

# HEALTH<sub>AND</sub> ENVIRONMENTAL CHANGE IN URBAN AREAS

Edited by

Wang Wuyi Thomas Krafft Mark Rosenberg Eva Pilot

China Environment Press



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# FOREWORD

*Health and Environmental Change in Urban Areas* consists of a collection of articles addressing important issues of urban health. The volume originated in a series of scientific symposia which took place annually at the Chinese Academy of Sciences - Institute of Geographic Sciences and Natural Resources Research (CAS-IGSNRR) between 2008 and 2012. The scientific symposia were part of a broader research collaboration led by CAS-IGSNRR which included also funding to hold scientific symposia and student training workshops between 2009 and 2012. Additional funding and in-kind support were secured from Maastricht University (the Netherlands), Queen's University (Canada), the International Geographical Union (IGU) Commission on Health and the Environment (CHE), the Earth System Science Partnership (ESSP) Joint Project on Global Environmental Change and Human Health (GECHH) and the International Human Dimensions Programme on Global Environmental Change (IHDP).

The purpose of the scientific symposia was twofold. First, to bring together both international and Chinese experts from the social, natural and health sciences to exchange ideas and conceptual approaches on urban health with a focus on “Environmental Change and Health Security in Beijing-Tianjin Urban Area – New Approaches to Reduce Potential Risks” as a case in point. The second purpose of the series of symposia was to provide the starting point for comprehensive capacity building in the form of international student training workshops. The symposia introduced key issues, concepts and methodologies, where the student trainees then had the opportunity to incorporate into their activities.

Across the five symposia, some 80 research papers were presented. To include all of them in a collection like this would have meant producing a set of books with a total number of pages of well over 1000. Instead, a selection of these papers has been included in this volume. Several of the presentations were based on research papers already published

earlier, but have been included to provide an overview of the issues that were discussed across the five symposia.

The collection is organized in five parts. Part 1, “International Perspectives on Environmental Change, Urbanization and Health” contains three papers. Wang et al. provide an overview of the environmental and health challenges that China faces. At the global level, Martens introduces a new way of thinking about the connections among globalisation, climate change and health. Mark Rosenberg and Thomas Krafft suggest a framework for thinking about global change, human health and governance.

The papers in Part 2, Environment and Health Risks in a Chinese Megacity, exemplify the many detailed discussions about environmental issues and their impacts on health which took place at the symposia. To place these issues in context, Kuang Wenhui’s paper documents and simulates the remarkable population growth which is taking place in the Beijing-Tianjin-Tangshan metropolitan area and should remind the reader that many of the environmental challenges are the result of the sheer scale at which Beijing-Tianjin-Tangshan megacity is growing. The papers also provide context for issues of water quality in Part 2, air quality in Part 3 and the urban vulnerable populations in Part 4. What follows are three papers by Ye Bixiong, Wei Jianrong et al. and Li Lijuan respectively which deal with the issues the Beijing-Tianjin population face regarding the quality of the water supply and the need for a sustainable water supply.

Given the attention that the air quality of Beijing-Tianjin receives internationally, the theme of Part 3 is “Air Quality Monitoring in Chinese Urban Areas.” The paper by Hu Maogui et al. demonstrates a highly innovative way of modelling ozone which plays a crucial role in global warming and air pollution. The papers by Liao Yongfeng and Zhu Tong deal with many of the broad issues that air pollution is having effects on health in Beijing and China. At a more detailed level, Zhang Fengying et al. analyse the effects of air pollution on allergic rhinitis and Pei Desheng et al. analyse mortality in one part of Beijing. Together, the papers highlight innovative ways of measuring air pollution and the impacts that air quality is having on health in Beijing.

