Planning, Science, and Traditional Knowledge to Save Our Seas

Environmental Planning for Oceans and Coasts: Methods, Tools, and Technologies. Portman, M. E. 2016. Springer International Publishing, Cham, Switzerland. 247 pp. US$137.00 (hardcover). ISBN 978-3-319-26971-9.

Sustaining Wildlands: Integrating Science and Community in Prince William Sound. Poe, A. J., and R. Gimblett, editors. 2017. University of Arizona Press, Tucson, AZ, U.S.A. 392 pp. US$65.00 (hardcover). ISBN 978-0-81653760-0.

Sustainable development is "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). The rapid changes of today are driven not only by natural processes, but also by an exponential growth of human population and exploding industrialization. Despite the advances in technologies of food production and the development of artificial materials, we still largely rely on natural resources and ecosystem services for our livelihoods. A growing range of anthropogenic impacts on wild territories together with climatic changes put more pressure and responsibility on policy makers, environmental managers, and planners who have to ensure the sustainability of natural resources. Both *Environmental Planning for Oceans and Coasts* and *Sustaining Wildlands* address issues related to challenging questions that environmental managers have to face in their work. The particular focus is on coastal and marine ecosystems.

Portman emphasizes the role of planning as opposed to that of science or management. Her book provides comprehensive background information, definitions of terms, and descriptions of methodological approaches. She introduces the reader to the major concepts in environmental planning and discusses the main conventions, agents, and institutions involved in this process at all levels and stages. She believes the primary task of marine environmental planners is to preserve and protect finite sea resources and the fragile balance of marine systems. This is particularly challenging today in the face of uncontrolled and often unexpected manifestations of climate-related changes aggravated by intensive development and growth of resource consumption. Each chapter starts with an abstract and ends with a useful summary, making the content well structured and easy to master. The book provides a thorough introduction to integrated approaches to ocean and coastal management; encourages recognition of the need for coordinated management and to involve a wide range of stakeholders in the decision-making process; and acknowledges ecosystem-based management as a foundation for marine spatial planning and, sustainable development of the entire system.

Sustaining Wildlands: Integrating Science and Community in Prince William Sound is, in a way, a tribute to the union of science, traditional knowledge, responsible nature users, and fact-based management in the restoration of a true pearl of northern nature, Prince William Sound, which was severely damaged by the *Exxon Valdez* oil spill in 1989.

After the accident, people witnessed a cultural and natural paradox. Instead of driving people away from the area, the oil-tanker accident attracted more tourists than ever to the sound, resulting in are vitalization of the local economy on the one hand and increased access to the wilderness on the other hand. Now, apart from the need to mitigate the environmental consequences of the accident, managing authorities have to deal with the effects of increased recreational use on wildlife within the sound and associated risks to local communities.

This book is built on over 30 years of work studying human–landscape interactions in Prince William Sound. The individual chapters are written by 28 managers and scientists involved in studying various aspects of the sound. Each piece of scientific and practical knowledge provided underscores the difficulties of managing this region sustainably. The authors are convinced that removing communication barriers between managers and stakeholders is an essential step toward sustainable recreational management. With this book, they hope to help the reader appreciate the challenges of applying science to the management of human use of wildlife.

Apart from the scientific and technical chapters, the book also presents essays based on the personal experiences of people inhabiting the region. After reading these essays, I felt as if I had traveled Prince William Sound myself and become familiar with dozens of its picturesque landscapes and exciting travel routes. The essence of local and traditional knowledge being passed from generation to generation and from one social group to another and now imprinted on these pages gives the book a very special charm; readers will care about the topics being discussed and become aware of the problems still to be solved.

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At a first glance, both books seem oriented toward a rather narrow audience (managers, spatial planners, and students studying environmental sciences). However, these books have a much broader appeal and will be useful for professional scientists and the broader public looking to expand their understanding of social and ecological processes around them, living on the coasts, harvesting natural resources for their livelihoods, or enjoying intangible ecosystem services.

