

**International Conference on  
“Soils under Global Challenge - a Challenge for  
the 21<sup>st</sup> Century”  
Constanta, Romania, September 3 - 10, 2002**

**European Community, Directorate-General Research -  
Accompanying Measure (Grant agreement)  
QLK5-CT-2002-30169**

The Conference was planned by this Institute taking into account the present growing interest on various aspects of environment quality, protection and sustainability. Within this larger scope, problems of soil degradation, desertification, drought, as well as related problems of global climatic changes, are important for land use, agriculture, forestry, and finally for food security of a growing world population. Research in various field of science and in different parts of the world are contributing to a better knowledge of the above mentioned problems, and exchange of research results is a pre-requisite for a better development of any science.

The origin of this Conference was, to a large extent, two FAIR and INCO-COPERNICUS Concerted Actions on Subsoil Compaction, carried during 1998 - 2001 and bringing together most European countries. Both Concerted Actions, as well of the Conference itself, were financially supported by the European Union.

*The main topics of the Conference included:*

1. Physical degradation processes: water and wind erosion, compaction, structure deterioration, crusting, aridisation, waterloggig, etc.
2. Chemical degradation processes: pollution, salinity, sodicity, acidification, humus and nutrient deficiency, toxicity.
3. Desertification in arid and dry-subhumid environments.
4. Drought under various soil and management conditions, inter-relations with farming and environment.
5. Global climatic changes, contribution of land use to emission of greenhouse gases from soils, farming practices and environment, carbon sequestration.

*Partners of the EC Grant Agreement were:*

- Research Institute for Soil Science and Agrochemistry, Bucharest, Romania, Prof. Mihail Dumitru
- Szent Istvan University, Gödöllő, Hungary: Prof. Laszlo Vermes.
- Alterra, Green World Research, Wageningen, The Netherlands: Ir. J.J.H. van den Akker.
- European Soil Conservation Society, Valencia, Spain: Dr. Jose Luis Rubio.
- Institute of Natural Resources and Agrobiolgy, Seville, Spain: Dr. Diego de la Rosa.
- Catholic University, Leuven la Neuve, Belgium: Dr. Bas van Wesemael.
- National Institute of Meteorology and Hydrology, Bucharest, Romania: Dr. Vasile Cuculeanu.
- Romanian Branch of the International Soil Tillage Organisation: Dr. Elisabeta Dumitru.
- Ovidius University, Constanta, Romania: Dr. M. Enciu.

**Conclusions of the International Conference**  
**“Soils under Global Change - a Challenge for the 21<sup>st</sup> Century”**  
**Constanta, Romania, September 3 – 6, 2002**

More than 200 scientists from 31 countries were registered for the Conference, and 130 abstracts of papers were published. The Program of the oral sessions included 56 papers, and the one of the poster sessions 74 papers. Substantial discussions took place concerning all these papers.

A mid-conference tour allowed the participants to know the Valu lui Trajan Agricultural Research & Development Station, 70 years old. Long term field experiments on mineral and organic fertilisation and use of waste dried mud from swine feedlots, as well as more recent experiments on conservation tillage and soil compaction, were visited and discussed.

The post-conference tour (September 7 – 10, 2002) allowed participants to visit several areas where significant initiatives on nature conservation and sustainable planning were done. The National Research & Development Institute of the Danube Delta, and the delta itself, one of the largest wetlands still existing in Europe, was the first of these objectives. A recently reclaimed and drained polder in the Danube Floodplain was visited, and problems concerning salt-affected soils were presented at the Research & Development Station Braila. Areas with various soil erosion problems were examined at the Research & Development Station for Soil Erosion Control in Perieni. Characteristics of local soils in all these areas, possible deterioration or improvement resulting from specific management practices, field experiments and their results, were presented and subject to detailed discussions.

The coincidence in time and objectives with the International Earth Summit in Johannesburg has been mentioned during the Conference, and decisions taken in Johannesburg will have to be considered in further development of research in the field of land degradation.

It was mentioned that the origin of this Conference was coming from the earlier European Union Concerted Actions on Subsoil Compaction (under the FAIR and respectively the INCO-COPERNICUS Programs), even if a much larger scope was included here.

