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INFORMATION EXCHANGE FOR DEVELOPING COUNTRIES
IN THE FIELD OF
COMMUNITY WATER SUPPLIES AND SANITATION.

An examination of current
resources, problems and
services together with
potential areas of coll-
aborative development within
the POETRI framework.

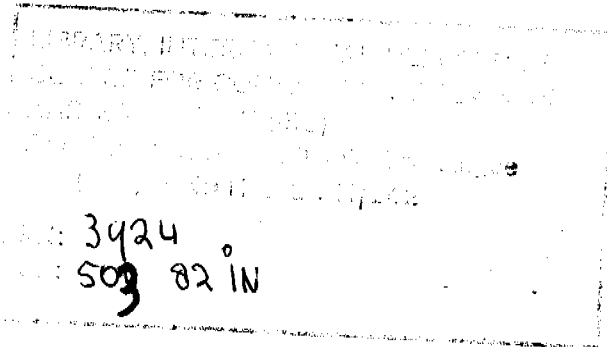
A report prepared by
Harry East
for the
International Reference Centre
for Community Water Supply

January 1982.

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I THE ORIGINS & OBJECTIVES OF POETRI*

1 THE PROGRAMME CONCEPT

POETRI arose from a recognition of the need for relevant and valid information on various aspects of community water supply and sanitation as an important requirement of the International Drinking Water Supply and Sanitation Decade. While it was known that there exist already a number of systems and services providing information relevant to the objectives of the Decade, it was also recognized that there is often a gap between the 'available' information and its actual accessibility. Moreover, such information is often not available at the right time and in the appropriate form of presentation and level of detail to meet the needs of a variety of users. The absence of appropriate information for planners, engineers and operational staff has often been a significant constraint in the development of water supplies and sanitation. In particular, the transfer of information to and between middle and lower echelon field workers is known to be minimal in many countries.

The United Nations Water Conference - at which the Decade was conceived - recommended in 1977 that 'an effective clearing-house mechanism should be developed through international cooperation, by strengthening existing mechanisms if available, at national, regional and international levels, to provide for the communication of selected information concerning all elements of community water supply and sanitation'. In response to this the International Reference Centre for Community Water Supply and Sanitation (IRC) created a programme (POETRI) to develop such a clearing-house and to provide means for communicating appropriate information between and in developing countries.

* Programme on exchange and transfer of information

POETRI has as objectives :

- a to develop and/or improve the infrastructure (facilities and capacities) needed in developing countries for the exchange and transfer of information and documentation;
- b to develop appropriate procedures for the collection, analysis/evaluation, storage, retrieval and dissemination of information of community water supply and sanitation.
- c to facilitate the exchange of such information and to promote its use; and
- d to identify subject areas within the field of community water supply and sanitation where insufficient appropriate information is available and, subsequently, to try to fill these gaps.

Priority has been given in the first phase of POETRI to strengthening capacities at the national level, ie

- a to strengthen the national information infrastructure for the purpose of better planning for the Decade
- b to improve the capacities of countries involved to absorb scientific and technological information from elsewhere, and
- c furthering these objectives through cooperation between countries with the active involvement of regional and international centres.

External support provided to countries in the context of POETRI is primarily 'country specific', ie assisting national agencies and centres in the development of a national information support programme and corresponding information systems and services for operational work (1). At the same time general guidelines have been developed (2).

2 FOCUS AND SCOPE

Emphasis is being given to information support to operational activities, the principal group of 'users' being agencies, departments, government field services and voluntary organizations that are in charge of community water supply and sanitation projects. Within these agencies, the main categories of users are :

- practitioners and technicians engaged in developmental and operational activities (design, construction, operation and maintenance, training, health education etc) at different levels; and
- managers, planners and others in the decision-making process engaged in co-ordinating work at the local and national level

POETRI focusses mainly on scientific and technical information which is in direct support of operational activities. Organizations active in the R & D field and scientific education (while not excluded per se as users) are considered as information suppliers (sources) rather than ultimate receivers.

3 ORGANIZATIONAL STRUCTURE AT THE NATIONAL LEVEL

Within each country participating in POETRI, the programme is organized by and through a National Focal Point (NFP). NFPs are located at existing information units or centres that form part of the government machinery, and should have easy access to operating agencies in the water supply and sanitation field and/or be located within an operating agency.

The main functions of a National Focal Point are:

- organization and coordination of POETRI at the national level;

- provision of training support to operating agencies as appropriate;
 - provision of support to an inventory and analysis of national information and documentation requirements, resource and constraints;
 - stimulation of a national consultation on an information support plan and a cooperative network for water supply and sanitation;
 - provision of national liaison for POETRI, acting as a 'switching centre' for information and documentation on water supply and sanitation;
- functioning as a focal point for external liaison and cooperation.

4 POSSIBLE DEVELOPMENTS AT REGIONAL AND INTERNATIONAL LEVELS

POETRI has been focussed primarily on development of national capabilities because, in the final analysis, these are the most important: without them there can be no effective information/technology transfer at any level.

Nevertheless, it has been assumed from the outset that POETRI will promote the implementation of services at regional/global levels aimed, in principle, at all developing countries. The services that were envisaged are :

- a selective dissemination of Decade documentation and a 'standard source library' for community water supply and sanitation.
- b distribution of a Decade newsletter and provision for a special review/abstracting service;
- c provision of a clearing-house and reference services on Decade related topics;

- d a journal on community water supply and sanitation in developing countries;
- e ad hoc publication services (1)

This report results from a preliminary study of the range and scope of existing, internationally available, information systems in the field of community water supply and sanitation. It seeks to view these service resources within a collaborative framework such as one which POETRI might provide. It is concerned almost entirely with activities which would involve:

- a information transfer through a documentary medium;
- b regional/global networking (ie two-way flows of information between institutions sharing common interests).

Focussing on information transfer through documents and on collaborative mechanisms to achieve it does not imply that this is the most important POETRI activity. It is, however, a significant one and, as such, requires a clear understanding of the implications and potential commitments. It should be noted that, while all the services envisaged above are concerned with documents, not all require interactive networking for their maintenance: some are more centralized than others.

In understanding the study and developing proposed collaborative activities the following initial assumptions were made:

- that there exists valid and relevant information on community water supply and sanitation, contained in documents, which is currently inaccessible, or difficult to access, by individuals in and/or concerned with the particular problems of developing countries;
- that the existing secondary services (eg those providing indexes, abstracts, photocopies, etc) of the industrialized countries only cover to a limited and unsatisfactory extent documents appropriate to the special needs of developing countries; especially documents produced in those countries;

- that despite the known and assumed shortcomings of the above services, the possibility of providing services specially oriented to the needs of developing countries by extracting and 'repackaging' appropriate material from them should be considered;

- that the enhancement of existing services in both industrialized and developing countries with the objective of providing services best suited to the needs of the developing world should be explored;

- that in procuring and disseminating information provided in developing countries the active participation of information centres/focal points in these countries is both necessary and desirable, and that to promote such participation effectively protocols for interchange would need to be developed and agreed;

- that while regional and international transfer of information in or about documents will not be necessarily the most preferred mechanism for all levels of practitioners and technicians engaged in development and operational activities, it would be through such mechanisms that 'intermediaries' working in national centres/focal points would enhance the qualities of their direct services to local users.

The possible services considered here are those of a collaborative nature, that is, services which require active and regular participation (including the provision of input) on the part of the user organizations. POETRI has envisaged two main approaches:

- (A) Identification, description and dissemination of information about relevant documents (current awareness, retrospective retrieval) and supply or loan of originals or copies of documents (clearing house, interlending).
- (B) Identification, description and dissemination of information about relevant organizations as sources of expertise and information (the referral mechanism). POETRI already includes this activity at the national level.

The development of regional or global services, especially those requiring collaborative action between national centres and focal points, would need the advice and consent of the potential participants. An agreement to cooperate, and the nature of the cooperation, implies collective consultations between the agencies and centres which would be involved.

This report is concerned with providing appropriate background information for such consultations and aims at establishing, to at least the first level of approximation:

- the size, scope, distribution and characteristics of documentary information within the scope of POETRI;
- the coverage of this material by existing services and availability of these services;
- means of promoting better use of existing services for the benefit of developing countries;
- options for collaborative mechanisms between institutions to provide new, or improve existing, trans-border information systems.

II PROBLEMS OF INFORMATION TRANSFER

1 DOCUMENTARY INFORMATION

Recovery of information relevant to a particular technical problem from the substantial amount of data that already exists and the transfer of this information within or to the developing world offers considerable problems. In this context the difficulties for all countries, but particularly developing ones, are related to the identification of relevant material and procuring access to it. Accessibility of documents varies considerably. It is influenced by the institutional and national origins of the document, its 'form' (eg as a paper in a professional journal, as a book or as a report of wide or limited distribution), its price (and the currency in which it must be paid for) and other factors.

But, problems of ultimate accessibility aside, the identification of potentially relevant source documents offers considerable difficulties initially. The 'literature of community water supply and sanitation is widely scattered; it is not practicable for individuals or single institutions to scan all possible sources of relevant information. For this reason various 'secondary' services have been created: those which scan a wide range of sources, select particular documents relevant to the mission and describe them in some way, for example in abstracts bulletins or indexes. All these services have some limitations - finance and inadequate access to original documents being common ones. Services are also necessarily limited by self-imposed criteria such as their perception of the scope or interest of their user audience. Thus a service that is mainly directed to users in industrialized countries will tend to ignore publications concerned with rural development in the Third World.

A study of the accessibility of development literature (3), conducted in 1975, came to the following conclusions:

- that institutions wishing to keep abreast of new development literature must go to very great expense to find out what exists and then obtain it;
- that certain types of development literature are more widely available than others of equal or potentially greater usefulness to the development mission;
- that there is a great deal of duplication in the abstracting and indexing of some development literature and conversely almost no abstracting and indexing of other important segments of the literature;
- that as a result of the above, many institutions have no means of knowing the existence of many items that would be directly relevant to their work, nor is there any place to which they may refer with any degree of certainty of finding them.

