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JUNE 2017  
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LLEIDA, SPAIN

1ST WORLD CONFERENCE  
**CONSOWA**




SUSTAINABLE LIFE  
ON EARTH  
THROUGH SOIL  
AND WATER  
CONSERVATION

SOIL  
AND  
WATER CONSERVATION  
UNDER GLOBAL CHANGE

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1ST WORLD CONFERENCE  
ON SOIL AND WATER CONSERVATION  
UNDER GLOBAL CHANGE  
(CONSOWA)  
*"Sustainable Life on Earth through  
Soil and Water Conservation"*



ESSC EUROPEAN SOCIETY OF SOIL CONSERVATION

WASWAC

ISCO International Soil Conservation Organization

EGU European Geosciences Union

SOIL AND WATER CONSERVATION SOCIETY

IUSS International Union of Soil Sciences COMMISSION 2 - "Soil and water conservation CONSERVATION 2A - Soil Welfare Unit"

IECA International Centre for Conservation

SECS Sociedad Española de la Ciencia del Suelo

ICIA Secció de Sòls

WASER

Universitat de Lleida

International Union of Soil Science

International Decade of Soils 2015-2024

Diputació de Lleida

## FINAL REPORT AND CONCLUSIONS

The 1<sup>st</sup> World Conference on Soil and Water Conservation under Global Change was held from 12-16 June 2017 in Lleida (Spain). For the first time, all the main World Scientific Organizations promoting wise and sustainable use, management and conservation of the main natural resources, soil and water, responsible for maintenance of life in Earth, have decided to have a joint Conference, called CONSOWA.

**The 1st World Conference on Soil and Water Conservation under Global Change (CONSOWA), was a joint Conference of the “International Soil Conservation Organization” (19th ISCO Conference), the “World Association for Soil and Water Conservation” (WASWAC International Conference), the “European Society for Soil Conservation” (8th ESSC Congress), the “International Union of Soil Science (IUSS-Commissions 3.2, 3.6), the Soil and Water Conservation Society (SWCS), the “International Erosion Control Association”(IECA) and the “World Association for Sedimentation and Erosion Research“(WASER) in parallel with the VIII Simposio Nacional sobre Control de la Degradación y Restauración de Suelos (SECS)**

The main objectives of the **1st World Conference on Soil and Water Conservation under Global Change (CONSOWA)** were:

- To analyze the present and previewed future situation, at World-wide level, of the conservation of the soil and water resources, as influenced by Global Changes, including population growth and development, changes in land use and management, and human induced climate changes. This situation would be analyzed and discussed taking into consideration the close and critical relation of the use and management of the limited soil and water resources with present and future climate changes, natural disasters, and with food and water supply for an increasing World population.

-To promote an increased collaboration, and even a full integration of their activities, to reach their goals more efficiently, of the main scientific international organizations promoting soil and water conservation research and activities at Worldwide level.

which were mainly fulfilled.

The Conference was carefully organized during the last two years, after having the approval of sponsorship from the different International Organizations and from the Spanish Soil Science Society (SECS), when they were approached by Prof. Ildefonso Pla, who took the responsibility for the organization. The following step was to get the approval of the Universitat de Lleida (UdL), and its Foundation, and from the Department of Soils and Environmental Sciences (DMACS) of the UdL. The Organization Committee was mainly composed by members of the DMACS-UdL, namely:

**PRESIDENT AND GENERAL COORDINATOR : Ildefons Pla Sentís**  
**INSTITUTIONAL COMMISSION COORDINATOR: Jaume Porta**  
**SCIENTIFIC COMMISSION COORDINATOR: Rosa Poch**  
**PROGRAMMING COMMISSION COORDINATOR: Angela Bosch**  
**FIELD TRIPS COMMISSION COORDINATOR: J. Carles Balasch**  
**PUBLICATIONS COMMISSION COORDINATOR: Rosa Poch**  
**EXHIBITIONS COMMISSION COORDINATOR: J. M. Villar**  
**ADMINISTRATIVE COMMISSION COORDINADOR: Ildefons Pla and Fundació UdL**  
**ORGANIZING COMMITTEE SECRETARY: Clara Llena**  
**CONFERENCE SECRETARY: Mariona Puigdevall and Marta Iglesias**

Thanks to all of them and their collaborators, we have been able to organize this very complex Conference, which has been very well qualified by most of the participants.

