.

* In addition, the eighth session of the Working Committee on IODE recommended the establishment of a new element in its structure, i.e. groups of experts.

The IOC, in conjunction with the Unesco Office of Oceanography, with financial support from the U.S. Agency for International Development and the U.S. National Science Foundation, and with the assistance of the U.S. NODC, has provided on-the-job training to 35 candidates from 21 nations, as part of a programme to assist the developing countries of Asia, Latin America and Africa to strengthen their capabilities to manage, process and utilize more effectively data and information about ocean resources and the related marine environment. These trainees will in many cases provide the nucleus for establishing data centres within their countries.

Brief descriptions of the existing oceanographic world, regional and national data centres, as well as specialized data and information centres, such as hydrographic, marine biological, etc., their capabilities, holdings accessibility, marine data and information service facilities, existing under the cognizance of ICSU, IOC, WMO, FAO, IHO, WHO, IAEA, ICES, UNEP are given in the brochure "A Guide to International Marine Data Services", published by IOC/Unesco in 1975, prepared by the Joint Task on Interdisciplinary and Interorganizational Data and Information Management and Referral. Steps have been taken to prepare more technical documented inventories of the data and information bases within the centres or systems previously identified in the brochure, which will serve as a Marine Environmental Data and Information (MEDI) Referral Catalogue.

The MEDI Referral Catalogue will provide information on the following:

- organizational characteristics of potential sources for environmental information (identically to the International Referral System (IRS) of the United Nations Environment Programme (UNEP));
- general characteristics of a coherent data file;
- detailed descriptions of its files in the form of the Environmental Data Base Directory (EDBD).

Regional co-operative investigations

In the IOC Manual on IODE (Unesco 1973) it is stated as follows:

"Another important form of international co-operation in marine science is participation in an international co-operative oceanographic expedition or programme. The agreement to conduct such an expedition or programme jointly is naturally associated with an intention on the part of the participating countries to share its results. When such an expedition or programme is carried out under the auspices of the IOC, the participants are obligated to exchange the resulting data according to the system outlined in this Guide or by amendments to this Guide that may be made by appropriate international co-ordination groups. If, however, such an expedition or programme is organized by other intergovernmental or non-governmental organizations, pertinent data should enter the present scheme of data exchange either through national, regional or disciplinary centres, or through the mechanism of declared national programmes".

Global co-operative investigations

The Integrated Global Ocean Station System (IGOSS), a programme sponsored jointly with WMO is a synoptic system designed to provide international monitoring and prediction services, including regional analyses and prediction for the marine community.

The data obtained in support of IGOSS after their initial operational use, continue to constitute an important resource and can serve for many years to come for a great variety of oceanographic applications and research requirements. IGOSS data, whether telecommunicated or transmitted by conventional means, should therefore be "preserved" for future users. "Preservation" in this context means that the data must be systematically acquired, archived, and retrieved for exchange and services.

The IOC Manual on IGOSS Data Archiving and Exchange (published in 1974 by IOC/Unesco in the series "IOC Manuals and Guides", Vol.1), which supplements the IOC Manual on IODE, is primarily concerned with archiving and exchange of oceanographic data, collected under IGOSS and reported in, or related to, the Code Forms BATHY (Temperature) and TESAC (Temperature/Salinity/Currents).

The concepts presented in this Manual are intended to accomplish the following objectives:

- establish certain obligatory procedures for the flow, archiving, processing, inventorying, and exchange of data collected under IGOSS to serve the long-term needs of the non-operational or secondary users;

- establish standard IOC/WMO logs and instructions for the ship-based encoding of data recorded according to WMO Code Forms for BATHY and TESAC;

- establish standard IOC exchange formats for archived BATHY and TESAC data;

- recommend specific procedures or discuss in illustrative terms various details of the IGOSS data archiving and exchange procedures, which eventually should become standardized as the implementation of IGOSS progresses. Examples of these are the format of inventory reports, quality control and processing procedures, data products, and data services.

The Working Committee on International Oceanographic Data Exchange agreed that a new element should be added to the present international data exchange network, composed of Designated National Agencies (DNAs), NODCs, regional centres and WDCs, namely the Responsible National Oceanographic Data Centre (RNODC).

At its eighth session (May 1975), the Working Committee on IODE defined the functions of RNODCs as follows (Recommendation IODE-VIII.12, Appendix 1):

Functions of the Responsible National Oceanographic Data Centres (RNODCs)

The RNODCs will:

(a) as their primary function, aid the World Data Centres (Oceanography) (WDCs) by providing various types of readily available services (i.e. statistical data summaries, data displays, etc.) at minimal costs for either specific projects, specific regions or specialized types of data. To this end, the World Data Centres will, under guidelines established by ICSU and the IOC Manual on IODE, arrange for the provision of data as required by the various RNODCs;

(b) assist, not necessarily on a regional basis, National Oceanographic Data Centres (NODCs) and Designated National Agencies (DNAs) requesting such help with the conversion of data into accepted standard formats and into preferred technical carriers (i.e. generally magnetic tapes) for subsequent submission to the WDCs;

(c) by arrangement, upon request, prepare non-standard data summaries, graphs and charts for their area of interest, or projects, but on a reimbursable basis;

(d) assist in the training of staff of emergent NODCs and DNAs in standard data management practices;

(e) compile and make available to the WDCs directories of both their data-base holdings and those data which are not suitable for centralized storage but which are stored at national or laboratory levels, or at non-oceanographic repositories.

