

**REPORT ON MISSIONS FOR
THE GLASOD-SOTER PROJECT, MARCH-APRIL 1989**

MADRID (13-14 March, 1989): PAP/RAC
NAIROBI (17-20 April, 1989): UNEP
SYRIA (22-26 April, 1989): ACSAD and ICARDA

L.R. Oldeman

May 1989



Report on Missions to

Madrid (13-14 March, 1989): Working Group on Erosion Mapping
Nairobi ((17-20 April, 1989): United Nations Environment Programme (UNEP)
Syria (22-26 April, 1989): Arab Center for the Studies of Arid Zones and
Dry Lands (ACSAD) and International Center
for Agricultural Research in the Dry Areas
(ICARDA).

At the request of the Director of the Priority Action Programme, Regional Activity Center (PAP/RAC), Mr. Arsen Pavasovic, a Working Group Meeting on Erosion Mapping in the framework of "inventory and Network of Erosion Measurements in the Mediterranean Zone for an environmentally sound management" was attended by L.R. Oldeman. The meeting was held in Madrid, Spain.

In the framework of the Global Assessment of Soil Degradation (GLASOD) project, UNEP requested Dr. W.G. Sombroek and Dr. L.R. Oldeman to present a mid-term progress report on GLASOD at their headquarters in Nairobi, Kenya.

At the invitation of ACSAD, Dr. Oldeman visited Syria to discuss progress on the preparation of the draft soil degradation status map for region II (Arab countries of North Africa and the Middle East). A field trip was organized to observe problems of wind erosion and salinization and a possible pilot area for SOTER in the Middle East was discussed with representatives of ACSAD and ICARDA.

Working Group on Erosion Mapping
in framework of
Inventory and Network of Erosion Measurements in the Mediterranean Zone
for an environmentally sound Management
13-14 March, 1989
ICONA, Madrid
(prepared by L.R. Oldeman)

1. Background papers

- 1.1 Inventory and Network of erosion measurements in the Mediterranean for an environmentally sound land management. Priority Action Programme, Regional Activity Centre, in cooperation with FAO, ACSAD. Febr. 1988.
- 1.2 Report of the Workshop on the state of rainfall erosion in the Mediterranean region. PAP/RAC, UNEP. Murcia, November 1988.
- 1.3 Notes on the ICONA-PAP consolidation meeting to define the programme of the cooperative project: "Inventory and Network of Erosion measurements in the Mediterranean for an Environmentally sound land management". PAP/RAC; UNEP; ICONA. Split, January 1989.

2. Discussion notes prepared for the Madrid meeting

- 2.1 Classification of the intensity, rate and risk of soil degradation. Sims, FAO.
- 2.2 A few ideas on soil erosion mapping. F. Mancini, Univ. Florence.
- 2.3 Standardization of a cartographic basis for the inventory of a World Soils and Terrain Digital Database and a Global Assessment of Soil Degradation. L.R. Oldeman, ISRIC.
- 2.4 Classification de terres limoneuses et repérage de sols humides dans l'outre-forêt (Alsace du Nord, France) à l'aide de données Landsat. Thematic Mapper. T. Vogt, Univ. Louis Pasteur, Strasbourg.
- 2.5 Cooperative project regarding erosion mapping. H. Vogt.
- 2.6 Review of some EEC and Italian Maps directly or indirectly related to soil erosion. A. Giordano (I), Univ. Torino.
- 2.7 Primera aproximacion para la elaboracion del plan nacional de restauracion hidrologico-forestal y control de la erosion. Leopoldo Rojo Serrano, ICONA.

3. Participants

EEC:	Mr. Andrea Giordano
France:	Mr. Henri Vogt
Spain:	Mr. José Angel Carrera Morales
	Mr. Leopoldo Rojo
Yugoslavia:	Mr. Miroljub Djorovic
FAO:	Mr. Dennis Sims
UNEP:	Mr. Anton C. Imeson
PAP/RAC:	Mr. Arsen Pavasovic
	Mr. Milivoje Ciric
Italy:	Prof. F. Mancini
ISRIC:	Mr. Roel Oldeman

4. Results of the discussion

A synthesis of discussion of the first day was prepared by Imeson. According to Pavasovic the main objective of this project activity is to correlate between various existing erosion mapping methodologies. Documents must be produced for November workshop. According to Sims first priority is to have an action plan. Preparation of project outline, which will be the major topic for discussion at next workshop. Erosion mapping should be linked with an erosion measurement project, but mapping should come first. All Mediterranean countries are interested to cooperate. Several have on-going mapping activities, although is some no erosion mapping effort. Mancini indicated that emphasis should be on improving knowledge on soil erodibility (K-factor). Vogt suggested that we need to have an idea on the distribution of erosion processes; not just mapping of actual erosion. We should concentrate on mapping watersheds if possible linked with measurements. Remote sensing is a very useful tool for preparation of erosion risks maps. Giordane discussed CORINE programme. It is qualitative. An objective approach using USLE. Ciric stressed need to define what kind of maps are needed. We should develop a realistic approach: 1) join CORINE project; 2) correlate existing maps or 3) use new knowledge and approach such as SOTER for a pilot area in Mediterranean zone. Sims strongly supports idea of SOTER pilot area and development of a database, but at what scale. Oldeman indicated that one of the characteristics of SOTER is a flexibility of scale. Rojo suggested to design a practical project framework clearly indicating objectives. This framework should be based on information from former meetings; it should identify the usefulness of erosion mapping; a relationship between scale and output must be established; a common methodology for mapping adopted and the role of remote sensing in erosion mapping must be defined. In Spain a relational database using ARCINFO developed for 1:1M qualitative erosion mapping is available for various catchment areas. The USLE approach is used. Separate maps on K-factor; slope x length factor; R-index factor, and C-factor are produced at scale 1:400.000. They were used to produce a soil erosion vulnerability map. (A report: Mapas de Estados Erosivos, Cuenca hidrografica del Tajo is given as example as well as a map of R-index isolines for Spain). It was generally concluded that a map scale of 1:250.000 (or 1:200.000) would be a good scale to map watersheds.

Location of priority areas depends on the individual country's approval to participate. Their support will be asked through a questionnaire. The first day ended with the conclusion that we should develop a practical approach, leading to a concrete project proposal. That a workshop is needed to discuss this proposal as well as a procedures manual. The project should have a duration of two years in anticipation of a larger project to map all Mediterranean coastal zones.

Sims and Oldeman were asked to develop a project framework. A concept is attached to this report. This was the topic of discussion on 14 march. The general conclusions as summarized by Pavasovic:

1. Join mapping and measurement of erosion into one project (and workshop).
2. Basic aim is development of a methodology to produce maps in several - at least three - selected pilot areas.
3. The basis of implementation is an interchange of various databases already in existence.

4. Take into account UNEP's concern (the negative environmental impact of erosion).
5. Correlation of existing maps should be reflected in project activities making what exists more useful.
6. The next workshop should concentrate on:
 - a. Project proposal
 - b. Development of reports on
 - 1) correlation of existing maps
 - 2) existing databases and methodologies
 - 3) measurements of erosion (to be discussed over the next two days)
 - c. Concentration on scale of accuracy 1: 250.000.

Another meeting is needed to elaborate on project proposal framework and to develop terms of reference for UNEP.

Briefly summarized this meeting resulted in a clear action plan to develop a project proposal to carry out erosion mapping and database compilation in three watershed pilot areas using a methodology that has and will also been tested in other pilot areas (LASOTER, NASOTER, WASOTER). The SOTER approach was strongly supported by the FAO representative (Sims) and a joint cooperative effort between ISRIC and ICONA was mentioned. ISRIC's participation could involve to develop a procedures manual for database compilation at a 1:250.000 scale. Such a manual will certainly be very useful in view of future requests by national governments that want to prepare databases at more detailed scale. A further round of discussions will take place in Split (Yugoslavia) early May. (See follow-up "note-for-the-file" of 12 May 1989, attached).

Note for the file

12 May 1989

For: Wim Sombroek
From: Roel Oldeman
Re.: Soil Erosion mapping Mediterranean Central Zone

Dennis Sims (FAO) called to report on Split meeting - a follow up of our previous meeting in Madrid (March 89). They discussed in more detail the project proposal framework for the execution of pilot area studies in the Mediterranean Coastal zone. They have decided to go ahead. Sufficient financial resources available (50% from Spanish government) There is an interest in three pilot areas (in Spain for sure, probably other areas in Italy and Morocco). Ayoub emphasized the need for ISRIC involvement, strongly supported also by Sims. The Spanish group (ICONA) has indicated that they do not clearly see the role of ISRIC. Therefore Sims urged for a joint meeting with ICONA and ISRIC. Original idea was to have such a meeting in Wageningen. I suggest to meet on neutral grounds, e.g. Rome. If this meeting can be scheduled in July, then Willem Peters as Spanish speaking technical coordinator of LASOTER can also attend. Sims agreed. He will send me all the details of the Split meeting after which I will call or fax Pavasovic in Split in his function as director of the PAP/RAC for this zone. There will be a workshop in October in Sevilla to develop an implementation plan. Meanwhile the conclusions of the Split meeting will be sent to all Mediterranean countries for comments.

Draft Project Framework

Name: Pilot Project for Erosion Mapping in Mediterranean Countries

Duration: Two years

Background :

1. Mediterranean environment:

- countries bordering the Mediterranean have been inhabited, and have been experiencing erosion, for many thousands of years.

- degradation of soil, vegetation, and latterly pollution due to industrial processes have strongly affected the Mediterranean sea itself modifying many natural processes and the populations of many animal and vegetative species.

2. The need for a combined approach;

- to obtain a holistic and quantitative view of the problem and its causes

- to identify priority areas, processes, and requirements

- to transfer information and methodologies, and be able to carry out necessary joint programmes, since a piecemeal approach can not be effective.

- To provide a better understanding of processes and causes.

3. UNEP and the Mediterranean Action Plan

- the general objectives of the plan

- the present lack of a suitable and universally accepted methodology for erosion classification and mapping

- undeveloped conservation and land-use planning programmes in some of the Mediterranean countries and more developed programmes and greater resources in others.

- consequent lack of a common understanding about the ~~understanding~~ relationship between physical, social, and economic factor which affect soil erosion.