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The General and the Specific of Ecosystem Services

Routledge Handbook of Ecosystem Services. Potschin, M., R. Haines-Young, R. Fish, and R.K. Turner, editors. 2016. Routledge, New York, U.S.A. 630 pp. US$240.00 (hardcover). ISBN 978-1-138-02508-0.

Water Ecosystem Services – a Global Perspective. Martin-Ortega, J., R.C. Ferrier, I.J. Gordon, and S. Khan, editors. 2015. Cambridge University Press, Cambridge, United Kingdom. 175 pp. £35. ISBN 978-1-107-10037-4.

From a concept used in ecology, conservation science, and environmental economics, ecosystem services (ES) have developed into a booming research field in just a few years, which is indicated by the growing list of conferences and emerging international organizations and journals (e.g., *Ecosystem Services* and *International Journal of Biodiversity Science, Ecosystem Services & Management*) dedicated to the topic. The concept of ES may offer several benefits for nature conservation. Preferences and motivations of stakeholders drive their land-use decisions, which can be regarded as demands for certain ES. Introducing ES language can create a common platform to help uncover the causes of land-use conflicts and find optimal solutions to them. In some cases, monetary valuation of ES may help communicate the value of nature to decision makers. A number of dedicated funding sources have been launched that allow ES research to help answer so-called traditional conservation science questions. The concept's integrated nature, that it is rooted in natural and social science, has led to a wide range of ES research methods. The overview of these methods is a serious task for experts as is choosing the best method in any specific assessment case. The popularity of the concept has rapidly increased the application of its methods and large-scale projects exploring new targets and spatial extents of ES assessments. One such project, the MAES (Mapping and Assessment of Ecosystems and Their Services) process of the European Union, provides the framework for national-level ES mapping and assessment of EU Member States. Such innovative applications usually have little methodological guidance, so assessors have to make choices from a range of methods based on their aims, characteristics of the area, and available data. This is why this handbook, which is written by leading experts on the topic, is extremely important and clearly fills a gap in ES science.

The book's 4 thematic parts and conclusion section provide a comprehensive and thorough overview of ES theory and practice. Part 1 reviews the conceptual basis of ES. The first, introductory chapter is by R. Costanza, the lead author of the most influential publication on ES science to date (Costanza et al. 1997). This chapter is followed by an overview of the most important conceptual ideas in current ES science by 2 of the book's editors, Marion Potschin and Roy Haines-Young. Further chapters in part 1 unravel some of these ideas in more detail, such as ecosystem structures and processes, social-ecological concepts, ES valuation and economics, and the relationship between ES and biodiversity. The first part closes with thoughts on perspectives that critically examine the ES concept.

Part 2 guides the reader from concept to application with an overview of frameworks, indicators, models, tools, and methods for mapping and assessment of ES. Some interesting approaches to ES operationalization are detailed, for example, the balance-sheet approach to adaptive management, stakeholder participation, integration of ES in environmental economics and business operation, and ES valuation, including beneficiary preferences and deliberative and nonmonetary valuation. This part of the book also contains 2 chapters with especially integrative and progressive ideas. One chapter presents frameworks for ecosystem assessments, and the other describes the possibilities of future thinking to support them. This part of the book ends with Gretchen Daily's visionary thoughts on some aspects of ES research.

In part 3, the authors introduce the 3 main sections of ES (provisioning, regulating, and cultural services) and their global importance. This is followed by a review of the primary ecosystem types (including natural, urban, and cultivated ecosystems), their status, and the most important ES provided by each. Finally, in part 4, questions of policy and human well-being are discussed in light of their relations to ES. General perspectives, opportunities, and risks of policy and ES integration are introduced first, and separate chapters deal with some topics in more detail, such as climate change, food and water security, poverty and health, the business sector, spatial and landscape planning, and maximizing

biodiversity and ES in conservation decision making. This part ends with a general review of institutional aspects and a summarizing chapter with some outlook thoughts on the ES concept. The conclusions section of the handbook focuses on sustainability and continuation of ES as well as the concept's future.

