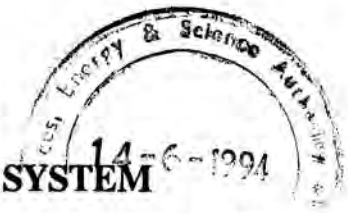

UNESCO STUDY OF AN INTERNATIONAL INFORMATION SYSTEM RELATING TO NEW AND RENEWABLE SOURCES OF ENERGY

Report of a Field Study in Sri Lanka

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A STUDY OF AN INTERNATIONAL INFORMATION SYSTEM RELATING TO NEW AND RENEWABLE SOURCES OF ENERGY

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Prepared for UNESCO

by

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P R E F A C E

The National Science Council of Sri Lanka (NSC) accepted an invitation by UNESCO to conduct a national survey of information activities in the field of new and renewable sources of energy. This survey was carried out within a period of about six weeks and was completed on the 30th April 1980.

In view of the importance of the subject, two senior officers of the Council were entrusted to carry out the study. Mr. M.A.T. de Silva, Assistant Secretary-General, has functioned as the Coordinator and Rapporteur of an informal body of specialists called the "Solar Energy Group" of the NSC, while Mrs. Nimala Amarasuriya is the Acting Librarian of the Sri Lanka Scientific and Technical Information Centre of the NSC.

The observations and comments made in the Report are those of the Authors, and are based entirely on the views expressed by respondents of the survey.

Secretary-General

NATIONAL SCIENCE COUNCIL

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I. OBJECTIVES

The objectives of this study are,

i. To identify the users of information on matters relating to new and renewable sources of energy,

ii. To determine the information needs on energy-related matters,

iii. To determine whether needs of such information-users are met,

iv. To identify obstacles to the flow of information to users,

v. To suggest practical solutions designed to fulfil the needs of information users.

2. SCOPE

The present study endeavours to cover all national institutions and as many individuals as possible who are directly or indirectly associated with studies on alternate sources of energy in Sri Lanka.

3. METHODOLOGY

3.I Questionaire

The procedures suggested by UNESCO in its documents marked PGI - 80/EGE. ½, PGI - 80/EGE. I/6, and PGI - 80/EGE. I/7 have been broadly taken into consideration in designing the study.

Initially a questionnaire (Annex I) was prepared incorporating points proposed in the UNESCO document PGI - 80/EGE. I/6. Following discussions with Mr. Jacques Tocatlion, Director of UNESCO's General Information Programme, a supplementary list of questions was prepared for further elucidation of facts. (Annex II).

3.2 Persons interviewed

In carrying out the survey, the project officers first prepared a list of Institutions and persons to be contacted. This list was primarily based on the membership of an informal group called the "Solar Energy Group" (SEG) of the National Science Council. The reasons for the choice of this group are as follows:

(a) It is a group of Scientists and Technologists who are either directly or indirectly involved in aspects of alternate sources of energy. (The Group has defined Solar Energy in its widest sense to include wind, biogas, solar, etc.)

(b) The group was formed under the auspices of the National Science Council of Sri Lanka to function as an advisory specialist body to the National Science Council. Any person known to be interested in alternate sources of energy could be elected to membership in this group.

(c) Since its inaugural meeting on the 2nd of June I979, the group had met at least on five occasions between June I979 and February I980, to discuss and review various issues related to alternate sources of energy. This is evidence of the interest its membership has on this subject.

Apart from the membership of the SEG (some of them were not available during the period of the survey) a few others were also interviewed. Some of them were new comers to the field of energy, while others had only a marginal interest in this field. In Institutions where R & D studies on alternate sources of energy are carried out as part of their normal functions, the Heads of these organisations and the librarians or information

specialists were also interviewed. The Survey was not restricted to the State Sector. Any person known to have interests in this field from the private sector was also interviewed.

Hence, inspite of the short time interval available for the field survey, viewing from a statistical standpoint, the coverage could be considered to approach the outlook for the "population".

3.3 Interviews

The interview with each person lasted 45 minutes to one hour, of which the first half hour was spent in collecting general information on the checklist (questionnaire) and explaining the purpose of the study. During the second part of the interview, a searching study was made on the personal interests and problems. The responses and replies of each person interviewed were recorded separately.

PART II - The Survey Study

I. INTRODUCTION

I.I Scientific and Technical (S & T) Information activities in Sri Lanka

The major components of S & T information activities in Sri Lanka are located in the libraries of the Institutions performing R & D or other work of a Scientific nature. Although these libraries specialise in certain areas and cater mostly to the persons working within those institutions, they play a major role in S & T information activities. Other information centres such as the network of Public Libraries and the libraries associated with Foreign missions in Sri Lanka, also contribute significantly to the local S & T information system. All the University libraries have large and comprehensive collections, especially that of the University of Peradeniya which is a legal deposit library.

I.I.I Sri Lanka Scientific and Technical Information Centre (SLSTIC)

In 1968, with the establishment of the National Science Council (NSC), and within it some years later, of a National Information Centre called the Sri Lanka Scientific and Technical Information Centre (SLSTIC), a strong base was created to serve as a clearing-house for S & T information activities.