4. Existence of methods and data-bases developed by FAO, CORINE, and the SOTER/GLASOD project funded by UNEP.

- objectives of the project^s

- the fact that guidelines for terrain mapping and degradation mapping have been developed by the project.

5. Purpose of the present project;

- the present project will establish the methodology for a much larger project to map erosion in all the Mediterranean countries and analyse in depth the relationship between physical factors, land use, social, economic, and political factors, and the effect of erosion upon the Mediterranean Sea itself.

OVERALL OBJECTIVE

To develop and demonstrate on pilot areas a practical methodology for erosion classification and mapping which:

i) will be useful for planning purposes and for the first stages of project planning;

ii) can be adopted by all of the countries in the Region;

iii) is capable of serving as a basis for more detailed mapping in the future;

iv) can serve as a framework for future work on a better understanding of erosion processes, and the relationship between physical, social, and economic aspects of soil degradation.

IMMEDIATE OBJECTIVES

1. Identify at least three, and preferably more suitable pilot areas, each one between 2000 and 10000 km² in size, bordering the coast in Mediterranean countries.

2. Collect existing maps and examine existing methodologies to develop a common approach to the survey and description of erosion status, risk, and rate which will permit the printing of maps at a scale of 1:250,000 with a common legend, for all Mediterranean countries. This will require:

i) agreement on information to be collected

ii) correlation of survey methods

iii) establishment, adaption, or use of compatible data-bases

iv) agreement on the number of erosion classes and their definition for the legend

3. Creating or up-grading the national capacities of participating countries through training, to identify and map soil degradation phenomena, and establishment of a cooperative network of institution, and where necessary supply needed equipment.

4. Survey and mapping of pilot areas in three or more Mediterranean countries, and production of joint technical documents covering the definition and classification of type, risk, status, and rate of erosion, survey methods, and establishment and maintenance of data-basis.

ACTIVITIES

1. Identification of pilot areas and institutions in Mediterranean countries willing, and with the necessary human resources to carry out the survey exercise, or who already possess some of the necessary data. (This activity will begin immediately, and should be officially completed two months after the signing of the project)

2. Using the existing data-base created by the related UNEP funded projects entitled Global Assessment of Human-Induced Soil Degradation as a foundation, and through a series of correlation meetings with survey teams from participating countries, finalize the methods of survey and the data to be collected.

3. Arrange the necessary training courses in survey methodology and the establishment and maintenance of data-bases. (This phase of the project will be completed by the end of the sixth month of the project)

4. Carry out the surveys in the pilot areas. (To be completed by the end of the fourteenth month)

5. Data entry (completed by the sixteenth month)

6. Finalization of the map legend (by the end of the eighteenth month)

7. Printing of the maps and preparation of technical reports. (by the twenty second month)

8. Holding of the Mediterranean conference for presentation and discussion of project results, and preparation and funding of the full-scale project. (to be completed before the termination of the pilot project)

INSTITUTIONAL ASPECTS

1. The project will be sponsored by ICONA and the Director of
Mr. L. Rojo will act as technical coordinator, working in close collaboration with Mr. A. Pavasovic, Director of PAP/RAC, and a small project management committee composed of technical representatives from each participating country.

2. Technical assistance ^{could} ~~will~~ be provided by the International Soil Reference and Information Centre (ISRIC), which is charged with the execution of the UNEP project Global Assessment of Human-Induced Soil Degradation, and the Food and Agricultural Organization (FAO), ^{Co-rips} and by other specialized organizations within Mediterranean countries, and, where necessary, consultancy.

INPUTS

1. Government inputs:

Participating countries will supply technical staff, office space, equipment, and vehicles.

2. External inputs:

i) Surveys (transport, data acquisition, field survey costs, materials) USD 100,000

ii) Workshop and technical meetings USD 80,000

iii) Training (fellowships and production of training materials) USD 70,000

iv) Final conference USD 60,000

v) Printing of maps and reports USD 50,000

vi) Purchase of computer hardware and software USD 50,000

vii) Expert services USD 50,000

(Provisional total USD 460,000)

Working Group for the Preparation
of the Workshop on Erosion Mapping

Madrid, March 13-14, 1989

Tentative Agenda

Monday, March 13

09.00 - 11.00

- Opening of the meeting.
- Election of the Chairman and Rapporteur.
- Adoption of the agenda.
- Analysis of and discussion on the position paper prepared by PAP/PAC and ICONA. (Murcia workshop.
- Presentation of the position papers prepared by PAC and other participants, if any.
SMB OLDENAV

11.00 - 11.30

- Coffee break.

11.30 - 14.00

- General discussion on:
 - objectives and expected outputs of the project;
 - objectives and expected outputs of the workshop.

Tuesday, March 14

09.00 - 10.30

- General discussion - continued.
- Future work of the working group and agreement on the preparation of documents.

10.30 - 11.00

- Coffee break.

11.00 - 14.00

- Formulation of conclusions and adoption of the notes.

Working Group for the Preparation
of the Workshop on Erosion Mapping

Madrid, March 13-14, 1999

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Working Group for the Preparation
of the Workshop on Erosion Mapping

Madrid, March 13-14, 1989

Tentative List of Documents

1. Position paper for the segment of the project "Inventory and Network of Erosion Measurement in the Mediterranean for an Environmentally Sound Land Management" dealing with standardization of the basis for soil erosion mapping of Mediterranean coastal zones;
2. Terms of Reference for the Preparation of the Document "Analysis of the Existing Soil Erosion Maps in the Mediterranean Coastal Zones";
3. Terms of Reference for the Preparation of the Document "Concept of Standardization of Cartographic Basis for Mediterranean Coastal Zones and Draft Project Proposal";
4. Terms of Reference for the Preparation of the Document "State of Art of Soil erosion Mapping";
5. Cooperative Project Regarding Erosion Mapping. Preparation of the Meeting of the Working Group for Erosion Mapping, by Mr. H. Vogt;
6. Outline pre-project proposal, by Mr. A.C. Imeson.

Visit to UNEP, Nairobi
17-20 April 1989
W.G. Sombroek and L.R. Oldeman

- Purpose: 1) To present Progress on GLASOD/SOTER
2) To discuss follow-up activities; Involvement of GRID; clearing House; Evaluation.

Monday 17 April. An audience of about 25 UNEP research staff attended a seminar on the progress of GLASOD/SOTER, (annex 1), chaired by Mr. S. Evteev. Sombroek introduced background, objectives, justification, requirements, potential users and benefits of SOTER. Oldeman discussed the progress of the two GLASOD activities.

1. the 1:10 M Global soil degradation status map: preparation of guidelines; its content; character of the map (creating awareness); maps and reports so far received; first compilation of South American segment.
2. LASOTER; procedures manual; Montevideo workshop; activities correlation teams; development database structure; GIS assessments; Porto Alegre meeting; new pilot areas (WASOTER and NASOTER).

During discussion more information was given on matrix tables and possible uses of the databases; generalizations made for 1:10 M map; slow progress with regard to WASOTER. The chairman concluded the seminar with an expression of satisfaction of the progress in such a short time.

Tuesday 18 April.

1. Mr. A. Ayoub. Discussion on possible extension of GLASOD in 1990 (see annex 2). Ayoub indicated no problems if finalization of soil degradation status map takes place in 1990 (definitely before the ISSS congress in Kyoto) without new finances. At the same time he suggested to prepare a new project document for a second GLASOD/SOTER phase with new finances, which would include training aspect and hardware/software acquisition (probably through GEMS support). Ayoub indicated that IGN is engaged in a desertification study by means of remote sensing in West Africa.
2. Mr. S. Sangweni: Head of Desertification Control/PAC. Also present: L. Kroumkatchev; Y. Matsumoto; Wilber K. Ottichilo (technical coordinator, desertification assessment and mapping project, Dept. of Resource Survey and Remote Sensing of the Min. Planning and National Development, formerly KREMU). Sangweni indicated that a global desertification assessment has to be finalized by 1992, after a first assessment was made in 1982. Thematic maps on desertification aspects are requested since 1977. UN interagency group on desertification (FAO, Unesco, WMO, UNEP). Various pilot studies have been carried out. A desertification Atlas has to be prepared on pilot studies. DC/PAC is very interested in the outcome of GLASOD and would like to incorporate results in their atlas. Wilber explained activities of a pilot study in Kenya on desertification. The FAO methodology appeared too detailed for application. A list of indicators, considered essential is made (annex 3). There are three pilot areas (Barengo: 6500 km². Masshabit: 12000 km², and Kora: 3000 km² in cooperation with Oxford Un.). Scale is 1:100.000. Soil maps are prepared, based on SPOT, taken in 1987 dry season and soil sampling done in wet and

dry season (analysis by NAL). Also a very detailed vegetation map prepared. The report on these studies ready July 1989 + digitalization.

A similar project is carried out in W. Africa. Several transects in cooperation with ORSTOM (Lionel Guyot; see map, figure 1), with UNEPCOM - cooperation with USSR, Ashrabad Desert Research Institute + Dakar Institute. A total area of 28.000 km² in the Sub Sahelian, Sub Soudanian zone. Aim to assess current status and rate of desertification. Project started in 1987, using SPOT/LANDSAT. A progress report, in french and english received: (GLASOD files W. Africa) Sangweni indicated that DC/PAC would like to be closely associated with WASOTER (perhaps committing \$ 50,000 additional to Ayoub's indication to commit \$ 50,000 for personnel/training aspects of WASOTER).

3. Mr. S. Evteev. Assistant Executive Director; Office of the Environment Programme.

Sombroek mentioned possibility of a pilot area in USSR, but indicated scale restrictions. According to Evteev these days a 1:1 M scale would not impose problems. A North-South transect would be interesting. Evteev strongly emphasized the importance to make the results of GLASOD known to the general public.

The 1:10 M wall map should be accompanied with a clearly written report not only indicating the features that were mapped, but also interpretation of the results. Dissemination to a large audience by means of a brochure. He suggested to work closely with UNEP's P.R. department.

