

Advances in Science, Technology & Innovation  
IEREK Interdisciplinary Series for Sustainable Development

Amjad Kallel · Mohamed Ksibi  
Hamed Ben Dhia · Nabil Khélifi *Editors*

# Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions

Proceedings of Euro-Mediterranean Conference  
for Environmental Integration (EMCEI-1), Tunisia 2017



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Editors

# Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions

Proceedings of Euro-Mediterranean  
Conference for Environmental Integration  
(EMCEI-1), Tunisia 2017

Volume II

 Springer

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## Preface

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### Highlights

- Springer, in collaboration with the Editorial Office of the Euro-Mediterranean Journal for Environmental Integration in Sfax, Tunisia, launched the First Euro-Mediterranean Conference for Environmental Integration (EMCEI: [www.emcei.net](http://www.emcei.net)) in November 2017.
- The conference gathered new research contributions from all disciplines of the environmental sciences by Euro-Mediterranean scientists with diverse backgrounds, in particular from the geo- and bio-environmental sciences and engineering.
- More than 800 short contributed papers were received from authors based in 50 countries. The evaluation process was managed by the Editors of this proceedings volume, who invited the members of the conference scientific committee and other international experts to review the papers. Ultimately, roughly 550 short papers were accepted.
- Papers are published in this proceedings volume, which is divided into 10 major sections representing the tracks (topics) of the conference. They cover a broad range of environmental research fields, mainly from the Euro-Mediterranean region, but also from surrounding regions and some other parts of the world that show similar case studies on environmental integration in general.
- Springer invited the Editors of the Euro-Mediterranean Journal for Environmental Integration and other distinguished scientists and experts to contribute to the conference in the form of keynote lectures and workshops.
- Authors of the best papers from this proceedings volume will be invited after evaluating their presentations during the conference to submit extended versions of their papers for evaluation before publication in a number of special issues in selected Springer journals.
- This conference proceedings volume gathers these new studies, which demonstrate how science and knowledge can help to promote a more sustainable environment for the Euro-Mediterranean region.

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### Summary

The Euro-Mediterranean region is currently facing not only political, economic, and social challenges but also an ever-growing environmental degradation—aspects that have made environmental and resource protection an increasingly important issue. These aspects have also rekindled the debate on revitalizing the Euro-Mediterranean integration process by means of concrete cooperative projects in various sectors, especially those related to environmental awareness, assessment, and improvement. This integration process is mainly intended to reduce the development gap between the northern and southern shores of the Mediterranean

and to create new and closer political, economic, social, cultural, and most importantly scientific ties between the two on the basis of common concerns.

In this context, and precisely in order to promote the Euro-Mediterranean scientific partnership so as to develop and integrate environmental research in the region, under the auspices of Springer a group of Euro-Mediterranean scientists recently launched the Euro-Mediterranean Journal for Environmental Integration (EMJEI). The journal, supported and hosted by the University of Sfax, Tunisia and its Association University & Environment (AUE), offers a scientific platform for showcasing and discussing the latest research advances concerning emerging environmental issues and challenges in the Euro-Mediterranean region.

To further strengthen Euro-Mediterranean environmental research, the Editors of the Euro-Mediterranean Journal for Environmental Integration launched, in close collaboration with Springer, the First Euro-Mediterranean Conference for Environmental Integration (EMCEI). This first installment of EMCEI, held in Sousse, Tunisia in November 2017, aims at gathering new research contributions from all disciplines of the environmental sciences by Euro-Mediterranean scientists with diverse backgrounds, in particular from the geo- and bio-environmental sciences and engineering, and thus makes an essential contribution to ensuring that science and knowledge can help to promote a more sustainable environment for the Euro-Mediterranean region.

Once the conference's call for papers had begun, the global relevance of EMCEI-2017 was demonstrated by the more than 800 contributed papers submitted by authors from 50 different countries. Following peer review, about 560 papers were ultimately accepted.

The papers gathered in this book offer a general and brief overview of current research on emerging environmental issues and challenges, and of related applications to a variety of problems in the Euro-Mediterranean region in particular, but also in surrounding regions and other parts of the world. They are arranged in 10 major sections, reflecting the main topics addressed at the conference, namely:

1. Innovative approaches and methods for environmental sustainability;
2. Environmental risk assessment, bioremediation, ecotoxicology, and environmental safety;
3. Water resources assessment, planning, protection, and management;
4. Environmental engineering and management;
5. Natural resources: characterization, assessment, management, and valorization;
6. Intelligent techniques in renewable energy (biomass, wind, waste, and solar);
7. Sustainable management of marine environments and coastal areas;
8. Remote sensing and GIS for geo-environmental investigations;
9. Environmental impacts of geo/natural hazards (earthquakes, landslides, volcanic, and marine hazards); and
10. Environmental health sciences (natural and social impacts on human health).

Presenting a broad range of topics and results, EMCEI-2017 offered a valuable opportunity for researchers and students to learn more about new advances in environmental research initiatives in view of the ever-growing environmental degradation in the Euro-Mediterranean region, which has made environmental and resource protection an increasingly important issue with regard to sustainable development and social welfare.

In addition to the several oral and poster sessions, participants enjoyed revealing keynote lectures by distinguished scientists and accompanying workshops. Keynote lectures highlighted the latest research results obtained in the Euro-Mediterranean region on topics including the following: clean energy production; wastewater treatment and energy production; novel approaches to contaminant removal in water; tracing pollution in aquatic systems; ecological risk assessment of plant protection products; environmental risk in connection with chemicals in soils; collecting and processing geodata for environmental and sustainable spatial planning; assessment of coastal morphological changes and the impact of sea level rise on

shorelines; long-term sustainability of coastal zones and their adaptation to climate change; urban agriculture and green infrastructures; seismic hazard assessment; new solutions for energy, biomedical, and environmental applications; and several other interesting case studies, all of which are included in the first section of this proceedings volume: “keynote lecturers and workshops”. The workshops were also an opportunity to discuss in round tables several regional issues hindering sustainable development in the Euro-Mediterranean community, updating and summarizing the latest advances in connection with ongoing cooperation projects between scientists based on the northern and southern shores of the Mediterranean. Lastly, they highlighted important case studies related to the environmental health sciences and integrated approaches to achieving a better environment, as well as training sessions on scientific writing and publishing techniques.

This first Springer EMCEI gave younger scientists, in particular, the opportunity to present their findings—and the outcomes astonished and delighted us. We hope that the ideas in this book can stimulate further work on environmental integration and sustainable development.

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Sfax, Tunisia  
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Amjad Kallel  
Mohamed Ksibi  
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