More recently, and specifically, an extensive review of low-cost technology options for sanitation, was preceded by an intensive literature search lasting several months (4). It was the purpose of this search 'to identify specific technical literature that could form the basis for a planner, engineer, or decision maker in a developing country to understand, evaluate, and implement specific technologies'. A computer search of 14 databases yielded a final choice of 188 references for the annotated bibliography attached to the review. The authors commented:

"It is not surprising that the databases do not provide a large amount of references on nonconventional wastewater technologies. Most databases are, after all, enterprises that reflect the information requirements of their clientele, which are universities, engineering firms, and government agencies in North America and Europe. As a result more than 99% of the published literature on wastewater is of no practical value to the urban and rural poor of developing countries. 'Published' as used here

means published in a form readily available to the international reader. This study has shown that valuable technical literature is in fact published as studies and reports, which tend to be hard to acquire".

By conducting ad hoc manual searches in specialized centres, and collecting additional literature, the consultants in this study were able to identify an additional 343 documents, 35% of which they characterized as 'unpublished'. Of the total number of references included in the bibliography 37% originated in developing countries and an additional 18%, although originating in European North America, deal specifically with conditions in developing countries. The balance of the literature, 45%, originated in the industrially developed countries, but was considered relevant to conditions in developing countries.

Experience in trying to mobilize documentary resources in branches of technology relevant to the needs of developing countries points to two broad conclusions:

- (1) Information services of international scope (the majority of which are controlled and sponsored by institutions in developed countries) are often weak in their coverage of material that is specifically relevant to Third World needs;
- (2) Such services are often not designed so that such information can be easily identified in the mass of information that they publish.

These general problems can be seen to have influenced the design and development of a number of collaborative international systems particularly with respect to: (1) improving

coverage by mobilizing efforts at national levels to identify and collect locally-produced documents, particularly those of a non-conventional nature and (2) the development of specialized services/centres focussing on specific areas, notably those of importance to developing countries. Fortunately, as will be shown in subsequent chapters of this report, there have been significant developments in services providing information relevant to the objectives of the Decade in the past few years. As an example of (1) above, the development by CEPIS of the Latin American network REPIDISCA has already activated 8 national centres in its region in pooling and exchanging nationally-produced information. As an example of (2) above, the Environmental Sanitation Information Centre (ENSIC) was founded in 1978 at the Asian Institute of Technology, following the work done by the International Development Research Centre of Canada on low-cost technology options for sanitation cited earlier. A number of other institutions are active in providing services to an international clientele.

POETRI should aim to promote the optimal use of existing relevant secondary services insofar as this is possible. In addition, and in consultation with the agencies involved in promoting and developing these services and systems, POETRI should focus its attention on the following issues:

- What are the current deficiencies in internationally available secondary services with respect to community water supply and sanitation in developing countries, particularly on terms of coverage of relevant documents and actual availability of service?
- Of the existing services: are there ways in which these can be improved to the benefit of developing countries and, if so, how might this be achieved realistically?

- What role can centres in developing countries play in the improvement of these services, by direct or indirect participation in their production?
- What new services (entirely new or created by combining or 'repackaging' existing services) are needed, and by what means can they be created?

A further problem, not explored to any extent in this report, yet nevertheless of great importance in this area, is that of the unavailability of information due to its being presented in a language not understood by the potential user. While the predominance of English as the international communication language between research scientists is increasing this is by no means the case, or even an established trend, among engineers and those working in technology. This has certainly been the case in the development of REPIDISCA, where a recurring theme in the national workshops that have been held is the pressing need for technical information in Spanish. One commentator has given his opinion that 'the regional acceptance of POETRI will be language dependent' (5)

2

REFERRAL

The term 'referral' is defined by UNISIST (6) as an indication of sources from which information may be obtained and the mechanisms for switching users to such sources. The activities of a referral centre are described as follows:

- to carry out on-going surveys of information sources available...with a thorough characterisation of their respective products...to facilitate data acquisition from operating services, to increase analytical access to their files; and to develop

standard routines for printing directories, card files, statistical surveys etc.

- to evaluate regional and/or resources with a view to detecting possible improvements in the division of labour and resources... ;
- to provide referral services to individual and corporate users..

The referral process, and specifically the compilation of source directories, has been seen by a number of institutions as a valuable mechanism in the process of technology transfer in the field of community water supply and sanitation. An essential component of the REPIDISCA network is the registration of sources in the Latin American region. CEPIS has also been instrumental in its region in working with the Regional Office for UNEP in developing exchange mechanisms between various regional sectorial information systems.

IRC, within POETRI, has prepared a directory of approximately 200 sources from its network of contacts. As a result of recent discussions with UNEP, it has been agreed that INFOTERRA (an international referral system on the environment) will undertake the responsibility of jointly publishing this directory, enhancing it with additional sources from its own files.

Many INFOTERRA focal points in developing countries are strictly concerned with referral activities and do not themselves provide substantive information. As has been recognized in Latin America, linkages between the POETRI focal points and those of INFOTERRA, at national and regional levels, should widen the channels of information transfer, as well as making a combination of documentary and institutional information resources available to a larger community of users.

III PRIMARY SOURCES OF DOCUMENTARY INFORMATION

1 TYPES AND ACCESSIBILITY

Primary sources of documentary information in the field of community water supplies and sanitation fall into two broad classes:

- 'published' (conventional) material which consists of articles in periodicals, commercially available books or monographs and some published conference proceedings;
- 'unpublished' (non-conventional) material which comprises a variety of documents which have two common characteristics - they are usually very difficult to obtain and seldom come under bibliographic control. Included in this class are the reports of municipalities, consultants, research and international organizations not specifically prepared for extensive circulation.

It would not be possible to isolate with precision from the large and complex world literature concerning water and sanitation, that part which falls within the scope of POETRI (ie that which is specifically relevant to the needs of developing countries) without a very extensive survey. Thus, any estimates of the size of the literature will inevitably be crude. It is impossible to take data generated by previous studies and the output of current services to deduce some 'order of magnitude' estimates of the annual outputs.

We would expect intuitively that the proportion of non-conventional literature would be high. The DEVSIS study estimated that approximately 60% of the development literature was unpublished. While this might seem, and probably is, high within the context of POETRI, it should be noted that the IRDC low-cost

sanitation study obtained a quarter of its references from non-conventional sources. When it is remembered that the investigators had relatively easy access to the published literature, compared with limited and laborious access to non-conventional material, it might be deduced that the actual percentage of non-conventional material is considerably more than 25%.

2 CONVENTIONAL LITERATURE

The largest published regular survey on water and waste water is that produced by the UK Water Research Centre: WRC Information. This provides approximately 4,000 abstracts per year by scanning over 400 journals and other sources. The bulk of WRC's output refers to conventional publications, dealing with scientific and technological literature and a high proportion of this is strictly only relevant to industrialized countries.

A survey (7) conducted by Intermediate Technology Services Ltd examined the content and distribution of existing publications covering the subject of water supplies and sanitation in developing countries. The object of the study was to establish whether or not there was a need for a new journal in this area. The findings may be taken to give an indication of what are the existing 'core' journals in this context. The relevance of the journals examined to water supplies and sanitation in developing countries was indicated by three levels :

a. 100% b. 50% c. occasional

Fifty-two journals were judged to be of relevance, with the following ratings :

a. 2 b. 22 c. 28

These findings give some indication of the scatter of relevant publications and this is reinforced by the practice of Environmental Sanitation Abstracts, which is devoted to sources of specific relevance to developing countries. ENSIC publishes approximately 900 abstracts a year in this journal, the majority of which are drawn from conventional publications and approximately 130 journals which are regularly scanned. Philippines Water Resources Abstracts, covering mainly published literature concerned with the conservation, control, use and management of water also produces approximately 900 abstracts a year, a very large proportion (about 95%) coming from the journals of industrialized countries.

From these indicators we may deduce that the total annual output of conventional publications within the scope of POETRI is possibly of the order of 1500 - 2000 items.

The following observations from the Intermediate Technology Services report adds some dimension to this picture :

"....there are many periodicals (in their 'b' category) which are limited either by their content, which is not wholly relevant, or by their geographical distribution, which confines them largely to particular countries or regions. Often both limitations apply. A further factor is that there are many publications which cover water supplies and sanitation at a fairly high scientific and technical level, and which therefore only partially

meet the needs of developing country situations and which are not generally relevant to the field and extension worker class of readership'.

3 NON-CONVENTIONAL LITERATURE

Estimating the size and distribution of non-conventional literature is no less difficult in the area of community water supply and sanitation than in other areas. By its definition - documents produced in limited numbers for limited distribution and not available through commercial distribution channels - quantification of this literature is only possible after exhaustive searching and direct contact with the issuing institution. Only a proportion of this literature, when identified, is of a quality or in a form of presentation suitable for dissemination to a wide audience of users.

Yet non-conventional publications, when identified, are often judged to be of value. In an extensive search for literature on low-cost sanitation, a team jointly sponsored by IDRC and the World Bank searched 14 computer-readable databases for relevant references. This yielded 188 references, all to 'published' papers. To supplement this list an ad hoc search was carried out by external consultants in 21 specialized information centres around the world. The results are given in Annex 3. What is notable in this context is that of the total 531 references selected for the state of the art bibliography, 121 (23%) were 'unpublished' (non-conventional) documents.

In an attempt to obtain some indicative figures for the non-conventional literature in this field, an analysis of the intake of such documents by IRC over a five month period (January - May inclusive, 1981) was made by

examining the library accessions bulletins. During this period 624 non-conventional documents were registered, of which 88 were excluded from the analysis owing to difficulties in readily identifying the source. The remaining 536 items were examined to determine their country of origin; international agency documents were counted separately.

