# Book Reviews

*Ecology*, 85(4), 2004, pp. 1168–1169


## DEMAND-SIDE DISUTILITY

Allen, Timothy F. H., Joseph A. Tainter, and Thomas W. Hoekstra. 2002. **Supply-side sustainability.** Complexity in Ecological Systems Series. Columbia University Press, New York. xv + 459 p. $69.50, £49.50 (cloth), ISBN: 0-231-10586-X (alk. paper); $34.50, £24.50 (paper), ISBN: 0-231-10587-8 (alk. paper).

In *Supply-side sustainability,* Allen et al. are clear about what they wish to accomplish: ''This book is of general interest to anyone with a role to play in promoting the sustainability of the modern world, including professionals in science, government, and business.'' They emphasize their ''general interest'' intent by announcing, ''This is our least abstract treatment to date and represents a continuation of a trend from esoteric, academic discourse toward execution and action. This is our best effort at making ecological theory practical and useful.'' ''Wonderful!,'' thought I, and read eagerly onward.

Part 1 was encouraging. Allen et al. revealed they were thinking about some crucial questions in sustainability science: What is the nature of the ''information economy''? Can money spent on research and development produce increasing returns to scale? Does social complexity produce political stability? Next came a chapter in which questions such as these were considered in the context of ancient empires and dynasties. For me, this was the most enjoyable chapter in the book. For ''practical'' and ''useful'' recommendations, however, I still found myself reading eagerly onward into Part 2.

As a federal civil servant and adjunct professor, I find that ''practical'' and ''useful'' are relative terms, so I leave it to readers to gauge for themselves the practicality and usefulness of the following:

> *The issue of the ontological status of emergent structures—that is, whether they are new in reality in themselves—need not be of concern and is not really a scientific matter. The central issue is dealing with reliable observables, and it appears that observables regularly generate the dualities, with their inherent potential for contradiction embedded in the act of observation.*
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> *The generative and evaluative functions play off each other, and we do not want to give either function primacy. Whichever function is given privilege, there is a reciprocal dependence working in the other direction. The evaluation maps substantially to natural selection, and the grist for its mill comes from the output of the thermodynamic, generative function. Meanwhile, the process of emergence is held in the context of the survival of irregularities; that is, they survive some sort of natural selection.*

Some may find the above practical and useful; their practices and uses must be quite interesting. For most, however, practical and useful will be the least apt adjectives imaginable.

Although I selected the quote to make a point, it was by no means unrepresentative of the ''guts'' of the book, i.e., pages 167–379. In fact, I had a difficult time selecting from dozens of quotes for purposes of this point. To make matters worse, the quote was in the chapter which was supposed to be about ''linking the ecology of sustainability to political sustainability,'' as if the politically inclined had time to wade through such a philosophical quagmire. Finding myself obligated to 94 more pages by the time I encountered the quagmire, I felt somewhat abused.

The esoteric nature of *Supply-side sustainability* is a major problem, but not the only problem. *Supply-side sustainability* is also redundant, verbose, and largely unconvincing. The five principles posited repeatedly by Allen et al. are: (1) manage for productive systems rather than for their outputs; (2) manage systems by managing their contexts; (3) identify what dysfunctional systems lack and supply only that; (4) deploy ecological processes to subsidize management efforts, rather than conversely; and, (5) understand diminishing returns to problem solving. The fifth principle is well worth writing about; it's hard to tell about the rest. Let's explore each one briefly.

The first two principles put *Supply-side sustainability* in a long line of books that recommend ''ecosystem management'' vs. the management of commodities. As with many such books, *Supply-side sustainability* employs nebulous concepts to support this recommendation. As others argued early on, however, the ''newness'' of ecosystem management is largely rhetorical. The new twist in this case entails calling it ''supply-side sustainability,'' which simply means sustaining the ultimate supplier (i.e., the ecosystem) of outputs (i.e., goods and services) rather than managing for the outputs themselves.

What is an example of managing the ''old'' way, i.e., for outputs? As Allen et al. accurately noted, the Gulf of Maine fishery was historically managed by taking fish ''at the size immediately above that of the maximum growth period. . . . Explicitly the old large fish classes are fished out.'' How do we conduct ''ecosystem management'' instead? ''To implement management for the entire system, we must work at the level of the constraints that operate on the resource, not at the level of the behavior of the resource itself. . . . We have recommended that the constraint be sought in the oldest fish, the ones that are explicitly targeted for extinction in the present management regime.'' For the fisheries manager, this means formulating fishing regulations that protect the older age classes. If it sounds a lot like population management, or managing for ''outputs,'' that's because it is (albeit with slightly more sophistication than maximum sustained yield).

Managing for productive systems (i.e., ecosystems) and managing system ''contexts'' (principle # 2) are largely the same, with the exception that contexts include social and political factors. This important principle was explicated in the earliest wildlife management texts, which correctly stated

that wildlife management consists of managing the animals themselves, their habitats, and people (i.e., social and political factors). Ecosystem context also includes the larger, often-global processes within which a given ecosystem resides. Therefore, we should be managing things such as global warming that undermine an ecosystem's ability to produce desired goods and services.