APPENDIX 1

LIST OF REFERENCES

Publications

Intergovernmental Oceanographic Commission. Comprehensive Outline of the Scope of the Long-term and Expanded Programme of Oceanic Exploration and Research, Paris, Unesco, 1970 (IOC Technical Series No.7)

Intergovernmental Oceanographic Commission. IGOSS (Integrated Global Ocean Station System) General Plan and Implementation Programme for Phase I, Paris, Unesco, 1971 (IOC Technical Series No.8)

Intergovernmental Oceanographic Commission. Manual on International Oceanographic Data Exchange, third edition (revised), Paris, Unesco, 1973 (IOC Technical Series No.9)

Intergovernmental Oceanographic Commission. Manual for IGOSS Data Archiving and Exchange, Paris, Unesco, 1974 (Series "IOC Manuals and Guides", Vol.1)

Intergovernmental Oceanographic Commission. International Catalogue of Ocean Data Stations, Paris, Unesco, 1975, (Series "IOC Manuals and Guides", Vol.2)

International Council of Scientific Unions. Guide to International Data Exchange through the World Data Centres, third edition, 1973

Unesco. Guide to International Marine Environmental Data Services, Paris, 1975

World Data Centre B, Oceanography. Concise Guide for Collecting, Processing and Documentation of CIM Data, Moscow, 1972

Documents

Data Format for International Exchange of Marine Geological Data (document IOC/IODE-VIII/INF.1)

Results of Marine Biological Investigations (ROMBI) - Reporting Form (document IOC/IODE-VIII/INF.2)

APPENDIX 2

LIST OF ACRONYMS

ACOMR	Advisory Committee on Oceanic Meteorological Research
ASFIS	Aquatic Sciences and Fisheries Information System
BATHY	Bathythermograph
CICAR	Co-operative Investigations of the Caribbean and Adjacent Regions
CIM	Co-operative Investigations in the Mediterranean
CINECA	Co-operative Investigations of the Northern Part of the Eastern Central Atlantic
DNA	Designated National Agency
ECOR	Engineering Committee on Oceanic Resources
EDBD	Environmental Data Base Directory
EDS	Environmental Data Service
FAO	Food and Agriculture Organization
GARP	Global Atmospheric Research Programme
GATE	GARP Atlantic Tropical Experiment
GIPME	Global Investigation of Pollution in the Marine Environment
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IDOE	International Decade of Ocean Exploration
IGGCI	International Geological/Geophysical Cruise Inventory
IGOSS	Integrated Global Ocean Station System
IGY	International Geophysical Year
IHO	International Hydrographic Organization
IMCO	Inter-Governmental Maritime Consultative Organization
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Exchange
IRS	International Referral System (of UNEP)

LEPOR	Long-term and Expanded Programme of Oceanic Exploration and Research
MEDI	Marine Environmental Data and Information
NOAA	National Oceanic and Atmospheric Administration (of the United States)
RDC	Regional Data Centre
RNODC	Responsible National Oceanographic Data Centre
ROMBI	Results of Marine Biological Investigations
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes
SCOR	Scientific Committee on Oceanic Research
TEMA	Training, Education and Mutual Assistance
TESAC	Temperature/Salinity/Currents
UNCHE	United Nations Conference on the Human Environment
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISIST	World Science Information System
WDC	World Data Centre
WHO	World Health Organization
WMO	World Meteorological Organization

APPENDIX 3

NATIONAL CO-ORDINATORS FOR INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE AND OCEANOGRAPHIC DATA CENTRES

	NODC or DNA	Date founded
Nestor Lopez Ambrosioni Argentine Oceanographic Data Centre (CEDO) Avenida Montes de Oca 2124 Buenos Aires Argentina	NODC	1974
Captain G.H.S. Osborn The Hydrographer Hydrographic Office Garden Island, N.S.W. 2000 Australia	NODC	1964
Adm. Paulo Gitahy de Alencastro Director, Hydrographic and Navigation Department Ilha Fiscal Rio de Janeiro Brazil	DNA	1971
Marine Environmental Data Service (MEDS) 615 Booth Street Ottawa Canada	NODC	
Captain Bruno Klaue Head, Centro Nacional de Datos Oceanograficos de Chile Instituto Hidrografico de la Armada Casilla 324 Valparaiso Chile	NODC	1968
Centros Nacionales de Datos Oceanograficos Centro Colombiano de Datos Oceanograficos "CECOLDO" Armada Nacional Mindefensa-Can-Oficina, 114 Apartado Aereo No.28466 Bogotá Colombia		
The Royal Danish Hydrographic Office Esplanaden 19 DK-1263 Copenhagen K Denmark		

