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A Guide to Environmental Information Services of the Private Sector

In Cincinnati in September 1972, at the Environmental Protection Agency's Information Symposium, several thousand participants heard several dozen speakers spend the better part of two days discussing sources of environmental information. I learned at that conference that there is little need to detail the number of sources that exist, and a great need to clarify *how* those sources can be discovered, evaluated and best used.

I will limit my discussion to environmental information services offered by the private sector, and emphasize how others can be found and best used. The discussion will include:

1. The importance of objective setting: defining the kind of information that is needed (and not needed).
2. A candid description of secondary publications such as directories, and environmental abstracting and current awareness services.
3. Use of automated searches and machine-readable data bases.
4. Four appendices are included which cover: environmental directories; environment abstracting and indexing services; information centers and systems—services offered; and environmental journals (compiled by Mike Bowen of *Environmental Science and Technology*).

THE IMPORTANCE OF OBJECTIVE SETTING: DEFINING THE INFORMATION NEEDED

Much has been written about the information explosion, but a clearer idea comes to mind through these figures from the Information Industry Association: 1971 saw publication of 450,000 book titles, 200,000 periodicals, 200,000 technical reports, 40,000 doctoral dissertations, 100,000 master's theses, 65,000 patents, 20,000 congressional bills, and 150,000 federal court cases.

Before tackling this largesse, it helps to know what one needs and does not need. For instance, a search to compare performance data on electrostatic precipitators would not be fruitful through the *Readers' Guide*, nor would it entail extensive historical searching, since new standards have made older equipment obsolete. In fact, some organization may exist that has already done such collating.

Often overlooked are such crucial questions as:

1. Is the need answer-oriented, or documentation-oriented?
2. Is the problem strictly current, or can older information apply?
3. Should all the world's literature be searched, or just a few specific books or journals?
4. Should nonperiodical information be included?
5. Is the need discipline-oriented? profession-oriented? multi-disciplinary or mission-oriented, such as environment?
6. How fast is all this data needed?

USE OF SECONDARY SOURCES: WHAT ORGANIZATIONS OR LITERATURE FILL THE NEED?

The pursuit of information falls into two synergistic categories: (1) ask someone who is apt to be familiar with the problem, or (2) locate existing documentation. In secondary source jargon, this means: (1) directories, and (2) indexing and abstracting services.

Directories

Little can be said of environmental directories except that a comprehensive and user-oriented one has yet to be created. The probability of a productive "hit" is low with existing references because comprehensiveness is made virtually impossible by the flux of the environmental sciences (the 1972 *Environment Index* had a 50 percent change factor in state environmental control directors), and because most directories are inadequately organized and indexed. In many cases, one has to know the name of an organization in order to find it in the directory. A host of environmental directories abounds, but only a few have proven valuable in environmental research. These are detailed in appendix A, but I will discuss each briefly.

Directory of Organizations Concerned with Environmental Research. Until the new edition is received, opinions must be based on the first edition, which was a computer printout of names and addresses of institutions. These were categorized by state, with no descriptive materials, and a numeric, inadequate indexing system.

Environmental Pollution: A Guide to Current Research. This analysis of the Smithsonian Institution's Science Information Exchange files categorizes

research according to major headings, with useful subject indexes. Unfortunately, while 1,000 pages are devoted to contents, only two pages describe how the contents are organized. In order to find out, one must plow through most of the 1,000 pages.

Directory of Consumer Protection and Environmental Agencies. We have not yet received this volume, but conversations with users indicate satisfaction.

Directory of Environmental Information Sources. This is the best horizontal listing currently available only because nothing else like it exists. The expanded, hardbound second edition provides a cursory listing of books and films, but does contain much useful and descriptive matter on organizations involved directly and indirectly in environmental information. Unfortunately, the typewriter type is hard on the eyes, and indexing is not subject-oriented.

Conservation Directory. This valuable, generally accurate and very inexpensive directory lists and describes international, national and state conservation groups and government organizations. It includes individual names and publications index, but lacks a subject index.

