

Books

Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions

By Shouraseni Sen Roy and R.B. Singh. Delhi, India: Oxford and IBH Publishing, 2002. ix + 232 pp. Rs 950, US\$ 47.00. ISBN 81-204-1565-5

This book has been produced to mark the International Year of Mountains 2002. It is the outcome of a research program undertaken by the authors, based at the University of Delhi, India. A major motivation for this research was the recognition that agriculture in the South Asian region is highly vulnerable both to the impacts of future climate change and to the effects of climatic variability under current climates. The authors clearly state the objectives of the book. There are 6, each phrased a question: What are the critical issues in climatic variability? Which are the most vulnerable areas and sectors under mountain regions? What are the extreme events occurring through nature-human interactions? How are agriculture and horticulture activities influenced by climatic variability? How are mountain people and policy-makers responding to environmental change? What are the most appropriate mitigation strategies?

How are these objectives addressed? There is a common approach in many of the 8 chapters. They combine a broad and general introduction on the topic of the chapter, some discussion of issues specific to mountainous regions, and a detailed report from one district in northwest India. It soon becomes clear that much of this book is a description of the authors' research in Kullu district, India, with more general material providing an introduction to that study.

Chapter 1 is a broad introduction to climate and climatic variability. It is pitched at undergraduate level, rather

than being a review of current research. Then, the research methods used in Kullu district are described. Data collected included weather, crops and population statistics over a 20 to 25 year period. Chapter 2 describes the geology, ecology, and some of the social issues of Kullu district.

The next 4 chapters concern climatic variability. Chapter 3 gives a general introduction to climate, the greenhouse effect, and its inputs on agriculture. A description and analysis of the climate of Kullu district is also presented. The authors note that there is often a lack of long-term data for climate in mountainous regions. Chapters 4 to 6 describe climatic variability and extreme events, agricultural production, and horticultural production, respectively. The format of each is similar. Very general background material is followed by more focused discussion from mountainous regions, and then the results of the study in Kullu. From the latter, we learn, for example, that horticulture in Kullu is largely centered around the production of apples.

The perception of policy-makers is covered in Chapter 7. This is mainly a report of a survey of local decision-makers in Kullu Valley. Issues explored by the authors include how local officials rank awareness of climate issues compared to other issues of concern to the local community. The final chapter revisits the conclusions from each of the previous chapters. It concludes with a list of 11 action points for development in Kullu Valley. The book is completed by 14 pages of bibliography and 4 appendices of graphs of rainfall and temperature at each sample site within Kullu district.

What is the audience for this book? The cover of the book lists climatologists, agricultural and atmospheric scientists, geographers, environmentalists, mountain experts, and policy-makers. For many of these, the background text may be too general and is best suited as introductory material for undergraduates studying

these subjects. Perhaps its wider appeal will be for those interested in a specific case study of how climate, agricultural systems, and social context interact within a mountainous region.

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Alpine Biodiversity in Europe

Edited by L. Nagy, G. Grabherr, Ch. Körner and D.B.A. Thompson. Berlin: Springer Verlag, 2003. xxxi + 477 pp. €149.95, £105.00. ISBN 3-540-00108-5.

This book considers the alpine areas of Europe: ecosystems "lying at or above the 'treeline' ecotone" (p 3), which cover about 3% of Europe's land area but contain about 20% of the continent's higher plant species. The book is the principal outcome of the Alpine Biodiversity Network (ALPNET) sponsored by the European Science Foundation from 1998 to 2000 to synthesize available knowledge on alpine biodiversity. As discussed below, ALPNET has largely succeeded in this objective, and this book is truly a benchmark publication; one of the best in recent years in Springer's Ecological Studies series (this is no 167).