	NODC or DNA	Date founded
Servicio Hidrográfico y Oceanográfico Armada del Ecuador P.O. Box 5940 Guayaquil Ecuador	NODC	Scheduled for 1973
Prof. Dr. Mostafa Salah Institute of Oceanography and Fisheries Kayet. Bey, Alexandria Arab Republic of Egypt	NODC	1971
Mr. Pentti Mälkki Institute of Marine Research P.O.B. 166 SF 00141 Helsinki 14 Finland	DNA	1930s
M. Georges Péluchon Chef du Bureau National de Données Océaniques of the Centre Océanologique de Bretagne (BNDO) Centre National pour l'Exploitation des Océans BP 337 29273 Brest Cedex France	NODC	1971
Herr Dipl.-Met. D. Kohnke Leiter des Deutschen Ozeanographischen (DOD) Datenzentrums D.2000 Hamburg 4 Bernhard-Nocht-Str. 78 Federal Republic of Germany	NODC	1967
Mr. Martin A. Mensah Fishery Research Unit United Nations Development Programme, FAO P.O. Box B 62, Community 2 Tema Ghana	DNA	
Ing. Rafael Santiago Chief, Section of Hydrography Institute of National Geography Guatemala	NODC	1949
dr. Unnsteinn Stefansson Chief, Oceanographic Department Marine Research Institute Skulagata 4 Reykjavik Iceland	NODC	
Dr. V.S. Bhatt National Oceanographic Data Centre National Institute of Oceanography P.O. Caranzalem Dona Paula, Goa India	NODC	1964

	NODC or DNA	Date founded
Dr. Al Magribi, Ali Basrah University College of Sciences Basrah Iraq		
Dr. Artur Hecht Oceanographic and Limnological Research Co. 120 Haatzmauth Road Haifa Israel		
Centro Nazionale Raccolta Dati Oceanographici Consiglio Nazionale Della Ricerche 7 Piazzale della Scienze Rome Italy	NODC	
Mr. Hideo Nitani Director, Japan Oceanographic Data Centre Hydrographic Department Maritime Safety Agency 3-1, 5-chome Tsukiji Chuo-Ku Tokyo 104 Japan	NODC	1965
Mr. Hyung-ki Kim Director of Technical Cooperation Bureau Ministry of Science and Tech. Seoul Republic of Korea	NODC	1974
Dr. Sami Lakkis National Council for Scientific Research Bld. Cité Sportive Dagher and Fakhri Bldg. Box 8281 Beirut Lebanon		
Mr. A. Crosnier Directeur Office de la Recherche Scientifique et Technique Outre-Met (ORSTOM) Boite Postale No.68 Nosy Be Madagascar		
Dr. Louis Saliba Department of Agriculture and Fisheries The Royal University of Malta Msida Malta		

	NODC or DNA	Date founded
Centro Nacional de Datos Oceanográphicos (CENADO) Instituto de Geofisca Universidad Nacional Autonoma de Mexico Mexico 2.D.F. Mexico	NODC	
Mr. Jilali Mouedden Institute of Maritime Fisheries Rue de Tiznit Casablanca Morocco	NODC	
Mr. G.K. Schoep Netherlands Centre for Oceanographic Data Department of Oceanography and Maritime Meteorology Royal Netherlands Meteorological Institute Utrechtseweg 297 De Bilt Netherlands	NODC	1974
Mr. Reidar Leinebø Norsk Oseanografisk Datasentir (NOD) Fiskeridirektoratets Havforskningsinstitutt Postboks 2906 5011 Bergen - Nordnes Norway	NODC	1972
Mr. S.D. D'Souza Commander, P.M. Director of Hydrology Naval Headquarters Karachi Pakistan	NCOR	1962
Mr. Oscar G. Guillen Chief, Oceanographic Department Institute of Delmar Casilla 3734 Callao Peru	DNA	
Mr. Mario C. Manansala Philippine Oceanographic Data Centre Republic of the Philippines Department of National Defense c/o Bureau of Coast and Geodetic Survey 421 Barraca, San Nicolas Manila Philippines	DNA	
Ing. Gheorghe Serpoianu Institutul Roman de Cercetari Marine Bulevardul Lenin Nr. 300 Constantza Romania	DNA	1970

