



Preface

Two events in May, 2008, remind us of the increasing impacts of nature's destructive power. Cyclone Nargis in Myanmar and the Wenchuan Earthquake in China have had significant impacts, especially in terms of the shocking number of fatalities and injuries and the attendant property losses. These events refresh our memories of other disasters of the recent past such as Cyclone Sidr in Bangladesh in 2007 and the Indian Ocean Tsunami in 2004. There is also often news of serious damage caused by floods, thunderstorms, heat waves and so on all over the world. It is noteworthy that these disasters are causing higher levels of damage due to increased vulnerability of society to these hazards with crippling impact on the economies and social structures of under-developed countries. Loss of lives and attendant financial losses due to disasters have been increasing recently. It is hypothesized that global warming and related climate change have the potential to further exacerbate this scenario through increase in the number and intensity of weather-related disasters.

Devastating disasters, e.g., tropical cyclones, are generally accompanied by high waves, storm surge, heavy rains, floods, landslides and lightning. Thus, there is a pressing need for pooling of expertise and cooperative actions to reduce losses from various types of natural disasters. The Hyogo Framework for Action negotiated in 2005 sets out priorities for disaster risk reduction and calls upon the international community to take practical steps to make communities safer. These include strengthening flood prevention measures and early warning systems, and applying relevant building standards to protect critical infrastructures such as schools, hospitals and homes.

The Wind Engineering Research Center (WERC) of Tokyo Polytechnic University (TPU) has been taking initiatives in promoting research and education for mitigation of wind-induced hazard and wind environmental issues in urban areas for a couple of decades, and will continue to devote its energy to realize safe and secure societies. TPU WERC was awarded the Global Center of Excellence (COE) Program entitled "New Frontier of Education and Research in Wind Engineering" by the Ministry of Education, Culture, Sports, Science and Technology, Japan, in 2008. TPU WERC always considers wind hazard mitigation at the global level as a priority obligation, because around 80% of economic losses due to natural disasters around the world are caused by extreme wind and related events.

Thus, one of the emerging issues we need to tackle is risk reduction of wind hazards and related urban environmental problems. These problems are not free from global environmental change, and cannot be discussed without considering current and future trends of meteorological events. This special issue of *Global Environmental Research* with a sub-title "Wind Disaster Risk and Global Environment Change" is planned as one of the important activities of the Global COE Program of Tokyo Polytechnic University (TPU) to contribute to society facing these problems by observing and analyzing wind-related disaster risk from this point of view. The idea of publishing this special issue was discussed by the co-editors at the Fourth International Symposium on Wind Effects on Buildings and Urban Environment held in Tokyo, March 4 - 6, 2009. This international symposium, focusing on *Cooperative Actions for Disaster Risk Reduction*, was co-hosted by the International Association for Wind Engineering, the United Nations University, the United Nations International Strategy for Disaster Reduction Secretariat, the Asian Disaster Reduction Center and the Global COE Program of Tokyo Polytechnic University. This symposium provided a stimulating and constructive forum for researchers from various disciplines related to natural disasters, engineers, educators, government officers and citizens specializing in disaster risk reduction, giving them the opportunity to exchange and share the latest scientific and technical information. The co-editors of this special issue reached the consensus that a part of the important output of this symposium, i.e. wind-related disaster risk reduction, should be widely disseminated to the public via an authorized international journal focusing on the increasing social significance of wind-related disaster risk reduction activities together with discussions on climate change and global warming phenomena.

The purpose of this special issue is to overview the current status and recent trends of extreme wind events in various places around the world, related disaster risk reduction activities, and climate change effects on extreme wind events in order to identify future activities that we should undertake. It first discusses the trends of extreme wind events and climate change from the meteorological viewpoint. It then discusses extreme wind events and damage assessment in Japan and the US from the wind engineering viewpoint. Climate change and wind-related disaster risk reduction activities in China and India are introduced, because the situations and actions taken in these countries with the world largest populations are very important for human society. It also discusses floods and storm surges



