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Editors

# Agro-Environmental Sustainability in MENA Regions

 Springer

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# Preface

The future of sustainable agriculture in MENA regions faces many challenges. This book captures agro-environmental sustainability in MENA regions and provides ideas extracted from the volume cases. In addition, some (update) findings from a few recently published research work related to the agro-environmental sustainability covered themes.

Environmental sustainability is concerned with the possibility of protecting and maintaining environmental resources for future generations. Developing countries are looking for growth while developed nations are looking for instruments for post-growth and intellectual development to think about sustainable development (economically effective, socially equitable and environmentally sustainable). For any economy that needs progress and development, growth has always been a significant goal. It is based mainly on the growth of factors of production owing to the enhanced use of available resources. The MENA region, however, faces a triple challenge: emerging climate patterns herald a future where water resources lie below sustainable levels; rapid population growth is threatening to imperil food security; and over-reliance on oil is curtailing governments' ability to act. Nevertheless, water crises are more acute than in the MENA region. In addition to food security, water scarcity is the biggest threat to human and environmental security in the region. Droughts, soil salinity and pollution, land subsidence and rural exodus have been triggered by the lack and inefficient use of resources. It has also helped trigger conflicts. A major culprit behind water scarcity in the MENA region is agriculture and food production. The situation needs new thinking on sustainability, efficient implementation of technology and radical transformation of agriculture.

This book holds much promise and potential for agro-environmental sustainability in MENA regions. It addresses the question of how science and technology can be mobilized to make that promise come true. Therefore, the intention of the book is to improve and address the following main theme: water management practices, diagnosis and new farming technologies, practices for sustainable plant and soil production, sustainable industry approach, and tourism activities in agricultural area.

The following are the key features for the book:

**Part One** is an introduction to agro-environmental sustainability in MENA regions where the editors present a general overview and highlight the technical elements of each chapter.

In **Part Two “Climate Change and Water Management Practices”**, three chapters are identified in the book related to water management practices. The first review chapter treats climate change impacts on water balance in Egypt and opportunities for adaptations. The second chapter gives an overview of these technologies and its environmental economics applications. Furthermore, to demonstrate the application of several wastewater treatment technologies with the high-efficiency treatment of municipal wastewater in small- and large-scale using biofilm systems with respect to the application of low-cost wastewater treatment also to reuse the treated wastewater for irrigation purpose as successful case studies from the MENA region. On the other hand, chapter three covers (i) the use of climatic data for estimating water requirements in olive trees (cv Meski) in the semi-arid Tunisian (Enfidha); (ii) the use of the sap flow method to quantify transpiration and water consumption; (iii) the evaluation of the physiological method according to ET<sub>0</sub>.

**Part Three “Diagnosis and New Farming Technologies”** contains five chapters, and different approaches are used to delineate and discuss the new farming technologies. The first one presents the agrarian system diagnosis in Kerkennah Archipelago in Tunisia. The second approach represents precision farming technologies to increasing soil and crop productivity. The third treats the importance of implementing an environmental information system in data-scarce countries. The fourth one is related to the green spaces for residential projects as a commitment to environmental concerns and a sustainable development initiative: design of a peri-urban park in Casablanca, Morocco. The last approach emphasizes the environment and sustainable development in the face of coastal artificialization cases of Tunisia, Morocco and Algeria.

In **Part Four “Practices for Sustainable Plant and Soil Production”**, several potential practices for sustainable soil production are implemented in this part. The first chapter presents the role of Tunisian medicinal plants as antifungal and antibacterial potentials for plants diseases control and also antioxidants activity of plants. The second presents an overview of sustainable agriculture in some Arab Maghreb countries (Morocco, Algeria and Tunisia) that has become the main economic sector responsible for multiple environmental impacts. The second developed potential practice is the possibilities of mineral fertilizer substitution via bio and organic fertilizers for decreasing the environmental pollution. The third one explains potential practice which is the possibility of mineral fertilizer substitution via bio and organic fertilizers for decreasing environmental pollution and improving of sesame (*Sesamum indicum* L.) vegetative growth. In the fourth chapter, the author gives an overview of the animal and rangeland resources in Shalatin—Abou Ramad—Halaib Triangle Region, Red Sea Governorate, Egypt, to identify the potentialities of animal and rangeland resources; main constraints and problems that would help in planning specific strategies for developing animal production in the region and enhancing local Bedouin’s welfare. While in the fifth chapter, the authors we carried out an analysis of the collected bibliographic corpus relating to the evolution of the urban

and peri-urban territories in some of the cities of the MENA, including Morocco, Algeria and Tunisia and, essentially, in the littoral regions of Morocco and Algeria.

In **Part Five “Industrial, Landscape, Touristic and Political Approaches for Agro-Environment Sustainability”**, different approaches are presented.

The fifth part of this book introduced six sustainable industry approaches. The first one is the sustainable mining site remediation under (semi) arid climates in the Middle East and in Northern Africa. Then, two study cases are presented in this part emphasizing on the value of using trees as a key element in the sustainability of cities, and the second explains how urban extension can modify the agricultural landscape of a coastal region. In both research studies, the landscape analysis approach is used.

The fourth approach is related to the interchange between agriculture and tourism in Tunisia in the context of sustainability. The fifth approach is the climate factors affecting sustainable human and tourism comfort in Egypt. Sustainable tourism is the application of sustainable development ideas to the tourism sector, that is, tourism that meets the needs of the existing generations without compromising the ability of future generations to meet their own life needs. In the last chapter, authors review the 2030 Agenda as a blueprint for water and ecosystem services in the context of agriculture with an interesting comparison between policies in both EU and Egypt.

The last chapter in this book (**Part Six**) is the conclusions and recommendations of the book. The chapter presents an update of the most recent findings, the most significant conclusions and recommendations of the chapters contained in the volume.

The editors (Mohamed Abu-hashim and Abdelazim Negm) acknowledge the support of the Science, Technology, and Innovation Authority (STIFA) of Egypt in the framework of the grant no. 30771 for the project titled “a novel standalone solar-driven agriculture greenhouse—desalination system: that grows its energy and irrigation water“ via the Newton-Mosharafa funding scheme.

Additionally, the editors are happy to acknowledge the contributions of all authors to make this book a great source of knowledge for the MENA regions countries on the level of researchers, graduate students, stakeholders and decision planners. We hope it helps the MENA regions countries to move forward towards sustainable development to achieve the related SDGs goals.

Moreover, the editors want to extend their thanks to the Springer team who worked hard for a long period to produce this unique book and made the authors’ and the editors’ dream a reality. Special thanks are due to Andrey Kostianoy and Alexis Vizcaino.

Last but not least, The editors love to close this preface by requesting feedback from the researchers’ and professionals’ communities and from all audiences as well to improve the next editions. Also, new chapters for next editions are welcomed.

Please send your feedback and your constructive comments and/or your new chapter to the editors via email. The emails are posted in the chapters.

Zagazig, Egypt  
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October 2020

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