



## Preface

Improving air quality and preventing health impacts from air pollution remain significant challenges. Air pollution from vegetation fires poses a serious public health threat in Asia as it undergoes rapid industrialization, urbanization and economic growth. To tackle public health issues from air pollution, it is important to grasp the diverse sources of air pollution. The health effects of urban air pollution resulting from industrial activities, such as transportation, power plants, factories and refineries have been widely recognized and extensively reported. Less attention has been paid, on the other hand, to health problems caused by smoke from vegetation fires. The causes of vegetation fires are both natural and human, and include agricultural residue burning and land clearing for plantations. Climate conditions also affect the frequency and intensity of vegetation fires.

Air pollution from vegetation fires is contrasted with urban air pollution in terms of the physical and chemical properties it has that can contribute to the occurrence of health effects. For example, polycyclic aromatic hydrocarbons (PAHs) from incomplete combustion of organic materials and secondary atmospheric reactions are known to pose toxicity and carcinogenicity issues. In addition, the spatial and temporal distribution of vegetation fire smoke tends to be more episodic and local to rural areas, affecting specific regions for shorter durations. Further, large-scale vegetation fires have a significant impact on the air quality of surrounding areas, transcending regional and national borders. Indeed, they have been recognized as a global issue. In a situation where climate change is predicted to intensify, there is growing concern about the increasing prevalence of large-scale and uncontrollable vegetation fires.

To mitigate the health impacts of this global air pollution, multi-disciplinary and multi-country efforts will be required. Previously, in low- and middle-income countries, assessment of exposure to smoke-derived air pollutants has not been easy due to scarcity of ground observation stations in the source areas. In recent years, however, remote sensing methods such as satellite imagery have been used for detecting biomass burning (hotspots) and estimating PM<sub>2.5</sub> concentrations (through optical thickness of aerosols), thus advancing epidemiological research on the health effects of smoke-derived air pollution in Southeast Asia and South Asia. Advances in toxicological research are also contributing to our understanding of the biological mechanisms by which inhalation of various air pollutants leads to biological responses that result in adverse health outcomes. In recent research, insights have also been reported on the interaction between air pollution and COVID-19. It will be necessary to understand the root causes of vegetation fires and take them into account for effective policy implementation.

This Special Issue of Global Environmental Research was designed to give an overview of the current research on smoke-derived air pollution and its health impacts in Asia by shedding light on various aspects related to this issue. I appreciate the authors for helping to providing the latest scientific knowledge and evidence as well as the reviewers who have helped improve the articles. I hope that this special issue will enhance our understanding of global air pollution and health issues and foster advancements in research toward improving air quality and public health.

Mortality due to outdoor air pollution is estimated at 4.2 million deaths annually according to WHO estimates, making it the largest contributor to the disease burden resulting from environmental factors.

**Guest Editors**

Kayo UEDA

Professor, Hokkaido University

