

Environmental Hazards

Assessing risk and reducing disaster

Sixth Edition

Keith Smith



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Preface to the sixth edition

It is over 20 years since the first edition of *Environmental Hazards* was published. Since then, our understanding of the environment and its hazards has improved. The theoretical base is stronger and more sophisticated tools for hazard monitoring and risk mitigation have become available. The whole field of study has matured from a relatively small sub-discipline into a mainstream, policy-driven area of active and relevant research. Positive outcomes have not always followed. The financial resources and the political will required for effective disaster reduction are often lacking. Surprise remains a common reaction when the Indian Ocean tsunami (2004), hurricane 'Katrina' (2005) and the Japan earthquake (2011) inflict death and destruction in these widely separated places. Environmental hazards pose important – even growing – threats which are rarely capable of simple solutions. Complex on-going processes – globalization, climate change, population growth, resource depletion, increasing material wealth – influence the death and destruction that disaster brings. This applies to all nations, although it is the poorest countries, and the most disadvantaged people, who suffer most.

Environmental Hazards strives to explain the drivers of hazard and outline the measures that

can reduce the disaster losses. From the outset, an account limited to 'natural' forces was insufficient and technological hazards, for example, have always been included. The scope of the book has widened further as fresh material has claimed its rightful place within a dynamic framework of emerging research and its applications. This new edition provides an up-to-date and balanced overview by drawing on multi-disciplinary sources. Although the structure of the book will be familiar to existing users, the content has been substantially re-written and expanded. There are more case studies, now supported by full-colour diagrams and photographs to illustrate real world situations, backed up by a comprehensive updated bibliography.

Over the years, the information highway leading to hazards and disasters has become increasingly congested. It is hoped that this book will continue to provide the reader with a useful road map that includes signposts along the way that encourage exploration of some of the minor routes that lie beyond the confines of this book.

Keith Smith
Braco, Perthshire
April 2012

Preface to the first edition

This book has been written primarily to provide an introductory text on environmental hazards for university and college students of geography, environmental science and related disciplines. It springs from my own experience in teaching such a course over several years and my specific inability to find a review of the field which matches my own priorities and prejudices. I hope, therefore, that this survey will prove useful as a basic source for appropriate intermediate to advanced undergraduate classes in British, North American and Antipodean institutions of higher education. If it encourages some students to pursue more advanced studies, or provides a means whereby other readers become more informed about hazardology, either as policy makers or citizens, then I will be well satisfied. Without a wider appreciation of the factors underlying the designation by the United Nations of the 1990s as the International Decade for Natural Disaster Reduction (IDNDR), the important practical aims of the Decade to improve human safety and welfare are unlikely to be achieved.

The term 'environmental hazards' defies precise definition. Not everyone, therefore, will

endorse either my choice of material or its treatment in terms of the balance between physical and social science concepts. In this book, the prime focus is on rapid-onset events, from either a natural or a technological origin, which directly threaten human life on a community scale through acute physical or chemical trauma. Such events are often associated with economic losses and some damage to ecosystems. Most disaster impact arises from 'natural' hazards and is mainly suffered by the poorest people in the world. Within this context, my intention, as expressed in the subtitle, has been to assess the threat posed by environmental hazards as a whole and to outline the actions which are needed to reduce the disaster potential.

The structure of the book reflects the need to distinguish between common principles and their application to individual case studies. Part I, 'the nature of hazard', seeks to show that, despite their diverse origins and differential impacts, environmental hazards create similar sorts of risks and disaster-reducing choices for people everywhere. Here the emphasis is on the identification and recognition of hazards, and their impact, together with the range of mitigating adjustments

that humans can make. These loss-sharing and loss-reducing adjustments form a recurring theme throughout the book. In Part II, 'The experience and reduction of hazard', individual environmental threats are considered under five main generic headings (seismic hazards, mass movement hazards, atmospheric hazards, hydrologic hazards and technologic hazards). In this section

the concern is for the assessment of specific hazards and the contribution which particular mitigation strategies either have made, or may make, to reducing the losses of life and property from that hazard.

*Keith Smith
Braco, Perthshire
July 1990*

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The previous (fifth) edition was co-authored by David Petley, University of Durham, who made important revisions to seven chapters. His valuable contributions are gratefully acknowledged both in general here and also *in situ* within the text. This edition benefits from the input of seven anonymous reviewers who made numerous insightful and supportive suggestions, the vast majority of which I have been pleased to incorporate. A special debt is owed to Nick Scarle, Senior Cartographer, School of Environment and Development, University of Manchester, who prepared the diagrams with great care and skill. As always, Routledge HQ has exercised a highly professional blend of advice and encouragement. I wish to thank Andrew Mould and his team for their support, this time recognizing the practical say-to-day help provided by Faye Leerink and Casey Mein. Finally, I would like to thank the University of Stirling for continuing support over many years and for granting full access to library facilities well into my period of retirement.

The raw material has come from an ever-widening group of sources. Some have been especially fruitful; notably the disaster database maintained by the Centre for Research on the Epidemiology of Disasters (CRED) at the University of Louvain, the annual *World Disasters Reports* published by the International Federation of Red Cross and Red Crescent Societies (IFRCRCS) in Geneva and various organizations in the USA, such as the United States Geological Survey (USGS) and the Federal Emergency Management Agency (FEMA), that place a wealth of information in the public domain. The authors and the publisher would like to thank the following learned societies, editors, publishers, organizations and individuals for permission to reprint, or reproduce in modified form, copyright material in various figures and tables as indicated below. Every effort has been made to identify, and make an appropriate citation to, the original sources. If there have been any accidental errors, or omissions, we apologize to those concerned.

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