The book is divided into 6 parts. Part I is the longest and, in spatial terms, most comprehensive. It begins with a brief introduction to Europe's alpine areas, providing a useful ecological classification (though the location of the symbols on the maps on pp 8 and 9 is unexplained). This is followed by a chapter which reports the only field research done specifically as part of the project, leading to a bioclimatic classification of these alpine areas. Data loggers were buried in the soil at a depth of 10 cm for 1 to nearly 2 years at 18 carefully chosen sites across Europe in order to measure

root zone temperature, as the most useful and feasible measure of alpine life conditions. The results show that life conditions are similar across 32° of latitude with regard to variables including season length and mean, minimum, and maximum temperature. Oceanicity and regional climate appear to be at least as important as latitude in determining regional temperature regime. This important chapter is followed by 10 regional accounts, describing the high mountain vegetation of most of Europe's alpine areas, each with a similar structure addressing geography, geology, climate, and past and present vegetation. Many of these chapters end with a short section which appears to derive from the personal interests of the authors. The chapters represent a valuable synthesis, though it is unfortunate that the environments and vegetation of Crete, Iceland, and the Tatras are not described despite the available information.

Part 2 considers plant and vegetation diversity. As with the succeeding 4 parts, it starts with an overview which introduces the theme and briefly summarizes the key points of the following chapters. The first 2 chapters are continent-wide in scope, Chapter 5 addressing taxonomic diversity as described in the 11 volumes of the *Atlas Florae Europaeae* published to date, from which color maps are drawn. It shows that the Alps and Pyrenees are both the most species-rich ranges and have the most endemics. Chapter 6 compares vegetation according to snow protection and bedrock geology, and shows that vascular plant richness is higher on calcareous substrates and declines northwards. In contrast, numbers of cryptogams (bryophytes and lichens) increase northwards. The following 5 chapters address spatial and altitudinal variations in plant diversity in the Scandes, Alps, and Sierra Nevada, using a variety of techniques.

Part 3 has 6 chapters, the first of which begins with the statements that "Our knowledge of alpine invertebrate taxa is rather patchy" (p 233). The alpine zone is not the most species-rich for invertebrates. However, many alpine invertebrates have unique adaptations to their environment, and thus are threatened by climate change. Chapter 13 considers the best known invertebrates across Europe, Macrolepidoptera (butterflies), and is followed by chapters on invertebrates in the Urals, arachnids in the Alps, and butterflies and carabids in the Italian Alps and Apennines. Part 4 moves to vertebrates, and contains 6 chapters. As the introductory chapter makes clear, there are many basic questions that remain unanswered, starting from the fundamental ones: what variables govern the presence or absence of species, and why are some specialized, while others are more widely distributed? Of the following 5 chapters, only the first considers birds, in Scotland. The others cover rodents in the Alps, large herbivores and the impacts of grazers (large and small) across Europe, and vertebrates in the Spanish Pyrenees and Sierra Nevada.

Part 5 changes the temporal focus, considering long-term vegetation dynamics. The introductory chapter is a fine synthesis of current knowledge, with key conclusions which state, in particular, that "The commonly assumed high sensitivity of alpine vegetation to climate change is largely due to invasion processes" and that "Alpine plant communities are vulnerable (sensitive and non-resilient) to perturbations" (p 407). Such conclusions derive to a large extent from the research reported in the 4 following chapters, on long-term changes in vegetation in Norway, Finland, the Urals, and the Alps. Part 6 consists of a single brief chapter by the editors: "Alpine biodiversity in space and time: a synthesis," which brings together many of the main points in

the preceding 37 chapters, notes some priorities for future research, and concludes with comments about the diverse importance of alpine areas.

Reviewing this book, some significant variations in geographical coverage rapidly became clear. As mentioned earlier, some alpine areas are not described in the regional accounts in Part 1. In the following parts, apart from the introductory chapters, there are 5 Europe-wide overviews, many chapters describing current knowledge regarding groups of organisms in the Alps and the Scandes, and a few chapters considering the Urals and the mountains of Spain. Yet scientists are active in other mountain ranges, such as the Balkans and Carpathians, and Iceland. The number of pages and chapters in the various parts would also suggest that we know far more about Europe's alpine vegetation than its vertebrates and, especially, invertebrates. Some more critical reflection on this would have been welcome in the concluding chapter.

