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9. ABSTRACT An efficient, computerized means of storing and retrieving soil resource information is presented. The Integrated Scientific Information System (ISIS) is currently distributed and used by UNESCO. ISIS permits input of both alphanumeric and numeric information by batch or on-line, interactive modes. The stored information is kept in addressed master files which may also be indexed by selected keywords. The retrieved information can be displayed on remote terminals or formatted as indexes or catalogs on high-speed printers. Once installed these programs can be used for the storage and retrieval of almost any kind of information. This system could be helpful in the organization and evaluation of many kinds of development data. Several hundred soil survey reports were characterized by the extraction and storage of relevant data on checklists specially compiled for the purpose. Information from the checklist was then input into the ISIS system for storage and retrieval. ISIS could be particularly useful to development funding agencies such as USAID and World Bank which have large amounts of materials on completed projects. The system would allow follow-up or evaluation studies to be completed easily on finished projects. The success or failure of project approaches or strategies could be more easily evaluated. It would also help avoid repetition or overlap of studies in a given geographic area. The system could also be used to compile relevant reference documents. Several versions of ISIS in existence. The gross characteristics are similar and resemble those described in this paper.

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AN APPLICATION OF A COMPUTERIZED
INFORMATION-STORAGE AND RETRIEVAL
SYSTEM FOR DEVELOPMENT PLANNING

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May 30, 1978

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Summary

An efficient, computerized means of storing and retrieving soil resources information is presented. The Integrated Scientific Information System is currently distributed and used by UNESCO. ISIS permits input of both alphanumeric and numeric information by batch or on-line, interactive modes. The stored information is kept in addressed master files which may also be indexed by selected keywords. Information, in the form of complete or selected segments of master records, is retrieved by Boolean combinations of the selected keywords. The retrieved information can be displayed on remote terminals (cathode ray tubes or printers) or formatted as indexes or catalogs on high-speed printers.

ISIS programs once installed can be used for the storage and retrieval of almost any kind of information. It is suggested that this system could be helpful in the organization and evaluation of many kinds of development data.

Several hundred soil survey reports were characterized by the extraction and storage of relevant data on check-lists specially compiled for that purpose. Information from the check-list was then input into the ISIS system for storage and retrieval.

An Application of a Computerized Information-Storage and Retrieval System for Development Planning

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Background

Today in most fields of scientific endeavor the amount of reports, publications, textbooks and other kinds of written information is overwhelming. An individual who depends on traditional means of selecting and reviewing important data is often lost in a maze of possibilities and fails to scratch the surface.

This quandary is often seen in the organization and analysis of government or funding agency-sponsored reports including such materials as soil surveys, project feasibility and operational studies and other related kinds of development publications. Government ministries in LDC's are more often than not overwhelmed with 20 or 30 years of project proposals, feasibility studies and complete project reports along with the accompanying materials such as soil surveys, climatic studies, geological investigations and any number of assorted materials which well-meaning aid-orientated agencies have seen fit to provide.

The information retrieval situation in funding or aid agencies in developed countries is not much better off. Granted the reports and accompanying materials are usually neatly and carefully filed away in some sort of library system, but rapid and efficient access to these materials is lacking. Also the volume of materials that need to be researched for any given country is prohibitive. The final result is in general an underutilization of valuable reports and studies for assessing the effectiveness of past development projects and for planning effective future development projects. This paper will present a computer-based information storage and retrieval system which if properly installed could make access to any catalogued information quick and efficient.

The Soil Resource Inventory Group (funded by AID supplemental grant csd 2834 at Cornell University) have been working on the characterization of existing soil survey reports and maps made for various agricultural development planning objectives in LDC's in fulfillment of one of their requirements for the AID grant.

The Data-Base

As stated above the data-base of interest to the SRI Group included all materials on soil resource inventories. This data-base was a small part of a larger data-base concerning materials written for all aspects of agricultural development in LDC's. The principles concerning the organization of the data-base described in this paper could be applied to a more extended data-base which would include: all forms of project proposals and reports all materials concerning systematic or national soil surveys, agronomic reports and studies, economic analyses and reports, climatological reports and datasets, other natural resource inventories and any other materials relevant to development projects.

The data-base in this particular study was restricted to soil resource inventories. By soil resource inventories it is meant such materials as soil survey reports, land capability or suitability studies and others. Of particular interest were soil resource inventories from LDC's. The sources of these reports were the libraries and collections existing in the Agronomy Department, the collection in Mann Library and materials sent to the SRI Group from the Land Resources Division in London, ORSTOM (Organisation de la Recherche Scientifique Outre-Mer) in Paris and others. It was decided at the onset to select materials in such a way as to get a good sampling of the existing soil resource inventories world-wide. To aid in such an endeavor complete bibliographies of soil resource inventories were sought. It was found that systematic national soil survey programs were well covered in this sense. The SRI grant had itself provided for a comprehensive bibliography of soil resource inventories of LDC's in Asia, Africa, and Latin America. FAO had a comprehensive list of surveys which their organization had funded and/or undertaken. Also the agricultural library at Cornell (Mann Library) had quite a comprehensive collection of government-sponsored soil resource inventory reports. There was however a serious lack of coverage on project-oriented reports. By project-oriented reports it is meant those reports and studies which were funded by development agencies such as USAID and World Bank and/or those reports and studies funded by the client governments of the LDC's themselves. The only project-oriented soil resource inventory reports which were totally available to the SRI Group were those studies undertaken by the Land Resources Division of Great Britain.

