Introduces biomes, showing and describing their main kinds and discussing their location, climate, and plant and animal life, as well as those developed by humans.

Introductory textbook using the entire range of tropical ecosystems - terrestrial, freshwater and marine - to illustrate and explain major ecological concepts. A resource for students and teachers to understand the importance of biomes and ecosystems; to appreciate the study of ecology and how it affects life around the world; to learn of the flora and fauna in biomes and ecosystems; and to initiate educational discussion on the subjects.

Correlation between plant distribution and climate is examined over different time and space scales to determine the mechanisms of control in physiological and bioclimatic terms.

Defines chaparral biomes and covers where they are located as well as the plants and animals that inhabit them.

Ecosystems introduces the basic concepts and processes in the ecosystem and explores its role in solving environmental problems. Examining the development of the ecosystem concept, the book explains how ecosystems function and analyzes the complex interactions between life and its physical environment. Presenting examples from all parts of the world within lively case studies and illustrations, Ecosystems focuses on "real world" problems and topical and controversial issues, particularly on human impacts on the natural environment, and the consequences of environmental change.

Explores the geography, ecology, and antiquity of 'open ecosystems' which include grasslands, savannas, and shrublands.

This second edition provides extensively expanded coverage of North American vegetation from arctic tundra to tropical forests.

Climate change is thought to be especially relevant to ecosystems in the cold biomes. Observed warming has been higher in cold climates through various positive feedbacks, especially declining snow and ice cover, and climate projections indicate further rapid warming in the decades to come. Temperature change can have profound impacts in cold biome ecosystems, either directly in terms of impacts on physiology or growing season length, or indirectly via changes in nutrient cycling. The regions focused on here are the (sub)arctic and the (sub)alpine areas, both characterized by short growing seasons and low annual temperatures, but with different radiation environments depending on latitude. Climate change can have impacts in all seasons. Increased spring temperatures can accelerate snowmelt, leading to an earlier onset of the growing season, while warmer summers may stimulate primary productivity through temperatures closer to metabolic optimum and/or increased mineralization rates. Winter warming can lead to the vegetation being damaged because of exposure to harsh frost without insulating snow cover. In all of this, concurrent changes in precipitation also play an important role: increased snowfall can buffer warming through enhanced advective cooling in snowmelt, a higher gradient of rain to snow, and lower summertime snowmelt. Nutrient uptake may be stimulated by warming directly (drought stress) or indirectly (e.g. impaired nutrient uptake). Micro-climate is crucial in these systems and requires particular attention as it can vary widely across the landscape, creating different growing environments in the space of a few meters or even less. Interest in cold region responses to climate change does not only arise from the fact that they harbor unique ecosystems that may be endangered, but also because they store large amounts of carbon that may be released under climate change. However, research is challenging because of the remoteness of many of these areas and the harsh conditions during much of the year. In spite of this, some studies have been carried out over an extensive period, spanning decades and yielding information on for example plant community reorganization (including invasions), and changes in the biogeography of the vast marine world. Based on patterns of algal ecology, the book divides the ocean into four primary compartments, which are then subdivided into secondary compartments. The book contains reports on observed changes or events, but also research making use of experimentally imposed environmental changes. The focus is varied, including phenology, physiology, soil ecology, and vegetable science and biochemistry, with the aim of providing a comprehensive overview of observed and expected responses to climate change in cold biome ecosystems.

Some people ask me why I wrote this book. I am not an expert in behavior but I have earned a master's degree in special education and I have also worked with emotionally disabled and oppositional defiant children for the last six years. Though most mainstream teachers and even some special education teachers shun the behavior classroom, I found that the behavior classroom is the best place to connect with children and help them through difficult times of stress and frustration.