Yell-O Pages. This 1971 computer printout of local citizens environmental groups is probably quite outdated, due to the ad hoc nature of such groups.

Encyclopedia of Information Systems. This most valuable guide to centers, systems and services provides detailed profiles on some 800 organizations.

Water Publications of State Agencies. This is a comprehensive valuable access point to local programs and publications that would be nearly impossible to otherwise locate.

Pollution Control Directory. The *Environmental Science and Technology* and the journals of the Air Pollution Control Association and the Water Pollution Control Federation also have annual directory issues that provide useful information (see appendix D).

Abstracting and Indexing Services

The best guide to the hundreds of abstracting services is *Ulrich's International Periodicals Directory* which lists forty pages of such services.

Since successful use of an abstracting service varies directly with the nature of one's information needs, it is essential that two primary questions be answered before selection proceeds:

1. How should information be conceptualized? Can the information sought be found through strictly disciplinary channels such as chemistry? (If so, then consult *Chemical Abstracts*.) Does it parallel a traditional profession such as engineering? (Then consult *Engineering Index*.) Does it

pertain to a specific kind of document, such as dissertations? (Then consult *Dissertation Abstracts*.) Or does it, as is the case with much of environmental reference work, transcend traditional information boundaries, document types, disciplines and professions? In that case the new environmental abstracting services, such as *Environment Information ACCESS* should be consulted.

2. What is the scope and depth of one's need? What scope of coverage is required, 300 or 3,500 journals? Journal literature only, or a mixed literature base? How detailed should subject coverage be? Does it stop with air pollution, or include such specifics as dust baghouses and stack configurations? How timely is the nature of the needed information: historical, or strictly current awareness? Will document retrieval be required? This may be an important timesaver, unless one is prepared to track down that article from *Pacific Insect*.

Would automatic search assistance be valuable? Comparing these needs to the services offered by potential abstract candidates is more complex, since *Ulrich's* does not provide details (check the *Encyclopedia of Information Systems*), but hopefully this discussion will provide some insights.

John Veyette's article discusses such institutional abstracting services as *Chemical Abstracts*, *Biological Abstracts* and *Engineering Index*; I will describe the leading private environmental literature reference services.

ENVIRONMENT INFORMATION ACCESS

This service of the Environment Information Center is issued semimonthly and reports new literature on twenty-one major areas of environmental affairs, including energy, environmental design, population control, food and drugs, transportation, weather modification, and wildlife, as well as the common categories of air, land, noise, wastes and water. *ACCESS* covers a mix of literature, including 3,500 international journals, government documents, conference papers and proceedings, research reports, special publications, and major newspaper articles. Special selections also cover books, *Federal Register* environmental entries, legislation, patents, and research in progress. Emphasis is on currency of information. All abstracts are staff written to emphasize the environmental significance of a document. Each issue includes an index section, through which abstracts can be located according to subject, industry (Standard Industrial Classifications) and author. All indexing is multiple entry, providing title, source, date, volume and number, page number, length in full page equivalents, and an accession number.

Example: Effluent Taxes: Abatement Prods or
Budget Balancers? Indust Water Engrg,
Apr 71, v8, n4, p18 (1) 07-71-03147

All indexing is cumulated annually in *The Environment Index*, which

CURRENT CONTENTS

This weekly service is not strictly environmental but merits coverage since three environmentally significant components are offered: (1) agricultural, food and veterinary sciences; (2) engineering and technology; and (3) life sciences. Contents pages of journals (coverage averages 800 journals per service) are reproduced, as in *Environmental Periodicals*—again not in alphabetic sequence. Contents are not indexed; but other Institute for Scientific Information services permit index analysis of its data base. Document retrieval is offered; no microfiche; searches and selective dissemination of information profile monitoring is available, but costs are not standardized. For a specific breakdown of the cost, journal coverage, lag time and services offered, consult appendix B.