(a) Developing Countries

82 items have been received from 24 developing countries which, by extrapolation suggests that IRC is receiving approximately 200 items from these countries on an annual basis. This provides an average of 8 documents per year per developing country received by the library, and indicates that, for approximately 100 developing countries (IRC's receipts are probably biased by the countries with which they have direct programme links) there would be an annual output of $8 \times 100 = 800$ items.

There is no way of estimating how effective IRC is currently in capturing this type of document; it would be reasonable to assume that we can possibly double this estimate.

Using these data and assumptions, the output of the developing world in terms of 'available' non-conventional documents is probably of the order of 800 - 1500 items per year.

(b) Industrialized Countries

The remaining 276 items came from developing countries although not all might be strictly within the scope of POETRI (ie at a technological level

relevant to the needs of developing countries). The number of documents from US sources was 120 (eg approximately 290 per year). It has been assumed (by analogy with ratios in agricultural development literature) that the total annual output of the industrialized countries would be up to four times this figure, ie 1000 - 1200 items per year.

(c) International Agencies

Documents had been acquired from UN family agencies and other international organizations (eg OECD, the World Council of Churches). The numbers of items received were as follows :

WHO	50
World Bank	25
UNDP	21
UNICEF	21
FAO	13
UNO	10
Other UN	23
Other inter-national	15

giving a total of 178 items in five months, or by extrapolation 430 items per year. Assuming that there is half as much material which has not been collected from international agencies, the estimated annual output is 400 - 600 items per year.

In summary, the estimated annual production of non-conventional literature within the scope of POETRI is:

Developing countries	800 - 1500
Industrialized countries	1000 - 1200
International agencies	<u>400 - 600</u>
Global Total	<u>2200 - 3300</u>

IV SYSTEMS AND SERVICES

This chapter identifies and outlines some existing systems and services providing information wholly or partially within the scope of POETRI, and are relevant to Decade activities. Each has an international clientele of users : some are specifically directed to developing countries or those concerned with the problems of the developing world. It is not an exhaustive survey and, to some extent, is based on information supplied by the institutions themselves. There is no implicit judgement of precedence in the order of presentation.

1 THE WATER RESEARCH CENTRE (WRC)

The Water Research Centre of the United Kingdom is a national centre for water research with involvement across the whole water and wastewater cycle.

Chief of its information services is the weekly publication WRC Information which contains up to 100 abstracts of selected books, journal articles and reports recently received. Subjects covered are water sources and supplies, water quality, monitoring and analysis, treatment, underground services, sewage treatment, industrial effluents and the effects of pollution. WRC Information is available free to members and by subscription to non-members. Annual and quinquennial cumulative author and subject indexes are available on microfiche. WRC also provides a full photocopying service for which users pay by means of pre-paid vouchers.

The production of WRC's information publications is automated and, by retrospective conversion, all abstracts

published in WRC Information since 1974 (about 30,000) are held in machine-readable form on the WRC AQUALINE database. AQUALINE is now available world-wide through the European Space Agency's IRS system in Europe and the Lockheed DIALOG system in the USA. As an essential aid to AQUALINE, WRC has developed the AQUALINE thesaurus - a comprehensive listing of over 70,000 terms used in the water industry and the inter-relationships between the words. Because of its expertise in this activity, IRC commissioned WRC to develop a thesaurus specifically designed for POETRI centres.

There is a growing demand on WRC from its members and from WHO (WRC is the Collaborating Centre for Drinking Water and Water Pollution Control for the WHO Regional Office for Europe) to extend its present coverage on intermediate water technology both in its abstracts bulletin and in its computerized database.

2 ENVIRONMENTAL SANITATION INFORMATION CENTRE (ENSIC)

This centre was founded in 1978 at the Asian Institute of Technology in Bangkok, following work done by the International Research Development Centre (IDRC) of Canada in compiling 'Low-cost Technology Options for Sanitation' which demonstrated the poor coverage of the sanitation problems of developing countries by information sources in industrialized countries. With financial support from IDRC, ENSIC attempts to cover all types of information related to rural water supply and sanitation, low cost options for disposal and re-use of wastes.

Its target audience comprises all institutions and individuals active in the field of environmental sanitation

in developing countries. Special emphasis is given to finding means of bringing relevant information and technologies to the level of little educated rural users.

ENSIC is attempting to build a comprehensive collection of documents in the field of environmental sanitation relating to water supply, refuse, human excreta, sewage, greywater and animal wastes. The information collected is repackaged in a number of ways through publications, a computerized database and reference and reprographic services.

The publications (which are all in English) include ENFO, a newsletter (4 issues/year), Environmental Sanitation Abstracts (3 issues/year), and Environmental Sanitation Reviews (3 issues/year). These publications are only available to members of ENSIC through payment of a membership fee: there is a differential scale of fees distinguishing between developed, middle-income and developing countries. (It is possible for some countries to pay in local currencies).

The output of the abstracts journal in 1980 was approximately 900 entries in the following subject areas :

	%
on-site collection and treatment	15
collection and off-site treatment	17
reuse	43
waste management	9
water management	10
general aspects	6

Entries are indexed according to keywords (subject and geographical) from a controlled vocabulary especially designed for documentation in, and retrieved from, the ENSIC computerised data base, the latter being built up

and searched by means of the CDS/ISIS software package. Environmental Sanitation Reviews publishes state of the art reviews on various environmental sanitation topics, eg 'land application of sewage sludges'. ENSIC's reference and reprographic services provide answers to queries and copies (photocopy and microfiche) of documents.

3 PAN AMERICAN CENTRE FOR SANITARY ENGINEERING AND ENVIRONMENTAL SCIENCES (CEPIS)

The activities of this centre, and specifically its initiatives in sponsoring the development of the REPIDISCA network, are more appropriately discussed in the next chapter (V: Existing international system models, section 4)

4 NATIONAL WATER RESEARCH COUNCIL (PHILIPPINES)

The National Hydraulic Research Centre publishes, under the auspices of the above council, Philippines Water Resources Abstracts, a quarterly journal. This publication contains approximately 900 abstracts a year, under the following subject headings:

- water cycle
- water supply augmentation and conservation
- water quality management and control
- water quality management and protection
- water resources planning
- resources data
- engineering works
- manpower, grants and facilities
- scientific and technical information

Very little non-conventional material appears to be covered by this journal and of the sources covered, less than 5% is from developing country literature. The indexes for this publication are computer produced.

5 THE ROSS INSTITUTE OF TROPICAL HYGIENE

This institute holds a substantial document and literature collection and particularly with respect to the health aspects of the Decade. It has compiled a major review and bibliography on the health aspects of excreta disposal. This work has been supported by the World Bank and publication is by the Johns Hopkins University Press.

The Institute is located within the London School of Hygiene and Tropical Medicine which also houses the Bureau of Hygiene and Tropical Diseases. The latter published two major abstracts journals : Tropical Diseases Bulletin and Abstracts on Hygiene and Communicable Diseases. These provide a selection of abstracts of articles which appear in the world's principle medical and scientific journals (approximately 700 are examined) and which make significant contributions to knowledge of various aspects of community and environmental health, of communicable diseases and their control, and of associated fields of microbiology, parasitology and medical entomology. The abstracts are prepared by named specialists who write critical comments on the articles where appropriate. The bureau is highly selective in articles chosen for abstracting: in certain instances articles which in themselves are excellent are excluded because they do not describe any new developments. Other types of publication abstracted are reports of international and national scientific and medical organizations, government departments, health authorities etc; reprints, published theses and books.

Abstracts on hygiene contains over 4000 entries per year, the section on 'water and sewage' yielding over a hundred abstracts. Tropical Diseases Bulletin has almost 3000 abstracts a year with a small section devoted to 'sanitation and water supplies'.

The above journals are currently produced by conventional printing methods: the Bureau hopes in the near future to employ computer-assisted methods of printing, possibly by using the sophisticated facilities of the Commonwealth Agricultural Bureaux. In this eventuality, the outputs of this organization would be available as a machine-readable database.

6 INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

IDRC, as a research centre in its own right, and as a funding agency, is involved with many projects of relevance to the Decade. Of specific interest in this chapter is SALUS: low-cost rural health care and health manpower training. This is a bibliography, produced irregularly, which has a special emphasis on developing countries. It is annotated with abstracts and the most recent issue (Volume 8) has 700 entries. The main subject areas covered are :

- reference works
- organization and planning
- health care implementation
- health workers - training and utilization
- formal evaluative studies

Appropriate references to water and sanitation matters are included in the bibliography. Copies of original articles can be supplied as photocopy or microfiche: IDRC has three depositaries in institutions in developing countries for its microfiche collection.

The bibliography is generated by computer (using ISIS software) and the SALUS database is available on magnetic tape in ISO format 2709.

7 WATER AND SANITATION FOR HEALTH PROJECT (WASH)

The primary purpose of the WASH project and its Information Centre is to serve USAID in Washington and its missions overseas in all aspects of water supply, sanitation and environmental health, with emphasis on rural and semi-urban areas.

The library collection was started in September 1980 and includes over 2000 reports, books, manuals and directories and a collection of journals and newsletters with an intake rate of approximately 70 new items per month. The holdings of the centre are held in computer-readable files which can be searched to produce specialized bibliographies on demand.

8 THE TOOL FOUNDATION

The TOOL Foundation in Amsterdam is working with a number of appropriate technology agencies in the development of an international network: Socially Appropriate Technology Information (SATIS). Much of the useful, practical information on appropriate technologies is not available from traditional libraries. SATIS is designed to access the unpublished appropriate technology information that exists in the technical enquiry services of VITA, TOOL, ITDG and similar agencies including those in developing countries.

A continuing activity is the compilation of a number of documentation directories (which can be cut into card form) for use by all participating agencies. The first directory, covering the documentation held by nine appropriate technology agencies on water and sanitation, and containing over 800 references was published in 1979.