Besides filling a gap in ES science, an important value of the book is that it meets perfectly the general expectations a reader has of a handbook. A number of concise chapters structured into thematic sections cover the topic's entire spectrum, including aspects of natural and social science as well as theory and practice. Despite the large number of authors, the book is very coherent and understandable for experts seeking new approaches and for readers just familiarizing themselves with the topic. Several review chapters will help readers synthesize the knowledge and select the approach that best fits their needs. Especially interesting and useable are the chapters on future assessments, with their highly integrated nature, such as "A Critical Perspective" by M. Sagoff and "Ecosystem Services: Where is the Discipline Heading?" by Georgina Mace. Although the book does very well as a handbook, our few critical comments are connected to this genre. In part 1, introductions of different methods are not always harmonized and coherent. In some cases, closely related and partially interdependent methods are introduced separately from different viewpoints, and the clarification of their connections remains the task of the reader. Themes described in the final chapter "Linking and Informing Agendas" appear somewhat incidental, although policy topics connected to ES are so numerous that complete coverage is impossible.

The *Routledge Handbook of Ecosystem Services* is an eminently useful handbook for experts, researchers, policy makers, practitioners, and students who deal with the topic of ES. Written by international leaders in the field, the book has a clear structure that will help the readers find answers to their theoretical or practical questions. This piece of work will be an important reference in ES science and practice for decades, and it is a good standard for those preparing similar handbooks or textbooks in other disciplines.

Whereas the handbook gives an overview of ES as a whole, *Water Ecosystem Services* (the latest book in the International Hydrological Programme [IHP] series published by UNESCO) compiles different perspectives on ES related to water. Throughout the book, one can find both aspects of what is termed *water ecosystem services*: services provided by water-based ecosystems (e.g., provisioning or recreational services) and water-related services provided by any ecosystem, mainly regulating services (e.g., catchment management). The respective chapter in the Routledge handbook defines the former as "aquatic services" and the latter as "hydrologic services"—maybe some clarification would have been useful in *Water Ecosystem Services* as well. The latter is the primary emphasis of the book, which may be in concordance with the UNESCO's aim to "advance our understanding of processes occurring in the water cycle."

In the beginning, instead of a framework, 4 "core elements" of an ecosystem-services approach are proposed: effects on human well-being, biophysical underpinning of service delivery, transdisciplinarity, and assessment of services for decision making. The authors suggest these elements are necessarily present in any ES-related work. They admit these core elements may be represented in different ways in any specific work. One needs to consider this claim in the widest possible sense; otherwise, the statement would exclude work on ES that focuses on only parts of these elements. The core elements are envisaged as nested, which is hard to follow and not helped by the counter-intuitive graphic. The chapters that follow return every now and then to these core elements. Critical thoughts on the usefulness and perils of using an ES approach are incorporated throughout.

Following these introductory chapters, the book is divided into 4 major parts. The first takes a look at ES as a means to address global challenges, such as evaluating the usefulness of prioritizing climate-change mitigation measures or managing (river) biodiversity. The second part considers existing frameworks for water management, such as the EU Water Framework Directive, biodiversity conservation, and integrated water resources management relative to an ES approach. In the third and main part, examples and case studies from throughout the world of assessments of water ES are presented. The criteria for selection are unclear. Of the 6 case studies, 2 are Australian and on catchment management and 1 is South Korean and deals with coastal ecosystem, the latter being the only nonfreshwater example in the book. Despite the editors emphasizing concerns about increasing monetization of ES, the case studies valuate ES on economic terms and sociological perspectives remain in the background. Nevertheless, the authors provide a wealth of critical insights and experiences derived from application of the ES concept. The last part ("Broadening the Perspective") provides a look into other, less usual aspects of ES. It guides the reader through new areas of thought, for example, ES relative to human rights, aquatic environments, and their cultural valuation and, interestingly, the psychological dimensions of water ecosystems (and conservation attitudes in general). The implications of some of these ideas are, unsurprisingly, not limited to water-related ES.

A concise summary chapter gives a good overview of the presented work and conclusions drawn and of the future of ES-based assessments, including challenges to be faced. Although the Routledge handbook is an essential for everyone dealing with ES, *Water Ecosystem Services* provides a good overview and some interesting thoughts regarding hydrologic and to a minor degree aquatic ES.

