Chapter 2 Biodiversity Ecosystems And Ecosystem Services

In 2005, The Millennium Ecosystem Assessment (MA) provided the first global assessment of the world's ecosystems and ecosystem services. It concluded that recent trends in ecosystem change threatened human wellbeing due to declining ecosystem services. This bleak prophecy has galvanized conservation organizations, ecologists, and economists to work toward rigorous valuations of ecosystem services at a spatial scale and with a resolution that can inform public policy. The editors have assembled the world's leading scientists in the fields of conservation, policy analysis, and resource economics to provide the most intensive and best technical analyses of ecosystem services to date. A key idea that guides the science is that the modelling and valuation approaches being developed should use data that are readily available around the world. In addition, the book documents a toolbox of ecosystem service mapping, modeling, and valuation models that both The Nature Conservancy and the World Wide Fund for Nature (WWF) are beginning to apply around the world as they transform conservation from a biodiversity only to a people and ecosystem services agenda. The book addresses land, freshwater, and marine systems at a variety of spatial scales and includes discussion of how to treat both climate change and cultural values when examining tradeoffs among ecosystem services.

As the Gulf of Mexico recovers from the Deepwater Horizon oil spill, natural resource managers face the challenge of understanding the impacts of the spill and setting priorities for restoration work. The full value of losses resulting from the spill cannot be captured, however, without consideration of changes in ecosystem services--the benefits delivered to society through natural processes. An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico discusses the benefits and challenges associated with using an ecosystem services approach to damage assessment, describing potential impacts of response technologies, exploring the role of resilience, and offering suggestions for areas of future research. This report illustrates how this approach might be applied to coastal wetlands, fisheries, marine mammals, and the deep sea -- each of which provide key ecosystem services in the Gulf -- and identifies substantial differences among these case studies. The report also discusses the suite of technologies used in the spill response, including burning, skimming, and chemical dispersants, and their possible long-term impacts on ecosystem services.

Ecosystems can be considered as dynamic and interactive clusters made up of plants, animals and micro-organism communities. Inevitably, mankind is an integral part of each ecosystem and as such enjoys all its provided benefits. Driven by the increasing necessity to preserve the ecosystem productivity, several ecological studies have been conducted in the last few years, highlighting the current state in which our planet is, and

focusing on future perspectives. This book contains comprehensive overviews and original studies focused on hazard analysis and evaluation of ecological variables affecting species diversity, richness and distribution, in order to identify the best management strategies to face and solve the conservation problems.

What can ecological science contribute to the sustainable management and conservation of the natural systems that underpin human well-being? Bridging the natural, physical and social sciences, this book shows how ecosystem ecology can inform the ecosystem services approach to environmental management. The authors recognise that ecosystems are rich in linkages between biophysical and social elements that generate powerful intrinsic dynamics. Unlike traditional reductionist approaches, the holistic perspective adopted here is able to explain the increasing range of scientific studies that have highlighted unexpected consequences of human activity, such as the lack of recovery of cod populations on the Grand Banks despite nearly two decades of fishery closures, or the degradation of Australia's fertile land through salt intrusion. Written primarily for researchers and graduate students in ecology and environmental management, it provides an accessible discussion of some of the most important aspects of ecosystem ecology and the potential relationships between them.

The two hundredth anniversary of the birth of Charles Darwin, February 12, 2009, occurred at a critical time for the United States and the world. In honor of Darwin's

birthday, the National Research Council appointed a committee under the auspices of the U.S. National Committee (USNC) for DIVERSITAS to plan a Symposium on Twenty-first Century Ecosystems. The purpose of the symposium was to capture some of the current excitement and recent progress in scientific understanding of ecosystems, from the microbial to the global level, while also highlighting how improved understanding can be applied to important policy issues that have broad biodiversity and ecosystem effects. The aim was to help inform new policy approaches that could satisfy human needs while also maintaining the integrity of the goods and services provided by biodiversity and ecosystems over both the short and the long terms. This report summarizes the views expressed by symposium participants; however, it does not provide a session-by-session summary of the presentations at the symposium. Instead, the symposium steering committee identified eight key themes that emerged from the lectures, which were addressed in different contexts by different speakers. The focus here is on general principles rather than specifics. These eight themes provide a sharp focus on a few concepts that enable scientists, environmental NGOs, and policy makers to engage more effectively around issues of central importance for biodiversity and ecosystem management.

