

Rapid Ecological Assessment Biological Diversity

This book provides an up to date review of the methods of measuring and assessing biological diversity, together with their application.

This report describes the invertebrate and algal assemblages around Ngulu and Ulithi Atolls based upon quantitative ecological surveys conducted as part of Yap State's Rapid Ecological Assessment (REA)

From its inception, the U.S. Department of the Interior has been charged with a conflicting mission. One set of statutes demands that the department must develop America's lands, that it get our trees, water, oil, and minerals out into the marketplace. Yet an opposing set of laws orders us to conserve these same resources, to preserve them for the long term and to consider the noncommodity values of our public landscape. That dichotomy, between rapid exploitation and long-term protection, demands what I see as the most significant policy departure of my tenure in office: the use of science-interdisciplinary science-as the primary basis for land management decisions. For more than a century, that has not been the case. Instead, we have managed this dichotomy by compartmentalizing the American landscape. Congress and my predecessors handled resource conflicts by drawing enclosures: "We'll create a national park here," they said, "and we'll put a wildlife refuge over there." Simple enough, as far as protection goes. And outside those protected areas, the message was equally simplistic: "Y'all come and get it. Have at it." The nature and the pace of the resource extraction was not at issue; if you could find it, it was yours.

Deforestation is frequently a topic of discussion in the environmental arena, but it is not just the number of trees that matters; the quality of the forest is also important. Even where the forest area is stable or increasing, there are often rapid changes in its character. Natural forests are being replaced by plantations or by intensively managed forests. Around the world, forests are becoming younger and less diverse, in both species and structure; this has important impacts for biodiversity and also affects many human values. In this groundbreaking text, forest quality is discussed as a useful new concept in forest conservation and management. Three main assessment criteria are used: authenticity; environmental benefits; and social and economic benefits. The book describes a methodology and protocol for collecting and analysing data, and outlines in detail the approach required with each indicator. The authors advocate a landscape approach to assessment and demonstrate how assessment works through a series of case studies that show how this approach can be used in many ways to help forest conservation management. This hands-on manual is for professionals involved in forestry, conservation and resource management worldwide, and contains case study material from Europe, Asia, Africa and Latin America that demonstrates practical uses of the new 'landscape' approach to forest conservation. Published with IUCN and WWF

This accessible and timely book provides a comprehensive overview of how to measure biodiversity. The book highlights new developments, including innovative approaches to measuring taxonomic distinctness and estimating species richness, and evaluates these alongside traditional methods such as species abundance distributions, and diversity and evenness statistics. Helps the reader quantify and interpret patterns of ecological diversity, focusing on the measurement and estimation of species richness and abundance. Explores the concept of ecological diversity, bringing new perspectives to a field beset by contradictory views and advice. Discussion spans issues such as the meaning of community in the context of ecological diversity, scales of diversity and distribution of diversity among taxa Highlights advances in measurement paying particular attention to new techniques such as species richness estimation, application of measures of diversity to conservation and environmental management and addressing sampling issues Includes worked examples of key methods in helping people to understand the techniques and use available computer packages

more effectively

From the oceans to continental heartlands, human activities have altered the physical characteristics of Earth's surface. With Earth's population projected to peak at 8 to 12 billion people by 2050 and the additional stress of climate change, it is more important than ever to understand how and where these changes are happening. Innovation in the geographical sciences has the potential to advance knowledge of place-based environmental change, sustainability, and the impacts of a rapidly changing economy and society. Understanding the Changing Planet outlines eleven strategic directions to focus research and leverage new technologies to harness the potential that the geographical sciences offer.

Wetland and Stream Rapid Assessments: Development, Validation, and Application describes the scientific and environmental policy background for rapid wetland and stream assessments, how such assessment methods are developed and statistically verified, and how they can be used in environmental decision-making—including wetland and stream permitting. In addition, it provides several case studies of method development and use in various parts of the world. Readers will find guidance on developing and testing such methods, along with examples of how these methods have been used in various programs across North America. Rapid wetland and stream functional assessments are becoming frequently used methods in federal, state and local environmental permitting programs in North America. Many governments are interested in developing new methods or improving existing methods for their own jurisdictions. This book provides an ideal guide to these initiatives. Offers guidance for the use and evaluation of rapid assessments to developers and users of these methods, as well as students of wetland and stream quality. Contains contributions from sources who are successful in academia, industry and government, bringing credibility and relevance to the content. Includes a statistically-based approach to testing the validity of the rapid method, which is very important to the usefulness and defensibility of assessment methods. First of its kind and unique in its blend of theoretical and practical approaches for mainstreaming biodiversity in impact assessment.