The Conference proved to be a good opportunity to emphasise the importance of soil quality, of the risks for its degradation through various and often serious processes in the present state of technical, demographic, economic and social conditions. At the same time, solutions for prevention and/or mitigation of these processes, as well as for rehabilitation of degraded soils, i.e., for a sustainable use of soils, all these solutions being of great interest for both farmers and decision makers, were presented and discussed. Further spread of soil degradation and lack of rehabilitation were shown to represent a serious risk for food security, for development of a clean environment, and finally even for social and political stability. The European Union new strategy for agriculture and environment was also presented and discussed.

Results of many discussions taking place during the Conference proved that soil degradation processes, of different kinds and with different intensities, are present all over the World, in any climatic and landscape environment, in developed, developing and undeveloped countries. Solutions to deal with soil degradation should certainly be different, specific to each of these particular conditions. As this Conference was organised in a country now

changing from one economic system to another one, and as many of the participants came from other countries being in the same situation, it became obvious there are in such cases specific and often difficult problems.

Papers presented at the Conference dealt with almost all important kinds of soil degradation. Water and wind erosion, landslides, waterlogging and flooding, aridisation, salinity and sodicity, compaction and structure deterioration, humus and nutrients deficiencies, acidification and alkalisation, pollution with various contaminants have to be mentioned. Problems related to drought, climate change, greenhouse gas emission, carbon sequestration and desertification, and their relations with soil quality and soil degradation, were also presented and discussed.

The main conclusions of interest for scientists, farmers and decision-makers may be summarised as follows:

1. Land use shall be reshaped in many areas where arable or unproductive utilisation is located on marginal land. Such reshaping should mainly mean afforestation (reforestation), in some cases returning their use to rangeland or even to wetland, but without rewetting land of good quality for use in agriculture. As a general recommendation, new land use planning with emphasis on the multifunctional character of soil resources should be considered. The set aside system in the European Union or the Conservation Reserve Program in the USA are examples that should be considered. Locally adjusted techniques for a proper management of set aside land are needed. The terms of set aside land and abandoned land should be more precisely defined and the differences between these terms have to be better taken into account. Financial difficulties and especially high density of rural population in most developing or undeveloped countries make almost impossible for the time being the application of such solutions, and consequently legislation and programs have to be adjusted to specific conditions of various countries.
2. Current management of land, especially of cropland, adequate to local conditions, should be selected with a view of maintaining or improving the soil quality is as much essential as the earlier mentioned practice. Such practices should have a much larger extent, used not only on marginal and other specific kinds of land, but generally applied. Adequate fertilisation, using both mineral fertilisers according to soil testing, without excessive amounts producing soil or groundwater pollution, and all available organic manure, is one of these practices. Tillage systems adequate to each kind of soil, and extension of various conservation tillage systems, are other such practices. Ground traffic has to be restricted as much as possible to periods when soils have an optimum moisture content. Mixed weed elimination and plant protection, combining chemical and non-chemical practices, should allow to deal with these problems without producing soil pollution or inadequate crop products.
3. New practices of a more substantial character are needed in some specific cases. Land consolidation and land planning making possible contour farming on sloping land and, respectively, elimination of excess water on flat land with perched waterlogging is one of these practices. It is of interest mainly for many countries where the structure of land property and land tenancy is excessively fragmented. Of course, solving this problem is unfortunately strongly related to social conditions of these countries and it has to be based on acceptance of the affected landowners. Irrigation, drainage and other agricultural engineering projects are another group of solutions to be considered in areas affected by drought or, respectively, by flooding and waterlogging. A careful examination of costs, of

possible additional outputs, of expected profit, of frequency of years with different weather conditions, a good correlation with environment and ecological problems, and especially the existence of an effective interest of local farmers, have to be analysed before deciding on implementation of such projects.

