

## BIBLIOGRAPHIC DATA BASES IN MARINE BIOLOGY

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The representative database softwares for bibliographic database management at individual, institutional and global level are described. Core, peripheral and general international bibliographic databases for marine biologists and other personnel from related branches are highlighted. The need for specific topic for search from user is emphasized by describing the search and retrieval methodology. The importance of incorporating bibliographic information pertaining to Indian marine science literature in ASFA database and document delivery facility is projected.

### 1. SCOPE AND DEFINITIONS:

The multi- and inter-disciplinary nature of the subjects make the scope of the specific discipline very confusing. Subjects belonging to marine science disciplines are not an exception to it. Thus nearly- and inter-related terms are defined at first instance to have clear understanding about their scope:

**MARINE BIOLOGY:** A Branch of BIOLOGY that deals with those living organisms which inhabit the sea.

**BIOLOGY:** A division of the natural sciences concerned with the study of the life and living organisms

**BIOLOGICAL OCEANOGRAPHY:** The study of the flora and fauna of the oceans in relation to marine ENVIRONMENT

**ENVIRONMENT:** The sum of all external conditions and influences affecting the development and life of organisms.

**FISHERIES:** A study pertaining to the culture, harvesting, preservation marketing, etc., of fish(es) or other aquatic life

On the basis of the above definition the scope of subject 'Marine Biology' limits to the study of understanding of the life cycle, taxonomy and morphology, reproduction and development, genetics and evolution as well as the physiology and biochemistry of a given organism. However in practice, atleast in India, Marine Biologists do not limit their studies within this scope alone. Marine Ecology or Biological Oceanography and Fisheries go hand-in-hand with Marine Biology. 'Marine Living Resources' is the appropriate term to encompass all such aspects.

It would be advisable to conceptualize the idea regarding the 'Bibliographic data bases' too at this stage. The definitions of these terms are as follows:

**BIBLIOGRAPHY:** A document containing description of the items - usually microdocuments - on specific subject, country, author, etc.

**DATABASE/BANK:** A collection of information, now, usually available in the computer readable format

The bibliographic databases may have the description with or without abstracts. Technological advancements have also made it possible the availability of full text articles on the computer readable storage media. Though such data bases do contain searchable bibliographic information, they cannot be termed as 'bibliographic', nor used in that sense.

## 2. DATABASES:

The 'bibliographic databases' have become the talk of the day. The importance of this kind of 'secondary source' of information suddenly caught the attention of R&D personnel. The reasons are:

- i) proliferation of publications,
- ii) inaccessibility to required 'primary sources',
- iii) downfall in the computer and communication costs,
- iv) capacity of computers for large data storage, search, retrieval and speedy transmission of information from distant place.

Variety of Data Base Management Softwares (DBMS) exist for specific user/ user groups as per the requirements.

### 2.1. Databases for/by individuals:

Today, an individual can also create his own bibliographic data base for personal use. Softwares (e.g. Papyrus) make it possible to input to such data bases by keying-in or even 'importing' information from other larger sources. This facility helps the researcher to search and retrieve relevant items subsequently to incorporate it at the end of their write-ups (research articles, technical reports, etc.,) in the desired format.

### 2.2. Databases for/by institutions :

The development of softwares for bibliographic information is much recent phenomena in the history of computer applications. One of such, microcomputer

based, Unesco developed software (CDS/ISIS) became very popular among the bibliographic data base management user community. To support local needs, libraries in India, to a large extent, use this software for bibliographic database management.

### 2.3. Databases with International scope coverage:

#### 2.3.1. Abstracting journal publishing houses and societies

The agencies of well established and reputed abstracting journals (Biological Abstracts, Chemical Abstracts, etc.,) switched over to the computerised storage and printing of their publications in late '60s. They noticed a market for the abstracts stored on magnetic storage devices like tapes. Large institutions were the subscribers for tapes. These were mainly used for offering Selected Dissemination of Information (SDI) services. The advancement in communication technologies in those days also gave birth to the new community of 'database vendors' (e.g. Dialog Info. Systems). These vendors leased variety of such data bases and made them available to the users through communication lines to their mainframe computers. This kind of an access to the data bases is known as 'online information retrieval'.

