NEDRES and MEDI: Complementary Systems for Data Referral and Exchange

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Abstract

This paper begins by setting out the situation with respect to the large volume of environmental data holdings and the problem(s) users encounter when they try to identify and access data relevant to their needs. The National Environmental Data Referral Service (NEDRES) developed by the National Oceanic and Atmospheric Administration (NOAA) and the Marine Environmental Data Information (MEDI) Referral System developed by the Intergovernmental Oceanographic Commission (IOC) are described. They are presented as two referral systems that address the long-recognized need for better coordination of environmental data and accessibility to it. In summary, the author suggests that as both systems exist and are operational, both could be further developed in the future as "front end" or entry level systems for on-line data delivery systems to better meet users' data needs and requirements.

INTRODUCTION

The existing volume of spatially-referenced, environmental data accumulated through research activities in the ecological and environmental sciences is increasing rapidly. Current environmental monitoring technologies (e.g. satellites and automated buoys) and analytical techniques (e.g. computer modelling) will ensure both more data and data-types are acquired for storage and archival. The certainty of increased data generation and acquisition is guaranteed by the implementation of current and planned global geoscience programs (e.g. Global Ocean Flux Study (GOFS), World Climate Program (WCP), World Ocean Circulation Experiment (WOCE), etc.).

It is not, however, enough to know that the environmental data exist and the volume of it will increase with time. The data must also be accessible. The awareness of, and
obtaining access to these environmental data held by numerous data sources poses a significant and not uncommon problem to the would-be user of environmental data collections. Often it is the case that existing data have been under-utilized, or not used at all because information about the data or data collection is incomplete or totally lacking and access to it is difficult.

The coupling of this ever increasing volume of data with the rising interest of nations, both developed and developing, in the global environment and resources will result in an enormous need for, and access to these massive collections of very complex, multi-disciplinary data. The requirement to fulfill this need on a continuing basis will become ever more urgent as the potential uses of the data increase due to expanded needs for it by governments in strategic decision-making and developing environmental impact assessments, resource management methodologies and environmental protection legislation.

In other words, the volumetric increase of environmental data acquired globally and regionally has created a need. To fulfill this need it will be necessary to establish a means to systematically handle, organize and manage data in order to be able to provide the user with information on its existence, location and the availability. The global dimension and scale of environmental data and its generation, acquisition, organization and utilization make worldwide coordination mandatory.

THE NATIONAL ENVIRONMENTAL DATA REFERRAL SERVICE (NEDRES)

Basic to the development of a coherent environmental data management scheme for the purpose of providing ready and effective access to data is the need to be aware of existing and available environmental data. NEDRES has been established on the firm and credible principles which advocate walking before running but, nonetheless, are necessary prerequisites of any environmental data management system.

Access to numeric environmental data is a significant problem for people and organizations who work in the fields of environmental sciences and related technologies. NEDRES was developed to alleviate this problem and address the long-recognized need for better coordination of environmental data. It is a descriptive inventory of data holdings that includes the identity of holders and specifications of access procedures.

The problem of access to environmental data has been widely recognized and continues to be typical rather than unusual for this data category, as well as for areas such as demographic, energy, economic and health data. A means for locating data sources is not only a necessary tool of any data and information management program, it is essential. In their report, Ecological and Environmental Data as Under-utilized National Resources, Armentano and Loucks identified the absence of such a “tool” for finding data as a
major problem:

"The spiralling cost of acquiring new data and the increasing use of existing data for policy analysis and environmental assessment appear to be giving a new value to all reliable ecological and environmental data. As the costs of research and environmental monitoring increase, the need for mechanisms that facilitate access to existing data becomes greater. Because there is currently no system for rapidly searching ecological databases, delays are incurred or time and money are expended unnecessarily for acquiring new data when, for many purposes, suitable data often already exist."

"Lost Opportunities in Accessing Data: The lack of a comprehensive clearinghouse activity for environmental data has led to situations where data bases of value to many potential users go unrecognized and therefore unused. This appears to be especially true of certain federal data collection and gathering activities."

