



Pollutant removal and the health effects of environmental pollution

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The 1st Euro-Mediterranean Conference for Environmental Integration (EMCEI: <http://www.emcei.net/2017>) was launched in November 2017 and held in Tunisia by Springer, in collaboration with the Editorial Office of the *Euro-Mediterranean Journal for Environmental Integration*.

The conference gathered new research contributions from a broad range of disciplines of the environmental sciences by Euro-Mediterranean scientists with diverse backgrounds, in particular from the geo- and bio-environmental sciences and engineering. The conference enjoyed the participation of more than 450 scientists from 50 countries, 16 invited speakers who are Editors of *Euro-Mediterranean Journal for Environmental Integration*, and other distinguished scientists who have made pioneering contributions to new trends in research, development, and innovation in the multidisciplinary fields of environmental sciences.

The primary aim of the conference was to re-launch the debate on revitalizing the Euro-Mediterranean environmental integration process by means of concrete cooperative projects in various sectors, especially those related to environmental awareness, assessment, remediation, and mitigation. This is a much needed approach in view of the accelerating environmental degradation being experienced by the Euro-Mediterranean and surrounding regions. In the context of fast population growth, improving living standards, modernization, and rapid industrialization, environmental challenges will continue or even be exacerbated in the years to come. These challenges reinforce the need to stimulate the environmental integration

process through the launch of the EMCEI. The conference provides a platform to collect research initiatives that highlight the importance of integrating environmental considerations into their activities by decision-makers from relevant sectors. Intensified integration of environmental concerns into policy decisions (i.e., environmental integration) is essential to move towards sustainable development. This is in line with the vision and plan of the European Commission—Environment and other regional official organizations whose mission is to protect, preserve, and improve the Euro-Mediterranean environment for the present and future generations.

All the papers presented during the conference as oral and poster sessions, keynote lectures, and during the workshops were compiled in two volumes of the conference proceedings entitled “*Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions*” and include 588 chapters (short conference papers) published by Springer and successfully indexed in the Web of Science database (Kallel et al. 2017).

The current Special Issue (SI) of Environmental Science and Pollution Research (ESPR) presents nine research papers on emerging environmental issues and challenges and how they apply to a variety of problems specific to the Euro-Mediterranean region, but which are also relevant to the surrounding regions and other parts of the world.

Three papers focusing on adsorption models and kinetics of pollutants from water and wastewater are as follows:

1. Selmi et al. (2018) investigated the adsorption of two different dyes in aqueous solution, methylene blue (MB), and methyl orange (MO), as a function of pH and temperature on four different activated carbons. The thermodynamics studies revealed that the adsorption process is spontaneous and endothermic. Both the nonlinear Brouers–Sotolongo fractal, BSf (n, α), kinetic model and the generalized Brouers–Sotolongo, GBS, isotherm model were found to fit the corresponding experimental results.
2. Maaloul et al. (2019) synthesized novel environmentally friendly cellulose beads from almond shells (CBBAS).

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They proved that CBBAS biosorbents can be easily separated from the solution for subsequent reuse, and thus, they represent a method for the removal of copper (II) from aqueous solutions that is both eco-friendly and economical.

- Mittal and Khanuja (2019) prepared MoSe₂ nanostructures (nanourchins and nanosheets) by a simple hydrothermal technique using selenium and sodium molybdate as precursors. Using different morphologies of MoSe₂, they found good photocatalytic performance on degradation of anionic dye, cationic dye, and reduction of Cr(VI) into Cr(III).

The SI also includes a paper in which Viccione et al. (2019) analyzed the performance of commercial filters used for the mechanical filtration of suspended solid particles with regard to head losses depending on the circulating flow rate, the nominal porosity of the filter, and its degree of clogging.

In another paper, Fourati et al. (2019) highlighted the capability of the halophyte *Sesuvium portulacastrum* L. as a suitable candidate for phytoremediation of Ni-contaminated soils by studying the nickel tolerance and toxicity mechanisms of this plant species.

