

Mountain Geography: Physical and Human Dimensions

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co-authors of the 12 chapters, and L.W. Price is the co-author of all but 2 chapters. All authors have long experience with mountains and most are from the United States, but three are from Europe, two from Canada, and one from Australia. Jack Ives wrote the forward for both books. In the 2013 forward he compared the two books and chronicled what has happened in mountain geography, and its importance, in the 32 years between the two books. The 12 chapters mainly follow those in the 1981 edition.

Although many examples are from the United States, reflecting the experience of the authors, this book is mostly global. I found this a challenging book to review as I do not have the necessary background to evaluate some of the chapters, especially those in human geography; hence, I am probably overly critical of the materials that I am more familiar with, and for that I apologize. My approach here is to briefly discuss the content of each chapter, as well as its strengths and weaknesses.

Chapter 1 (Introduction) mainly discusses the definition of mountains, where they are located, and sets the stage for later chapters.

Chapter 2 (Origins of Mountains) has adequate coverage of the various kinds of mountains (folded, faulted, etc.) and relates them to plate tectonics. Discussed are island arcs, collisional mountain ranges, and the connection between mountain erosion and isostatic uplift. Two topics could have been expanded. (1) The volcanic mountains that rim the Pacific Ocean are major landforms and deserve more coverage as they pose significant hazards to the many people living and working on and near them. In this regard, the highly successful U.S. Geological Survey program on volcanic hazards/prediction should have been mentioned. (2) Also deserving more coverage are fault-bounded mountains, as much research has been devoted to the geometry and timing of young faulting events (e.g., the Salt Lake City region, the Basin and Range region, etc.). This is the field of neotectonics (see the book by J. P. McCalpin (2009) on paleoseismology, and the book by W. B. Bull (2007) on tectonic geomorphology). Both of these hazards are important to nearby large populations; this topic is mentioned briefly in Chapter 10, but the specific kinds of hazards and their prediction should be in this chapter. Finally, some classifications presented (e.g., for fault scarps and types of folds) seem unnecessary for a book of this type.

Chapter 3 (Mountain Climate) is an in-depth discussion of factors and elements that characterize mountain climates around the world. This chapter is among the group of better written and explained chapters. At the end of the chapter is a good discussion of climate change and how it will affect all aspects of mountain geography. This includes glacier melting, water supply–stream discharge, the impact on wildlife and vegetation, and its role in water supply and downstream river behavior. The impact on ecosystems is considered, and how wildlife and vegetation might adapt. Other chapters, but not all, also touch on the impacts of climate change in their discipline. What could have been added is past Quaternary climates of the world, as these are important to past events (e.g., glaciations, geomorphic processes, soil formation, etc.).

Chapter 4 (Snow, Ice, Avalanches, and Glaciers) is also thorough, well written, and well illustrated. It starts with the conversion of snow after it is deposited, its importance as a water resource, and other freezing water phenomena. This leads to an in-depth discussion of avalanches, their classification, causes, motion, the identification of tracks, and avalanche mitigation. This is followed by glacier formation and movement, and their erosional and depositional effects. Missing is a discussion of past glaciations

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This book is a revision of the 1981 book, *MOUNTAINS AND MAN*, by L. W. Price, with the same publisher. The original book had a single author, whereas this one has 5 editors, 17 different

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using the moraine record and their ages; this would connect well with the paleoclimate that I suggested be added to Chapter 3.

Chapter 5 (Mountain Landforms and Geomorphic Processes) starts off with the links between mountains, climate and denudation. Weathering is discussed as it prepares surficial materials that are then moved downslope by various mechanisms, sometimes leaving characteristic landforms. Also included are frost-related features, such as permafrost, patterned ground, and rock glaciers. The chapter ends with fluvial and eolian processes and deposition. The five editors should have exerted some editorial control on figure 5.2 (origin of mountains) and related text, as chapter 2 covers that topic. Also, no reference is made to the three books by W. B. Bull (1991, 2007, 2009) on climatic and tectonic geomorphology, for surely they are important to a discussion on landscape development. Bull's books also discuss mountains in arid regions; this is not the only chapter that could have added a section on what is happening in mountains in arid regions.