AUTOMATED SEARCHES AND MACHINE-READABLE DATA BASES: IS THE PRICE WORTH THE RESULT?

The rapidly increasing size of most literature files (*Chemical Abstracts* is estimated at 500,000, ISI at 400,000) virtually demands machine-processing of bibliographic information. Particularly when a researcher is confronted with a massive retrospective file, machine searching can at least separate wheat from chaff.

Rather than provide an exhaustive listing of the various services available, I direct the reader to the *Encyclopedia of Information Systems*, which describes 800 information services and indicates which ones provide searches and rent machine-readable data bases.

This discussion will be restricted to a few private services with environmental specialization, and to some comments about such services in general.

Data Base Producers Who Also Provide Searches

Only two private organizations provide such services: EIC and ISI.

EIC search requests can be made directly to headquarters, based upon a general descriptive request, which is translated into keywords. A request may search just one keyword or combination of keywords. Price base for any search is \$75, plus \$10 per keyword. Output at present is a bibliographic citation and accession number which can be used to retrieve the abstract and full transcript of a particular document. Searches include both current and retrospective information.

ISI offers a variety of search techniques, including retrieval of documents according to the kinds of references they cite, according to interest profiles (selective dissemination of information) and keywords. Prices are not standardized and are best obtained from ISI.

Service Bureaus

Many data base producers prefer to distribute their information wholesale to service bureaus such as New England Research Applications or Lockheed Information Systems, which will perform searches or install on-line terminals in a subscriber's facilities. Price and type of output vary with the organization, but NERAC is a good example. This independent branch of the University of Connecticut acts as a computer-based information processing house for such data bases as *CA Condensates*, *Compendex*, BIOSIS, NTIS, DDC, ISI and others. Search prices are based on a flat rate of \$185 for 500 hits per data base, plus \$25 per additional hit and 20¢ per additional abstract retrieval. Output is a citation printout and searches are supervised by professionals.

Interactive Systems

The best example of the rapidly increasing interactive networks is *Leadermart*, centered at Lehigh University, which shares a variety of data bases with the University of Georgia, University of Pittsburgh and others. Data bases can be searched through an on-line conversational mode system, using cathode ray tube terminals. Price depends on the amount of computer time used; output is on the CRT, but can be retrieved in hard copy from an on-line printer.

A commercial counterpart to *Leadermart* is the Lockheed Information Systems network mentioned earlier, but access is only through one's own installed terminal. Cost varies between \$200 and \$800 per month, depending on usage.

Rental of Machine-Readable Data Bases

If indigenous computer equipment is available, data bases can be organizationally acquired and searched. *Environmental Science Index* is a computer tape service which can be rented in one master reel (\$3,825) or six environmental subcategories (\$975 each) which cover land environment, air environment, water, wastes, health and energy. The service includes monthly update tapes.

ISI's data base can be rented in its entirety (\$20,000) or by components such as *Science Citation Index* (price varies with subscriber type).

Use of Automation

The major question facing users of automated access systems is one of compatibility with search needs and objectives. The same questions that applied to abstract services should apply here: Is it a discipline-oriented need? Is it multi-disciplinary, e.g., found in the environmental sciences? Two EIC experiences illustrate this need: case no. 1 involved a custom-requested search through the mails of a scientific literature data base on "the environmental

impact of water resources development" (including twenty-five specific keyword indicators, from erosion to reservoirs). Although resulting printouts retrieved several hundred bibliographic citations, only two could be considered relevant "hits."

Case no. 2 involved a search using an on-line conversational mode interactive search system, using *Chemical Abstracts*, *Compendex*, *ASCE Abstracts* and some other data bases. The search involved "environmental effects of nitrogen supersaturation from dams"—a phenomenon that is killing salmon in the Pacific Northwest.

