REPORT OF ACTIVITIES

1999-2001



International Soil Reference and Information Centre

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PREFACE

This report describes the main activities undertaken by the International Soil Reference and Information Centre (ISRIC) during the period 1999-2001. As such, it deviates from the institute's common practice to publish bi-annual reports. The main reason for including a third year in this overview was the forthcoming change in institutional structure of the institute.

The year 2001 was the last in which ISRIC has been administered by the International Institute for Aerospace and Earth Sciences (ITC), Enschede.

From January 2002 ISRIC has had a cooperative agreement with the Wageningen University and Research Centre (Wageningen UR).

1 ORGANIZATION

1.1 BACKGROUND

Leading themes on the international and national agenda of policy-makers are food security for a rapidly increasing world population, the consequences of climate change, atmospheric pollution, and the quantity and quality of water. While food, air and water are clearly recognized by society as essential for life, soils are not although they play a crucial role in supporting ecosystems as well as maintaining a healthy environment.

The world faces an enormous challenge: on the one hand an annual increase of 80 million people to feed, in particular in the less developed countries, and on the other hand an alarming extent of soil degradation in many agricultural areas.

The collection, storage, and dissemination of soil data have always been a central issue in soil science, especially in soil survey. A common complaint, however, has been that the derived products – soil maps complemented with reports – were often incomprehensible for non-soil scientists. Information technology has opened new possibilities to interact with potential users of soil information. Soil and terrain data are increasingly being stored and handled in geo-referenced databases linked to Geographical Information Systems (GIS).

ISRIC, in cooperation with the Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP) and International Union of Soil Sciences (IUSS), has developed a uniform system for handling soil and terrain data (SOTER), initially for use at a global scale. This internationally recognized methodology is now operational in many countries worldwide at different scale levels, ranging from national to continental.

Geo-referenced soil and terrain databases can be used to produce information for a wide variety of applications that are identified in interaction with clients. Important themes of interest are:

- the role of soils in global change
- the role of soils in ensuring food security
- the role of soils in sustainable use of the land

ISRIC staff will continue to address these issues, in cooperation with colleagues within the Wageningen University and Research Centre, other relevant institutions in the Netherlands, and its partners in the international arena.

Further, being the World Data Centre (WDC) for Soils of the International Council of Science (ICSU), ISRIC has the obligation to:

• collect data and information on the world's soil resources

- maintain the collected data and information
- improve the accessibility and dissemination of this information
- function as a portal for soils through the World Wide Web.

The mandate of ISRIC is: "to provide a better understanding about the role of soils and to promote sustainable use of the land".

ISRIC's programme has been revised during the reporting period, and the main themes of activity have been:

- consolidation of ISRIC's collection of the major soils of the world in the form of soil monoliths, reference and associated materials;
- implementation of an Internet Policy Plan for enhanced accessibility of ISRIC's collection of soil and terrain information by:
 - developing a Portal for soil information through ISRIC's website
 - developing a virtual soil exposition
 - developing a Web platform for new, collaborative projects
- development of a World Soils and Terrain Digital Database and provision of technical assistance and training in the establishment of land resources information systems at regional and local scale (SOTER, a cooperative programme with FAO, IUSS, and UNEP);
- assessment of the status and risk of soil degradation and its impact on food security;
- participation in the World Overview of Conservation Approaches and Technologies (WOCAT; a cooperative programme with CDE, Berne);
- assessment of the role of soils in global change;
- assistance with the establishment of National Soil Reference and Information Collections.

Section 2 gives an overview of ISRIC's main activities during the period 1999-2001, Staff publications are listed in Section 3. Section 4 tabulates staff participation in consultancies, meetings and workshops. Personnel composition of ISRIC is described in Section 5.

1.2 INSTITUTIONAL DEVELOPMENTS

ISRIC was founded as the International Soil Museum in 1966. It celebrated its 35th anniversary in 2001, a year that marked an important transition point in its existence. The institute dissolved its cooperation agreement with the International Institute for Aerospace and Earth Sciences (ITC), Enschede, and negotiated an association agreement with the Wageningen University and Research Centre (Wageningen UR).

These developments took place in accordance with the internationalising of Higher Education in the Netherlands, as a result of which ITC was invited by the Ministry in 1999 to submit proposals for a linkage with a Dutch University. Ultimately, ITC chose to integrate with the University of Twente. Simultaneously, the Agricultural Research Institutions (DLO) of the Ministry of Agriculture, Fisheries and Nature and departments of the Wageningen University were in a process of integration leading to the formation of Wageningen University and Research Centre. One of the resulting clusters within Wageningen UR is the Expertise Group on Environmental Sciences (Kenniseenheid Groene Ruimte), which includes Alterra, a former DLO institute, and the Department of Environmental Sciences (DOW) of Wageningen University.

In view of the changes in ISRIC's institutional environment, the Board of ISRIC established an ad-hoc Committee to advise on the most desirable positioning of ISRIC (March 2000). The option recommended in the concluding report, "Grounds for a Future of ISRIC" (July 2000), is "a close association of ISRIC with Wageningen UR, with an independent status within the Expertise Group on Environmental Sciences. Whether this option can be realized, depends on financial aspects such as continuation of baseline funding, of core activities, extra funds for ICT-development and the move of ISRIC to Born-Zuid". The Committee based their advice on interviews with leading representatives of national and international institutions.

The interviews further revealed a strong support for three major tasks to be undertaken by ISRIC:

- Development of a World Soils and Terrain Database (SOTER) and provision of technical assistance and training in the establishment of Land Resources Information Systems at regional and local scales;
- Consolidation of ISRIC's unique collection of the major soils of the world including soil monoliths, reports, maps, slides and other reference materials;
- Implementation of an Internet Policy Plan for enhanced accessibility of ISRIC's information and data.

The cooperation agreement between Wageningen UR and ISRIC was formally signed on 22 November 2001, with representatives of Wageningen UR, ITC and ISRIC.



Signing of the cooperation agreement between Wageningen UR and ISRIC

As of 1 January 2002, ISRIC's institutional position is as follows:

"The International Soil Reference and Information Centre (ISRIC) is an independent Foundation associated with Wageningen University, especially with the Department of Environmental Sciences (DOW), which forms part of the 'Expertise Group Environmental Sciences' of Wageningen University and Research Centre".

1.3 ORGANIZATIONAL DEVELOPMENTS

1.3.1 Internet policy plan

ISRIC has maintained a small site on the World Wide Web since 1996. In 1999, ISRIC consulted its customers and potential new user/client groups to gauge their interest in ISRIC's products and services and to identify their preferences for making use of them through the Internet. The results from these email interviews have been summarized as follows:

- There is a need to enhance ISRIC's promotional activities. Familiarity with ISRIC's databases and their applications is generally low among ISRIC's potential clients. On the other hand, all respondents showed an overwhelming professional interest in all databases, suggesting that ISRIC could increase their use by stepping up its marketing activities.
- The results of the consultations suggest a serious 'problem in accessing' ISRIC's information services and products: they have a high appeal but only very few respondents indicated that they actually use them. This suggests a need to restructure the access to ISRIC's information products and services.
- Most respondents registered their keen interest in online access to soil and terrain information through the Internet;
- All respondents reported that they were able to make use of the Internet although not all could access adequately the World Wide Web.