	NODC or DNA	Date founded
Dr. Tham Ah Kow Director Regional Marine Biological Centre c/o University of Singapore Bukit Timah Road Singapore 10		
Dr. F.M. Fernandez Director del Centro Español de Datos Oceanográficos Instituto Español de Oceanografía C./Alcalá, No.27-4° Madrid-14 Spain	NODC	1968
Dr. Artur Svansson Fishery Board of Sweden Box 4031 40040 Göteborg 4 Sweden	DNA	1966
Prof. Pierre Tardent President of the Commission d'Océanographie et de Limnogéologie de la SHSN Zoologisches Institut der Universität Künstlergasse 16 8006 Zürich Suisse		
The Principal Secretary Ministry of Natural Resources and Tourism P.O. Box 9372 Dar es Salaam Tanzania	DNA	1971
Mrs. Chalermvarn Choosup Thai National Documentation Centre Applied Scientific Research Corp. Bangkok 9 Thailand		
Mr. Sveket Gucluer Department of Navigation and Hydrography Seyir ve Hidrografi Daire Baskanligi Cubuklu-Istanbul Turkey	DNA	
Mr. V.I. Lamanov Head, Oceanographic Data Centre of the USSR 6 ul. Koroleva Obninsk Kaluzhskaya oblasth USSR		

	NODC or DNA	Date founded
Dr. D.T. Grossart British Oceanographic Data Service Institute of Oceanographic Sciences Wormley Godalming Surrey - GV8 5UB United Kingdom	NODC	1968
Mr. Robert V. Ochinero Director National Oceanographic Data Center National Oceanic and Atmospheric Administration Environmental Data Service Washington, D.C. 20235 United States of America	NODC	1961
WDC-A (Oceanography) National Oceanic and Atmospheric Administration Rockville, Maryland 20852 United States of America		
WDC-B (Oceanography) Moloderhuaya 3 Moscow 117-296 USSR		
Regional Oceanographic Data Centre International Council for the Exploration of the Sea (ICES) Service Hydrographique Charlottenlund Slot DK-2920 Charlottenlund Denmark		

APPENDIX 4

	ACCESSION NUMBER

DATA DOCUMENTATION FORM

NOAA FORM 24-13
(4-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANOGRAPHIC DATA CENTER
RECORDS SECTION
ROCKVILLE, MARYLAND 20852

FORM APPROVED
O.M.B. No. 41-R2651

This form should accompany all data submissions to NODC. Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent information at that time. This may be most easily accomplished by attaching reports, publications, or manuscripts which are readily available describing data collection, analysis, and format specifics. Readable, handwritten submissions are acceptable in all cases. All data shipments should be sent to the above address.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED BY DONOR FOR ALL DATA TRANSMITTALS

1. NAME AND ADDRESS OF INSTITUTION, LABORATORY, OR ACTIVITY WITH WHICH SUBMITTED DATA ARE ASSOCIATED

2. EXPEDITION, PROJECT, OR PROGRAM DURING WHICH DATA WERE COLLECTED

3. CRUISE NUMBER(S) USED BY ORIGINATOR TO IDENTIFY DATA IN THIS SHIPMENT

4. PLATFORM NAME(S)

5. PLATFORM TYPE(S) *(E.G., SHIP, BUOY, ETC.)*

6. PLATFORM AND OPERATOR NATIONALITY(IES)

PLATFORM	OPERATOR

7. DATES

FROM: MO/DAY/YR	TO: MO/DAY/YR

8. ARE DATA PROPRIETARY?

☐ NO ☐ YES

IF YES, WHEN CAN THEY BE RELEASED FOR GENERAL USE? YEAR____ MONTH____

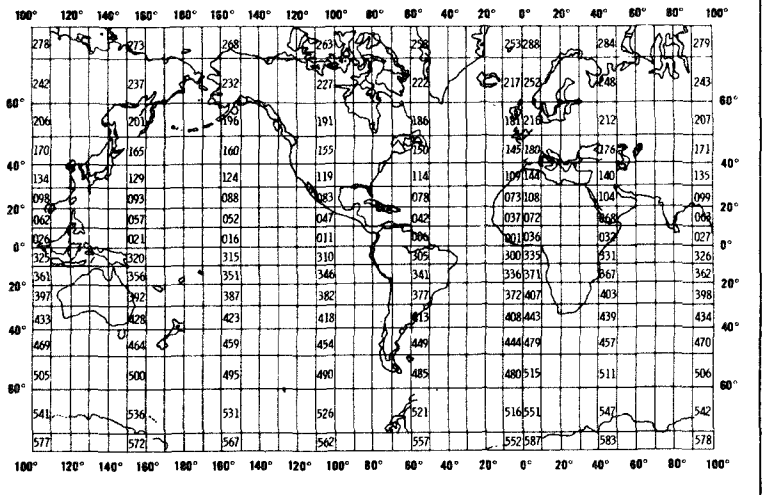
9. ARE DATA DECLARED NATIONAL PROGRAM (DNP)?
(I.E., SHOULD THEY BE INCLUDED IN WORLD DATA CENTERS HOLDINGS FOR INTERNATIONAL EXCHANGE?)