Subsequently directories on manufacture and services, energy and power, and building and construction work have been published, together with some supplements. The document descriptions include:

- standard bibliographic descriptions
- keywords
- institutions in the network holding the original document
- a series of indicators:
 - (a) presentation - book, manual, data sheet etc.
 - (b) bias - technical, scientific, economic, commercial etc.
 - (c) relevance - research, design, construct, operate etc.
 - (d) scale - home, village, local etc.
 - (e) practicability - ideas, sketches, costs etc
 - (f) experience - theory, prototype, limited use etc.
 - (g) geographic - industrial, developing.

So far the majority of references processed have come from institutions in developed countries, but there are seven organizations in developing countries which have registered their intent to contribute, and some are already doing so.

9 UNITED NATIONS ENVIRONMENT PROGRAMME

The international referral system, INFOTERRA, promoted by UNEP, is discussed in the following chapter. It is relevant to mention here the findings of an investigation of the coverage of source institutions active in the water and sanitation fields covered by INFOTERRA. This was compared with a draft directory which had been prepared by IRC as a contribution to POETRI.

The INFOTERRA list included 404 sources as against the POETRI list of 187 source institutions. The overlap between the lists was very small: 17 institutions in

common. The INFOTERRA list had 15 countries not covered by POETRI of which 3 are developing countries; the POETRI list had 30 countries not listed by INFOTERRA of which 25 are developing.

Some of the reasons for these discrepancies are

- POETRI focussed on centres in developing countries, and was selective in what it included; for industrialized countries it only included institutions that deliver services directly to developing countries;
- POETRI only listed governmental or non-profit institutions;
- POETRI included 43 regional or international agencies.

The comparative figures obtained in this exercise are given in Annex 1. Some of the implications for future actions within POETRI are given in subsequent chapters.

V EXISTING INTERNATIONAL SYSTEM MODELS

The purpose of this chapter is to examine various modes of cooperation in information transfer which have been developed within the international community within the last decade. Each of the systems discussed has its own peculiar features which relate to the nature of its mission, the community working within that mission and the institutions supporting the development and maintenance of the particular system. There has, moreover, been a considerable change in the international climate since some of these systems were first projected. Nevertheless, some of these systems have gained a level of effectiveness that early pessimists thought unattainable through joint action at the international level. There are, in fact, some features of collaborative operation which - with some variation - are common to most of the systems discussed here. The experience gained in the development of these systems is of considerable interest if POETRI is to concern itself with sponsoring more effective interchange of information at the regional and international levels.

1 INIS (INTERNATIONAL NUCLEAR INFORMATION SYSTEM)

Although the INIS system has had emulators there are peculiar reasons for its relatively painless establishment. Nuclear science and engineering have attracted large interest and funding from the governments of industrialized countries and latterly from less developed countries. It is essentially a high technology/'big science' area: there is no appropriate or intermediate technology area, no special considerations for the developing world.

The decision to develop a cooperative system, centred on the International Atomic Energy Agency, was made during the early period of US Soviet detente and INIS

owes its existence probably as much to political expedience as to any perceived technical or service benefits. The main advantages of a cooperative effort were seen to be better coverage (especially of technical report literature which is extensive and important in this field) and international cost-sharing. The major contributing countries had already well-developed information facilities, usually centralized and controlled by government through one specific ministry.

The system, which was designed and agreed collectively established an important precedent - that of the 'territorial formula'. According to this formula each participating country appoints an INIS Liaison Officer who is responsible ultimately for

- (a) organizing within his own country the identification, selection and description (eg abstracting and indexing) of locally produced documents relevant to the nuclear science mission. These documents descriptions, catalogued and indexed according to the agreed protocols of the system, are then transmitted to the INIS international centre in Vienna;
- (b) receiving from the INIS centre the merged files of all inputs from contributing countries, to exploit these files in whatever way is deemed to be nationally appropriate without restriction from the IAEA.

It is for these reasons that INIS is described as a 'decentralized' system: the concept is that national

bodies are responsible for providing national input and exploiting locally the combined international file, and bearing the local costs of these activities. (In fact a printed journal Atomindex is produced at the Vienna centre and distributed worldwide. The main function of the IAEA centre has always been the receipt, merger and and redistribution of the computer readable files, the maintenance of standards and quality control with respect to these files, and the implementation of developments of the system agreed by national participants).

The costs involved in operating the IAEA centre come from the regular programme budget of the IAEA, ie ultimately from member country contributions.

INIS operates a 'clearinghouse' for non-conventional literature, that is, one copy of all non-conventional documents entered in the file is held in Vienna where it is recorded on microfiche. Copies of these microfiche are available to any contributing country.

It was agreed early in the development of INIS that the 'carrier language' of the system would be English only. In effect this means that all the inputs and outputs to they system are in English, as are the procedural manuals of the system. In the nuclear science field this is not a heavy imposition.

INIS has worked well because it started with a good political impetus, has a well-defined scope, uses well-appointed national centres, is well-financed and heavily influenced in the Agency by two major World Powers. One problem not anticipated in the design of the 1960s is implicit in the territorial formula. This allows any participant country to exploit the INIS file how it prefers

within its borders but not beyond them without agreement. The advent of internationally available online systems, using telecommunication facilities, was not adequately foreseen and can create difficulties due to different attitudes of participating countries as to how the database might be 'marketed'. AGRIS and ASFIS (see below) face similar problems.

The innovation of the territorial formula for sharing responsibilities among the various participants had had a considerable impact on the design of later international systems. The formula has been seen to have the following benefits :

- avoidance of duplication of effort;
- each participant bears the cost of finding and reporting the information in his own territory. It is a matter of intrinsic national interest to perform this task and the costs of doing so are in proportion to the size of national programmes;
- the cost of finding and reporting the information (the largest part of the total costs) is borne by the participants, so that the central costs (to be borne by the IAEA's regular budget) are minimized.

Further conclusions can be drawn from the INIS experience and from the systems which have emulated INIS:

- that the system builds its own momentum: as individual countries improved and increased their input, their example was emulated by others;
- that the costs can be held within estimates and the international staff needed at the INIS centre does not grow inordinately;

- that effort is needed to define operational procedures in clearly written manuals and that a continuing training programme is needed to upgrade the skills of staff at participating centres;
- that decisions about the management of the system and its future need not be highly centralized.

2 AGRIS (International Information System for the Agricultural Sciences and Technology)

Superficially AGRIS is very similar to INIS: in fact it shares the same data processing facilities as INIS in Vienna. The dissimilarities and their concomitant problems are probably relevant to the environment in which POETRI operates. Agriculture (which has a broad definition within FAO's programme activities including forestry, fisheries, land and water use, rural development etc) is not like nuclear science and technology. It is a long-established activity involving craft, technology and latterly science, influenced by climate, geological, cultural, socio-economic and other factors.

Although AGRIS is a participatory system, organized by FAO through national input and liaison centres, its infrastructure has been more complex from the outset. While the concept of AGRIS received support from industrialized countries from the beginning, it was early seen by some to be in conflict or competition with existing services. In theory all developing countries can both contribute to and benefit from a cooperative agricultural information system: currently by 25% of the total input to AGRIS (ie 30,000 documents per year) come from developing countries. Despite this the governing bodies of FAO were slow in accepting the central coordinating function into their regular programme and budget.

While the national territorial formula applies equally

well in AGRIS, there is in fact regionalization of input/output activities in a number of areas (the European Communities, Latin America, SE Asia). Regional subsystems have proved necessary and desirable because

- some were pre-existing, in embryo or fact;
- it is easier for the FAO centre to deal with a smaller number of centres by working directly with regional organizations;
- development funding is attracted by regional programmes and was needed in promoting AGRIS input centres in developing countries.

The AGRIS system, as originally conceived, was to operate at two levels:

- Level I - a comprehensive current awareness service;
- Level II - a network of specialized services.

The thinking behind this was that the current services of international scope were inadequate in coverage and currency and that this could be remedied by creating an INIS-like collaborative service (Level I). The documents identified in the Level I 'inventory' so produced would be treated again (through abstracting, deep indexing by specialized centres working in particular sectors (Level II)). Although Level II as a distinct concept has faded from the FAO/AGRIS programme, specialized information centres for particular areas of interest do exist (eg cassava, irrigation technology, etc).

It should be noted that AGRIS covers science and technology literature (very little 'agricultural extension' material), that it is global in approach and not restrictively aimed at developing countries. The

development of AGRIS input centres in developing countries has necessitated a considerable amount of regional and national training.

It should also be noted that the 1978 costs for central activities for IAEA/INIS and FAO/AGRIS were annually \$1.64 million and \$0.45 million respectively. The latter figure does not include extrabudgetary contributions for training activities.

3 DEVSI8 (International System for the Development Sciences)

Although this system has not developed as initially conceived in the planning stage, and seems unlikely to do so, its conceptualization, problems and subsequent development are of some interest. DEVSI8 was developed to ameliorate the situation of the transfer of development sciences information - a wide area, difficult to define.

An extensive preliminary design study proposed a system of INIS-like structure which would produce two major data bases: (a) a bibliographic database containing abstracts, and available in English, Spanish and French, similar to Atomindex and (b) a referral file of institutional sources of information. The (1975) costs of central operations were estimated at just over \$1 million per annum.

Why DEVSI8 received muted support for its implementation is obscure and probably complex. However, three factors were probably significant:

- (1) Perceived difficulties in delimiting the subject scope of 'development science' coupled with a concern that this would lead to overlap with pre-existing systems;
- (2) Reluctance of governments and development institutions to make the appropriate documentation - which might in some cases be regarded as 'sensitive' - available;
- (3) A general reluctance on the part of governments, particularly those of industrialized countries, to sanction the creation of another global system centred on a UN agency. (Implicit in this is not only the need for increased budgetary appropriations, but also possibly a turning-away from subsidized international services towards a more commercial approach to information transfer).