With guidance from an external consultant, the 'ISRIC Internet Working Group" developed a plan that would meet user demands as expressed in the response to the e-mail interviews (see "ISRIC beyond 2000, a Strategic Internet Policy Plan", December, 1999).

Based on the "Strategic Internet Policy Plan" and the report "Grounds for a Future" an outline was developed for ISRIC's business plan. Emphasis was placed on the financial implications of implementing ISRIC's Internet Policy Plan, as an initial investment of NLG 1,25 million (KEuro 567) would be needed for this activity. ISRIC's business plan was presented to the Ministry of Education, Culture and Sciences (OCW) and to the Council of Wageningen University in 2001. The Ministry subsequently agreed to provide 40% of the needed investment, as a subsidy. The Governing Council of Wageningen University further agreed to provide an interest-free loan covering 50% of the costs. ISRIC will provide 10% of the needed funds from its own resources.

1.3.2 Soil Analytical Laboratory

Most of the traditional analytical work on ISRIC's soil monolith collection has been completed during the period under review. Further, requests for soil analytical work sponsored by outside sources have sharply declined over the past years. In this context, the Board requested ISRIC management to develop plans for dismantling ISRIC's soil analytical laboratory and to conclude an agreement with the Laboratory of Soil Science and Geology of Wageningen University for the integration of soil analytical work. ISRIC's analytical laboratory was dismantled in 2001.

1.3.3 The future move to "Born-Zuid"

All divisions and departments of Wageningen UR relevant to ISRIC - such as Alterra, all divisions belonging to the Department of Environmental Sciences, and the De Haaff Library - will ultimately be located in a cluster of buildings called "De Born" where new buildings will be constructed at "Born-Zuid". Relocation of ISRIC within this cluster is of obvious interest, as it will provide significant added value for both ISRIC and the cluster Expertise Group on Environmental Sciences of Wageningen UR.

1.4 STAFF DEVELOPMENTS

In view of the organizational developments described earlier, a reorganization plan was formulated in 2001. Staff members of ISRIC's analytical laboratory were reallocated to new positions within the institute.

Between 1999 and 2001, seven staff members resigned for personal reasons or because their temporary contract expired. At the end of 2001, there were three vacancies: GIS Technical Officer; Web-master/Web-programmer; and Technical Officer Library and Map Collection.

Since more emphasis will be placed on educational services, as recommended in the report "Grounds for a Future", ISRIC appointed a Scientific Officer Education as of 1 September 2001. Section 5 gives an overview of the ISRIC's staff and names of the ISRIC Board.

1.5 FINANCIAL DEVELOPMENTS

ISRIC's average annual income over the period 1999-2001 was KEuro 1225. Although the total income declined over this period, mainly as a result of a lower turnover of consultancy projects, ISRIC's annual income (exclusive of the material component) is stable with a tendency to increase slightly. Nevertheless, the declining turnover of the personnel component of consultancy projects is a serious concern. Donor agencies are less interested to fund data compilation activities, such as the SOTER programme, which form one of ISRIC's major tasks.

ISRIC's total expenditure over 1999-2001 averaged KEuro 1212. Although the total expenditure declined over this period, mainly as a result of declining material costs for consultancy projects, ISRIC's annual expenditure exclusive of these costs was stable during the period under review. While total gross salaries plus social security benefits increased, accommodation costs remained stable except in 2001, the year in which the laboratory was dismantled and transformed into office space, other material costs decreased.

The general policy reserves of ISRIC have grown from KEuro 46 at the end of 1998 to KEURO 107 at the end of 2001. The operational results in 2000 (KEuro 78) are significant, which is mainly the result of a re-calculation of ISRIC's basic subsidy over the past six years.

The Internet Policy Plan became operational in 2001. Income was of a one-off financial contribution of the Ministry of OCW was received late 2001. Expenditure was incurred mainly for outsourcing activities and some personnel costs. The ICT-related reserves by the end of 2001 stood at KEuro 149. This led to a total company capital of KEuro 257 by 31 December 2001.

	1998	1999	2000	2001
INCOME				
Basic subsidy	855	874	933	1017
 Turnover cons. projects: Personnel 	193	159	149	90
 Turnover cons. projects: Material 	135	97	61	19
Miscellaneous	52	43	72	49
Total Income	1235	1173	1215	1175
EXPENDITURES				
 Salaries, soc. Securities 	879	895	904	957
Housing	77	88	76	110
Other mat. Costs	122	80	81	90
 Hardware investments 	15	20	14	15
 Mat. costs cons. Projects 	149	88	62	22
Total expenditures	1242	1171	1137	1194
Operational results	-7	2	78	-19
Capital reserves previous years	53	46	48	127
Total capital	46	48	126	107
ICT plan				
• Income				227
 Expenditures 				78
Operational results				149
ICT capital				149
Total capital, including ICT capital				257

Table 1. Financial overview ISRIC (1998-2001, in Euro x 1000)

2 ACTIVITIES

2.1 DEVELOPMENT AND USE OF SOIL AND TERRAIN DATABASES

2.1.1 General

The SOTER programme, a joint initiative of FAO, IUSS, ISRIC and UNEP, has developed a geographically referenced, computerized information system that can store and handle soil and terrain data, compiled according to standard procedures.

During the period under review, minor revisions have been introduced in the methodology. A 1:2.5 million-scale soil and terrain database for Central and Eastern Europe has been finalized. Also, development of a 1:2.5 million scale SOTER database for Southern Africa started in 2001. Ultimately, these activities at a continental level will serve to generate a global SOTER database at scale 1: 5 million, which upon its completion will supersede the 1:5 million scale FAO-Unesco *Soil Map of the World*. The compilation of this global SOTER database at scale 1:5 million is a joint activity of FAO, UNEP and ISRIC.

SOTER activities at national and sub-national level continued in Hainan Province, P.R. of China, and Indonesia. New activities were initiated in Zimbabwe and South Africa.

2.1.2 Revision of SOTER Methodology

Between 1999 and 2001, minor modifications have been introduced in the SOTER methodology (as described in the Procedures Manual of 1995).

About 100 individuals who have been involved in the development of the SOTER methodology or who have used SOTER databases were sent a questionnaire to identify possible needs for revision of the methodology. Although most respondents indicated that the present methodology answered their objectives, several suggestions for improvement were made, such as:

- Allow more than one profile per soil component,
- Integration of digital information (Digital elevation models (DEM) and Remote Sensing (RS)), and
- Develop applications at higher resolutions than 1:100,000.

A Windows-based, SOTER attribute data handling software has been developed and is available via the ISRIC website.

2.1.3 Activities at 'continental' scale

SOTER database for Central and Eastern European Database (SOVEUR)

The quality of Europe's environment has deteriorated as a result of soil degradation and pollution. These processes can severely affect food production, the quality of surface and groundwater, and ultimately biodiversity and human health. Policy measures and conservation methodologies are needed to halt and reverse this trend. It is in this overall context that the project on "Mapping of Soil and Terrain Vulnerability in Central and Eastern Europe" (SOVEUR) was implemented at ISRIC in 1997, under contract with FAO.