Considering the fast growing popularity of ES as research subject and as an applied tool in policy and practice, leading experts in the field have a clear responsibility to present balanced syntheses and set future research directions. In our opinion, authors of both these books laudably meet this expectation.

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Putting Islands on the Map

Messages from Islands – a Global Biodiversity Tour. Hanski, I. 2016. University of Chicago Press, Chicago, IL, U.S.A. 272 pp. US$32.50 (paperback). ISBN 978-0-226-40644-2.

Islands have inspired a large number of scientists to develop key ecological and evolutionary theories. Ilkka Hanski, a world leading scientist in the fields of ecology, evolution, and conservation science, despite having most of his research based on continental experiments on metapopulation dynamics, shows in this book that islands were in many circumstances the inspiration for most of his research findings. Rooted in a strong capacity to observe natural phenomena, Ilkka Hanski credits his PhD work in Borneo for building his passion for biodiversity and ecological processes.

Hanski uses 6 model islands to show in 6 chapters how his experiences in Borneo (chapter 1) and Madagascar (chapter 2); on a small island on the Gulf of Finland (Haminanluoto, 2 ha) (chapter 3); and at La Gomera (chapter 4), the Aland Islands (chapter 5), and Greenland (chapter 6) enriched his understanding of key ecological and evolutionary processes, such as patterns of species distribution, evolutionary generation of diversity, dynamics of biodiversity change, impacts of invasions on island native communities and species, and habitat loss and fragmentation (biodiversity erosion), and why biodiversity is important.

Hanski clearly demonstrates that his journey as a scientist was inspired by six island sanctuaries. By performing standardized field studies to describe the diversity of dung beetles in Borneo, he came to appreciate the diversity of life and realized biodiversity is not distributed evenly across the planet. In chapter 1 he describes 3 patterns in the distribution of biodiversity: hotspots, the latitudinal diversity gradient (i.e., diversity increases toward the tropics), and the species–area relationship (SAR). To show how isolation and time make it possible for evolution to occasionally produce radically new features, Hanski describes (in chapter 2) novel eco-evolutionary pathways on the incredible biodiverse and geologically old island of Madagascar. When visiting Haminanluoto, a small island on the Gulf of Finland (chapter 3), Hanski observed the dynamics of biodiversity erosion and noted how fast local and regional extinctions were taking place due to human action. The impacts of land-use changes and climatic changes induce a shift in species distributions, and many species are facing imminent extinction (extinction debt [Kuussaari et al. 2009]). Chapter 4 calls attention to the terrible effects of the spread of invasive species on islands, where they cause the extinction of endemic species, creating novel ecosystems and homogenizing island communities. Paramount for Hanski's innovative research was his work on the Aland Islands (chapter 5), particularly on the Glanville fritillary butterfly (*Melitaea cinxia*). The author describes the impact of habitat loss and consequent habitat fragmentation on metapopulation dynamics. The third-of-third rule is described, which aim to protect at least 10% of habitats on Earth. The last chapter deals with the importance of biodiversity for increasing ecosystem productivity and stability. The debate around human-made or invasive species generating novel ecosystems is presented, but Hanski clearly defends the importance of restoration of native island habitats as the best way to maintain rich and unique island biodiversity (i.e., conservation is vital).

I was astonished by the elegance of this book in which a narrative of personal experiences (this book was written when the author was ill with a terminal cancer, and it is dedicated to his family) mixes with rigorous scientific descriptions of many biological processes on islands.

I met Ilkka Hanski in the Azores in 2000, and he was astonished by the level of destruction provoked by invasive plants on this archipelago, a process he calls in this book "the green tsunami" (p. 121). At that time my colleagues and I were starting a large survey of soil and canopy arthropods (100 plots in 20 native forest fragments on 7 Azorean islands [Borges et al. 2005]). Repeating the same survey 10 years later (in 2010), we found a clear erosion of biodiversity, mostly caused by invasive plants, which had brought many Azorean arthropod species to near extinction. The loss of biodiversity Hanski observed is being replicated in Azores and, unfortunately, on many other islands.