4. R. Olembo, Deputy Assistant Executive Director, OEP.

Olembo indicated his satisfaction with GLASOD/SOTER progress. Within UNEP all attention now directed to the June 1992 meeting: international Conference of Natural Environment (probably in Brasilia). This implies that UNEP's general policy is to keep a "low profile", but likely priority subjects will be: climatic change; biologic diversity; oceans and coastal areas; land deterioration (including desertification). He indicated that UNEP will support within their means other pilot areas in developing countries, while he stressed that developed countries should also carry out pilot area studies using own resources (we indicated NASOTER). Olembo inquired about a W. European SOTER. He suggested an advisory committee meeting to be held soon and the need to establish a Global/International Advisory Group on Environmental Degradation for GLASOD/SOTER. How to interest donor support. Through CG system. We indicated support from ICRISAT and most probably ICARDA, but we cannot expect financial support from CG's core budget. Better to approach CG's donors directly (We indicated DGIS interest for a possible SOTER pilot area in India). Olembo would like to have a round table conference with some donors, perhaps during upcoming Governing Council meeting in May. Financial support for a Mediterranean SOTER possibly through UNEP trust fund for this area.

5. A. Buonajuti. Chief, Follow-up and Evaluation Section.

Buonajuti indicated that the success of GLASOD can only be judged if national governments are using the methodologies developed. He wondered how and when this can be measured. We indicated that the long range objective can only be evaluated after a good training programme is executed. At this stage there is a growing interest in the participating countries to extend the SOTER methodology to

other areas outside the pilot region. EMBRAPA is interested in an area around Brasilia, INTA is developing a project proposed for the Rio Plata region. Right now there is a strong need to develop training materials and a training programme to use the SOTER database. Such a training should not only involve soil scientists but also staff of user oriented agencies in order to establish a question-answer group. (What type of information is needed and what can be supplied by SOTER). Evaluation can only take place after such a training. Meanwhile an advisory group will evaluate the technical aspects of SOTER. Such a meeting could take place in August (during the ISEC conference in Wageningen on wednesday afternoon 17 August 1989).

6. D. Schmidt / Clearing House.

With the strong support from Mr. Ayoub, Wim stressed the usefulness of a link of a second phase of a NASREC project to UNEP's national soils policies programme (In addition to Syria and Uganda there are now foreseen in this programme: Kenya, Nepal, Indonesia, Jamaica, Ecuador). Such a link will also make it easier for DGIS to contribute (though in practice the funding may go directly from the Hague to Wageningen). UNEP will comment on the final report on NASREC-I and will soon send a letter of UNEP's interest in NASREC-II probably to be signed by the Deputy Executive Director, Mansfield. Sombroek promised to stimulate DGIS to contribute to other clearing house proposals as well.

7. M. Northon-Griffith/GEMS; M.D. Gwynne; Mauro Mendoza (Peruvian soil scientist).

Gwynne indicated that the implementation of the DC/PAC would be ultimately placed in GEMS/PAC. He was therefore interested to see whether the GLASOD map could be digitized and linked to the matrix database, so that in addition to the conventional 1:10 M map a series of thematic maps could be produced. As a test it was suggested to use the E. Africa report as an example to see what could be done. GEMS will digitize the map - to be provided on a solid base - and we will supply the matrix database (both prepared by Hakkeling, STIBOKA). The results should stay within the confines of UNEP/GEMS and ISRIC/GLASOD as long as the map has not yet been approved by the national agencies. Griffith discussed a project: "Improvement of Capabilities of Resource Management in Africa". In first instance hardware will be installed in 12 english speaking countries in Africa (a.o. Lesotho, Botswana, Uganda,...) with GIS training at a regional centre (PS2 model 80; IBM hardware). GIS system is not yet decided, but ARCINFO is only software compatible with 80 system. There is no satellite image processing on 80 system. Hence ERDAS and ILWIS cannot be used yet (it would take a manyear to develop this according to van Genderen). (There is a regional GRID-node at AIT-Bangkok, being started up by Mooneyhan (Formerly at GRID-Geneva). One of the PS2.80 computers has been given on loan to Unesco-MAB for training purposes. ITC is involved and will become a node of GRID for training. GEMS wants to have standard databases for various environmental aspects. SOTER could very well become the standard for soils and terrain databases. Financial support for the African-programme is sought by teaming up with the World Bank which will try to attract UNDP funding. Gwynne strongly requested exchange of contacts with SOTER, in particular our WASOTER involvement. With respect to our GIS assessment procedures they did not share our serious concern about the

selection of appropriate GIS for SOTER, since they expect very soon GIS's to be compatible with each other! BUT they are still very interested in the outcome of our approach.

19 April Mr. Mendoza.

Further discussions on choice of hardware/software. We should not underestimate the problems of maintenance and servicing. These costs can run very high. Best is to install a robust simple system with not too complicated software. Since GIS developments go very rapidly a high investment in a system now can lead to disappointments later. Roel received various documents in the GRID information series¹. Also copies of various GIS reviews. We also discussed some ideas on an assessment of water erosion risks other than USLE. Mendoza very much favoured the idea of rating a small number of variables that are most pertinent for soil water erosion than using a mathematical approach for which coefficients have to be determined on-site (These ideas were ventilated during the Porto Alegre meeting!). We agreed to exchange ideas in the future and to work more closely.

Final meeting with Ayoub and Schomaker. The GLASOD follow-up should be discussed during advisory committee meeting in August. After the General Council meeting in May more will be known about budget and priorities for action. Ayoub will prepare a draft proposal for follow-up according to UNEP lines after the August meeting. Ayoub wondered about the possibility to prepare a soil degradation status map of Africa at a scale of 1:7.5 M. How much would this cost? I will discuss this with STIBOKA. It also depends very much on the results of region I (West Africa) and II (North Africa + Arab countries). Ayoub once again expressed his satisfaction with the GLASOD progress and his happiness with the well illustrated poster (Prepared by Wouter Bomer).

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- Annex 1^a. Participants GLASOD-SOTER seminar 17 April 1989.
Annex 1^b. Summary of GLASOD-SOTER progress as of 1 April 1989.
Annex 2. Proposal for 8 month extension of GLASOD project.
Annex 3. List of indicators for desertification risk assessment.
Annex 4. List of documents received at UNEP.

¹GLASOD document files on GIS, see annex 4

PROGRAMME DURING VISIT DR. W. SOMBROEK AND DR. R. OLDEMAN TO
UNEP, NAIROBI: 17-19 APRIL 1989

17 April 1989: 14.30-16.30 hrs.

Presentation GLASOD/SOTER by Dr. W. Sombroek & Dr. R. Oldeman

Chaired by: Mr. S. Evteev (Assistant Executive Director)

Attended by: Mr. J. Boddens Hosang (Permanent Representative,
Netherlands)
Mr. R. Olembo (Deputy Assistant Executive Director,
Office of Environment Programme)
Mr. A. Ayoub (EM/Soils)
Ms. M. Schomaker (EM/Soils)
Mr. A. AlFutaih (Fund)
Mr. S. Sangweni (DC/PAC)
Mr. T. Maukonen (DC/PAC)
Ms. S. Rämcke-Wyes (DC/PAC)
Mr. P. Mogstad (DC/PAC)
Mr. M. Gwynne (GEMS)
Mr. M. Norton-Griffith (GEMS)
Mr. M. Mendoza (GEMS)
Mr. H. Croze (GRID)
Mr. A. Buonajuti (FUES)
Mr. H. Wyes (PCU)
Mr. M. Magnusson (PCU)
Ms. A. Jonasson-Granados (CH)
Mr. J. Balek (EM/Water)
Ms. M. Bjorklund (EM/Wildlife)
Mr. J. Grunblatt (DRSRS/KREMU)
Mr. W. Ottichilo (DRSRS/KREMU)

Tuesday, 18 April

11.00-1120 hrs: Desertification Control (DC/PAC)

Attended by: Mr. S. Sangweni (DC/PAC)
Mr. L. Kroumkatchev (DC/PAC)
Ms. Y. Matsumoto (DC/PAC)
Mr. W. Ottichilo (DRSRS/KREMU)
Ms. M. Schomaker (EM/Soils)

11.20-1210 hrs: Mr. S. Evteev (AED)
Mr. A. Ayoub (EM/Soils)

12.10-13.00 hrs: Mr. R. Olembo (DAED/Progr.)
Mr. A. Ayoub (EM/Soils)
Ms. M. Schomaker (EM/Soils)

14.30-15.00 hrs: Follow up and Evaluation Section
Mr. A. Buonajuti (FUES)
Mr. A. Ayoub (EM/Soils)
Ms. M. Schomaker (EM/Soils)

.... / ...

15.00-15.30 hrs.

Clearing House

Mr. D. Schmidt (CH)
Mr. A. Ayoub (EM/Soils)
Ms. M. Schomaker (EM/Soils)

15.30-17.45 hrs:

GEMS/GRID

Mr. M. Gwynne (GEMS)
Mr. M. Norton-Griffith (GEMS)
Mr. M. Mendoza (GEMS)
Mr. J. Weber (GRID-consultant)
Mr. A. Ayoub (EM/Soils)
Ms. M. Schomaker (EM/Soils)

Wednesday, 19 April

14.30-16.00 hrs:

GEMS

Mr. M. Mendoza

GLOBAL ASSESSMENT OF SOIL DEGRADATION
"GLASOD"

by
Wim Sombroek and Roel Oldeman¹

Background

One of the elements of the World Soils Policy of the United Nations Environment Programme (UNEP) is the development of methodologies to monitor global soil and land resources. Methods are required which can reliably detect significant changes in those soil and terrain characteristics which directly or indirectly effect the quantity and quality of the land and its ability to produce food, fibre and timber. An assessment of the status and risk of soil degradation will provide one of the essential data sets for such a global understanding.

In response to these needs the following activities took place:

Development of a project proposal: "World Soils and Terrain Digital Database" (SOTER).

The International Society of Soil Science (ISSS) convened a workshop in Wageningen, The Netherlands (January, 1986) (1) to discuss the aims and scope of a possible international programme to establish a digital soil resources map of the world and accompanying soil and terrain databases at a scale of 1:1,000,000. There is a recognized need to collate and correlate national and regional geographic soil databases and to bring them under a common denominator that can serve as a legend for a new soil map of the world. There was a wide agreement as to the need and desirability of the proposed 1:1 M soil map, and a project proposal for a World Soils and Terrain Digital Database "SOTER" (2) was endorsed at the ISSS International Soil Congress in Hamburg, West Germany in August 1986.

Development of a project document: "Global Assessment of Soil Degradation" (GLASOD).

