Preface

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Biographical notes: Khaiwal Ravindra is currently working as 'Scientist' at the University of Hertfordshire, UK and also holds a position of 'special academic personnel' at the University of Antwerp, Belgium. His research interests involve method development, chemical characterisation, source apportionment, health risks and mitigation policies for persistent and emerging pollutants; including global climate change and environmental impact assessment. Currently, he is working on CAIR4HEALTH, HENVINET, ENVIRISK and other European Union projects. He has authored more than 35 peer reviewed articles having over 450 citations and also wrote/edited four books. He is serving various international journals and is also a member of editorial board of *International Journal of Environment and Waste Management*, *Air, Soil and Water Research*, *Forum Geographic* and *Environmental Monitoring and Assessment*.

Special issue: There is a growing concern over environmental issues and problems, as a large number of people are suffering owing to the negative effect of environmental pollutants in various environmental matrices. To provide safe drinking water is still a challenge, especially in the developing world. Natural sources of water such as rivers are being continuously polluted by major drains and sewage discharge from various cities and industrial effluents. The air quality in the major cities is becoming deleterious because of increasing number of motor vehicles and poor control for emission. Furthermore, these problems are becoming more intense with the increase in population.

This special issue includes selected peer-reviewed papers on the recent advancement of analytical methods for the analysis of arsenic, antimony (by Inductively Coupled Plasma Mass Spectrometry or ICP-MS) and lead (by sequential extraction combined with

isotopic analysis); measurement and distribution of mercury, biomonitoring of Polycyclic Aromatic Hydrocarbon (PAH); transfer and translocation of organochlorine pesticides in agricultural areas; adsorption dynamics of cobalt; use of ethylenediurea to assess the impact of ozone on vegetation; management of waste organic matter and residential used water; water-quality management models for optimising drainage water treatment; finally, on the use of Principal Component Analysis (PCA) and geo-statistics for the evaluation of groundwater quality.

ICP-MS offers better sensitivity than Graphite Furnace Atomic Absorption Spectrometry (GFAAS) with the multi-element speed for the determination of trace elements in solution. Instead of routine analysis of various pollutants in water, soil, air, ICP-MS also used to measure the isotopic ratios of elements in various environmental matrices. It can also be used to determine the source of contamination by adding known amounts of isotopically enriched standards or by isotope dilution. Sequential extraction combined with isotope analysis shows a significant tool to study the potential mobilisation of lead and other metals. The use of variations in stable isotope ratios has proven a well-established diagnostic technique to characterise sources of various contamination and to evaluate the global impact of various anthropogenic sources. Mercury in any form is toxic and its emissions have been estimated to be approximately 6000–7500 t/yr and most of them are produced by human activities. The study of the distribution of mercury in soils and vegetation is significant to assess the extent and the diffusion of mercury contamination. Industrial effluent containing heavy metals like cobalt can pose a threat to aquatic ecosystem as well as to human. The suitability and treatability of waste materials such as waste tyre rubber granules is interesting to study for cobalt removal.

PAHs are ubiquitous in environment and have been the subject of detailed research owing to their toxicity, environmental persistence and prevalence. In the past, lichens are used to study the accumulation of various pollutants; however, very little is known about the accumulation of PAHs by the lichen thallus. The biomonitoring of PAHs using lichens can provide an alternative tool to assess their sources and levels. Organochlorine pesticides (such as aldrin, DDT, dieldrin and endrin) have been widely used in the past and now banned in most of the countries. However, the continued persistence and wide distribution of these substances in various environments remain a concern. Hence, it is significant to study the transfer and translocation of these pesticides in crops and residue considering the human health risks. The background concentration of ozone in the troposphere is increasing, and it is an important photochemical secondary air pollutant at ground levels. This urges to focus on the growing threat from ground-level ozone to crops, semi-natural vegetation and human health, and the processes, which regulate removal of ozone at the Earth's surface.

Sustainable waste management is a challenge for 21st century. The use of organic wastes for biological production offers an eco-friendly management of waste organic matters such as pig dung, dairy sludge, and poultry excreta, and residential wastewater can be used for bio-culture and production of red worms (*Tubifex tubifex*). Increasing anthropogenic input of nutrients threats ecological processes and biodiversity of water bodies and especially of coastal waters. Development of simple models using the monitoring data can support decision-support system for management strategies. Statistical tools are useful to extract inherent hydrochemistry from large data sets. The use of multivariate techniques, such as PCA, can simplify the interpretation of complex systems and transforms the original set of variables into a smaller set of linear

combinations that accounts for most of the variance of the original set. The primary function of this analysis is the reduction of the number of variables while retaining the original information as much as possible. These multivariate techniques can help to explain the contamination types and seasonal variations in the groundwater, and are also widely used in atmospheric sciences to characterise and to enhance the accuracy of emission source

The above discussion shows that the prevention, control and abatement of various environmental pollutants have become an urgent need, which requires the knowledge of the nature, source and extent of pollution. Additionally, the monitoring, identification and characterisation of the various pollutants in different environmental matrices will be an aid to understanding their possible implications for health effects.

Finally, I thank all the contributors for sending their manuscript for consideration in the special issue, as well as all the referees who did an excellent job for improving the manuscript.