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Mountain Meteorology: Fundamentals and Applications

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Energy-related web sites

The following web sites were chosen to illustrate some of the issues associated with energy in mountain regions as well as certain types of energy production, with a primary focus on solar energy and hydropower. Searching for hydropower sites on the web reveals how controversial the topic of hydropower is and how intensively it is being discussed. Several sites that deal with alternative approaches to energy have also been included here, although they do not always focus specifically on mountain regions.

Energy issues in mountains

ICIMOD: Energy use in the Hindu Kush-Himalaya
www.icimod.org.sg/focus/energy/energy-toc.htm
List of interesting documents concerning energy use in the Hindu Kush-Himalaya, some with special reference to hydropower aspects.

ICIMOD: Mountain risks and hazards
www.icimod.org.sg/focus/risks_hazards/inamflod.html
An online article by Kunda Dixit and Inam Ahmed in which information is presented to support the argument that a paradigm shift is needed in making plans for long-term flood mitigation, in the way we think about floods, and in relation to what is and is not possible in this context.

Nepal Ghatta Project
www.nathaneagle.com/ghatta
Web site of a project aiming to modify traditional water mill (*ghatta*) technology to transform *ghattas* into community battery charging stations.

Water projects in Nepal: Lessons from displacement rehabilitation
www.rim.edu.bt/manual/icimod/sites/nepalnet/water/water_projects.htm
Web site provided by the Royal Institute of Management in Thimphu, Bhutan. The online article argues the "resettlement and rehabilitation of population affected by water projects has been generally unsatisfactory the world over" and that "reforms in planning and management of programs to resettle and rehabilitate the displaced population are essential to avoid conflict and consequential high social stress."

Homepage of the Snowy Mountains Hydroelectric Scheme
www.snowyhydro.com.au/main.cfm
Web site of the Snowy Mountains Scheme, supported by the Snowy Mountains Hydroelectric Authority. The Scheme lies mostly within Kosciuszko National Park in Australia's Southern Alps. While most of the Scheme's engineering features are located underground, the construction and operation of such a large-scale project in a unique Australian environment has significant potential environmental implications. The Scheme provides 2360 gigaliters of water west of the Great Dividing Range for irrigation and river management and produces 5100 gigawatt hours of renewable electricity annually. The project attempts to reconcile power generation, environmental benefits, and recreational challenges.

Solar energy

American Solar Energy Society
www.solartoday.org/1999/nov-dec/feature2.html
"Peruvian Villages Go Solar," by John Duffy, is an abstract from an article in *Solar Today*, November–December 1999. *Solar Today* is the journal of the American Solar Energy Society.

Fraunhofer Institute for Solar Energy Systems
www.ise.fhg.de/www-links/Other_Solar.html
Contains a list of web sites on solar energy and other renewable sources of energy. Prepared by the Fraunhofer Institute for Solar Energy Systems.

Alternative approaches

Energia
www.energia.org/
Web site of an international network on women and sustainable energy that links individuals and groups concerned with energy, the environment, and women. Energia aims to strengthen the role of women in sustainable energy development through information exchange, training, research, advocacy, and action. This site contains two interesting articles: "'Energizing' Rural Areas of Peru," which describes an alternative demand-led way of introducing energy applied in Peru and Bolivia that the author calls 'energization,' and "The Success of Biogas Plants in Nepal: A Note on Gender," which describes a successful program for disseminating biogas plants in Nepal and summarizes the findings of various studies on the impact of biogas technology on the quality of women's lives.

FAO, SD Dimensions, Energy for Development
www.fao.org/sd/EGdirect/Egan0007.htm
Online article "Stoves Used for Space Heating and Cooking in Mountainous Areas of Asia," extracted from an FAO/RWEDP report on a workshop dealing with stoves used at different altitudes and by different ethnic groups. It discusses the various merits of stove programs.

Green-e: Renewable Electricity Program
www.green-e.org/
Web site supported by the nonprofit organization Center for Resource Solutions, which has established the Green-e Renewable Electricity Certification Program to promote interest and consumer confidence in the purchase of renewable green power from credible companies.

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Hydropower

World Commission on Dams
www.dams.org/
The site is devoted to the major landmark final report of the World Commission on Dams, which contains a thorough discussion of the pros and cons of dams and dam construction. The entire report can be downloaded at www.damsreport.org/. An overview of the report can be found at www.damsreport.org/docs/overview/wcd_overview.pdf.