☐ NO ☐ YES ☐ PART *(SPECIFY BELOW)*

10. PERSON TO WHOM INQUIRIES CONCERNING DATA SHOULD BE ADDRESSED WITH TELEPHONE NUMBER *(AND ADDRESS IF OTHER THAN IN ITEM-1)*

11. PLEASE DARKEN ALL MARSDEN SQUARES IN WHICH ANY DATA CONTAINED IN YOUR SUBMISSION WERE COLLECTED.

GENERAL AREA



NOAA FORM 24-13

USCOMM-DC 44289-P72

B. SCIENTIFIC CONTENT

Include enough information concerning manner of observation, instrumentation, analysis, and data reduction routines to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained as a permanent part of the data and will be available to future users. Equivalent information already available may be substituted for this section of the form (i.e., publications, reports, and manuscripts describing observational and analytical methods). If you do not provide equivalent information by attachment, please complete the scientific content section in a manner similar to the one shown in the following example.

EXAMPLE (HYPOTHETICAL INFORMATION)

NAME OF DATA FIELD	REPORTING UNITS OR CODE	METHODS OF OBSERVATION AND INSTRUMENTS USED (SPECIFY TYPE AND MODEL)	ANALYTICAL METHODS (INCLUDING MODIFICATIONS) AND LABORATORY PROCEDURES	DATA PROCESSING TECHNIQUES WITH FILTERING AND AVERAGING
Salinity	‰	Nansen bottles	Inductive salinometer (Hytech model 5510)	N/A (not applicable)
		STD Bissett-Berman Model 9006	N/A	Values averaged over 5-meter intervals
Water color	Forel scale	Visual comparison with Forel bottles	N/A	N/A
Sediment size	ϕ units and percent by weight	Ewing corer	Standard sieves. Carbonate fraction removed by acid treatment	Same as "Sedimentary Rock Manual," Folk '65

(SPACE IS PROVIDED ON THE FOLLOWING TWO PAGES FOR THIS INFORMATION)

C. DATA FORMAT

This information is requested only for data transmitted on punched cards or magnetic tape. Have one of your data processing specialists furnish answers either on the form or by attaching equivalent readily available documentation. Identify the nature and meaning of all entries and explain any codes used.

1. List the record types contained in your file transmittal (e.g., tape label record, master, detail, standard depth, etc.).

2. Describe briefly how your file is organized.

3-13. Self-explanatory.

14. Enter the field name as appropriate (e.g., header information, temperature, depth, salinity.

15. Enter starting position of the field.

16. Enter field length in number columns and unit of measurement (e.g., bit, byte, character, word) in unit column.

17. Enter attributes as expressed in the programming language specified in item 3 (e.g., "F 4.1," "BINARY FIXED (5.1)").

18. Describe field. If sort field, enter "SORT 1" for first, "SORT 2" for second, etc. If field is repeated, state number of times it is repeated.

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE, OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE
GIVE METHOD OF IDENTIFYING EACH RECORD TYPE

2. GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-1 ☐ ALGOL ☐ COBOL ☐ FORTRAN ☐ _____ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:
NAME AND PHONE NUMBER _____
ADDRESS _____

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE ☐ BCD ☐ BINARY ☐ ASCII ☐ EBCDIC ☐ _____

6. NUMBER OF TRACKS (CHANNELS) ☐ SEVEN ☐ NINE ☐ _____

7. PARITY ☐ ODD ☐ EVEN

8. DENSITY ☐ 200 BPI ☐ 1600 BPI ☐ 556 BPI ☐ 800 BPI ☐ _____

9. LENGTH OF INTER-RECORD GAP (IF KNOWN) ☐ 3/4 INCH ☐ _____

10. END OF FILE MARK ☐ OCTAL 17 ☐ _____

11. PASTE-ON-PAPER LABEL DESCRIPTION *(INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)*

12. PHYSICAL BLOCK LENGTH IN BYTES

13. LENGTH OF BYTES IN BITS

NOAA FORM 24-13 USCOMM-DC 44289-P72

RECORD FORMAT DESCRIPTION

RECORD NAME _____

14. FIELD NAME	15. POSITION FROM - 1 MEASURED IN _____ (e.g., bits, bytes)	16. LENGTH		17. ATTRIBUTES	18. USE AND MEANING
		NUMBER	UNITS		

NOAA FORM 24-13 USCOMM-DC 44289-P72

D. INSTRUMENT CALIBRATION

This calibration information will be utilized by NOAA's National Oceanographic Instrumentation Center in their efforts to develop calibration standards for voluntary acceptance by the oceanographic community. Identify the instruments used by your organization to obtain the scientific content of the DDF (i.e., STD, temperature and pressure sensors, salinometers, oxygen meters, velocimeters, etc.) and furnish the calibration data requested by completing and/or checking ("✓") the appropriate spaces. Add the interval time (i.e., 3 months, 6 months, 9 months, etc.) if the fixed interval calibration cycle is checked.