Conservation Biology for All provides cutting-edge but basic conservation science to a global readership. A series of authoritative chapters have been written by the top names in conservation biology with the principal aim of disseminating cutting-edge

conservation knowledge as widely as possible. Important topics such as balancing conversion and human needs, climate change, conservation planning, designing and analyzing conservation research, ecosystem services, endangered species management, extinctions, fire, habitat loss, and invasive species are covered. Numerous textboxes describing additional relevant material or case studies are also included. The global biodiversity crisis is now unstoppable; what can be saved in the developing world will require an educated constituency in both the developing and developed world. Habitat loss is particularly acute in developing countries, which is of special concern because it tends to be these locations where the greatest species diversity and richest centres of endemism are to be found. Sadly, developing world conservation scientists have found it difficult to access an authoritative textbook, which is particularly ironic since it is these countries where the potential benefits of knowledge application are greatest. There is now an urgent need to educate the next generation of scientists in developing countries, so that they are in a better position to protect their natural resources.

Advances in Ecological Research is one of the most successful series in the highly competitive field of ecology. Each volume publishes topical and important reviews, interpreting ecology as widely as in the past, to include all material that contributes to our understanding of the field. Topics in this invaluable series include the physiology, populations, and communities of plants and animals, as well as landscape and

ecosystem ecology. Presents the most updated information on the field of ecology, publishing topical and important reviews Provides all information that relates to a thorough understanding of the field Includes data on physiology, populations, and communities of plants and animals New ideas on ES Integrative approach working across a variety of levels of biological organization and spatial and temporal scales Diversity of relevant subjects covered

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Urbanization is a global phenomenon and the book emphasizes that this is not just a social-technological process. It is also a social-ecological process where cities are places for nature, and where cities also are dependent on, and have impacts on, the biosphere at different scales from local to global. The book is a global assessment and delivers four main conclusions: Urban areas are expanding faster than urban populations. Half the increase in urban land across the world over the next 20 years will occur in Asia, with the most extensive change expected to take place in India and

China Urban areas modify their local and regional climate through the urban heat island effect and by altering precipitation patterns, which together will have significant impacts on net primary production, ecosystem health, and biodiversity Urban expansion will heavily draw on natural resources, including water, on a global scale, and will often consume prime agricultural land, with knock-on effects on biodiversity and ecosystem services elsewhere Future urban expansion will often occur in areas where the capacity for formal governance is restricted, which will constrain the protection of biodiversity and management of ecosystem services

The idea that nature provides services to people is one of the most powerful concepts to have emerged over the last two decades. It is shaping our understanding of the role that biodiverse ecosystems play in the environment and their benefits for humankind. As a result, there is a growing interest in operational and methodological issues surrounding ecosystem services amongst environmental managers, and many institutions are now developing teaching programmes to equip the next generation with the skills needed to apply the concepts more effectively. This handbook provides a comprehensive reference text on ecosystem services, integrating natural and social science (including economics). Collectively the chapters, written by the world's leading authorities, demonstrate the importance of biodiversity for people, policy and practice. They also show how the value of ecosystems to society can be expressed in monetary and non-monetary terms, so that the environment can be better taken into account in

decision making. The significance of the ecosystem service paradigm is that it helps us redefine and better communicate the relationships between people and nature. It is shown how these are essential to resolving challenges such as sustainable development and poverty reduction, and the creation of a green economy in developing and developed world contexts.

Climate change is occurring, is caused largely by human activities, and poses significant risks for--and in many cases is already affecting--a broad range of human and natural systems. The compelling case for these conclusions is provided in Advancing the Science of Climate Change, part of a congressionally requested suite of studies known as America's Climate Choices. While noting that there is always more to learn and that the scientific process is never closed, the book shows that hypotheses about climate change are supported by multiple lines of evidence and have stood firm in the face of serious debate and careful evaluation of alternative explanations. As decision makers respond to these risks, the nation's scientific enterprise can contribute through research that improves understanding of the causes and consequences of climate change and also is useful to decision makers at the local, regional, national, and international levels. The book identifies decisions being made in 12 sectors, ranging from agriculture to transportation, to identify decisions being made in response to climate change. Advancing the Science of Climate Change calls for a single federal entity or program to coordinate a national, multidisciplinary research effort aimed at

improving both understanding and responses to climate change. Seven cross-cutting research themes are identified to support this scientific enterprise. In addition, leaders of federal climate research should redouble efforts to deploy a comprehensive climate observing system, improve climate models and other analytical tools, invest in human capital, and improve linkages between research and decisions by forming partnerships with action-oriented programs.