The project encompassed collaboration with specialists from thirteen countries in Central and Eastern Europe, who collated the primary data using uniform criteria and guidelines. The project area covers Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation (west of the Urals), Slovakia, and the Ukraine.

The aims of the SOVEUR project are to strengthen regional awareness of the significant role soils play in protecting food and water supplies, and to demonstrate the need for environmental protection, by preparing soil degradation and vulnerability maps that can focus attention upon the areas most at risk (scale 1:2,500,000). This has been achieved by: (a) developing a soil and terrain (SOTER) digital database; (b) mapping the current status of soil degradation; and, (c) assessing the soil's vulnerability to selected categories of pollutants. The final product, which includes the databases, GIS maps, and accompanying technical reports, has been delivered to FAO in 2000 and published as No. 10 in *FAO's Land and Water Digital Media Series.* An example of the output is shown in Figure 1.

SOTER database for Southern Africa (SOTERSAF)

In 1991, FAO and ISRIC signed an agreement to compile a SOTER database for seven countries in Southern Africa at scale 1:2,500,000. The study area covers Botswana, Namibia, Mozambique, South Africa, Swaziland, Tanzania, and Zimbabwe. Completion of the SOTERSAF database is scheduled for late 2002.

National institutes in the respective countries compiled databases for Namibia, South Africa and Zimbabwe, with technical support from ISRIC. The relevant institutes are: the Institute of Soil, Climate and Water of the Agricultural Research Council (ARC-ISCW) in Pretoria; the Pedology and Cartographic Section of the Chemical and Soil Research Institute in Harare (under an agreement with UNEP); and, the Agro-Ecological Zones Project of the Ministry of Agriculture, Water and Rural Development in Windhoek (under an agreement with FAO).



Figure 1. Relative vulnerability to cadmium mobilisation, inducible by acid deposition in Central and Eastern Europe

SOTER databases for the remaining four countries will be compiled at ISRIC. The SOTER database for Tanzania as well as documentation (maps, reports, GIS files and databases) for Botswana, Mozambique and Swaziland needed for this compilation activity are being made available by FAO. This information is complemented by documentation held in ISRIC's library, and is in the process of being collated into a harmonized SOTER database for the region. A digital elevation model (DEM), with a grid resolution of 1 km², has been used to delineate landforms and to characterize SOTER units. The database for Botswana was completed in 2001, after border correlation with Namibia.

SOTER database of the European Union

The European Union has decided to develop a 1:5,000,000 scale SOTER database for the whole of Europe. In the framework of this activity, representatives of the European Soil Bureau (ESB) and ISRIC dscussed procedures for incorporating the information held on the 1:1,000,000 European Soil Database into a 1:5,000,000 scale SOTER database at a workshop at INRA, Orleans. Interim products were reviewed.

2.1.4 Activities at national scale

Sustainable Land Management for Agricultural Production in Hainan Province

This project (1998-2002), financed by UNDP, aims to develop in a sustainable way the agricultural sector in Hainan Province, P.R. of China, by training of agricultural research and extension staff in the use of a SOTER database for fertility management, land degradation assessment and land evaluation for tropical crops. Demonstration sites in sustainable management have been developed by the national institutes in four selected counties. Results of these sites will be extrapolated to the provincial level by means of a SOTER database.

Most of ISRIC's work for the project in 1999 and 2000 consisted of technical assistance. ISRIC helped staff at the Institute of Soil Science, Academia Sinica (ISS-AS) to develop a 1:250,000 scale soil and terrain database at the provincial level. It also helped staff of the Chinese Academy of Tropical Agricultural Sciences (CATAS) to develop SOTER databases for selected windows, at scale 1:50,000. The technical support by ISRIC included several field visits during which methodological aspects were discussed.

In 2000, two groups of Chinese project staff visited ISRIC for 6 weeks training on applications of the SOTER database, notably a water erosion risk assessment and development of land evaluation models for several tropical crops. The SOTER database for Hainan Province was finalized in late 2000.

In 2001, ISRIC organized a training workshop on further development of applications of the SOTER databases at the Chinese Academy of Tropical Agricultural Sciences, in Hainan. The erosion assessment was completed and a land suitability evaluation was made for various land utilization types (Figure 2).



Figure 2. Suitability for banana grown under high input and medium technology in Hainan

The impact of Desertification on Food Security in Southern Africa (ZILRIS)

The Pedology and Cartography Section of the Chemistry and Soil Research Institute (CSRI), Harare, and ISRIC signed a Memorandum of Understanding to develop a national SOTER database at scale 1:1,000,000 with financial support from UNEP. The aim of the project was to assess the impact of dry land degradation on food production in Zimbabwe. The 18 months project started in 2000 and officially ended in mid 2001. It included an implementation workshop and several technical missions. The first version of the SOTER database of Zimbabwe became available at the end of 2001 for checking and interpretation. Due to delays in database compilation at CSRI, UNEP has agreed to extend the project period with one year. In addition, an assessment of water erosion risk has been included in the revised terms of reference.

SOTER database for South Africa

With financial support from FAO, ISRIC gave technical advice ISCW to convert the existing Land Type database of South Africa at scale 1:250,000 into an internationally compatible system at scale 1:1,000,000. The SOTER approach was selected for this purpose by ISCW, in view of regional SOTER activities in Southern Africa (see SOTERSAF) and similar proposed activities in West Africa (see WALRIS, Section 2.5). Initially, the SOTERSAF database will be used for land evaluation studies.

The assistance from ISRIC consisted of two parts: conversion of the South African soil classification system into the WRB system and procedures for compiling a SOTER database. Having access to a rather detailed DEM, an automated methodology was developed to classify landforms along the definitions and criteria of the SOTER Procedures Manual.

A first version of a SOTER database for South Africa, without soil profile data, was completed by ISCW in late 2001. Soil profile information from the Land Type database will be transferred to relevant SOTER units in early 2002.

Related to this activity, ISRIC staff participated in:

- A FAO/ISCW expert consultation on Land Resources Inventories/SOTER, National Soil Degradation Assessment and Mapping and its Impacts on Soil Productivity (October 1999).
- A training given to alumni of ITC during a refresher course on soil information systems at ISCW (November 2000).

Berau Forest Management Project

The Berau Forest Management Project (BFMP) was funded by the EU with the overall aim to achieve sustainable forest management and conservation in the forests of Indonesia. ISRIC provided consultancy services over the full reporting period. The work consisted of soil and terrain database development at various scales, in combination with other environmental data, for basic forest planning. Examples of derived maps produced are: priority areas for biodiversity conservation, potential suitable habitat for *Proboscis* monkeys, assessment of soil erosion risk, ecosystem stability, land suitability for food and tree crops, forest zonation, and identification of priority areas for nature conservation. Results of this work were presented in Jakarta at international conference on "Data Management and Modelling using Remote Sensing and GIS for Tropical Forest Land Inventory".