Islands are isolated entities especially conducive to speciation and therefore to ecological and evolutionary innovations. This book comes at a timely moment, when there is the need to put islands on the map again. At a time when dozens of Pacific islands will disappear due to sea-level rise promoted by climate change, the

intensification of agriculture and tourist activities are driving major habitat destruction, and invasive species are replacing native biota, how do we make the rest of the world care about islands? With this book, Ilkka Hanski makes an excellent contribution to an increased valuation of islands as key ecosystems that need careful protection on a planet in crisis.

Islands should be part of the solution in world biodiversity conservation strategies (e.g., Declaration of Guadeloupe 2014). As observed by Hanski, all facets of biodiversity are rapidly changing on islands, and I consider it urgent to promote long-term standardized monitoring of the remnant native forests to obtain quantitative baselines for detecting changes in island ecosystems (Schmeller et al. 2017; Borges et al. 2018).

With inspiration by Ilkka Hanski, we should also invest in cross-disciplinary research on islands, joining the fields of ecology, evolution, population genetics, and conservation. Solving several biological shortfalls will be paramount to responding to key questions Hanski highlights (see also Hortal et al. 2015). "How many species are still to be described on islands?" (the Linnean shortfall), "How have species evolved in isolation?" (the Darwinian shortfall), "How are species distributed on islands?" (the Wallacean shortfall), and, "How are humans interfering in the relative species abundances of native and alien species?" (the Prestonian shortfall) (see also Cardoso et al. 2011). Responding to these questions will be the best way to pay tribute to Hanski's rich scientific legacy.

Elegantly, Ilkka Hanski shows that despite islands being simplified systems, they are also eminently suitable microcosms in which to study ecology and evolution. This book will be a powerful inspiration for a new generation of students and researchers interested in island topics and in mechanisms generating biodiversity on Earth. The book is also accessible to nonacademic readers and deserves consideration by all stakeholders responsible for the conservation of island biodiversity.

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Noted with Interest

Invasive Plant Species of the World: a Reference Guide to Environmental Weeds. 2nd edition. Weber, E. 2017. CAB International, Wallingford, Oxon, U.K. 582 pp. £195.00 (hardcover). ISBN 978-1-78064-386-1.

This is an improved edition of the comprehensive book on the 500 most important invasive plant species. Improvements over the first edition include photos and distribution maps with the origin and status of almost all species, more detailed descriptions of the ecology and impact of the species, and a separate section on control methods. Some small modifications make the new version more handy: English common names are easy to find and the arrangement of the reference list is better. The shorter introduction was not a good decision. For such a book, it is very important to clearly state the criteria for species selection, to define terms, and to detail source information, listing of web pages is insufficient. The list of websites highlights the question of whether such a reference book is even needed in the internet era. The spread of invasive species is accelerating, and a reference book can only provide a snapshot of this process. If one needs current information about the distribution of a species, one should check internet databases and their sources of information. The current literature about the biology, ecology, and control of invasive species is increasing and easily accessible online. The author did not provide basic statistics about the origin, life form, use, etc., of the 500 species. However, large reference books have their advantages. The book provides good documentation of problematic species. For those interested in natural history, it is worth leafing through. They will learn what effects these species can have on continents other than their own and how their characteristics change when they are introduced to another area. This guide is a good starting point for more-detailed research. It is recommended for horticulturists and nonprofessional gardeners because most of the invasive species were introduced as ornamental plants.

Why Birds Matter: Avian Ecological Function and Ecosystem Services. Şekercioğlu, Ç. H., D. G. Wenny, and C. J. Whelan. 2016. University of Chicago Press, Chicago, IL, U.S.A. 341 pp. US$45.00 (paperback). ISBN 978-0-226-38263-0.