At the invitation of UNEP an ad-hoc expert meeting was held in May 1987 in Nairobi with participation of UNEP and ISSS representatives (3). This meeting reached consensus on:

1. Production of a global soil degradation map at a scale 1:10,000,000.
2. Generation of soil degradation maps and soil and terrain databases for five test areas at a scale of 1:1,000,000.
3. Storage of data collected under the project in the Global Resource Information Database (GRID), from where they will be readily transferable to users as required.

In September 1987 an agreement was signed between UNEP and the International Soil Reference and Information Centre (ISRIC) in Wageningen for the execution of a project: Global Assessment of Soil Degradation (GLASOD) (4). ISRIC administers and coordinates all activities related to the accomplishment of two separate activities:

¹International Soil Reference and Information Centre (ISRIC)
P.O. Box 353
6700 AJ Wageningen, The Netherlands

1. The preparation of a world map on the status of soil degradation at an average scale of 1:10 M.
2. The preparation of a detailed assessment on the status and risk of soil degradation for one pilot area in Latin America, covering portions of Argentina, Brazil, and Uruguay, accompanied by a 1:1 M map.

The project has a duration of 28 months. ISRIC is assisted in the execution of the activities by the Netherlands Soil Survey Institute (STIBOKA), the International Institute for Aerospace Survey and Earth Sciences (ITC), the Food and Agriculture Organization of the United Nations (FAO), and the International Society of Soil Science (ISSS).

This project is a first step towards a global soil degradation assessment and the establishment of a world soils and terrain digital database.

Objectives

The immediate objectives of SOTER is to improve the capability to deliver accurate, timely, useful information about soils and terrain resources to decision-makers. More specifically the following results are expected from SOTER:

- 1) An orderly arrangement of resource information.
- 2) An improvement in standardization and compatibility of reporting soils and terrain data/information.
- 3) An improvement in accessibility of soil and terrain and related resource information.
- 4) A dynamic resource information system with updating and purging capabilities.
- 5) An information service for national resource planning in developing countries.
- 6) A systems model for technology transfer.

The SOTER project has been divided into three phases, each with a different set of tasks designed to move as quickly as is feasible and possible towards an operational system easily accessible to the user community. The activities for each phase are as follows:

- Phase I: (years 1 and 2). Development and testing of methodologies.
 Phase II: (years 3, 4 and 5). Refinement and testing of all elements in the Database system (data acquisition and correlation; data input and output).
 Phase III: (years 6-15). Operational input to and output from the Database: transfer of technology.

The pilot area activity within the GLASOD project should be considered as the first phase of the SOTER project.

The immediate objectives of GLASOD is to strengthen the awareness of decision makers and policy makers on the dangers resulting from inappropriate land and soil management to the global well being and to improve the capability in regional and national institutions to deliver accurate information on qualitative and quantitative soil degradation processes for national and regional agricultural planning purposes. Soil degradation is defined here as a process that describes human induced

phenomena which lower the current and/or future capacity of the soil to support human life.

On the world map as well as for the pilot area we want to describe and delineate on maps situations where the balance between climatic aggressivity and the potential resistance of the terrain has been or is being broken by human action: thus we want to describe the present status of human induced soil degradation. In the pilot area we also need to assess the relative fragility of the land system: we want to indicate the risk of soil degradation.

The status of soil degradation is described by three elements of degradation:

- a. type of soil degradation refers to the process that causes the displacement of soil material by water and wind, as well as in-situ deterioration by physical, chemical and biological processes;
- b. degree of soil degradation refers to the present state of the degradation process (none, slight, moderate, severe, extreme);
- c. recent-past rate of soil degradation refers to the apparent rapidity of the degradation process (slow, medium, rapid).

For each recognized mapping unit the relative extent of the degraded soils is indicated.

Implementation

It is obvious that the world soil degradation assessment requires a completely different approach compared to the regional degradation assessment in the pilot area. Although the basic concepts and the legend for the global assessment should also be applicable for the regional assessment of soil degradation, the approach for the 1:10 M soil degradation status map is qualitative, while the risk assessment for the pilot area has to be as quantitative as possible.

Implementation of the Global Soil Degradation Status Map:

The following steps are taken to implement the preparation of a global soil degradation map at an average scale of 1:10 M:

- Preparation of guidelines. Descriptive rules are formulated for the preparation of this global map to ensure uniformity of interpretation by regional institutions and/or qualified specialists around the world who are asked to cooperate. After consultation with an international panel of soil degradation specialists a final edited version of Guidelines for General Assessment of the Status of Human-induced Soil Degradation has been prepared (5).
- Designation of regional institutions and/or qualified specialists. The world has been divided in 21 regions (see map). For each region an institution or an individual qualified specialist has been approached and contracted to prepare a regional soil degradation map and complementary data sets according to the Guidelines on base maps at an average scale of 1:5 M, provided by the project. Negotiations with these collaborators started in May 1988 and the majority of contracts were concluded in September 1988.
- Regional map preparation. Although in the original time frame it was expected that the 21 regional soil degradation maps could be finalized by early 1989, the majority of regional cooperators indicated that it

would take them at least 6 months to complete this assignment. By April 1989 11 regional maps and complementary data sets were completed.

- Map compilation. The regional soil degradation status maps, prepared at an average scale of 1:5M will be correlated and then reduced to a final average scale of 1:10M. The international division of the Netherlands Soil Survey Institute (STIBOKA) in Wageningen has been subcontracted to prepare the compiled global soil degradation status map. An ad-hoc international soil degradation expert committee will then evaluate the results.
- National approval. Before the draft map will be sent to the cartographic department, national soil research organizations will be invited to comment on the soil degradation map of their country.
- Preparation of a multi-coloured global soil degradation status map is subcontracted to the cartography department of STIBOKA and publication is expected in the first half of 1990.

Implementation of the Soil and Terrain Database for the pilot area in South America.

Based on recommendations of an ad-hoc committee for the development of a Universal Legend for SOTER (3), the Land Resources Research Centre in Ottawa, Canada, prepared a Procedures Manual for Small Scale Map and Database Compilation (6). This manual was thoroughly discussed during the first regional SOTER/GLASOD workshop in Montevideo (March 1989)(7). The three participating countries (Argentina, Brazil, Uruguay) appointed national correlation teams to acquire soil and terrain attributes for the selected pilot area (28°-32°30' South; 54°-60° West). The teams participated in two field trips and correlation meetings to assess the workability of the Procedures Manual and to discuss the interpretation of the status of human-induced soil degradation. The results of eight months field work was presented and discussed during a second regional GLASOD/SOTER workshop in Porto Alegre (December 1988)(8). Approximately 90% of the soils and terrain data were collected.

Meanwhile a SOTER database structure was developed, using ORACLE5 as relational database management system (9). Also a separate climate database file was developed.

The soils and terrain data and the climate data were entered into the SOTER database during the first quarter of 1989.

No decision has been taken on a Geographic Information System at this stage. An ad-hoc committee on "GIS for SOTER" was formed to assess the suitability of commercially available GIS's for SOTER. The committee submitted their report in March 1989 (10) and recommended to carry out a market survey, followed by an assessment of the three most suitable GIS's by means of a benchmark test. A final decision on the choice of the most appropriate GIS is expected early August 1989.

Provided that the necessary hardware/software can be acquired, preliminary tests of the SOTER database will be conducted later this year to assess the use of the system in producing interpretive maps such as on water erosion hazard, potential productivity, irrigable land, and others.

Related SOTER developments

- **WASOTER:** A project proposal for a second pilot area in West Africa was prepared (11) (portions of Benin, Burkina Faso, Ghana, Niger, Nigeria, and Togo) and discussed during a FAO-sponsored West and Central African Soils Correlation Committee meeting in Cotonou, Benin (November 1988). When the proposal is endorsed by the National Governments involved, the E.E.C. will be approached for funding. International organizations (United Nations Environment Programme/UNEP; the ICRISAT-Sahelian Centre in Niamey, Niger; the Regional Remote Sensing Centre, Ouagadougou, Burkina Faso; the International Fertilizer Development Centre/IFDC), and national organizations (ORSTOM, France; Hohenheim University, Stuttgart; Agricultural University, Wageningen) have already indicated strong interest in this West African SOTER activity.
- **NASOTER:** A project and implementation plan for a third pilot area located in North America has been formulated by a joint working group of the U.S. Soil Conservation Service and the Canadian Land Resources Research Centre (13) (March 1989). Finalization of NASOTER is expected early 1990.

April 1989

Documents prepared/published in the framework of GLASOD/SOTER

- (1) ISSS, 1986. Proceedings of an International Workshop on the Structure of a Digital International Soil Resources Map annex Data Base. (20-24 January 1986, ISRIC, Wageningen). Ed. by M.F. Baumgardner and L.R. Oldeman. SOTER Report 1. ISSS, Wageningen. 138 p.
- (2) ISSS, 1986. Project Proposal "World Soils and Terrain Digital Database at a scale 1:1M ("SOTER"). Ed. by M.F. Baumgardner. ISSS, Wageningen. 23 p.
- (3) ISSS, 1987. Proceedings of the Second International Workshop on a Global Soils and Terrain Digital Database (18-22 May 1987, UNEP, Nairobi). Ed. by R.F. van de Weg. SOTER Report 2. ISSS, Wageningen. 47 p.
- (4) UNEP, 1987. Project Document. Global Assessment of Soil Degradation. (FP/9101-87-88(2694); FP/4101-87-88(2694); FP/6101-87-88(2694); FP/6201-87-88(2694). UNEP, Nairobi and ISRIC, Wageningen. September 1987, 17 p. + ann.
- (5) ISRIC, 1988. Guidelines for General Assessment of the Status of Human-Induced Soil Degradation. Ed. by L.R. Oldeman. Working Paper & Preprint 88/4, ISRIC, Wageningen, 11 p. (in english and french).
- (6) Shield, J.A. and D.R. Coote, 1988. SOTER Procedures Manual for Small Scale Map and Database Compilation (for discussion). Land Resources Research Centre under contract to GLASOD Project. Working Paper & Preprint no. 88/2. ISRIC, Wageningen. 141 p.
- (7) ISSS, 1988. Proceedings of the First Regional Workshop on a Global Soils and Terrain Digital Database and Global Assessment of Soil Degradation (20-25 March 1988, Montevideo). Ed. by W.L. Peters. SOTER Report 3. ISSS, Wageningen. 81 p. in English, 86 p. in Spanish.
- (8) ISSS, 1989. Proceedings of the Second Regional Workshop on a Global Soils and Terrain Digital Database (12-16 December 1988, Porto Alegre). Ed. by W.L. Peters. SOTER Report 4. ISSS, Wageningen. (in print).
- (9) Pulles, J.M.M., 1988. A Model for a Soils and Terrain Digital Database. Working Paper & Preprint 88/8. ISRIC, Wageningen. 32 p.
- (10) ISSS, 1989. Selection of a Geographic Information System (GIS) for SOTER. Final Report of a Sub-committee on GIS Selection. Ed. by B. MacDonald, LRRG, Canada. 7 p.
- (11) ISRIC, 1988. Project Proposal for a West African Soils and Terrain Digital Database (WASOTER). Ed. by L.R. Oldeman. ISRIC, Wageningen. 9 p. (in English and French).
- (12) ISSS, 1989. Report of a Workshop on Implementation Plan for North American Pilot Area of the SOTER Project (NASOTER)(6-9 March 1989, Ottawa). Ed. by M.F. Baumgardner. ISSS, Purdue (in print).