We (especially me) would be mistaken to denigrate the importance of managing contexts. After all, several colleagues and I described how species conservation was ultimately a matter of establishing a steady state economy, given that the context of species endangerment was economic growth, which drives not only habitat destruction but global warming. The problem is that Allen et al. do not provide any new and compelling insights about how to improve our management of people and global processes. They generally favor the market as a mechanism for such management, but other books, e.g., Geoffrey Heal, are much more clear and concise on that subject.

Principle # 3, ''identify[ing] what dysfunctional systems lack and supply[ing] only that,'' is also old hat. When a corn field is short on nitrogen, we fertilize; when a rangeland is short on minerals, we salt. In general, we identify the limiting factor and attempt to supply it. Allen et al. emphasize that when we conduct such supplementary activities, we should take care not to undermine the ecosystem functions that produce other important goods and services, such as wildlife in the fields and erosion control on the range. This much is entirely agreeable, but the presentation is not.

Principle # 4, ''deploy[ing] ecological processes to subsidize management efforts,'' is jargon for working with nature. This too is agreeable but is more likely to result from a widespread Wendell Berry readership than the arcane academics of Allen et al.

If there is a saving grace in *Supply-side sustainability,* it is point # 5, which calls us to ''understand the problem of diminishing returns to problem solving.'' This point too has been made by others and is a very good one. The difference between this point and the others is that this point deserves much more emphasis for purposes of sustainability, and Allen et al. do emphasize it. In their concluding ''Retrospect and prospects,'' they even suggest that ''all the arguments in this chapter can be translated into the language of diminishing returns.'' Thinking this an overstatement, however, I scribbled in the margin, ''should have just focused on this.''

That there is a general law of diminishing returns was adamantly denied by the late Julian Simon, the quintessential technological optimist and pop economist. The notion of perpetually increasing returns to scale survives in neoclassical economics, exemplified by the ''new growth theory'' (aka ''endogenous growth theory'') of Paul Romer and followers. In particular, intellectual property rights, especially patent law, will produce increasing per capita wealth as long as we have an ever-expanding labor supply devoted to research and development. Perpetual economic growth begets perpetual economic growth! Sustainability action will require a thorough debunking of this nonsense.

The debunking of perpetual economic growth theory will require steadfast effort by the Allens et al. of the world, not so much because it is intellectually indomitable but because it is politically defended by an iron triangle of corporations, politicians, and neoclassical economists. Allen et al. almost did their part in this regard, mustering laws of thermodynamics, principles of ecology, and historical evidence in their service. Unfortunately, their propensity to throw everything but the kitchen sink into the argument produced a mixed message. They repeatedly hold out hope for an ''information economy'' to supersede the material basis of the old, supposedly non-information economy. This runs contrary to their argument that the information comes at a cost, requiring research and development which itself requires the liquidation of natural capital.

A clear indication that *Supply-side sustainability* misses the mark is their coverage of the issue of economic growth, seen by leaders in sustainability science (e.g., Herman Daly) as the ultimate challenge to sustainability. Allen et al. seldom even use the phrase. This is no mere matter of semantics, for not only is there no index entry for ''economic growth,'' there is none for ''economic development,'' ''ecological economics,'' or even ''economics''! Furthermore, in an extensive list of references, there are none made to Herman Daly, Kenneth Boulding, or Robert Costanza, all key figures in the literature on sustainability cum economics. This speaks volumes to the practicality and usefulness of a 459-page sustainability book, because in the domestic policy arena, the table devoted to economic growth dwarfs all others.

Unfortunately, and despite the promising beginning of *Supply-side sustainability,* I cannot recommend the book to sustainability thinkers at large, much less would-be sustainability practitioners. I consider the time of these ''sustainability people'' some of the most valuable time spent on earth. With the proliferation of sustainability literature, we cannot afford the bogging down of sustainability people in books that drone, ''in ecosystems, the external force serves as an *evaluative function* that gives semantic meaning to adaptations, whereas the syntax of the internal energetic limits come from a *generative function* that previously caused the emergence of the structure that has adaptations.''

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# ARTHROPODS OF THE TROPICAL CANOPY (AND ELSEWHERE)

Basset, Yves, Vojtech Novotny, Scott E. Miller, and Roger L. Kitching, editors. 2003. **Arthropods of tropical forests: spatio-temporal dynamics and resource use in the canopy.** Cambridge University Press, New York. xvi + 474 p. $110.00, ISBN: 0-521-82000-6.

Jack Hitt, in his essay ''A gospel according to the Earth'' (Harpers, July 2003), discusses the emergence of a spiritual environmentalism from dispassionate Cartesian science, and writes ''. . . new words appear in the culture and assume a subtle power, one that begins to feel like truth. For now, we might not be able to hear the fullness of their meanings or foresee the ripe possibilities of their future connotations. *Compost. Global warming. Off the grid. Pollution. Renewable. Tree-sitting.*'' To these I add, *canopy*. The emotional allure of the canopy continues to draw scientists to the leafy empyrean, on ropes and rafts, balloons and booms, catwalks and cables. A new edited volume on the arthropods of the tropical forest canopy adds to the body of high-quality science flowing from this idealized realm.