In Part 4, the emphasis shifts from understanding environmental issues to understanding

the parts of the population who are most vulnerable to the impacts of the environment in major Chinese cities. The first paper (Jennifer Holdaway et al.) deals with one of the most socially complex and unique aspects of Chinese society, internal migration and how both legal and illegal internal migrants (the “floating population”) are among the most vulnerable parts of the population. Only recently have social researchers and planners in China begun to think about the older population now that it is beginning to grow rapidly with the decline in fertilities rates and the impacts of the “one child” policies become increasingly apparent as people ask who will provide informal care for the older population in the future. The papers by Cheng Yang and Mark Rosenberg and Lu Jiehua examine some of the aspects of the growing older population in Beijing-Tianjin and what this means for services at the community level. The final paper in this section by Zheng Rui deals with how Chinese society perceives the changes taking place using a risk framework.

In the final part of the book, the chapters consider issues of emerging and re-emerging diseases and the respective public health surveillance as they relate to both China and the global context. Svetlana Malkhazova and Natalia Shartova examine malaria in Russia and show how with climate change malaria as a health issue is expanding into parts of Russia where malaria has never been known or had disappeared centuries ago. The lessons from Russia have obvious implications for other parts of the world where changing environmental conditions related to global change are leading to the emergence and re-emergence of diseases. The emergence and rapid spread of the highly infectious disease SARS in 2003 has demonstrated the need for new ways of early identifying outbreaks so that they can be effectively contained before they have the chance to spread. SARS had also highlighted the special vulnerability of large urban agglomerations in a globalized world. Three papers consider the concepts of syndromic surveillance and the challenges of setting up a syndromic surveillance system as one way of detecting outbreaks early and effectively in various settings. Eva Pilot et al. report on a pilot study that use routine data from emergency medical services in India for early detection of infectious disease outbreaks. Alexandra Ziemann describes a new European approach to syndromic surveillance that can be applied in the various EU member countries. In the final chapter Eva Pilot et al. discuss new approaches to public health surveillance in urban China that use school absenteeism monitoring and temporary fever clinics as sources for

syndromic surveillance.

The magnitude and rapidity of the economic growth in the Beijing-Tianjin Urban Area and across China in general has been without precedence over the past 30 years. With this growth have come environmental challenges which are significantly affecting the health of the people, particularly those living in China's largest cities and those most vulnerable to the effects of pollution. This book provides some of the most current thinking on understanding the issues confronting Chinese people, how to respond to these issues and how to plan for future health challenges. The book also provides an international perspective on health, urbanization and the environment from which all can learn.

**Wang Wuyi, Mark Rosenberg, Thomas Krafft, Eva Pilot**

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# **Part I**

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## **INTERNATIONAL PERSPECTIVES ON ENVIRONMENTAL CHANGE, URBANIZATION AND HEALTH**





# Chapter 1

## ENVIRONMENTAL CHANGE AND ITS CHALLENGE TO HEALTH IN CHINA

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### 1.1 Introduction

Anthropogenic activities in the past 50 years, in both extent and rate, have caused more geographical environmental changes than in any period in the history of China. They have resulted in environmental problems, and some of the environmental changes are irreversible. Under the background of future global warming, China faces many challenges such as rapid urbanization, shortage of energy and mineral resources, water deficiency, and cultivated land and food insecurity, which means environmental deterioration and health risks will be aggravated. Some of the unacknowledged potential threats could be even more serious. Social and harmonious development will bear greater pressure.

In the past 100 years, China's annual mean ground level temperature has increased noticeably by about 0.5-0.8°C, though the current extent of warming has not yet reached the highest level over the past 2000 years (National Assessment Report on Climate, 2007; Ge et al., 2002). From 1956 to 2002, the mean annual precipitation anomaly throughout the country increased slightly, although drought aggravated most parts of North China and the southern part of Northeast China (National Assessment Report on Climate, 2007). The total amount of the extracted groundwater was one-eighth of the country's total annual mean amount, which resulted in a serious ecological crisis (State Environmental Protection Administration of China, 2007). Nationwide lake reclamation has led to a loss of more than 32.5 billion m<sup>3</sup> of freshwater storage, particularly a rapid shrinkage of inland and drainage lake surface area, even drying up lakes, leading to lake ecological disasters (Bai and Wang, 2003).

A great amount of raw coal, building materials, iron, food, and freshwater resources need