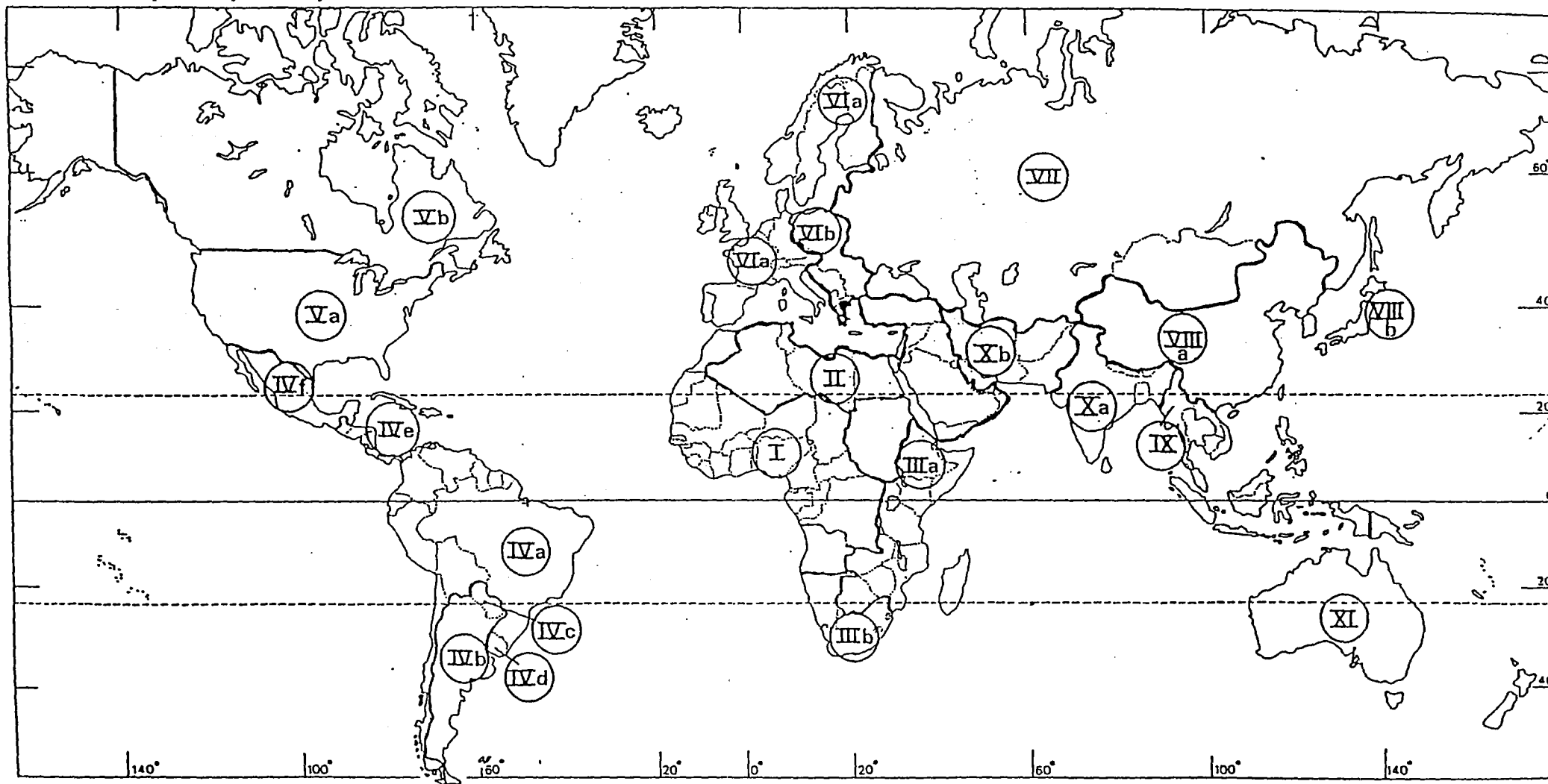
GLASOD REGIONS

I : West + Central Africa
 II : North Africa + Arab countries + Turkey
 *III^a : East and South East Africa
 III^b : Southern Africa
 *IV^a : South America
 *IV^b : Argentina
 *IV^c : Paraguay

IV^d : Uruguay
 IV^e : Central America
 *IV^f : Mexico.
 *V^a : USA
 V^b : Canada.
 VI^a : West + North Europe
 *VI^b : East + Central Europe

VII : USSR + Mongolia
 *VIII^a : China, North Korea
 VIII^b : Japan, South Korea
 *IX : Southeast Asia
 X^a : Indian Subcontinent
 *X^b : Iran + Afghanistan + Pakistan
 XI : Australia + N. Zealand +
 P. New Guinea + S. Pacific

Note: *: Maps + complementary data sets received on or before April 1, 1989



UNITED NATIONS ENVIRONMENT PROGRAMME

Project Document

Section 1

Project Identification

- 1.1 Title of Project: Global Assessment of Soil Degradation (GLASOD)
 1.2 Project number: FP/9101-87-88(2694)
 FP/4101-87-88(2694)
 FP/6101- " "
 FP/6201- " "
 1.3 Subject area: Multiline: GEMS(4101)/Soils(6101)/Arid lands
 and Desertification(6201)
 1.4 Geographical Scope: 10 Global
 1.5 Implementation: Supporting organization:
 The International Soil Reference and
 Information Centre (ISRIC), Wageningen in
 association with FAO, ISSS, STIBOKA, and ITC.
 1.6 Duration of Extension of GLASOD Project 8 months (i.e. an extension to a total duration
 from 28 months to 36 months).
 commencing January 1990
 completion August 1990
 1.7 Cost of Project (expressed in U.S. Dollars)

	Current Budget	Extension	
1.	Sept.87-Dec.89	Jan.90-Aug.90	%
cost to Environment fund	610.000	175.000	70
cost to ISRIC/SOTER/ISSS	280.000	80.000	30
Total	890.000	255.000	100

Section 2

Background

The International Soil and Reference Centre (ISRIC), Wageningen presented a mid-term progress report at a meeting in UNEP headquarters, Nairobi (April 1989) (see annex 1). The conclusions of this report are that the activities, as described in the Project Document, have been implemented without major problems and that preliminary reports received from cooperators in this project world wide indicate a strong support and great interest in GLASOD. A total of 21 regional institutions have contributed to the preparation of draft regional soil degradation status maps at an average scale of 1:5 M, while three national correlation teams in the first Latin-American pilot area of the World Soils and Terrain Digital Database Project (SOTER) have finalized the data acquisition phase. The accomplishments, conclusions and recommendations that were endorsed during the second regional workshop on GLASOD/SOTER, held in Porto Alegre, Brazil (December 1988) are attached as annex 2-A.

Section 3

Justification for Extension of GLASOD

The mid-term progress report made it clear that the time frame of 28 months to finalize all stages of the GLASOD/SOTER project is too limited for various reasons.

1. Soil Degradation Map at 1:10 M scale

With regard to the preparation of the global soil degradation map at an average scale of 1:10 M it should be noted that the project document suggested only 10 specific regions for which contracts will be let for the preparation of soil degradation maps. After discussions with the advisory committee and correspondence with various possible cooperators the number of regions increased to 21. Since subcontracts had to be established by correspondence inevitable delays occurred. Although the guidelines prepared for the preparation of these regional maps were considered sufficiently clear, the interpretation of the status of soil degradation is mainly done by the "expert system", which means that our cooperators have to verify their interpretations through communication with national soil experts. For this reason it is expected that the 21 regional soil degradation maps will be finalized not before June, July 1989. Although correlation and compilation activities have already started - a first draft soil degradation map for South America was presented during the April 1989 meeting in Nairobi - finalization of this important activity, which includes a final check and approval of the appropriate national government agencies is expected by the end of 1989. Considering the fact that the cartographic work and printing of the multicolored world soil degradation map and the preparation of a final document will take approximately four months the activities related to the preparation of a global soil degradation map can be completed not before May 1990.

2. Latin American Pilot Area for SOTER

With regard to the activities for the Latin American Pilot area a major aspect that needs to be considered is training of the local staff in the participating countries to use the created soils and terrain digital database. Before training materials can be developed a thorough assessment of currently available software systems (i.e. Geographic Information Systems) has to be made. It is expected that a specially appointed international ad-hoc committee on GIS-for-SOTER will give their recommendations for a GIS, suitable for the project by August 1989. A SOTER database has been structured using ORACLE5 and all data have already been entered. Digitization of the polygons can commence immediately after a GIS has been selected and the appropriate hardware and software is obtained. The final phase: testing of the database and producing interpretive maps on water erosion hazard, potential productivity, irrigable land etc. - can be carried out during the last quarter of 1989. Development of training materials and training of local staff can be done in the first half of 1990, provided that the necessary hard- and software has been acquired and installed in the three countries. In view of the legitimate desire of the Latin American countries for further implementation and expansion of the SOTER database and its utilization, this training aspect is considered very important.

3. Prospective future Pilot Areas for SOTER

Finally it must be mentioned that the project document indicate the need to implement the methodologies developed for the Latin American project, in other pilot areas. As indicated in the mid term progress report, ISRIC is already negotiating on behalf of the ISSS possibilities for a second pilot area in West Africa, which initiative is strongly supported by a number of international and national organizations working in this region. A third pilot area located in North America has recently been implemented, while the Priority Action PRogramme, Regional Activity Centre (PAP/RAC) is

considering to implement a SOTER pilot area activity in the Mediterranean Coastal Zone. It is expected that new project proposals for the West African and Mediterranean pilot areas will be formulated in late 1989 or early 1990.