Afterwards, we got the important collaboration of the European Geophysical Union (EGU) Meeting Support Program, of the IUSS Stimulus Fund and of the IUSS Division 3, of the ESSC Grants Program, which allowed us to finance scholarships, including registration fees, to a group of bright young researchers, mainly from developing countries, and to cover registration fees of some keynote speakers from developing countries. Some of the young researchers from developing countries also got free lodging in the UdL dormitories.

Some collaborations from local Organizations, and specially from the Diputació de Lleida, the Paeria de Lleida, the Institut Geologic de Catalunya, the Consell Catala de la Producció Integrada, AKIS International, and the Cabildos of Lanzarote and Fuerteventura Islands, also contributed to the success of the Conference.

Although initially we have previewed an attendance of 300-350 participants, based on the people that had manifested their interest and intention to participate, submitting on time short abstracts, finally the number of registered participants was close to 250. This reduction in number could be mainly attributed to cancellations for different reasons, among them difficulties to get entry visas (at least 60) and to get financing from their Institutions. For future conferences, it would be necessary to take into consideration those increased limitations, which will decrease the number and countries of origin of participants. In our case, those limitations to get entry visa, apparently were not solved in many cases even with our invitation letters, certifying the reception and approval of the submitted paper, for oral or poster presentations. Still, with all those limitations, we were able to have participants from **34 countries of all continents**, including: **Argelia, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chekia, China, Chile, Colombia, Costa Rica, France, Germany, Hungary, Italy, Iran, Japan, Jordan, México, Mozambique, Paraguay, Peru, Portugal, Rumania, Rússia, Serbia, Spain, Switzerland, Taiwan China, Turkey, UK, USA, and Venezuela.**

In any case, the number of participants and represented countries was much higher than in other conferences organized separately by the different Organizations sponsoring CONSOWA in the last two years, where the number of foreign participants and represented countries did not exceed in most of the cases 50 and 12 respectively.

It is worth to mention that in CONSOWA we had a large participation of young researchers, including PhD students (30% of the total number of participants), thanks to the very reduced registration fees for them, and thanks to the high number of scholarships, covering registration fees and in some case lodging, with funds provided by IUSS, EGU, ESSC and UdL.

The program of the Conference **included 19 invited keynote plenary lectures, 87 oral presentations in 13 sessions, and 104 poster presentations in three daily sessions.** Besides there were programmed two discussion sessions, with the following objectives:

**Discussion Session 1:** Analysis and recommendations to change present limitations for the Study and research of soil and water degradation processes and in the application of prevention and remediation practices.

**Discussion Session 2** (Activity dedicated to the International Decade of Soils (2015-2024) proclaimed by IUSS): Analysis and setting the challenges and required achievements in the next decade, to prevent and counteract the previewed effects of global changes on soil and water degradation processes, and effects on food and water supply for the increasing World population, on the environmental degradation and on natural disasters

Additionally, there were programmed 7 field trips, one pre-conference, one post-conference and five during the conference, to visit and observe different systems and practices of land use and management, and of soil and water degradation processes and effects, both under dry-land and irrigated conditions.

The keynote lectures were a very important part of the Conference, with lecturers purposely selected, based on their recognized experience, research and responsibilities, at World or regional levels, in the central topics of CONSOWA. They included:

**RATTAN LAL (USA)** "Soil and Water Conservation to Mitigate Climate Change and Advance Food and Nutritional Security".

**ZHAOYIN WANG (CHINA)** "Two thousand years debate and practices of sedimentation management of the Yellow River".

**WINFRIED BLUM (AUSTRIA)** "Threats to soil and water conservation - general developments and future scenarios, a worldwide perspective".

