

Environmental Science

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Mongi Seffen · Vincenzo Naddeo *Editors*

Recent Advances in Environmental Science from the Euro- Mediterranean and Surrounding Regions (2nd Edition)

Proceedings of 2nd Euro-Mediterranean
Conference for Environmental
Integration (EMCEI-2), Tunisia 2019

Environmental Science and Engineering

Environmental Science

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Preface

The Euro-Mediterranean and surrounding regions are currently facing accelerating environmental degradation. In the context of fast population growth, developing living standards, modernization and rapid industrialization, environmental challenges will continue and even be exacerbated in the years to come. These challenges reinforce the need to stimulate the environmental integration process by including environmental awareness, assessment, remediation and mitigation in concrete cooperative projects in the various sectors, and, most importantly, by highlighting the importance to decision-makers from the relevant sectors of integrating environmental considerations into their activities.

The integration of environmental concerns into policy decisions (i.e. environmental integration) must be intensified in order to move towards sustainable development. This is in line with the vision and plan of the European Commission for the Environment and other official organizations whose mission is to protect, preserve and improve both shores of the Euro-Mediterranean environment and their natural resources for present and future generations to ensure prosperity and social cohesion.

To stimulate the environmental integration process, it is the responsibility of scientists to consider opportunities to highlight research into potential solutions for environmental concerns and protection requirements based on innovative approaches that contribute to the preservation of a sustainable environment in the region.

In this context, the best contributions to the 2nd Euro-Mediterranean Conference on Environmental Integration (EMCEI-2019: www.emcei.net) were selected for this edited volume in order to emphasize the importance of the environmental integration process by considering the latest outcomes from interdisciplinary research (natural sciences, technology and engineering, and social sciences) with a broader focus on solution-based sustainability research, combined with a regional dimension: the Euro-Mediterranean area (which encompasses all the countries surrounding the Mediterranean) to bring recommendations and solutions for many common environmental issues, as well as mutual lessons learned.

Topics covered include approaches and methods for environmentally sustainable innovation; environmental risk assessment; bioremediation; eco-toxicology; water quality management; management of natural resources, including water resources

and georesources; renewable energy; waste valorization and management; sustainable marine and coastal area management; geo- and natural hazards such as earthquakes, landslides and others; geotechnical and geo-environmental engineering; remote sensing and GIS for geo-environmental investigations; the impact of natural and social environments on human health; among others.

In addition to the aforementioned, this environmental integration process in the Euro-Mediterranean region can only achieve its goals through the stimulation of initiatives that reduce the development gap between the two shores of the Mediterranean and that create new and closer political, economic, social, cultural and, in particular, scientific ties, founded on shared concerns which develop and integrate environmental research in the region.

In this context, Springer and the Editorial office of the *Euro-Mediterranean Journal for Environmental Integration* organized the second edition of EMCEI which was held in Sousse, Tunisia in October 2019 following the 1st EMCEI launched in 2017. In response to the conference's call for papers, more than 600 papers were submitted by authors from 58 different countries, demonstrating the global relevance of EMCEI. Following peer review, 373 papers from the geo- and bio-environmental sciences and engineering were ultimately accepted, thus making an essential contribution to the science and knowledge bases to promote a more sustainable environment for the Euro-Mediterranean region.

The short papers gathered in this volume offer an overview of current research on emerging and ongoing environmental issues and challenges and of how it applies to problems specific to the Euro-Mediterranean region and to surrounding regions so that a broader perspective on related and similar environmental challenges may be gained. Papers are categorized into thirteen broad sections to reflect the main topics addressed at the conference, namely:

1. Engineering applications for environmental management;
2. Process control, simulations and intensification for environmental management;
3. Ecotoxicology, environmental safety and bioremediation;
4. Biotechnology for environmental management;
5. Climate-change-related effects on the environment and ecological systems;
6. Natural resources, agriculture and the environment;
7. Smart technologies for environmentally friendly energy production;
8. Remote sensing and GIS for environmental monitoring and management;
9. Environmental impacts of natural hazards and environmental risk assessment;
10. Sustainable management of marine and coastal environments;
11. Sustainable management of the urban environment;
12. Sustainable management of the indoor and built environment;
13. Environmental-change-related impacts on human health.