Two major reasons caused these nonproductive searches: (1) retrieval methodology, and (2) data base specialization. In Case no. 1, the retrieval scheme was probably at fault, since indexing was computer-derived from titles. If the title did not contain a certain keyword, it could obviously not be indexed, nor could the system make value judgments about the connotations of a title. These limitations become particularly significant in the environmental sciences which incorporate a large body of literature not structured according to standard scientific methods.

Case no. 2 involved data bases whose indexing was based on original documents, not just title, but in the process of system incorporation a unique retrieval method (descriptive phraseology) was superimposed which did not permit Boolean search capability. The discipline-oriented data bases also probably did not fit the search, which required a more environmental data base.

Such experiences led to the development of the recently announced *Environmental Science Index*. This computer-tape service crosses disciplinary lines, is based on a manually indexed, controlled vocabulary, and based on original document readings, using an EIC-developed environmental thesaurus.

It would, however, be just as futile to search *Environmental Science Index* for general chemical literature as it is to search *Chemical Abstracts* for environmental effects of nitrogen from dams.

The answer to the question: "Are automated systems worth the cost?" is that the intelligent coupling of high-speed machine search capability with human supervision *can* provide cost-effective quality searching of otherwise unmanageable data bases. Hours of tedious, manual searching can be avoided, leaving more time for analysis of a handful of relatively productive documents.

Although the details of this paper have been limited to private environmental services, these guidelines should apply to services that are not strictly environmental.

The best way to negotiate the environmental information maze is through secondary services or systems. The following appendices provide a starting point.

APPENDIX A
ENVIRONMENTAL DIRECTORIES

Subject Coverage	Title	Author	Publisher	Date	Cost	Pages
Environmental research organization	<i>Directory of Organizations Concerned with Environmental Research</i>	Lake Erie Environmental Studies	Holt Information Systems, 383 Madison Ave., N.Y., N.Y. 10017	1972		
Environmental research in progress	<i>Environmental Pollution: A Guide to Current Research</i>	Smithsonian Science Information Exchange	CCM Information Corp., 866 Third Ave., N.Y., N.Y. 10022	1971	\$39.95	851
Federal government	<i>Directory of Consumer Protection and Environmental Agencies</i>	California Center for Public Affairs	Academic Media, 32 Lincoln Ave., Orange, N.J. 07050	1971	\$39.50	
Environment information resources	<i>Directory of Environmental Information Sources</i>	Nat'l Foundation for Environmental Control	Nat'l Found. for Environ. Control, 151 Tremont St. Boston, Mass. 02111	1972	\$29.95	457
Conservation and environmental groups	<i>Conservation Directory</i>	Nat'l Wildlife Federation	Nat'l Wildlife Fed., 1412 16th St. NW, Wash. D.C. 20036	1972 annual	\$ 2.00	165
Local environmental groups	<i>Yell-O Pages</i>	Environmental Resources	Environ. Resources, 2000 P. St. NW, Wash. D.C. 20036	1971	\$5-15	240
Information systems	<i>Encyclopedia of Information Systems</i>	Anthony Kruzas	Academic Media, 32 Lincoln Ave., Orange, N.J. 07050	1971	\$67.50	
Water information	<i>Water Publications of State Agencies</i>	Water Information Center, NY	Water Research Bldg., Manhasset Isle, Port Washington, N.Y. 11050	1972	\$39.50	319
Industrial products and services	<i>Pollution Control Directory</i>	Environmental Science and Technology	Amer. Chemical Soc., 1155 16th St. NW, Wash. D.C. 20036	Oct. 1972	\$ 9/yr	162