Two papers on the potential use of bio-components as alternatives to synthetic chemicals are presented:

- Ponsankar et al. (2019) proved that the bioactive compound cucurbitacin E from *Citrullus colocynthis* (L.) Schrad would offer a biorational product alternative to synthetic pesticides in pest management. They confirmed these findings through bioassay on different larval instars of *Spodoptera litura* and toxicity tests on the earthworm *Eisenia fetida*.
- The study of Palanikani et al. (2019) might open new dimensions in the application of medicinal plant products as safe and effective protection in fresh water aquaculture against various infections. Indeed, they proved that the implementation of methanolic crude extracts of *Andrographis paniculata* to *Labeo rohita* improved the non-specific fish immune system and provides efficient antibacterial activity against the *Aeromonas hydrophila* pathogen.

In the last two papers, the authors:

- Gao et al. (2019) provided an important insight into the combined toxicity on soil-dwelling organisms of live-stock growth promoters when applied to the soil as manure. They revealed a potential adverse effect on

earthworms (*Eisenia fetida*) of the combined sub-acute exposure of roxarsone and copper.

- Brini et al. (2018) established the correlation between respiratory syncytial virus (RSV) bronchiolitis and climate factors (including temperature, rainfall, and humidity) in the area of Sousse, Tunisia, in neonates and children. The impact of climate factors on viral circulation was statistically analyzed. Their findings could greatly help to determine the optimal timing of appropriate strategies to prevent outbreaks of RSV, taking into account specific Tunisian climate parameters.

We hope that this SI, taking some of the best contributions to the 1st EMCEI, will offer ESPR readers a valuable opportunity to learn more about some of the new advances in environmental research initiatives in view of the accelerating environmental degradation in the Euro-Mediterranean region, which has made environmental and resource protection a dominant priority for sustainable development and social welfare.

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References

- Brini I et al (2018) Temporal and climate characteristics of respiratory syncytial virus bronchiolitis in neonates and children in Sousse, Tunisia, during a 13-year surveillance. *Environ Sci Pollut Res*. <https://doi.org/10.1007/s11356-018-3922-x>
- Fourati E et al (2019) Nickel tolerance and toxicity mechanisms in the halophyte *Sesuvium portulacastrum* L. as revealed by Ni localization and ligand environment studies. *Environ Sci Pollut Res*. <https://doi.org/10.1007/s11356-019-05209-8>
- Gao Y, Sun X, Zhang Z, Li X (2019) Combined effect of growth promoter roxarsone and copper on the earthworm *Eisenia fetida*. *Environ Sci Pollut Res*. <https://doi.org/10.1007/s11356-019-05484-5>
- Kallel A, Ksibi M, Dhia HB, Khélifi N (2017) Recent advances in environmental science from the Euro-Mediterranean and surrounding regions: proceedings of Euro-Mediterranean Conference for Environmental Integration (EMCEI-1), Tunisia 2017. Springer International Publishing
- Maaloul N, Oulego P, Rendueles M, Ghorbal A, Diaz M (2019) Synthesis and characterization of eco-friendly cellulose beads for copper (II) removal from aqueous solutions. *Environ Sci Pollut Res*. <https://doi.org/10.1007/s11356-018-3812-2>
- Mittal H, Khanuja M (2019) Nanosheets- and nanourchins-like nanostructures of MoSe₂ for photocatalytic water purification: kinetics

and reusability study. *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-019-06275-8>

- Palanikani R, Chanthini KM-P, Soranam R, Thanigaivel A, Karthi S, Senthil-Nathan S, Murugesan AG (2019) Efficacy of *Andrographis paniculata* supplements induce a non-specific immune system against the pathogenicity of *Aeromonas hydrophila* infection in Indian major carp (*Labeo rohita*). *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-019-05957-7>
- Ponsankar A et al (2019) Toxicity and developmental effect of cucurbitacin E from *Citrullus colocynthis* L. (Cucurbitales: Cucurbitaceae) against *Spodoptera litura* Fab. and a non-target earthworm *Eisenia fetida* Savigny. *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-019-04438-1>
- Selmi T, Seffen M, Celzard A, Fierro V (2018) Effect of the adsorption pH and temperature on the parameters of the Brouers–Sotolongo models. *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-018-3835-8>
- Viccione G, Evangelista S, Armenante A, Ricciardi V (2019) Clogging process and related pressure drops in wire-wound filters: laboratory evidence. *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-019-05628-7>