Natural resources are those gift which are directly from nature. India presents nature in all its splendour. Diversity in physical and climatic condition result in wide range of natural vegetation in different region. In their turn these provide habitat for different species of animals and birds, while rain forests are found in the Andaman, Cactus are found in the Thar desert. Similarly there are alpine forests in the Himalayas while mangroves are grown in the saline soil of Andamans. Since the beginning of our civilisation the varied natural features with its flora and fauna have influenced the life and tradition of world and enriched their natural resources. It is always believed in the interrelationship among nature, environment and people. Therefore, the efforts for conservation of biodiversity and natural resources should be in tune with the processes and its occurrence in space and time from micro level to mega level. The present book is based on numerous materials, reports, and authors own extensive surveys and researchers of the nation. The book will be welcomed by all taxonomists, foresters, environmentalists and other decision makers. Contents Chapter 1: Introduction;

Chapter 2: Importance of Biodiversity; Chapter 3: Ecosystems, Environment and Biodiversity; Chapter 4: Extintion of Species and Loss; Chapter 5: Conservation of Biodiversity; Chapter 6: General Aspects of Biodiversity; Chapter 7: Action Plant for National Biodiversity Strategy; Chapter 8: Gene Bank Conservation; Chapter 9: Information on Hot Spot; Chapter 10: Social Biota for Biodiversity; Chapter 11: Biodiversity and Neotropical Primates; Chapter 12: Biodiversity Loss and Threat; Chapter 13: Biodiversity in Farming; Chapter 14: Nature and Natural Resources Conservation; Chapter 15: Plant Protection International Convention; Chapter 16: Biological Diversity Convention; Chapter 17: Natural Biological Capital of the Earth; Chapter 18: Conservation of Biodiversity in Indian Scenario; Chapter 19: Conservation Biodiversity in Future Strategies for India; Chapter 20: Management of Wildland Biodiversity; Chapter 21: Biodiversity Issues Impact on Diversity; Chapter 22: Systematics and Biodiversity; Chapter 23: Biodiversity for Tropical Region; Chapter 24: Plant Species Richness and Global Warming; Chapter 25: Diversity in Community; Chapter 26: Bioresources Protection; Chapter 27: Diversity in Ecosystem; Chapter 28: Systems for Renewable Energy; Chapter 29: Environmental Monitoring (Bioindicators); Chapter 30: Environmental Priorities in India; Chapter 31: Environmental Organisations and Agencies.

This volume provides an enlightening and pragmatic approach to preserving biological diversity by gathering a wide range of peer-reviewed scientific content from biodiversity

researchers and conservators from around the world. It brings comprehensive knowledge and information on the present status of conservation of biological diversity including floral, faunal, and microbial diversity. A detailed account of recent trends in conservation and applications under changing climate conditions, focusing mainly on agriculturally and industrially important microbes and their sustainable utilization, is presented as well. Over the past five decades, extensive research work has been done on many aspects of biodiversity conservation and sustainable utilization of biological resources. This book examines this crucial issue. Chapters discuss biodiversity concepts, benefits, and values for economic and sustainable development; explores applications and strategies for biodiversity preservation; and considers the role of biodiversity conservation in public awareness services and cultural significance. The volume also examines the process of evolution and the future of biodiversity in conjunction with climate change factors, with special reference to infectious diseases. An ecosystem services (ES) approach seems to entail two different, but intertwined, mechanisms: (1) the adoption of the conceptual framework of ES, as a particular (instrumental) angle from which to analyze the linkages between people and the environment; and (2) the experimentation with a set of ES (e)valuation tools and instruments in order to reduce complexities through the adoption of economic/monetary values wherever suitable. This chapter explores both mechanisms—with respect to the conceptualization and to the valuation of ES—at the level of Belgian environmental

policy making.