Presenting a broad range of topics and results, the 2nd EMCEI offered a valuable opportunity for researchers and students to learn more about recent advances in environmental research initiatives in view of the accelerating environmental degradation of the Euro-Mediterranean region, which has made environmental and

resource protection a dominant priority for sustainable development and societal welfare. We hope scientists and policy makers will find these contributions from the 2nd EMCEI useful in the search to understand and solve some of the most pressing environmental issues for the Mediterranean region.

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About the 2nd Springer Conference of the *Euro-Mediterranean Journal for Environmental Integration* (EMCEI-2), Tunisia 2019



Currently, the Euro-Mediterranean region is facing not only significant political, economical and social challenges, but also an ever-growing environmental degradation that has made environmental and resource protection an increasingly critical issue. These issues have re-energized the debate on the Euro-Mediterranean integration process through concrete cooperative projects in many sectors, especially those concerned with environmental awareness, assessment and improvement. This integration process is intended to reduce the development gap between the northern and southern coasts of the Mediterranean and to create new and closer political, economical, social, cultural and, most importantly, scientific ties between these two shores founded on common concerns.



In this context, and with the specific aim to promote Euro-Mediterranean scientific partnership so as to develop and integrate environmental research and findings into the activities of related sectors in the region, a group of Euro-Mediterranean scientists have recently launched the *Euro-Mediterranean Journal for Environmental Integration*. This Springer journal, which started in 2016, has been now indexed in the Web of Science (ISI's ESCI database). It offers a scientific platform for presenting and discussing the latest advances in research with a focus on emerging environmental issues and challenges in the region. In particular, this first regional journal from the Euro-Mediterranean, encompassing all disciplines of the earth and environmental

sciences, seeks to make societies and decision-makers from related sectors aware of the importance of integrating environmental considerations into their respective activities. In this context, the journal provides a scientific forum that promotes the exchange of knowledge and fosters collaborations to improve the consistency of environmental management efforts between the countries of the northern and southern shores of the Mediterranean.



To further strengthen Euro-Mediterranean environmental integration, the Editors of the *Euro-Mediterranean Journal for Environmental Integration* organize this year, in close collaboration with Springer, the 2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2). The conference aims to gather new research contributions from all disciplines of earth and environmental sciences by Euro-Mediterranean scientists from diverse backgrounds, and thus makes an essential contribution towards ensuring that science and knowledge contribute to the promotion of a more sustainable environment for the Euro-Mediterranean region.

The scientific committee of the 2nd EMCEI invites research papers on all cross-cutting themes of the environmental sciences and engineering, with a main focus on the following thirteen conference tracks:

- Track 1. Engineering applications for environmental management
- Track 2. Process control, simulations and intensification for environmental management
- Track 3. Ecotoxicology, environmental safety and bioremediation
- Track 4. Biotechnology for environmental management
- Track 5. Climate-change-related effects on the environment and ecological systems
- Track 6. Natural resources, agriculture and the environment
- Track 7. Smart technologies for environmentally friendly energy production
- Track 8. Remote sensing and GIS for environmental monitoring and management
- Track 9. Environmental impacts of natural hazards and environmental risk assessment
- Track 10. Sustainable management of marine and coastal environments
- Track 11. Sustainable management of the urban environment
- Track 12. Sustainable management of the indoor and built environment
- Track 13. Environmental-change-related impacts on human health.

The dynamic four-day conference provided more than 400 attendees with opportunities to share their latest unpublished findings and learn the newest environment

studies. The event also allowed attendees to meet and discuss with the journal's editors and reviewers.

More than 600 short contributing papers to the conference were submitted by authors from more than 70 countries. After a pre-conference peer-review process by more than 500 reviewers, 373 papers were accepted. These papers were published as chapters in the conference proceedings by Springer.

The conference proceedings consist of thirteen sections, each edited by the following group of *Euro-Mediterranean Journal for Environmental Integration* (EMJEI) editors and other guest editors:

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