

Introduction to Energy Resources, Technology and Society

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An Introduction to Applied Biogeography

By Ian F. Spellerberg and John W.D. Sawyer
Cambridge University Press
Cambridge, United Kingdom
 1999, 243 p.
 US\$24.95, paperback
 US\$64.95, hardback

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Biogeography is a field that has lately regained prominence after decline from its heyday in the 18th and 19th centuries when the faunas and floras of new worlds were being documented by such greats as von Humboldt, Darwin, and Wallace. Wallace alone collected 125,660 species from the Malay Archipelago. The early workers reveled in the rich diversity of life, and their discoveries led to an overthrow of ancient ideas on how life was created and organized on earth. Today, biogeography has a new, almost opposite perspective, in assessing the loss of species diversity and the threat to natural ecology posed by the pressures of human population growth, resource exploitation, pollution, and climate change.

Spellerberg and Sawyer's goal is to introduce the science of applied biogeography focussing on environmental protection and resource management, but much of their book is devoted to introductory biogeography with emphasis on historical highlights, biogeographic classifications, island biogeography, geology, ecology, and data collection. Most chapters begin with a fanciful introduction to the topic, and then discussion proceeds to more technical aspects, but all material is handled fairly briefly, in a simple manner true to the introductory nature of the book. Focal points of the book include island populations, wildlife corridors, and fragmented habitats. The authors have extensive experience in both hemispheres and bring a fairly balanced perspective to the topics, although the bias in examples and illustrations favours the United Kingdom, Australia, and New Zealand. Throughout, the writing is clear and very readable. Key information is summarized

conveniently in 22 tables scattered through the book. The graphics are in black and white, most are clear, but a few illustrations are not. The graphics pale in comparison to Bailey's (1998) *Ecoregions* that I reviewed last year (*Geoscience Canada*, v. 25, p. 193).

Spellerberg and Sawyer raise a number of key problems in biogeography. There are, for example, approximately 1.7 million described species from a potential world total of 11-30 million species. Species may be going extinct faster than they are being described! Taxonomy is generally in decline and the geographic areas of highest species diversity ("Vavilov centres") of Africa, Asia and South America have the fewest taxonomists. Another bugaboo in biogeography is the lack of a uniform scheme for classifying the biological diversity of the world's plant and animal communities and ecosystems. Unfortunately, no ready solutions appear to be at hand. A bright spot for the future may be the development of computer data bases, the use of GIS in storing and modelling data, the exchange of data bases on the World Wide Web, and the increased awareness of the importance of maintaining species diversity. The authors wishfully predict the future creation of a "World Biogeography Agency." Spellerberg and Sawyer conclude with a useful list of conventional organizations and web sites devoted to ecology and environmental management, for example, the World Conservation Monitoring Centre, in Cambridge, England.

This book fulfills its goal as an introduction to applied biogeography, but it probably is not the definitive work on the topic. Given the huge potential scope of biogeography, it is probable, however, that the definitive work on the subject may never be written.

Introduction to Energy Resources, Technology and Society

By Edward S. Cassedy and Peter Z. Grossman
Cambridge University Press
 1998 (second edition), 427 p.
 US\$80.00, hardcover
 US\$34.95, paper

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The text of this book is divided into three parts. I: Energy Resources and Technology; II: Power Generation: the technology and its effects; III: Energy technology in the Future.

The purpose of Part I is to acquaint the reader with the kinds of energy sources in the world, and the methodology of converting these sources to energy. The methods of making resource estimates of oil and gas and reserves of them are addressed. In addition, the conflicting views regarding estimates are aired. References to oil and natural gas dominate Part I but renewable sources are treated also: water power, nuclear, wind, solar, geothermal, wood, and biomass energy.

Part II deals mainly with the way fossil fuels (oil, gas, coal) are converted to energy and the resulting impact the process has on the environment. This entails a discussion on the carbon cycle and acid rain. These undesirable features engender high costs now and in the future.

Nuclear fission occupies 60 pages in Part II. The authors review the physics of how the nuclear reaction is initiated and how the heat is captured and converted to energy. They discuss the incidents at Three Mile Island and Chernobyl. Just as there is an acid rain consequence when using oil for the source of energy there is a similar problem after uranium is used to create energy. The authors give a discussion on the disposal (or storage) of radioactive waste. The last chapter of Part II contains the authors' views on the real cost of electricity.

Part III contains a classification of technologies which are too costly today

but may be cost effective in the future. An example of near term may be solar-thermal for producing domestic hot water; for medium term are the adaptation of syngas (biomass derived and coal derived); and for a long term example is large scale transmission and distribution of energy using the medium of hydrogen.