A regional inventory of soil and land conditions, at scale 1:250,000, of the Berau Regency and adjoining areas has also been made. The SOTER database for Berau, complemented with other environmental data sets, was linked with models for analysis and decision support on land use and management, and district spatial planning.

Forest Fire Prevention Project

ISRIC provided consultancy services to the EU-financed project for 'Forest Fire Prevention' over the period of 2000-2001. A soil and terrain database, at scale 1:250,000, was compiled for the forest concession in the Sungai Wain-Batu Ampar area, east of Balikpapan Bay. The survey and database were developed to identify properties and variation of land relevant for spatial planning, and to provide an input to forest fire risk assessment analysis.

2.2 CONSERVATION AND DEGRADATION

2.2.1 World Overview of Conservation Approaches and Technologies

ISRIC has been involved in the World Overview of Conservation Approaches and Technologies (WOCAT) project from its initiation in 1992, and has been a member of the Management Group since 1996.

In the period under review, ISRIC played an increasingly important role in the WOCAT programme. The working time allocated for WOCAT-activities at ISRIC was increased to 35% in a new Memorandum of Understanding with Centre for Development and Environment (CDE), Bern, with specific contributions to:

- Project management: coordination and establishing new contacts; organisation of workshops, in particular the annual meetings in Wageningen (2000) and Kenya (2001).
- The mapping component: assisting in the development of the methodology and testing of the database, coordination of mapping activities in various countries.
- Soil and Water Conservation (SWC) categorisation: contributing to the development of a consistent hierarchical system to categorize SWC measures, which is the first in its kind.
- Development of Guidelines on the Use of WOCAT data. Based on the WOCAT data, a set of "key indicators" was identified that serve as a yardstick to evaluate strengths and weaknesses of a technology or approach.

Other important developments to which ISRIC contributed, were the considerable expansion of activities in terms of number of countries and institutions involved (over 30 by late 2001), number of trained specialists (over 350) and the general increased interest for WOCAT by (inter)national organisations and individuals, as was illustrated during various international events. Additional financial support, besides core funds from Swiss Development Cooperation (SDC), was provided by Danish International Development Agency (DANIDA). The search for more donors continued, in order to make WOCAT a truly broad-based initiative, also in terms of funding.

ISRIC hosted the 5th Annual International WOCAT Workshop and Steering Meeting at its premises in Wageningen.

2.2.2 Pan-European Soil Erosion Assessment

The Pan-European Soil Erosion Assessment (PESERA) project started in 2000 with financial support from the 5th Framework Programme of the EU. The project is scheduled to run for 36 months. The main partners are: KU Leuven, Belgium; University of Leeds, UK; CSIC, Almeria, Spain; INRA, Orléans, France; European Soil Bureau, JRC, Ispra, Italy; Agricultural University of Athens, Greece; and ISRIC.

The PESERA project will develop, calibrate and validate a physically based and spatially distributed model to quantify soil erosion in a nested strategy of focussing on environmentally sensitive areas relevant to a European scale. The model's robustness and flexibility will be demonstrated through its performance at different resolutions and across agro-ecological zones, and its relevance to policy makers through impact assessment and scenario analysis.

There are three main phases in the project: (1) Model development, (2) Model Testing, and (3) Model Application. Besides participating in all project workshops, ISRIC staff is mainly involved in phase 3, namely carrying out the scenario analyses using model and data layers provided by the other partners.

2.2.3 Procedures for Degradation and Land Resources Assessments

Prior to the 2^{°d} International Conference of Land Degradation, held in January 1999 in Khon Kaen (Thailand), the Organizing Committee appointed an international scientific editorial panel to produce a state-of-the-art publication, covering all aspects of land degradation. The resulting book includes selected papers presented at the Conference complemented with additional invited papers. It covers all aspects of land degradation: status, driving forces, impact on society and environment, tools for monitoring and assessment, law and policies, conservation and rehabilitation, and international initiatives. ISRIC staff provided assistance in editorial work, together with staff from many other organizations. The resulting book, *Responses to Land Degradation*, was published in 2001.

At the request of FAO, ISRIC staff prepared three technical reports. These include *"Guidelines for the Qualitative Assessment of Degradation"* describing a modified GLASOD methodology, with some applied examples from a preceding study in Asia, and *"Guidelines for the Assessment of Land Resources"*. The later contain a concise description of the SOTER methodology and Soil Degradation Assessment. A draft version of a third document on "Guidelines for quantitative assessment of Soil Degradation" is being circulated for comments.

During the period under review, ISRIC became involved in the project entitled Land Degradation Assessment for Dryland Areas (LADA). This large international project is carried out by institutions such as FAO, UNEP (GEF), IFA, World Bank, IFPRI as well as many national institutions. In the initial phase, ISRIC's involvement will mainly include the compilation of Technical Documents.

2.2.4 Management options for increasing soil carbon sequestration

Vast areas of the world have been degraded as a result of inappropriate management practices. Appropriate practices for increasing the storage of organic carbon in the soil thus deserve more attention in policies aimed at reducing national and global CO_{2^-} budgets, similar to re- or afforestation and bio-fuel programmes. Differences in soil type and their suitability for different uses, as well as management implications of elevated atmospheric CO_2 concentrations and increased temperatures, must be considered when identifying these options. Promising management options have been reviewed at the request of the Dutch National Research Programme on Global Air Pollution and Climate Change (*NRP Project 952282*).

2.3 DOCUMENTATION

2.3.1 ISRIC Soil Reference Collection

During the last three years efforts were focussed on re-examining ISRIC's vast global soil reference collection (presently some 970 soil monoliths from 75 countries) in terms of condition of the soil monolith, its representativeness, both according to soil type and geographic location, and completeness of the accompanying data. At the same time, some soil monoliths were selected to be made available for (semi-)permanent loan to universities, high schools and other educational facilities.

One hundred and fifty (150) monoliths in store, originating from 20 countries, have been prepared between 1999 and 2001. Analytical data for 3500 samples have been screened, partly verified, and added to the ISRIC Soil Information System (ISIS). Additional analysis and verification of some 1500 samples still needs to be done. During the reporting period the ISIS software format has been changed from DOS-based dBASE IV to MS Access.

At the end of 2001, information of some 696 reference soil profiles was available in the ISIS database, an increase of 9 profiles with respect to the 687 profiles held at the end of 1998. Other priorities prevented the addition of more profiles to the database.

Three new profiles were collected; two in the Massif Central, France, as part of ISRIC's collaboration in the EU-financed project "Soil Resources of European Volcanic Systems" (COST Action 622), and one in the vicinity of Wageningen. The monoliths of France were added to ISRIC's reference collection of Andosols, in which the European section is somewhat under-represented.

Presently, soil monoliths from the ISRIC collection can be viewed at the Catholic University of Leuven, Belgium, the Natural History Museum in London, UK, and the Royal Tropical Institute in Amsterdam, the Netherlands, in addition to the permanent exhibition of some 80 soils at ISRIC (Figure 3).

2.3.2 ISRIC documentation facilities

ISRIC has continued to enlarge its collection of books and reports, especially so-called "grey literature", soil maps and related thematic maps, data and slides. In view of the increasing demand upon ISRIC to make its documentation on the soils in the world more readily available, the documentation section has been studying possibilities to enhance accessibility in an electronic way, and to make the information available on-line.