Arthropods have always been a prominent feature of canopy science, inspired by Erwin's early surmise that there was an uncharted world of arthropod diversity just above our heads. Ever since, entomologists have headed out with myriad traps, nets, baits, bags, blacklights, foggers, funnels, and sifters to document this trove of tropical diversity. Of the billions of individual arthropods that are born and die every day, a few million have been diverted from their usual path to oblivion. They have been selected in a highly structured way, examined, and enshrined in our research collections. We began to see the results of this sampling in the arthropod chapters of Sutton et al.'s *Tropical rain forest: ecology and management* (Sutton, S. L., T. C. Whitmore, and A. C. Chadwick, editors. 1983. Blackwell, Malden, Massachusetts). Stork et al. then provided us with an edited volume dedicated to the subject (Stork, N. E., J. Adis, and R. K. Didham, editors. 1997. *Canopy arthropods*. Chapman and Hall, New York). This latest compendium, edited by Basset et al., brings us up to date and significantly advances the field.

The volume originated from a symposium held in August, 2000, at the *XXI International Congress of Entomology* in Brazil. There are 35 chapters divided into five sections and addressing three main themes: vertical stratification, temporal patterns, and resource use. The first section introduces the volume, reviews canopy access and sampling methods, and reviews the three main themes. The second, third, and fourth sections are new data papers on the three themes, respectively. The fifth section is entitled ''Synthesis: spatio-temporal dynamics and resource use in tropical canopies'' but actually contains a diverse assemblage of papers that did not quite fit any of the previous sections. Each section has a short introduction that previews the ensuing chapters. I always find such internal summaries particularly valuable in edited volumes. The book opens and closes with synthetic chapters by the editors. References are all aggregated in 60 pages at the end of the book, rather than being associated with each chapter. The book is well edited and I found few typographical or citation errors.

There is broad taxonomic and geographic coverage. There are papers on ants, bark beetles, moths, butterflies, spiders, springtails, mites, grasshoppers, and all manner of phytophagous beetles. There are about a dozen papers from the Neotropics, five from Africa, and seven from Australasia.

The picture I see emerging from the various chapters is that some tropical canopies are indeed home to a unique fauna, but not necessarily an extraordinarily diverse one compared to other components of the forest as a whole. If you define the canopy as the entire ecosystem above the soil then yes, a large fraction of the biodiversity resides there. Also, if you do studies comparing the upper canopy with the dark understory immediately beneath a closed canopy you will find more species up in the light (as long as you do not include the soil and litter microfauna). But if you consider the forest as a whole, often the bulk of the diversity is closer to the ground, in treefall gaps and other natural disturbances. I was surprised to learn that a significant proportion of high canopy beetles, on which the claims of high canopy (and global) diversity rest, have larvae that are root or seed feeders and probably live in the soil or on the forest floor. Thus the approach of treating the canopy as an island-like habitat, with its own endemic fauna and ecological processes, is unlikely to produce much insight. I was intrigued with the chapter by Speight et al. on the influence of forest management on insects. Even monospecific plantations of exotic trees maintained relatively high canopy biodiversity if the understory vegetation was left intact. It was only when the ground vegetation was kept cleared (e.g., oil palm plantations) that diversity plummeted.

Nevertheless, there is a subset of species that are high canopy specialists in native forests, living their entire lives in the harsh upper edge of the canopy. Many of these are indeed new species, or known from a few museum specimens and discovered to be common in the upper strata. This is why my taxonomist friends salivate when a new canopy fogging sample is promised.

Overall this book is a solid contribution to what we know about the spatial and temporal distribution of tropical arthropods. It is descriptive and does not break much new ground in either theory or analytical methods. Thus the audience for the book is probably those directly involved in the community ecology of arthropods. That said, there are two papers, one by Ødegaard and one by Barrios, I found particularly important in the realm of insect-host plant relationships. Ødegaard's paper on host specificity of phytophagous beetles in a patch of Panamanian dry forest is a masterpiece. It relies on a remarkably thorough set of direct observations of feeding beetles, it applies newly developed theory that he has published elsewhere, and it radically alters (downward) our estimates of diversity based on patterns of beetle host specificity. Barrios' paper contrasts the herbivore fauna of conspecific seedlings and mature trees. He found almost no overlap in

the herbivore communities, a result with consequences for the Janzen-Connell theory of high tropical species richness.

As I write this review one of the editors of the volume, Dr. Basset, is involved in a large-scale effort to characterize arthropod biodiversity in a forest in Panama. Called ''IBISCA,'' the project is sponsored by private companies and motivated by the glamour of the canopy and the various contrivances for getting there. But it is gratifying that in the fine print the scientific underpinning includes the whole forest ecosystem, with sampling of litter and soil (and I hope edges and gaps). The acronym itself stands for ''Investigating the Biodiversity of Soil and Canopy Arthropods,'' when in the past it might have been ''IBICA.'' Three cheers for canopy science, and may our understanding of tropical arthropods in all habitats benefit thereby.

