Land Degradation and Desertification: Assessment, Mitigation and Remediation

Pandi Zdruli · Marcello Pagliai · Selim Kapur · Angel Faz Cano
Editors

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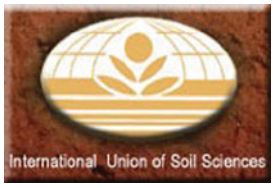
CIHEAM-Mediterranean Agronomic Institute, Bari, Italy

Italian Society of Soil Science



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Foreword

Land degradation and desertification issues are now milestone pillars of the international environmental and development agendas. Not only because they affect the livelihoods of billions of people and have direct consequences on the well-being of entire societies, but also due to devastating effects on ecosystem's stability, functions and services, loss of biodiversity and an endless list of other ill-related severances. Problems are exacerbated when land degradation, mostly a human-induced process is combined with naturally occurring drought. It is for these reasons that the recent terminology adopted by the United Nations Convention to Combat Desertification (UNCCD) involves Desertification, Land Degradation and Drought (DLDD). That represents a major shift for the UNCCD itself covering thus the entire planet Earth and bringing it closer to similar UN Conventions like the Biological Diversity (CBD) and the UN Framework Convention to Climate Change (UNFCCC). However, for the UNCCD the major focus will still be placed on drylands and particularly in Africa.

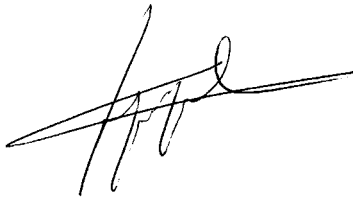
The scientific community has invested more than half a century research in land degradation and desertification and much is known now compared with the time when Auberville for the first time in the 1950s coined the term "desertification", interesting enough not in the drylands but in tropical forests of Africa. Yet, the link between science and policymaking appears to be week and information flow among many stakeholders involved in the combat against land degradation and desertification is not moving fast either.

Results "on-the-ground" in the last decade are not yet convincing many local stakeholders that progress has been made, despite numerous excellent examples of sustainable natural resources management worldwide as documented also by this book. Recent trends ask for a paradigm shift in support of sustainable land management rather than simply focusing on combating land degradation. Climate change will continue to dominate the environmental agenda and its effects will impact also the land degradation-affected areas that will experience additional adversities. While recognising the needs for further mitigation actions to alleviate climate change effects, adaptation to the new climatic conditions will be the final unavoidable choice as the history of nature evolution has shown.

This book contains selected papers of the 5th International Conference on Land Degradation held at the Mediterranean Agronomic Institute of Bari, Italy (IAMB) in

18-22 September 2008. The event was sponsored also by the Italian Society of Soil Science (SISS), the International Union of Soil Sciences (IUSS) and the European Commission, Joint Research Centre, Institute for Environment and Sustainability (EC, JRC, IES). These institutions have been involved for long in land degradation research and mitigation studies.

We are delighted to offer this unique opportunity of presenting papers covering a wide range of topics and geographical areas, all of them serving the purpose of understanding better the cause-effect relationships of land degradation and desertification and to identify the best options for assessment, monitoring, mitigation, and remediation.



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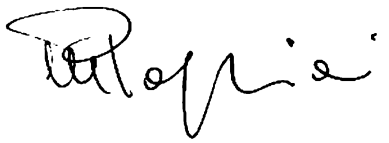

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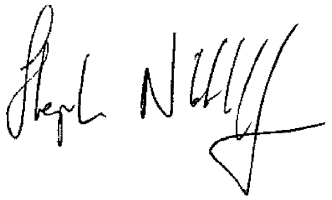

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Editors' Note

The editors would like to express their gratitude to all the authors for their prompt response, hard work and professionalism in preparing their chapters. For some of them this was a first opportunity to write a chapter in a special Springer book, but this was exactly what we intended when we invited them to collaborate in this effort. We are sure this strengthens and enriches the book. We realised that it has been a great challenge to complete this book in a such short time. All of this was possible, thanks to authors' friendly cooperation and enthusiasm that made our tasks easier.

The scientific content of each chapter is the responsibility of individual author(s) and despite our continuous efforts to improve their content, there may be additional questions and comments. We thus invite the reader to kindly ask or write directly to each corresponding author for further clarification. Our editorial tasks were carried out in full respect of everyone's beliefs and research findings, and wherever necessary, to improve the content of each chapter. We did this without any prejudice for individual or professional gains.