International Centre for Hydropower (ICH)
www.ntnu.no/ich/
The International Centre for Hydropower (ICH) is an association of companies and organizations active in all aspects of hydropower generation and supply. Membership is open to all parties involved in the development, implementation, and operation of hydropower.

International Commission on Large Dams (ICOLD)
genepi.louis-jean.com/cigb/index.html
Contains ICOLD's view of the report of the World Commission on Dams as well as other views. A related site, www.hydro2001.com/, contains information about two conferences: The Fourth International Conference Hydropower '01, Bergen, 20–22 June 2001, and the ICOLD European Symposium, Dams in a European Context, Geiranger, 25–27 June 2001. Hydropower '01 will focus on private sector development, hydropower as environmentally sustainable power generation, recent trends in plant operation, and innovative technology and design.

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Books

Mountain Meteorology: Fundamentals and Applications.

By C. David Whiteman. Oxford University Press, New York and Oxford, 2000. xiii + 355 pp, hardback. UK£29.50; US$39.95. ISBN 0-19-513271-8.

This book explores a wide range of issues relevant to climatology and meteorology as applied to mountain regions. It would appear to be typically aimed at an audience of advanced undergraduate students and those doing graduate research. The book has a very pleasant format, the text is nicely laid out, and the figures are, on the whole, superb, making use of excellent, didactic graphics and sketches.

The volume is divided into four major sections, the shortest of which is devoted to an introduction to mountain climates, with a particular focus on the mountains of North America. This introduces the reader to some of the themes that are dealt with in other chapters. The principal factors governing mountain climates are clearly set out: latitude, altitude, the degree of continentality, and the importance of regional circulation patterns in forging regional climates in complex terrain.

Part II provides a descriptive overview of the essentials of atmospheric dynamics and thermodynamics. This section addresses in a classical manner the scales of atmospheric motion, stability and other aspects related to the planetary boundary layer, pressure as a driving force behind winds and midlatitude frontal systems, cloud and precipitation processes, and techniques for analyzing and forecasting weather. Whenever possible, Whiteman attempts to apply the more general aspects of atmospheric physics to mountain regions.

As a transition to the section dedicated to particular applications of mountain meteorology, Part III deals with mountain winds. A distinction is made between terrain-forced flows and mountain-and-valley breezes. In the former case, processes are highlighted that determine the manner through which large-scale flows interact with topographic obstacles, that is, by flowing over or around mountains or by being blocked as a result of cold-air damming. The chapter related to mountain winds addresses aspects such as the mechanisms responsible for up-slope and valley winds, disturbances of local breezes through large-scale flows, and particularities of diurnal winds in basins and over plateaus. Here again, the author relates many qualitative and theoretical concepts to concrete examples selected mostly from the various mountain zones of North America.

The three chapters of Part IV build on the preceding chapters to enter into substantial detail on weather-related problem areas specific to mountains. The latter two of these chapters have been contributed by other authors. In Chapter 12, the concepts of diurnal breezes or synoptically driven blocking episodes are applied to air quality problems in valleys or at the interface between plains and mountain areas. Interesting examples of smog formation under particular meteorological conditions are given for readily identifiable regions such as the valley resort of Vail (Colorado) or the city of Boulder at the foot of the Colorado Front Range.

A second major area of preoccupation, namely forest and brush fires in remote mountain regions or those with limited access for prevention and control, is addressed in Chapter 13. The issues raised in this chapter are multidisciplinary and range from the beneficial effects of fire as a regeneration mechanism for many ecosystems to the danger fire can represent in terms of loss of

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life and damage to infrastructure. The indirect effects of fire, such as the enhanced risk of slope instability following the destruction of vegetation in complex terrain, are also discussed. This chapter brings a number of interesting and original side issues to light, in particular the feedbacks of changed surface conditions onto local or regional climate. Previously forested mountain slopes that undergo extensive denudation by fire, for example, will significantly change the ambient air temperatures as a result of shifts in the surface energy budget; moisture will also be affected through the land-cover change. Although many of the topics discussed in this chapter are far from being specific to mountains, the manner in which fire is triggered and the factors that propagate forest fires make for interesting reading. The chapter ends with a number of guidelines for fire monitoring, control, and prevention.

Another chapter that is not necessarily specific to mountains is the final one, devoted to aerial spraying. The micrometeorological aspects of chemical spray deposition are addressed in terms of both perturbations induced by the turbulence generated by the aircraft themselves and atmospheric dispersion of the chemicals as they fall earthward. In mountain regions, the rate of deposition of products sprayed from aircraft is modulated by local and regional factors such as valley breezes or reduced flow patterns resulting from blocking situations.