During the reporting period, over 2,000 books and reports, partly obtained through legacies, have been added to the library, bringing its number of title holding to some 17,000. Increasingly, this includes more documents in digital format, such as CD-ROMs of conference proceedings, global and regional datasets and photo-CDs.



Figure 3. View of part of the humid tropics section in ISRIC's World Soil Museum

ISRIC continued to expand its worldwide collection of soil maps. Emphasis is placed on the collection of small-scale maps (< 1:200,000), with an emphasis on those of the less developed countries. The map collection, and catalogue, is available for consultation in Wageningen. An important aim of the map collection, with accompanying reports where available, is to provide material for the compilation of the Global Soils and Terrain Database (SOTER) at a scale of 1:5 million.

2.3.3 World Reference Base for Soil Resources

During the reporting period ISRIC, together with the Wageningen University, the Catholic University of Leuven in Belgium the FAO and the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, prepared "Lecture notes on the major soils of the world", based on the World Reference Base for Soil Resources (WRB). This document has been issued as FAO World Soil Resources Report 94.

2.3.4 Internet Policy Plan

Since 1996, ISRIC has maintained a site on the World Wide Web - <u>http://www.isric.nl</u>. During the period under review, ISRIC developed and implemented an Internet Policy Plan in order to use the Internet as the main outlet for its products and services (datasets, documents, maps, programs, etc.). The implementation of the Internet Policy Plan has been based on the esults of an email survey amongst some 350 end-users of ISRIC products and services, conducted in 1999. This survey showed a keen interest in on-line consultation facilities of ISRIC datasets, catalogues and information, of which the development of a "Virtual Soil Museum" as educational tool scored high.

A request for financial assistance for the development of an Information and Communication Technology (ICT) strategy was honoured favourably by the Dutch Ministry of Education, Culture and Sciences (see Section 1.3.1). The website was completely restructured in 2001, focussing on information services, data delivery and soil portal aspects (see http://www.isric.org). ISRIC personel received specialized training in writing for and presention of materials on the website.

2.4 TRAINING AND LECTURING

2.4.1 Assistance with establishment of laboratories

Central Laboratory at Fayoum, Egypt

ISRIC's task in this project, assistance in the installation of a new laboratory in Fayoum, was completed in 1999. After all necessities were selected and shipped, a representative of ISRIC visited the premises at Fayoum twice to install the equipment and start up the essential laboratory work. ISRIC's staff member also trained local staff both in the lab procedures and in the use of SOILIMS, a lab management software tool.

Libya

A short training on soil and water analytical procedures as well as quality management aspects was given to three laboratory officers from the Ministry of Agriculture, Tripoli, Libya in 1999 at ISRIC. The training was part of a package deal of a trade company that equipped a soil and water laboratory in Libya.

2.4.2 Assistance with development of soil and terrain databases

All ISRIC's SOTER projects include a training component, and such training meetings are not listed individually here. In addition, training in use of the SOTER methodology was given on-site in Bosnia-Herzegovina, Namibia and Morocco. ISRIC staff also organised short SOTER training sessions for scientists from Tamil Nadu State (India), Surinam, and North Korea. The later sessions focussed both on methodological aspects as well as applications of SOTER databases at multiple scale levels.

2.4.3 Contributions to international courses

Having a cooperative agreement with the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, ISRIC staff members lectured at the Professional Master (PM) and Master of Science (MSc) courses of ITC on "Geoinformation for Sustainable Soil Resource Management". Subjects taught were "Introduction to physico-

chemical aspects of soil formation" and "Introduction to global soil classification systems". Lectures on soil quality management were also given at ITC in the preparation of student's fieldwork.

Starting in 1999, ISRIC has been requested to participate in lecturing at the International Institute for Infrastructural, Hydraulic and Environmental Engineering (IHE), Delft, on "Soil Quality Management" for their international Master's programme in "Environmental Science and Technology".

At the request of the International Land Reclamation Institute (ILRI), an ISRIC staff member lectured in their International Course on Land Drainage on "Soils and Drainage". In addition, field visits were conducted with the course participants as part of their introductory excursion around Wageningen.

An ISRIC staff member gave an introductory lecture on "Soils of the World" for the international course in Soil Physics, bi-annually organized by the International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

ISRIC further participated in the refresher courses for teachers of secondary schools and technical colleges in the Netherlands, participating in the international GLOBE programme (GLOBE: Global Learning and Observation to Benefit the Environment). A one-day training workshop for volunteers assisting schools implementing the GLOBE protocols was organized at ISRIC in May 2001.

2.5 MISCELLANEOUS

This section describes a variety of short-term activities and consultancies that have been carried out by ISRIC for or in collaboration with a range of international and national organizations, private companies and foundations. These include: (a) the organisation of a regional workshop on "Establishment of an Integrated Land Resources Information System for the Conservation and Rehabilitation of Land Resources in West Africa" (WALRIS) in Cotonou, (b) a desk study for Tropenbos International, (c) consultancy services to the SENTER-financed project for 'Optimisation of water management in Estonia'; (d) contributions to the CST/UNCCD network survey project, (e) providing technical assistance to the Pilot Analysis of Global Ecosystems (PAGE), a study coordinated by WRI and IFPRI, and (f) deriving representative soil parameter estimates for the soil types of the world at the request of the International Food Policy Research Institute (IFPRI).

Workshop on "Establishment of an Integrated Land Resources Information System for the Conservation and Rehabilitation of Land Resources in West Africa"

ISRIC co-organized a regional implementation workshop on "Establishment of an Integrated Land Resources Information System for the Conservation and Rehabilitation of Land Resources in West Africa" (WALRIS) in Cotonou, Benin (23-25 February 1999). The workshop was held as a positive response to the demand for accurate, up-to-date and readily accessible data on natural resources, repeatedly expressed in many policy documents. Started as an initiative of the International Institute for Tropical Agriculture (IITA, Ibadan, Nigeria) and ISRIC, endorsements for this initiative came from many national, regional, and international institutions/organizations. The workshop was

sponsored by CTA (Wageningen), ICRISAT, ISNAR, ISRIC, UNU/INRA, and WARDA, and was attended by participants from 10 national institutions (Benin, Burkina Faso, Cameroon, Ivory Coast, Ghana, Mali, Niger, Nigeria, Senegal, Togo) and 6 regional and international centres and organizations (IITA, WARDA, ICRISAT, ISRIC, IFDC, University of Hohenheim). In concluding the workshop, the participants agreed that it would be desirable "to establish an Integrated Land Resources Information System at National and Regional Level for Sustainable Management of Land Resources in West Africa, using internationally accepted methodologies, such as those developed under the aegis of the International Union of Soil Sciences and United Nations Agencies." Funding for this work is currently being sought from international donor agencies, in close consultation with Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF).