With assistance from UNDP, this Centre has expanded its activities and is now co-ordinating information activities within the country with the co-operation of 27 S & T libraries (Annex V). Some of the current activities and services provided by SLSTIC are as follows:

(a) Maintains a Union Catalogue of foreign S & T books (UNICAST).
(b) Maintains a Union List of Periodicals (UNILIST).
(c) Indexing of local scientific literature. This is published as a quarterly bulletin - "The Sri Lanka Science Index".

(d) Maintains a National Reports Depository, in which reports by institutions, proceedings of Seminars and Conferences, and other reports by individual research workers are collected.

(e) Provides Inter-Library lending facilities.

(f) Provides an Environmental Information Service (EIS) which publishes "Current Contents" and "Current Environmental Acquisitions" quarterly.

(g) Building a Repository for literature on renewable energy. This centre is also the national focal point for the Commonwealth Regional Renewable Energy Research Information System (CRRERIS), organised by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia.

(h) Photocopying service and photocopy procurement services (BLLD).

(i) Arranges workshops, seminars and provides in-service training facilities for library and information workers.

I.I.2 Library & Information Centre of the Ceylon Institute of Scientific & Industrial Research (CISIR):

The Ceylon Institute of Scientific and Industrial Research is the main organisation in Sri Lanka for technical development and for advisory services to industry. The Library and Information Centre, apart from other activities, publishes bibliographies on natural resources of Sri Lanka. They issue a quarterly newsletter, CISIREACH, giving information on current research activities of the Institute. A personal service for queries and manual literature searches are provided.

I.I.3 Industrial Development Board: Documentation & Publications Division:

Industrial Development Board (IDB), whose main objective is the promotion of industry, has a specialized library and documentation centre. The Industrial Information Service (IIS) of the Institution is available to industrialists and institutions. IDB publishes a monthly "Current

Awareness Service" in the form of an indexing bulletin for the area of industrial applications and the quarterly "Products Bulletin". There is also a service for manual literature searches and individual queries. Services available to industry are publicised through brochures and seminars and the journal "Karmantha". The IDB is the local focal point for the IDRC-sponsored Asian Network for Industrial Technology Information and Extension (TECHNONET).

I.I.4 Agrarian Research and Training Institute (ARTI):

This institute is the national centre for agrarian information. The U.S.Agency for International Development is assisting in developing this centre possibly into a regional information centre on agriculture.

I.I.5 Coconut Information Centre (COCONIS):

The IDRC has approved of a project for a regional Coconut Information Centre at the Coconut Research Institute (CRI). The CRI has a comprehensive collection of literature on coconut, and provides information on cultivation, processing, technology and related fields.

I.I.6 Centre for Development Studies (CDI):

The Centre for Development Studies has been set up under the Ministry of Planning & Finance with UNDP assistance.

I.2 External Documentation Services:

There is little exchange of information between Sri Lanka Documentation and Information Centres and foreign centres. This is due to a number of factors such as insufficient promotion effort and lack of awareness of the potential of the various services among the Scientific and Technical community.

I.2.I MEDLINE - Medline queries are sent by medical libraries to the regional WHO office in New Delhi. MEDLARS/MEDLINE searches are used mainly by the university staff. WHO has offered free MEDLINE searches to be performed in Geneva.

I.2.2 AGRIS - Inputs to AGRIS are handled by the Department of Agriculture, Peradeniya.

I.2.3 UNEP - UNEP referrals (UN Environmental Programme): The Ministry of Planning is responsible for UNEP referrals. Information regarding potentially toxic chemicals is sent by the Government Analyst who is the national correspondent.

I.2.4 TECHNONET - The Industrial Development Board is the local focal point for the IDRC - sponsored Asian Network for Industrial Technology Information and Extension (TECHNONET). The headquarters of TECHNONET are in Singapore. Through the IDB, access to the computerized SDI service on the database at the Hongkong Productivity Centre is available to other centres in Sri Lanka. TECHNONET also supplies a large number of reports on microfiche. It also offers training facilities for information officers and extension officers.

I.2.5 International Nuclear Information Service (INIS): Information from INIS is received by the Atomic Energy Authority in Sri Lanka.

I.2.6 National Technical Information Service (NTIS): A collaborative program between SLSTIC, NSC, and NTIS was established in I978, and SLSTIC was designated the Sri Lanka Co-operating agency for NTIS. The demand for NTIS reports through the National Science Council is increasing steadily.

2. FIELD SURVEY

The field survey consisted of visits to institutions, departments and organisations involved in studies on alternate sources of energy followed by personal interviews with staff members associated with R & D work. Whereever relevant and feasible, at each institution the persons directly

involved in R & D work on alternate sources of energy were interviewed first. This was followed by interviews with economists (where necessary), information specialists, and policy makers. In all 30 person were interviewed.
Details in relation to the methodology adopted are given in Part I Section 3 of this Report.