Biodiversity Conservation and Habitat Management is a component of *Encyclopedia of Natural Resources Policy and Management* in the global *Encyclopedia of Life Support Systems (EOLSS)*, which is an integrated compendium of twenty one Encyclopedias. Biodiversity is declining worldwide at a very unprecedented rate as a complex response to several human-induced changes in the global environment. The magnitude of these changes is so large and their effects are so strongly linked to the altered ecosystem processes and to human (ab-)use of natural resources that biodiversity loss is today perceived as one of the most important issues that humankind should face with extreme urgency. Disseminating information, raising awareness, and propelling concern within a diversified target audience (general public, schools, local authorities, and government agencies) are also essential to develop shared responsibility and to encourage collaborative efforts and compliance. This has been the main objective of “Biodiversity Conservation and Habitat Management”. The Theme on Biodiversity Conservation and Habitat Management provides the essential aspects and a myriad of issues of great relevance to our world in eight major topics of discussion, and is focused on 1) History and Overview of Biodiversity Conservation and Protected Areas, 2) Management of Forests and other Wooded Habitats, 3) Management of Savannahs and Other Open Habitats, 4) Management of Wetlands, 5) Management of Tourism and Human Recreation Pressure, 6) Conservation Strategies, Species Action Plans and Translocation, 7) Captive Breeding and Gene Banks, and 8) Eradication and Control of Invasive Species. These two volumes are aimed at the following five major target audiences: University and College students, Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

Developments in technologies have evolved in a much wider use of technology throughout

science, government, and business; resulting in the expansion of geographic information systems. GIS is the academic study and practice of presenting geographical data through a system designed to capture, store, analyze, and manage geographic information. *Geographic Information Systems: Concepts, Methodologies, Tools, and Applications* is a collection of knowledge on the latest advancements and research of geographic information systems. This book aims to be useful for academics and practitioners involved in geographical data.

Estuaries are among the most biologically productive ecosystems on the planet--critical to the life cycles of fish, other aquatic animals, and the creatures which feed on them. *Estuarine Ecology, Second Edition*, covers the physical and chemical aspects of estuaries, the biology and ecology of key organisms, the flow of organic matter through estuaries, and human interactions, such as the environmental impact of fisheries on estuaries and the effects of global climate change on these important ecosystems. Authored by a team of world experts from the estuarine science community, this long-awaited, full-color edition includes new chapters covering phytoplankton, seagrasses, coastal marshes, mangroves, benthic algae, Integrated Coastal Zone Management techniques, and the effects of global climate change. It also features an entirely new section on estuarine ecosystem processes, trophic webs, ecosystem metabolism, and the interactions between estuaries and other ecosystems such as wetlands and marshes

Wetlands - swamp, marsh, bayou, tundra and bog - are places that are rarely visited and often misunderstood but they have, in fact, conspicuous roles in the physical, biological and cultural geography of the world. They are intrinsically beautiful environments where one may see the natural and essential values in the interaction of water, soil, vegetation, wildlife, and humans. Wetlands occur at the confluence of unique terrestrial, hydrological and climatic conditions that give rise to some of the most biodiverse regions of the world. They also play vital roles in the cycling and storage of key nutrients, materials and energy through the Earth's system. A complete study of wetland environments requires the assessment of their physical and biological attributes, properties and functions of these ecosystems, and the economic, political and social aspects that mediate their use globally. A systems approach is taken throughout this book which emphasizes the interactions between these elements of wetland ecosystems. Moreover, selected case studies from across the world are used to illustrate wetland characteristics and circumstances. This book is intended to foster a greater awareness and appreciation of wetlands, promote a culture of conservation and wise management, and spread the knowledge that wetlands are important, indeed crucial, elements of the global environment. Our attempts to understand, manage and enhance wetlands in the twenty-first century are part of the larger effort to maintain a sustainable Earth. Readership: Introductory or intermediate level undergraduates taking courses on wetland environments
Additional resources for this book can be found at:

[www.wiley.com/go/aber/wetland/a](http://www.wiley.com/go/aber/wetland).

The central concept guiding the management of parks and wilderness over the past century has been "naturalness"—to a large extent the explicit purpose in establishing these special areas was to keep them in their "natural" state. But what does that mean, particularly as the effects of stressors such as habitat fragmentation, altered disturbance regimes, pollution, invasive species, and climate change become both more pronounced and more pervasive? *Beyond Naturalness* brings together leading scientists and policymakers to explore the concept of naturalness, its varied meanings, and the extent to which it provides adequate guidance regarding where, when, and how managers should intervene in ecosystem processes to protect park and wilderness values. The main

conclusion is the idea that naturalness will continue to provide an important touchstone for protected area conservation, but that more specific goals and objectives are needed to guide stewardship. The issues considered in *Beyond Naturalness* are central not just to conservation of parks, but to many areas of ecological thinking—including the fields of conservation biology and ecological restoration—and represent the cutting edge of discussions of both values and practice in the twenty-first century. This book offers excellent writing and focus, along with remarkable clarity of thought on some of the difficult questions being raised in light of new and changing stressors such as global environmental climate change.