A particular word of thank you goes to Ms. Margaret Deignan, Associate Editor at Environmental Sciences Unit of Springer who was the first to write and solicit us about the preparation of this book as she noticed the potential for this publication. We are thankful also to all the sponsors of the 5th International Conference on Land Degradation and in particular to the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) and its Vice President Prof. Giuliana Trisorio Liuzzi, to the Director of the Mediterranean Agronomic Institute of Bari in Italy (IAMB), Dr. Cosimo Lacirignola to Deputy Director of IAMB, Dr. Maurizio Raeli, and to the Head of Land and Water Resources Management Department of IAMB, Dr. Nicola Lamaddalena for their enormous support in successfully organising this conference. Among us, an exceptional thank you is addressed to Dr. Pandi Zdruli in recognition of his endless and tireless efforts, scientific perseverance and scrutiny that have left their mark throughout this book.

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October 2009

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About the Editors

Dr. Pandi Zdruli over the last decade has been a Senior Research Scientist and Professor of Soil Science and Natural Resources with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), Land and Water Resources Management Department of the Mediterranean Agronomic Institute of Bari, in Italy. Prior to this position he was Visiting Scientist with the European Commission's Joint Research Centre in Ispra, Italy, Senior Fulbright Research Fellow at the United States Department of Agriculture, Natural Resources Conservation Service (USDA NRCS) in Washington DC, USA, and Chief of the Pedology Department of the Soil Science Institute of Tirana in his native Albania. Dr. Zdruli is author of over 46 scientific and technical papers, Editor-In-Chief of 10 books and distinguished member of a number of professional national and international organisations. He has over 28 years of experience in agriculture and rural development, soil science, sustainable land management, land degradation and desertification studies and integrated environmental impact assessments.

Dr. Marcello Pagliai has been for more than a decade Director of the Research Centre for Agrobiology and Pedology of the Italian Agricultural Research Council and President of the Italian Soil Science Society from 2002 to 2008. He was also Chairman of the Commission 2.1 (Soil Physics) of the International Union of Soil Sciences (IUSS) for the period 2002–2006. His main research efforts are centred in the fields of Soil Micromorphology and Soil Physics and particularly on: soil-conditioner interactions, effects of waste applications and organic materials on soil structure, evaluation of the impact of different tillage systems and management practices on soil quality, soil crusting, soil physical and biological degradation, soil compaction, sensibility and vulnerability and paddy soils research. Coordinator of several research projects on soil management and conservation, he is also author and co-author of 191 publications, Associate-Editor-In-Chief of the European Journal of Agronomy (Elsevier) and Member of the Editorial Board of Soil and Tillage Research (Elsevier).

Dr. Selim Kapur is Professor of Soil Science and Archaeometry at the University of Çukurova, in Adana, Turkey. He has organised various international meetings and events since the mid sixties when in Madrid, Spain in 1966 was held the first Meeting on Red Mediterranean Soils that later developed as Meetings of Soils with

Mediterranean Type of Climate; the tenth of such meetings was held in 2009 in Lebanon. Dr. Kapur has also organised the 1st International Conference on Land Degradation held in Adana in 1996 and latter on again in Adana he prearranged the 12th International Meeting on Soil Micromorphology. He is member of the European Soil Bureau Network and Secretary of the Working Group on Land Degradation of the International Union of Soil Sciences. He has been a Wageningen STIBOKA (now ALTERRA) and Hohenheim University fellow scientist. Dr. Kapur is author and also reviewer/editor of numerous papers and chapters published in national and international journals as well as books that have contributed on the interdisciplinary character of soil science, and in particular of soil micromorphology. Has contributed largely to the development of the Anthroscape context in relation to soils and has more than 35 years of research and experience in sustainable land management.

Prof. Angel Faz Cano received his Bachelor, Master and PhD degrees from the University of Murcia, in Spain. He is currently professor of Soil Science at the Agricultural Science and Technology Department, and Director of the Research Group on Sustainable Use, Management and Reclamation of Soil and Water, Technical University of Cartagena, Spain. Current national and international projects include soil usage and global change in semiarid areas: carbon cycle, agricultural application of pig slurries and organic residues from horticulture for crop production, mining and industrial polluted soils risk assessment, reclamation and landscape design. In addition to Spain, he has made extensive research on soils and water management in Latin America. Currently he is Vice chair of the Working Group on Land Degradation of Internatonal Union of Soil Sciences (IUSS), and just elected in 2008 as Vice chair of the Commission Soil Geography of IUSS.