

of the more expensive professional floras. I highly recommend this book not only as a source of information for the specialists, but to the non-specialists interested in southern British Columbia's flora.

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## ENVIRONMENT

### Wild Thailand

By Belinda Stewart-Cox, photographs by Gerald Cubitt.  
MIT Press, Cambridge, Massachusetts. 208 pp., illus.  
U.S. \$40.00.

Bangkok is a city of extremes: beautiful buildings and ugly poverty, but the photographs in *Wild Thailand* show a lush countryside, hundreds of orchid species, exotic animals, and curious insects. There has been a reduction in undisturbed forest from 70% in the 1930s to 15% of the land area of Thailand today. The author fluctuates between lyrical praise of what still remains of the original countryside, and despair at the loss of so much of it to make way for development and provide raw materials (particularly wood) to the rest of the world. In spite of a population explosion and the consequent need for housing and agricultural land, efforts have been made to conserve what is left: there are 77 national parks, 36 wildlife sanctuaries, and 40 non-hunting areas.

*Wild Thailand* is a lavishly illustrated overview of the country's natural history, and the photographs are superb. However, the text has more depth than usual in this genre, and also chronicles the efforts of both Thais and dedicated western ecologists to prevent further degradation. Government support dates from the 1970s and there are several effective indigenous non-governmental organizations working within the country, often in partnership with world conservation organizations such as UNESCO.

The index is unusually comprehensive, and the bibliography has a high proportion of Thai authors. Reading this lovely book leaves one feeling optimistic that Thailand will succeed in halting the devastation of the past century and conserve the rich flora and fauna.

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### Ecology of Infectious Diseases in Natural Populations

Edited by B. T. Grenfell and A. P. Dobson. 1995.  
Cambridge University Press, Cambridge, Massachusetts.  
xii + 521 pp., illus. U.S. \$59.95.

The Isaac Newton Institute brought together experts from 11 countries for a workshop in March 1993. The four working groups dealt with population biology, genetics, evolutionary issues, and the spatial dynamics of parasitism. The result provides a synthesis of current knowledge about the quantitative ecology and epidemiology of infections in both animal and plant host populations. As the introduction states, "The epidemiology of infectious diseases is one of the great triumphs of applied ecology."

A few facts of general interest emerge. Brucellosis has been present for 75 years among Elk in Yellowstone National Park, but tests that are accurate in cattle, when extrapolated to Bison or Elk, give large numbers of both false negative and false positive results for this disease. Rabies, even as it spreads, is increasing in prevalence among Striped Skunks and Raccoons. The introduction of the myxoma virus to Australia initially led to widespread reductions in rabbit populations – until the virus became less virulent and the rabbits became more resistant. An effective vaccine for rinderpest led to

its eradication throughout much of East Africa. Do parasites regulate host populations? Yes, though as yet *Trichostrongylus tenuis* in Red Grouse is one of the few well-documented examples.

Macroparasites, such as lice, fleas, ticks, and various worms, have a diversity of antigens, cause morbidity more often than mortality, and may live in equilibrium with their host. Others may reduce host survival, increase susceptibility to predation, decrease the ability to defend resources, or affect host fecundity and even cause host castration. There are complicated relationships between parasites and hosts, between parasites, and between host nutrition, immune responses, infection intensity and disease prevalence. Many problems are spatial: tuberculosis among possums in New Zealand assumed great importance because it posed a potential threat to that country's lucrative cattle export market.

Most problems and their possible analyses and solutions are tested by sophisticated mathematical models. Each chapter has an unusually extensive bibliography. There is a useful glossary, but clearly if the reader needs help with some of the simpler terms, he or she should not be attempting to read this book.



In summary, this book is another example of the complexity of biological interactions, which can be understood only by highly specialized experts. This book on occasion should be a useful reference, whereby reading of the introduction and conclusion of one or two chapters might provide the needed

answer to someone's problem. Almost no one will read it from cover to cover.

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### **The Environmental Impacts of Lead Shotshell Ammunition and Lead Fishing Weights in Canada**

By A. M. Scheuhammer and S. L. Norris. 1995. Occasional Paper 88. Canadian Wildlife Service, Ottawa, Ontario 54 pp.

Classical Mediterranean civilization is said to have collapsed in part through the toxicity of lead ingested by many routes (though a perusal of Plutarch suggests that the lack of nonlethal methods of political succession may also have been important); modern North America has recently banned its use in gasoline and paint. This easily-manipulated element has many attractive physical and chemical properties, but it can easily get out of control.

All pollution teaches us that insignificant actions endlessly repeated add up to significant problems. One shotgun shell may bring home a meal, while stray pellets disappear instantly into illimitable marsh and waters. A snapped fishing line is regretted mostly for the \$5 lure. As decades of shot rain down on ever-decreasing wetlands, and curtains of gear festoon telephone cables at bridges, the insignificant accumulates. Lost lead is swallowed for gizzard gravel by water birds, embedded and fallen pellets dissolve, and herbivores, scavengers, and predators consume lead with their food. As many as 200 pellets per square metre accumulate in marshes; 40% of North American waterfowl ingest sporting lead every season; and half the mortality of Common Loons (*Gavia immer*) may be due to ingested sinkers.

This clearly written document does what it sets out to do. Anyone interested in a brief review of the

history, production, environmental chemistry, and toxicology of sporting lead on Canadian birds should consult it. If, however, the reviewer is prepared to be astonished, it can also be read as a critique of many facets of Commercial Society: Thirty percent of carcasses of Loons, never legal targets, carry embedded pellets (page 30). Six shots are fired for every duck retrieved (page 10) and 20-45% of ducks hit are crippled rather than retrieved (page 37); I do not hunt waterfowl, but as a museum bird collector, such dismal marksmanship would have led me to seek remedial training or another method of obtaining specimens. Despite the 20 years of furore over this problem, without regulation only a tiny fraction of shot or sinker sales are of alternative materials (page 39). Almost all manufacturers queried by the authors considered Commercial ritual to be more important than the welfare of Canada's fauna, and none would disclose the amount of lead they currently use in these products (pages 12, 15).

Individuals and the market have had two decades to adjust to the knowledge that it is evil to shoot lead over marshes. Evidently only increased government regulation can save the hundreds of thousands of waterbirds killed or debilitated by sporting lead every year.

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### **An Ecosystem Approach to Living Sustainably – A Perspective for the Ministry of Natural Resources**

By Paul A. Gray, Leslie Demal, Dave Hogg, Don Greer, Dave Euler, and Dave DeYoe. 1995. Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 77 pp., illus. Free.

Contrary to what the title suggests, this Discussion Paper (it is not a book) does not outline an ecosystem approach to living sustainably - by the authors' own admission, this document is intended "to serve as a catalyst for discussion and debate". In fact, in only one brief section (which is itself cited from another source), are any guidelines to living sustain-

ably listed. The rest of the document outlines a framework to organize the Ecosystem Approach, but no part of the framework is unique to this issue. Cooperation, shunning the me-generation, a citizen's approach, incorporate policies that reach beyond politicians' terms of office, effective communications, learn from history - all of these are useful ideas, but none is elaborated upon in the context of an ecosystem approach to sustainable living.

The paper emphasizes several themes throughout. The most refreshing one is contrary to the





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