**WALTER PENGUE (ARGENTINA)** "Mining Soils in the Argentinian Pampas: Hidden costs derived of technological intensification in industrial agricultural models"

**JOSÉ LUIS RUBIO (SPAIN)** "New perspectives for soil conservation in today global transition scenarios".

**FERNANDO DELGADO (VENEZUELA)** "Soil-water-climate management and conservation systems in ancient cultures of Tropical Latin America".

**GUSTAVO MERTEN (BRAZIL)** "Soybean expansion in Brazil: land use changes and soil management challenges".

**MIODRAG ZLATIC (SERBIA)** "Socio - economic issues of torrential flooding prevention".

**SAMIR A. EL SWAIFY (USA)** "Diagnostic Criteria for Soil Degradation — Necessary Distinctions for Tropical Environments".

**LI RUI (CHINA)** "Preliminary Functions of Soil and Water Conservation Practices for Climate Change Mitigation and Adaptation in China".

**MIQUEL ARAN (SPAIN)** "Role of inorganic and organic fertilizers on soil degradation. Case of the intensive arable land in Western Catalonia (Spain)".

**MARK NEARING (USA)** "The Rangeland Hydrology and Erosion Model".

**CARMELO DAZZI (ITALY)** "Anthropogenic soils and soil security: environmental and economic consideration".

**ARTEMI CERDÁ (SPAIN)** "Fire effects on soils and on erosion processes".

**FENLI ZHENG (CHINA)** "Soil erosion, soil quality and crop yield in the Chinese Mollisol region".

**ROY SIDLE (AUSTRALIA)** "Dynamic environmental controls on rainfall triggered landslides".

**ILDEFONSO PLA (SPAIN)** "New advances in the evaluation of salt-affected soils under dryland and irrigated conditions".

**WANG FEI (CHINA)** "Impacts of re-vegetation on surface soil moisture over the Chinese Loess Plateau and new challenges of soil and water conservation".

**BERND LENNARTZ (GERMANY)** "Nutrient export patterns from artificially drained lowland catchments"

Their presentations covered, and even surpassed our expectation, and from them, and the discussion generated, we may extract the following conclusions:

- Most of the present and previewed at medium term problems derived of soil and water degradation and their effects, at Worldwide level, may be mainly attributed to pressures derived of population growth and development, and to social, economic and marketing factors.
- Nowadays, besides surface erosion processes, are other soil degradation processes like mass erosion, soil organic matter and nutrient depletion, soil and water contamination and salinization, soil compaction, etc, which in many cases have more direct influence on critical derived effects related to food and water supply for an increasing population, and on natural disasters like droughts, sedimentation, flooding, etc, causing increasing human and economic losses
- The adoption of what usually are considered "standard", of universal application, land conservation systems and practices, like bench terracing, zero tillage, etc, without considering the specific conditions (soil, climate, drainage, crops, rotations, etc) may lead, and is leading instead to land, soil and water degradation processes, with onsite and offsite sometimes catastrophic consequences. There were presented examples of those processes in China, Argentina and Brazil, with different characteristics, but in all cases affecting very large extensions of agricultural lands.
- The benefits of soils, as regulator of greenhouses gas emissions to the atmosphere, through C sequestration in the soil, may be better reached in a sustainable way, with appropriate land, soil and water management leading to improved sustainable agricultural production, and to reduced

deforestation, The approach has to be more to apply land management practices to attenuate climate change progress and effects, than to adapt land management practices to mostly hypothetical previewed future climate changes.

- Although land and soil degradation processes and related effects are generally a consequence of inadequate land use and management, derived of social and economical pressures, their effective control is in many cases limited due to deficiencies in the available local information on soils, climate, and on research related to the specific degradation processes. In those cases, the empirical application of “standard” or “universal” conservation practices, supposedly effective under any combination of soils, climate, hydrological conditions, cropping systems, etc, may lead and is leading to catastrophic consequences.
- The great number of factors, and their complex interactions, determining and affecting soil and water degradation processes, and conservation practices, require more interdisciplinary approaches and research, in order to be able to identify, to evaluate and to find adequate valid and sustainable alternatives to the different problems.

