

BOOK REVIEWS

Conservation Biology : an Evolutionary-Ecological Perspective, M.E. Soulé and B.A. Wilcox, eds. Sinauer Associates, Inc., Sunderland, Mass. pp. 395 (1980).

My first reaction on opening this book was that conservation biology has finally come into its own as a separate subject. There is much in this book that is invaluable to the serious researcher interested in conservation, with most techniques and methods currently in vogue being summarised in one place. There are some major lacunae, however, which are summarised below.

In the first chapter, Soulé and Wilcox seek to define the scope of conservation biology. In my opinion, by eliminating economics from the purview of conservation biology they have left out the single most important element of conservation in the developing countries. The problem in the so-called Third World is not the development of techniques required for effective conservation plans, it is in making these plans palatable. This is because all conservation action involves the allocation of resources, and is thus dependent on being able to justify this allocation. Talk about the deployment of reserves 'benefitting' local people is certainly appropriate, but it is hard to come up with examples where this is actually happening. Phu Kradung National Park in Northeast Thailand is one exception, where the local people benefit by acting as guides and carriers. From India, with which I am more familiar, it is difficult to come up with a single positive example. In a nutshell, there is no formula for 'benefit' that has worked.

In the following chapter Gilbert discusses co-evolved food webs, keystone mutualists, mobile links and ant mosaics and their implications in conservation. He stresses the need to preserve different successional stages, and the necessity to integrate agriculture, forestry and conservation. No suggestions, however, about how this could be done.

Eisenberg then discusses the factors governing the density and biomass of tropical mammals. These include trophic strategy, home range size and body size. Biomass is highest in the tropical forest, with rainforest having most of its mammalian biomass in the form of arboreal animals. The larger and rarer mammals such as the carnivores and the anteaters provide the best indicators of ecosystem health.

Diamond examines the distributional patterns of tropical birds, and arrives at some unexpected results. Bird distributions are more patchy in the areas that contain a larger number of species. He examines the reasons for this, and concludes that in many instances a series of small reserves may be of greater value than a single large reserve.

In Chapter 5, on heterogeneity in tropical vegetation, Foster points out that areas with very poor soil conditions often support plant and animal communities very different from the surrounding forest. He notes that to support a community of animals a reserve should contain areas where the flowering and fruiting patterns of the trees are not all in synchrony, with continuously wet areas to receive priority. He examines the effects of natural disasters such as hurricanes, earthquakes and treefalls. However, to suggest that these need to be taken into account while planning reserves may be unrealistic because of their very unpredictability.

Wilcox next discusses island biogeography theory and its implications for reserve design, followed by Terborgh and Winter, who examine the process of extinction. The only slight correlation obtained is that large animals tend to disappear oftener than their smaller counterparts.

Franklin then uses population genetics to estimate the minimum population sizes required to ensure both the short term and long term survival of a species, and arrives at estimates of 50 and 500, respectively. It must be noted, however, that in a large number of species today the 500-in-one-area criterion can no longer be met. These include the tiger and lion in India. Also, as Soulé notes delicately in the next chapter, "to... extrapolate from the breeding effects produced in the laboratory or the farm to the consequences of genetic drift and inbreeding in organisms fresh from nature is to be nagged by certain doubts".

Soulé shows that survival in a number of species is linked to the heterozygosity of the individual concerned. He comes to the questionable conclusion that speciation is more or less over, at least in mammals. It must be pointed out that a number of species adapted to degraded or agricultural lands have now got a considerably expanded habitat. And is Soulé convinced that man is the ultimate species and will not be replaced in the future by descendants of *Rattus rattus* ?

Next, Goodman deals with mathematical models for managing small animal populations. He analyses three scenarios: how to increase the population of a wild animal, how to stabilise its population, and how to achieve the optimal age structure for a captive population. In the first case he recommends that we increase fecundity and/or survival rates. Unfortunately he doesn't tell us how to do this.

This is followed by an overview of captive propagation by Conway. He summarises the case for breeding wild animals in captivity. The benefits include the maintenance of a gene bank and the possibility of release into the wild at a future date. He notes some of the problems with captive breeding, such as the incompatibility of breeding pairs. A very important case is made for wildlife preservation from an economic point of view, one of the few such arguments in this book: it has been estimated that a single maned lion is worth US \$515,000 for viewing purposes, \$8500 for hunting, and \$1150 as a trophy. (But more will follow on the supposed benefits of tourism.) Incidentally, it came as a shock to discover that *Axis axis* was "rare in its own homeland"; I was under the impression that it was easily the commonest deer in South Asia.