During early '80s a CD-ROM (Compact Disc - Read Only Memory) technology added a new dimension to the database media. The small pocketable optical disc stores 550,000 (roughly 370,000 printed pages) of information. Many international data bases are now available on such discs.

#### 2.3.2. International Co-operative Information Systems

While these developments were taking place, the international agencies also came forward to pull-in the bibliographic information on co-operative basis. International

Nuclear Information System (INIS), Agricultural Research Information System (AGRIS) are representative examples. The marine science personnel also are fortunate to have one such agency: Aquatic Sciences & Fisheries Information System (ASFIS) with their principal product - Aquatic Sciences & Fisheries Abstracts popularly known as ASFA.

### 3. DATABASES FOR MARINE LIVING RESOURCES:

Among the available databases with an international coverage, the best suited for marine living resources are:

Core    Peripheral    General

ASFA	AQUALINE	SCI
	AGRIS	CCOD-A (ABES)
	BIOSIS	

AQUALINE concentrates on freshwater studies whereas, the section of AGRIS is useful mainly for fishery scientists alone. BIOSIS is a general purpose database (Biological Abstracts product). The SCI (Science Citation Index) is non-abstracted database of source items along with citations to them. The CCOD-A (ABES) Current Contents on Diskettes with Abstracts section on Agriculture, Biology and Environmental Sciences -is exclusively meant for searching latest literature. ASFA database is the best suited source of information for marine science personnel. ASFA- CD is one of the products of ASFIS on compact discs. The first disc stores information for ten years from 1978. The other disc for the data from 1988 onwards is updated quarterly. National Institute of Oceanography (NIO) library use ASFA-CDs for search and retrieval.

### 4. SEARCH AND RETRIEVAL:

It is often noticed that a novice user of databases enquire on the topics too broad than that of his immediate interest. In such case he gets very large set of information not of any

immediate use. Other aspects could be searched as and when required to get an updated, latest version of information. Sometimes, very large list of keywords without any relationship among them are proposed for search. Pinpointed and exhaustive information search and retrieval from such databases is an art and one requires some knowledge about query formulation, data elements and search methodologies. For better results it is always advisable to atleast know about the same. Following paragraphs attempt to describe such techniques.

#### 4.1. Data elements :

Each bibliographic record in the ASFA-CD consists of many data elements. The very prominent ones are:

- Title of the document
- Author(s)
- Authors address
- Corporate authors
- Source of publication
- Series title/ information
- Languages of the text and abstracts
- Abstract
- Subject/ Taxonomic/ Geographic descriptors
- Publication type
- Publication numbers (ISSN, ISBN, Report Nos, etc.)

Each word in a record is indexed. This facilitates very fast searching of the relevant information. The searches are carried out by one of the following methods:

#### 4.2. Searching with terms (free text):

Literature search on the computer demands the formulation of the 'search strategy'. It can be described as the transformation of a specific topic (which is usually described in a simple sentence) in the form of key words along with their relationships. The relationships among these key words are established by using three types of 'search operators': i) AND, ii) OR and iii) NOT apart from round brackets.

Suppose a researcher is interested in the literature on the topic 'Litter fall, decomposition and detritus dynamics in mangrove swamps'. This topic would give following terms:

litter  
decomposition  
detritus  
mangrove

The use of search operators to establish their relationships would make the search strategy as follows:

mangrove AND (litter OR decomposition OR detritus)

The operator AND selects those records where both the terms under enquiry are occurring. Whereas the operator OR selects all those records where any of the terms under search are occurring. Thus the above search strategy, intends to select those records where any of the terms within parenthesis - litter, decomposition and detritus - are occurring alongwith the term mangrove.