Chapter 6 (Mountain Soils) follows the generally accepted organization of the soil-forming factors. For classification, the use of the U.S. Soil Taxonomy is good as many people are familiar with it, but a world soil map, rather than the U.S. one, would give a more global view. The last section is on soil uses and resulting potential problems. One use not mentioned is the use of soils and weathering phenomena to estimate the ages of mountain landscapes and deposits, a common practice of many geomorphologists. A key paper on this latter topic is that by Tonkin and Basher (1990), who relate soil development to both tectonic and erosion rates in the Southern Alps. A diagram of a soil profile(s) with horizons would have been useful to convey better what soils are. Profile form (e.g., horizon sequence) could have been added to the discussion of Soil Taxonomy units. The use of quotation marks around horizon designations ("A," "B," etc.) is odd, and not standard. In addition, the E horizon should have been defined and used as it is common in many mountains. A generalized model of soil processes (e.g., Simonson, 1978) might have helped readers understand soils better. Figure 6.8 is good for the vegetation, but the expected profile forms should have been added to reinforce the soil-vegetation relationship.

Chapter 7 (Mountain Vegetation) is a thorough coverage of vegetation in mountains in many climatic settings, and an example of a presentation that is global. The use of latitudinal and longitudinal graphs helps the reader understand the overall relationships well. The organization is first, mountain forests, then reasons and characteristics of timberline position, followed by alpine vegetation. At the end, the future of vegetation is discussed in light of climate change and human disturbance.

Chapter 8 (Mountain Wildlife) begins by showing the parallel patterns between wildlife and the vegetation of the previous chapter. The early part goes into the environment that wildlife have to cope with, including climate, nutrients, mountain-range isolation, and declining oxygen with increasing altitude. This is followed by strategies for survival which are quite varied and include migration for some, hibernation for others, and the importance of timing of reproduction. At the end of the chapter are various morphological and physiological adaptations that allow for survival. This complex subject is presented well, but a summary section would have been useful for readers.

Chapter 9 (Attitudes Towards Mountains) is the first of four chapters on aspects of human geography. This chapter starts with what has been gleaned from the archeological record (e.g., native North Americans, Incas), and then the Western traditions with

the attitudes of the people of the Biblical Period, Greeks, and Romans. This is followed by the attitudes of the Eastern traditions (China, India, Japan, Tibet). Finally, in the Modern Period, tourism increases, mountain clubs form, and mountain exploration and climbing take place. I thought some mention of setting aside parcels of land from development, such as national parks and wilderness areas, would have fit well here, but that is in Chapter 12.

Chapter 10 (People in the Mountains) starts off with the population in the mountains, permanent versus semi-permanent, and the more recent urbanization of the mountains. This is followed by a discussion of the environment mountain people have to cope with, including geology, topography, effects of declining oxygen with altitude, weather, hydrology, vegetation, and wildlife. Where appropriate, the effects on the people are mentioned. Then are the various livelihoods of the people (e.g., mining, forestry, etc.) and the impact of those on the environment. This is followed by the hazards they face, such as earthquakes, volcanoes, landslides, meteorological events, and biohazards (including wildfires). The final discussion is how the people adjust to much of the above.

Chapter 11 (Agricultural Settlement and Land Use in Mountains) discusses the vertical distribution of environments which results in the vertical distribution of agriculture, and how it has been affected by modernization. The authors recognize four land-use strategies: sedentary agriculture, pastoralism, mixed agriculture, and agroforestry.

Chapter 12 (Sustainable Mountain Development) first defines SMD, followed by key issues such as transportation, communication, poverty, out-migration, conflict, and drugs. More recently, tourism has impacted the mountains, and there has been a movement toward conservation and protected areas. Water resources commonly lie in the mountains, and it also provides hydropower to a much larger population. At the end are listed many things that can be done toward achieving SMD. Throughout this chapter the various governmental agencies and meetings that address this issue are mentioned. Missing is a discussion of the impact of population growth on sustainability.

The five editors could have done a better job editing this book. Because there are so many editors, the problem could have been that each thought the other was going to handle certain tasks. I have mentioned already some references that could have been used, and there are others. They also should have asked the authors to update some references; examples are an old introductory text instead of a more recent text in the field, old edition of a book rather than the newer edition that discusses mountains more, and an old paper rather than a more recent one. In one instance, the newer paper I am asking for includes data for the same mountain range being discussed. I understand the five editors cannot be expected to know everything, but this could have been rectified by enlisting the help of outside reviewers. The quality of writing as well as that of some figures (some quite old) and captions vary, and they could have controlled this. Left to the authors' choice was adding English equivalents to the metric units, and cross-referencing other chapters. Arid mountains and climate change were covered in some chapters, but not all. I realize it is hard to organize and give directions to 17 authors, but the five editors could have done it.

I do not want reader to think the book should not be read or used in a course. On the contrary, the book is packed full of useful information, and if used in a course, the instructors can add what they want and compensate for shortcomings. So read it and you will learn a lot—I certainly did.

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