4. The participants to the Conference considered that problems of soil degradation and protection should have a more extended place in the European Union strategy. Concerning research, such an extended place should have these problems in the 6<sup>th</sup> Framework, enabling development of co-operation between all countries of the European Union, of Central and Eastern Europe, of the Newly Independent States. Several papers presented at the Conference showed that many data on soils are available in these latest parts of the World and should be more widely used. Differences in natural and social conditions in various parts of the World are important in developing techniques for soil conservation. Examples among many others: emission of methane is a problem in paddy soils, while emission of carbon dioxide is a problem in areas where deforestation takes place. And, climate changes could lead to negative effects in many areas, but also to positive affects in some other areas.
5. The multidisciplinary character of research in soil degradation and soil protection was clearly resulting from the Conference. Soil, climate, vegetation, management of agricultural and forestry land all contribute to these processes and practices, and co-operation between these fields of science should be developed. An approach more clearly emphasising the holistic and systemic, approach is necessary. Such an approach should include consecutive steps referring to an early warning of possible degradation processes, a real forecast concerning these processes in various areas, followed by implementation of adequate prevention measures. There is a need for further development of modern computer-based techniques, as data bases, geographical information systems, decision support systems, simulation modelling. Increase of public awareness about soil resources, their quality, risks of degradation, prevention, mitigation and rehabilitation is important. In every country new legislation, including technical and financial support from different sources, but also penalties, should be considered.

Recommendations mentioned above are certainly resulting from the experience of the participants as scientists, their mainly interest being related to the technical aspects of the studied problems. The Conference is at the same time stressing on the fact that application of these recommendations shall at the same time take into consideration macro-economic, as well as social and political elements, and that decision-makers should carefully examine these aspects before proceeding to final actions.

## Publications

Most of the papers presented at the Conference have been published in two volumes, ca. 700 pages), including 76 papers with authors coming from 20 countries. All topics originally planned are represented in the Proceedings, and as for some topics there was a significant number of papers, they were subdivided.

### *Editorial Board:*

- Canarache, Andrei (Romania)
- De la Rosa, Diego (Spain)
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- Enache, Roxana (Romania)
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- Rubio, Jose Luis (Spain)
- Van en Akker, Jan J, H. (The Netherlands)
- Van Wesemael, Bas (Belgium)
- Vermes, Laszlo (Hungary)

### *Sections of the Conference Proceedings:*

1. Soil degradation and desertification – concepts, policy, methodology (6 papers)
2. Soil degradation risk, impact and prevention – case studies at country and local level (11 papers)
3. Global climatic changes, greenhouse gas emission, influence on soil cover (8 papers)
4. Drought – effects and mitigation (5 papers)
5. Soil pollution – processes, prevention, reconstruction (12 papers)
6. Soil nutrients depletion, degradation of other soil chemical properties – processes and impact (5 papers)
7. Soil compaction – relations to soil tillage, processes, prevention, re-loosening (10 papers)
8. Soil structure and other soil physical properties – degradation and improvement (11 papers)
9. Soil erosion – processes, modelling, control (8 papers)

### *Invited papers presented and published in the Proceedings are:*

- Blum W. (Austria): *Soil and international conventions.*
- Varallyay G. (Hungary): *Global change - soil degradation processes and their management.*
- Tejwani G. K. (India): *Perspectives of soil & water conservation in the developing countries.*
- Dumitru M., Ciobanu C., Manea A., Carstea S. (Romania): *Land and soil quality monitoring in Romania.*
- Voplakal K., Novak P. (Czech Republic): *The content and fractional composition of the phosphoric acid, its transformations and its plant available forms content in the main soils representative of Czech Republic.*
- Van den Akker J. J. H. (The Netherlands): *Prevention of subsoil compaction by using the carrying capacity concept.*

- Horn R. (Germany): *Strain - stress effects in structured unsaturated soils on coupled mechanical and hydraulic processes.*
- Popa N., Purnavel G., Filiche E., Petrovici G. (Romania): *Choosing the input parameters of soil erosion models.*
- Vermes L. (Hungary): *Importance of international actions and co – operation for drought mitigation.*
- Van Wesemael B. (Belgium): *Evolution of soil carbon stocks as a result of historical land use change: a case study from the Belgian Ardennes.*

**Proceedings may be ordered at:**

*Research Institute for Soil Science and Agrochemistry, Bd. Marasti 61, Bucharest 71331, Romania; Tel. +40-1-2241790, extension 268; Fax: +40-1-2225979; E-Mail: [r.enache@icpa.ro](mailto:r.enache@icpa.ro)*

*Cheques may be sent to the address above.*

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