Caused in part by the slash-and-burn practices of both large- and small-scale farmers, the environmental implications of tropical deforestation remain a worldwide concern. Yet the small-scale farmers who use slash-and-burn agriculture depend on it to produce food and make a living for their families. With contributions from scientists, economists, ecologists, and anthropologists, this book provides an overall analysis of the environmental, economic, and social reasons for why slash and burn is so common and presents alternatives to this destructive practice.

The world's ecosystems are increasingly threatened by human development. Ecological impact assessment (EclA) is used to predict and evaluate the impacts of development on ecosystems and their components, thereby providing the information needed to ensure that ecological issues are given full and proper consideration in development planning. Environmental impact assessment (EIA) has emerged as a key to sustainable development by integrating social, economic and environmental issues in many countries. EclA has a major part to play as a component of EIA but also has other potential applications in environmental planning and management. *Ecological Impact Assessment* provides a comprehensive review of the EclA process and summarizes the ecological theories and tools that can be used to understand, explain and evaluate the ecological consequences of development proposals. It is intended for the many individuals and companies involved in EIA and EclA, as well as other areas of environmental management where impacts on ecosystems need to be evaluated. It will benefit planners, regulators, environmental consultants and scientists and will also provide an invaluable sourcebook and guide for the growing number of undergraduate students taking courses in applied ecology, EIA and related topics in environmental science. A practical management guide for the increasing numbers of practitioners of EclA. A rapidly expanding subject driven by the proliferation of environmental legislation worldwide.

As the impacts of anthropogenic activities increase in both magnitude and extent, biodiversity is coming under increasing pressure. Scientists and policy makers are frequently hampered by a lack of information on biological systems, particularly information relating to long-term trends. Such information is crucial to developing an understanding as to how biodiversity may respond to global

environmental change. Knowledge gaps make it very difficult to develop effective policies and legislation to reduce and reverse biodiversity loss. This book explores the gap between global commitments to biodiversity conservation, and local action to track biodiversity change and implement conservation action. High profile international political commitments to improve biodiversity conservation, such as the targets set by the Convention on Biological Diversity, require innovative and rapid responses from both science and policy. This multi-disciplinary perspective highlights barriers to conservation and offers novel solutions to evaluating trends in biodiversity at multiple scales.

This practical handbook of reptile field ecology and conservation brings together a distinguished, international group of reptile researchers to provide a state-of-the-art review of the many new and exciting techniques used to study reptiles. The authors describe ecological sampling techniques and how they are implemented to monitor the conservation status and population trends of snakes, lizards, tuatara, turtles, and crocodylians throughout the world. Emphasis is placed on the extent of statistical inference and the biases associated with different techniques and analyses. The chapters focus on the application of field research and data analysis for achieving an understanding of reptile life history, population dynamics, movement patterns, thermal ecology, conservation status, and the relationship between reptiles and their environment. The book emphasises the need for thorough planning, and demonstrates how a multi-dimensional approach incorporates information related to morphology, genetics, molecular biology, epidemiology, statistical modelling, animal welfare, and biosecurity. Although accentuating field sampling, sections on experimental applications in laboratories and zoos, thermal ecology, genetics, landscape ecology, disease and biosecurity, and management options are included. Much of this information is scattered in the scientific literature or not readily available, and the intention is to provide an affordable, comprehensive synthesis for use by graduate students, researchers, and practising conservationists worldwide.

Biological diversity is important for ecosystem function and services, which in turn is essential for human well-being. Under the Convention on Biological Diversity, international efforts have been made to achieve a significant reduction in the current rate of biodiversity loss. The loss continues, however. The Asia-Pacific region includes both developing countries with high biodiversity and developed countries with sophisticated data collection and analyses, but only limited information about the status quo of biodiversity in this region has been available. Many Asia-Pacific countries have rapidly grown their economies and social infrastructures, causing a loss of biodiversity and requiring an urgent mandate to achieve a balance between development and conservation in the region. In December 2009, scientists successfully organized the Asia-Pacific Biodiversity Observation Network in the region, to establish a network for research and monitoring of ecosystems and biodiversity and to build a cooperative framework. The present volume is the first collection of information on biodiversity in the Asia-

Pacific and represents a quantum step forward in science that optimizes the synergy between development and biodiversity conservation.