3. RESULTS AND OBSERVATIONS

3.I Characteristics of Organisations

Some of the basic characteristics of the institutions to which users of Information on New and Renewable Sources of Energy are attached, are summarised in Table I. Among the ten state sector organisations, the Ceylon Electricity Board (CEB), the Ceylon Institute of Scientific and Industrial Research (CISIR), the Industrial Development Board (IDB), the National Engineering Research and Development (NERD) Centre and the Water Resources Board (WRB) are associated with R & D work on alternate sources of energy, as part of their normal functions. Thus the persons interviewed from these five State Institutions had the official backing to carry out their projects which were in certain cases initiated through their own initiative and interest. The Ministry of Finance & Planning had its own unit to provide advice on matters pertaining to Energy. The activities of this institution in relation to energy matters were mostly for purposes of planning.

The CEB, which is the Institution responsible for production and distribution of electrical energy in the country, has under its wing an Energy Unit which maintains and operates the UNEP - supported Rural Energy Centre at Pattiyapola, a remote village in Sri Lanka. Except for energy from Geothermal sources, the CEB has its eyes on all other sources of new and renewable energy.

The NERD Centre has a wind and biogas unit to carry out R & D work, while the WRB has established the Energy Unit to develop, demonstrate and market, water-lifting devices through the use of wind energy, draught animals and human effort.

The remaining four state Institutions have marginal interest in alternate sources of energy and the persons interviewed are working on energy - related subjects basically through personal interest. It was of significance to note that arrangements were being made at the University of Moratuwa to establish an Information Centre for alternate sources of energy.

Persons attached to seven state institutes concentrated on energy generation from wind, biomass and wood charcoal. Six institutions had persons working on Solar Energy, while five institutions had persons working on hydropower and draught animals. Energy from tidal waves, thermal gradient and geothermal sources were the subjects of least interest. None had interest in oil shale and tar sands.

3.2 Information needs of users in the organisations

3.2.I Categories of Users

The categories of users are summarised in Table I, and characterized in Table II. All persons interviewed are also listed in the latter table. Many of the responding individuals are senior scientists or technologists; and hence perform a component of administrative work. This is the reason for categorizing these individuals under two or sometimes three functional groups.

3.2.2 Nature of information needs

In general, all persons interviewed wished to have information on every theme in respect of their fields of study. This was obviously because, in a small country such as ours, the overall applied aspect of an energy source has to receive priority consideration over specialized studies on a narrower theme. Information in relation to objects was mostly sought on materials, equipment, processes, analyses and statistics. Regulations, standardisation and statistics were of special importance to economists, planners and decision-makers.

All respondents sought information of a scientific and technical nature, but many included economic and social information on energy-related matters. Legal and institutional aspects were of interest only to seven persons.

3.2.3 Aim of Information

Majority of respondents sought information for R & D work. While ten out of thirty needed information for decision-making, only six persons sought information for forecasting.

3.2.4 Form in which information should be received

Almost all person wished to have information in the form of books, monographs, periodicals, abstracting and indexing services, bibliographies, reports, statistical data and replies to specific requests. However, at least one person said that books were out-of-date when received, and hence served only a limited purpose. Patent specifications and engineering drawings were of special interest to those engaged in design and construction research. Information in microforms was not useful to a large majority, as facilities were not available for their use. The most prefered form for information was abstracting and indexing services.

3.2.5 Language and accessibility

Although every respondent prefered to have the information in the English language, concern was expressed by some, about the lack of facilities to obtain English translations of documents produced in Chinese, Russian, languages of East European countries and also from Latin American countries. In relation to accessibility, there was general agreement that information on this field should preferably be received and made available through a central National Centre such as the Sri Lanka Scientific and Technical Information Centre (SLSTIC) of the National Science Council. Significantly such

a arrangement was acceptable even to those residing at Peradeniya, a township IIO Kilometers away from the Centre in Colombo.

A few said that they would not rely heavily on a National Centre to deliver the goods but agreed that this would be the best option.

3.3 Information Sources Used

3.3.I Institutional Sources

All persons interviewed claimed that information on their subjects of interest was obtained mainly through local libraries, and by personal contacts. Some had contacts through their former professors or supervisors, and through fellow students associated with them during post-graduate studies. Others had made contacts at international seminars and conferences, while still others had contracted for information through exchange of reports, documents, etc. with counterparts working in other countries.

Although personal requests have been the widely practiced system to obtain information in this field, success has been somewhat limited. While few people had responded favourably others had either not replied or requested for payment.

Five persons said that they had used local meterological data for their work, although some of them thought that this data were unreliable. There had been no means for checking the data. The CEB had its own statistical unit and therefore, those attached to it obtained their data from this unit. One respondent was fortunate to get the required statistical data on draught animals from an Indian Source.

The Water Resource Board is associated on a joint programme with the Steering Committee for the Development of Wind Energy in Developing Countries (S.W.D.), based in Holland. This organization has been the chief source of scientific and technical information on wind energy for the WRB. It has also provided advisory, consultancy and technical engineering services to the local organisation.

Only three persons have been able to contact Documentation Centres abroad. Sources from which information had been obtained by respondents, are listed in Annex III, and the publications which have been received by them are listed in Annex IV.

Except for IDB which has contacts with Singapore S.D.I. and NTIS, there is no evidence for the use of S.D.I. services, computerized files or referral services in other institutions.

3.3.2 Promotion of information use

The CEB has been intensively involved in the promotion of user-education, and feed-back mechanism in relation to alternate sources of energy. The NERD Centre and CISIR have also been involved in these aspects to a limited extent. Among others, the mechanical engineering department of the University of Peradeniya has been able to use its student population for promotion of user education and feed-back mechanisms.