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## BAT ECOLOGY: ADVANCES OF THE PAST 20 YEARS

Kunz, Thomas H., and M. Brock Fenton, editors. 2003. **Bat ecology.** The University of Chicago Press, Chicago, Illinois. xix + 779 p. $55.00, £38.50, ISBN: 0-226-46206-4 (alk. paper).

Bat biologists have long consulted two books *Ecology of bats* (1982. Plenum Press, New York) and *Ecological and behavioral methods for the study of bats* (1988. Smithsonian Institution Press, Washington, D.C), both edited by Thomas H. Kunz. *Bat ecology,* edited by Kunz and M. Brock Fenton, is a new book which aims to summarize our knowledge of bat biology since *Ecology of bats* was published. The increased knowledge is due in great part to the many technological, analytical, and empirical advances that have come about in the past two decades. Kunz and Fenton have enlisted an outstanding group of bat biologists, who, without exception, have done a superb job summarizing and synthesizing the material in their respective chapters.

In some of the chapters (1–3, 10, and 14), a table is used to summarize basic information for species that have been studied. These tables (a) indicate the species for which data are available, (b) allow one to compare results between different species, and (c) allow one to formulate and test hypotheses. For example, the first chapter, ''Ecology of cavity and foliage roosting bats,'' and Table 1.1 summarize information about the characteristics of the roosts occupied by the various species. The compiling of similar tables for every chapter would have been very valuable.

A common theme throughout the book is the great variation in morphology and behavior of bats, and how these characteristics have evolved and how they fit into the life history of the bat. These discussions are generally well thought out and help the reader to understand both the evolution and function of the system or process.

The chapter by Barclay and Harder on life history is particularly interesting as it ties small size, long life, low reproduction, few predators, and other life history traits together. Bats are then compared with shrews, another group of small mammals with similar food habits but with opposite life traits, i.e., short life, high reproductive rate, and numerous predators.

In several chapters, the high number of species in the tropics is discussed, along with their evolution into many different habitats and niches. Information on interactions between bats and their insect prey is nicely summarized by Jones and Rydell (Chapter 7). Many bats feed on insects, which are soft inside and hard outside. Other bats have diversified to feed on fruit, pollen, nectar, and even vertebrates, which, in contrast, are hard inside, and soft outside.

Chapter 8 by Helversen and Winter compares nectar feeding of birds and bats, and the coevolution of bats with the flowers they feed upon. These flowers have nocturnal anthesis, are often bell shaped, have large nectar and pollen productivity, but have inconspicuous colors on fully exposed positions on the plants. Some of them are scented with odors that do not resemble the characteristic sweet smells of many flowers, but are rather unpleasant to us. This and all chapters are very instructive and well written, although more detailed explanation was sometimes needed. One such area is in Chapter 8, which seems overloaded with supposition and short on solid data. The authors state that, although plants certainly enlisted ''megabats'' in the Old World and ''microbats'' in the New World, the two bat pollination systems have presumably evolved from a common ancestor, since both probably derived from a pollination system involving ancient nonflying mammals.

Chapter 12 by Patterson, Willig, and Stevens includes a good discussion of trophic strategies, niche partitioning, and patterns of ecological organization. I would have liked to have known the number of bat species in each of the 32 assemblages in Table 12.1; it also would have been nice to include more temperate assemblages.

Speakman and Thomas, in Chapter 10 on physiological ecology, state that body temperature and body size have a greater effect on animal function than other characteristics. This is true since temperature affects the rates of all processes, and size affects the amount of food and area required by the species. Also, the surface-to-mass ratio varies with differences in size. The importance of temperature and size are made apparent, as they were examined from many different

viewpoints in the various chapters. Speakman and Thomas do not present a conclusion as to why bats frequently arouse during hibernation, in spite of its high energetic cost. That questions like this are sprinkled throughout is another great value of the book, indicating future topics for study. Speakman and Thomas emphasize that laboratory studies show what can occur with regard to the relation between body size and temperature, but that field studies must provide the data as to what really occurs. This sort of field verification is of course true for many other questions.

The chapter on diseases (Chapter 14 by Messenger et al.) summarizes the various diseases of bats, especially viruses; they then use much of the chapter for discussion of rabies. Their work on viral typing has helped to answer many questions about bats and rabies, showing that bat rabies cycles independently from terrestrial mammal rabies cycling, and that rabies cycles independently in several bat species. These authors also present a wealth of questions that could serve as topics for further work. Unfortunately, they do not discuss histoplasmosis in relation to bats. They mention, but do not consider parasites, which points out that it would have been useful to include a chapter on parasites in this work.

The last chapter is on conservation ecology by Racey and Entwistle. They, as well as Fleming and Eby (Chapter 4), emphasize that much of the general information needed for conservation purposes is lacking, including some of the basic information on distribution and abundance. Also needed is information on population trends, potential threats, and ecological requirements, including interrelationships with other organisms. Such information can help lead to conservation applications or approaches to avoid or mitigate possible threats. It is pointed out that conservation is particularly difficult on migratory species, as both summer and winter habits must be considered, as well as migratory stopovers. Conservation of bats is of ever-increasing concern. However, I do have to argue with the first sentence in their epilogue, that states that conservation biology is a new discipline. As one graduating from a Department of Conservation nearly 50 years ago, I know that conservation biology is very important, but certainly not new.