Map Checklist

The first step in the characterization of soil survey reports and maps was the extraction and storage of relevant

data from the survey maps and reports. To accomplish this in an efficient and orderly manner several approximations of a soil survey check-list were proposed. In this way elements comprising the master record were clearly identified. The final check-list, the input document (see Appendix I), includes three kinds of survey and report information: 1) general background and important bibliographic data including country, title, map scale, and supplementary maps and reports; 2) objectives for which the soil survey was made; 3) raw circle-count data for the computation of map parameters and map classification.

The Information Storage and Retrieval System

The computerized information retrieval system used for the SRI project was ISIS (an acronym for Integrated Scientific Information System). ISIS was developed by the Central Library and Documentation Branch of the International Labour Office, an agency of the U.N. in Geneva. One significant advantage of the system is that it permits on-line enquiry of the files using remote visual display terminals. The program was originally designed to handle bibliographic data. However, the record structures are sufficiently general so that basic information processing can be performed on almost any kind of data (Schieber, 1972). This means that once installed the ISIS system can be used to manipulate several different kinds of datasets at one time or can be used to manipulate new and different datasets when new projects are established.

The ISIS program has three major aspects which define its structure and functions. These are: 1) data entry and file structure, 2) record retrieval and 3) printing of catalogues and indexes. The file structure consists of four kinds of files. The first, the master file, contains the database in formatted records. Each record is tagged numerically and consists of individual numerically tagged fields. A second file, the transaction file, is the worksheet for record input and formatting. All fields and data for the records are input into this file and checked to be sure that all mistakes have been corrected. When the records are complete and correct they are merged from the transaction to the master file. A third file, the cross-reference file, contains all the addresses of the master records. This file is a link between the numerical addresses of the master records and the actual position of the master records on their disk. The fourth kind of file, the inverted file, is necessary for the actual retrieval of master records. The inverted file

contains selected fields or keywords which are contained in the master records and which are used for record retrieval. For example, selected fields or keywords in the case of this Soil Resource Inventory Project included: the country about which the report was written, the scale of the published map, and the kinds of supplementary maps and information, such as geological, vegetation etc., included in the SRI report. These selected fields and keywords are assigned where appropriate to an address for each master record. These are the two aspects of the inverted file. Data entry in the case of the SRI project was done on-line at a remote terminal. Data entry could also be done in batch if desired. Data preparation, discussed previously, essentially involved the preparation of a checklist on which the individual fields of a record were defined and completed and from which data would be entered into the ISIS transaction file (Appendix I).

The data is then keyed into the program in machine-readable form, in this case at a remote terminal, field by field, record by record. At this point the data is in the transaction file and will remain there until merged into the master file. Figure 1 shows the relationships between data input, the major files and data retrieval.

In retrieval the user can scan the database using keywords from the inverted file or he can scan the database using exact character strings which may occur anywhere in the stored records. For example, in this case if a listing of all soil resource inventories from Thailand were needed the inverted file which contains the keyword "Thailand" would be scanned. When the keyword is located the addresses of all the records for Thailand reports are also given and then using the cross-reference and master files the records are displayed (see Figure 2). ISIS permits greater flexibility of searches by allowing the searcher to qualify the records he is searching with a set of keywords linked by the Boolean operators for "and", "or" and "not". For example, one could search in our example all reports containing maps from Brazil at a published scale of 1:250,000. The database contains 4 maps for Brazil at this scale (see Figure 3). This number will be expanded by using the Boolean operator "or" as for example in the case of locating all maps from Brazil at a scale of 1:250,000 or 1:500,000 (see Figure 4). The searches in these examples are quite simple; more complex searches could be formulated by using other sets of keywords in the inverted files or by increasing the number of fields containing keywords in the inverted files. Searches may also be made using the "text" feature. This allows a search to be made of all stored information in the master file. The program in this case searches for exact character configurations in a specified field.