4. Conclusion

The positive responses from international, regional and national agencies to the GLASOD/SOTER project; the need to develop a solid training programme for the use of the SOTER database; the desire to expand the SOTER database to areas outside the pilot areas; the prospect to test the methodologies in other pilot areas around the world, are major reasons to seek an extension of the present GLASOD project for another eight months.

GLOBAL ASSESSMENT OF SOIL DEGRADATION

Budget Proposal
8 months Extension January-August 1990
(in U.S. Dollars)

	UNEP	ISRIC/ISSS	STIB/ITC
10 Proj. Personnel Comp.			
1100 Proj. Personnel			
1101 Proj. manager	40.000 (8mm)	5.000 (1mm)	
1102 Proj. support	20.000 (6mm)	5.000 (1mm)	5.000(1mm)
1300 Adm. support			
1301 Adm. assistant		3.000 (2mm)	
1600 Travel			
1601 Travel	5.000	5.000	
1999 Comp. total	<u>65.000</u>	<u>18.000</u>	<u>5.000</u>
20 SUB Contract			
2100 Sub-contracts			
2103 Data processing	2.000	5.000	5.000
2107 Data correlation	10.000	4.000	5.000
2999 Component total	<u>12.000</u>	<u>9.000</u>	<u>10.000</u>
30 TRAINING			
3100 Developm. training mat.	5.000		3.000
3201 Workshop (Tr. course)	15.000		
3999 Component total	<u>20.000</u>		<u>3.000</u>
40 EQUIPMENT			
4200 Non expendable			
Hardware/software	78.000*	26.000**	
4999 Component total	<u>78.000</u>	<u>26.000</u>	
50 MISCELLANEOUS			
5104 Rental Premises		4.000	
5301 Communications		2.000	
5303 Others		3.000	
5999 Component total		<u>9.000</u>	
TOTAL	175.000	62.000	18.000

*) Hardware/software for the three Latin American countries

**) Hardware/software for ISRIC



International Society of Soil Science (ISSS)
Association Internationale de la Science du Sol (AISS)
Internationale Bodenkundliche Gesellschaft (IBG)
Sociedad Internacional de la Ciencia del Suelo (SICS)

**Proceedings
of the
Second Regional Workshop
on a
Global Soils and Terrain Digital Database
and
Global Assessment of Soil Degradation**

12-15 December 1988

at

Faculdade de Agronomia

UFRGS

Porto Alegre

Brazil



UNEP



ISRIC

Workshop organised in the framework
of the GLASOD project of UNEP-ISRIC

5.0 FINAL SESSION REPORTS

5.1 Accomplishments, Conclusions and Recommendations

1. Accomplishments.

1. The correlation teams have established an excellent regional cooperation and the activities as stated in the terms of reference have been executed on schedule.
2. All data on SOTER polygon files, terrain component files and soil layer files have been collected and polygon maps have been prepared. Climate files and soil degradation status files are being prepared and completed on or before the end of February 1989.
3. A second version of the Procedures Manual on Degradation Status and Risk assessment has been prepared and presented.
4. A database structure for the SOTER Attributes and the separate climate attributes has been created.
5. A first draft of a Geographic Information System approach for SOTER was presented.

2. Conclusions

1. A group of soil scientists with strong administrative support from each of the three participating countries has made a significant contribution to the implementation and testing of GLASOD/SOTER Procedures Manual for Small Scale Map and Database Compilation.
2. Although important progress has been made, continuous research and development is needed to further improve methodologies for soil degradation assessment at scale of 1:1,000,000.
3. Although the workshop was not originally included in the project document, it is concluded that for a correlation methodology assessment a workshop is essential at the end of the data acquisition phase of the project.

3. Recommendations

1. It is recommended and considered indispensable that support be solicited to acquire and install a basic hardware/software system in each of the three participating countries as soon as possible.
2. As soon as a decision has been taken on hardware/software, training materials have to be prepared and an appropriate training programme be implemented in the three participating countries.

3. Taking advantage of the acquired skills and valuable experience of the teams in the participating countries it is recommended that further plans be developed for implementation and expansion of the SOTER database and its utilization. These plans should be formulated by the three countries involved.

TABLE I SELECTED DESERTIFICATION INDICATORS.

TYPE	INDICATORS
PHYSICAL	<p><u>CLIMATE AND PHYSIOGRAPHY</u></p> <ul style="list-style-type: none"> a. Climate conditions for biological productivity (Kg of DM/Ha/yr/mm of rain) and climatic aggressivity b. Terrain i.e slope. <p><u>SOIL</u></p> <ul style="list-style-type: none"> a. Surface status (texture) b. Soil fertility i.e organic matter c. Soil structure d. Soil permeability e. Soil erodibility f. Soil salinization g. Soil alkalization h. Soil crusting <p><u>WIND.</u></p> <ul style="list-style-type: none"> a. Wind speed, direction and frequency b. Wind Erodibility c. Rating of potential soil loss d. Surface area covered by hummocks, % of area <p><u>WATER.</u></p> <ul style="list-style-type: none"> a. Status of Surface drainage systems. b. Type of erosion
BIOLOGICAL	<p><u>VEGETATION</u></p> <ul style="list-style-type: none"> a. Canopy cover (%) b. A bare-ground biomass prods (Kg/ha/yr) c. Key species : distribution frequency. <p><u>ANIMAL.</u></p> <ul style="list-style-type: none"> a. Key species b. Population c. Herd composition e. Production.

TYPE

INDICATORS

SOCIAL

LAND AND WATER USE.

- a. Pastoralism
- b. Dryland agriculture
- c. Irrigation
- d. Firewood
- e. Water
- f. Mining

SETTLEMENT PATTERNS

- a. Expansion of settlement and sedentarization.
- b. New and old types settlements
- c. Settlement abandonment.

HUMAN BIOLOGICAL PARAMETERS.

- a. Population structure and rates.
- b. Measures of nutrition status
- c. Public health indices

SOCIAL PROCESS PARAMETERS.

- a. Conflicts
- b. Migration
- c. Re-distribution patterns
- d. Marginalization
- e. Cash versus subsistence.

ANNEX 4. List of Documents received at UNEP, Nairobi (17-21 April, 1989)

1. Evaluation des Milieux Sahéliens 1952-1987. Etudes des Critères accessibles par télédétection transect Mauritanie-Mali, Rapport intermédiaire, IGN, ORSTOM, ICPZ, UNEP, Jan. 1989. (in french and english). (File GLASOD/WASOTER).
2. GRID Information Series, No.1. Criteria, Hardware and Software for a Global Land and Soil Monitoring System. Nairobi, 1981.
3. GRID Information Series, No.2. Report, Ad hoc Expert Group Meeting for Review of Hardware and Software Criteria for a Global Resource Information Database, Nairobi, 1983.
4. GRID Info. Series, No.10. UNEP/UNITAR Training Programme in G.I.S. in the field of Environment: Report on the first year training (1986-87). Nairobi, 1987.
5. GRID Info. Series, No.11. An Assessment of GEMS Global Monitoring Networks: Data Management and Linkages to GRID. Nairobi, 1987.
6. GRID Info. Series, No. 13. Guidelines for the Development of GRID-Compatible National Geographic Information Systems. Nairobi, 1987.
7. GRID Info. Series, No.16. Report of an Ad-hoc Expert Workshop on GRID System Architecture.
8. GRID Case Studies series No.1. Uganda Case Study: A sampler atlas of environmental resource datasets with GRID. Nairobi, 1987.
9. GRID Case Studies series No.2. Africa Elephant Database project: Final Report-Phase 1 + Maps. Nairobi, 1987.
10. GRID Case Studies. Nile Delta Case Study: Results. Nairobi, 1987.
11. Interagency Group on Desertification. Working paper for consideration of Desertification Assessment, monitoring and Mapping Activities currently undertaken by members of the working group as Preparation for General Assessment of Progress in Implementation of PACD. Nairobi, 1988.
12. GRID News. Volume 1, No. 1, 2, 3.
13. Reprints
 1. Preliminary Evaluation of the ERDAS System
 2. Listing of primary ERDAS User's located in developing countries
 3. GIS news. Aug. 1988. in Programmatic Engineering and Remote Sensing, Vol. LIV No.8.
 4. Topographic Database 6/88 (National Geographical Data Center)
 5. Gravity Database 6/88 (National Geographical Data Center)
 6. Potential Fields Satellite Database 6/88 (National Geographical Data Center)
 7. Bathymetry/Topography Data.
 8. SPANSth Version 4.0. Announcement.