APPENDIX B
ENVIRONMENTAL ABSTRACTING AND INDEXING SERVICES

	Index	Issues Abstracts	Subj. Cov.	Cum. Index	Periodical Cov.	Non-Periodical
<i>Environment Information ACCESS</i>	X	X	21	X	3500	X
EIC, 124 East 39th St. NY, NY 10016		\$150				
<i>Pollution Abstracts</i>	X	X	7	X	3500	X
PO Box 2369 La Jolla, CA 97037		\$ 80				
<i>Environmental Periodicals</i>			no breakdown		300	
Env. Studies Inst., Int'l Academy Riviera Campus, 2048 Alameda Padre Serra, Santa Barbara, CA 93103		\$ 60				
<i>Current Contents - Agricultural, Food and Veterinary Sciences</i>		\$100			800	
<i>Engineering and Technology</i>		\$100	no breakdown		700	
<i>Life Sciences</i>		\$100			1000	
Inst. for Scientific Information 325 Chestnut St. Philadelphia, PA 19106						
<i>Environment Information ACCESS</i>		Audio Visual X		Document Retrieval	Microfiche	Type of Index
<i>Pollution Abstracts</i>	1 to 3 months		22X	X	X	multiple entry
<i>Environmental Periodicals</i>	6 to 8 months		6X	X		keytalfa
<i>Current Contents</i>	contents pages only 2 to 6 months		8X	X		N/A
	contents pages only 1 to 2 months		52X	SDI only	X	

APPENDIX D ENVIRONMENTAL JOURNALS

This appendix is not claimed to be totally comprehensive. It should be considered only as a guide to technical literature and as indicative of different types of publications.

Explanations of the column headings are given below:

- Cost:** Annual subscription in U.S. Those affiliated with issuing society or association generally get a discount. Foreign subscriptions cost more; institutional subscriptions usually cost more than individual. C.C. means "controlled circulation"—free subscription to "qualified readers." Those not qualified must pay.
- Aimed at:** The primary audience for whom publication is edited. Publications sometimes use jargon and special terms which only their primary audience can understand.
- Technical Level:** Low: can probably be read by educated laymen.
Moderate: technical training may be necessary to understand some or all articles.
High: specialized technical training essential to understand articles.
- Availability:** Indication of whether available on newsstands, in public libraries, technical libraries, or so specialized as to be available only in some technical libraries.

APPENDIX D (cont.)
SCIENTIFIC JOURNALS

<i>Title</i>	<i>Publisher (year of appearance)</i>	<i>Frequency</i>	<i>Cost</i>	<i>Aimed at</i>	<i>Technical Level</i>	<i>Availability</i>
<i>Environmental Science and Technology</i>	American Chemical Soc. (1967)	monthly w/annual directory	\$ 9.00	env. profs.	low-high	technical libraries, some public libraries
<i>Environmental Pollution</i>	Elsevier (1970)	quarterly	15.60	env. res.	high	technical libraries
<i>Water Research</i>	Pergamon Press (1967)	monthly	100.00	water sci.	high	technical libraries
<i>Water Resources Research</i>	Am. Geophys. Union (1965)	bimonthly	20.00	water supply profs.	high	technical libraries
<i>Bulletin of Environmental Contamination and Toxicology</i>	Springer- Verlag (1966)	bimonthly	28.00	prof. toxicols.	high	technical libraries
<i>Atmospheric Environment</i>	Pergamon Press (1967)	monthly	60.00	air pol. profs.	high	technical libraries
<i>Environmental Letters</i>	Marcel Dekker (1971)	8/yr.	40.00	env. res.	high	technical libraries
<i>Journal of Environmental Sciences</i>	Institute of Env. Sciences (1958)	bimonthly	12.00	env. res.	high	technical libraries

NON-SCIENTIFIC JOURNALS

<i>Title</i>	<i>Publisher (year of appearance)</i>	<i>Frequency</i>	<i>Cost</i>	<i>Aimed at</i>	<i>Technical Level</i>	<i>Availability</i>
<i>Environmental Affairs</i>	Boston Coll. Env. Law Center (1971)	quarterly	\$ 15.00	inter- discipli- nary audience of profs.	low-moderate	Availability ?

