

that government policies on areas such as taxation can be crucial in building the capacity of NGOs to carry out private conservation measures.

One attractive feature of the book is the numerous case studies (really vignettes, as they are too brief to be full case studies, averaging 4 or 5 paragraphs in length). These studies give a sense of reality to the general principles that are covered in the book, showing how these are applied to a variety of specific conditions.

The book is written for an audience outside the US, because the depth of analysis is not sufficient for an American readership. For example, no mention is made of the so-called "sagebrush rebellion", where private ranchers are opposing government conservation policy, even on federally-owned lands. The author also appears to be ignorant of the very significant private sector conservation work that is being done in countries such as South Africa, Zimbabwe, Venezuela and Brazil. This broader perspective would have given considerably more authority to the manuscript.

The discussion of fee hunting is limited by the author's perception that fee hunting is primarily to help the landowner defray the costs of protecting land for wildlife conservation. In fact, many landowners expect to earn a considerable profit from fee hunting and various non-consumptive uses, which provides a much stronger motivation than simply helping to defray the costs; in Wyoming, Montana and Idaho, the 75 or so guest ranches generated at least \$750 million per annum.

For a book published in 1995, this one is curiously out of date, with the 1987 report of the Brundtland Commission being the main indicator of government support for action to conserve biodiversity, but far more important was the signature at the Earth Summit in Rio in 1992 of the Convention on Biological Diversity, and its subsequent rapid entry into force.

The author seems to take some pleasure in undermining or downplaying the current protected area estate which is in government ownership, seeming to support the argument that "public ownership of natural areas is an unnecessarily costly option." This flies in the face of the current investment by governments in all parts of the world to establish and manage some 9500 protected areas, covering a land

area the size of China. Certainly protected areas do have some problems, but these increasingly are being addressed through various forms of co-management with people in rural areas.

This book has served a useful purpose in highlighting private approaches to conservation and underlining the vital role that they play in protecting biodiversity. This is an extremely useful point, but this book does not yet provide a comprehensive picture on how the private sector can support conservation.

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The Future Eaters: An Ecological History of the Australasian Lands and People

The Future Eaters: An Ecological History of the Australasian Lands and People. Timothy F. Flannery. Reed Press, Port Melbourne, Australia, 1994, 423 pp., ISBN 0-7301-0487-7.

Tim Flannery has produced an exquisite and highly readable treatment of the co-evolving human and natural systems of Australasia. Starting with the creation of Australasia out of Gondwanaland some 40 million years ago, Flannery is able to explain the unique features of the Australasian flora and fauna (including humans) that are a direct result of its unique geological history, soils and climate. In particular, the differences between the "new" lands of Australasia (Australia or "New Holland" as it was once known, New Zealand, New Caledonia and New Guinea) and the "old" lands of Europe are brilliantly explained as the result of the complex interaction of the environmental forces acting on them over several historical time frames.

For example, Australia has drifted northward over the last 40 million years at about the same rate that the earth was cooling going into the last ice age, leading to a uniquely stable long-term climate. Almost all other parts of the world were experiencing

large climate shifts over the same period. This allowed Australia to develop a much higher diversity of plants and animals than one would otherwise expect. At the same time, the interannual unpredictability of rainfall due to the effects of the El Niño Southern Oscillation (ENSO) combined with the lack of significant volcanism or glaciation to create fertile soils has led to very low soil nutrient levels and low productivity ecosystems with a host of unique adaptations. The relatively high biodiversity of Australia is partly explained as an adaptation to these hostile conditions, where higher levels of cooperation between plant and animal species pay off. The aboriginal habitation of Australia, which began 40 000 to 60 000 years ago, adapted to and changed these unique conditions in several ways. Australian aborigines never developed formal agriculture because it was not sustainable in the unpredictable, low-productivity Australian environment. Instead, they developed elaborate cooperative networks which literally covered the continent so that in times of drought or flood groups could visit their neighbors in less affected areas. In nearby New Guinea, by contrast, where collision with the Asian plate produced high mountains, temperate climate zones, predictable rainfall and fertile soils, an elaborate sedentary agriculture did develop.

Flannery's treatment of humans and their varied historical attempts to establish relationships with the Australasian environment is by far one of the most interesting parts of the book and clearly marks it as a unique contribution. He avoids taking either the "extreme" environmentalist or economist positions which have hindered development of a deeper ecological economic understanding of this complex relationship. The extreme environmental approach would be to recount the natural history of the region and then bemoan modern human's destruction of the natural balance while glorifying aboriginal people's adaptation to that balance. The extreme economic approach would be to totally ignore the region's natural history and unique natural features and presume that all natural systems are like the Europe and North America that bred modern industrial societies. Flannery very clearly lays out the error of both of these extreme views, by first recounting the ways in which aboriginal peoples did "upset the balance" in all the "natural" areas they invaded. In some cases,

like the Australian aborigines, they were able to create a new balance (which was significantly different from the old balance) but which was still sustainable. Any ecosystem into which one introduces a significant number of new large omnivores will change, and humans are particularly effective large omnivores. The original Australian aborigines caused the extinction of many species of megaherbivores and replaced (in many areas) what was originally a high-diversity closed woodland ecosystem which did not burn and where most nutrient recycling was through herbivores, with a lower-diversity open-woodland ecosystem which recycled nutrients through almost annual fires set and controlled by the aboriginal humans. This new ecosystem lasted for the over 40 000 years of aboriginal occupation. In contrast, the Maori invasion of New Zealand from Polynesia occurred only 1000 years ago or so, and was fueled by the unsustainable harvesting of the Moa (a large ostrich-like flightless bird) to the point of extinction. The Maori population had crashed significantly by the time of the first European contact in 1642, and it is an open question whether they would have developed a sustainable relationship with their new home or ultimately died out, like the early Polynesian colonizers of Easter Island, after their easily exploitable resources were exhausted. The bottom line is that all the environments of Australasia were significantly altered by humans at various periods before the arrival of Europeans, some to a new sustainable balance, some not.

European invaders of Australasia invariably made the mistake of assuming that the "new" lands were just like the "old" lands in Europe. Flannery artfully points out the many ways this assumption fails. The "old" lands are actually geologically quite new, with new highly fertile soils, low biodiversity and a very predictable annual climate cycle which could yield a predictable and large annual harvest. The old lands also had many extant megaherbivores which had been domesticated to take advantage of the predictable harvest. The "new" lands, by contrast, are geologically quite old and their climate patterns are very different, both from one to the other and compared to the European climate. Australia is very different from Europe because of its low-fertility soils and very unpredictable interannual rainfall patterns. Assuming that it was like Europe caused sev-

eral disasters among early settlers. New Zealand, by contrast, has new volcanic soils and abundant, predictable rainfall. With the loss of the Moa, it lacked a megaherbivore to take advantage of its grasslands and European sheep and cattle could easily fill an open niche. The implications of all of this for current efforts to forge a new sustainable relationship between humans and their varied environments is the subject of the concluding sections of the book.

To my mind, Flannery's book is the way all history should be written. It is comprehensive and explanatory and therefore is a useful guide to future policy. It allows for the unique contributions of individual humans, but puts these actions in the proper context. It helps us to understand our world

and our place in it at a level that is essential in order to have any hope of designing a sustainable human presence on the planet.

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