The dominant topics of the oral and poster presentations were related to: **surface erosion (16%), soil quality (SOM and biological aspects) (13%), water management (12%: 10% dryland, 2 % irrigated), carbon sequestration (10%), climate changes (10%), soil tillage (8%), soil contamination (6%)**. It is worth to mention the reduced number of papers on topics like **sedimentation effects (5%), social economic factors (4%), crop production effects (4%), mass erosion (2%), desertification (2%), salinization and sodification (2%), soil compaction (2%), wind erosion (1.5%), flooding effects (1.5%)**.

About 60% of the papers were based on empirical approaches and empirical models, more than in actual field or laboratory data and research. In any case, there is observed a decrease, in relation to previous conferences in the past, in the presentation of papers dedicated to surface soil erosion, and to soil tillage and desertification, and an increase in aspects more related to the hydrological, chemical and biological aspects and factors of soil degradation. In general, with some very valuable exceptions, the empirical approaches, the reduced field work, the focus in isolated aspects of soil and water conservation not forming part of a more wide projects, and the scarce interdisciplinary work, were the predominant characteristic of the research results presented in CONSOWA.

The discussion sessions started with a short presentation of the members of each panel, about the particular points of view in relation to the topic of each session, followed by open participation of the attendants, with comments and questions based on them and on the main points contained in a basic draft paper. The content of the draft paper, previously distributed to all participants, was based on contributions of selected leading specialists on different aspects of soil and water conservation at Worldwide level. They were: J. Dumansky (Canada); S. El-Swaify (USA); J. L. Rubio (Spain); W. Blum (Austria); C. Dazzi (Italy); G. Farías (Brazil); A. Cerdá (Spain); Li Rui (China); I. Pla (Spain). The members of the panels were:

Discussion Session 1: **Carmelo Dazzi, Samir El-Swaify, José L. Rubio, Craig Benson**  
Moderator: **Idefonso Pla Sentís**

Discussion Session 2: **Winfried Blum, Mark Nearing, Li Rui, Gonçalo Farías**  
Moderator: **Idefonso Pla Sentís**

As the time allocated for those discussion sessions during the Conference was limited, there was decided to ask all participants to submit or to send by email their comments or ideas during or after (with a time limit) CONSOWA. All contributions will be taken into account by a selected editorial committee, as a basis, together with the draft paper and the talks of the panel members, to write a final

document, which will be published and submitted to all potentially interested Institutions and Organizations at different levels.

The field trips, both the pre-conference (surroundings of Barcelona), post-conference (Lanzarote and Fuerteventura Canary Islands), and the five ones during the Conference, were carefully organized, with selection of places to be visited, where there could be seen different land use and management systems and practices related with soil and water conservation aspects. The visited places included areas with semiarid to arid climate, but also with sub-humid climates, used for forestry, different cropping systems and for husbandry, both under dry-land and irrigated conditions. Among the main aspects that could be observed in the field trips there are worth to mention:

- *Agricultural use of lands in peri-urban areas*
- *Land and soil reclamation and use for organic and bio-dynamic agriculture, in areas previously used for mining and quarry extractions*
- *Rain water harvesting, and soil water conservation practices, for agricultural production un arid climates*
- *Effects of changing from dry-land to irrigated conditions, on soil and water management and on soil conservation practices and structures.*
- *Changes in land use and management and on soil and water conservation practices, determined by economical and marketing pressures.*
- *Effects of present and historical land use and management on surface erosion and in mass erosion, as a source of sediments affecting the storage capacity of dams. Practices and structures to control them.*
- *Land, soil and water use and management, with high technological level, under very intensive irrigated highly productive agriculture (mainly fruit production), in soils of “inherent” very low quality.*
- *“Terroirs”, where the combination of soils, climate, variety and age of the vines, and management permits the production of very high quality wines.*

Besides, in all field trips there were included visits to places with expectacular landscapes and of high historical and archeological value.