The truncation of the term at appropriate place helps in maximising search results. In above example, if the term decomposition is truncated at 'decompos' it would retrieve the records with occurrence of terms decomposition as well as decomposing. Similarly, if detritus is truncated at 'detrit' it would retrieve the conceptually similar terms like detrital or detritic along with detritus. The truncation symbol (usually '\*') requires to be added at the common roots of the variant terms like: 'decompos\*' or 'detrit\*', etc.

Computer is not an intelligent system. It cannot search for conceptually similar terms/records. It can only search for a given term. Thus the search strategy needs to be padded with all conceptually similar terms. In the above example, the concept of decomposition is also likely to be expressed using terms like: 'degradation', 'biodegradation', 'bioremediation'.

For optimum results, the selection of appropriate terms from the subject, truncation

of selected terms, addition of alternate terms to a given term, using appropriate search operators etc., matter much. Thus the search strategy for the above topic would be: 'mangrove\* AND (litter OR decomposition OR degrad\* OR bioremediation\* OR detrit\*)'

#### 4.3. Searching from the index:

Each word in an ASFA database mentioned above, is indexed. One can search terms from the index to search relevant documents.

#### 4.4. Searching on non-subject areas:

It may be borne in mind that ASFA databases are not used for the literature search on specific subject alone. They can also be used for various purposes exemplified below:

- contributions of a specific individual, organization or country, etc.,
- identifying research trends in a specific area (subject and /or geographic) on the basis of number of papers published,
- identifying specialists in a specific area,
- identifying number of institutions, personnel, etc., in a given country

#### 4.5. Information retrieval:

The searched information could be retrieved for further use. It could be viewed on the monitor for immediate reference or for checking the relevance of the searched results. The results could also be copied in the form of files on to the user owned storage devices like floppy diskettes. These can be carried easily from place to place for future use. Reading, editing, printing or even 'exporting' of records to other data base is also possible using such files (of course after considering copyright restrictions). These files can also be transmitted over telecommunication lines using appropriate computer, modems, etc.

## 5. NATIONAL INFORMATION CENTRE FOR ASFA IN INDIA:

The NIO library offers the facility of literature search on ASFA-CD without any charge to all Indian nationals. For obtaining bibliographic information on very specific area of interest the user may write to the librarian along with the search topic and a blank floppy diskette. This service has been widely recognised and found useful by the marine science researchers. More than 700 searches are carried out annually.

The literature search and retrieval is not possible unless the information is stored in the database. As mentioned above, ASFA is a product of an international co-operation. At present, 15 countries are contributing their literature to this database on co-operative basis, besides involvement of intergovernmental organizations and private agencies. India is one of such countries. The national input centre for ASFA is at the NIO library. The library keeps track of the literature published in India. In order to make this job exhaustive, a co-operation from the researchers by way of sending a copy of their publications for inclusion in this data base is also expected. This would help them in publicizing their research results to other R & D community spread world over.

## 6. DATA BASES AND DOCUMENT DELIVERY:

The retrieval of relevant references or information from bibliographic databases donot serve the purpose of an information seeker completely. The requirement of an original document cannot be replaced by such data bases. Large number of institutions not able to subscribe to primary journals are noticed to be diverting their funds to subscriptions for these data bases on CDs. This is an unwarranted investment in duplicating resources. As such, access facility to a data base at one agency within a country is quite enough. Others too can get the benefit of this

facility as the computerized search and retrieval does not burden heavily on the manpower requirements of the host institution. It is rather advised to pay membership fees of institutes having such data bases and/ or acquire photocopies of the required articles by an individual or institution than investing on duplicating similar databases.

An institution having rich collection with such data base as backup facility can serve the community better. Fortunately, in India, NIO library has very good collection in the field of marine sciences. It has a capability to provide the primary literature from their collection. It is appealed to the marine science users to utilize this resource to a maximum possible extent.