accompanying extreme wind events and recent trends in estimating the combined effects of wind and water. The life-times of buildings and structures can be 50 years, 100 years or more, and the effects of future trends of strong wind events should be considered in estimation of the design wind load level. Then, climate change and its effects on the design wind speed estimation method for buildings and structures are also discussed. Climate change effects are also important in the assessment of air quality and heat environment in densely built city areas, which have a severe impact on daily human life. These environmental problems are also discussed with reference to typical examples of the high-density cities of Hong Kong and Tokyo. Since these disaster risk reduction problems and urban environmental problems cannot be independent of central and local government policies or social systems, steps taken by the building and insurance industries and government organizations for extreme wind related disasters in the US, Japan, and Europe are introduced. Finally, a recent innovative trial to establish an engineering virtual organization (EVO) using cyber-infrastructures to offer a sophisticated platform available for education, research and practice of structural design of infrastructures and world-wide disaster risk reduction activities is introduced.

As Ban Ki-moon, the Secretary-General of the UN, said recently in Bangladesh, “*Almost as dangerous as the cyclones or earthquakes themselves is the myth that the destruction and deaths they cause are somehow unavoidable, the inevitable result of natural calamity.*” He continued that “*It is true that we cannot prevent the events themselves. But we can determine our response—and, through our actions, either compound disasters or diminish them.*”

We believe that global action in education and research is a key to achieving this target, and we are very happy to share our knowledge and information base and resources concerning wind-related hazard mitigation to society at large, through this special issue.

Finally, the co-editors are grateful to the Editorial Board members of the Association of International Research Initiatives for Environmental Studies for kindly giving them the opportunity to publish this special issue.

Yukio TAMURA

*Professor and Director, Global COE Program,
Tokyo Polytechnic University
President, International Association for Wind Engineering*

Masatoshi YOSHINO

*Senior Program Advisor, United Nations University
Emeritus Professor, University of Tsukuba*



Yukio TAMURA

Professor Yukio Tamura received his Doctor of Engineering from Waseda University in Japan, and became a faculty member of Tokyo Polytechnic University (TPU) in 1983, and has been a full professor since 1989. Professor Tamura's career in research includes the problems on design wind speeds in

tropical cyclone-prone regions, characteristics of wind-induced response of tall buildings and long-span structures, focusing on codification to compensate for unknown and uncertain portions in existing provisions. He has also conducted research on wind resistant design of tall buildings and the human perception threshold for wind-induced horizontal vibrations of buildings over a wide range of vibration frequencies considering the habitability to vibrations of various types of buildings. He also studies vibration control technology to improve habitability of buildings to vibration, and focused on the importance of estimating the inherent damping ability of buildings. Prof. Tamura has joined or supervised projects of tall buildings, exhibition halls and football stadiums in Japan, Korea, Taiwan and China. Prof. Tamura is Director of Global Center of Excellence Program of TPU, and currently holds several responsible positions, including President of the International Association for Wind Engineering, and Associate Member of the Science Council of Japan. He was awarded the Prize of Architectural Institute of Japan in 1993, the Prize of Japan Association for Wind Engineering in 1994, and the Jack E. Cermak Medal of the American Society of Civil Engineers in 2004.



Masatoshi YOSHINO

Born in Tokyo on 1 January 1928, Masatoshi Yoshino graduated from Tokyo Bunrika University, BA in 1951 and MA in 1953, majoring in geoscience, particularly climatology. He obtained his Doctor of Science in 1961. He was a research fellow of Alexander-von-Humboldt Foundation, 1961-63, at the University Bonn, Germany. He was an Associate Professor at Hosei University, Tokyo, 1968-70, Full Professor at the same University, 1970-74, Full Professor at the Institute of Geoscience, University of Tsukuba, Japan, 1974-91 and at the Department of Geography, Aichi University, Japan, 1991-97. Currently, he is Professor Emeritus at the University Tsukuba and Senior Programme Advisor, Sustainable Environmental Development, United Nations University. In the past he has served as President of the Association of Japanese Geographers and of the Japanese Arid Land Studies, Vice-president of International Geographical Union (IGU) and Former chairman of the National Committee of International Geosphere-Biosphere Programme (IGBP) in Japan. He has published many books, including “*Climate in a small area*,” (University of Tokyo Press, 1975), in English, 549 pages, and about 300 articles. He served as a chairman of the editorial committee of ‘*Global Environmental Research*’ for Volumes 1 to 6.