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Dr. Mohamed Ksibi obtained his MSc (1989) and PhD (1993) degrees in Applied Chemistry from the University of Poitiers, France. Afterwards, he undertook a one-year postdoctoral research fellowship at the National Institute of Scientific and Technical Research (Tunisia, 1995). In 2003, he obtained his accreditation to supervise research (HDR) in Chemistry from the University of Sfax, Tunisia, where he was then appointed Professor of Chemistry (2009). In 2011, he became Director of the High Institute of Biotechnology in Sfax. His research focuses on chemicals in the environment, and wastewater treatment and reuse. He developed new assessment methods for toxicity in water containing various pollutants (dyes, phenolic and pharmaceutical compounds, polluted water from pulp and paper mills, domestic wastewater, etc.) following different wastewater treatment techniques. He has co-published about 60 papers in indexed journals. He has been involved in the establishment of several joint scientific projects with Moroccan, Portuguese, German, and Japanese scientists on the quantification and risk assessment of emerging organic contaminants and heavy metals in soils and surface waters in Tunisia. More recently, he has participated in the NATO-SfP project “Remediation Processes in Uranium and other Mining Explorations.” Prof. Ksibi is the co-Editor-in-Chief of the *Euro-Mediterranean Journal for Environmental Integration* (Springer) since 2019.

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Dr. Hamed Ben Dhia is currently Professor Emeritus in the Sfax National School of Engineers at the University of Sfax, Tunisia. He received his education in Tunisia and then in France where he graduated with a PhD degree in Geothermal Energy and Aquifers Modeling from the Faculty of Sciences, Bordeaux and Ecole des Mines in Paris. His working career started in Libya in water research for the Saharan region (1973–74); he then moved to Morocco with the

National Phosphate Company (1975–1978), before returning to Tunisia as a lecturer/professor at the University of Sfax (1979–2012), active in several research projects concentrating on Hydrogeology, Geothermal Energy, Environmental Sciences, and Engineering Geology. He has co-published more than 180 papers in national and international journals. Furthermore, he has supervised and successfully handled about 50 master and 30 doctoral theses. Prof. Ben Dhia was appointed Head of the Earth Science Department (1982–1986) and Director (1993–1997) of the National School of Engineers of Sfax, and President (Rector) of the University of Sfax (1997–2011). This long career has enabled him to acquire skills and expertise in several fields such as Natural Resources, Green Growth, University Management, and Entrepreneurship Learning/Coaching. In 2016, Prof. Ben Dhia, along with Dr. Khélifi (Springer) and other scientists based at the University of Sfax and some northern Mediterranean shore universities, founded the *Euro-Mediterranean Journal for Environmental Integration*.



Dr. Nabil Khélifi undertook fellowships at the System for Analysis, Research and Training (START) in 2005 and the German Academic Exchange Service (DAAD), as part of his PhD studies in Marine Geosciences at the University of Kiel in Germany (2006 to 2010). After his PhD, he received a research grant from the German Science Foundation (DFG) to conduct research projects at the GEOMAR Ocean Research Centre in Kiel, Germany, on

oceanography and climate reconstructions in the North Atlantic and the Mediterranean (2010 to 2013). His research findings have been presented at many conferences and published in esteemed journals. He co-organized workshops on the Pliocene climate in Bordeaux, France

(2009), and Bristol, UK (2013), funded by the European Science Foundation (ESF). In late 2013, he received the Swiss Government Excellence Scholarship (SGES). In 2014, he joined Springer in Heidelberg, Germany, as an Editor, was promoted to Senior Editor in 2017 responsible for developing their publishing program in the MENA region. He is active in educational seminars for authors, reviewers, and editors to help improve publication output and quality. He is a Visiting Lecturer at King Saud University, KSA, where he gives MSc lectures on scientific presentations and publishing techniques, as well as career development workshops. Dr. Khélifi has launched two Springer conferences (more details at www.emcei.net and www.cajg.org). In 2016, he was awarded the Africa Green Future Leadership Award for his promotion of publications from Africa. In 2020, he received the Saudi Society for Geosciences Award for successful management of the *Arabian Journal of Geosciences*.