The concepts and issues addressed throughout the manuscript are upheld by a substantial bibliography, including the author's own original research over a number of years. It would have been of interest perhaps to have a broader outlook in terms of mountains than just those of the United States. There are, of course, similarities in weather and climate patterns in different mountains of the world, especially in extratropical regions. But it might have been valuable to have a chapter devoted to specific aspects of mountain meteorology in the tropics, such as the disturbances induced by monsoon circulations to normal weather patterns in the Himalayas or the particularities of the tropical cloud forests. This would have helped the reader identify key differences in terms of meteorology that inevitably exist between the tropics and the midlatitudes. Even comparisons of certain climate–orography interactions within different midlatitude regions might have provided a further, useful dimension.

These comments should not overshadow the fact that this new reference work represents a most useful contribution to our understanding of weather and climate processes in complex terrain. It is indeed rare to encounter such a wealth of different topics, particularly those that are dealt with in the final section of the book.

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Profiting From Sunshine: Passive Solar Building in the Mountains.

Edited by N. K. Bansai and Kamal Rijal. ICIMOD, Kathmandu, 2000. 284 pp. US$15.00 (developed countries, agencies); US$10.00 (developing countries). ISBN 92-9115-099-1.

This publication from the International Center for Integrated Mountain Development (ICIMOD) promises much. The mountain areas of the countries in question—China, India, Nepal, and Pakistan—each contain regions where the thermal demand for space heating and the free thermal supply of the sun are reasonably in phase. The high altitudes generate the demand for a significant part of the year, while the solar supply is capable of meeting most, if not all, of it. However, it is not as simple as all that. The ratio of demand to supply depends not only on particular mesoclimatic and microclimatic characteristics but is also reliant on a multitude of variables in terms of the design of the buildings. These variables are normally controlled or specified by the architect.

Thus, the scene is set for the kind of useful information one might reasonably anticipate from such a title. However, expectation and fulfillment are unfortunately not too well matched. Papers from four workshops organized by ICIMOD in each of the four countries do not appear to have been well edited. For instance, there is a considerable amount of overlap between the six main chapter themes, which makes for a general lack of cohesion. Papers from any of the regular solar conferences inevitably reflect the varying disciplines of the authors. Typically engineers and physicists dominate, with the contributions of architects very much in the minority. This then raises the issue of where the market for such a publication lies. If it aims primarily at the scientific community, the architectural one remains in the dark or perhaps, at best, in twilight. To illuminate architects so they are enthused enough to design solar buildings, scientific data must be translated. This then is the dilemma for the editorial team. Of course, one might rely on the consultants of the architects to assimilate such knowledge, and then it is they who have the responsibility of translated dissemination. But for all the glib talk of holistic multidisciplinary teams, real cross-disciplinary understanding remains poor.

Even accepting the unedited scientific bias of the papers, there are other frustrations. For example, the relationship between the mountainous regions, their climates, and

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the distribution of population is not given. Thus, the architectural market remains undefined. Also, although the essential domestic problem of aligning the thermal profile of cooking to that of space heating is quite well summarized at the outset, its resolution is not systematically addressed. This may reflect how the workshops were organized in the first place, but it is frustrating. The challenge is to use affordable materials in suitable areas and quantities to achieve an appropriate level of thermal resistance, capacitance, and radiant transmission in order to enable fuel-efficient cookers to meet the residual space-heating load together with passive solar gain and other incidental gains. This challenge clearly brings in the geometry of plan and section and relative positions of materials, in relation to free thermal gains, in such a way that captured solar energy is not displaced in terms of its usefulness by the other thermal inputs. In order to try to get some sense of how the workshop dealt with these fundamental issues, it is necessary to go from one paper to another to find out small parts of the puzzle; the hope is always to get a more complete picture. This is where a stronger editorial hand could and should have come much more strongly into play.

There are also irritating lapses of accuracy, for example, with names and dates, as well as lack of consistency with units. Conversion to SI units throughout would have been welcome. The contact details for individual authors would also have been very useful. Then any queries could be readily resolved and more detailed information, particularly with respect to systems and performance, obtained. Although some authors do provide informative drawings and summaries of data, others do not, and access to further information over and above the bibliographies becomes vital. Further, where examples from other climatic regions are cited, there is very little information with respect to the specific relevance and capability of the techniques for the mountain climates under examination.