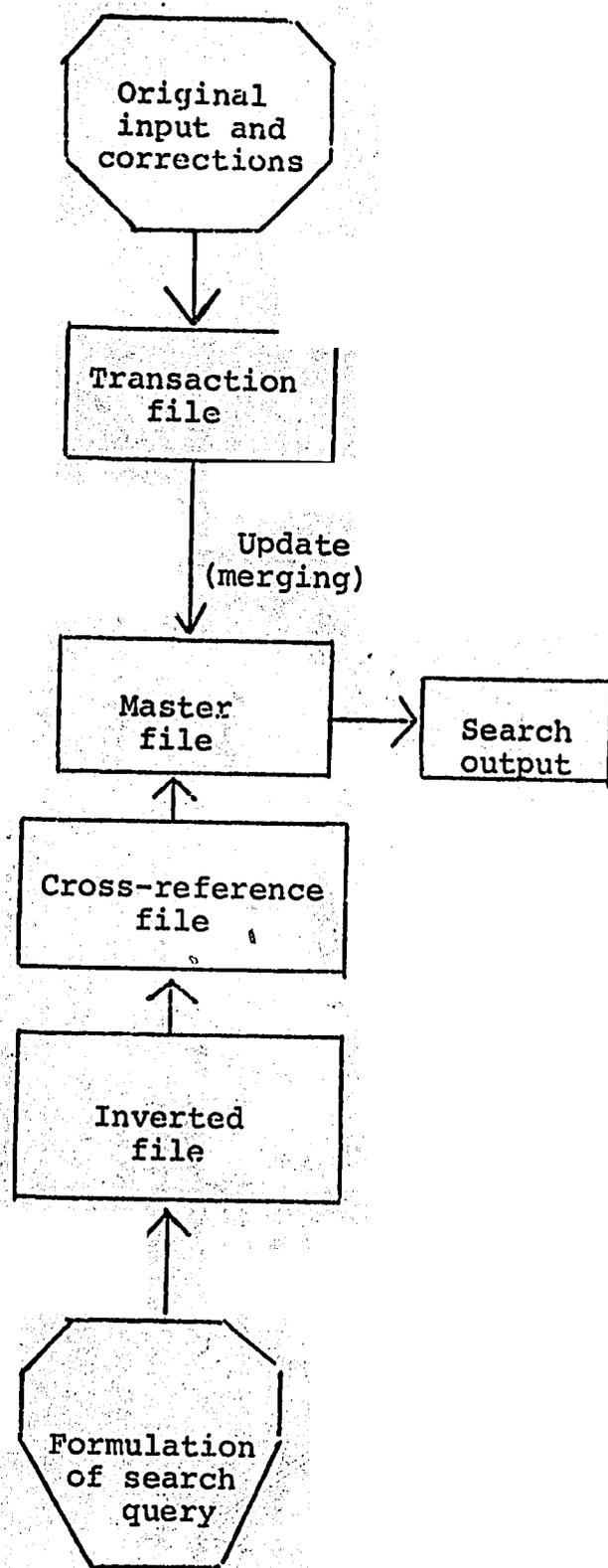


Figure 1. Relationships between input, major files and retrieval.

```

exec search
SEARCH PROCESSOR - PLEASE SELECT DATA BASE.
maps
FILES BEING OPENED - PLEASE BE PATIENT.
SAVE PREVIOUS SEARCHES ? YES OR NO
no
SEARCH NO. T-001.          DATA BASE = MAPS
ENTER QUESTION.
= thailand
= THAILAND
F = 00005          T = 00005
SEARCH COMMAND ?
da
118  1971  12  THAILAND
TITLE: SOIL SURVEY OF CHANGWAT UBON RATCHATHA 00136
>
118  1972  15  THAILAND
TITLE: DETAILED RECONNAISSANCE SOIL SURVEY OF NAN PROVINCE 00134
>
118  1972  2  THAILAND
TITLE: THE SOILS OF THE KINGDOM OF THAILAND. EXPLANATORY TEXT OF THE GENERAL SOIL MAP 00132
>
118  1968  1  THAILAND
TITLE: SOILS OF THAILAND. A RECONNAISSANCE SURVEY WITH MAP SHOWING THE GENERAL SOIL CONDITIONS 00103
>
118  1966  1  THAILAND
TITLE: SOIL SURVEY REPORTS OF THE LAND DEVL DEPT MOBILITY DEVELOPMENTAL RESEARCH STUDY IN THAILAND 00093
>
SEARCH COMMAND ?

```

Figure 2. Search for Thailand reports and maps.

```

= brazil
= BRAZIL
  P = 00014
SEARCH COMMAND ?
+ scale e
+ SCALE E
  P = 00086
SEARCH COMMAND ?
ds
118 1969 1 BRZ
TITLE: SOLOS DA BACIA HIDROGRAFICA DO RIO UNA 00129
>
118 1970 1 BRAZIL
TITLE: LEVANTAMENTO DE RECONHECIMENTO DOS SOLOS DO NOROESTE DO ESTADO DO PARANA 00081
(INFORME PRELIMINAR)
>
118 1972 1 BRAZIL
TITLE: LEVANTAMENTO EXPLORATORIO- RECONHECIMENTO DE SOLOS DO ESTADO DA PARAIBA 00078
>
118 1966 4 BRAZIL
TITLE: AMAZON SOILS. A RECONNAISSANCE OF THE SOILS OF THE BRAZILIAN AMAZON 00015
REGION
SEARCH COMMAND ?

