it has the potential to escape the mindless dichotomy between genes and environment in a fruitful way.

The authors also write that "inclusive fitness theory implies that altruism is a very restricted phenomenon and, moreover, is not truly altruistic in motive" (p. 197). This impression seems to be widespread among people lacking background in evolutionary biology, but in fact psychological egoism (i.e., egoistic "motives") is not necessarily what one would expect as a proximate mechanism from the point of view of evolutionary biology (Wilson 1991, Sober 1994, Sober and Wilson 1998). Although as a general rule there tends to be selection for "evolutionary selfish/egoistic" behavior (i.e., behavior that enhances the fitness of one's self at the expense of others), such behavior implies nothing about the motives with which we are equipped for exercising the behavior.

Finally, I should point out that Gardner and Stern have not cited several central reviews that address human behavior and environmental problems from an evolutionary perspective (e.g., Heinen and Low 1992, Low and Heinen 1993). These reviews are mainly in agreement with the presentation of the book but represent a more thorough and general approach than the evolutionary material that is presented. More recently, Low (1996) has actually tested with cross-cultural data, and rejected, one aspect of one of the four methods that I mentioned at the beginning of this review (i.e., the idea that we can solve environmental problems by returning to the attitudes of traditional societies).

Environmental Problems and Human Behavior is a very well written and integrated book. If it were to examine the literature from an evolutionary perspective (e.g., Heinen and Low 1992, Low and Heinen 1993). These reviews are mainly in agreement with the presentation of the book but represent a more thorough and general approach than the evolutionary material that is presented. More recently, Low (1996) has actually tested with cross-cultural data, and rejected, one aspect of one of the four methods that I mentioned at the beginning of this review (i.e., the idea that we can solve environmental problems by returning to the attitudes of traditional societies).

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References cited

SCIENCE, UNCERTAINTY, AND ENVIRONMENTAL POLICY


Scientific Uncertainty and Environmental Problem Solving is a long and uneven collection of essays without a clear focus. As a natural scientist familiar with environmental issues, I inferred from the title that the book would deal with uncertainties associated with understanding the causes of environmental problems. However, it soon becomes clear that this definition of scientific uncertainty does not correspond to that of most of the authors—and, indeed, that the authors do not agree among themselves as to the definition of uncertainty.

An example of the wide range of possible definitions can be found in chapter 10, which deals with environmental impact assessments. The chapter's author, Larry W. Canter, writes: "Uncertainty, as used herein, refers to insufficient information on the project and environmental setting, inaccuracy in impact prediction, or lack of knowledge in impact interpretation, the effectiveness of mitigation measures, and decision making" (pp. 299-300). The lack of a common definition causes the book to appear to be a collection of individual articles rather than a connected whole.

In addition to this disconnectedness, the authors of several chapters appear to use uncertainty as a pretext to express views that reflect other considerations, for example, moral judgments. For example, the first chapter, by Kristin Shrader-Fechette, ends with the assertion that "doing science well thus requires us to understand the environmental contexts of its applications" (p. 34). Chapter 2, which deals with high-level nuclear waste disposal, concludes with a plea for "temporary, negotiated, monitored, retrievable storage facilities" that Lemons thinks would be "ethically more justified" than underground storage (p. 87).

The only theme that appears in a significant number of chapters is that the way in which environmental decisions are currently made is not fair or equitable and that this situation can be remedied only if the "precautionary principle" is adopted. In chapter 1, Shrader-Fechette says that "environmental effects should be assumed 'guilty until proved innocent'" (p. 23); in chapter 3, Carl F. Jordan and Christopher Miller assert that "the role of scientists is to issue warnings..." (p. 115); in chapter 5, Judith S. Weis urges the reader to "refrain
from actions with potential negative impacts, even in the absence of clear proof of their harmfulness” (p. 161); and in chapter 7, Lemons suggests that “...it is more prudent to accept a higher risk of an erroneous conclusion that activities will cause harm...” (p. 229).

In chapter 13, which deals with environmental law, Donald A. Brown and Patrick Zaepfel apply this principle to the courts and suggest that under the current civil litigation system, “an expert that attempts to show that harm is merely possible will not be allowed to testify... Thus, the rules on the admissibility of expert testimony may be inconsistent with the precautionary principle” (p. 383). They also express the belief that this same problem occurs in legal decisions in which government agencies take administrative actions on environmental matters.

I should note that the author of chapter 4, Richard A. Carpenter, does provide an alternative view. He points out that the precautionary principle does “not produce objective operating guidelines and simply requires another value judgement...of the proper balance of risk between taking immediate gains and losing long-term potential” (p. 124). He further quotes others who suggest that the precautionary principle is not very useful because it offers no guidance as to what precautionary measures are most appropriate in a given situation. This chapter is the most well written and balanced of the book.

As might be gathered from the preceding discussion, the book has a much greater focus on environmental policy than on technical or scientific issues. However, a few chapters do address such concerns. For example, chapter 6 deals with assessing ecological risk—in particular, with extrapolating responses in laboratory systems to natural systems. The chapter includes a long list of uncertainties that should be considered when making such extrapolations. However, the authors do not give the reader the full advantage of their expertise in this area because they do not put these uncertainties in context (e.g., by discussing the relative importance of each of these types of uncertainty). The last sentence of the chapter reflects this lack of context: “Listing and quantifying the uncertainty in the study are valuable components of the investigation and should be elements in all ecotoxicologic investigations” (p. 203).

The examples used by the authors do address a wide range of environmental problems, including high-level radioactive waste disposal, sustainable development, sewage sludge disposal, biodiversity, fisheries management, water resources management, and climate change impacts. The level of detail and the amount of space devoted to technical aspects of these problems varies greatly from chapter to chapter.

Although the way in which a book is written is generally less important than its content, writing style is a significant problem in regard to this book. I found it very difficult to stay focused on either individual chapters or the book as a whole, in part because many authors do not present their views in a well-organized, concise, and straightforward manner and in part because the connections among chapters are not made clear. In addition, from the titles of the cited articles in many of the chapters, it appears that other sources, often by the same author or authors, would provide a more coherent exposition of the main points in the chapter and place them in a more understandable context.

The audience for whom this book is intended is not entirely clear from the text. Perhaps the most likely readers would be people interested in environmental policy decisions from more of a social science than a natural science perspective. These people might include policymakers as well as students of policy issues. In addition, people who share the precautionary philosophy may be more likely to choose this volume than those who do not share this viewpoint. However, reading sections of this book might help the latter group to understand the bases for this philosophy and how the proponents would like it applied in the future.

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