Biodiversity is under global threat and available evidence suggests that we are headed towards another mass extinction. There exists a need for tools to assess and protect biodiversity because each level of biodiversity, from genes to ecosystems, requires a unique set of tools to solve challenges in biodiversity conservation. The goal of the work herein provides technical advances for assessing genetic biodiversity for a species of endangered fairy shrimp, Branchinecta lynchi (Chapter 1), application of a universal genetic tool to assess taxa diversity of communities of alpine benthic macroinvertebrates (Chapter 2), and an assessment of a novel law that is used in the state of California to ensure protection of biodiversity (Chapter 3). Each chapter increases our knowledge of tools that can be used to assess and protect biodiversity in unique ways and in total spans all levels of biodiversity.Chapter one describes eight novel microsatellite markers for the vernal pool fairy shrimp, Branchinecta lynchi, which has been extirpated from 90% of its range. These genetic loci were developed for the purpose of evaluating genetic diversity and population structure of remaining populations, as well as providing a new tool for assisting in the delineation of management areas that will hopefully aid in their conservation and recovery. These markers can also be used for the study of their evolution and a few loci are potentially useful in other Branchinecta species.Chapter two evaluates a process that is often taken for granted as being something that is easily done. Namely, in many community

ecological studies the goal is to produce a species list from a sample of individuals. In this study we compared a newer method by which individuals can be identified (i.e., genetic barcode identification) to the use of established morphological tools and estimated taxonomic resolution gained by a combined use of both methods. We further tested whether a change in taxonomic resolution significantly altered richness estimates for benthic macroinvertebrates sampled from ten lakes in Sequoia National Park, USA. Across all lakes, 81 unique taxa were identified and 42% (34) were reliably identified to species using both barcode and morphological identification. Of the 34 taxa identified to species with both methods of identification, 70% (25) were identified using only their barcodes. The increased resolution of 28%, on average per lake sampled, resulted in a significant difference in estimated richness within a lake at the order, family, genus, and species levels of taxonomy, and suggests that if only morphology is used to create species lists for benthic macroinvertebrates we are potentially underestimating richness. Our results demonstrate that a combined identification approach improves accuracy of benthic macroinvertebrate species lists in alpine lakes and subsequent estimates of richness.Chapter three moves from development and use of genetic tools to evaluate biodiversity to a social construct for how to protect biodiversity. In this chapter we evaluated socioeconomic and political barriers to plan implementation for conservation plans under the Natural Community Conservation Planning (NCCP) Act of California. The NCCP Act is a proactive approach to resolve an important challenge in

conservation: achieving protection of biodiversity in the face of human economic growth and development. We evaluated conservation plans that included over 300 species and the potential protection of nearly seven million acres of habitat and assessed potential barriers in the planning process that may impede implementation. Data pertaining to socioeconomic and ecological characteristics in planning areas was aggregated and then used to characterize plans at different stages (e.g., implemented or abandoned). Second, we evaluated stakeholder involvement used for the planning process. Lastly, we surveyed county and city elected officials from California to assess their opinions regarding the trade-off between conservation and economic development and the value of NCCPs to resolve this trade-off. We found that implemented plans were characterized by higher population density and human development index, lower median housing value, higher number of community types included in plans, and higher average involvement of stakeholders when compared to abandoned plans. Politicians from the regions where NCCPs are implemented were more likely to think that NCCPs are an effective tool for conservation of California's native biodiversity when compared to politicians from places where planning for an NCCP has been abandoned. The methodology used to assess the planning process of the NCCP program, as well as the findings, will inform future NCCP program efforts and can be a model for how to assess other planning efforts in conservation management.

In this volume of the TEEB (The Economics of Ecosystems and Biodiversity)

publication series, the key concepts of the project are applied to local and regional policy and public management. The aim is to show that by taking nature's benefits into account, decision makers can promote local development to ensure human well-being and economic growth and stability, while maintaining environmental sustainability. The book explores the potential for local development provided by an approach based on nature. It offers examples of successful implementation of this approach from across the world, highlighting the importance of local decision making in management and planning. It provides tools and practical guidance for reform, and throughout the volume the economic benefits of environmental consideration at a local level are expounded. This book is intended to offer inspiration and practical suggestions for the improvement and sustainable management of the environment and human well-being. The local aspect of this book complements the focus of the previous three volumes, completing the set to provide a comprehensive approach to simultaneously improving and maintaining economic and environmental stability, as well as human well-being.

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.