INSTRUMENT TYPE (MFR., MODEL NO.)	DATE OF LAST CALIBRATION	INSTRUMENT WAS CALIBRATED BY		CHECK ONE: INSTRUMENT IS CALIBRATED					INSTRUMENT IS NOT CALIBRATED
		YOUR ORGANIZATION (√)	OTHER ORGANIZATION (GIVE NAME)	AT FIXED INTERVALS (√)	BEFORE OR AFTER USE (√)	BEFORE AND AFTER USE (√)	ONLY AFTER REPAIR (√)	ONLY WHEN NEW (√)	(√)

APPENDIX 5

AN OVERVIEW OF THE U.S. ENVIRONMENTAL DATA BASE DIRECTORY

INTRODUCTION

Recommendation 101 and, more specifically, Recommendation 91 from the United Nations Conference on the Human Environment at Stockholm 1972, speak to the need for comprehensive, interdisciplinary, environmental data and information referral services. What follows is a description of the Environmental Data Base Directory, a referral system developed by the Environmental Data Service of the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce, for referral to available files or "data bases" of environmental data

OVERVIEW OF THE SYSTEM

The Environmental Data Base Directory (EDBD) is a major element in NOAA's Environmental Data Index (ENDEX) concept. Other elements of ENDEX include data collection effort descriptions (i.e. Report of Observations/Samples Collected by Oceanographic Programmes (ROSCOP)) and other international and domestic first- and second-level data inventories, and detailed descriptions and illustrative displays from large existing sets of environmental data. A system similar to the EDBD was developed by the IOC's IMAR Task Team. This system is called MEDI (Marine Environmental Data Inventory).

The objectives of the Environmental Data Base Directory (EDBD) portion of ENDEX is to provide managers, planners, scientists, and engineers with a comprehensive data referral service to existing and available files of environmental data. To do this, an interview scheme has been devised to describe environmental files, load these descriptions into a flexible computer system, search these files in an interactive manner and publish timely subsets for geographic and discipline areas of current interest. A concept fundamental to the effective operation of EDBD was the development and use of a standardized, controlled vocabulary of environmental data and their method of observation (or laboratory analysis). The controlled vocabulary ensured common understanding of the terms in these fields by a variety of participants, i.e. data collectors, data managers, and data users involved in the EDBD effort.

USE OF CONTROLLED VOCABULARIES

A key ingredient for efficient retrieval, i.e. minimizing false drops (returns) and misses, is the use of controlled vocabularies for particular scientific fields. A full listing of the ENDEX Vocabulary as well as the "ENDEX Vocabulary Manual", which contains explanations concerning the format of the vocabulary and user instructions, is available from the U.S. NODC.

The vocabulary is a collection of all the environmental parametric terms that represent data catalogued in the EDBD. Each unique measurement of the environment is represented by a "proper" term consisting of the parameter accompanied by the sphere in which it was sampled and the method of sampling. The rest of the vocabulary consists of terms which are more general or specific, i.e. synonyms to "proper" terms and pointers to the "proper" term. Every time a new term occurs (i.e. verified as not already in the vocabulary) the vocabulary is augmented and periodically a new listing of the updated vocabulary is prepared. This unique identification of scientific measurements ensures accurate retrieval regardless of the user's scientific field of specialization.

DESCRIPTION OF A FILE OF ENVIRONMENTAL DATA

A file of available environmental data is the unit upon which descriptions are prepared and referrals made. A file is considered as a self-contained batch of data which can be handled as a unit and should have the following characteristics:

- it should be generally available to requesters from the holding organization;
- it should be a "batch" of data normally stored and handled as a unit (i.e. a data report, a magnetic tape or set of magnetic tapes, a file of photographs, etc.);
- access to any record within the file should be based on a single scheme (i.e. the same computer programme could be used to retrieve from any portion of the file).

Each description (see Figure 1) of a file of environmental data consists of the organization name and address of the holder of the data file, location and time period of the actual measurements, a brief narrative abstract giving salient features and uses of the file, and a list of all parameters and methods by which the data were collected. Detailed instructions for coding information about a data file or data base are given in the Handbook for Interviewers (available from EDS).

RETRIEVAL STRATEGIES

Searches can be made for virtually any descriptor coded into the file but generally will be confined to time period, geographic region, institution and desired parameters. Requests can be phrased and rephrased until a subset of file descriptions satisfying particular requirements has been located. There are a number of display options: the number of "hits", by groupings of selected descriptors, or whole file descriptions. A requester may, after a brief period of training, enter his own request or the request can be phoned in and an EDS data specialist will phrase and enter the request and relay results either by phone or mail.