3.4 Information dissemination and exchange activities

Information dissemination activities have taken place mostly through person to person contacts, correspondence, and through publications. The CEB, WRB and IDB which have national programmes, use the media to disseminate information. Information is also disseminated through Seminars and Conferences, both at national and international levels. Except for the WRB - SWD (Holland), inter-country programme for wind energy studies, and the CEB - East-West Centre collaboration programme on "Energy for Rural Development", there are hardly any inter-country collaboration programmes for the dissemination of information.

3.5 Obstacles encountered in satisfying users' needs

It was strongly evident that political considerations at the national level have never, or rarely, been an impediment to the flow of information. However, economic issues have frequently restricted the free flow of information. Steeply rising prices have been the main cause for this problem. The annual increments in the budgetry allocation for books and periodicals have not been able

to match the steep increase in the prices of these publications - specially those from the industrialized countries.

There was however, some agreement in the claim that while information on energy - related matters were available from Western countries, less came from the Region and from developing countries.

Other obstacles of a technical nature which impeded the flow of information are listed below:

(a) Lack of information regarding existing national, regional and international information sources and services, in the field of new and renewable sources of energy.

(b) Lack of coordination with international information systems. There is no systematic effort to interact with international information activities.

(c) Lack of communication facilities such as telex, on-line services, etc. Main channel of communication at present is by correspondence which leads to delay.

(d) Lack of publishing outlets and facilities. Most of the research carried out in the country is published only as internal reports of the particular institution. Because of this, the results of research rarely circulate within the country. The output to the international system is practically negligible.

(e) Inability to keep abreast of current developments due to lack of current awareness services, state-of-the-art reports, etc. Most research workers complained that foreign periodicals and journals were received at least 6 months late.

(f) Lack of abstracting and indexing services.

(g) Lack of access to sources providing accurate statistical data. Only one of the Institutions surveyed had established its own statistical unit. There is no contact with foreign statistical data centres or computerized numerical data bases, scarcity of evaluated data and considerable time lags between data requests and retrieval.

(h) Lack of communication with Information Analysis Centres able to supply evaluated repackaged information. No services are available for the consolidation, repackaging and distribution of information to the general public. Because of this, information items for a specific need have to be searched for in several locations.

(i) Lack of equipment eg. photo-copying machines and microform reader/printers. There was a lack of interest in current forms of information dissemination eg. microforms, due to the lack of reader/printers.

(j) Lack of information on forth-coming meetings, seminars, training programmes, etc.

(k) Lack of closer links between University research programmes and entrepreneur's needs.

4. CONCLUSIONS AND PROPOSALS

4.I The National Scene

4.I.I General outlook and constraints

The preceeding analysis of the existing situation in Sri Lanka in the field of information dissemination on new and renewable sources of energy, clearly demonstrates the serious inadequacy of the library, information and documentation services presently available to meet the needs of the users.

The primary issues that emerged from this study are,

(a) a lack of awareness of the contributions made by persons working on the same subject within the country,

(b) lack of awareness of the information material available within the country.

Obviously, therefore, one of the first issues to be considered, is the establishment of a well-conceived national system to co-ordinate and integrate the information dissemination services within the country.

4.I.2 Need for a Central Information Unit

The national needs could best be effected by the establishment of a Central Unit for Information on Energy. The Unit could be conveniently housed at SLSTIC of the National Science Council, which already possesses the necessary infrastructure and is also the focal point of the National Science Information Network.

The main objectives of the Central Unit would be,

(a) to collect and filter information on new and renewable sources of energy coming from foreign sources and to disseminate that part of it which is relevant to the appropriate users, and

(b) to collect information regarding research carried out in Sri Lanka in this field and to make it available within the country and abroad.

4.I.3 Requirements and functions of the Central Unit

The Central Unit should,

(i) possess trained staff, equipment and other requirements for it to function effectively as a referral and retrieval centre. Its organization should enable it to locate the required information and channel it back to the user with the least possible delay.

(ii) ensure that there exists within the country at least one accessible copy of each significant publication in the field.

(iii) effect the rationalization of national acquisitions - especially abstracting and indexing journals to avoid waste of foreign exchange and unnecessary duplication of publications. This will also ensure wider subject coverage.

(iv) be a depository for published and unpublished reports of scientific work of the country.

(v) provide 'Current Awareness', information analysis, state-of-the-art reports, statistical data, surveys, etc.

(vi) provide translation services.

(vii) provide reprographic facilities.

(viii) publish catalogues, bibliographies, abstracts, reviews, etc.

(ix) establish regional and international collaboration in the field.

The Central Unit should study users' needs, both real and potential, and prepare appropriate measures on the basis of these studies. To accomplish this the following steps should be undertaken:

(a) Identification of the informational requirements of each institution in the field.

(b) Identification of the core fields of each worker within the institution.

(c) Identification of those subject fields where information could be obtained by exchange programmes.

These steps would enable the Central Unit to establish user profiles. The Central Unit should be aware of the resources of the various institutions and should compile a Union Catalogue.