Last, but not least, each chapter contains a long and relatively complete list of references. Included are many of the most important papers of the past 20 years. This resource adds great value to this book.

*Bat ecology* is well written, well edited, and has very few typographical errors. The authors have clearly achieved their stated goals. This is a very valuable book, which all serious bat biologists will want to have on their bookshelves. Like its predecessor, *Ecology of bats,* it will come off the shelf very often.

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## DEPROGRAMMING INVASION BIOLOGISTS?

Theodoropoulos, David I. 2003. **Invasion biology: critique of a pseudoscience.** Avvar Books, Blythe, California. xii + 236 p. $14.50, ISBN: 0-9708504-1-7.

Occasionally ideas come along that are extraordinarily far outside of the mainstream. The contentions of creationists, holocaust deniers, and ''flat earthers'' are uniformly condemned or dismissed, though, by biologists, historians, and astronomers whose worldviews are structured by evidence-based theory rather than blind belief. Yet professionals in these fields, and the educated general public, sometimes find themselves defending empirical truths against claims that seem to emerge from left field. Now, it is invasion biologists' turn to face misguided invective. The venue is an odd little book by the self-described conservation biologist David Theodoropoulos, whose central thesis is that invasive species, far from representing the major environmental and economic problem that ecologists study, discuss, and cite, are really not a problem at all. Not only does Theodoropoulos argue that invaders are benign, he suggests that there is no scientific evidence for harm caused by them, and he even proposes increased anthropogenic dispersal as an ''essential strategy'' in biodiversity conservation.

The book's thirteen chapters are distributed among three sections. The key take-home messages of these sections are that there is no biogeographic or ecological evidence that invasive species are abnormal or harmful, that invasion biologists are ideologically brainwashed according to the criteria of postmodern psychosocial theory, and that anthropogenic dispersal should be a key ingredient in conservation strategies. While scientists and policy makers will find much to fault in each of the book's parts, it is the middle chapters that form the core of the book and seem to drive the rest of Theodoropoulos's tirade. Specifically, invasion biologists will be surprised to learn that their work is isolated from the rest of biology, that their research is solely motivated by xenophobia with historical roots in Nazism, and that ''[p]sychotherapeutic counseling has been successfully used to reduce racial prejudice in individuals, and could be used to help anti-invader extremists.''

The book's errors of scholarship include the erection of ''straw man'' arguments, use of outdated or incorrect citations, selective use of evidence and case studies, faulty or inconsistent logic, an inadequate evolutionary framework, and frequent use of precisely the kind of hyperbole of which the author accuses invasion biologists. While there is little

risk that scientists or practitioners will take this book seriously, they should be acquainted with it for at least two reasons. First, it attacks and undermines the scientific process, and especially that implicit in applied, action-oriented science: similar incendiary arguments might easily be levied against conservation biologists, restoration ecologists, and global change scientists. Second, the book is likely (and this is urged by the author) to fall into the hands of policy-makers or politicians who are generally inclined against environmental regulation. That the book not only dismisses the evidence of invasion biology but also *promotes* the spread of species beyond their native ranges *in order to conserve them* is of particular concern. Ecologists can learn from this book, though. First, the book rightly points out that sometimes we use language that is more strident than scientific; greater care can indeed be taken to present scientific arguments precisely, accurately, and without hyperbole. Second, applied ecologists can be more careful, regardless of their audience, to emphasize the nature and magnitude of the evidence underlying their claims. Invasion biologists are intimately acquainted with the evidence for invaders' impacts, and they need not overstate their case to make a strong one.

Theodoropoulos correctly points out that invasion biologists sometimes use baggage-laden words when describing their work. While this is perhaps unfortunate, terminology is not ideological destiny, and it is disingenuous not to acknowledge the difference between applying a term like ''alien'' to humans and using it to describe other species. The illogical analogy between eugenic racism and invasion biology is the ''straw man'' at the core of the book's argument. The central section of the book argues that any scientist or policy-maker concerned with the ecological, economic, or public health impacts of non-native species is displaying the kind of fear, hatred, and bias historically used against Jews, women, racial minorities, socioeconomically disadvantaged people, and other groups. Clearly, concern about the unregulated spread of species is wholly different—in a host of ways—from misguided attempts to impose inequity on particular populations of *Homo sapiens*. In fact, there is nothing illogical about a biologist being personally in favor of an open human immigration policy across international borders, while at the same time adamantly opposing the importation of exotic species. Invasion biologists have human foibles like anyone else, but they can surely distinguish between policies that apply to people and those that apply to other animals, plants, microbes, and pathogens. Would Theodoropoulos consider epidemiologists working to reduce the spread of Ebola, SARS, West Nile Virus, and hantavirus to be xenophobes? Among the dangers of this book is that many serious policy issues regarding non-native organisms are lost amid inflammatory arguments that academics are corrupted by corporate money, and that invasion biology's intellectual structure is identical to ''xenophobic, nationalist, racist, authoritarian, and fascist ideologies.'' Against this backdrop, evidence for harm from invasive species is claimed to be absent, but in actuality, those data are simply ignored.

