

Aquatic Ecosystems: Trends and Global Prospects

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Source: BioScience, 59(10) : 910-912

Published By: American Institute of Biological Sciences

URL: <https://doi.org/10.1525/bio.2009.59.10.16>

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an approaching Cuban aircraft, and provided records to show that the plane's spray tank had been reconfigured to carry extra fuel and was incapable of dispensing insects.

North Korea was the only country to support the Cuban allegations. Yet Lockwood gives them credence, noting that the thrips infestation was initially limited to Matanzas Province while farms further east were unaffected. Zilinskas, however, offers a plausible explanation. He notes that in the years before reaching Cuba, thrips had spread throughout the Caribbean region. Zilinskas believes that on 14–18 October 1996, winds from Hurricane Lili picked up the insects from areas where they were endemic and dropped them on central Cuba, a few days before the State Department crop-duster overflowed the island. Indeed, the hurricane took nearly the same path across Matanzas Province as the US aircraft, albeit in the opposite direction.

In sum, by giving credence to allegations of US biological warfare that have been convincingly discredited, *Six-Legged Soldiers* does its readers a disservice and detracts from its central message that entomological warfare poses an enduring threat to society.

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References cited

- Furmanski M, Wheelis M. 2006. Allegations of biological weapons use. Pages 252–283 in Wheelis M, Rózsa L, Dando M, eds. *Deadly Cultures: Biological Weapons since 1945*. Harvard University Press.
- Leitenberg M. 1998. Resolution of the Korean War biological warfare allegations. *Critical Reviews in Microbiology* 24: 169–194.
- Zilinskas RA. 1999. Cuban allegations of biological warfare by the United States: Assessing the evidence. *Critical Reviews in Microbiology* 25: 173–227.

WATER ACROSS THE WORLD: THE BIG PICTURE

Aquatic Ecosystems: Trends and Global Prospects. Nicholas V. C. Polunin, ed. Cambridge University Press, 2008. 512 pp., illus. \$160.00 (ISBN 9780521833271 cloth).

Aquatic Ecosystems: Trends and Global Prospects is a very ambitious multi-authored volume that attempts to identify the current threats and future prospects for all types of aquatic ecosystems around the world. The high-quality, policy-relevant science described in *Aquatic Ecosystems*, together with the breadth of perspective, make the book a gold mine for students and scholars of aquatic ecosystems as well as for those involved in their management.

The book's major goals are to determine how the diverse aquatic ecosystems of the world might look in the year 2025, which of these aquatic ecosystems are the most threatened, what the primary drivers of change are, and how this information can be used in the conservation and management of these ecosystems. This is all done within the widely recognized context of a human population that has grown threefold in the past century and increased its water usage sixfold. While the global water crisis is widely recognized, this volume provides a wealth of information on which threats are the greatest for each type of the diverse array of aquatic ecosystems.

Nicholas V. C. Polunin, the editor of this volume, is a professor at the School of Marine Science and Technology in Newcastle in the United Kingdom, with a specialty in marine environmental science. He is also the current president of the Foundation for Environmental Conservation. Polunin has assembled an impressive array of over 100 leading aquatic scientists from 26 countries to contribute to this volume. *Aquatic Ecosystems* has its roots in a set of review

papers that were published in the journal *Environmental Conservation*, the flagship journal of the Foundation for Environmental Conservation. This Swiss-based foundation was established in the early 1970s with a mission that is “holistically global...and...as widely international as possible.” The comprehensive global array of aquatic ecosystems addressed in this volume and the broadly international group of leading aquatic scientists who contributed to it satisfy this mission and thus offer readers a valuable perspective on aquatic ecosystems at the broadest scale.

The volume is broken down into seven core sections by aquatic ecosystem type: flowing waters (streams and rivers, groundwater, and flood plains), still waters (small lakes and ponds, large freshwater lakes, and saline lakes), freshwater wetlands (temperate peatlands, temperate freshwater wetlands, and tropical wetlands), coastal wetlands (salt-marsh, mangrove, and estuarine), rocky shores (rocky intertidal, kelp forests, and coral reefs), soft shores (sandy, seagrass, and benthic continental shelves), and vast marine systems (marine pelagic, polar ice-edge, and deep-sea floor). The volume also includes multiauthored introduction and synthesis chapters. While it is clear that many of the chapters are extensions of recent reviews that cover a similar set of aquatic ecosystems and human impacts, a comparable compendium of the diversity of aquatic ecosystems does not exist. Each chapter starts by describing the characteristics of a given suite of aquatic ecosystems, summarizes the most critical threats to these ecosystems, and then provides either projections to the 2025 timeline or conclusions about what is needed for the effective management of these types of ecosystems in the future.