4.I.4 The role of participating organizations

The participating organizations should fulfil certain functions:

(i) Keep the Central Unit aware of all the new published documents received. This would include books, periodicals, reports, etc., and non-book materials. These should be indexed and classified and a duplicate card sent to the Central Unit.

(ii) Inform the Central Unit of the research work undertaken at the institution. This is of paramount importance.

(iii) Inform the Central Unit of research on new subject areas on which information would be required.

(iv) Provide feed-back on the part of the users for the continuous up-dating of the designed system.

4.I.5 Communication facilities

The development of the facilities of communication is essential for coordination of information facilities and the dissemination of information. The lack of effective channels for quick communication is one of the main drawbacks in the dissemination of information in this field. Much confusion exists in this field due to the considerable amount of mostly un-coordinated research carried out by isolated groups. There was indeed a remarkable lack of communication between workers in the same field. It is also suggested that new communication techniques, basically audio-visual in character, be provided to disseminate information about new and renewable sources of energy to the public.

4.2 The Regional Scene

4.2.I General outlook and constraints

The Survey revealed that for most workers in this field, regional information was more relevant and useful, than literature from the developed countries. Unfortunately,

many users said that literature from the developed countries was much more accessible to them than literature published within the Asian Region. Relatively few journals are published in this field within the Region, although many are available from the Western Countries.

Some of the other constraints to the flow of information within the region are as follows:

(a) Lack of information on the organisations and persons associated with energy-related studies within the region.

(b) The relatively slower flow of information within the region.

(c) Lack of an awareness of the information sources available within the region.

(d) Lack of a Regional documentation and information analysis centre for retrieval, analysis, repackaging and dissemination of information on energy-related matters.

4.2.2 Need for a Regional Centre

It has been proposed that a Regional Information Centre on new and renewable sources of energy should be established with the main aim of ensuring access to the information sources available within the Region, and to provide access to literature from outside the Region. This centre should preferably function under the aegis of the UN System.

The objectives of the Regional Information Centre would be,

(a) to survey, study and monitor the information needs of users (persons, organizations or governments).

(b) to receive, collect, search and retrieve information on all matters pertaining to energy-related studies.

(c) to analyse, classify, consolidate and repackage energy-related information to meet the needs of the users.

(d) to transmit, disseminate and provide on request any data or information on energy-related subject matter.

(e) to prepare Union Catalogues, Directories, etc. to service the users.

(f) to function as the regional focal point for the international network on energy information.

4.2.3 Functions of the Regional Centre

The main functions of the Regional Centres should be,

(a) to survey the resources within the region and to organize these resources for maximum coverage of the information needs within the region,

(b) to establish a reference collection which could supplement the collections at the National Central Units within the Region,

(c) to publish and update a Regional Union Catalogue,

(d) to supply on demand information and documents within and outside the region,

(e) to publish Current Awareness service on published research,

(f) to offer computerized SDI service (standard profiles) on their data base,

(g) to provide regional training programmes for library and information officers and extension officers particularly in this field.

More specifically the Regional Centres should attend to the following:

(i) A Directory of Information Centres and Databases on New and Renewable sources of Energy should be published by the Regional Centre. The lack of awareness and inability to identify existing centres in this field was one of the main drawbacks to research workers and planners, etc.

(ii) A Directory of Scientific and Technical Personnel including names and addresses of personnel working on various aspects of new and renewable sources of energy, should be compiled.

(iii) Communication Facilities: The supply of photocopies, etc., from India and other countries within the Region should be much more advantageous than supply from Centres in Europe, or America. Effective channels of communication for document delivery service should be developed within the Region.

(iv) Regional meetings should be held to (a) take stock of regional resources and to study their needs, (b) review the progress of the programme through representatives of national network activity.

4.3 The International Scene

4.3.I General outlook and constraints

Although the plea for regional information appeared stronger, the survey showed that international information is also vital. There was indeed a desire among many users to keep abreast of high technology developments of the industrialized countries, in respect of their fields of study. Others stressed the need to establish links with persons and organizations carrying out parallel and more relevant studies in countries of other regions. Specific references were made to the lack of information from developing countries of the African and Latin American regions.

The constraints to the flow of information at the regional level applies to the international scene, but in addition, the language barrier has been shown to be a serious obstacle.

The section that follows lists the issues that needs consideration to overcome the impediments for the dissemination of information at the international level.

4.3.2 Need for an International Network

A flexible network linking all the national & regional centres should be established at the international level. The mechanism for networking could be based on principles similar to these of UNISIST. The national Central Unit could serve as the focal point in each Member country. This would involve reinforcement of existing services of the national Centre. The responsibilities for the activities of the network, such as preparation of Union Catalogues, could be shared among members.

At present, projects and programmes in the field of non-conventional energy are isolated, decentralized and unknown, because there is little, if any, exchange of information between them. Information regarding them rarely circulates outside the national frame-work, because of a lack of systematic effort on the part of the national centres to interact with international information activities. The proposed international information system should facilitate the flow of information to developing countries.

4.3.3 Function of the Network

(i) The compilation of directories identifying existing national, regional and international information sources on new and renewable sources of energy. Projects and institutions active in the energy field in each member country should be inventoried. For the purpose of compiling the directory, a survey of information services in existence for each type of renewable energy, should be made. The directory should be freely available to all member states. Member countries should send information regarding new projects, etc., so that the directory could be constantly updated.