However, although not developing as originally designed, DEVSIS activities have progressed, though sometimes under other names. Institutions in Morocco, Pakistan, the Philippines, Canada, the Federal Republic of Germany and the Soviet Union provided input to the 1979 issue of DEVINDEX; CLADES of the Economic Commission for Latin America has produced PLANINDEX; the Information Services Unit of the UN Department of International Economic and Social Affairs is now producing Development Information Abstracts, and the Economic Commission for Africa has established the Pan African Development Information System (PADIS) and is preparing to publish its first development information bibliography. All the above are using common methods developed in the DEVSIS feasibility study. It is significant to note

that many of the above operations are using either the MINISIS or ISIS computer software, the latter also being used by systems in the POETRI scope of interest, eg ENSIC and CEPIS/REPIDISCA.

4 REPIDISCA (Pan American Network of Information and Documentation on Sanitary Engineering and Environmental Sciences)

This system, sponsored by PAHO/CEPIS, is being developed as a decentralized regional network with similar structure and operations to those of AGRIS and INIS, but limited to the Latin American and Caribbean region. Although it predates POETRI, it is a clear manifestation of the principles of the programme since one of its prime aims is to "develop a national information infrastructure aimed at environmental engineers and scientists, researchers, teachers, designers, managers, technicians, operators and community developers working in water supply and public health agencies" (8). In fact, REPIDISCA was proposed some years after CEPIS had begun to provide ad hoc assistance to several countries for the formation of national information centres. POETRI has recently sponsored a regional workshop at CEPIS and is providing assistance in the development of national centres in Ecuador, Argentina, Columbia and Peru.

REPIDISCA is currently producing a table of contents bulletin (TABCONT) of the 55 most important journals in the field, including all the relevant Latin American journals. TABCONT is available by subscription and offers a photocopy service for all the articles announced.

The first issue of a quarterly bibliography, REPINDEX,

which will contain 50% of its input from eight national collaborating centres, was due to be published at the end of 1981. This issue will contain about 700 entries, CEPIS itself providing the remaining 50% of the input. In the REPIDISCA system, CEPIS aims to supplement the national Latin American input with selected references from the world's literature generated outside the region. REPIDISCA has implemented ISIS software and has received considerable financial assistance from IDRC in the design and implementation phases of the system.

UNESCO/PGI has recently provided a grant to REPIDISCA to establish a regional pilot document delivery service, including the development of microfiche capacity within the network and cost-recovery mechanisms which will facilitate payment in local currency.

The 'carrier language' of REPIDISCA is, naturally enough, Spanish. It should be noted in this context that AGRINTER - the Latin American regional agricultural information system - which has developed in parallel with, and provides input to, AGRIS also operates in Spanish. As the carrier language of AGRIS is English, AGRINTER is obliged to prepare parallel records in both languages.

The four systems which have been described so far all operate on the 'territorial formula' principle. The systems described next are all collaborative in their operation, and involve work-sharing, but cooperation is on a much more ad hoc basis with fewer number organizations playing a more dominant role.

5 ASFIS (Aquatic Sciences and Fisheries Information System)

This system is sponsored by FAO in collaboration with a number of international and national agencies. It has a complex developmental history of which the following are salient features. FAO published for a number of years a bibliography of aquatic sciences and fisheries but encountered problems in maintaining it. A commercial (British) organization, Information Retrieval Limited (IRL), began publication of a 'rival' journal covering the published conventional (ie mainly journal) literature. Consultations between FAO, IRC and a number of (developed country) fisheries institutions led to an agreement whereby the ASFIS system was created. (The major output of this system is Aquatic Sciences & Fisheries Abstracts (ASFA)). The main features of ASFIS are :

- IRL inputs material from the worldwide 'conventional' literature and is responsible for the printing and marketing of ASFA. It receives the income from sales, but supplies each participant organization with a number of free copies of ASFA;
- FAO inputs its own material, other references from non-conventional sources, and edits the input supplied by all institutions other than IRL;
- German, French and Soviet institutions input material from their own language literature;
- Other institutions (in the UK, USA, Canada) input mainly non-conventional literature generated in their own countries.

The cooperation has been shaped by contracts between FAO and IRL and 'memoranda of understanding' between individual partners and FAO. In effect the contributing

agencies provide input which supplements the 'core' of journal literature covered by IRL. This literature is either 'difficult' non-English language material and/or non-conventional literature of various types.

FAO, and latterly the International Oceanographic Commission, are joint sponsors of the system and are advised by a Panel of Experts consisting of individuals from cooperating national centres. FAO recruits new members and has been active recently in trying to draw in institutions from developing countries. In 1978 the annual central funding was about \$0.2 million. Presumably the commercial publisher recovers at least his costs.

Although the ASFIS data base has been made available internationally online, at least one country has imposed national restrictions on its use.

The ASFIS model is of interest because it has been built around a commercial operation which is subsidized by the input of 'difficult' material. The extent to which it specifically serves the needs of developing countries is not clear. Recently IRL has been sold to a US publisher, Cambridge Publications; it is not known what effect, if any, this might have on its continuing contribution to ASFIS.

6 IFIS (International Food Information System)

IFIS is an inter-institutional (rather than inter-governmental) cooperative which is controlled by four institutions (one British, one Dutch, one West German, one US). A high proportion of the input is provided by one UK organization - the Commonwealth Agricultural Bureaux (CAB) to a large extent as a 'spin off' from

its existing services. The remaining 25% (which is controlled editorially by CAB) is supplied from eight other bodies, globally scattered, which are paid for their input in cash or kind. The German centre is responsible for data processing and production of the output services: an abstracts journal and magnetic tapes (the data base is also available internationally for online search).

IFIS provides outputs in English only and concentrates on journal literature. The system is self-financing, its services are expensive and its economic viability probably rests on the considerable interest of the food industry in its products. It appears to have minimal developing country orientation, either in its organization or coverage.

7 NATIONAL SYSTEMS WITH INTERNATIONAL PARTICIPATION

There are some forms of international cooperation of which the US National Library of Medicine's MEDLARS system and the Chemical Abstracts Service provide examples. These are characterized by a single dominant centre in one country owning and controlling the overall systems design and management. Cooperation of this type usually arises because the parent system can, through suitable bilateral agreements, achieve better global coverage, through inputs provided by its collaborators, more easily and cheaply. In return the collaborators are given advantageous access to the system, which remains firmly in the control of the parent organization.

8 INFOTERRA

INFOTERRA is a world-wide referral network for environmental information coordinated by the United Nations Environmental Programme (UNEP). It has over 100

registered national focal points which identify sources of environmental information and feed data on these into the International Directory of Sources which is published periodically by UNEP and distributed throughout the network. Each national focal point consults the International Directory in referring users to sources of environmental information around the world. Alternatively, an integrated file of sources is available in machine-readable form and may be searched by computer. The INFOTERRA focal points may or may not be located in, or attached to, information centres. If the former, then they are often in a position to supply substantive information services; if the latter, which is sometimes the case in developing countries, they do not.

The overlap in scope between INFOTERRA and POETRI has been outlined in the previous chapter: this has already led IRC into a cooperative directory production exercise. In the following chapters further possibilities for future cooperation are outlined.

VI THE CASE FOR MORE COOPERATION

The preceding chapters have surveyed the current situation with respect to problems of information transfer, information sources and current service provision aimed at regional and international users in the field of community water supply and sanitation. The experience of existing international cooperative systems has also been outlined in order to gain some insights into possible modes of cooperation in information transfer to further the activities of the Decade. This chapter seeks to bring these observations together in an attempt to identify what are the obstacles, particularly for developing countries, in accessing information which is theoretically 'available' but in practice unknown or inaccessible; and to review cooperative approaches which might lead concerned agencies, active in the field, to achieve a better dissemination of relevant information. The subsequent chapter identifies programme activities, at regional and international levels, arising from these findings.

While there is considerable emphasis in Decade activities - and this is reflected in POETRI - in the development and strengthening of national capabilities, together with an endorsement of the concept of technical cooperation between developing countries (both unassailable approaches) the fact remains that a great deal of relevant information is lodged within the systems and services controlled or sponsored by industrialized countries. Further, mobility of information produced in developing countries is hampered by limited transfer facilities between these countries.

The coverage of conventional literature by secondary services presents problems, particularly of scale, but

these are not insuperable. Leaving aside the problems of language, and concentrating on scientific and technological services catering for the English-speaking world, the norm is for one or, usually at most, two published abstracting and indexing services to serve the international clientele of users. This is the case in chemistry and physics, medicine and agriculture, and in various branches of engineering. There is a strong economic reason for this: the number of published sources to be scanned is often very large and implies access to large expensive collections, and the intrinsic cost of searching, selecting, abstracting and indexing is high. Moreover, the latter activities require the services of scarce and increasingly expensive specialized staff: it does not make economic sense to replicate these activities in a large number of institutions.

There are several hundred journals relevant to water and sanitation (see chapter III). While existing services, such as those produced by ENSIC and WRC, may not give a total coverage of the published literature within their scope, possible improvements are likely to be marginal. If they are deficient in, for example, the area of published literature on health care (which extends into several hundreds of journal sources) it would seem operationally and economically sensible to capture these from existing secondary services already covering this area.

There is, however, an intrinsic problem for centres in developing countries wishing to access relevant published material through the large services of international scope operated from developing countries. (ENSIC, which specifically orients its services to developing country needs, is excluded from this part

of the discussion). Leaving aside the cost, and the frequent requirement to meet this with scarce hard currency, much of the content of such publications and databases is irrelevant to actual needs and level of development. What developing countries more often require is a subset of the total collection and ready access to the original documents. This implies a 'repackaging' service which selects, from a number of large databases, development-specific material, and an adequate document-supply back-up service.