```

Figure 3. Search for Brazilian maps at 1:250,000 ("scale e")

```

= brazil
= BRAZIL
  P = 00014
SEARCH COMMAND ?
( scale e
( SCALE E
  P = 00086
SEARCH COMMAND ?
* scale f
* SCALE F
  P = 00022
SEARCH COMMAND ?
)
)
  P = 00096
SEARCH COMMAND ?
da
118 1969 1 BRAZIL 00129
TITLE: SOLOS DA BACIA HIDROGRAFICA DO RIO UNA
>
118 1970 1 BRAZIL 00081
TITLE: LEVANTAMENTO DE RECONHECIMENTO DOS SOLOS DO NOROESTE DO ESTADO DO PARANA
(INFORME PRELIMINAR)
>
118 1973 1 BRAZIL 00079
TITLE: LEVANTAMENTO DE RECONHECIMENTO DOS SOLOS DO ESTADO DO RIO GRANDE DO SUL
>
118 1972 1 BRAZIL 00078
TITLE: LEVANTAMENTO EXPLORATORIO- RECONHECIMENTO DE SOLOS DO ESTADO DA PARAIBA
>
118 1972 1 BRAZIL 00029
TITLE: SOLOS DA RODOVIA TRANSCORINTICA
>
118 1975 1 BRAZIL 00027
TITLE: PROJETO RADAM (LEVANTAMENTO DE RECURSOS NATURAIS)
>
118 1966 4 BRAZIL 00015
TITLE: AMAZON SOILS. A RECONNAISSANCE OF THE SOILS OF THE BRAZILIAN AMAZON
REGION
>
SEARCH COMMAND ?
$
END SEARCH T-001. DATA BASE = MAPS T-001
SAVE RESULT ?
no
SEARCH NO. T-002. DATA BASE = MAPS T-002
ENTER QUESTION.
exit
READY

```

Figure 4. Search for Brazilian maps at 1:250,000 ("scale e") : all other maps at 1:500,000 ("scale f").

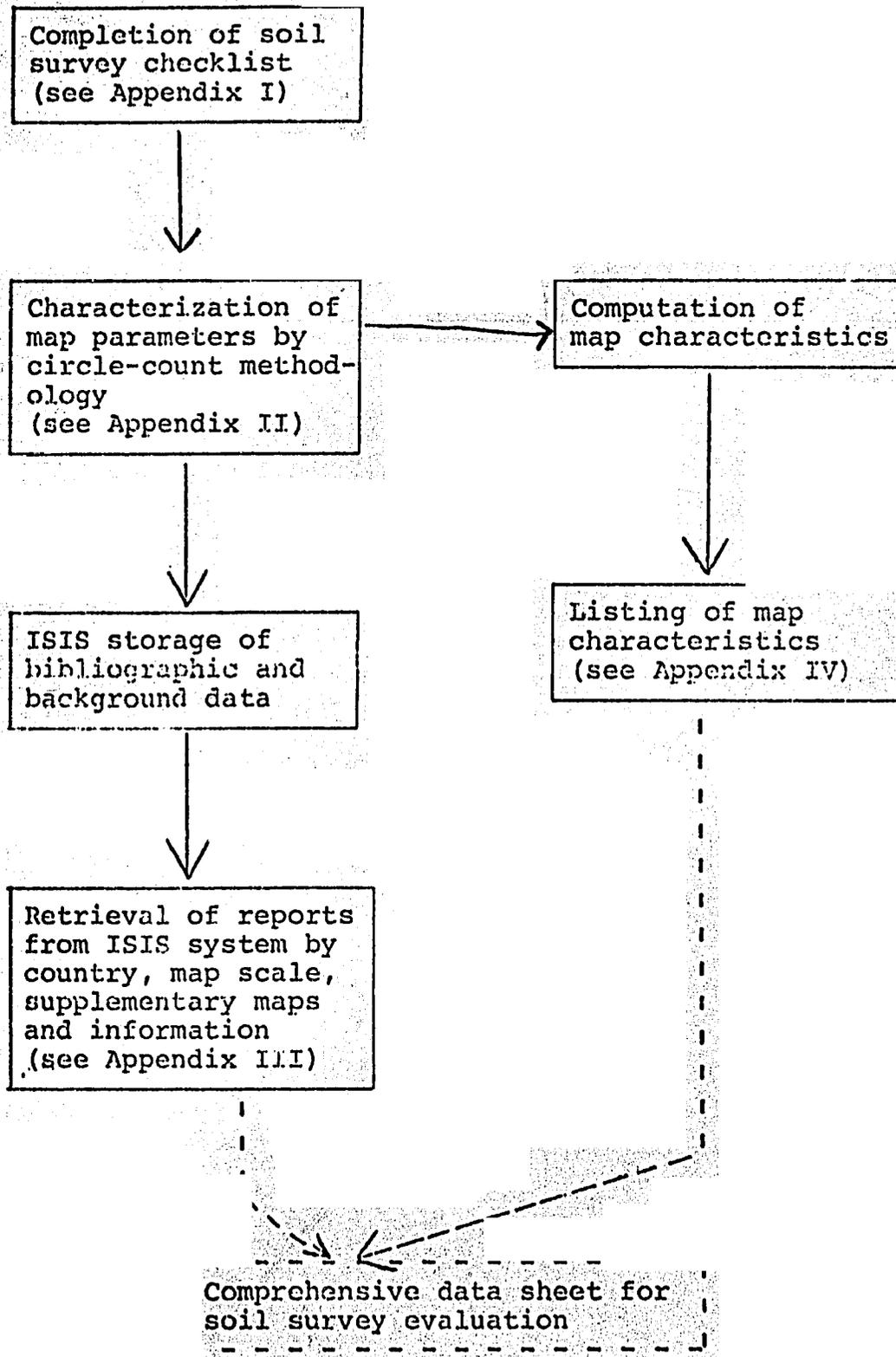
The ISIS retrieval search routine has supplementary features which may be useful to some users such as compiling a record on the kinds of searches formulated and their dates. This facility was not used in this project.