It should be emphasized that data per se are not contained in the ENDEX EDBD system, only descriptions of data and data files. A requester, after receiving a list of possible files of interest to him, must still make arrangements with the holding institution to get the data. These arrangements can be made at cost by the EDS. Data held by the Environmental Data Service data centres are readily available at cost of retrieval.

ACQUISITION OF FILE DESCRIPTIONS

Describing a file of environmental data is a task requiring specialization and training. A Handbook for Interviewers and a training programme have been prepared to instruct personnel in the techniques of file description.

Mail surveys (questionnaires) have been used to gain a feel for the types and volumes of environmental data in a region. However, the depth to which one can go in a mailed questionnaire is very limited. EDS experience has shown that an interview approach to describing files is by far the most effective technique to use. The interview approach is slower and initially more expensive but the quality, depth and breadth of the results, to date, appear to be vastly superior to other techniques.

UPDATING FILE DESCRIPTIONS

A critical aspect of data referral is the continuing maintenance of file descriptions. New files are constantly being produced. Their descriptions need timely

entry into the system. Information on changes in the availability and/or location of files must be sought and entered into the system.

The technique used with ENDEX (EDBD) is to regularly (every two years) send to each contributor a listing of his particular data file descriptions, with a request that he update any out-of-date information.

Figure 1

Example of one entire ENDEX (EDBD) record

CARBON FLUX IN AN ESTUARINE MARSH No. 000066

U.S. COASTAL, NORTH ATLANTIC OCEAN, CHESAPEAKE BAY, VIRGINIA,
YORK RIVER, WARE AND CARTER CREEKS.
MARSDEN SQ- 11676
OBS PERIOD- JUN 1971 to PRESENT

ABSTRACT:
The energy budget of a tidal cycle in the estuarine waters of the Ware and Carter Creeks of the York River was measured each month from June 1971 to the present. Carbon flux parameters were measured in the top 6 inches of water and reported in a VIMS thesis and available at no cost upon request.

Parameter	Sphere	Method	Units	Obs.	Freq.
position	earth	fixed point	map location	24 stations	24 hourly/ month
time	earth	station time	ymdhl	22 stations	24 hourly/ month
salinity	water	conductivity	parts per thousand	1000 obs	24 hourly/ month
dissolved oxygen - winkler titration -	water	titration	milligrams per litre	1000 obs	24 hourly/ month
adenosine triphosphate - luciferin-luciferase	water	bioassy	mg atp per litre	1000 obs	24 hourly/ month
carbon	water	beta scintillation - wet cumbustion/ infrared spectrometry	milligrams per litre	1000 obs	24 hourly/ month
total organic carbon	water	wet combustion/ infrared spectrometry	milligrams per litre	1000 obs	24 hourly/ month
dissolved organic carbon	water	wet combustion/ infrared spectrometry	milligrams per litre	1000 obs	24 hourly/ month
particulate organ carbon	water	wet combustion/ infrared spectrometry	milligrams per litre	1000 obs	24 hourly/ month

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GLOUCESTER POINT, VIRGINIA, USA 23062
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APPENDIX 6

COMPREHENSIVE OUTLINE OF THE SCOPE OF THE LONG-TERM AND EXPANDED PROGRAMME OF OCEANIC EXPLORATION AND RESEARCH (LEPOR)

(Introduction to the comprehensive outline of the scope of LEPOR extracted from the IOC Technical Series No.7, Unesco, 1970)

1. The General Assembly of the United Nations in December 1968 adopted Resolution 2467 (XXIII), which contains the following request to the Intergovernmental Oceanographic Commission (Part D, Section 4.a):

> "4. Requests the United Nations Educational, Scientific and Cultural Organization that its Intergovernmental Oceanographic Commission:
>
> (a) Intensify its activities in the scientific field, within its terms of reference and in co-operation with other interested agencies, in particular with regard to co-ordinating the scientific aspects of a long-term and expanded programme of world-wide exploration of the oceans and their resources of which the International Decade of Ocean Exploration will be an important element, including international agency programmes, and expanded international exchange of data from national programmes, and international efforts to strengthen the research capabilities of all interested nations with particular regard to the needs of the developing countries;".

This programme will be referred to further in this document as the Expanded Programme.

2. A Special Working Group of the IOC on the Long-Term and Expanded Programme, established by the IOC Bureau and Consultative Council at its 9th meeting, met in Paris, 16-21 June 1969, and prepared a "Draft Comprehensive Outline of the Scope of the Long-Term and Expanded Programme of Oceanic Exploration and Research" (SC/IOC-VI/7 Appendix). The Working Group used as the basis of its work the report "Global Ocean Research" prepared by a Joint Working Party of the Advisory Committee on Marine Resources Research of the FAO, the Scientific Committee on Oceanic Research of ICSU, and the AGOR of the World Meteorological Organization, and more than 30 national proposals.