The world’s oceans cover 70% of the earth’s surface and are home to a myriad of amazing and beautiful creatures. However, the biodiversity of the oceans is incre- ingly coming under serious threat from many human activities including overfi- ing, use of destructive fishing methods, pollution and commercial aquaculture. In addition, climate change is already having an impact on some marine ecosystems. This book discusses some of the major threats facing marine ecosystems by cons- ering a range of topics, under chapters discussing biodiversity (Chapter 1), fisheries (Chapter 2), aquaculture (Chapter 3), pollution (Chapter 4) and the impacts of increasing greenhouse gas emissions (Chapter 5). It goes on to explore solutions to

the problems by discussing equitable and sustainable management of the oceans (Chapter 6) and protecting marine ecosystems using marine reserves (Chapter 7). Presently, 76% of the oceans are fully or over-exploited with respect to fishing, and many species have been severely depleted. It is abundantly clear that, in general, current fisheries management regimes are to blame for much of the widespread degradation of the oceans. Many policy-makers and scientists now agree that we must adopt a radical new approach to managing the seas – one that is precautionary in nature and has protection of the whole marine ecosystem as its primary objective. This 'ecosystem-based approach' is vital if we are to ensure the health of our oceans for future generations.

Marine ecosystems are ecosystems found in the oceans and seas. This book on marine ecosystems studies new research trends with regard to this field. The marine ecosystem is the largest ecosystem of the planet and can be sub-classified into rocky shores, submarine canyons, cold seeps, etc. Research and study into the composition of ecosystems and their processes plays a key role in conservation and in upholding biodiversity on Earth. With state-of-the-art inputs by acclaimed experts of this field, this book targets students and professionals. For someone with an interest and eye for detail, this book covers the most significant topics in the field of marine ecosystems.

This multi-contributor, international volume synthesizes contributions from the world's leading soil scientists and ecologists, describing cutting-edge research that provides a basis for the maintenance of soil health and sustainability. The book covers these advances from a unique perspective of examining the ecosystem services produced by soil biota across different scales - from biotic interactions at microscales to communities functioning at regional and global

scales. The book leads the user towards an understanding of how the sustainability of soils, biodiversity, and ecosystem services can be maintained and how humans, other animals, and ecosystems are dependent on living soils and ecosystem services. This is a valuable reference book for academic libraries and professional ecologists worldwide as a statement of progress in the broad field of soil ecology. It will also be of interest to both upper level undergraduate and graduate students taking courses in soil ecology, as well as academic researchers and professionals in the field requiring an authoritative, balanced, and up-to-date overview of this fast expanding topic.

The utilization of natural resources to satisfy worldwide growing consumption of goods and services has severe ecological consequences. Aside from the projected doubling of food consumption in the next fifty years, the growing trade of biofuels and other commodities is a global challenge as the economic activities in the primary sector (i.e. mining, fisheries, aquaculture, forestry and agriculture) can damage biodiversity and ecosystem services. This should be taken into account in the decision-making affecting the global value chains linking consumer, retailer, processor, and producer in the North and the South. To cover the topic of ecosystem services and global trade this book is organized into four major parts. Part 1 gives the theoretical framework from an ecological, economic and political perspectives. Part 2 explores how internationally traded biophysical commodities from agriculture, forestry and fisheries translates into a virtual flow of land, freshwater, and marine ecosystems. Part 3 describes how two widely used accounting tools (i.e., Life Cycle Assessment and Green National Accounts) deal with international aspects of ecosystem services, and Part 4 shows how instruments like labelling, bans, or payments for ecosystem services in the private and

public sector can influence trade patterns and the management of ecosystem services. This collection is a valuable contribution to the global change science dealing with ecosystem services. It illustrates the consequences of international trade on global ecosystem services and provides an overview of accounting tools and of market-based policy instruments to address negative and positive externalities. The book is certainly innovative, because it brings together research findings from distinct disciplines especially Industrial Ecology and Ecosystem Sciences, as well as Environmental Economics and Political Science.

This book is a product of the TEEB study (The Economics of Ecosystems and Biodiversity). It provides important evidence of growing corporate concern about biodiversity loss and offers examples of how leading companies are taking action to conserve biodiversity and to restore ecosystems. This book reviews indicators and drivers of biodiversity loss and ecosystem decline, and shows how these present both risks and opportunities to all businesses. It examines the changing preferences of consumers for nature-friendly products and services, and offers examples of how companies are responding. The book also describes recent initiatives to enable businesses to measure, value and report their impacts and dependencies on biodiversity and ecosystem services. The authors review a range of practical tools to manage biodiversity risks in business, with examples of how companies are using these tools to reduce costs, protect their brands and deliver real business value. The book also explores the emergence of new business models that deliver biodiversity benefits and ecosystem services on a commercial basis, the policy enabling frameworks needed to stimulate investment and entrepreneurship to realize such opportunities, and the obstacles that must be overcome. The book further examines how businesses can align their actions in relation to

biodiversity and ecosystem services with other corporate responsibility initiatives, including community engagement and poverty reduction. Finally, the book concludes with a summary and recommendations for action.