A book such as this is largely a reflection of the people who were drawn into ALPNET; and we know well that there are many communities of botanists, zoologists—and all their various subgroups—and that they often do not interact too effectively. Differences in ability in the English language doubtless also played a role in the composition of the ALPNET team; the book has 76 authors from 16 countries, but only 12 come from outside the present European Union, Norway, and Switzerland. It is to be hoped that, as the European Union extends eastwards, more scientists from eastern and central Europe will become involved in future continent-wide appraisals of alpine biodiversity, so that that its richness in all taxonomic groups—a truly European heritage—can be documented and synthesized. Nevertheless, this high-quality book is far more than just a first step, and should be in the

library of every organization concerned in any way with alpine biodiversity in Europe.

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CD-ROM

PARDYP in the Middle Mountains of the Hindu Kush Himalayan Region

CD-ROM. Kathmandu, Nepal: International Centre for Integrated Mountain Development, 2002.
ISBN 92-9115-586-1.

This CD-ROM provides a very comprehensive overview of the People and Resources Dynamics Project (PARDYP) conducted within 5 study watersheds in the Hindu Kush Himalaya: two in Nepal (Jikhu Khola, Yarsha Khola) and one each in China (Xizhuang), India (Bhetagad Garur Ganga), and Pakistan (Hilkot). The main goal of the project is to improve the understanding of environmental and socioeconomic processes associated with degradation and rehabilitation of mountain ecosystems and to generate wider adoption of proposed solutions by stakeholders in the Hindu Kush Himalaya. The results presented relate to work undertaken in the field between 1996 and 2000 during phase I of the project. Phase II was due to be completed by the end of 2002. Although the main fieldwork covered the period 1996 to 2000, the use of aerial photographs allows some of the analysis, such as that of land use change, to be extended back before 1996.

The watersheds have been chosen so that a balanced picture is obtained of the great variety of landscapes and socioeconomic sys-

tems that exist in the region. Elevation of the watersheds generally ranges from 1000–3000m and they vary in size from 639 ha (Hilkot, Pakistan) to 4509 ha (Jikhu Khola, Nepal). Climate ranges from humid temperate at Hilkot, with 67 rain days, to humid subtropical at Jikhu Khola with 142 rain days. Staple crops are relatively similar across the watersheds (maize, wheat, rice, potatoes) but cash crops are sometimes different, with tea and tobacco being important in the Xizhuang watershed, and tomato, fruit and vegetables being more important in the others.

The types of detailed information provided for each watershed are essentially consistent and follow the broad guidelines of the overall project. The information is portrayed in maps, graphs, tables and diagrams exemplified by excellent colour photographs. The main information provided for each watershed covers soil fertility (pH, available phosphorus, carbon percentage, CEC, nitrogen content) under a variety of different land uses and agricultural systems, erosion and sedimentation (based on numerous erosion plot studies), hydrology (mean daily discharge, infiltration rates, flow duration curves), meteorology (rainfall variation, monthly rainfall, rainfall intensity, maximum, minimum and mean temperature, annual water balances), geology, land use (especially land use change over varying periods of time), and land suitability. It is clear from the data that a number of problems are occurring, such as land degradation, soil erosion and the increasing acidification of many soils. In addition to these essentially physical attributes, a large variety of socioeconomic characteristics are covered, including gender issues, energy and fuelwood sources, farmers' perceptions, household status,

income status and ethnicity. Hopefully, this listing will give some idea of the wealth of invaluable information provided for the 5 watersheds. It must be one of the most detailed and readily available sources of information on these issues for the Himalayan region. The results presented here also go some way to dispelling the "uncertainty" dilemma that has dominated discussion of Himalayan issues in the past.

In addition to the data for the individual watersheds, a substantive discussion and synthesis is provided, drawing together information from the 5 watersheds. The main issues identified and discussed are: implementation and management, livelihood potentials, on-farm, common and water resources, inequity and gender and community institutions. As a final conclusion, a number of general problems are enumerated, namely: population growth, deforestation, water availability, resource degradation, declining soil fertility, flood, drought, poor infrastructure, availability of forest products, and excessive workloads for women.