3. The present "Comprehensive Outline of the Scope of the Expanded Programme" as adapted from the Draft Outline reflects comments received on the Draft Outline from Member States, the United Nations Committee on Peaceful Uses of the Sea-bed and Ocean Floor Beyond the Limits of National Jurisdiction, and other interested international organizations. The report "Global Ocean Research" is attached as Appendix I. In adopting this outline, the Sixth Session of the Intergovernmental Oceanographic Commission recognized that, by the very nature of marine science, the outline cannot be exhaustive and that other programmes of equal merit may well arise during the course of the Expanded Programme.

4. The purpose of the Expanded Programme is recognized to be as follows:

> "to increase knowledge of the ocean, its contents and the contents of its subsoil, and its interfaces with the land, the atmosphere, and the ocean floor and to improve understanding of processes operating in or affecting the marine environment, with the goal of enhanced utilization of the ocean and its resources for the benefit of mankind".

In achieving this purpose, the Commission should take into account the needs and interests of developing countries.

5. The proposals for the Expanded Programme contained in the Draft Outline cover also the International Decade of Ocean Exploration as an important element of this Programme as defined by United Nations Resolution 2467 D (XXIII). In order to understand better the relationship between these programmes, the Working Group recommended that the implementation of the Expanded Programme be started as soon as feasible after its adoption, preferably in 1970, and that the International Decade of Ocean Exploration be recognized as the acceleration phase of the Expanded Programme.

6. Various steps are under way to broaden the base of the IOC and to strengthen the co-operation between IOC and other interested bodies of the United Nations system. The IOC Sixth Session decided that the broadened IOC, in close co-operation with other interested bodies, accept the proposed responsibilities to (1) develop the scientific content and form of the Expanded Programme, and (2) to co-ordinate its implementation.

7. During the early years of the Expanded Programme major emphasis must be given to detailed planning. Although it is not now possible to identify all the ongoing and scheduled activities relevant to the purposes of the Expanded Programme, there are certain activities that can clearly contribute to its initial phase, such as:

(a) co-operative investigations, such as that under way in the Kuroshio and adjacent regions, and those planned or projected in the Caribbean, Mediterranean, Southern Ocean and North Atlantic;

(b) those elements of IGOSS that relate to the research on the scales and frequencies of oceanic phenomena, investigations of ocean-atmosphere interaction directed towards understanding of the ocean, and studies of variability required for the design of the eventual operating system;

(c) those elements of World Weather Watch and the Global Atmospheric Research Programme that concern oceanic phenomena and the influence on them of atmospheric conditions and processes;

(d) those elements of the regular and field programmes of international agencies dealing with scientific aspects of marine resources and their environment.

8. It was recognized that a number of co-operative investigations are being carried out by international organizations outside the United Nations system, such as ICES and ICMAF. Such investigations may be highly relevant to the purpose of the Expanded Programme and ways must be found to facilitate their co-ordination with programmes being implemented within the United Nations system. For example, an IOC/ICES/ICMAF Co-ordinating Group for the North Atlantic has already been established with this end in view.

It was also noted that a number of supporting activities within the United Nations system and by other organizations will contribute importantly to implementation of the Expanded Programme. These include activities related to data and information management; training, education and manpower; instrumentation and methods; technology and supporting facilities and services; assistance to developing countries; legal aspects of scientific investigation. Comment on these matters is given later in this document.

9. During the development of the Expanded Programme, new co-operative projects will be presented for possible inclusion. In the view of the IOC Sixth Session the following criteria could be applied as appropriate in the selection of co-operative projects:

(1) Member States are willing to participate actively in the project;

(2) the project can be carried out most effectively through international co-operative action;

(3) the project has a sound scientific basis and is well designed to yield significant new information;

(4) the project will provide information and understanding that will contribute to the goal of enhanced utilization of the ocean and its resources;

(5) the project will help meet the needs of developing countries.

A project that satisfied all these criteria would be an extremely strong candidate for inclusion in the Expanded Programme. It will not be necessary in each case that all criteria be met, but the willingness of Member States to participate is clearly essential.

APPENDIX 7

AD HOC GROUPS, TASK TEAMS AND GROUPS OF EXPERTS OF THE IOC WORKING COMMITTEE FOR INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE

(as established at the eighth session of the Working Committee on IODE, May 1975)

Ad hoc Groups

1. Marine Pollution Data
2. Exchange of Satellite and Airborne Sensed Data
3. IGOSS Data Archiving and Exchange
4. Marine Geological/Geophysical Data Management
5. Marine Information Management
6. Format Development
7. Joint IOC/WMO ad hoc Group on Air-Sea Interaction Data

Task Teams

1. Wave Data Management

Groups of Experts

1. Marine Environmental Data and Information (MEDI) Referral System
2. Development of a Pilot Programme for Responsible National Oceanographic Data Centres (RNODCs)
3. Joint FAO/IOC Panel of Experts on Aquatic Sciences and Fisheries Information System (ASFIS)