The searches produce an output specific to a certain kind of request. Other kinds of output may be produced from the database. The most common kinds of output would be catalogs and indexes. For example catalogs may be produced on a high-speed printer, organized and sorted according to any of the fields of the records in the master file. For the SRI project a catalog was produced by sorting the records in the master file by country and scale class. The sorted files were then printed in a format designed by the user. An example of a section of the catalog can be seen in Appendix II. Other kinds of catalogs and indexes could be made by selecting and sorting on other fields in the inverted file.

Possible Applications of ISIS

The ISIS program was selected for use by the SRI project to aid in the characterization of soil surveys (see flow chart, Figure 5). Another program not discussed in this paper computed map parameters for use in soil map classification. ISIS aided in the soil resource inventory characterization process by allowing selected information on soil resource inventory reports and maps to be stored and retrieved in varying combinations of keyword characteristics. In such a way specific maps and reports exhibiting desired characteristics to be tested could be searched instantaneously. Planning agencies or ministries in LDC's could benefit from the installation of an ISIS system. It would facilitate the organization and classification of existing project reports, studies and related work. It could be used to retrieve background datasets on climate, soils and other natural resources by geographic region, or retrieve project studies by geographic region, or retrieve project reports, schematic soil surveys etc. by kind of project, success of project, published map scale and any other combination of desired classification characteristics. As stated previously, once the ISIS programs are installed in a computer operating system any number of databases may be used for storage and retrieval.

ISIS could be particularly useful to development funding agencies such as USAID and World Bank which have large amounts of materials on completed projects. The system would allow follow-up or evaluation studies

Fig. 5. Soil Survey Characterization Flow Chart

to be completed easily on finished projects. The success or failure of project approaches or strategies could be more easily evaluated. It would also help avoid repetition or overlap of studies in a given geographic area. The system could also be used to compile relevant reference documents.

Several other information-storage and retrieval systems have been observed by the author. The CAIN and AGRICOLA systems used by the National Agricultural Library contain millions of records or citations. Their size is orders of magnitude greater than the database used in the SRI project. However, they were not as powerful in terms of retrieving combinations of selected keywords from abstracts etc. Also their selection of fields was not seen to be particularly conducive to the retrieval of information on geographic regions or soil resource inventories. The ISIS system is a very powerful system for organizing and retrieving information from a database.

Obtaining the ISIS Programs

Several versions of ISIS are in existence. The gross characteristics of all the versions are similar, however, and resemble the characteristics described in this paper. The author used a version currently placed on-line by the Computer Activity Group (CAG) of Cornell University. This version is a closely-related descendant of the original developed by the International Labour Organization in Stockholm. The most recent and official version is currently being dispensed by UNESCO in Paris, France. To obtain the latest documentation and other information on setting up the ISIS system contact the following person:

Mr. G. Del Bigio
Chief, Documentation Systems Development Section
Documentation System Division
UNESCO
7 Place de Fonteno
75700 Paris,
France

Bibliography

- Schaar, G. M. 1977. Technical documentation on ISIS at Cornell (unpublished). Cornell University, Ithaca, NY.
- Schieber, W. D. 1972. Technical manual on ISIS (a generalis information storage and retrieval system designed at the international Labour Office), Statskontoret, Stockholm, 1972.

APPENDIX I

SOIL SURVEY CHECKLIST (5/77)