The situation with respect to non-conventional literature is much more critical. A high proportion (possibly a half) of the information contained in documents relating to the water and sanitation needs of the Third World (whether it is produced by or for developing countries) is unpublished. It is not adequately covered by abstracting and indexing services and the collections of such documents by specialized institutions tend to be uneven. This is not surprising because even the report literature generated in industrialized countries is notoriously difficult to control. One of the prime objectives of the INIS system was to mobilize nationally-produced non-conventional literature internationally, and this has been echoed by subsequent international cooperative undertakings: a better transfer of locally-produced, Spanish-language material within the Latin American region has been a major incentive in the development of the REPIDISCA network.

There do not appear to be any effective solutions to this problem outside the collaborative approach. Of the systems reviewed in the previous chapter, those with

the best performance for disseminating non-conventional material are the ones which have developed the territorial approach to identifying, collecting and controlling it. For many developing countries, and for most specialized agencies, the major part of their collaborative input is non-conventional. A basis for an improvement in the dissemination of this type of information is contained in the cooperative efforts of the TOOL Foundation with other appropriate technology agencies in pooling access to their specialized document collections, which are rich in non-conventional material. However, as presently operated, this information can only represent an unequal coverage of what actually exists, nor can the system be reaching a large proportion of the potential users of it. Furthermore, the separation of non-conventional material from conventional in most systems is arbitrary, not reflecting the actual information-content interest of users.

It is equally arbitrary to divorce referral activities from those of supplying substantive information, as though the former were a cheap substitute for the latter, rather than a complement to it. This objection has been voiced about the INFOTERRA system, more particularly on the part of developing countries.

The type of user envisaged by POETRI is not very likely to be versed in foreign languages. Within the national infrastructure, the predominant local language would be the medium of discourse. But on a regional and international basis, communication is limited by resources, and can only be approached feasibly by using a small number of international languages. The DEVSIS report asserted that English, French and Spanish are the

most widely used in the development literature and by the development community (the report gives the proportion of documents about developing countries as: English 63%, Spanish 20%, French 18% - many documents are issued in two or more languages which is why the percentages add up to more than 100%). POETRI-sponsored activities should aim to produce some kind of parity for these three languages.

The CEPIS/REPIDISCA network arose partly from the needs of the Spanish-speaking Latin American community and partly as a response to the neglect of the Spanish language literature. The situation is much less satisfactory for the French-speaking developing world. POETRI has established a regional focal point at the Comité Interfricain d'Etudes Hydrauliques (CIEH) in Upper Volta and it is presumably this institution which would be the development centre for a network for francophone Africa. To minimise problems in information transfer, POETRI should promote linguistically compatible systems tools, eg thesauri and other indexing aids.

Since state of the art reviews and other summary publications are highly valued and are being produced specifically for Decade activities, and it is desirable that they be available in the three international languages, some coordination between differently linguistically-orientated specialized centres might obviate duplication of effort, at the expense of cheaper translation.

Access to primary documents is a major problem for developing countries. In the long run this problem is best alleviated by building up good local national

and regional collections with effective loan and photocopy services. In the short term, a more rational and informed use of existing clearing-house services is called for. The majority of services listed in chapter VI offer some kind of photocopy services for the documents they announce. REPIDISCA, with UNESCO's assistance, is piloting a photocopying service for its region. A similar type of scheme might be developed for other regions by regional centres and information-rich development organizations in industrialized countries through the development of a cooperative clearing-house mechanism.

The conclusions so far indicate that more cooperation and perhaps even the collaborative production of services might provide a considerable improvement in the accessibility of development information for water and sanitation. The question arises: in what modality could such cooperation be achieved? There can be little doubt that internationally managed cooperative systems of the type described in the first part of the previous chapter have fallen out of favour (or fashion) in international circles for a number of reasons. Not least of these is their alleged remoteness from grass-roots needs, their inherently high cost of operation, and their need for central subsidy. Another serious, but inevitable, objection is that the less-developed countries are less able to capitalize on their outputs. Regional systems for developing countries find more favour provided they can centre around an established institution, preferably with an inter-governmental mandate, and reasonable security of continuing funding.

What can be said in favour of regional and global systems:

and networks is that through sharing developmental and operational costs, the use of scarce capital and manpower resources can be optimized in a number of ways. They also provide a framework for joint development and offer a more rational programmatic approach for technical assistance and aid agencies. The AGRIS system has acted as a catalyst to regional developments (and through these, to development of national capabilities) in both Latin America and S.E. Asia. This is exemplified by joint workshops and training seminars, regional use of scarce data processing facilities, development of document exchange and loan facilities, sharing of computer programmes and experience in their use. DEVSIS, while deferring many aspects of the global approach, has stimulated collaborative approaches in Africa and Latin America. Within the scope of POETRI, REPIDISCA has been conceived in the philosophy of resource sharing and regional self-help. Un-coordinated development of national systems in developing countries can lead to incompatibility between them, which retards technology transfer.

Regional and international cooperation is the only proven way of achieving reasonably comprehensive modes of identifying and transferring unpublished documents between countries (it is for this reason that this is a current priority development for the countries of the European Communities).

Finally, although there is some scepticism as to the rate at which (and whether or not it is particularly relevant or desirable) access to computer-stored information through international telecommunications will become available to centres in developing countries, there is no doubt that they are now, or soon will be,

accessible by the majority of development agencies active in Decade programmes and providing services to the developing world. The services, or sectors of services, relevant to developing country community water supplies and sanitation, tend to be small individually. As an aggregate they might well provide an economically viable database for access by modern telecommunications facilities. With this possibility in view, it would be perverse not to aim for the development of coherent services (while preserving their local integrity) on a regional and international basis.

VII OUTLINE OF AN ACTION PROGRAMME WITHIN THE POETRI FRAMEWORK

The aim of this report is to provide a discussion document by means of which IRC and other agencies operating information services in support of Decade activities can focus on areas of possible cooperative development within the broad aims of POETRI. For this reason it does not present formal proposals, since these would imply a degree of acceptance of the analyses and assumptions in this report, and an existing commitment to joint action. The consultant has assumed, however, that there exists a comity of purpose among institutions involved in Decade activities, and this does imply a willingness to provide mutual programme support, insofar as this is feasible, to improve the overall transfer of technology through information to and between developing countries.

This chapter identifies some possible actions, the majority of which would involve support from a number of institutions. IRC, as a designated reference centre of WHO, and through POETRI, can provide a forum for discussion of these possibilities and might act as a contributor to and a coordinator of the following joint programme activities. There are five areas, some of which are inter-related.

1 DEVELOPMENT OF REGIONAL NETWORKS

As has been shown by the development within the Latin American region of the REPIDISCA network, the creation of regional networks is a corollary of the strengthening of national infrastructures within the region. In Latin America, CEPIS, as a regional centre of WHO, formed a natural focus for initiatives and for attracting development funds. Though not strictly comparable, CIEH in Africa and PEPAS in S.E. Asia, seem

appropriate focii for similar developments in their respective regions. Whether they would follow a similar coordinative and operational role to CEPIS, or delegate some or all of these functions to other specialized centres within their regions would depend on local considerations and agreements. Francophone Africa would be an appropriate area for a centre which would, inter alia, provide coverage of information in the French language, and services to users conversant with that language. The principle working language within the S.E. Asian network would be English.

The specific nature of services promoted at the regional level would depend on needs and capacities. They would involve identification of information generated within the region at the local and national level and its transfer. They would also involve the identification and capture of information relevant to the region, but generated outside it, and to do this would require extra-regional links and cooperative agreements with specialized centres and systems in the water and sanitation and related fields.

An important objective of regional cooperation would be to optimise the use of scarce human, technical and financial resources by seeking compatibility with information systems relating to other sectors in the region. For example, in developing PADIS the Economic Commission for Africa has undertaken to develop formats compatible with DEVSIS and AGRIS. This not only allows information to be more readily transferred between these systems, but also facilitates the common use of programme packages such as ISIS and MINISIS,

which are available and increasingly used in centres in developing countries, and are maintained internationally.

Interconnection of national systems within a region gives substance to the organization of regional workshops and seminars. The implementation of compatible procedures allows joint training in service development: in document selection and description, use of thesauri and indexing techniques, exploitation of external information sources and systems. In this context there is an opportunity to draw on outside expertise (eg CEPIS on regional networking, ENSIC on abstracting, WRC on thesaurus use, ITDG/VITA/TOOL etc on appropriate technology dissemination etc.) and use it in an effective way. Other components of regional development are proposed under subsequent programme area headings.

2 IMPROVING THE TRANSFER OF NON-CONVENTIONAL DOCUMENTS

The problems associated with non-conventional documents are identification, selection as relevant to a wider audience, announcement and accessibility. The approach taken by REPIDISCA is for national centres within the region to assume responsibility for the first two actions and for the regional system to inform users of the existence of non-conventional documents through its current awareness and retrieval services. Access to copies of the original documents, in photocopy and microfiche form, is to be through a central regional store and clearinghouse.

Ideally such a scheme might be implemented in other regional networks, but this will take time. There are some shorter-term interim measures that should be considered which involve the promotion and extension

of existing activities. As mentioned in chapter IV, section 8, the SATIS system has gone some way towards building a network among appropriate technology institutions which has identified and registered documents in the water and sanitation field. A substantial proportion of these will be non-conventional.

Negotiations should be made with TOOL and the other agencies involved to establish how this information might be supplemented and more widely disseminated through POETRI mechanisms. IRC might undertake to solicit inputs from other institutions with which it has contact, and to provide input itself. The feasibility of converting the back-files into computer-readable form and feeding them into the integrated database discussed in the next section should be investigated. This would make it possible to disseminate descriptions of these documents through a number of existing and possibly new services. The feasibility of creating a microfiche collection of these documents, copies of which would be deposited at regional centres, IRC and other agencies acting as clearinghouses should also be investigated.