The book is a philosophical text. The first part deals with the fruits of geologists' endeavours but the word, geology, does not appear in the index. In brief the book describes the technologies employed in obtaining energy from oil, gas, coal, uranium and water. The organization of the subject is logical and comprehensive. For geologists it would serve as a handbook. The index is inadequate, however. A reader will not find pages quickly – geothermal power indexed for p. 248: the page is blank. One heading is "Geothermal power" on p. 117, but it is not in the index. The index for heat pumps is p. 381-382 but actually it is page 385. Similarly "cold fusion" is not on p. 311 but p. 315.

This book cannot serve as a standard text for geologists but it can be a ready reference for those wanting brief access to almost all aspects of knowledge pertaining to energy. The price is right, especially for the paperback edition.

A Traveller's Guide to Geological Wonders in Alberta

By Ron Mussieux and Marilyn Nelson
Federation of Alberta Naturalists and the Canadian Society of Petroleum Geologists
Calgary, Alberta
1998, 254 p., C\$24.95

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Authors Ron Mussieux and Marilyn Nelson and their illustrator, Dan Magee, are to be congratulated on this splendid guidebook that introduces the reader painlessly and informatively to about 110 geological sites in Alberta. It does this without emphasizing the glorious Rock-

ies at the expense of other parts of the province. As stated in the foreword, the very grandeur of the Rockies comes from contrast with the arid plains, productive parkland, and boreal forests. The influence of geology is found in all these varied landscapes.

The book begins with a geological primer that the authors rightly state is optional reading because each site is fully described in a stand-alone explanatory piece. However, the primer is very well done and will certainly enhance the lay reader's appreciation of site visits. It consists of a sketch map and brief descriptions of the major geological divisions of the province, followed by an introduction to rocks and to the geological column. Extra pages are devoted to some Alberta specialties such as the formation of the Rockies, the development of caves, and the origin of meteorites.

The sites are grouped into six "tourist destination regions" that include both major cities, i.e., Calgary and Edmonton and their environs, the north, the heartland (central Alberta), the Rockies and the south. Each site within these regions is described by two or more pages of text, coloured photographs, a mini-location map and, in most cases, an explanatory diagram, e.g., a cross-section. Most sites chosen are easily accessible. Many can be examined from main roads, others require short drives down secondary roads or walks along trails. A very few in the north can be reached only by plane or boat.

The range and diversity of geological wonders is enormous. Sites in the Rockies naturally include prominent peaks such as Mt. Yamnuska and the McConnell Thrust, Mt. Rundle, the classic Front Range mountain, and Castle Mountain: exemplar of the Main Ranges. They also include features such as the well-known Cadomin Cave, some of the many spectacular waterfalls, rock slides, and turquoise mountain lakes, together with sand dunes on Jasper Lake, the fast-receding (but still very accessible) Athabasca Glacier, and the eye-catching drumlin cluster of Morley Flats. The origin and significance of all of these features are carefully described, and fascinating tidbits of extra information often provided. For example, although I've visited Bow Falls scores of times, I didn't know that the Permian Ishbel Group strata on the steep north bank contained several lay-

ers of phosphate rock. Nor did I know that commercial phosphate deposits are hitherto unknown in Canada so that these occurrences may be a guide to prospecting beyond National Park boundaries.

So, what after the mountains? Naturally the fossil fuel resources beneath the prairie are identified as geological wonders. A myriad of pump jacks (oil donkeys?) keep us informed of present activities and provincial and national monuments and interpretation centres remind us of the recent exciting past: of Turner Valley, Alberta's first major oil strike in 1914, a classic anticlinal trap where flaring depleted gas pressure and prevented recovery of 88 percent of the oil. You can still visit a remnant of that flaring today; of Leduc #1 drill site, a prime example of the reef trap, which ushered in the modern oil and gas era; and of the Pembina Field which offers fine illustrations of "pinch-out" stratigraphic traps but where the prolific but "tight" Cardium sandstone reservoirs make the pump jacks work hard for their rewards.

Before the oil boom, coal mining was a major source of provincial prosperity. The Foothills and Front Ranges mining of semi-anthracite is now only remembered by ruins and interpretation centres. However, the mining of humble bituminous coal from horizontal strata beneath the Prairies continues to feed the furnaces of generating plants that produce much of Alberta's electricity. Such coal seams can be viewed in several places, particularly in the badlands near Drumheller where 139 mines opened and closed over the years.

Drumheller is also home to the famed Royal Tyrrell Museum of Paleontology. To its south is the Dinosaur Provincial Park, designated a World Heritage Site to recognize both its importance as a dinosaur fossil locality and to acknowledge the eerie landforms that characterize this region of badlands. The ancient environment of the dinosaurs and the recent erosion that produced the landforms are particularly well illustrated and described. South again, another site is Devil's Coulee near Milk River where dinosaur nests and eggs can be visited on tours.

The attention of amateur mineral collectors is drawn to crystals of quartz, calcite and feldspar and also to more exotic substances such as petrified wood in quarries near Edmonton,