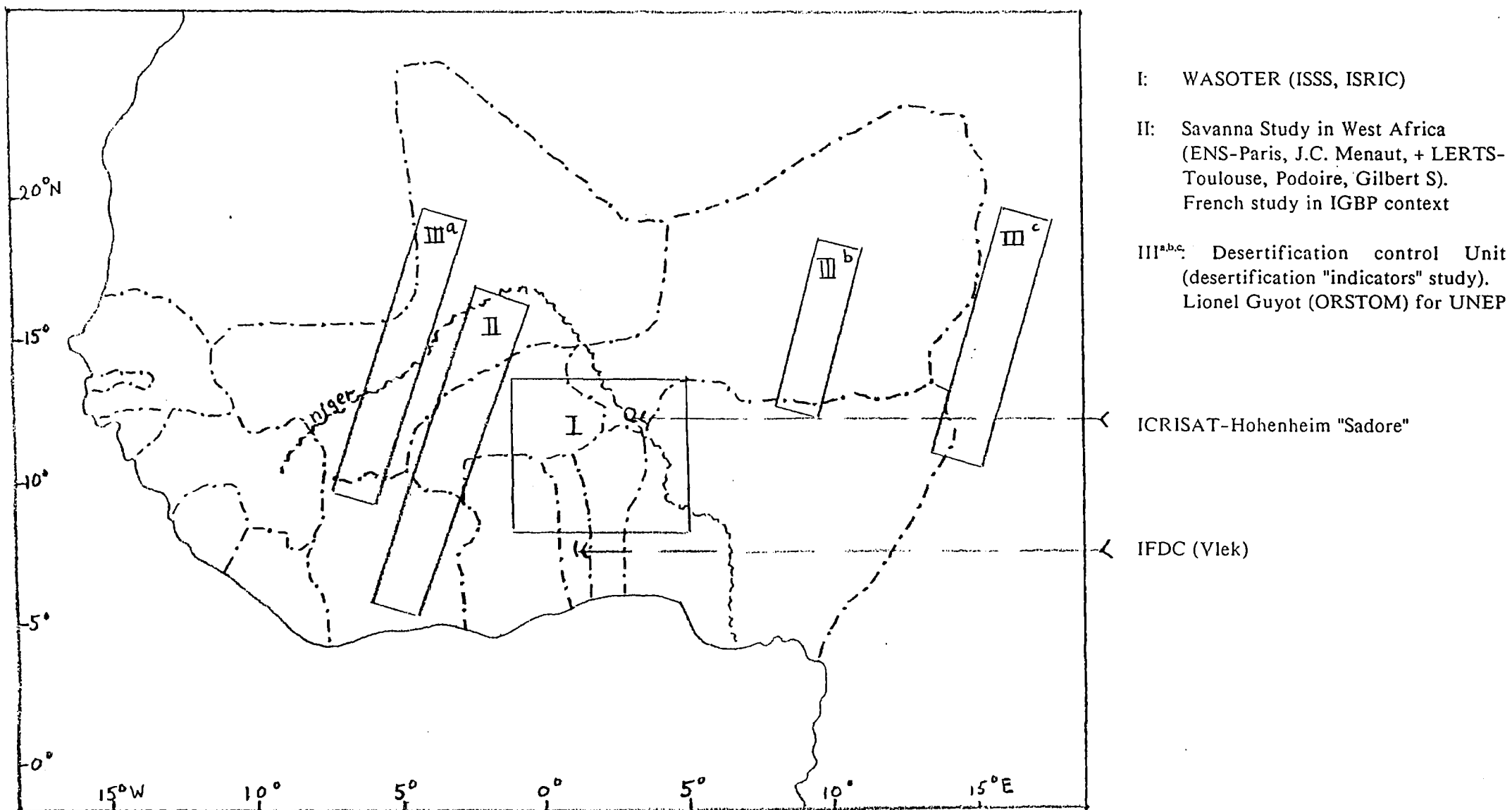


figure 1: Some project activities in West Africa

Visit to the Arab Center for the Studies of Arid zones and Dry Lands
(ACSAD)

Damascus 22-26 April 1989

L.R. Oldeman

- Purpose:
- 1) To discuss progress GLASOD, Region II
 - 2) To discuss possibilities for a SOTER pilot area in an arid zone
 - 3) To visit the International Center for Agricultural Research in the Dry Areas (ICARDA).

Saturday 22 April

According to Dr. Osman and Dr. Ilaiwi of the Soil Science Division of ACSAD preparation of the soil degradation map of region II can only be done satisfactorily through consultation with national experts in the various countries of region II ("Expert System"). They have requested the most up-to-date information and have received materials from most countries (except from North and South Yemen, Turkey, Algeria, and Libya). But this is expected shortly (after Ramadan). Compilation of the draft soil degradation map and matrix tables will be done during May, but it was agreed that the final deadline would be not later than 15 June 1989 for the submission of the map, matrix tables and technical report. The report of region III^A (East and Southeast Africa) prepared by STIBOKA (Hakkeling) was left as example.

ACSAD is very interested to coordinate a SOTER pilot area in the arid region. Presently ACSAD has carried out the mapping of various types of environmental information - geology, geography, soils, climate, vegetation - for the Hamad Basin Project, which includes portions of Syria, Jordan, Iraq, and Saudi-Arabia, at a scale of 1:1 M. A topographic map of the project area was received. Major problems in this area are salinization hazards. ACSAD indicated that a SOTER project could commence as soon as there is an agreed project proposal. Further discussions will be held with ICARDA.

A three-day field trip is organized to visit areas with problems on wind erosion and salinization (see figure 1). Dr. Ilaiwi will accompany me on this trip. A brief visit was also made to the soil lab of ACSAD, where Dr. Tcukama Moheigh is in charge. The lab seems to be well equipped. It serves mainly as a training centre for Arab nationals.

Sunday 23 April

Damascus to Deir ez Zor along the Euphrate river, via Palmyra. The Damascus plain is relatively fertile and with adequate irrigation fruit- and nut-trees (mainly olives and walnut) can be cultivated, often mixed with a barley crop. Once outside the plain one enters an undulating landscape with mainly calciorthids. Along roadcuts one observes that a sandy subsoil is covered by a calcic horizon, which is solid and serves as a protective cover against wind erosion. Vegetation is sparse but wind erosion is slight except at some spots where the calcic pan is broken (road cuts). Beyond Palmyra the situation changes dramatically. In many places the government has tilled the soil and sown barley in the expectation that there will be sufficient rainfall like the previous year. Unfortunately this year winter

rainfall was very low and consequently the development of the cereal is minimal. Harvesting will be impossible. As soon as the sheep move in to graze the barley crop severe wind erosion is expected. Off-site effects of wind erosion become more and more apparent. There is a very fragile environmental balance. As long as the land is left alone the natural vegetation cover will prevent wind and water-erosion. But even in this very dry region - rainfall is less than 200 mm per year - water erosion occurs as soon as the vegetation is removed. Ilaiwi indicate that he tries to fight this government action to cultivate the soils, but without results. The salinization problem in the Euphrate valley - a width of approximately 10 km - is very serious. Many agricultural lands are abandoned as the salinity of the soil has reached a very high level. Crop stands are very poor. Salt crusts are seen everywhere. A french project has installed drains to pump out the salty groundwater, but these drains are three kilometres apart and the effect is nihil.

Monday 24 April

Visit to upper terraces of the Euphrate, North of the valley. Hypergypsic gipsyorthids (Ilaiwi classification) and Petrogypsic gipsyorthids. The very thin topsoil is covered by hardly visible grass cover, grazed by thousands of sheep. As annual rainfall increases somewhat (± 250 mm) and last year there was above normal rainfall. Thousands of hectares are cultivated for a cereal winter crop. As rainfall is below normal this year the crop looks extremely poor. Severe wind erosion can be expected this summer. Wind erosion was also severe last year after harvest. Off-site effects could be seen everywhere. (The railroad track from Al Hasakah to Deir ez Zor; overblowing of Bedouin settlements; overblowing of standing crop). Ilaiwi indicated that he has proposed to Ayoub a project in this area with the intention to stop these actions of the government. He has made a video clip of the problems in this area. Return to Euphrate valley, visit to the huge reservoir and dam in the Euphrate, West of Ar Raqqa and overnight stay at Aleppo.

Tuesday 25 April

Visit to ICARDA, some 30 km South of Aleppo. Discussions with Dr. Peter J. Cooper - Program Leader / Soil Physicist, Farm Resources Management Program, and Dr. Hazel Harris, Soil Water conservation scientist. Hazel showed rainfall statistics, with indicates that the January + February rainfall is around 100 mm. In 1988 rainfall was about 180 mm, while this year total rainfall for January + February was only 20 mm (see figure 2). After a brief introduction on the general aspects of SOTER we discussed the feasibility of a pilot area in this region. ICARDA would be a potential user of the database, particularly an interest to assess soil degradation. They wondered what models we are using. I explained that the SOTER project is in a test phase and that we have not yet selected an agreed methodology. ICARDA is conducting case studies to assess water erosion in western Syria. Mr. Wolfgang Goebel (agroclimatologist) has developed weather generation models. These could be linked to the climate database of SOTER. ICARDA would give full support to a SOTER initiative. The tentatively proposed area - a transect from Turkey in the North to Saudi Arabia in the South is considered very interesting both by ICARDA and by ACSAD (see figure 3). Roel will prepare a condensed summary for a MESOTER (Middle East SOTER) to

be send to ICARDA and ACSAD for their formal reply. Copies will also be send to Ayoub (UNEP). ICARDA and ACSAD will prepare a list of ongoing projects and activities in the proposed transect.

A final discussion was held later in the evening with Osman and Ilaiwi. The GLASOD region II will definitely be finalized before 15 June, but some results will be sent earlier. Osman was very pleased with ICARDA's support for MESOTER. He will briefly report this to Ayoub during his meeting in Split (Yugoslavia), for the Mediterranean project on water erosion mapping. Finally I received six soil samples with request for 1) texture and CEC analysis and 2) mineralogy of clay, silt, and sand fraction by the ISRIC laboratory.

Documents/maps received:

1. Soil map of Syria and LEbanon, scale 1:1 M, by Ilaiwi, 1985.
2. Topographic map of the Haman-Basin Project, scale 1:1 M, 1983.
3. Plan of Action to combat desertification in Syria. UNEP/ACSAD, 1987.
4. ICARDA. Annual Report 1987.
5. ICARDA. Farming Systems Program. Annual Report for 1986, 1987, 1988.