A common theme running throughout *Aquatic Ecosystems* emphasizes and compares the relative importance of more local-to-regional anthropogenic threats (such as eutrophication and contamination) to more global threats (such as climate change, sea-level rise, and invasive species). The volume makes clear that an integrated approach will ultimately be critical to successful man-

doi:10.1525/bio.2009.59.10.16

agement because of geopolitical and geographic interconnections among aquatic ecosystems ranging from headwater wetlands, lakes, and streams to the larger rivers, estuaries, saltmarshes, and coastal and open oceans.


In addition to its value to scholars and practitioners dealing with almost any type of aquatic ecosystem, this book would be an excellent choice for an advanced seminar course for students who have some background in aquatic ecosystems. The only impediment might be the book's rather high cost.

The coverage of both the range of topics and the literature are quite comprehensive, with more than 100 pages of references. Yet as in any volume with such an ambitious goal, some areas are overlooked. For example, the striking increases that have been observed in dissolved organic carbon in many lakes and rivers over the past 15 to 20 years in many parts of Europe and North America (Evans et al. 2005, Findlay 2005) are not discussed, but provide a clear signal of important changes in aquatic ecosystems in these highly populated regions of the planet. The more recent literature suggests that at least in some areas this is a reversal of the threat of the acidification of inland waters (Evans et al. 2006, Monteith et al. 2007).

A particularly interesting chapter on polar ice-edge marine systems discusses their great susceptibility to climate change, most likely mediated largely through changes in ice dynamics. Yet polar, montane, and alpine lakes, which are particularly threatened by both regional contaminants through both global and alpine distillery mechanisms and accelerated climate change at high latitudes and elevations, are not given much attention. Other very timely topics that receive scant attention include endocrine disruptors and nanoparticles. These omissions are relatively minor, however, given the impressive breadth and depth of coverage of this volume.


One of the real strengths of *Aquatic Ecosystems* is the discussion of the variable sensitivity of different types of ecosystems to the suite of threats. For example, while sandy coastal regions are

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susceptible to pollution, the impact of pollution on seagrass communities is far greater because of eutrophication and associated changes in water transparency. Fishing, on the other hand, is the greatest threat to soft-bottomed coastal and open ocean waters. In general, all of the wide suite of impacts are likely to be most severe in developing countries, but the responsibility for management may lie as much with developed countries because their commerce and economic systems are globally interconnected, and they possess the technical expertise to solve the tragedy of this global commons.

This book does an outstanding job of providing a comparative assessment of the threats and future prospects

facing a broad array of aquatic ecosystems. The compilation of knowledge, carefully catalogued and insightfully discussed, is a fascinating read for anyone who works with aquatic ecosystems. The combination of high-quality science and breadth of coverage is impressive. Even for those working on local and regional problems, the treatment of common solutions to widespread problems presented in this book will make it a valuable asset.

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References cited

- Evans CD, Monteith DT, Cooper DM. 2005. Long-term increases in surface water dissolved organic carbon: Observations, possible causes, and environmental impacts. *Environmental Pollution* 137: 55–71.
- Evans CD, Chapman PJ, Clark JM, Monteith DT, Cresser MS. 2006. Alternative explanations for rising dissolved organic carbon export from organic soils. *Global Change Biology* 12: 2044–2053.
- Findlay SEG. 2005. Increased carbon transport in the Hudson River: Unexpected consequence of nitrogen deposition? *Frontiers in Ecology and the Environment* 3: 133–137.
- Monteith DT, et al. 2007. Dissolved organic carbon trends resulting from changes in atmospheric deposition chemistry. *Nature* 450: 537–541.

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doi:10.1525/bio.2009.59.10.17