This commentary may seem overly negative. The document does contain much valuable information, which in turn represents much useful work, both in the field and from predictive simulations. However, the bottom line is that, in its present form, this remains a book that points to the need for at least one other book, more coherently structured and digestible for both architectural students and practitioners, and perhaps another appraisal specifically for scientists and engineers.

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Agricultural Terracing: Development Perspectives.

By Ek Raj Ojha. Ratna Pustak Bhandar, Kathmandu, 1997. xviii + 77 pp + 32 photos. (No price provided.)

The book presents convincing arguments for the promotion of terracing, that is, the need to develop sustainable land management not only in high-potential areas. The problems of terracing are introduced in relation to both biophysical and socioeconomic factors. The author provides a brief but interesting assessment of how historical terrace systems were introduced, where some of them are still maintained today, and why others have disappeared. This perspective offers some important lessons.

The central part of the book contains a good overview of different types of terraces and their technical variations, with a great degree of detail. However, there is a question whether all technical considerations and recommendations are relevant and manageable by farmers, particularly in marginal areas. In those areas, we must assume, for example, that many farmers do not have optimal economic preconditions to establish and maintain costly conservation measures such as terraces and that their fields can vary considerably with respect to slope and soil. How can they maintain terrace grades of precisely 0.4, 0.6, and 0.8%, depending on the soil type? Although all technical instructions are well intended, many of them, such as the use of Caterpillars, would place too heavy a demand on both farmers and technicians.

The author rightly indicates that it is impossible to solve such problems only within the agricultural sector and only by the efforts of farmers and other land users. He stresses the need for external assistance and incentives, and he presents some case studies on programs for enhancing terracing and public awareness. In the reviewer's opinion, however, the author should have been more critical in presenting the advantages and disadvantages of terracing. Compared with the benefits of terracing, which are explained at length, their costs, problems, and constraints are mentioned only briefly. Statements such as one about an increase in farm productivity of 20–30% due to terracing should not be generalized, as they may invite unwarranted enthusiasm on the part of the reader. This form of argumentation may harbor unfortunate surprises for land users and terracing programs. To avoid detrimental side effects, both the use and the positive and negative impacts of incentives should be assessed more critically prior to implementation. One should not forget that positive case studies and results cannot be extrapolated to other areas and

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populations without verification and that negative experience provides many lessons.

Unfortunately, a lot of recent experience with indigenous knowledge about soil and water conservation and participatory technology development has not been considered in this book. But overall, it is encouraging that a scientist attempts to make his research results accessible and understandable to a larger and perhaps not exclusively scientific audience.

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Tourism and Development in Mountain Regions.

Edited by P. M. Godde, M. F. Price, and F. M. Zimmerman. CABI Publishing, Wallingford and New York, 2000. xiii + 357 pp. £45.00. ISBN 0-85199-391-5.

The impact of increased levels of tourism activity in upland areas is a highly topical issue, particularly with greater awareness that many so-called soft tourism activities such as ecotourism and wildlife tourism may be far from impact-free. Indeed, the expansion of such activities is having a seriously deleterious effect on many fragile mountain ecosystems. This problem was highlighted in Chapter 13 of Agenda 21, derived from the UNCED (United Nations Conference on Environment and Development) held in Rio in 1992. Chapter 13 stresses the vital importance of mountain ecosystems to the global community. The agenda put forward at Rio has since been developed in many areas and by many organizations, varying in scale from international organizations through national governments to local NGOs.

The many, complex roles played by mountains in tourism (sometimes sports playground, sometimes cultural receptacle, sometimes pilgrimage center) are well illustrated by the 16 chapters of this book, which include a diverse set of case studies at different scales and from different regions. Not all are well known; while there are several from the Himalayas and Alps, the book also includes far less well documented areas such as the Gurvansaikhan National Park in Mongolia and the eastern highlands bioregion of Zimbabwe. The work starts with a scene-setting chapter and closes with a paper postulating strategies for future mountain tourism. In between, contributions are varied in content and complexity, but unity has been provided by the evidently tight editorial guidelines given to each contributor. This gives the book a pleasing consistency, with chapters structured in the same way, and it has clearly been subjected to a high level of editorial control.

Several chapters emphasize the perils of unplanned tourism development in mountains and many detail the disastrous environmental and cultural consequences that can result from such activities and from which it is almost impossible for the area to recover. Nor has the introduction of restrictive policies on tourism access necessarily been effective in anything but the broadest environmental terms since, even in areas such as Bhutan (widely regarded as the leader in the planned mountain tourism stakes), tourism development has had considerable cultural, if not environmental, impact.