Schedule A: General Background Information

1. Field Number:	14. Report Accompanied by the Following Maps: <table border="1"> <thead> <tr> <th>Type</th> <th>No</th> <th>Yes</th> <th>Actual Scale</th> <th>Scale Code*</th> </tr> </thead> <tbody> <tr> <td>Geology</td> <td></td> <td></td> <td></td> <td>G</td> </tr> <tr> <td>Vegetation</td> <td></td> <td></td> <td></td> <td>V</td> </tr> <tr> <td>Physiography</td> <td></td> <td></td> <td></td> <td>P</td> </tr> <tr> <td>Climate</td> <td></td> <td></td> <td></td> <td>C</td> </tr> <tr> <td>Land-use (present)</td> <td></td> <td></td> <td></td> <td>U</td> </tr> <tr> <td>Land Capability/Potential</td> <td></td> <td></td> <td></td> <td>L</td> </tr> <tr> <td>Irrigation potential</td> <td></td> <td></td> <td></td> <td>I</td> </tr> <tr> <td>Erosion hazard</td> <td></td> <td></td> <td></td> <td>E</td> </tr> <tr> <td>Other</td> <td></td> <td></td> <td></td> <td>O</td> </tr> </tbody> </table>	Type	No	Yes	Actual Scale	Scale Code*	Geology				G	Vegetation				V	Physiography				P	Climate				C	Land-use (present)				U	Land Capability/Potential				L	Irrigation potential				I	Erosion hazard				E	Other				O	15. Report Accompanied by the Following Information <table border="1"> <thead> <tr> <th>Type</th> <th>No</th> <th>Yes</th> <th>Scale Code*</th> </tr> </thead> <tbody> <tr> <td>Geology</td> <td></td> <td></td> <td>G</td> </tr> <tr> <td>Vegetation</td> <td></td> <td></td> <td>V</td> </tr> <tr> <td>Physiography</td> <td></td> <td></td> <td>P</td> </tr> <tr> <td>Climate</td> <td></td> <td></td> <td>C</td> </tr> <tr> <td>Land-use (present)</td> <td></td> <td></td> <td>U</td> </tr> <tr> <td>Land Capability/Potential</td> <td></td> <td></td> <td>L</td> </tr> <tr> <td>Irrigation Potential</td> <td></td> <td></td> <td>I</td> </tr> <tr> <td>Erosion hazard</td> <td></td> <td></td> <td>E</td> </tr> <tr> <td>Other (Specify)</td> <td></td> <td></td> <td>O</td> </tr> </tbody> </table>	Type	No	Yes	Scale Code*	Geology			G	Vegetation			V	Physiography			P	Climate			C	Land-use (present)			U	Land Capability/Potential			L	Irrigation Potential			I	Erosion hazard			E	Other (Specify)			O
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3. # of Map Sheets																																																																																												
4. Country																																																																																												
5. Title of Report:																																																																																												
6. Report Prepared By/Author: (last name, first name)																																																																																												
7. Map Scale:																																																																																												
8. Area: (km ²)																																																																																												
9. Book reference:																																																																																												
10. Publisher:																																																																																												
11. City (publisher):																																																																																												
12. Number of pages:																																																																																												
13. Other Bibliographic Information (Report #; Gov. Agency, Division, etc.)																																																																																												

*Scale Code	
1	→ 1:12,999
2	1: 13,000 - 1: 25,999
3	1: 26,000 - 1: 59,999
4	1: 60,000 - 1:129,999
5	1:130,000 - 1:259,999
6	1:260,000 - 1:649,999
7	1:650,000 - →
8	None indicated

Evaluation done by:
Evaluation completed on:

6. Supplementary Field Numbers:

SOIL SURVEY CHECKLIST -- Page 2

Schedule B: Characterization of the Survey

Objective(s) of Survey 1/ Indicated		
	Yes	No
Broad Land Use Planning		
National Planning and Inventory		
Identification and Broad Development Regions		
for purposes below:		
Cropping		
Grazing		
Range Lands		
Forestry		
Wildlife and recreation		
Watersheds		
Urban or settlement areas		
Others (specify)		
Soil Inventory of a Region (some management requirements stated or implied)		
Regional Planning (general)		
Selection of promising areas for a specific purpose		

Add asterisks(*) to "check-mark" if you believe that a particular objective is implied or that the report seems to meet the requirements for that particular objective.

Soils information should be specific enough to assess the suitability for broad groups of plants in cultural systems.

Cultural Systems General Planning (including:)		
Shifting cultivation		
Wet culture (paddy rice, sugar cane, etc.)		
Rainfed permanent culture		
Irrigation dryland culture		
Other (specify:)		
Grazing		
Dryland		
Irrigated		
Rangelands		
Forestry		
Wildlife and Recreation		
Settlement Areas		
Assess drainage requirements		
Background for soil conservation or reclamation program		
Delineate areas for watershed development		
General location of transport infrastructure, secondary industries or urban development		
Planning and Execution of Extensive Projects 2/		
Siting areas of rainfed crops and pastures (based on specific management requirements)- (specify crops or pastures:)		
Irrigation feasibility		
Rangelands		
Forestry		
Wildlife and Recreation		

SOIL SURVEY CHECKLIST - Page 3

Land Settlement Sites		Provides data for soil classification and genesis	
Engineering and urban purposes- (specify)		Provides data for geomorphology, geography or ecology	
Others (specify)		Others (specify)	
Project Execution and Siting 3/			
Irrigation siting (specify crops Site experiment stations and field plots (specify crops)			
Crops for which management systems are indicated (specify)			
Engineering and urban uses			
Site roads and pipelines			
Site foundations, sewers, septic tanks			
Landscaping plans			
General or Cross-Objectives			
Scientific advancement			

Soil information should be specific enough to assess the suitability for specific crops

Appendix II - Selected pages from catalog compiled
by country and scale class

Key:

Scale A	> 1:12,999
Scale B	1:13,000 - 1:25,999
Scale C	1:26,000 - 1:59,999
Scale D	1:60,000 - 1:129,999
Scale E	1:130,000 - 1:259,99
Scale F	1:260,000 - 1:649,99
Scale G	1:650,000 -

TITLE: SOILS OF YUNGNING, KWANGSI

PREPARED BY: LI, L.C.