Senner then models the effects of inbreeding depression on captive populations and calculates the time such a population will take to go extinct with respect to initial population size and maintenance size. As Senner says, and model is a mix of simplifying assumptions. I wonder how his results would have changed if fecundity and viability increased over time in an inbred population, as they surely must do. While on the subject of inbreeding, it is perhaps pertinent to note that all accidental introductions to another region, as well as the successful colonists that Wilcox discusses earlier, must have descended from small inbred populations.

Next, Benirschke et al. discuss the various new technologies that are now used in captive propagation. These include monitoring pregnancies by assaying the levels of estrogen in urine, and determining the sex of birds by calculating the estrogen/testosterone ratio in fecal samples. They also summarise some cases of chromosomal variation in monkeys. For instance, there are eight karyotypes in the owl monkey and pairing appropriately karyotyped individuals leads to much better reproduction. This is followed by a chapter by Kleiman on the characteristics of mating, breeding and rearing systems which affect the successful propagation of captive animals.

In the next chapter Campbell summarises the problems of reintroducing animals into the wild. These include high cost, the possibility of released animals migrating from the release site, the possibility of these animals being diseased, the necessity of conducting detailed baseline studies before reintroduction, laws, bureaucratic procedures, and finally problems which might be caused by local people.

Coe then presents an overview of the factors affecting the distribution of wildlife in Africa today. He identifies an increasing human population and an increasing livestock population as the main factors leading to the decline of wildlife.

Coe argues in his article that what is protecting the wildlife over large parts of Africa is the presence of the tsetse fly. He argues that the programmes designed to wipe out the tsetse fly are undesirable since they will only lead to a reinvasion by

humans and cattle. This is not the appropriate place to discuss the chauvinism of this argument. I merely wish to point out the disservice done to conservation by this form of reasoning, its advocates being labelled as unrealistic elitists. Coe also makes a strong case for increased tourism to enable countries to realise revenues from their wildlife. This, again, may be an unavoidable trend, but seems to be potentially dangerous when one looks at the instances of cultures being completely debased by tourism. It also needs to be pointed out that little revenue from tourism typically goes to the poor who need it the most. Again, the success of tourism is linked to whether the affluent nations are undergoing recession or not, and any country that plans its growth on the basis of tourist revenue is asking for trouble.

Whitmore then discusses the plight of the tropical rainforest. Between 1964 and 1973 an estimated 11 million hectares of rainforest were lost. This is equivalent to 21 hectares per minute. By the year 2000 an additional 556 million hectares will be lost, due to 'quarrying' for timber, shifting cultivation, and cattle-raising. Only 30% of the world's tropical rainforest cover will then be left. In terms of species diversity the Malayan rainforests appear to be the richest, with stands having up to 150 tree species of more than 30 cm girth per hectare. Only 35% of this forest tract now remains. The consequences of its removal include the loss of species, the removal of nutrient capital, increased siltation, and possible long term climatic changes.

Whitmore argues that the most successful brief that conservationists can present is to assert that man's dependence on other organisms is such that unless attack on them is moderated, human existence is threatened. This is a perfectly correct and reasonable argument—but how does one convince politicians who are unable to see beyond the next election, and in any case unwilling to do so? Unfortunately, the individuals who must make practical decisions or choices important to conservation cannot see the problem in this light, a dilemma not addressed much by the contributions to this book.

Pyle examines the market and nonmarket values of resources such as nature reserves. Realism at last—he argues that an alternative to the traditional modes of looking at these values is to treat them strictly as political management options, regardless of the underlying rationale.

Finally, Ehrlich sums up the strategy conservationists should follow over the next 20 years. He suggests five "laws of conservation"—these are that in conservation there is only successful defence or retreat, never an advance, since once a habitat is gone it is gone forever; continued population growth and conservation are incompatible; a growthmanic economic system and conservation are also incompatible; the idea that short-term goals only should be considered is lethal; and finally conservation should be promoted as a matter of human self-help.

The obvious corollary to all this—and this is where the book falls short—is that conservationists need total commitment towards, and involvement in, the programmes of population control and appropriate technology. Also, conservation isn't about trying to persuade the already converted urban elite—it is about teaching the rural dweller the value of the resource, and how it can serve him both immediately and on a sustained basis. How do we involve ourselves?

Admittedly, the book is not *about* economics. At worst we could say that it will mislead the reader that progress is being made when the limiting problems are in other fields and have barely been identified. Academics should not become too smug about the importance of their technical contributions in solving the real problems in this part of the world.

All this apart, the book is a valuable reference work for every biologist interested in conservation, even though parts of it are too technical for the lay reader.

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