Environmental DNA (eDNA) refers to DNA that can be extracted from environmental samples (such as soil, water, feces, or air) without the prior isolation of any target organism. The analysis of environmental DNA has the potential of providing high-throughput information on taxa and functional genes in a given environment, and is easily amenable to the study of both aquatic and terrestrial ecosystems. It can provide an understanding of past or present biological communities as well as their trophic relationships, and can thus offer useful insights into ecosystem functioning. There is now a rapidly-growing interest amongst biologists in applying analysis of environmental DNA to their own research. However, good practices and protocols dealing with environmental DNA are currently widely dispersed across numerous papers, with many of them presenting only preliminary results and using a diversity of methods. In this context, the principal objective of this practical handbook is to provide biologists (both students and researchers) with the scientific background necessary to assist with the understanding and implementation of best practices and analyses based on environmental DNA.

The Princeton Guide to Ecology is a concise, authoritative one-volume reference to the field's major subjects and key concepts. Edited by eminent ecologist Simon Levin, with contributions from an international team of leading ecologists, the book contains more than ninety clear, accurate, and up-to-date articles on the most important topics within seven major areas: autecology, population ecology, communities and ecosystems, landscapes and the biosphere,

conservation biology, ecosystem services, and biosphere management. Complete with more than 200 illustrations (including sixteen pages in color), a glossary of key terms, a chronology of milestones in the field, suggestions for further reading on each topic, and an index, this is an essential volume for undergraduate and graduate students, research ecologists, scientists in related fields, policymakers, and anyone else with a serious interest in ecology. Explains key topics in one concise and authoritative volume Features more than ninety articles written by an international team of leading ecologists Contains more than 200 illustrations, including sixteen pages in color Includes glossary, chronology, suggestions for further reading, and index Covers autecology, population ecology, communities and ecosystems, landscapes and the biosphere, conservation biology, ecosystem services, and biosphere management

Resource-management decisions, especially in the area of protecting and maintaining biodiversity, are usually incremental, limited in time by the ability to forecast conditions and human needs, and the result of tradeoffs between conservation and other management goals. The individual decisions may not have a major effect but can have a cumulative major effect. Perspectives on Biodiversity reviews current understanding of the value of biodiversity and the methods that are useful in assessing that value in particular circumstances. It recommends and details a list of components-including diversity of species, genetic variability within and among species, distribution of species across the ecosystem, the aesthetic satisfaction derived from diversity, and the duty to preserve and protect biodiversity. The book also recommends that more information about the role of biodiversity in sustaining natural resources be gathered and

summarized in ways useful to managers. Acknowledging that decisions about biodiversity are necessarily qualitative and change over time because of the nonmarket nature of so many of the values, the committee recommends periodic reviews of management decisions.

Biodiversity in Drylands, the first internationally based synthesis volume in the Long-Term Ecological Research (LTER) Network Series, unifies the concepts of species and landscape diversity with respect to deserts. Within this framework, the book treats several emerging themes, among them: · how animal biodiversity can be supported in deserts · diversity's relation to habitat structure, environmental variability, and species interactions · the relation between spatial scale and diversity · how to use a landscape simulation model to understand diversity · microbial contributions to biodiversity in deserts · species diversity and ecosystem processes · resource partitioning and biodiversity in fractal environments · effects of grazing on biodiversity · reconciliation ecology and the future of conservation management In the face of global change, integration is crucial for dealing with the problem of sustaining biodiversity. This book promises to be a vital resource for students, researchers, and managers interested in integrative species, resource, and landscape diversities.