SCALE: 1:200,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

NANKING

(1936)

148 PAGES

1 MAP SHEETS

TITLE: A RECONNAISSANCE SOIL SURVEY OF THE HARBIN REGION

PREPARED BY: PENDLETON, R. L. CH'ANG, L. C. CHEN, W. HOL
K. C.

SCALE: 1:350,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA.

PEIPING

(1935)

154 PAGES

1 MAP SHEETS

TITLE: A RECONNAISSANCE SOIL SURVEY OF CH'ENGTU AREA, SZECH'UAN

PREPARED BY: CHU, L.T.

SCALE: 1:200,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

NANKING

(1937)

139 PAGES

1 MAP SHEETS

TITLE: SOILS OF SOUTH CENTRAL KWEICHOW

PREPARED BY: LI, L.C. HSEUNG, Y. HOU, H.Y.

SCALE: 1:250,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

PEHPEI

(1941)

80 PAGES

1 MAP SHEETS

TITLE: A RECONNAISSANCE INVESTIGATION OF THE SALINE DELTA SOILS
OF EASTERN KIANGSU, CHINA

PREPARED BY: THORP, J. HOU, K. C.

SCALE: 1:500,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

PEIPING

(1934)

140 PAGES

1 MAP SHEETS

TITLE: SOILS OF CHENGTU AND HWAYANG AREA, SZECHUAN

PREPARED BY: LIU, H.P.

SCALE: 1:150,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

PEHPEI

(1941)

37 PAGES

1 MAP SHEETS

TITLE: SOILS OF LIUCHIANGHSIEN, KWANGSI

PREPARED BY: LI, L.C.

SCALE: 1:250,000

PUBLISHER: THE NATIONAL GEOLOGICAL SURVEY OF CHINA,

PEHPEI

(1940)

46 PAGES

1 MAP SHEETS

TITLE: NOTICES SUR LES CARTES PEDOLOGIQUES DE RECONNAISSANCE AU
1/200,000 FEUILLE NO. 33 BRICKAVILLE-MORAMANGA
PREPARED BY: HERVIEU, J.
SCALE: 1:200,000
PUBLISHER: PUBLIC. DE L'INST. DE RECHERCHE DE MADAGASCAR
, TANANARIVE-T
(1960)
69 PAGES
1 MAP SHEETS

TITLE: NOTICES SUR LES CARTES PEDOLOGIQUES DE RECONNAISSANCE
FEUILLE NO. 7 ANTONIBE
PREPARED BY: VIEILLEFON, J.
SCALE: 1:200,000
PUBLISHER: PUBLIC. DE L'INST. DE RECHERCHE SCIENTIFIQUE
DE MADAGASCAR, TANANARIVE-T
(1961)
73 PAGES
1 MAP SHEETS

TITLE: NOTICES SUR LES CARTES PEDOLOGIQUES DE RECONNAISSANCE AL
1/200,000 FEUILLE NO. 64 AMBOVOMBE
PREPARED BY: HERVIEU, J.
SCALE: 1:200,000
PUBLISHER: PUBLIC DE L'INSTITUT DE RECHERCHE
SCIENTIFIQUE, TANANARIVE-T
(1958)
70 PAGES
1 MAP SHEETS

TITLE: NOTICE SUR LES CARTES PEDOLOGIQUES DE RECONNAISSANCE AU
1/200,000. FEUILLE NO. 8-ANTSOHIHY
PREPARED BY: VIEILLEFON, J.
SCALE: 1:200,000
PUBLISHER: PUBLIC DE L'INSTITUT DE RECHERCHE
SCIENTIFIQUE DE MADAGASCAR, TANANARIVE-T
(1963)
87 PAGES
1 MAP SHEETS

TITLE: NOTICES SUR LES CARTES PEDOLOGIQUES DE RECONNAISSANCE.
FEUILLE NO. 65 FORT-DAUPHIN
PREPARED BY: HERVIEU, J.
SCALE: 1:200,000
PUBLISHER: PUBLIC DE L'INSTITUT DE RECHERCHE
SCIENTIFIQUE DE MADAGASCAR, TANANARIVE-T
(1960)
51 PAGES
1 MAP SHEETS

TITLE: THE LAND CAPABILITY CLASSIFICATION OF SABAH, THE INTERIOR
RESIDENCY AND LABUAN

PREPARED BY: THOMAS, P. LO, F.K.C. HEPBURN, A.J.

SCALE: 1:250,000

PUBLISHER: LAND RESOURCES DIVISION, MINISTRY OF
OVERSEAS DEVELOPMENT, SURREY

(1976)

112 PAGES

4 MAP SHEETS

TITLE: THE LAND CAPABILITY CLASSIFICATION OF SABAH VOL. 1 THE
TAWAU RESIDENCY

PREPARED BY: THOMAS, P. LO, F. K. C. HEPBURN, A. J.

SCALE: 1:250,000

PUBLISHER: LAND RESOURCES DIVISION, MINISTRY OF OVERSEA
DEVELOPMENT, SURREY

(1976)

114 PAGES

4 MAP SHEETS

TITLE: THE LAND CAPABILITY CLASSIFICATION OF SABAH VOL. 2 THE
SANDAKAN RESIDENCY

PREPARED BY: THOMAS, P. LO, F. K. C. HEPBURN, A. J.

