the floodplain forests. A growth of major commercial fisheries has already had a negative impact on a small number of highly desirable species. The commercial fisheries have also affected the fish resources of the shrimpers (the inhabitants of the floodplains): an interesting communal approach to fisheries management has arisen in response. The assessment provided suggests there might be room for 100% growth in fisheries yield, but the paucity of information on ecology and lake ecology, together with the inadequacy of regulation, suggest proceeding with caution. Certainly the authors' view seems correct: the complex ecology suggests classic stock assessment may not work.

Two chapters—one on terrestrial arthropods and one on mercury—speak at first blush to be out of place. The companion of soil arthropods from forest and different floodplains is not many centuries the only place where biodiversity gets much attention in the book (other than in an initial description). So the chapter presents a reminder that impact of development on biodiversity is a central part of this story.

Population is a rather significant in the Amazon floodplain because of the vast amounts of water. Nonetheless, mercury pollution from extensive gold mining has become a matter of real concern in certain places and for particular fish stocks. This is a reminder as well that not only are the population control projects now underway in some cities long overdue, but also that mentioned—'that' any consideration of the future of the floodplain must recognize that quality of life in cities (and thus their attractiveness to a major fraction of Amazon population) is fundamental to the story.

The penultimate chapter is an extremely useful summary of the legal aspects of the use of the Amazon floodplains by the one Roberto dos Santos Vieira—the only such treatment I have seen. The four editors provide a final chapter that draws on all the preceding chapters and provides a useful overview and summary that can stand on its own.

The diagrammatic presentations of complex subjects are excellent but a good general editor could have made the book even better. The index is abbreviated, inadequate, and frustrating. Specialized terms are used in chapters without explanation, e.g., salamander fishes. Nonetheless, this is an impertinent, solid, and timely book. A zoning system for the areas based on this information is needed as rapidly as possible.

THOMAS R. LUCAS
The United Nations Foundation
1301 Connecticut Avenue, Suite 700, N.W.
Washington, D.C. 20005
llucas@worldbank.org

EUTROPHICATION PROCESSES: NORTHWEST FLORIDA ESTUARY RESPONSE


This new addition to the CRC Marine Science Series, which is designed to "focus on the synthesis of recent advances in marine science," joins a series of texts by scientists who are recognized authorities in their respective fields. An equally impressive list of individuals contributed to the three decades of scientific study that were drawn upon by Dr. Livingston in preparing this volume.

This book is a singular compendium of data combined with an equally unique analysis of changes in coastal food webs in response to nutrient loading, the results of 30 yr of research in the northeastern Gulf of Mexico along roughly 240 miles of the northwest Florida coast. The concept of looking at ecological systems, on a watershed basis and the case for development of long-term databases are both validated by the supporting evidence of the research presented on northeastern Gulf of Mexico water bodies, especially Perdido Bay, Florida, the focus of most of the work that is described and highlighted in the text.

Eutrophication and associated concepts, such as increases in harmful algal bloom events and their relationship to increased levels of nutrients, are very briefly presented in an introductory chapter. This is followed by in-depth descriptions of the physical settings for each study area, and a detailed account of phytoplankton populations, river flow, nutrient, sediment, and water quality dynamics over an 11-yr period in Perdido Bay.

This description leads to a detailed analysis of changes in the bay's phytoplankton community structure in response to nutrient loading, originating primarily from a single pulp mill source, including accounts of harmful algal bloom events, and also the effects on the benthic macrofaunal assemblages and benthic fauna over an extended period of time. Over half of the text is devoted to documenting the effects on the numbers and species richness of the phytoplankton, and the effects changes in the phytoplankton community have on the animals, macroinvertebrates, and fishes in Perdido Bay over the same 11-yr period, highlighting the decrease in secondary production that accompanied an observed increase in nutrient-driven bloom events.