This synthesis focuses on estimates of biodiversity change as projected for the 21st century by models or extrapolations based on experiments and observed trends. The term "biodiversity" is used in a broad sense as it is defined in the Convention on Biological Diversity to mean the abundance and distributions of and interactions between genotypes, species, communities, ecosystems and biomes. This synthesis pays particular attention to the interactions between biodiversity and ecosystem services and to critical "tipping points" that could lead to large, rapid and potentially irreversible changes. Comparisons between models are used to estimate the range of projections and to identify sources of uncertainty. Experiments and observed trends are used to check the plausibility of these projections.

"The report describes the results of surveys of biodiversity and status of fish communities of Pohnpei, Ahnd and Pakin Atolls in August and September 2005. The primary goal of the fish survey was to provide a comprehensive inventory of reef fishes inhabiting Pohnpei and nearby Ant and Pakin atolls. This segment of the fauna includes fishes living on or near coral reefs down to the limit of safe sport diving or approximately 55 m depth. It therefore excludes most deepwater and offshore pelagic species such as flying fishes, tunas, and billfishes"--Executive summary.

Rapid Ecological Assessment (REA) is a methodology developed by The Nature Conservancy to provide comprehensive and reliable information about biodiversity resources in situations where time and financial resources are limited. REAs utilize a combination of remote-sensed imagery, reconnaissance overflights, field data collection, and spatial information visualization to generate useful information for conservation planning. Nature in Focus is an in-depth guide to the theory and practice of REAs, offering a detailed approach for assessing biodiversity in a rapid and integrative manner. It provides researchers with the essential tools and techniques they need to conduct an REA, and offers valuable advice about the planning and implementation aspects. The book: presents an overview of the REA methodology and sampling framework reviews all aspects of an REA: planning and management, mapping and spatial information, information management describes surveys of vegetation and fauna presents a generalized description of threat assessments explores the manner in which large amounts of data produced by different REA teams are integrated and synthesized into a cohesive set of management recommendations explains how the REA effort is documented, published, and disseminated offers a detailed REA case studyAlso included is a set of twelve color maps that describe the sequence of mapping activities in the case-study REA, along with other map examples from a range of REAs. In addition to the case study, appendixes offer a full set of REA field forms for sampling, and a model "Scope of Work" that describes the nature of work to be conducted in an REA and outlines the roles and responsibilities of the participating organizations. Nature in Focus presents the collective experience of more than ten years of REA field-testing. Conservation practitioners and biodiversity scientists who are involved with REA initiatives, along with managers, policymakers, and others involved with conservation programs will find the book a useful and nontechnical guide to an essential element of successful conservation.

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Studies, Volume 51. Small tropical and subtropical islands are particularly attuned to the effects of the surrounding ocean and atmosphere. Frequently, these islands are densely populated and rely on the sea for sustenance and economic viability. Oftentimes too, individual island nations do not have the resources to address issues in oceanography and marine meteorology that are central to their future well-being. United Nations agencies, government and non-government organizations, and universities are dimly aware of their role to enhance collaboration between natural scientists and resource managers, particularly for Small Island Developing States (SIDS). Accordingly, a meeting entitled "Small Island Oceanography in Relation to Sustainable Economic Development and Related Coastal Area Management" was held in Martinique, French Antilles, November 8-10, 1993.

The Biodiversity Conservation Handbook is designed to assist state and local policymakers who wish to "think globally and act locally" by developing a state or local biodiversity program. In addition to providing background on biodiversity generally and the importance of such programs at the state and local level, it looks at how science can inform and be incorporated into biodiversity programs, the various legal tools states can use in implementing such programs, and the importance of considering people's social and economic needs in designing biodiversity programs. Last, it examines the steps Pennsylvania has taken to conserve and restore the native biodiversity within its borders.

This book reviews and analyzes the period in the last half century where "the environment" became an issue as important as economic growth to many people; to assess the current situation and begin planning for the challenges that lie ahead. The authors are a distinguished group of individuals who have played important roles in conservation and the development of environmental policy throughout much of the world.