Reconnaissance of physical and biological resources in Vietnam

This desk study was carried out for Tropenbos International, a Wageningen-based forest research foundation, which aims at developing and maintaining sustainable tropical rainforest management. The study provided the Tropenbos Programme with the biophysical basis for selecting a new research site on the Southeast Asian continent as part of its new phase, which will start in 2001. Strong and weak points of five potential Tropenbos sites in Vietnam were identified.

• Optimisation of water management in Estonia

ISRIC provided consultancy services to the SENTER-financed project for 'Optimisation of water management in Estonia' over the period of 2001-2002. This project aims to support Estonia in integrating EU regulations (Water Framework Directive), in water management in rural areas. The leading consultancy firm DHV is implementing the project in association with Alterra and ENTEC. ISRIC assisted the Estonian counterpart ENTEC in developing a land use plan for the river Pärnu River Basin.

CST/UNCCD network survey project

At the instigation of UNEP and with the approval of the Conference of Parties to the UN Convention to Combat Desertification (UNCCD), ISRIC took part in a world-wide consortium of organizations and institutions to carry out a preliminary survey and evaluation of units working on desertification issues, particularly existing networks, and to suggest a methodology for a later in-depth evaluation of such units at regional and sub regional level. Other consortium members are: ACSAD, AOAD, DESCONAP, EEA, FAO, KCL, OSS, RIOD, UNEP, UNSO/UNDP, UoA and WMO.

In the context of the project, ISRIC was asked to be part of the Questionnaire Working Group in order to contribute to its design, to collect descriptive information on networks including linkages, users, and capacity to implement the Convention to Combat Desertification, to analyse the questionnaire returns, and to compile a database.

Activities for the project started early in 1999 and were completed in mid 2000. A second phase, focussing on Southern Africa, has been formulated and submitted for financing through the Committee for Science and Technology of the UN Convention to Combat Desertification.

Pilot Analysis of Global Ecosystems

ISRIC provided technical input to the Pilot Analysis of Global Ecosystems: Agroecosystems (PAGE), a collaborative effort between WRI, IFPRI, intergovernmental organizations, agencies, research institutes, and individual experts from over 25 countries. PAGE is the first attempt to synthesize information available on a global scale about condition and change over time of five major categories of ecosystems (see: http://www.ifpri.org). ISRIC's contribution concerned mainly conditions of soil resources, in particular the status of land degradation and soil carbon contents.

Deriving representative soil parameter estimates for the soil types of the world

This study was commissioned by the International Food Policy Research Institute (IFPRI). It is a sequel to a joint study carried out in 1997 by IIASA, FAO and ISRIC, which aimed at refining the agro-edaphic element in the revision of FAO's Agro-Ecological Zones (AEZ) methodology and in the Land Use Change and Land Cover (LUC) project. The project reviewed and completed the initial methodology and produced revised data files of representative soil parameters for the soils of the world as described by the FAO soil legend (version 1975 and 1988). The resulting data files can be linked to the Digital Soil Map of the World and more recent SOTER databases via the soil classification code. They can be used in studies in support of sustainable agriculture and environmental protection, at a global to regional scale (<1:250,000).

3 STAFF PUBLICATIONS

ISRIC staff publications are listed in five broad categories: (1) articles in peer-reviewed journals, (2) contributions to edited books and proceedings, (3) ISRIC reports and publications, (4) contributions to Newsletter, Bulletins, and workshop abstracts, and (5) consultancy and missions reports.

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4 TRAVEL AND MEETINGS

Related to ISRIC's programme and project activities as discussed in Sections 2 of this report, ISRIC staff participated in training workshops, both at its facilities in Wageningen and abroad. ISRIC staff have also been invited to present papers and posters at various workshops, international conferences and symposia. The following table summarizes these activities and contributions.

Training courses

Name and Location	Period	Contents	Participants	Financed by	
Central Laboratory for Soil, Water and Plant Analysis. Fayoum, Egypt	Sep-Oct 1999	backstopping activities	staff Fayoum Central Laboratory (Egypt)	Neth. Min. of Int. Coop.	
Study tour of delegation of the DPR of Korea. ISRIC, Wageningen	20-29 August 2000	Overview of ISRIC activities	5 staff of Min. of Agric.	Swiss Agency of Dev. Cooperation	
Study tour on soil information systems and sustainable agriculture. ISRIC, Wageningen	12 September – 6 October 2000	Soil information systems and their applications	5 staff members of the Soils Instit. of Min. of Agric. of Tamil Nadu (India)	FAO	
Study tour of staff of the Surinam Soil Survey. ISRIC, Wageningen	7-8 August 2000	SOTER	3 staff members of Soil Survey Surinam	CSO	
ITC Refresher course in: New Tools in Assessing Land Resources for Rural Development Planning in Southern Africa. Pretoria, South Africa	November 2000	SOTER, Degradation Assessments, WOCAT, ALES	18 participants from S. Africa, Namibia, Zambia, Zimbabwe, Mozambique, Swaziland, Botswana, Lesotho	ITC (DGIS)	
Soil degradation/ conservation section in ITC EREG-LDCR module. ITC, Enschede	February 2000	Degradation Assessments, WOCAT	ITC course participants	ПС	
Soil degradation/ conservation section in IHE course. IHE, Delft	January 2000	Soil properties, Degradation Assessments, WOCAT	IHE course participants	IHE	
Sustainable Land Management for Agricultural Production in Hainan Province (PR of China). ISRIC, Wageningen	Feb-May 2000	SOTER applications for Hainan	6 project staff of ISS-AS and CATAS	UNDP	
ILRI 39 th International Course on Land Drainage, Wageningen	August 2000	Aspects of soils and drainage	20 ICLD course participants	ILRI	
Soil degradation/ conservation section in IHE course. IHE, Delft	January-March 2001	Soil properties, Degradation Assessments, WOCAT	IHE Course participants	IHE	

Name and Location	Period	Contents	Participants	Financed by
College on Soil Physics, ICTP, Trieste, Italy	March 2001	Geography of soils in the world	20 Course participants	ICTP
ILRI 40 th International Course on Land Drainage, Wageningen	August 2001	Aspects of soils and drainage	14 ICLD course participants	ILRI

Consultancies

Activity	Period	ISRIC staff member	Financed by
SOTER training in Bosnia-Herzegovina for the Inventory of post-War Situation of Land Resources in BiH. Cooperation project of Institute of Agropedology (Sarajevo) and the Agricultural Institute (Bania Luka).	23 October - 7 November 2000	Dijkshoorn	FAO
Development of Soil Information System for Berau Forestry Management Project	3x one month in 1999- 2000; 2x in 2001	Mantel	EU
Optimisation of water management in Estonia	December 2001	Mantel	SENTER
SOTER consultancy Windhoek, Namibia	29 January - 04 February 2001	van Engelen	AEZ project