Given this book's unusual claims, a note about the author and publisher is in order. Evaluating books is like evaluating websites: one must look closely at credentials and connections. While Theodoropoulos describes himself as a conservation biologist, I could find no evidence of any academic affiliation, advanced degree, or even an undergraduate background in biological science. The book cites 23 publications of which Theodoropoulos is first or sole author, none of which is a refereed journal article or book chapter. His listed occupation as manager of ''a biological preserve and a public-access seed bank'' in the California mountains stimulated me to do a Google search. This nature preserve is apparently synonymous with a commercial seed company selling a range of plants from around the world. Further, Theodoropoulos (personally and under his apparent commercial pseudonym) is politically active in the online opposition to federal ''white listing'' protocols, recommended by the authors of the ESA's *Issues in Ecology* report on biotic invasions, which would consider imported species potentially harmful unless demonstrated otherwise. This lobbying includes opposition to terms such as ''pre-screening'' and ''risk assessment'' in federal invasive species laws or regulations. The book's publisher, Avvar Books of Blythe, California (''specializing in peer-reviewed natural history books''), has two other published or forthcoming volumes: a retrospective on riparian revegetation and a taxonomic treatise on white-cheeked geese.

This book condemns an entire subfield of ecology on spurious, highly politicized grounds. Many *Ecology* readers are doing excellent research in invasion biology; most of these researchers are also engaged in critical applied and policy extensions of that research. This book explicitly tells policy-makers and decision-makers that all invasion biology research and its conclusions are complete bunk. Because the book has the superficial trappings of a scientific treatise and it does make a few good points, it has clear potential to hoodwink policy-makers inclined to oppose *any* federal or state controls on species transport. Ecologists need to know that this kind of invective, masquerading as an authentic scientific critique, is out there so that they can preempt or at least thoughtfully respond to it when they inevitably encounter it.

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# UNDERSTANDING COMPLEX POPULATION DYNAMICS

Turchin, Peter. 2003. **Complex population dynamics: a theoretical/empirical synthesis.** Monographs in Population Biology, 35. Princeton University Press, Princeton, New Jersey. xvii + 450 p. $75.00 (cloth), ISBN: 0-691-09020-3 (alk. paper); $29.95 (paper), ISBN 0-691-09021-1 (alk. paper).

Biocomplexity has rapidly pushed into the mainstream of ecological thought and funding. In 2002, Dr. Rita Colwell concluded a talk titled ''Biocomplexity: a new paradigm for infectious disease'' with the following admonition:

> *To foretell events today, we attempt to read not tea leaves but the messages of complexity. . . . we can reduce our perplexity, and progress on the path to prediction in ecology and epidemiology, by borrowing from each other's wisdom*

(Colwell, R. R. 2002. Biocomplexity: a new paradigm for infectious disease. Remarks made at the Harvard/MIT Conference on Infectious Disease, 9 March 2002 [Online: ⟨http://www.nsf.gov/od/lpa/forum/colwell/rc020309harvard.htm⟩]). Peter Turchin's book on modeling complex population dynamics is best viewed as his attempt to share his wisdom with us.

*Complex population dynamics* was written, in part, to provide a single comprehensive review of complex population dynamics. Turchin details three goals for this book. His first goal was to review progress in answering fundamental questions about why populations exhibit complex behavior like outbreaks, limit cycles, and (perhaps) chaotic fluctuations. As a second goal for this book, Turchin promotes the idea that there are general laws of population dynamics akin to the general laws governing the movement of planets. Third, Turchin provides a detailed tutorial about methodologies for analyzing complex population dynamics that includes insights from mathematical modeling, time-series analysis, and field experiments. These three goals set a broad and ambitious agenda for this strong and well-written book.

Turchin envisions two distinct uses for this book. First, he intended the book to serve as a prescription for scientists working in complex population dynamics. Turchin believes we are on the threshold of a grand synthesis and that scientists working in the field need to embed their work in a larger tapestry of general principles and laws. Second, Turchin intended that this book be adopted as a textbook for a course in population dynamics or population ecology. In general, the book is written well enough to serve both intentions, although its utility as a textbook will probably be limited to instructors and students very comfortable with mathematical ecology.

The book is organized into three sections, theory, data, and case studies. The theory section contains five chapters. The first chapter, ''Introduction,'' gives a very brief overview of his philosophy of doing science and the methodological tenets that are used throughout the book. Turchin argues quite eloquently for the need to build mathematical models and test them against real data. This philosophical disclaimer gives the book a very informal and personal feel. In the second chapter, ''Population dynamics from first principles,'' Turchin begins with simple postulates about exponential growth, self-limitation, and trophic oscillations in search for general laws of population dynamics. This chapter is a mix of very broad concepts and specific examples. The third chapter, ''Single-species populations,'' reviews many models of population growth starting with simple, unstructured ODE models then moving through more complicated models with time delays, stochastic effects, and complex feedbacks. The fourth chapter, ''Trophic interactions,'' is the largest chapter in the book, spanning nearly 60 pages. In it, Turchin extends the mathematical models presented in Chapter 3 to include predator-prey dynamics, plant-grazer interactions, and pathogen/parasite models. This chapter provides a clean, exceptionally well-written overview of a diverse class of models. In Chapter 5, ''Connecting mathematical theory to empirical dynamics,'' Turchin makes the transition from theory to empirical data. Although the chapter is a necessary bridge to the material on analysis of empirical data, the chapter seems slightly off balance and choppy.