Small island developing states (SIDS) are renowned for the rich biodiversity of their marine and terrestrial ecosystems. However, it is also well known that because of their isolation, fragility, and extreme vulnerability to environmental deterioration, their biodiversity is among the most threatened in the world. Identifying and monitoring all the components of biological diversity is a formidable task. This publication therefore proposes to identify those components of biodiversity that are a resource for humanity, primarily focusing upon the biological resources used by people, whether they are floral and faunal species and their genetic variations, or whole ecosystems. It outlines systems for rapid assessment to monitor the status of crucial resources that are in current use or have potential for future use so that those under threat of depletion can be quickly identified. This will in turn facilitate taking informed policy decisions for biodiversity conservation strategies, generate public awareness of important biodiversity issues and build regional and local scientific capacity in this field. An essential, up-to-date look at the critical interactions between biological diversity and climate change that will serve as an immediate call to action. The physical and biological impacts of climate change are dramatic and broad-ranging. People who care about the planet and manage natural resources urgently need a synthesis of our rapidly growing understanding of these issues.

In this all-new sequel to the 2005 volume *Climate Change and Biodiversity*, leading experts in the field summarize observed changes, assess what the future holds, and offer suggested responses. From extinction risk to ocean acidification, from the future of the Amazon to changes in ecosystem services, and from geoengineering to the power of ecosystem restoration, this book captures the sweep of climate change transformation of the biosphere.

The Ecosystem Approach, defined as a strategy for the management of land, water and living resources that promotes conservation and sustainable use in an equitable way, was adopted at the Second Conference of the Parties of the CBD as the primary framework for action under the Convention. It puts people and their nature resource use practices squarely at the centre of the decision-making framework. The case studies presented here were discussed at three workshops held in Southern Africa, South America and Southeast Asia. They provide practical examples of the Ecosystem Approach as well as a number of recommendations for action that are widely relevant to Parties and other bodies. Species are disappearing from the earth at a rate of hundreds, and perhaps thousands, of times greater than every before witnessed. According to many scientists, this rapid destruction will lead to irreversible changes in the earth's ecosystem. *The Expendable Future* provides a comprehensive and critical evaluation of the politics of biological diversity in the United States and of state and federal policies on endangered species from the early 1960s to the present. Drawing on congressional hearing and debates, previously unpublished public opinion surveys, interviews with state officials and employees of the Department of the Interior, and internal documents from this and other government agencies, Tobin provides an in-depth analysis of the policies on endangered species and the policy relationships among the different units of government involved in implementation. He examines the resources that are available for the protection of endangered species and the way in which those resources are matched to the priorities. Tobin also discusses the processes by which species are classified as endangered, how these species' critical habitats are determined and protected, and the successes, and mostly failures, of current recovery programs.

This book highlights the use of information and communication technology (ICT) infrastructures in order to develop smart cities and produce smart economies in Africa. It discusses a robust set of concepts, including smart planning, smart infrastructure development, smart economic development, smart environmental sustainability, smart social development, resilience, and smart peace and security in several African cities. By drawing on the accumulated knowledge on various conditions that make cities smart, green, livable and healthy, it helps in the planning, design and management of African urbanization. In turn, it fosters the development of e-commerce, e-education, e-governance, etc. The rapid development of ICT infrastructures facilitates the creation of smart economies in digitally served cities and towns through smart urban planning, smart infrastructures, smart land tenure and smart urban policies. In the long term, this

can reduce emissions of CO₂, promote the creation of low carbon cities, reduce land degradation and promote biodiversity.

Humans have changed ecosystems more rapidly and extensively in the last 50 years than in any comparable period of human history. We have done this to meet the growing demands for food, fresh water, timber, fiber, and fuel. While changes to ecosystems have enhanced the well-being of billions of people, they have also caused a substantial and largely irreversible loss in diversity of life on Earth, and have strained the capacity of ecosystems to continue providing critical services. Among the findings: Approximately 60% of the services that support life on Earth are being degraded or used unsustainably. The harmful consequences of this degradation could grow significantly worse in the next 50 years. Only four ecosystem services have been enhanced in the last 50 years: crops, livestock, aquaculture, and the sequestration of carbon. The capacity of ecosystems to neutralize pollutants, protect us from natural disasters, and control the outbreaks of pests and diseases is declining significantly. Terrestrial and freshwater systems are reaching the limits of their ability to absorb nitrogen. Harvesting of fish and other resources from coastal and marine systems is compromising their ability to deliver food in the future. Richly illustrated with maps and graphs, *Current State and Trends* presents an assessment of Earth's ability to provide twenty-four distinct services essential to human well-being. These include food, fiber, and other materials; the regulation of the climate and fresh water systems; underlying support systems such as nutrient cycling; and the fulfillment of cultural, spiritual, and aesthetic values. The volume pays particular attention to the current health of key ecosystems, including inland waters, forests, oceans, croplands, and dryland systems, among others. It will be an indispensable reference for scientists, environmentalists, agency professionals, and students.

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