"Evaluation of Apparent Needs: The survey of present services has identified needs for data and information that are currently unmet. Government agencies and researchers sometimes turn to federal computerized data bases but find access to be complicated and delays in obtaining results. Federal outreach initiatives often are pitched toward an agency-specific clientele and, overall have not been successful in alleviating the access problems."

"... the following mechanisms are being suggested for meeting the national needs for access to existing data bases. An immediate need in the national environmental assessment/research community is for comprehensive, updated, but simple compilation of available databases and models. The compilation would constitute a data 'catalog' of measurement programs, database documentation, information on availability, and a short abstract describing the nature and goals of the work."

"The value of the catalog would be proportional to its timeliness and its visibility for a broad spectrum of potential users. To meet these criteria, the catalog should be revised at least annually for each region, and should be distributed systematically or made available to all users."

NEDRES is responsive to the needs and requirements expressed above. For improved access to environmental data, NEDRES was designed to be interdisciplinary in the scope of its coverage and content. It includes temporal and geographic information (spatially-indexed) in the description of data sets; and, utilizes methods of access and delivery of information that are flexible, easy to use and convenient to the user.

In development since the early 1980's by the National Oceanic and Atmospheric Administration (NOAA), the National Environmental Data Referral Service (NEDRES) database has provided improved access to a broad range of widely scattered environmental data held by government and national laboratories and research institutions. NEDRES is a network of organizations cooperating voluntarily with NOAA to facil-
itate public access to environmental data through a variety of products and services. This cooperative network includes major Federal, State and local agencies, institutions and programs interested in environmental data. As a result of this 'networking structure' for joint endeavors, NEDRES provides a unique opportunity for intergovernmental and institutional coordination in information resource management. Coordination with existing environmental and natural resources data and information services provides a source of input and updating as well as additional capabilities for NEDRES. As a consequence, NEDRES is capable of providing referral services to specialized data and information sources not well known outside the geographic area or subject discipline for which they are developed.

Since October, 1983, NOAA has offered public access to this computer-searchable catalog and index of the environmental data holdings of individual and organizational sources throughout North America.

The NEDRES database identifies the existence, location, characteristics and availability of environmental data. Climatology, meteorology, oceanography, geology and geophysics, hydrology, limnology, fisheries, pollution and satellite remote sensing are examples of the major categories of data described in the database. A search of NEDRES gives a complete description in a standardized format of available data that satisfies the criteria specified by the user. Although the purpose of NEDRES is to direct people to data, a NEDRES record is comprised of text describing the file and not the actual data. More than 20,000 data set descriptions are currently in the database with more being added on a quarterly basis.

In addition to the importance of content and standardization to the design of this referral service has been the design of access methods that are convenient, flexible and easy to use. For this reason NEDRES uses the on-line information retrieval system of a commercial computer service company (BRS Information Technologies in Latham, NY) to optimize the ease of access, use and speed of searching the database.

NEDRES services and products include public access through an on-line, interactive retrieval system marketed by both the NEDRES Program Office in NOAA and the on-line vendor, topical and geographic catalogs of data holdings and sources; and a search request service. The BRS facilities are a host system to many databases that include the many well-known bibliographic and textual databases for reference journals, newspapers, etc. The strengths of the system are its provision of an easy-to-learn means of targeting information in large volumes of text and accessibility from any location in the United States, or the world, where a node for TYMNET or TELNET has been established.

There are now available mini-computer and micro-computer versions of the NEDRES database management system. They have been developed by BRS to operate under MS/DOS or UNIX and use the same command language and search procedures of the
This has permitted the down-loading of NEDRES database subsets from the mainframe database to any IBM-compatible personal computer. That is to say, the user now has the option of searching a "specialized" or "regional" database at their own work-site without the necessity of a telecommunications link-up to the BRS mainframe.