Conferences and Workshops

Venue	Place, Country	Period	Participant	Organization
Various WOCAT workshops (technical meetings, training workshops)	Bern, Rome, Pretoria, Wageningen, Aleppo, Bangkok, Nairobi, Iringa, Nazret	1999-2001	van Lynden	WOCAT
Various PESERA workshops	Orléans, Leuven, Athens, Toulouse, Almeria	1999-2001	van Lynden, Mantel	PESERA
Technical consultation on the European Soil Information System	Rome, Italy	2-3 September 1999	van Engelen	FAO-ESB
GCTE Focus 3 Conference – Food & Forestry: Global Change and Global Challenges	Reading, United Kingdom	19-23 September 1999	Batjes	GCTE of IGBP
2 nd International Land Degradation Conference	Khon Kaen, Thailand	25-29 September 1999	Oldeman, van Lynden	ISCO
International Congress on Soil Vulnerability and Sensitivity	Florence, Italy	18-21 October 1999	Batjes	Italian Society of Soil Science and European Soil Bureau
FAO/ISCW expert consultation Pretoria on land resources inventories/SOTER	Pretoria, South Africa	26-29 October 1999	van Engelen	FAO
Concluding SOVEUR workshop	Busteni, Romania	26-31 October 1999	Oldeman, Dijkshoorn, Batjes, van Lynden	ISRIC and RISSA
Int. Conference: "Managing Natural Resources for Sustainable Agricl. Production in the 21st	New Delhi, India	14-18 February 2000	Oldeman	Indian Agricultural Research Centre, Indian Council of Agricultural Research.

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venue	Place, Country	Period	Participant	Organization
Century"				
Technical consultation on SOTER Europe	Wageningen, NL	10-11 February 2000	Batjes, Dijkshoorn, Spaargaren & van Engelen	ISRIC, FAO and ESB
Third International Congress "Man and Soil at the Third Millennium"	Valencia, Spain	28 March – 1 April 2000	Batjes	European Society for Soil Conservation (ESSC)
Workshop "Onderzoek Global Change en Klimaatverandering"	Utrecht, NL	19 May 2000	Batjes, Sombroek	NWO, KNAW commissions for IGBP/ WCRP en HDP
EUROSOIL 2000	Reading, United Kingdom	4-6 September 2000	Batjes	British Society of Soil Science (BSSS)
International Workshop on Carbon Sequestration in the Soil	Dakar, Senegal	25-29 September 2000	Batjes	USAID, EROS Data Centre, and Centre Suivie Écologique pour la Gestion de resources naturelles (CSE)
Expert Group meeting on Software for Agroclimatic Data Management	Washington, D.C., U.S.A.	16-20 October 2000	Oldeman	WMO, Geneva; USDA, Washington
11 th ISCO Conference	Buenos Aires	23-27 October 2000	van Lynden	ISCO
Annual Meeting South African Association of Agricultural Lab.	Stellenbosch, South Africa	14-23 October 2000	van Reeuwijk	Central Agricl. Labs. and WEPAL
Land Degradation meeting	Rome, Italy	5-7 December 2000	van Lynden	FAO
Soil erosion indicators workshop	Copenhagen, Denmark	27-28 March 2001	van Lynden	European Environment Agency
Food Security and Soils	Tutzing, Germany	01-04 April 2001	Kauffman	Evangelische Academie Tutzing
First Technical Design Workshop, "Millennium Eco- system Assessment"	Bilthoven, Netherlands	08-11 April 2001	Batjes	Millennium Ecosystem Assessment
COST action 622 workshop	Clermont-Fernand, France	30 May - 03 June 2001	Spaargaren	CNRS
Expert Workshop on Land and Climate Change	Nairobi, Kenya	7-8 June 2001	Oldeman, Kauffman	UNEP, Nairobi
Various RELMA meetings, incl. WOCAT	Nairobi, Nyeri, Iringa, Bern	1999-2001	van Lynden	-
1st Portuguese Soil Science Congress	Lisbon, Portugal	26-29 June 2001	Dijkshoorn	Portuguese Soc. Soil Sci.
Croatian Soil Sci. Soc. meeting	Brijuni/Zagreb, Croatia	04-10 July 2001	Spaargaren	Croatian Soc. Soil Sci.
Global Change Open Science Conference (IGBP)	Amsterdam, Netherlands	10-13 July 2001	Batjes	IGBP, IHDP and WCRP
INRA meeting on SOTER for Europe	Orleans, France	02-03 October 2001	van Engelen	INRA
COP-V conference of parties	Geneva, Switzerland	10-08 October 2001	Kauffman/ Spaargaren	UNCCD

Venue	Place, Country	Period	Participant	Organization
Tropical Agriculture in Transition – Opportunities for Mitigating Greenhouse Gas Emissions?	Bonn, Germany	07-09 November 2001	Batjes	Centre for Development Research (ZEF) and Fraunhofer Institute for Atmospheric Research (IFU).
21st Century Challenges in Publishing and Editing	Lisbon, Portugal	10-11 November 2001	Hartemink	Elsevier Publishing
Final Symposium of National Programme on Global Air pollution and Climate)	Noordwijkerhout, Netherlands	14-15 November 2001	Batjes	Dutch National Programme on Global Air pollution and Climate Change (NOP II)
SOTER workshop Maghreb	Rabat, Morocco	12-16 November 2001	van Engelen	FAO

Missions

Activity	Period	ISRIC staff member	Financed by
Fact-finding mission to UNEP-GRID Sioux Falls for cooperation re. UNEP.NET	10 - 16 November 2001	Spaargaren	ISRIC

5 PERSONNEL

5.1 BOARD

- Dr. Ir. A.W. de Jager (Chairman), Enschede (on behalf of ITC)
- Prof. Dr. J. Bouma, Environmental Sciences Field of Expertise, Wageningen UR (on behalf of the Scientific Advisory Council of ISRIC)
- Prof. Dr. M.J. Kropff, Plant Sciences Field of Expertise, Wageningen UR (on behalf of the Board of Wageningen UR)
- Drs. G.W.J. van Dorp, International Institute for Geo-information Science and Earth Observation, ITC, Enschede (on personal title)
- Ir. W. van Vuure, Wageningen University and Research Centre (on behalf of the Ministry of Agriculture, Nature Management and Fisheries)
- Dr. A.N. van der Zande, Environmental Sciences Field of Expertise, Wageningen UR (on behalf of the Agricultural Research Department of the Netherlands)

Changes

Drs. G.W.J. van Dorp, Director Internal Affairs at ITC, replaced Prof. dr. ir. K. Harmsen, Rector, International Institute for Aerospace Survey and Earth Sciences in 2001.

5.2 STAFF¹

Directorate

- Dr. L.R. Oldeman, Director
- Ir. J.H. Kauffman, Deputy Director

Directorate Support

- Y.G.L. Karpes-Liem, Secretary to the Directorate
- J. Brussen, Administrative Officer Finances
- K.J. Berendsen, Technical Officer System Operations

¹ Situation as per 31 December 2001.

