

Increasing climate variability and climate change, lead to increases in climate extremes. Under a changing climate, the role of several sectors of the economy, such as agriculture, as provider of environmental and ecosystem services, will further gain importance. On the other hand, natural disasters play a major role in several sectors of the economy, including agriculture, energy, health, transportation, tourism, and the economic cost associated with all natural disasters has increased significantly. Current scientific projections point, among others, to changes in climate extremes, mainly floods and droughts, in many areas of the world. Environmental degradation is one of the major factors contributing to vulnerability, because it directly magnifies the risk of natural disasters. Vulnerability of the environment can be reduced through adaptation measures and tools to increasing climate variability. In order to ensure environmental sustainability, a better understanding of the natural disasters and their impacts, is essential.

From the beginning of 21st century, there is an awareness of risk in the environment along with a growing concern for the continuing potential damage caused by hazards. Moreover, besides physical protection, a synthesis of anti-hazard measures starts being considered, including land use management, better planning for response and recovery and emergency warnings. Further, a global program to reduce the losses from natural hazards was adopted in December 1989 by the U.N. General Assembly declaring the 1990s as the International Decade for Natural Disaster Reduction (IDNDR). The challenge to researchers within the hazards community was to use their skill and adopt a wider perspective involving global change for a safer and sustainable environment. In addition, the World Conference on Disaster Reduction has adopted several strategic goals resulting in a number of priorities for action during the following 10 years (2005–2015). Recently, the Sendai Framework for Disaster Risk Reduction 2015–2030 has been adopted, which requires a better understanding of risk in all its dimensions of vulnerability, exposure and hazards. The Sendai Framework recognizes the importance of

science and technology for disaster risk reduction. The goal is to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, environmental, technological, educational, structural, legal, social, health, cultural, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

The current scientific trend focuses on the relationship between climate change and extreme weather and climate events, the impacts of such events, and the strategies to manage the associated risks. Thus, it has been recognized that a holistic and integrated approach to environmental hazards needs to be attempted using common methodologies, such as risk analysis, which involves risk management and risk assessment. Indeed, risk management means reducing the threats posed by known hazards, whereas at the same time accepting unmanageable risks and maximizing any related benefits. Risk assessment constitutes the first part within the risk management framework and involves evaluating the importance of a risk, either quantitatively, or qualitatively. Nevertheless, the risk management framework also includes a fourth step, risk governance, i.e. the need for a feedback of all the risk assessment undertakings. However, there is a lack of such feedback, which constitutes a serious deficiency in the reduction of environmental hazards at the present time.

The purpose of the book can be summarized within the following points, which also constitute advantages of the book:

- (1) To present current quantitative methodologies of environmental hazards, i.e. forecasting-nowcasting (before), monitoring (during) and assessment (after).
- (2) To incorporate these methodologies within the corresponding components of the risk management framework.
- (3) To develop a holistic and integrated methodological procedure for risk management of environmental hazards.

This book attempts primarily to provide a text and also to serve as a cook book on environmental hazards for senior undergraduate students, graduate students, researchers and professionals of environmental science, environmental economics and management, physical and natural sciences, applied sciences, engineering, geography, geology, agriculture, ecology and similar fields. As already mentioned, the emphasis is placed on methodological approaches and procedures for the three main temporal stages in the study of environmental hazards, namely before, during and after, based on geoinformatic technologies and data, as well as simulation. This approach is considered a contemporary and innovative procedure and constitutes a current research trend in the field of environmental hazards.

The subject of the book, besides comprehensive and conceptual descriptions, consists of analysis and presentation of quantitative methodologies of environmental hazards within the risk management framework and, in particular, within the three

components of risk assessment, namely risk identification, risk estimation and risk evaluation. Specifically, the book covers hydrometeorological hazards (floods, droughts, storms, hail, desertification), biophysical hazards (frost, heatwaves, epidemics, forest fires), geophysical hazards including geological hazards (landslides, snow and ice avalanches), tectonic hazards (earthquakes, volcanoes), and technological hazards. Nevertheless, the need for such a book comes from my own experience in teaching such courses and conducting research on the subject for several decades.

Nicolas R. Dalezios

Volos, Greece

August 2016