The Marine Environmental Data Information Referral System (MEDI)

Earlier in my presentation of this paper, I made the point that worldwide coordination of environmental data acquisition is mandatory because of the dimensions and scale involved. With respect to this requirement NEDRES can and has served as a "mechanism" for U.S. participation and exchange with other international data referral systems, such as those of the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC); and, the United Nations Environment Programme (UNEP). Their systems or services could be the means of providing the valuable linkages for the continuing development of national and international data referral systems and the means of coordination of environmental data on a global scale.

The MEDI Referral System is one of those systems whereby intergovernmental and institutional coordination in information resources management could be realized with a national system such as NEDRES. Both are used to inform a data user or producer on the characteristics, location and availability of (marine-related) environmental data in a standardized format. This is because both stem from the simple concept that a system is needed which can provide an easily and readily accessible means for anyone to locate data relevant to their needs.

Since its development and implementation by the IOC in the late 1970's, the MEDI Referral System has been operated and maintained by the IOC's MEDI Coordination Centre on behalf of participating organizations. MEDI was designed and intended to be used as a resource tool for both national and international marine monitoring and research activities. The objective of the fully operational referral system is to provide the marine community with referrals in a standard format concerning the availability, location and characteristics of marine environmental data to meet the community's specific needs within the framework of the UNEP international environmental referral system - INFOTERRA.

The MEDI Referral System contains descriptions of data files held by international centers and national centers associated with an international network such as the IOC's International Oceanographic Data and Information Exchange (IODE) network of National Oceanographic Data Centers (NODC's), Designated National Agencies (DNA's); and the World Data Center System (WDC). The following organizational participants have joined together to operate as a MEDI network:
Intergovernmental Oceanographic Commission (IOC)
Food and Agriculture Organisation of the United Nations (FAO)
International Council for the Exploration of the Seas (ICES)
International Hydrographic Organization (IHO)
International Atomic Energy Agency (IAEA)
World Meteorological Organization (WMO)
United Nations Environment Programme (UNEP)

Each file description in MEDI contains the name of the file, a brief narrative description of the file, data type(s) and volumes comprising it, geographic coverage, medium of storage, conditions on availability and conditions or procedures for obtaining the data. Input and updating of the MEDI database is accomplished by having national and international centers submit descriptions of their holdings on a 'MEDI Input Registration Form'. The MEDI Coordination Centre reviews, edits and processes the descriptions for input to the database.

These descriptions are maintained as a database on computer facilities available to the MEDI Coordination Centre at UNESCO Headquarters in Paris, France. MEDI's services and products include the MEDI Referral Catalogue that is published periodically and is manually searchable. Equivalent in content to the database, the Catalogue also contains indices that permit manual searching of the Catalogue and lists details of marine data holdings of all participating centers. On-line searches and specialized indices for broad subject areas and data-types are available on request.

The current procedure for a potential user to follow is that they would request information from a center, for example, IFREMER in France, MEDS in Canada or the IHO in Monaco. If the center cannot fully satisfy the user's needs, it will contact the MEDI Coordination Centre for referral information, either directly or through designated MEDI points-of-contact in one or more of the several international organizations participating in the MEDI Referral System.

SUMMARY REMARKS

In closing I would like to say that the development of NEDRES, and MEDI at a more general level, has been the development of a means to respond to the needs and requirements articulated by Armanatano and Loucks. The implementation of NEDRES as a centralised and integrated service could facilitate the coordination of widely-located environmental data archives. This would provide the user (planner, data administrator, scientist) with a powerful tool for the identification of data needed in strategic decision-making, the management of massive volumes of environmental data, or planning research programs and projects.

NEDRES could be further developed in the future to become "front end" systems for
automated data access and delivery of data files to the user or large-scale systems like UNEP's geographic information system - the Global Resources Information Database (GRID). Such developments in NEDRES could only enhance data and information exchange/interchange to maximize the use of spatially-indexed environmental data in research planning and management. The value and import of the role NEDRES can play is the bringing together of the users, producers and holders of environmental data.

REFERENCES