One of the most relevant programmed activity of the Conference, was the ceremony of investiture as “Doctor Honoris Causa” at the University of Lleida (Spain) of Prof Dr Rattan Lal, President of IUSS upon proposal of the Departments of Soils and Environmental Sciences and of Crop and Forest Science of the Agricultural and Forestry Schools of UdL. Prof. Dr. Rattan Lal, besides being at present the President of the IUSS, the main World Organization in Soil Science, is one of the main World recognized rechearcher in the area of Soil and Water Conservation and related effects on agricultural food production and on the environment. He has been a pioneer in the studies of the relations of C sequestration in soils and vegetation with climate change. He is probably the soil and water conservation researcher that has more publications in these topics, which are the most consulted and cited by other people doing research in this area.

During the Conference there were programmed and held board meetings of several of the Organizations sponsoring CONSOWA. One of the main points discussed, both in the individual board meetings on Monday 12 June, and afterwards in the joint board meeting on Friday 16 June, was the convenience and possibilities to organize similar joint conferences like CONSOWA in the future, In general, both the different members of the Organizations participating on those meetings, and many other opinions of participants, directly during the Conference and in mails received afterwards, coincide in that based on the generally accepted success of this first experience of CONSOWA, it would be worth to continue it in the future. Based on that generalized feeling, we made a proposal to the joint board meeting, which would be called “Lleida Declaration”, as follows:

### LLEIDA (DECLARATION)

The Joint Board Meeting of the Internacional Organizations participating in the 1st CONSOWA Conference held on Lleida (Spain) 12-16 June 2017, based on the positive experience of this first Joint Conference, have decided:

- 1) To repeat in the future this kind of Joint Conferences, which will be called CONSOWA with consecutive numbers (2<sup>nd</sup> CONSOWA, 3<sup>rd</sup> CONSOWA, etc).
- 2) These Joint Conferences would be held every 2-4 years, in a country selected during the previous CONSOWA
- 3) This would not prevent that the individual organizations have conferences, workshops, etc in specific topics, in between those CONSOWA Conferences, inviting to them all the other organizations.
- 4) To facilitate the organization of those Joint Conferences, the Organizations here represented decide to create a Confederation of them, with a Coordinating Committee formed by the Presidents of the different Organizations, chaired by one of them in a rotatory basis.
- 5) The final objective, to be further analyzed by the Confederation, would be to become in the future a unique Organization on Soil and Water Conservation, with different chapters, corresponding to different aspects of the general topic, including the different objectives and activities of the present separate organizations, if possible.
- 6) To this declaration and agreements, other organizations dealing with the general objective of soil and water conservation, not represented here, may request to be included at any time, if they wish to do so.

Lleida, 16 June 2017

After an exchange of ideas and comments about the general proposals contained in this declaration, it was agreed that based on the success of this 1<sup>st</sup> joint conference CONSOWA, it would be worth to repeat it in the future, with the same name (CONSOWA) or other, if there is proposed a more convenient alternative. It was also agreed, that in order to avoid that the organization of future CONSOWAS would depend only on individual initiatives like this one, it would be convenient to create a kind of structure, to assure the continuous exchange and collaboration among organizations. Although it was generally considered as desirable to have in the future a unique strong organization, it was also realized that due to the very different structures and rules of the present organizations, it will take some time to reach that final objective. That is what, in the meantime there is proposed to create a kind of confederation of the organizations agreeing to be members of such confederation, chaired by the President of one of the organizations, in a rotatory basis.

As not all the Organizations sponsoring CONSOWA 2017, were represented in the joint board meeting, and the scarce number of board members of the represented Organizations being present, it was decided to take a time for considering the different proposals in each board, before it is reached a final decision. As President of ISCO and of the first CONSOWA I would be ready to act as a liaison of the different Organizations to prepare the final proposal agreed by all of them. The next proposed joint meeting of WASWAC and ISCO in India in 2019, which also could be sponsored by the other organizations participating in the 1<sup>st</sup> CONSOWA if the organizers ask for it, could be a good occasion to reach a final decision about the proposed joint Organization.

Lleida 10 July 2017



Idefonso Pla Sentís  
President of ISCO  
President of CONSOWA 2017