(ii) The compilation of a directory of specialists involved in the energy field is also of importance. Names and addresses, and their specific information-fulfilling needs must be identified.

(iii) Many computerized systems on environment, agriculture, chemistry, etc., include references to new and renewable sources of energy. These services too should be identified and inventoried.

(iv) More cooperative programmes between member states having similar energy-related problems should be fostered to allow the exchange of experience. The existing programmes in Sri Lanka eg., between the Energy Unit of the Water Resources Board and the Steering Committee for Development of Wind Energy (SWD), Netherlands, have proved to be very beneficial, information-wise.

(v) Adherence to internationally accepted standards and guidelines should be enforced as far as possible, by the Member states. It is important that procedures adopted within the national and regional networks conform to international standards and are compatible with international systems to which they might be linked.

(vi) Assistance should be given to Member states to establish data centres. These centres should be responsible for the generation, compilation, evaluation and dissemination of numerical and statistical data. Data collection programmes should be implemented for data on designing, applications, resources, etc. International cooperation between existing data centres in this field is weak.

(vii) More Information Analysis Centres able to supply evaluated and repackaged information for specific types of users should be established. Several modes of repackaging information should be considered to suit given needs. At present, information items for a given need have to be searched for in several locations.

(viii) Assistance to the Member States for the production of current awareness services, abstracting and indexing services, etc., to enable them to keep abreast of current international developments.

The publication of state-of-the-art reviews on particular topics, hand-books, etc., should also be undertaken by the proposed international network.

(ix) The provision of access to documents containing 'source' information such as reports of on-going research, reports on seminars, workshops, congresses, etc.,which are of great importance in this field as technologies are constantly evolving. There should be international cooperation between Member States for the collection of 'source' information and documents with a limited circulation.

(x) Since information is generated by almost all countries, language barriers which impede the flow of information should be eliminated as far as possible. Translation facilities should be easily available for the Member States within the network. Information generated by some of the developing countries does not enter the international information system at present because of the language barrier.

(xi) The provision of advisory services to agencies and countries regarding the organization of information systems and services. These should also offer guidance in the choice of an adoption of techniques and products.

(xii) International cooperation should be established to overcome the serious obstacles faced by the less developed countries due to lack of finances by the following steps:

(a) Improved document delivery facilities, such as by using UNESCO coupons, should be explored to replace the use of hard currency. The developing countries have difficulties in obtaining documents and services because of inadequate transferable currencies.

(b) Financial aid should be provided to centres to enable them to purchase basic equipment mainly photocopying machines and microform reader/printers. Promoting the use of microform would, in the long run, facilitate the flow of information into the country as most important journals and periodicals are now available in this form and the cost of air-freight is very much less than for conventional documents.

(xiii) More programmes on training and continuing education should be organised at the international and regional level for information officers and extension officers. These are especially needed by information personnel in the developing countries, who at present lack training in information handling techniques in this specific field.

(xiv) The publication of an International Newsletter which could provide up-to-date information on forth-coming conferences meetings, workshops, training programmes, etc.,in the field of new and renewable sources of energy. Many research workers said that they were unable to attend important international and regional meetings and training courses due to lack of timely information. Inability to attend these meetings is a serious obstacle, as personal contacts made during them form one of the most important channels of information.

(xv) Follow-up studies have to be continuously carried out to ensure that the programmes established are effective and to redirect those services that do not prove to be effective.

TABLE I - SUMMARY OF INSTITUTIONAL CHARACTERISTICS

Name of Organisation	Functions and role of Activities								Subjects of Interest										Sponsorship				Unit Responsible for Information Activities						Categories of Users						
	Planning	Research Centre	Manufacture	Pilot Plant/Exten	Educational	Tech. transfer	Policy/Decision	Others	Solar	Wind	Tidal Wave	Thermal gradiant	Geothermal	Biomass	Hydropower	Wood Charcoal	Draught Animals	Peat	Government	Public Sector	Private Sector	International	Library	Inform. Centre	Docum. Centre	Stats. Unit	Public Unit	Others	Management	Scientist	Technologist	Teachers	Exten. Personnel	Planners/Policy	Others
1. Agriculture Department		x		x	x	x								x		x	x		x						x	x	x	Demo. Unit	x	x	x	x	x	x	
2. Ceylon Electricity Board	x	x	x	x		x	x		x	x	x	x		x	x	x	x	x		x			x			x			x	x	x		x	x	
3. C.I.S.I.R	x	x		x		x			x	x				x	x	x		x		x			x						x	x	x	x	x	x	
4. Department of Highways	x						x		General Policy Planning on energy in private capacity										x				x						x	x						
5. Industrial Development Board		x		x		x								x		x	x			x			x					Exten. Unit	x	x	x		x		
6. NERD Centre		x		x		x			x	x		x		x	x		x			x			x	x	x	x	x		x	x	x		x		
7. University of Moratuwa		x			x				x	x		x		x		x				x			x			x			x	x	x				
8. University of Peradeniya		x		x	x	x		Consultancy	x	x			x	x	x	x	x	x		x			x			x		Students	x	x	x	x	x		
9. Water Resources Board	x	x	x	x		x	x			x						x	x			x			x			x			x	x	x		x		
10. Ministry of Finance and Planning	x						x	Evaluation	x	x				x	x	x		x											x	x				x	Economist Librarian Public Consultant
11. Private Sector													x	x							x		x												Asst Advisors