SCALE: 1:250,000

PUBLISHER: LAND RESOURCES DIVISION, MINISTRY OF OVERSEA
DEVELOPMENT, SURREY

(1976)

126 PAGES

7 MAP SHEETS

TITLE: THE LAND CAPABILITY CLASSIFICATION OF SABAH, THE WEST
COASTLAND KUDAT RESIDENCIES

PREPARED BY: THOMAS, P. LO, F.C.K. HEPBURN, A.J.

SCALE: 1:250,000

PUBLISHER: LAND RESOURCES DIVISION, MINISTRY OF
OVERSEAS DEVELOPMENT, SURREY

(1976)

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4 MAP SHEETS

TITLE: INVENTARIO, EVALUACION Y USO RACIONAL DE LOS RECURSOS
NATURALES DE LA COSTA. CUENCA DEL RIO PISCO VOLUMEN II
ANEXOS Y MAPAS

PREPARED BY: ONERN

SCALE: 1:50,000 1:100,000 1:200,000 1:300,000

PUBLISHER: ONERN, LIMA
(1971)

120 PAGES

11 MAP SHEETS

TITLE: INVENTARIO, EVALUACION Y USO RACIONAL DE LOS RECURSOS
NATURALES DE LA COSTA. CUENCAS DE LOS RIOS SANTA
LACRAMARCA Y NEPENA VOLUMEN III ANEXOS Y MAPAS

PREPARED BY: NONE

SCALE: 1:50,000 1:200,000 1:80,000 1:350,000

PUBLISHER: ONERN, LIMA
(1972)

357 PAGES

15 MAP SHEETS

TITLE: INVENTARIO, EVALUACION Y USO RACIONAL DE LOS RECURSOS
NATURALES DE LA COSTA. CUENCAS DE LOS RIOS SAN JUAN
(CHINCHA) Y TOPARA VOLUMEN II ANEXOS Y MAPAS

PREPARED BY: NONE

SCALE: 1:40,000 1:200,000 1:300,000

PUBLISHER: ONERN, LIMA
(1970)

157 PAGES

8 MAP SHEETS

TITLE: INVENTARIO, EVALUACION, Y USO RACIONAL DE LOS RECURSOS
NATURALES DE LA COSTA. CUENCA DEL RIO ICA. VOLUMEN II
ANEXOS Y MAPAS

PREPARED BY: NONE

SCALE: 1:60,000 1:200,000 1:300,000

PUBLISHER: ONERN, LIMA
(1971)

122 PAGES

8 MAP SHEETS

TITLE: INVENTARIO EVALUACION Y USO RACIONAL DE LOS RECURSOS
NATURALES DE LA COSTA CUENCA DEL RIO CANETE VOLUMEN II
ANEXOS Y MAPAS

PREPARED BY: NONE

SCALE: 1:40,000- 1:300,000

PUBLISHER: ONERN, LIMA
(1970)

196 PAGES

9 MAP SHEET

TITLE: SOIL SURVEY OF ALDAY PROVINCE, PHILIPPINES
PREPARED BY: ARISTORENAS, I. J. ROMERO, I. A. SALAZAR.

SCALE: 1:100,000

PUBLISHER: BUREAU OF SOILS, DEPT. AGRIC. & NAT. RES,
REP. PHILIPPINES, MANILA

(1965)

111 PAGES

1 MAP SHEETS

TITLE: SOIL SURVEY OF ILOCOS SUR PROVINCE, PHILIPPINES

PREPARED BY: MARIANO, J. A.

SCALE: 1:125,000

PUBLISHER: DEPT. OF AGRIC. & NAT. RESOURCES, MANILA

(1954)

50 PAGES

1 MAP SHEETS

TITLE: SOIL SURVEY OF LAGUNA PROVINCE, PHILIPPINES

PREPARED BY: ALICANTE, M. M. ROSELL, D. Z. BERNARDO. F.
ROMERO, I. ENGLE, L.

SCALE: 1:100,000

PUBLISHER: DEPT. OF AGRIC. AND NAT. RESOURCES, REP.
PHILIPPINES, MANILA

(1948)

64 PAGES

1 MAP SHEETS

TITLE: CARTE DES SOLS ET DE LA VEGETATION DU CONGO ET DU
RUANDA-URUNDI 17. REGION DE YANONCE-YATOLEMA

PREPARED BY: VAN WAMBEKE, A

SCALE: 1:100,000

PUBLISHER: PUBLIC. DE L'INST. NAT. POUR L'ETUDE AGRON.
DU CONGO (INEAC), BRUXELLES

(1960)

28 PAGES

1 MAP SHEETS

TITLE: CARTE DES SOLS ET LA VEGETATION DU CONGO BELGE ET DI
RUANDA-URUNDI 12. REGION DE BENGAMISA

PREPARED BY: VAN WAMBEKE, A.

SCALE: 1:100,000

PUBLISHER: PUBLIC DE L'INST NAT POUR L'ETUDE AGRON DU
CONGO BELGE (INEAC, BRUXELLES)

(1958)

47 PAGES

1 MAP SHEETS