3 CREATING AN INTEGRATED DATABASE

This activity is the subject of a separate joint proposal prepared by WRC and IRC. In summary, it proposes the ad hoc building of a computer-held database of records within the scope of POETRI, by merging together records which already exist in machine-readable form from existing systems, eg WRC, ENSIC, SALUS, REPIDISCA, WASH, etc. Additional records selected from the collections of, for example, IRC, the Ross Institute and SATIS would be converted through optical character recognition techniques (OCR) or by direct keyboarding. The subject scope

of the data base would be as defined by the scope of the POETRI thesaurus and would include the following categories of information:

- water supply
- sanitation
- health aspects
- socio-economic considerations
- legal and political matters

The records available in the database would relate both to conventional and non-conventional documents.

The integrated database would have the function of bringing together references from a number of operating systems without diminishing their autonomy or threatening the viability of the services which they currently produce. Rather, existing publications could be enhanced by incorporating material in their subject field gathered from other sources for the database.

Institutions with access to the database would be able to extract from it records to be included in the following types of publication

- technical digests for particular problem areas. These would consist of brief state of the art papers supported by relevant abstracts and/or references.
- indexes by title, author and/or keyword in particular areas or related to particular countries or regions, or covering the entire subject scope of the data base;

Other paper-based services would be available on demand. Collaborating organizations (at the national, regional or international level) with the appropriate facilities could :

- undertake searches of the database for persons without direct access, and mail the resulting information to them;
- provide selective dissemination of information services (SDI), ie, undertake, on a regular basis, the selection of new references entering the database which match and individual's or group's predefined criteria of interest.

Organizations in developed countries involved in technical assistance within the Decade programme (and increasingly centres in developing countries) could make direct access to the database through international telecommunications networks.

WRC would undertake to

- process and integrate the records entering the consolidated database;
- provide the database, in whole or selected parts, to cooperating centres;
- negotiate the mounting of the database on a host computer for on-line interrogation;
- provide special output tapes, as required, to publishing centres;
- assist in the publication and distribution of new services.

4 DEVELOPMENT OF DOCUMENT CLEARINGHOUSE FACILITIES

Sections 1 and 2 relating to regional networks and dissemination of non-conventional literature have underlines the need to provide access to copies of original documents. As far as non-conventional literature is concerned, the clearinghouse function is seen to be a facility which should be developed at the level of regional centres. As a short - to medium - term measure the feasibility of IRC working with TOOL

and other development agencies to produce a microfiche collection of pooled resources has been proposed. This would consist of a few thousand documents which need not necessarily be microfiched initially as a total set, but as demand for individual items arises.

Two other problematic areas require additional study:

- access to conventional publications
- payment for loans, copies and microfiche.

In fact the major problem of access to this type of material is cost and payment, since there are a number of large organizations (pre-eminently the Lending Division of the British Library) which offer an international postal service of extensive coverage. Developing countries are encountering increasing difficulties in paying for such services.

Since the major demand for conventional publications is for serial literature, and since a number of the services mentioned in this report offer photocopy back-up services for such literature, collective action could be taken to compile a joint holdings list of the serials available from these organizations and the terms on which they are available. The list could be based on one of the largest holdings (presumably WRC) and enhanced by other institutions, indicating for which of these journals they can supply photocopies, and additional sources not already listed.

An additional study should be undertaken to investigate the feasibility of devising pre-paid vouchers for copying services that would be acceptable to the cooperating suppliers (ie could be encashed into their working currency). These could be purchased in local currency, as are

UNESCO coupons, which are generally acceptable, but scarce. Both REPIDISCA and AGRINTER (the Latin American agricultural information network) have devised schemes of this type, and their advice and experience should be solicited. It seems likely that WHO regional offices would have to play a crucial role in this type of scheme.

5 REFERRAL

UNEP has expended a considerable amount of resources on designing and implementing world-wide its INFOTERRA referral system. Within its scope are sources of information on water and sanitation. It could hardly be denied that the system is imperfect, but it is unlikely that any other agency could undertake at this stage to support a comparable global system.

IRC, which has already agreed to some joint action with INFOTERRA, should explore with UNEP means for enhancing the content and use of this system for the benefit of the POETRI collaborators.

Action can be envisaged at a number of levels :

- national. POETRI National Focal Points should be encouraged to assist their INFOTERRA counterparts in registering and describing national sources of water and sanitation information and in assisting their own users in the exploitation of the INFOTERRA files.
- regional. Regional Centres (following CEPIS's example) should be encouraged and assisted to work with UNEP regional offices to offer complementary services within their region.

- international. IRC should explore the possibility with UNEP of its acting as a specialized INFOTERRA focal point for referral activities within the scope of POETRI, concentrating on the service needs of developing countries. From its status in Decade activities, IRC should be in a unique position to relate referral requests to appropriate services. It could advise INFOTERRA on the future production of specialized directories and supplement them from its own resources.

ANNEX 1: COMPARISON OF INFOTERRA AND POETRI SOURCE INSTITUTIONS

COUNTRY	INFOTERRA				POETRI				OVERLAP	
	NATIONAL	REGIONAL	INTERNAT.	TOTAL	NATIONAL	REGIONAL	INTERNAT.	TOTAL	NO.	
ARGENTINA	1	-	-	1	2	-	-	2	-	
AUSTRALIA	26	-	-	26	-	-	-	-	-	
AUSTRIA	1	1	-	2	-	-	-	-	-	
BANGLADESH	6	-	-	6	3	-	1	4	-	
BARBADOS	-	-	-	-	1	2	-	3	-	
BELGIUM	-	-	-	-	1	-	-	1	-	
BENIN	-	-	-	-	1	-	-	1	-	
BOLIVIA	1	-	-	1	2	-	-	2	-	
BOTSWANA	2	-	-	2	2	-	-	2	-	
BRAZIL	16	-	-	16	10	-	-	10	1	
BULGARIA	2	-	-	2	-	-	-	-	-	
CAMEROON	-	-	-	-	-	1	-	1	-	
CANADA	2	-	-	2	3	-	1	4	-	
CHILE	2	-	-	2	8	-	-	8	1	
CHINA, PEOPLES REP	9	-	-	9	-	-	-	-	-	
COLOMBIA	3	-	-	3	2	-	-	2	-	
COSTA RICA	1	-	-	1	1	-	-	1	1	
CYPRUS	1	-	-	1	1	-	-	1	1	
CZECHOSLOVAKIA	1	-	-	1	-	-	-	-	-	
DENMARK	2	-	-	2	-	1	-	1	-	
ECUADOR	-	-	-	-	3	-	-	3	-	
EGYPT	-	-	-	-	1	-	-	1	-	
ETHIOPIA	1	-	-	1	-	1	-	1	-	
FINLAND	3	-	-	3	-	-	-	-	-	
FRANCE	7	-	-	7	2	1	2	5	1	
GABON	-	-	-	-	1	-	-	1	-	
GERMANY, DEM. REP	4	-	-	4	-	-	-	-	-	
GERMANY, FED. REP	24	-	-	24	1	-	-	1	-	
GHANA	1	-	-	1	2	-	-	2	-	
GILBERT ISLANDS	-	-	-	-	1	-	-	1	-	
GUATEMELA	-	-	-	-	1	3	-	4	-	
INDIA	41	-	1	42	8	1	-	9	1	
INDONESIA	5	-	-	5	7	-	-	7	-	
IRAN	-	-	-	-	1	-	-	1	-	
IRELAND	-	-	-	-	1	-	-	1	-	
ISRAEL	11	-	-	11	3	-	-	3	-	
ITALY	1	-	-	1	-	-	2	2	-	
IVORY COAST	-	-	-	-	-	1	-	1	-	
JAMAICA	2	-	-	2	1	-	-	1	1	
JAPAN	13	-	-	13	-	-	-	-	-	

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COUNTRY	INFOTERRA				POETRI				OVERLAP	
	NATIONAL	REGIONAL	INTERNAT.	TOTAL	NATIONAL	REGIONAL	INTERNAT.	TOTAL		NO.
JORDAN	-	-	-	-	2	-	-	2		-
KENYA	1	-	2	3	5	1	1	7		1
KOREA	1	-	-	1	-	-	-	-		-
MALAGASY REPUBLIC	-	-	-	-	1	-	-	1		-
MALAWI	-	-	-	-	2	-	-	2		-
MALAYSIA	1	-	-	1	-	-	-	-		-
MEXICO	4	-	-	4	2	1	-	3		-
MOROCCO	4	-	-	4	1	-	-	1		1
MOZAMBIQUE	-	-	-	-	1	-	-	1		-
NEPAL	-	-	-	-	2	-	-	2		-
NETHERLANDS	7	-	-	7	3	-	1	4		-
NICARAGUA	-	-	-	-	1	-	-	1		-
NIGERIA	-	-	-	-	1	-	-	1		-
NORWAY	5	-	-	5	-	-	-	-		-
OMAN	-	-	-	-	1	-	-	1		-
PAKISTAN	-	-	-	-	2	-	-	2		-
PANAMA	-	-	-	-	1	-	-	1		-
PERU	2	1	-	3	2	1	-	3		1
PHILLIPINES	11	-	-	11	9	1	1	11		-
PAPUA NEW GUINEA	-	-	-	-	6	-	-	6		-
POLAND	5	-	-	5	3	-	-	3		-
PORTUGAL	1	-	-	1	-	-	-	-		-
PUERTO RICO	-	-	-	-	2	-	-	2		-
SAUDI ARABIA	-	-	-	-	1	-	-	1		-
SENEGAL	-	-	-	-	1	1	-	2		-
SIERRE LEONE	-	-	-	-	2	-	-	2		-
SOMALIA	1	-	-	1	-	-	-	-		-
SOUTH AFRICA	-	-	-	-	1	1	-	2		-
SPAIN	1	-	-	1	2	-	-	2		1
SRI LANKA	1	-	-	1	4	-	-	4		-
ST. LUCIA	-	-	-	-	1	-	-	1		-
SUDAN	-	-	-	-	1	-	-	1		-
SWEDEN	2	-	-	2	-	-	-	-		-
SWITZERLAND	1	-	-	1	1	-	3	4		-
TANZANIA	2	-	-	2	3	-	-	3		-
THAILAND	8	2	-	10	-	2	-	2		1
TOGO	-	-	-	-	1	-	-	1		-
UK	31	-	3	34	5	-	4	9		4
USSR	-	-	4	4	-	-	1	1		-
USA	104	-	4	108	5	-	5	10		1

ANNEX 1: COMPARISON OF INFOTERRA AND POETRI SOURCE INSTITUTIONS

COUNTRY	INFOTERRA				POETRI				OVERLAP
	NATIONAL	REGIONAL	INTERNAT.	TOTAL	NATIONAL	REGIONAL	INTERNAT.	TOTAL	NO.
UPPER VOLTA	-	-	-	-	-	1	-	1	-
URUGUAY	1	-	-	1	1	-	-	1	-
VANAUTU	-	-	-	-	1	-	-	1	-
VENUZUELA	-	-	-	-	1	1	-	2	-
YUGOSLAVIA	2	-	-	2	-	-	-	-	-
ZAIRE	-	-	-	-	2	-	-	2	-
ZAMBIA	1	-	-	1	2	-	-	2	-
ZIMBABWE	-	-	-	-	2	-	-	2	-
T O T A L	386	4	14	404	144	21	22	187	17

ANNEX 2: SAMPLES FROM EXISTING SERVICES

81-3681*

Tubewell theory and practice.