In *Why Birds Matter*, the authors describe a wide range of ecosystem-service implications of ornithology. The volume is beautifully designed, replete with highly informative figures, text boxes, and graphs and tables of original data suitable for meta-analyses. The volume details the ecosystem services (ES) provided by birds and emphasizes the importance of an ethical and economical approach to ornithology. The authors delve into the following topics in 12 chapters: environmental economics as it relates to birds; effects of changes in trophic structures on ES; mitigation of anthropogenic disruption of bird-related ES; facilitation of ES delivery through a network approach; the value of ES provided by trophic interactions including birds; pollination by birds; ecological and economic value of seed dispersal by birds; classification of frugivory for all avian families; dispersal of plants by waterbirds; ES provided by avian scavengers and the future of avian scavenger conservation; nutrient cycling and dynamics and how they provide substantial supporting and cultural ES; ES of forest birds; and ecological functions and ES in the tropics; and the role of agroforestry in maintaining avian guilds. The final chapter is a summation of conclusions, an analysis of ecosystem disservices of birds (e.g., pest species), and a discussion of important research questions and related conservation issues, including conservation funding. The authors' analyses are splendid, and every ornithologist, conservationist, and environmental economist should read this book.

Sharks: Conservation, Governance, and Management. Techera, E. J., and N. Klein, editors. 2014. Routledge, New York, NY, U.S.A. 331 pp. US$120.78 (hardcover). ISBN 978-0-415-84476-5.

This book tackles the problem of protecting the diversity of sharks. Relative to marine mammals, sharks have a fraught relationship with the general public. Adventure books and movies, sailor's stories, and most media outlets present sharks as cruel, killing machines, so it is difficult to get the public to understand and want to protect this group of beautiful species. According to the authors, change is happening slowly. They offer a good overview of shark protection, including how national and international laws can be used and the value of international treaties (e.g., the Convention on International Trade in Endangered Species of Wild Fauna and Flora) and conservation organizations (e.g., International Union for Conservation of Nature) that pinpoint species or species groups for special protection. The authors aim to inform the public of the vulnerability of the world's shark species. One of the major threats is the cultural importance of shark fin soup, but sharks are also targeted for their meat, skin, and liver (oil). This, as well as bycatch by commercial fishing of other species groups (bony fishes), is decreasing their numbers. An estimated 100 million individuals are killed annually, not including by-catch and illegal fishing. The future is not totally dark for sharks because many countries have established marine protected areas and regulate or ban shark fishing. Chapters on shark biology in the book emphasize the need for more research because understanding of sharks, from the number of species (still uncertain, estimates range from 500 to 1000) to their feeding, ecology, and fecundity, is sparse. Many shark species are highly susceptible to anthropogenic disturbance (i.e., fishing, pollution, and habitat destruction) due to their long life span, relatively high age of sexual maturity, and low fecundity. The book is an eye-opener and should be read by fisheries policy makers, politicians, and students.

A Swift Guide to Butterflies of Mexico and Central America. 2nd edition. Glassberg, J. 2017. Princeton University Press, Princeton, NJ, U.S.A. 304 pp. US$39.95 (paperback). ISBN 9780691176482.

This book is a natural continuation of Glassberg's guide to the butterflies of North America and not only in a geographical sense. In this volume, the introduction does not reiterate butterfly biology and morphology. The novelty in the introduction is the map of the Mexican ecosystems. The author has achieved a challenging task: making a pocket guide that covers over 2000 butterfly species from one of the most biodiversity-rich areas in the world (>10% of global butterfly biodiversity). Determining how the identification schedule is structured takes some time. However, compared with other guides, this one seems less clumsy, probably because much less is known about the biology of butterflies from tropical areas than from temperate areas. The schedule gives information on the size of the butterfly, caterpillar food plant, and sometimes habitat and flight period (only for species restricted to a specific habitat or to a particular season). Species' ranges are indicated by associating the common English and scientific names with different colors on maps. The book covers all 6 families of Lepidoptera: Papilionidae, Pieridae, Lycaenidae, Riodinidae, Nymphalidae, and Hesperidae. The photos are beautiful, and most show live individuals in the wild. Important characteristics for correct identification are indicated by a red line in the identification schedule, and at the end of the book there is a useful visual index to help the reader navigate the book. Overall, this is an important guide for all butterfly watchers who plan to visit Mexico or Central America.