This comprehensive volume describes how ecosystem services-based approaches can assist in addressing major global and regional water challenges, such as climate change, biodiversity loss, and water security in the developing world, by integrating

scientific knowledge from different disciplines, such as hydrological modelling, environmental economics, psychology and international law. Empirical assessments at the national, catchment and regional levels are used to critically appraise this systemic approach, and the merits and potential limitations are presented. The practicalities of this approach with regard to water resources management, nature conservation, and sustainable business practices are discussed, and the role of society in underpinning the concept of ecosystem services is explored. Presenting new insights and perspectives on how to shape future strategies, this contributory volume is a valuable reference for researchers, academics, students and policy makers, in environmental studies, hydrology, water resource management, ecology, environmental law, policy and economics, and conservation biology.

This classic by the distinguished Harvard entomologist tells how life on earth evolved and became diverse, and now, how diversity and life are endangered by us, truly. While Wilson contributed a great deal to environmental ethics by calling for the preservation of whole ecosystems rather than individual species, his environmentalism appears too anthropocentric: "We should judge every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity." And: "Signals abound that the loss of life's diversity endangers not just the body but the spirit." This reprint of the 1992 Belknap Press publication contains a new foreword. Annotation copyrighted by Book News, Inc., Portland, OR

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.

This book comprehensively addresses the economic, social and institutional difficulties in conserving biodiversity and the ecosystem services that it provides. It covers a wide range of issues such as biodiversity, ecosystem services and valuation in the context of diverse ecosystems such as tropical forests, marine areas, wetlands and agricultural landscapes, non-timber forest products, incentives and institutions, payments for ecosystem services, governance, intellectual property rights and the protection of traditional knowledge, management of protected areas, and climate change and biodiversity. It also covers the application of environmental economics and institutional economics to different cases and the use of techniques such as contingent valuation method and game theory. The book spans the globe with case studies drawn from a cross section of regions and continents including the UK, US, Europe, Australia, India,

Africa and South America.

This fully revised and expanded edition of Fundamentals of Soil Ecology continues its holistic approach to soil biology and ecosystem function. Students and ecosystem researchers will gain a greater understanding of the central roles that soils play in ecosystem development and function. The authors emphasize the increasing importance of soils as the organizing center for all terrestrial ecosystems and provide an overview of theory and practice of soil ecology, both from an ecosystem and evolutionary biology point of view. This volume contains updated and greatly expanded coverage of all belowground biota (roots, microbes and fauna) and methods to identify and determine its distribution and abundance. New chapters are provided on soil biodiversity and its relationship to ecosystem processes, suggested laboratory and field methods to measure biota and their activities in ecosystems.. Contains over 60% new material and 150 more pages Includes new chapters on soil biodiversity and its relationship to ecosystem function Outlines suggested laboratory and field methods Incorporates new pedagogical features Combines theoretical and practical approaches The book starts by summarizing the development of the basic science and provides a meta-analysis that quantitatively tests several biodiversity and ecosystem functioning hypotheses.

Following the much acclaimed success of the first volume ofKey Topics in Conservation Biology, this entirely new secondvolume addresses an innovative array of key topics in

contemporaryconservation biology. Written by an internationally renownedteam of authors, Key Topics in Conservation Biology 2 addsto the still topical foundations laid in the first volume(published in 2007) by exploring a further 25 cutting-edge issuesin modern biodiversity conservation, including controversialsubjects such as setting conservation priorities, balancing thefocus on species and ecosystems, and financial mechanisms to valuebiodiversity and pay for its conservation. Other chapters, settingthe framework for conservation, address the sociology andphilosophy of peoples' relation with Nature and its impact onhealth, and such challenging practical issues as wildlife trade andconflict between people and carnivores. As a new development, thissecond volume of Key Topics includes chapters on major ecosystems,such as forests, islands and both fresh and marine waters, alongwith case studies of the conservation of major taxa: plants,butterflies, birds and mammals. A further selection of topicsconsider how to safeguard the future through monitoring, reserveplanning, corridors and connectivity, together with approaches toreintroduction and re-wilding, along with managing wildlifedisease. A final chapter, by the editors, synthesises thinking onthe relationship between biodiversity conservation and humandevelopment. Each topic is explored by a team of top international experts,assembled to bring their own cross-cutting knowledge to apenetrating synthesis of the issues from both theoretical andpractical perspectives. The interdisciplinary nature of biodiversity conservation isreflected throughout the book. Each essay examines the fundamentalprinciples of the topic, the methodologies involved and, crucially,the human dimension. In this way, Key Topics in ConservationBiology 2, like its sister volume, Key Topics in ConservationBiology, embraces issues from cutting-edge ecological scienceto policy, environmental economics, governance, ethics, and thepractical issues of implementation. Key

Topics in Conservation Biology 2 will, like itssister volume, be a valuable resource in universities and colleges,government departments, and conservation agencies. It is aimedparticularly at senior undergraduate and graduate students inconservation biology and wildlife management and wider ecologicaland environmental subjects, and those taking Masters degrees in anyfield relevant to conservation and the environment. Conservationpractitioners, policy-makers, and the wider general public eager tounderstand more about important environmental issues will also findthis book invaluable.