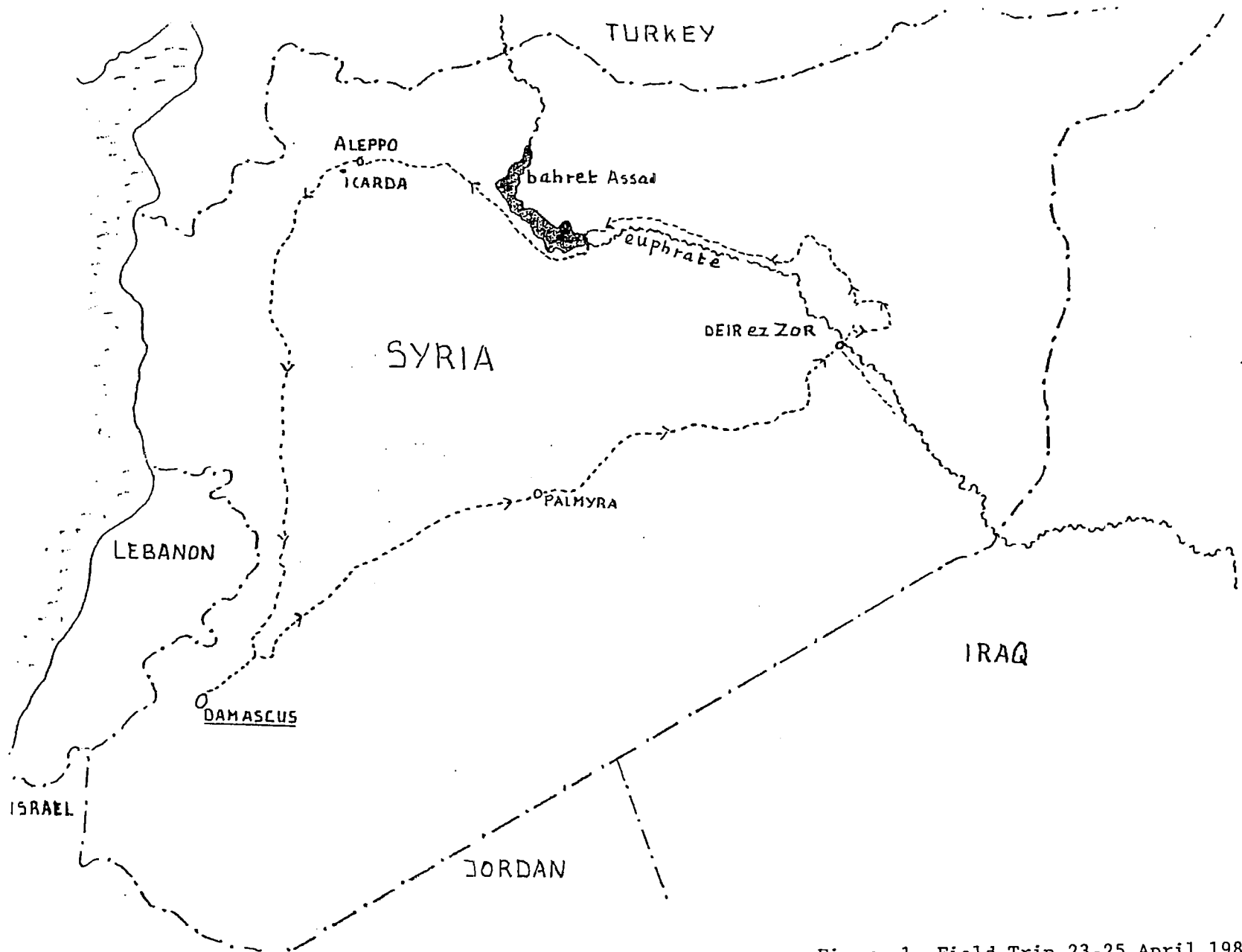


Figure 1. Field Trip 23-25 April 1989

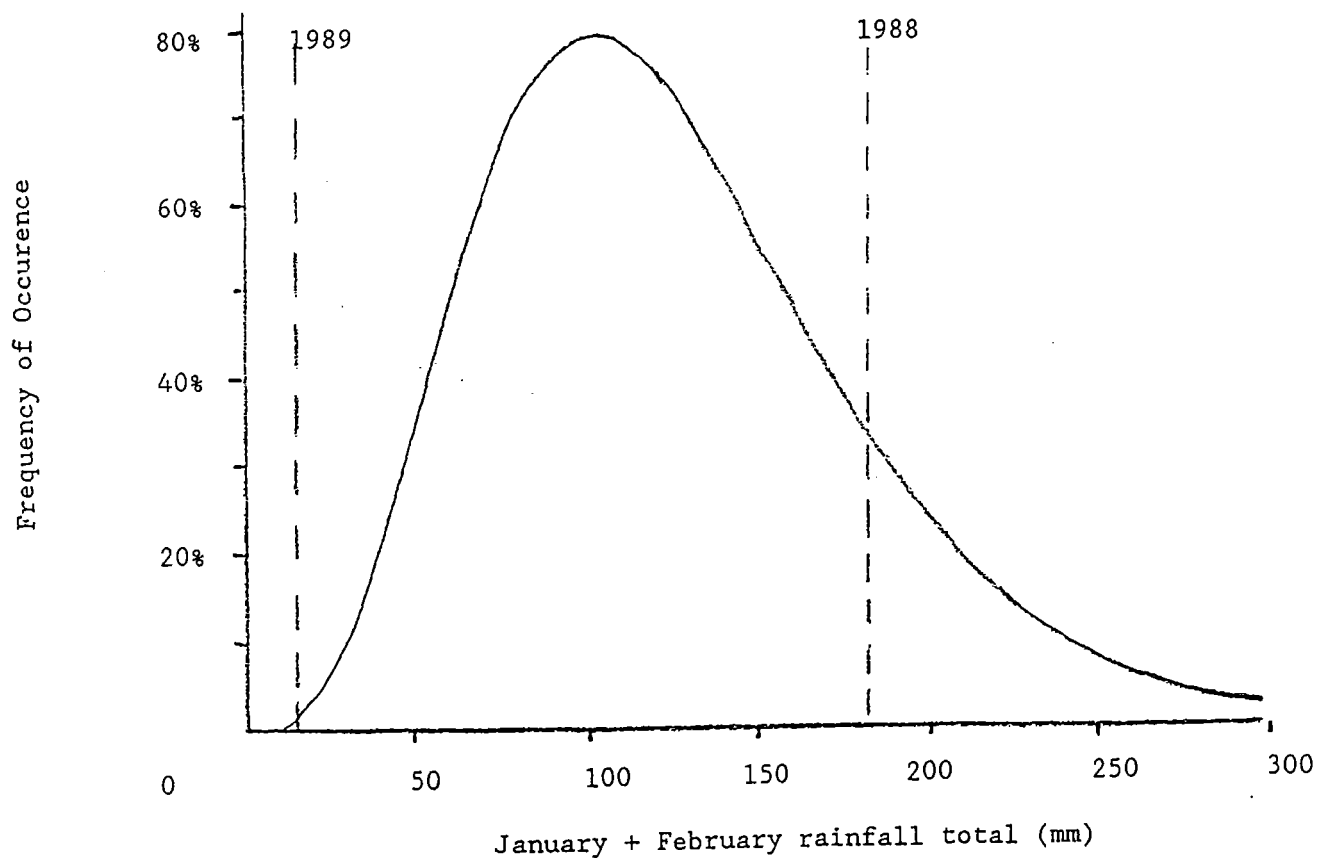
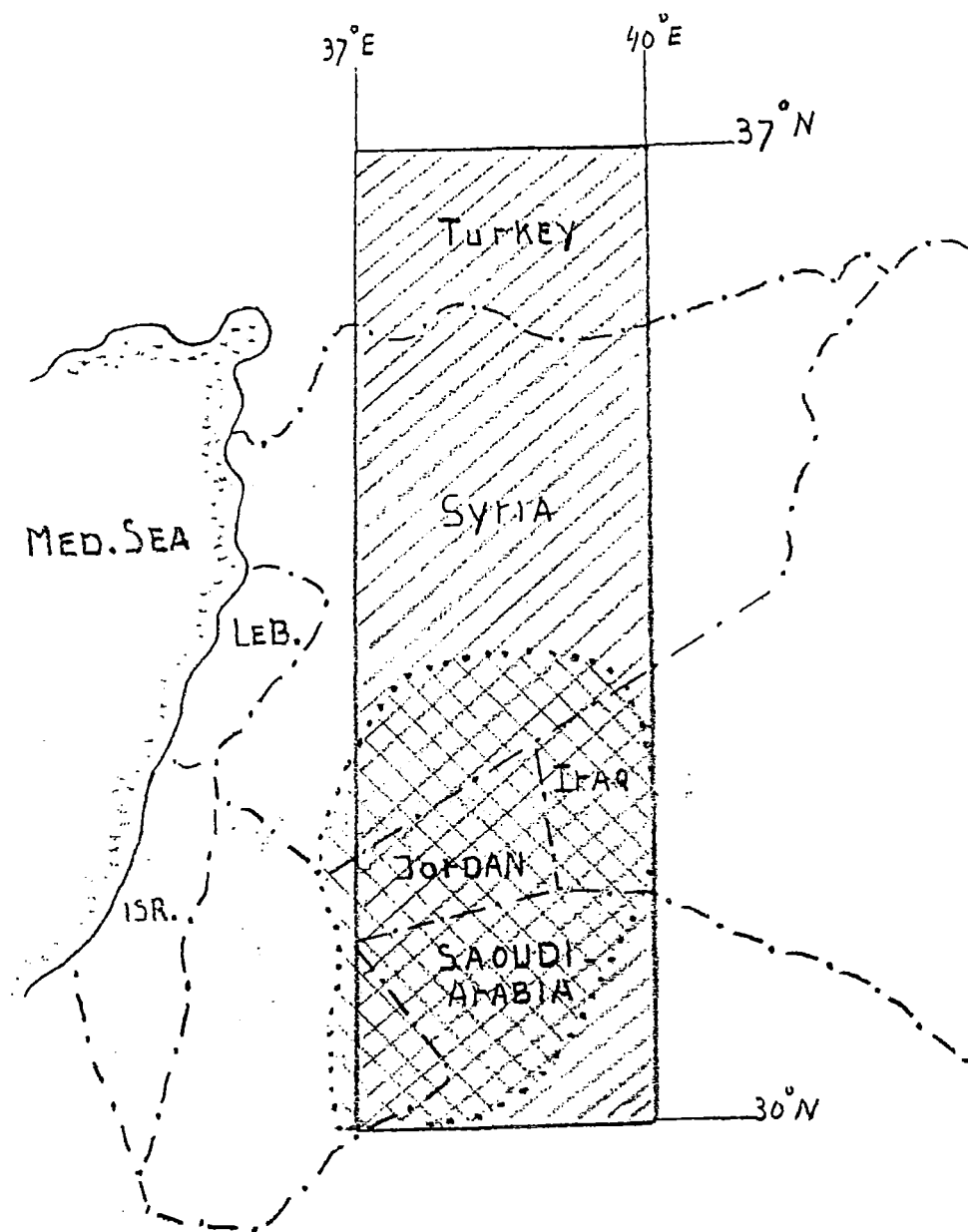
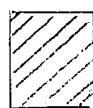


Figure 2: Relative frequency of total rainfall amount in January + February at Aleppo, Syria. Vertical dashed lines show the position in the distribution of the 1988 and 1989 seasons (Source, ICARDA 1989).



Hamadan-Basin Project area



Proposed Pilot area

Figure 3. MESOTER Pilot area transect (suggested).