This is such a wide-ranging project, and the data presented are so substantial, that there will be something of use to anyone with an interest in Himalayan affairs. It also provides a baseline to judge the results of previous work and a challenge to future projects. The efficiency and skill with which the results are presented belie the immense amount of work, often in difficult conditions and political unrest, which was necessary to produce data of a high quality. I look forward to the results of Phase II of the project.

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MRD received this Letter to the Editor. We encourage readers to respond to articles and reviews published in MRD, and send their views on topical mountain-related issues.—Ed.

Letter to the Editor

Review of: Transboundary Protected Areas: The Viability of Regional Conservation Strategies

I am glad that Dietrich Schmidt-Vogt reviewed the book *Transboundary Protected Areas: The Viability of Regional Conservation Strategies* (Goodale et al 2003) in the last issue of MRD. Mountain transboundary protected areas—if they truly have collaborative or joint management—are important vehicles for effective management of those cultural, biological and physical resources that are no respecters of political lines on a map, or guards at a border. They can also promote reduced tension and conflict—and even peace—as is the case with Peace Parks. Unfortunately of the 169 transborder complexes, the vast majority are simply abutting PAs, with little effective cooperation between them.

Unfortunately, as the reviewer points out, only some of the book chapters deal with mountain situations, and many deal only with community-based conservation rather than transboundary protected areas (TBPAs). Nonetheless, the book is a valuable contribution.

I cannot let the reviewer's statement stand that "the first major publication on this topic was *Trans-*

boundary Protected Areas for Peace and Cooperation (Sandwith et al 2001)," even though I am a co-author of that work. His statement does not recognize the pioneering work of others who laid the groundwork for the current renewed interest in TBPAs.

Probably the first publication grew out of a workshop in 1988 in Vancouver, Canada, organized by Jim Thorsell, who has been instrumental in advancing this concept. It resulted in *Parks on the Borderline: Experiences in Transfrontier Conservation*, edited by him and printed in 1990 as IUCN Protected Area Programme Series No 1. The second publication appeared in 1993 as *Transfrontier Reserves for Peace and Nature: A Contribution to Human Security*, edited by Arthur H. Westing and published by UNEP. This was followed by one emanating from a mountain workshop that I co-organized in the Australian Alps in 1995. The workshop focused on the issue of cooperation across boundaries, bringing pairs of mountain park managers from all continents, and produced *Transborder Protected Area Cooperation* (Hamilton et al 1996, published by IUCN and Australian Alps National Parks).

Meanwhile IUCN's European Region produced an action plan in 1994: "Parks for Life". This identified among other items a Priority Project 22 on transfrontier protected areas. It listed 42 abutting complexes (10 of them in mountains), and suggested 9 mountain locations for future possibilities. This action plan gave rise to two "early on" meetings organized by Jan Cerovsk? and the Czech Ecopoint organiza-

tion, and two more publications: *Transboundary Biodiversity Conservation* (1995) and *Transboundary Protected Areas in Europe* (1996).

Following the IUCN, World Commission on Protected Area's "Parks for Peace Conference" in South Africa in September 1997, there came a special issue of the PARKS journal (Vol 7, No 3, 1997) devoted to Parks for Peace, as well as a little-distributed volume of Proceedings, edited by David Sheppard. And finally, in 2000, the UNESCO-MAB National Committee of Poland printed a book *Biosphere Reserves on Borders*, reporting on 8 case studies (6 of them mountains).

All of these predate the Sandwith, Shine, Hamilton and Sheppard publication of 2001, referred to by Vogt as "the first," and are presented to show the evolution and growing support for TBPAs. Since mountains often form country or state boundaries, mountain TBPAs are particularly important in promoting harmony and peace across what are frequently borders having tension or even armed conflict. How wonderful if a step forward in the Kashmir could be taken by a Siachen Glacier Peace Park, or if the current Demilitarized Zone (a *de facto* nature protected area) between North and South Korea could be converted into at least a 4 km by 246 km linear TBPA!

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