Human well-being relies critically on ecosystem services provided by nature. Examples include water and air quality regulation, nutrient cycling and decomposition, plant pollination and flood control, all of which are dependent on biodiversity. They are predominantly public goods with limited or no markets and do not command any price in the conventional economic system, so their loss is often not detected and continues unaddressed and unabated. This in turn not only impacts human well-being, but also seriously undermines the sustainability of the economic system. It is against this background that TEEB: The Economics of Ecosystems and Biodiversity project was set up in 2007 and led by the United Nations Environment Programme to provide a comprehensive global assessment of economic aspects of these issues. This book, written by a team of international experts, represents the scientific state of the art, providing a comprehensive assessment of the fundamental ecological and economic principles of measuring and valuing ecosystem services and biodiversity, and showing how these can be mainstreamed into public policies. This volume and subsequent TEEB outputs will provide the authoritative knowledge and guidance to drive forward the biodiversity conservation agenda for the next decade.

Biodiversity is usually explored at three levels which work together to create the complexity of life on our planet ¿ genetic diversity, species diversity and ecosystem diversity. It is estimated that there are 13.6 million species of plants, animals and micro-organisms on Earth. Australia has about one million of these ¿ over 7% of the world's total and more than twice the number of species in Europe and North America combined. As a developed nation, Australia has a special responsibility for biodiversity conservation and management. Of global concern are the environmental threats of loss of habitat and loss of species caused by greenhouse pollution, climate change, extinction and overpopulation. Current biodiversity conservation practice clearly acknowledges that it is far more efficient to conserve whole ecosystems which encompass biodiversity at all levels, rather than focus on a few highly visible and popular species in isolation. What are the features of Australia's biodiversity and what are we currently doing to conserve it for future generations? Can we achieve ecological sustainability?Chapter 1: Understanding BiodiversityChapter 2: Biodiversity ConservationGlossary; Facts and Figures; Additional Resources; Index

This report describes the status and trends of biodiversity and ecosystem services in the Nordic region, the drivers and pressures affecting them, interactions and effects on people and society, and options for governance. The main report consists of two volumes. Volume 1 The general overview (this report) and Volume 2 The geographical case studies. This study has been inspired by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services (IPBES). It departs from case studies (Volume 2, the geographical case studies) from ten geographical areas in the Nordic countries (Denmark, Finland, Iceland, Norway, Sweden) and the autonomous areas of Faroe Islands, Greenland, and Åland. The aim

was to describe status and trends of biodiversity and ecosystem services in the Nordic region, including the drivers and pressures affecting these ecosystems, the effects on people and society and options for governance. The Nordic study is structured as closely as possible to the framework for the regional assessments currently being finalized within IPBES. The report highlights environmental differences and similarities in the Nordic coastal areas, like the inhabitants´ relation to nature and the environment as well as similarities in social and policy instruments between the Nordic countries. This study provides background material for decision-making and it is shown that Nordic cooperation is of great importance for sustainable coastal management and should be strengthened in future work.

"The new book Mapping Ecosystem Services provides a comprehensive collection of theories, methods and practical applications of ecosystem services (ES) mapping, for the first time bringing together valuable knowledge and techniques from leading international experts in the field." (www.eurekalert.org).

The term biodiversity has become a mainstream concept that can be found in any newspaper at any given time. Concerns on biodiversity protection are usually linked to species protection and extinction risks for iconic species, such as whales, pandas and so on. However, conserving biodiversity has much deeper implications than preserving a few (although important) species. Biodiversity in ecosystems is tightly linked to ecosystem functions such as biomass production, organic matter decomposition, ecosystem resilience, and others. Many of these ecological processes are also directly implied in services that the humankind obtains from ecosystems. The first part of this book will introduce different concepts and theories important to understand the links between ecosystem function and ecosystem biodiversity. The

second part of the book provides a wide range of different studies showcasing the evidence and practical implications of such relationships.