ANNEX I

QUESTIONNAIRE

(I) ORGANIZATION AND INDIVIDUAL DESCRIPTION

I.I Name of Organization

Address

Telephone

Telegram

I.2 Institutional characteristics

I.2.I Function and role of organization:

Planning

Research Centre

Manufacturing firm

Pilot plant and extension

Educational Institution

Technology transfer

Policy and decision making

I.2.2 Circle specific subject from subject list -

Solar

Wind

Tidal wave

Thermal gradient

Geothermal

Biomass

Hydropower

Wood charcoal

Draught animals

Oil shale

Tar sands

Peat

I.2.3 Sponsorship:

Government

Public sector

Private sector

International

I.2.4 Staff:

Local

Foreign

2/...

I.2.5 Unit responsible for information activities:

Library

Information Centre

Documentation Centre

Statistical Unit

Publications Unit

Other (explain) -

I.3 Person interviewed:

I.3.I Name

Address

Telephone

Title

Department

I.3.2 Subject interest -

I.3.3 Function in the Organization:

Management

Scientist

Technologist

Librarian

Information specialist

Extension services personnel

Marketing

(2) INFORMATION NEEDS OF USERS IN THE ORGANIZATION

2.I Categories of Users:

Management

Research

Technologists

Teachers

Extension service personnel

Planners/Policy makers/Decision makers

Economist

Public

2.2 Information needs (corresponds to matrix)

2.2.I Identifying the nature of the information

Themes Characteristics of energy sources
Harnessing
Transfer
Storage
Utilization

Objects Materials
Equipment
Processes
Analyses - monitoring
Regulations - standardization
Statistics

Aspects Scientific
Technical
Economic or financial
Social, legal, institutional

2.2.2 Aim of information:

Decision making
Forecasting
Research and Development
Popularization

2.2.3 Form in which information should be received:

Books
Monographs
Periodicals
Abstracting & Indexing Services
Bibliographies
Reports
Patent specifications
Engineering drawings
Numerical & statistical data
Microforms
Replies to specific requests
Other specifications (explain)

2.2.4 Media:

Documents -

Individuals -

2.2.5 Qualitative:

Language

Timeliness

Physical accessibility

(3) INFORMATION SOURCES USED/PROMOTION OF USE

3.1 Institutional Sources:	Local	Foreign
Libraries		
Statistical collections		
Meterological Data Centres		
Information Analysis Centres		
Documentation Centres		

3.1.1 The sources used:

Books		
Monographs		
Periodicals		
Abstracting & Indexing Services		
Bibliographies		
Reports		
Patent Specifications		
Engineering drawings		
Numerical & Statistical data		
Microforms		
Replies to specific requests		
Other specifications (explain)		

3.2 Services:	Local	Foreign
S.D.I.		
Computerized Files		
Referral services		
Advisory/consultancy service		
Technical engineering service		

3.3 Promotion of information use:

User education

Managcment sensitization

Feedback mechanism

(4) INFORMATION DISSEMINATION AND EXCHANGE ACTIVITIES

4.I Personal level -

Person to person contacts

Correspondence

Publication

Media

4.2 Institutional level -

Publications

Seminars & conferences

Extension personnel

Media

4.3 National level -

Co-operation programmes

National programme

Information centres

4.4 International level -

International Information Systems

International Seminars and Conferences

Inter - Country collaborative programmes

(5) OBSTACLES ENCOUNTERED IN SATISFYING USER'S NEEDS

Political

Economic

Technical

Social eg. language

(6) PROPOSALS FOR OVERCOMING THESE OBSTACLES

INFORMATION NEEDS MATRIX

User category	(1) Subject: Theme	(1) Subject: Object	(1) Subject: Aspect	(2) Aim of information	(3) Form	(4) Media	(5) Qualitative

ANNEX II

SUPPLEMENTARY QUESTIONNAIRE

(I) Why have you chosen a particular theme?

What was the basis for your judgment?

Are others doing the same work?

(2) How do you communicate with others working in the same field?

Are there any local associations, etc.?

Regional?

International?

what are the communication means?

(3) Evaluation of data:
How do you know whether the data is correct?

Have you had an opportunity of testing them?

(4) Current Awareness:

How do you keep abreast of current developments?

Do the Journals cover your field of interest?

Would you like to have a current awareness service?

Would you trust a national information network to do the work for you?

Would you like references, abstracts,?

What about reports?

Do you have these reports (give examples)?

Solar data, how do you obtain it?

Is it easy?

Is it satisfactory?

If you are satisfied with the bibliographical literature there may be problems with data, industrial catalogs, etc. which may not be well organised.

In your work what is the most important area-theoretical, data on testing, designing, etc.?

Do you have any language problems?

How close do you keep in touch with industry?

Is there need for specialised equipment?

Do you need it?

What sort of service would you like to have?

(5) Would like to have the information in a national centre who would process and send you relevant data?