N. AHMAD.

Pakistan Academy of Sciences, Lahore, Monograph No.4, 1981. 328 pp. (34495).

A comprehensive treatise on the design, construction and maintenance of tubewells for irrigation and water supply purposes is presented, based on the author's broad experience of these matters on the Indian sub-continent. A historical review of the exploitation of ground water by mechanical methods is followed by a discussion of the hydraulic behaviour of tubewells and boreholes, their design and installation, maintenance requirements and types of pumping equipment. Special chapters are devoted to methods for estimation of yields and techniques for dewatering structural foundations for large buildings. Well-drilling techniques are reviewed with descriptions of the cutting equipment, well logging by geophysical methods and other related topics, and a final chapter is devoted to the methods and equipment for artificial groundwater recharge. Pakistan

5074 **Briscoe, J. Role of water supply in improving health in poor countries (with special reference to Bangla Desh).** American Journal of Clinical Nutrition (Bethesda, Md.), 31(11), Nov 1978, 2100-2113. Engl.

Despite the fact that rural people often continue their traditional water use habits even when alternative sources of pure water are available, the author suggests that the fault lies not so much with the people as with the process of decision-making on water improvement programmes. In support of this position, he examines several research issues concerning water supply and health, including the effect of water supply on health, the use of classical waterborne diseases (e.g., cholera) as models for water-related diseases, and the specification of water supply standards. Studies and observations concerning cholera in Bangladesh are used to illustrate a number of hypotheses about the contribution of safe water supplies to disease control. (DP-E)

WRC INFORMATION

SALUS

440115 ROLE OF NIGHT SOIL IN JAPANESE AGRICULTURE.

Takahashi, T. Organic Recycling in Asia. FAO Soils Bull. No. 36. ISBN: 92-5-100655-5. Published by Food and Agriculture Organization, Rome. 1 363-364 (1978). En.

While in some of the countries EXCRETA was utilized in crop production, there is strong prejudice against its use in the other countries, mainly because of offensive odours. Sanitary latrines designed to conserve night-soil and eliminate odours could be set up in these countries on a pilot-scale to educate the villagers to use these facilities for conversion of excreta into odourless and innocuous humus.

Source

FERTILIZER VALUE

JAPAN

A: S590F6

ENVIRONMENTAL SANITATION ABSTRACTS

O code 741/342/344/745
 owner SKAT B 45 + a/GATE 342/TOOL 741/VITA XVI AD-1
 title Drinking water installations and drainage requirements
 SC 492 in buildings in Nepal

author Bachmann A
 published SATA, P.O. Box 113, Kathmandu, Nepal

periodical --

series --

pubn.no. --

language English

presentation

book

article

manual

letter

drawing

conf.paper

keywords

bias	relevance	scale	practicality	experience	geographic
technical	research	home	ideas	theory	industrial
scientific	design	village	sketches	experiment	developing
economic	instruct	local	detailed plan	prototype	
social	construct	national	costs	limited use	
commercial	operate	international	results	general use	
philosophic	evaluate				

pages 141 date 1978 price ...
 also in c110 refs. 4

SATIS

Nepal/manual on plumbing techniques and equipment/
 storage tanks/pipe systems/fire hydrants/fittings/
 water supply systems/pipe installation requirements/
 training guide/reference guide/pipe dimensions/valves/
 joints

Annex 3: Data from IDRC's study on information on low-cost technology options for sanitation (1978)

Results of computer searches for documents relevant to the study.

Data base	Long list	Short list
U.S. National Agricultural Library (AGRICOLA)	2023	148
Aquarius	—	—
Biological Sciences Information Service (BIOSIS)	1487	86
Congressional Information Service (CIS)	—	—
Computerized Engineering Index (COMPENDEX)	3321	125
Environmental Data Base Directory (EDBD)	—	—
Environmental Information On Line (ENVIROLINE)	3316	29
Information Service in Mechanical Engineering (ISMEC)	146	4
Instructional Resources Information Systems (IRIS) on water quality	2150	11
National Technical Information Service (NTIS)	2669	50
Pollution Abstracts (PAB)	1253	182
Science Citation Index (SCISEARCH)	1543	72
Congressional Research Service (SCORPIO)	—	—
Solid Wastes Information Retrieval System (SWIRS)	—	—
Selected Water Resources Abstracts (SWRA)	2788	20
Total	20 696	727

Source of document retrieval, both published and unpublished.

	Unpublished	Published	Total
Computer search	—	188	188
External consultants	82	152	234
World Bank reports	17	—	17
Additional literature	22	70	92
Total	121	410	531

Annex 4: References

- 1 Programme on exchange and transfer of information (POETRI). Outline programme Phase I. June 1980 International Reference Centre for Community Water Supply and Sanitation. IRC/POE/80.3 - Rev. 2.

- 2 (Draft) POETRI Reference manual. IDC.
 Volume I
 I Introduction
 II Planning for information support systems & services for water supply and sanitation at national level.
 III Setting up information services at national level.
 IV Guidelines for national inventories of sources of information.
 V Guidelines for compiling user inventories and surveying user requirements.
 VI Guidelines on education and training for information support at national level.
 VII Training handbook for POETRI national workshops and courses.
 VIII Guide for indexing and abstracting within POETRI.

 Volume II
 I International Directory of Sources of Information on CWSS.
 II Thesaurus of CWSS terms.

- 3 DEVSIS: preliminary design of an international information system for the development sciences. 1976, International Development Research Centre, Ottawa, Canada. ISBN: 0-88936-084-7.

- 4 Low-cost technology options for sanitation. A state of the art review and annotated bibliography. Rybczynski W, Polpraesert C and McGarry M, 1978, International Development Research Centre, Ottawa, Canada.

- 5 Personal Communication from Dr C Bartone, CEPIS.
Lima, Peru.
- 6 UNISIST Study Report on the feasibility of a World
Science Information System. UNESCO/UNISIST/4,
UNESCO, Paris, 1971, p. 91.
- 7 Possibilities for a new water supplies and sanitation
journal for developing countries. Solomon F, Stern P H.
April 1977. Intermediate Technology Sciences Ltd,
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- 8 Pan American Network of Information and Documentation
on Sanitary Engineering and Environmental Sciences:
REPIDISCA. A programme description. CEPIS: Prepared
for the Vth Interagency Consultation Meeting on
the Environment in Latin America and the Caribbean,
October 1979, Washington DC.

Annex 5. Persons providing information for this study.

Mr. A.A. Winters
Chief, section of Promotion of Information
policies and planning
Division of the Central Information Programme
UNESCO
7, Place de Fontenoy
75007 Paris
France

Mr. Paul Boyd
United Nations Development Programme (UNDP)
1 United Nations Plaza
New York, NY 10017
U.S.A.

Dr. Richard Feachem
ROSS Institute of tropical hygiene
London School of hygiene and tropical medicine
Keppel Street
London WC1E 7HT
United Kingdom

Mr. Solomon
Intermediate Technology Development Group
9 King Street
London WC2E 8HN
United Kingdom

Mr. M.Y. Emsellem
Cefigre
Boite Postale 13
Sophia Antipolis
06560 Valbonne
France

Mr. J. Valls, director
Library and Regional Documentation Centre
Asian Institute of Technology
P.O. Box 2754
Bangkok
Thailand

Mr. Jim Beverly
Water and Sanitation for Health Project
Coordination and Information Centre
1611 N. Kent Street, room 1002
Arlington, Virginia 22209
U.S.A.

Mr. M. Brandreth
Associate Director Information Sciences
International Development Research Centre
60 Queen Street
Box 8500
Ottawa
Canada K1G 3H9

Mr. J. Tinker, director
Earthscan
10 Percy Street
London W1P 0DR
United Kingdom

Mr. Odyer A. Sperandio, manager
Global Promotion and Cooperation for Water
Supply and Sanitation
Division of Environmental Health
World Health Organization
1211 Geneva 27
Switzerland

Mr. P. Stevens
Manager, Environmental Health Technology and Support
Division of Environmental Health
World Health Organization
1211 Geneva 27
Switzerland

Mr. Krissiamba Ali
Comité Inter-Africain d'Etudes Hydrauliques
CIEH
B.P. 369
Ouagadougou
Haute Volta

Mr. F. Go, director
PEPAS
P.O. Box 2250 2580
Kuala Lumpur
Malaysia

Dr. Carl Bartone
CEPIS
Calle los Pinos 259
Casilla Postal 4337
Lima 100
Peru

Dr. W.W. Wilkinson
Water Research Centre
Medmenham Laboratory
P.O. Box 16
Medmenham, Marlow
Bucks SL7 2HD
United Kingdom