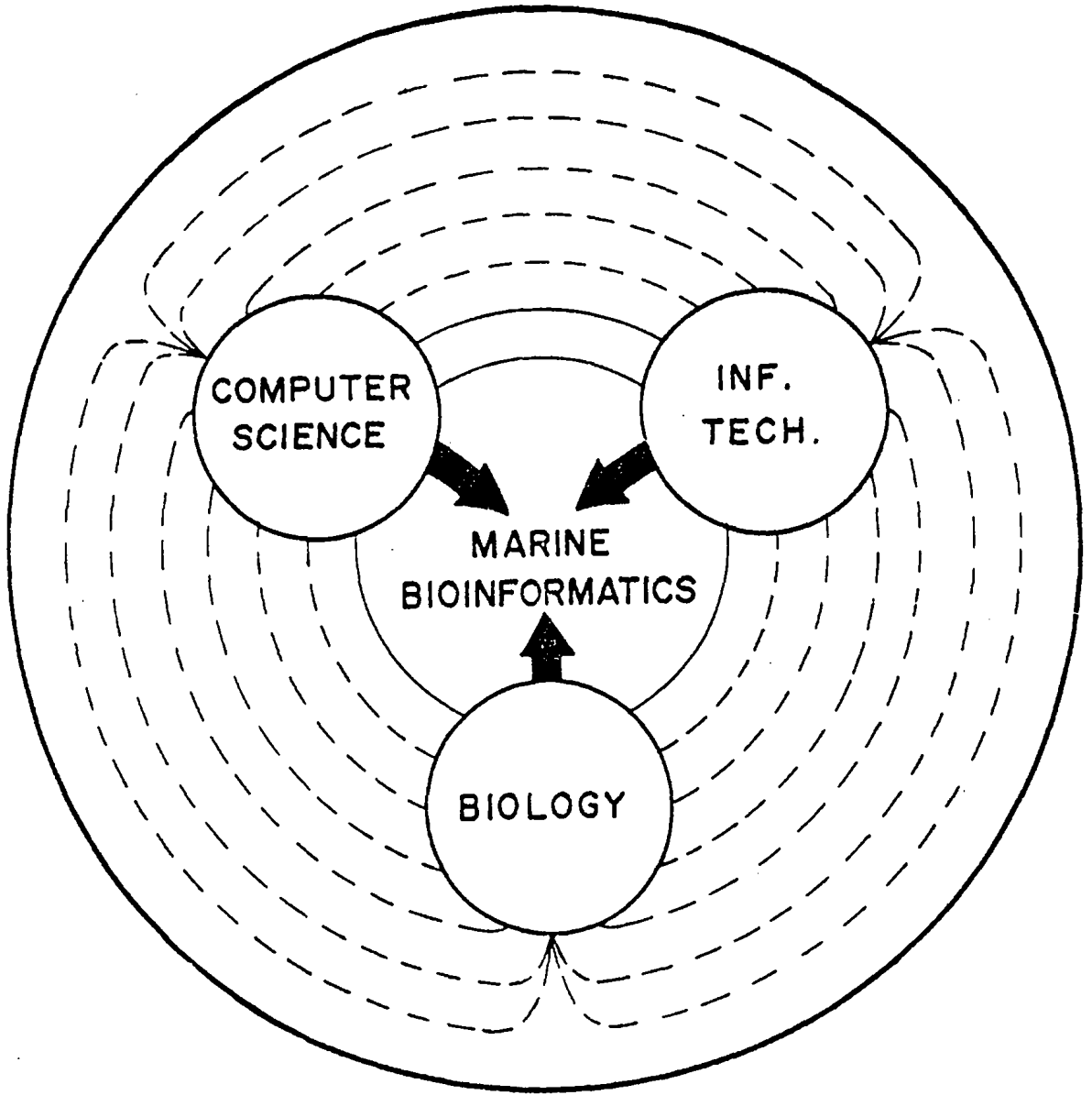


Fig. 1. MARINE BIOINFORMATICS