Research and Development

- Drs. V.W.P. van Engelen, Head; SOTER manager
- Ir. N.H. Batjes, Scientific Officer Soils and Global Change
- Ir. J.A. Dijkshoorn, Scientific Officer SOTER
- J.R.M. Huting, Technical Officer GIS
- Drs. G.W.J. van Lynden, Scientific Officer Soil Degradation and Conservation
- Ir. S. Mantel, Scientific Officer Land Evaluation
- Ir. P. Tempel, Technical Officer Programming
- Vacancy, Technical Officer GIS

Documentation, Information and Education

- Dr. O.C. Spaargaren, Head; Documentation and ICT Development
- M. Ahmad, M.Sc., Technical Officer Monolith Preparation
- W.C.W.A. Bomer, Technical Officer Graphical Design and Digital Document Preparation
- J.C. Jonker-Verbiesen, librarian
- Dr. A.E. Hartemink, Scientific Officer Education (from September 2001)
- N. Manuchehri, M.Sc., Technical Officer Analytical Services
- A.J.M. van Oostrum, M.Sc., Technical Officer Collection Management and Quality Control
- Dr. L.P. van Reeuwijk, Scientific Officer Education
- Vacancy, Technical Officer Library and Map Collection

Outgoing staff

- J.P. Lesschen (WRB/ICT): September-December 2001
- Ing. A.B. Bos (ICT, facility management): March 1984-September 2001
- Ing. J.W. Resink (GIS, spatial analysis): January 1994-September 2001
- R.A. Smaal (laboratory): August 1974-June 2000
- B.H. Thalen (cartography): April 1995-September 2001
- S. Vriend (general support): May 1997-September 2001
- H.F. de Ridder-Helder (secretarial, library assistance): September 1995-June 1999

5.3 GUEST RESEARCHERS

- Drs. J.H.V. van Baren, 1999-present: Deputy Secretary General IUSS
- Dr. W.G. Sombroek, 1999-present: Consultant GTZ/Amazon Basin.
- Ir. R.M. Westerink, May-November 1999: study leave. Implemented a SOTER module for Nampula Province, Mozambique, under supervision of Drs van Engelen.
- Ing. Alfred Hartemink, M.Sc. January 1999-August 2001: Worked on his research data from Papua New Guinea, and completed his Ph.D. Thesis on "Soil fertility decline in the tropics with case studies on plantation crops" at the Department of Soil Science, Reading University. Editorial activities for publication: "Response to Land Degradation".
- Dr. R. Asiamah (Soil Research institute, Ghana), April-May 1999: Research on "Characterization of Plinthite in the Forest Soils of Ghana".
- Prof. Stalin Jose Torres Pernalete and Ms. Cenaida del Valle Perdomo (CIRS, Fac. de Agronomica, Venezuela), August-September 2001: worked on soil and terrain databases, with focus on Latin America and the Caribbean (SOTERLAC), GIS, and Soil Museum.

LIST OF ACRONYMS

	Abbreviation	Description
ACSAD The		The Arab Center for the Studies of Arid Zones and Dry Lands, Syria
	AEZ	Agro-Ecological Zones
	ALES	Automated Land Evaluation System
	BFMP	Berau Forest Management Project, Indonesia
	CATAS	Chinese Academy of Tropical Agricultral Sciences, P.R. China
	CDE	Centre for Development and Environment, University of Berne
	CCD	UN Convention to Combat Desertification
	CGIAR	Consultative Group on International Agricultural Research
	CIRS	Centro de Información y Referencia de Suelos, Venezuela
	CORAF	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles, Senegal
	CSRI	Chemistry and Soil Research Institute, Harare
	СТА	Centre Technique de Coopération Agricole et Rurale, Wageningen
	DANIDA	Danish International Development Agency
	DESCONAP	Regional Network of Research and Training Centres on Desertification Controls in Asia and The Pacific
	DGIS	Directorate-General for International Cooperation, Ministry of Foreign Affairs, the Netherlands
	DHV	DHV Consultants, the Netherlands
	EEA	European Environmental Agency, Denmark
	ESB	European Soils Bureau
	ESSC	European Society for Soil Conservation
	EU	European Union
	FAO	Food and Agriculture Organization of the United Nations
	GDE	Group for Development and Environment, Switzerland
	GEF	Global Environmental Facility
	GIS	Geographic Information System
	GLASOD	Global Assessment of Soil Degradation project, ISRIC
	GLOBE	Global Learning and Observation to Benefit the Environment
	GTZ	Gesellschaft für Technische Zusammenarbeit, Germany
	IAC	International Agricultural Centre, Wageningen
	IARC	International Agricultural Research Centers
	ICLD	International Course on Land Drainage
	ICRISAT	International Crops Research Institute for the Semi-arid and Arid Tropics, Niger
	ISCW, ARC	Institute of Soil, Climate and Water of the Agricultural Research Council
	ICT	Information and Communication Technology
	ICTP	International Centre for Theoretical Physics, Italy
	IFDC	International Fertilizer Development Center, Togo
	IFPRI	International Food Policy Research Institute, Washington
	IHE	International Institute for Infrastructural, Hydraulic and Environmental Engineering, Netherlands
	IIASA	International Institute for Applied Systems Analyses, Austria

Abbreviation	Description
IITA	International Institute of Tropical Agriculture, Nigeria
ILRI	International Institute for Land Reclamation and Improvement, Netherlands
IPCC	International Panel for Climate Change
ISIS	ISRIC Soil Information System
ISNAR	International Service for National Agricultural Research, Netherlands
ISRIC	International Soil Reference and Information Centre, Netherlands
ISS-AS	Institute of Soil Science, Academia Sinica, P.R. of China
ITC	International Institute for Geo-information Science and Earth Observation, Nether- lands
IUSS	International Union of Soil Sciences, Austria
JRC	Joint Research Centre, Italy
KCL	King's College London, United Kingdom
LADA	Land Degradation Assessment for Dryland Areas, FAO
LRIS	Land Resources Information Systems
LUC	Land Use Change & Land Cover project
NOP	Dutch National Research Programme on Global Air Pollution and Climate Change, the Netherlands
OSS	Observatoire du Sahara et du Sahel, France
PAGE	Pilot Analysis of Global Ecosystems: Agroecosystems
PESERA	Pan-European Soil Erosion Assessment
RIOD	International NGO Network on Desertification
RIVM	National Institute of Public Health and Envrionmental Protection, the Netherlands
SDC	Swiss Development Cooperation
SOILIMS	Soil Laboratory Information and Management System, ISRIC
SOTER	Land Resources Information System for Asssessment and Monitoring, IUSS
SOTERLAC	SOTER project, Latin America and the Caribbean
SOTERSAF	SOTER database for Southern Africa
SOVEUR	Soil and Terrain Vulnerability Manning in Central and Eastern Europe, ISBIC
SULLAMA	Sustainable Land Management project
SWC	Soil and Water Conservation
	United Nations Development Programme
	United Nations Environment Programme Kenva
	United Nations Educational Scientific and Cultural Organization
	Office to Combat Desertification and Drought
	United Nations University/Institute for Natural Resources of Africa, Ghana
	University of Arizona 11 S A
	Land Pasqureas Information Systems for sustainable management of natural
WALKIS	resources in West Africa
WARDA	West Africa Rice Development Association, Côte d'Ivoire
WMO	World Meteorological Organization
WOCAT	World Overview of Conservation Activities and Technologies, Switzerland
WRB	World Reference Base for Soil Resources
WU	Wageningen University, the Netherlands
WUR	Wageningen University and Research Centre, the Netherlands
ZILRIS	The impact of Desertification on Food Security in Southern Africa