The second major section of the book focuses on the analysis of time-series data. This section includes three small chapters (6—''Empirical approaches: an overview''; 7—''Phenomenological time-series analysis''; and 8—''Fitting mechanistic models''). Turchin's writing is so strong and his organization so sure that reading is effortless. As I read through these three sections, I found myself nodding vigorously in agreement at least twice a page. The chapters are focused and pragmatic and offer a wealth of insight on topics like detrending and differencing time series, model complexity, cross validation, and a very nice critique of the overuse of AIC for model comparisons. Experienced researchers and graduate students alike will want to mark page after page to use as a reference.

The final section of the book includes six broad case studies of complex population dynamics including the ''Larch budmoth'' (Chapter 9), ''Southern pine beetle'' (Chapter 10), ''Red grouse'' (Chapter 11), ''Voles and other rodents'' (Chapter 12), ''Snowshoe hare'' (Chapter 13), and ''Ungulates'' (Chapter 14). Each chapter includes a brief introduction, an analysis of the empirical data, a review of hypotheses and models that have been proposed, and a brief synthesis. As with the second section of the book, Turchin is at his best when he guides the reader through the analysis of the empirical data and then compares and contrasts competing models and hypotheses. These chapters are well written, but they cover a lot of ground. Readers that are not very familiar with the case studies may have to re-read the chapter several times.

In the final chapter of the book, Turchin steps back from the specific and reflects on the general principles outlined in the first section (particularly Chapters 2–4). Turchin concludes that nearly all examples of complex population dynamics stem from trophic interactions, the majority of which are specialist predators. Turchin reiterates his belief in the value of testing models with empirical data. He also asserts

that the models that perform best across the wide variety of case studies are models with few factors. He concludes the chapter with an upbeat view of the enormous progress that has been made in understanding complex population dynamics.

Overall, Turchin's book is a superbly written text offering many fresh insights both pragmatic and profound. Turchin seems at his smoothest and most compelling when he is deriving specific relationships, demonstrating particular methodological approaches, or delving into a detailed case study. The more ambitious attempt to frame general principles of complex population dynamics is sometimes more difficult to read. Throughout the book, Turchin manages to present complex material in an informal style with clarity and eloquence. As a result, Turchin succeeds in sharing with the reader his extensive knowledge and wisdom in the exactly the way envisioned by Dr. Colwell in her remarks about Biocomplexity.

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# Spotlight

## RECENT PUBLICATIONS OF PARTICULAR INTEREST

Able, Kenneth P., editor. 1999. **Gatherings of angels: migrating birds and their ecology.** Cornell University Press, Ithaca, New York. xi + 193 p. $18.95, £11.50, ISBN: 0-8014-3362-2 (alk. paper). Four chapters cover general information (e.g., behavior, stopovers, conservation). The remaining six chapters focus on individual species—blackpoll warbler, broad-winged hawk, sandhill cranes, white-rumped sandpiper, dunlins and western sandpipers, and hummingbirds.

Brown, Lester R. 2003. **Plan B: rescuing a planet under stress and a civilization in trouble.** W. W. Norton, New York. xvii + 285 p. $27.95 (cloth), ISBN: 0-393-05859-X; $15.95 (paper), ISBN: 0-393-32523-7. Brown's ''Plan B'' is a ''world-wide mobilization to stabilize population and climate.'' Brown details environmental problems and outlines his recommended solutions. His topics include water, soil, temperature, and social problems.

## BOOKS AND MONOGRAPHS RECEIVED THROUGH DECEMBER 2003

Able, Kenneth P., editor. 1999. **Gatherings of angels: migrating birds and their ecology.** Cornell University Press, Ithaca, New York. xi + 193 p. $18.95, £11.50, ISBN: 0-8014-3362-2 (alk. paper).

Alimov, Alexander F. 2003. **Towards a theory of the functioning of aquatic ecosystems.** Backhuys, Leiden, The Netherlands. v + 130 p. $49.00, €42.00, ISBN: 90-5782-134-6.

Baker, Malchus B., Jr., Peter F. Ffolliott, Leonard F. DeBano, and Daniel G. Neary, editors. 2003. **Riparian areas of the southwestern United States: hydrology, ecology, and management.** Lewis, New York. 408 p. $89.96, ISBN: 1-56670-626-2 (alk. paper).

Brown, Lester R. 2003. **Plan B: rescuing a planet under stress and a civilization in trouble.** W. W. Norton, New York. xvii + 285 p. $27.95 (cloth), ISBN: 0-393-05859-X; $15.95 (paper), ISBN: 0-393-32523-7.