Early chapters look at the impact of tourism on biophysical environments and the human inhabitants of mountain areas. Some fascinating cases are quoted, notably the work of Buckley, Pickering, and Warnken on alpine tourism resorts in Australia. Another excellent chapter has been contributed by Valaoras on the Prespa region of Greece, which emphasizes the role that a local community can have in setting appropriate limits for tourism and in developing appropriate mechanisms for tourism development. Later chapters look at economic and policy-making issues, especially in the implementation of so-called soft tourism policies, and there is a fascinating case study by Barkin on ecotourism in the Monarch butterfly reserve in the highlands of west-central Mexico–a highly topical issue in view of recently publicized threats to the area and a possible extension of the Reserve. Several papers deal with Nepal, lamenting the failure of the Nepalese government to develop a manageable tourism strategy for its mountain areas. Wendy Brewer Lama looks at Nepalese issues from the point of view of the role of women in community projects, and Gurung and DeCoursey examine the case of Upper Mustang, one of the fragile peripheral Nepalese Buddhist kingdoms opened to tourism in 1992 with grossly inadequate forward planning. The consequences of this decision, despite much investment in control strategies, have been very severe for the inhabitants of this remote and beautiful desert country.

The book has considerable integrity, with some more solid chapters balanced by more free-ranging contributions, notably a lively, if slightly peripheral, account of the role of storytelling in maintaining the integrity of indigenous aboriginal Canadian communities in British Columbia, Canada. Each chapter finishes with a good bibliography, though it would have been nice if these could have been collated into a single large bibliography at the end of the book, purely for convenience. The work has been produced to a high standard and illustrations have been reproduced well, although there are occasional errors of referencing and a few typos. At £45, it would certainly be out of the range of student purchas-

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es, except by a few postgraduates, but certainly constitutes a must-have for all academic libraries in institutions that deal with tourism, planning, development studies, regional studies, or the management of environmental change.

It is interesting that, at the time this review was written (November 2000), many scientists are predicting decreased levels of sports tourism in many mountain areas (especially in Europe) over future decades as a result of global warming. However, this decreased utilization level is likely to be matched by increasing utilization of other areas, consequent upon the proliferation of potential special-interest mountain tourism activities, the greater experience of the traveling public (both domestic and international), easier access to information, and a reduction in the real costs of air fares. This will increase, rather than decrease, the importance of systematically planning tourism activities in mountain areas and setting in place appropriate procedures to monitor the effectiveness of regulatory mechanisms, without which it is very easy to let degradation continue past the point of no return. Visitor education programs are also a vital tool, and virtually each case study included here emphasizes that local communities hold the key to success in sustainable tourism projects. Mountain environments must be viewed as a total ecosystem, where culture and environment are inextricably related and need to be integrated in successful development planning. This interesting book, which not only reviews case studies in past mountain tourism but suggests a strategic approach to developing sustainable mountain tourism in the future, undoubtedly makes a major contribution to the literature of the subject.

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Creating Colorado: The Making of a Western American Landscape, 1860–1940.

By William Wyckoff. Yale University Press, New Haven and London, 1999. xiv + 336 pp. US$30.00. ISBN 0-300-07118-3.

William Wyckoff has produced a detailed and finely crafted tribute to his long love affair with Colorado's people and landscape. *Creating Colorado* is an unabashedly geographical treatment of times past, organized by places, regions, and themes rather than by historical eras. In the tradition of sweeping syntheses produced by Donald W. Meinig (1972, 1998), this is a human geography of Colorado and how it changed as a result of nature and the impress of national cultural, economic, and political systems. A brief introduction to "pre-1860 geographies," such as the physical environment and Native Americans, precedes five regional chapters covering the years from 1860 to 1920 that are central to establishing the bedrock of Colorado's human geography. Reflecting the state's mostly inside-out settlement pattern, the organization of the five regional chapters sequentially proceeds through the mountains, Piedmont, eastern plains, southern periphery, and western slope, with the most material appropriately devoted to the mountains and Piedmont. The concluding chapter explores the years between 1920 and 1940 by placing the state within larger national and regional contexts.