APPENDIX D (cont.)
TRADE PRESS

<i>Title</i>	<i>Publisher (year of appearance)</i>	<i>Frequency</i>	<i>Cost</i>	<i>Aimed at</i>	<i>Technical Level</i>	<i>Availability</i>
<i>Industrial Wastes</i>		bimonthly	C.C./ \$10.00	ind. waste engrs. & off.	low-moderate	some technical libraries
<i>Water and Sewage Works</i>	Scranton Publ. Co. (1890)	monthly	\$ 7.50	munic. water & waste engrs. & off.	low-moderate	some technical libraries
<i>Effluent and Water Treatment Journal (British)</i>	Thunder- bird Enterprises (1961)	monthly	\$15.00	munic. water & waste engrs. & off.	low-moderate	some technical libraries
<i>Water and Wastes Engineering</i>	Dun-Donnelley (1964)	monthly	C.C./ \$ 6.00	water supply profs.	low	some technical libraries
<i>Industrial Water Engineering</i>	Target Communic. (1963)	bimonthly	C.C./ \$10.00	water supply profs.	low-moderate	some technical libraries
<i>Pollution Engineering</i>	Technical Publ. (1969)	monthly	C.C./ \$12.00	ind. engrs. manage- ment	moderate	technical libraries
<i>Waste Age</i>	3 Sons Publ. Co. (1970)	bimonthly	C.C./ \$10.00	solid waste profs.	low	?
<i>Environmental Pollution Management (British)</i>	The Nat'l. Mag. Co. (1971)	monthly	C.C. only	ind. manage- ment	low	?
<i>The American City</i>	Buttenheim Publ. Co. (1909)	monthly	C.C./ \$15.00	munic. off.	low	technical libraries many public
<i>Solid Waste Management</i>	RRJ Publ. Co. (1958)	monthly	\$ 6.00	solid waste profs.	low	technical libraries

APPENDIX D (cont.)
GENERAL MAGAZINES

<i>Title</i>	<i>Publisher (year of appearance)</i>	<i>Frequency</i>	<i>Cost</i>	<i>Aimed at</i>	<i>Technical Level</i>	<i>Availability</i>
<i>Ecology Today</i>	Ecological Dimensions (1970)	bimonthly	\$ 6.00	concerned low laymen	low	mail sub. some public libraries
<i>The Ecologist (British)</i>	The Ecologist Ltd. (1970)	monthly	\$12.00	concerned low laymen	low	mail sub.
<i>Clean Air (British)</i>	Nat. Soc. For Clean Air (1929)	quarterly	\$ 3.50	concerned low laymen & profs.	low	some libraries
<i>Environmental Quality Magazine</i>	Env. Awareness Assoc. (1970)	monthly	\$10.00	concerned low environ- mentalists, "ecofreaks"	low	newsstands (\$1)
<i>Environment</i>	Comm. For Env. Inf. (1958)	10 issues/ yr.	\$10.00	intelligent low-moderate laymen	low-moderate	technical libraries many public libraries

APPENDIX D (cont.)
TECHNICAL JOURNALS

<i>Title</i>	<i>Publisher (year of appearance)</i>	<i>Frequency</i>	<i>Cost</i>	<i>Aimed at</i>	<i>Technical Level</i>	<i>Availability</i>
<i>Journal Water Pollution Control Federation</i>	Water Pol. Control Federation (1928)	monthly with 2 extra issues	\$35.00	water pol. profs.	moderate-high	technical libraries
<i>Journal of the Air Pollution Control Assoc.</i>	Air Pol. Control Assn. (1951)	monthly	\$25.00 to non- profit libraries & indivs.	water supply profs.	moderate-high	technical libraries
<i>Journal of American Water Works Assn.</i>	Amer. Water Works Assn. (1914)	monthly	\$20.00	water supply profs.	moderate	technical libraries
<i>Journal of the Sanitary Engineering Division (ASCE)</i>	Amer. Society of Civil Engineers				moderate-high	technical libraries
<i>Journal of Environmental Health</i>	Nat. Env. Health Assn. (1938)	bimonthly	\$ 8.00	public health profs.	low-moderate	technical libraries