

EARTH'S HAZARDS

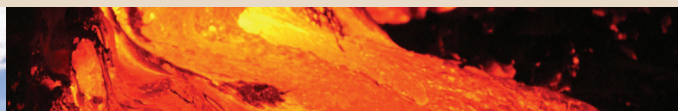
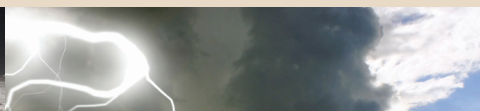
Understanding Natural Disasters and Catastrophes

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From "Earth's Natural Hazards"
by David M. Best and David B. Hacker
www.kendallhunt.com/earthshazards





Preface

The topic of natural hazards and disasters has always been of interest to the general populace. Each day on Earth brings some type of hazardous event that is part of the dynamic nature of the planet. This results in changes in the appearance of the landscape, and oftentimes the creation of a crisis for humans who are affected by the event. The broad range of disasters covered in this text addresses these events, from earthquakes, floods, and volcanoes to the biological hazards that often result indirectly from these events.

Normal geological processes have been studied and taught for more than two hundred years. The basics of river flow, landslides, and volcanoes were recognized early in the study of processes occurring on Earth, but geologists have developed a more detailed understanding of many others through the use of improved technology. By using satellite data and surface observations we are able to better explain how natural processes such as increased rainfall and river flow can generate floods in a given area. Monitoring movement in the subsurface gives insights into possible earthquake activity or volcanic eruptions. Examples of major disasters are numerous. During the past thirty years the eruption of Mount St. Helens in southwestern Washington, widespread flooding of the Midwest in the United States, the tsunami in South Asia and earthquakes, including the one in Haiti in January 2010, are just a few examples of geologically recent occurrences of life-changing events.

The dynamic nature of Earth became very evident in the latest stage of the preparation of this book. The following events occurred but are not addressed in the text:

- Magnitude 7.2 earthquake in Chile on March 11, 2010,
- Massive flooding in Rhode Island and Nashville, Tennessee in March and April 2010,
- Magnitude 6.9 earthquake in southern China on April 13, 2010 killing 2,200 people,
- Eruption of Eyjafjallajökull volcano in Iceland on April 14, 2010 disrupting air traffic across the Atlantic Ocean and on the European continent; activity continued for several weeks,
- Tornadoes strike Yazoo City, Mississippi on April 24, 2010 killing 12 people.

Featured Themes

The dynamic nature of the material covered in this text is presented through the use of carefully selected images and art work that reduce the amount of visual overload that can occur in such a course. Pictures are worth a thousand words, as we oftentimes hear; we have attempted to do this without offering too many images. Questions for Thought are at the end of each chapter as well as several web sites and brief lists of reference and reading material.

Topic Organization

Following an introduction to hazards in general and the development of the Earth system, volcanoes and earthquakes, which are many times interrelated, are presented. Discussions of mass movements and tsunami follow earthquakes, as the movement of land and water is often a result of earthquakes. Extraterrestrial hazards close out the first half of the material.

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Almost 75 percent of Earth's surface is covered by water. Four chapters address the role that the atmosphere and water play in the creation of natural hazards. A general introduction to global climate, followed by streams and oceans, explains how the presence of water is a key force on Earth. The uncontrolled presence of cyclonic storms completes the section related to water. Wildfires, often the result of too little water in regions, have become an increasing problem in our country as well as in other parts of the globe. New topics provide material about biological hazards and the environment.

Several chapters include sections that address Lessons from the Geologic Past, as determined from the geologic record. The concepts and processes associated with the featured disasters have been stressed and the number of specific terms introduced with each topic has been held to a minimum.

Support Materials

An Instructor's Guide is available, in addition to a compact disc that contains images used in the text. Another resource is the availability of a web site that has links to current information on recent disasters (<http://oak.ucc.nau.edu/dmb25>). Numerous other sites exist on the Internet.



Acknowledgments

This work grew out an initial proposal by David B. Hacker, who contributed to the early stages of the text. I was asked by Tina Bower, Developmental Editor at Kendall Hunt at the time, to provide some material. My efforts evolved into writing a major portion of the text. Tina was succeeded by Lynne Rogers, Senior Development Editor, who has provided a continued high level of direction and encouragement. Challenges that always arise with the production of a textbook have been ably addressed by Charmayne McMurray, Senior Production Editor and Renae Horstman, Senior Permissions Editor. In somewhat quieter ways, but equally important, Paul Carty, Director of Publishing Partnerships, offered his high level support for completion of the project. Geology is an observational science which requires lucid artwork. This phase of the text was the charge of Craig White—job well done!

Throughout the writing of this book I often called on a cadre of colleagues to listen to ideas and provide me the impetus necessary to complete the work. The assistance of the following colleagues and professionals has proven to help me in the writing and presentation of material: from Northern Arizona University Lee Drickamer, Regents Professor Emeritus of Biology, James Wittke, School of Earth Sciences and Environmental Sustainability, and geology graduate students Chris Kassel, Mark Sutton, and Rachelle Wagner; Charles Denton, U. S. Forest Service (retired); Wendell Duffield, U. S. Geological Survey (retired) and for providing or suggesting image and image sources: James S. Best, Rich Giraud, Utah Geological Survey; Sara Jenkins, Desert Research Institute; Dave Norman, Washington State Department of Natural Resources; and Pat Stormer, Save the Light, Inc.. Discussions with Jeff Leid, Associate Professor of Biological Sciences and Alex Alvarez, Professor of Criminology and Criminal Justice at NAU improved my understanding of hazardous diseases. Special thanks go to Darrell Boomgaarden, who granted an interview relating his personal experiences during the Great Alaskan earthquake of March 1964.

I especially wish to recognize the help of my close friend and colleague, Syl Allred, Ph. D., Principal Lecturer in the Department of Biological Sciences at Northern Arizona University who collaborated with me in writing Chapter 14, Human and Natural Interactions on the Environment. He also provided support throughout the project.

Finally I wish to express sincere thanks to my wife Mary, who provided continued encouragement whenever challenges arose. Her persistence allowed the work to come to come to fruition. In addition her review of several chapters and her assistance with polishing the text made the material read much more clearly.

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I hope you find the text interesting and engaging and I ask that you make me aware of any errors, corrections, or additions you might have. The process of assembling a text is always difficult and oversights do occur. Thank you for your interest.

David M. Best
Flagstaff, Arizona
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