Building upon the ideas of cultural geographers, environmental historians, and physical geographers, Wyckoff uses the concepts of location, place, and landscape to aptly demonstrate the breadth, depth, and vibrancy of his historical geography. The tone is stridently geographical; the summary of mining, for example, focuses on the spatial systems of roads, rails, and capital flows. The reader is subjected to a myriad of geographies, including investment geography, railroad geography, population geography, settlement geography, mountain geography, and even the geography of "conquerable curiosities." Overall, though, a great deal is said with little wasted ink in the author's evocative and clean style. Leadville, for example, "suffered mightily amid the carnage of silver's lost glitter," and "once a locale yielded its best color, population drained faster than spring runoff from an alpine snowfield." Over 100 illustrations add to the interpretive skill and appeal of the volume, mostly in the form of well-chosen archival photographs, drawings, and maps, interspersed with other maps drafted for this volume and a few contemporary photographs by the author. The role of historic photos as "visual parables" is rivaled by the bird's-eye views of several towns. Thirty-four pages of footnotes round out the scholarly tone of the lengthy tome.

Five themes guide the reader's understanding of settlement patterns, ethnic geographies, and cultural landscapes: the doctrine of first effective settlement and the self-attraction of growth, the meeting of many cultures, the ideological dominance of capitalism and liberal individualism, the indelible stamp of political institutions, and the immediacy of nature and environmental resource issues in everyday life. The author has previously employed a five-theme scheme to good effect in writing about the Mountainous West (Wyckoff and Dilsaver 1995). Resource extraction, sustainable and nonsustainable developments, federal government largesse, and the marrying of urban areas to mountain environments are just a few of the topics employed to illuminate the growth and change over time in the five Colorado regions.

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Wyckoff achieves an accurate feel for each region. Nature and the land are never far from the forefront of this tale, most obviously in the dramatic humans–environment interactions in the mountain zone involving metals mining, forestry, and tourism but also in the other regions that delve into coal mining, irrigated agriculture, water management, mountain parks, grazing, and the Dust Bowl. The thorough treatment of the five regions is also achieved through Wyckoff's frequent and helpful tendency to summarize phenomena into a few categories. For example, the Piedmont Heartland region is broken into four distinctive subregions (Denver–Golden–Boulder, Fort Collins–Greeley, Colorado Springs, and Pueblo), and within Denver, four fundamental changes in urban geography are identified. Denver's rise to power is fascinating reading, as the author is on familiar ground, revisiting an urban landscape he has elsewhere explored (Wyckoff 1992).

This is a tightly edited book, free from typographical errors and gross misstatements, and shortcomings in any form are rare. The major fault is in the tiny reproduction of the maps drafted for the book. A great deal of work clearly went into making these maps to illustrate the author's points, but many garner less than a half page of space. Grab your magnifying glass; this reduction results in 18 maps displaying a font size between 4 and 7 points. Other quibbles include Figure 9, a 1:62,500-scale topographic map that illustrates glacial landforms less well than would a 1:24,000-scale map. The significance of including trapper Ezekiel Williams on Figure 15, a map of early Colorado expeditions, is unclear, as is the reason for the omission of Juan Bautista de Anza's 1779 Comanche campaign. Although the footnoting is extensive, no leads are provided to explain the exodus of the Anasazi (p. 25), the name change of the Grand River to Colorado River (p. 226) and Snowy Range (on Figure 18) to Front Range, or why the proposal to establish Mount Evans National Park failed (p. 85). Additionally, it is implied on p. 21 that the Green River and Yampa River join in Utah rather than Colorado, and the Sand Creek Massacre is referred to as "east of Denver" (p. 109) when southeast is a better choice.

While examining the origins of a Colorado landscape that is still in the making, Wyckoff strives to remind the reader of how the state is representative of the West, but the connections between Colorado and national forces are highlighted much more than those between Colorado and the region. Mountain scholars would likely prefer more discussion on the human geographies of significant mountain landmarks, such as Mount of the Holy Cross, Grays Peak, or Longs Peak, but in this synthesis of changing Colorado landscapes, case studies are not used. The focus is on how places contribute to the bigger picture rather than on how broad forces play out in small ways. This book is not a comprehensive resource for the history of each significant Colorado town or landform. Cripple Creek, for example, receives light treatment. But the book excels at providing a broad synthesis of Colorado geographic interpretations backed up with innumerable details. *Creating Colorado* has vaulted to the forefront of scholarship on Colorado's land and people.

Illuminating how the modern scene is tied to the past is a hallmark of good historical geography, and Wyckoff keeps the focus on what has led to what we see today. His penchant for capturing the essence of pertinent details provokes a hunger for what he would say about the recent Colorado scene. Colorado is one of the places I know best, but like Wyckoff, I have had the outsider perspective. This apparent paradox—intimate familiarity without longtime residence—is testament to the value of repeated journeys to a place and the joy of new discoveries of mountain delights.

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