Data sets, collected from four other northwest Florida estuarine systems, are employed to compare habitat, water quality, nutrient levels, and sediments among the systems and the responses of fauna to these changes. An analysis of phytoplankton community changes over a one-year period to each suite of environmental factors is presented for the four selected coastal embayments, all referenced to observations made in Perdido Bay. These analyses are focused on the re-
sults of anthropogenically impacted systems ("anthropogenically impacted stress") and the fate of excess added nutrients within these systems. Prior to the 1980s, these systems, and their interactions were not well understood. The importance of including ancillary information, particularly salinity patterns and analysis of sediment quality, is stressed when undertaking an evaluation of patterns in secondary production. The authors then focus on work at more geographically distant systems, primarily Chesapeake and Florida Bays, and brings political perspective into play, commenting on the use of funding to support long-term studies and assessments of the quality of northeast Gulf of Mexico estuaries. Although the politics of science in general and local politics in the northeast Gulf of Mexico in particular may be of interest to students studying eutrophication as an environmental issue, the author’s observations on “inept politics” adds little to the strength of the text. The data presented are more than sufficient to support the need for long-term research and the general failure, prior to the publication of this volume, to adequately recognize the alarming state deteriorating health of anthropogenically impacted estuaries in the northeastern Gulf of Mexico.

Findings and results are summarized in the final two chapters of the text, highlighting the direct relationships observed between nutrient loading from anthropogenic sources and the development of harmful algal blooms and bloom-dominated phytoplankton communities, and the resulting negative impact on secondary production. Nearly all of the graphs of data collected over time are extremely “information dense,” and as a result are not immediately clear or interpretable without consulting the text. Several figures are nearly illegible along their axes. However, the representations of the data in spatial dimension format are readily understandable. The two appendices will be of considerable use to students and scientists who are beginning studies that are ecological in nature, and seeking a list of accepted techniques for use in environmentally oriented studies of coastal ecosystems and their health, function, and trophic dynamics.

In summary, the bulk of the text is devoted to the estuaries of the Florida panhandle region as specific examples of the effects of coastal eutrophication. A scant 200 page, one chapter brings in specific examples from other coastal areas of the United States. It is used as a textbook for a course with a broader focus. It could serve as an excellent set of case studies, but would need to be supplemented by a textbook that provides more detailed information on the biology, chemistry, ecology, and trophic structure of estuarine systems. Alone, it will be an extremely valuable addition to the reference libraries of researchers working in northern Gulf of Mexico estuaries. This volume should also prove to be particularly useful to persons involved in studies and discussions related to the effects of coastal eutrophication and the ultimate fate and results of nutrient loading in our estuaries.

CYNTHIA A. MONCREIF
The University of Southern Mississippi
College of Marine Sciences
Department of Coastal Sciences
Ocean Springs, Mississippi 39565-7000

Cynthia.moncreif@usm.edu

PLOWING EARTH

Place some water, oxygen, carbon dioxide, nitrogen and other life-essential inorganic compounds, into a sealed bottle. Put it out in the sun, and watch. From now till eternity there will be little to observe. Add photoautotrophs (e.g., plants and algae) and nitrogen-fixing microbes, and the entire contents of the bottle change with dramatic rapidity. Organic matter, living and dead, accumulates in the bottle until the stocks of inorganic compounds are depleted. Add chemoheterotrophs (e.g., herbivores, carnivores, decomposers) and the accumulated organic material is transformed back into inorganic material. Autotrophs and heterotrophs create a highly dynamic system, one powered by photoautotrophic production. Now imagine instead a larger system having 2500 gigatons (4 x 10^11 g) of CO, 1.2 million Gt of O, and 3.9 million Gt of N, spread out over 510 million km, and millions of autotrophic and heterotrophic organisms made up of some 10-100 million species. This is Earth, an enormous biogeochemical engine of unimaginable complexity powered by about 110 Gt C yr^-1 of organic fuel produced by photoautotrophs and consumed by heterotrophs. As humans take the helm of this complex system, it has become increasingly important to understand how it works, and understanding how production powers earth is a good place to start.

**Terrestrial global productivity, by J. Roy, B. Saugier, and H. Mooney.** presents the most recent overview of terrestrial production. Fifty contributors, a veritable Who's who in plant, ecosystem, and earth-system ecology, provide concise reviews of a variety of topics related to production. The volume is the outcome of a symposium entitled, "Terrestrial global productivity: past, present, and future," held in Montpellier, France in 1997 in honor of the late F. E. Eckardt, a pioneer in physiological studies of production. The volume's 23 chapters are divided into three sections. The first section covers the basic and abiotic components of production, the second