ANNEX III

Other Sources of Information on Energy-Related matters

01. American Petroleum Institute (API).
02. Asian Institute of Technology (AIT), Bangkok, Thailand.
03. Association of Development Research and Training Institute for Asia and the Pacific (ADIPA).
04. British Information Services (BIS), U.K.
05. British Library Lending Division (BLLD), Boston Spa, Yorkshire, England.
06. Commonwealth Regional Renewable Energy Resources Information System (CRRERIS).
07. East-West Resource Systems Institute (RSI), U.S.A.
08. Energy Update Center, Bombay, India.
09. Environmental Protection Society (EPS), U.S.A.
10. Indian Institute of Technology (IIT), Madras, India.
11. International Book Information Services, Inc. (IBIS), Netherlands.
12. International Centre for Theoretical Physics, Trieste, Italy.
13. International Institute for Environment & Development (IIED).
14. Khadi and Village Industries Commission, Bombay, India.
15. Reader Service' of the Institute of Electrical Engineers (IEE), London.
16. Renewable Energy Resources Information Center (RERIC), Bangkok, Thailand.
17. Singapore Institute of Standards and Industrial Research (SISIR), Singapore 4.
18. Steering Committee for the Development of Wind Energy in Developing Countries (SWD), Netherlands.
19. Tata Energy Research Centre, India.
20. United Nations Environmental Program (UNEP), Nairobi.
21. U.S. National Academy of Sciences.
22. Volunteers in Technical Assistance (VITA), Maryland, U.S.A.

ANNEX IV

Journals and other Publications received by Respondents

01. Abstracts of Selected Solar Energy Technology (ASSET), UN University, Tokyo, Japan.
02. Biogas Newsletter, Nepal.
03. Intermediate Technology Publications (ITP), 9, King Street, London, U.K.
04. International Journal of Solar Energy.
05. Publications and Proceedings of Institute of Electrical Engineers (London).
06. Science (The Journal of American Association for the Advancement of Science).
07. Solar Energy, (Science and Technology), International Solar Energy Society.
08. Solar Energy, UN University.
09. Sun World, International Solar Energy Society.
10. Wind and Sun Compendium.
11. Wind Engineering, University of Surrey.

ANNEX V

LIST OF LIBRARIES PARTICIPATING IN NATIONAL SCIENCE INFORMATION NETWORK

ARTI	Agricultural Research & Training Institute, II4, Wijerama Mawatha, Colombo 7.
BC(C)	British Council (Colombo), I54, Galle Road, Colombo 3. Tel. 2338I, 23382.
BC(K)	British Council (Kandy), Dalada Veediya, Kandy. Tel. 08/3I40
BCS	Bureau of Ceylon Standards, 53, Dharmapala Mawatha, Colombo 3. Tel. 2605I.
CEB	Ceylon Electricity Board, 50, Sir Chittampalam A Gardinar Mawatha, Colombo 2. Tel. 2447I.
CISIR	Ceylon Institute of Scientific & Industrial Research, 363, Bauddhaloka Mawatha, Colombo 7. Tel. 93807.
CPC	Colombo Port Commission Technical Library, Port Commission, Colombo I. Tel. 2I20I.
CRI	Coconut Research Institute, Bandirippuwa Estate, Lunuwila. Tel. 95 Dankotuwa.
CSC	Ceylon Steel Corporation, Aturugiriya. Tel. 079/2II-2I3 (29447-8).
CTB	Ceylon Transport Board, Engi. Div., Werahera. Tel. 8II2I.
CTC	Ceylon Technical College, Colombo IO. Tel. 24I76.
IDB	Industrial Development Board, 6I5, Galle Road, Katubedde, Moratuwa. Tel. 072/232.
NIM	National Institute of Management, I20/5, Wijerama Mawatha, Colombo 7.
NML	Dept. of National Museums, Albert Crescent, Colombo 7. Tel. 933I4.
NSC	National Science Council of Sri Lanka, 47/5, Maitland Place, Colombo 7. Tel. 9677I.
RRI	Rubber Research Institute, DArtonfield, Agalawatte. Tel. 26 Agalawatte.
SEC	State Engineering Corporation I30, W.A.D.Ramanayake Mawatha, Colombo 2. Tel. 2I26I, 202II.
SLML	Sri Lanka Medical Library, 6, Wijerama Mawatha, Colombo 7. Tel. 9I42O.
SLTyC	Sri Lanka Tyre Corporation, Dalugama, Kelaniya.
UC	University of Colombo, Colombo 3. Tel. 86432.
UCM	University of Colombo, Medical Library, Faculty of Medicine, Kynsey Road, Colombo 8. Tel. 92068.
UJ	University of Jaffna, Thirunelvely, Jaffna. Tel. 48I, 7592-4.
USJP	University of Sri Jayawardena Pura, Gangodawila, Nugegoda.
UM	University of Moratuwa, Katubedde, Moratuwa. Tel. 072/30I, 534.
UP	University of Peradeniya, Peradeniya. Tel. 08/830I.
TTC	Telecommunication Training Centre. Horetuduwa, Moratuwa.
WSDB	Water Supply & Drainage Board, Ratmalana. Tel. 07I/367,3I6,528.