Child, Lois, John H. Brock, Giuseppe Brundu, Karel Prach, Petr Pyšek, P. Max Wade, and Mark Williamson, editors. 2003. **Plant invasions: ecological threats and management solutions.** Backhuys, Leiden, The Netherlands. xii + 457 p. $124.50, €108.00, ISBN: 90-5782-135-4.

Closs, Gerry, Barbara Downes, and Andrew Boulton. 2003. **Freshwater ecology: a scientific introduction.** Blackwell, Malden, Massachusetts. xiv + 221 p. $59.95, ISBN: 0-632-05266-X (alk. paper).

Cooper, Gregory John. 2003. **The science of the struggle for existence: on the foundations of ecology.** Cambridge Studies in Philosophy and Biology. Cambridge University Press, New York. xv + 319 p. $60.00, ISBN: 0-521-80432-9.

Daly, Herman E., and Joshua Farley. 2003. **Ecological economics: principles and applications.** Island Press, Washington, D.C. xxvii + 454 p. $40.00, ISBN: 1-55963-312-3 (alk. paper).

du Toit, Johan T., Kevin H. Rogers, and Harry C. Biggs, editors. 2003. **The Kruger experience: ecology and management of savanna heterogeneity.** Island Press, Washington, D.C. xv + 519 p. $75.00 (cloth), ISBN: 1-55963-981-4 (alk. paper); $40.00 (paper), ISBN: 1-55963-982-2 (alk. paper).

Eisner, Thomas. 2003. **For love of insects.** Harvard University Press, Cambridge, Massachusetts. xi + 448 p. $29.95, ISBN: 0-674-01181-3 (alk. paper).

Kangas, Patrick C. 2003. **Ecological engineering: principles and practice.** Lewis, New York. 452 p. $80.96, ISBN: 1-56670-599-1 (alk. paper).

Krech, Shepard, III, J. R. McNeill, and Carolyn Merchant, editors. 2003. **Encyclopedia of world environmental history.** Volume 1: A–E; Volume 2: F–N; Volume 3: O–Z, Index. Routledge, New York. xlvi + 1429 p. $345.00, $518.00 (Canada), ISBN: 0-415-93732-9 (acid-free paper).

Magurran, Anne E. 2003. **Measuring biological diversity.** Blackwell, Malden, Massachusetts. viii + 256 p. $54.95, ISBN: 0-632-05633-9 (alk. paper).

McQueen, Mike, and Ed McMahon. 2003. **Land conservation financing.** Island Press, Washington, D.C. xvi + 223 p. $27.00, ISBN: 1-55963-481-2 (alk. paper).

Melillo, Jerry M., Christopher B. Field, and Bedrich Moldan, editors. 2003. **Interactions of the major biogeochemical cycles: global change and human impacts.** SCOPE, 61. Island Press, Washington, D.D. xxi + 357 p. $75.00 (cloth), ISBN: 1-55963-065-5 (alk. paper); $35.00 (paper), ISBN: 1-55963-066-3 (alk. paper).

Otte, Marinus L., editor. 2003. **Wetlands of Ireland: distribution, ecology, uses and economic value.** Dufour, Chester Springs, Pennsylvania, and University College Dublin Press, Dublin, Ireland. 256 p. $79.95 (cloth), ISBN: 1-900621-88-6; $39.95 (paper), ISBN: 1-900621-89-4.

Sideleva, Valentina G. 2003. **The endemic fishes of Lake Baikal.** Backhuys, Leiden, The Netherlands. xv + 270 p. $131.00, €112.00, ISBN: 90-5782-133-8.

Slobodkin, Lawrence B. 2003. **A citizen's guide to ecology.** Oxford University Press, New York. 245 p. $49.50 (cloth), ISBN: 0-19-516286-2 (acid-free paper); $14.95 (paper), ISBN: 0-19-516287-0 (acid-free paper).

Smil, Vaclav. 2003. **Energy at the crossroads: global perspectives and uncertainties.** The MIT Press, Cambridge, Massachusetts. xiv + 427 p. $34.95, ISBN: 0-262-19492-9 (alk. paper).

Spray, Sharon L., and Karen L. McGlothlin, editors. 2003. **Loss of biodiversity.** Exploring Environmental Challenges: A Multidisciplinary Approach. Rowman and Littlefield, Lanham, Maryland. xxiv + 179 p. $65.00 (cloth), ISBN: 0-7425-2566-X (alk. paper); $21.95 (paper), ISBN: 0-7425-2567-8 (alk. paper).

Weber, Ewald. 2004. **Invasive plant species of the world: a reference guide to environmental weeds.** CABI, Cambridge, Massachusetts. vii + 548 p. $140.00, £75.00, ISBN: 0-85199-695-7 (alk. paper).

Wydoski, Richard S., and Richard L. Whitney. 2003. **Inland fishes of Washington.** Second edition. University of Washington Press, Seattle, Washington. xiii + 322 p. $50.00, ISBN: 0-295-98338-8 (alk. paper).