Phytophthora and Primary Production of the Various Vegetational Zones and of the Entire Biosphere The biosphere is that layer at the earth's surface in which living organisms exist and biological cycling takes place. It includes the upper horizons of the soil in which plants root, the atmosphere near the ground, (so far as organisms penetrate this space), and all the surface waters. More than 99% of the earth's biomass is phytophthora, to which we shall limit our discussion. Amounts of phytophthora are distinctly related to vegetal tional zones. Because accurate determination of phytophthora and primary production is difficult, only gross estimates have been available until recently. However, in 1970, Bazilevich et al. published (in Russian) more accurate calculations, based on the rapidly accumulating literature, for the various thermal zones and bioclimatic regions of the earth. These authors calculated mean phyto mass and mean annual primary production for the various regions as dry mass (in tons) per hectare. On the basis of measurements of the areas covered by the individual regions, excluding rivers, lakes, glaciers, and permanent snow, total phytophthora and total annual production for the various regions were obtained (see table). The sum of these figures is the phytophthora and annual production of the land surface of the earth. In addition, the table gives corresponding data for the waters of the earth. The values involved are potential i.e., they are based on natural vegetation uninfluenced by man.

In Habitats and Ecological Communities of Indiana, leading experts assess the health and diversity of Indiana's eight wildlife habitats, providing detailed analysis, data-generated maps, color photographs, and complete lists of flora and fauna. This groundbreaking reference details the state's forests, grasslands, wetlands, aquatic systems, barren lands, and subterranean systems, and describes the nature and impact of two man-made habitats: agricultural and developed lands. The book considers extirpated and endangered species alongside invasives and exotics, and evaluates floral and faunal distribution at century intervals to chart ecological change.

This book presents an in-depth discussion of the biological and ecological geography of the oceans. It synthesizes locally restricted studies of the ocean to generate a global geography of the vast marine world. Based on patterns of algal ecology, the book divides the ocean into four primary compartments, which are then subdivided into secondary compartments. *Includes color insert of the latest in satellite imagery showing the world's oceans, their similarities and differences *Revised and updated to reflect the latest in oceanographic research *Ideal for anyone interested in understanding ocean ecology -- accessible and informative

Early biogeographers such as Alexander von Humboldt recognized the broad-scale coupling of vegetation and climate. This observation shaped the modern biome concept which organizes ecosystems by assumed relationships to environmental controls. This approach has been criticized for missing key impacts on the distribution and functioning of biomes like historical contingency, biogeographic history, disturbance ecology, and evolution. Are biomes still a convenient framework for organizing our understanding of biodiversity? What factors determine the functional differences between biomes and at what spatial, temporal, and phylogenetic scales are those drivers most important? How can we better represent the functional characteristics and dynamics of ecosystems? This Research Topic highlights the latest discussions and research on biomes, drawing from a wide range of approaches spanning from macroecology and phylogeography to remote sensing and modelling ecosystem responses to global change.

After publication of the first volume of the Tropical Rain Forest, the International Journal of Mycology and Lichenology commented: “This is a welcome addition to the literature on the ecology of tropical rain forests. The book provides a wealth of data and stimulating discussions and is of great interest to ecologists interested in tropical areas.” Whereas the
first volume dealt with system-ecological aspects such as community organization and processes, the present volume concentrates on biogeographical aspects such as species composition, diversity, and geographical variation. Recent ecological research in the tropical rain forest has greatly extended our understanding of biogeographical patterns of species variation in the various groups of organisms, and has revealed many of the ecological and evolutionary forces that led to the present patterns of variation. Many important systems of co-evolution between the tropical rain forest ecosystems have also come to light, and the loss of species and related damage is better understood in quantitative terms. This volume presents a comprehensive review of these and other features of the rain forest ecosystem structure, and the ecological processes operating that system. General chapters on abiotic and biotic factors are followed by specific chapters on all major groups of organisms. Prospects for the future are discussed and research needs clearly stated. Also the human exploitation of the systems, its effects and its limits are discussed. The book is extensively illustrated by photographs, graphs, and tables, and comprehensive bibliographies follow each chapter. Author, systematic and subject indices complete the book. It is a must for all ecologists, agriculturalists, foresters, agronomists, hydrologists, soil scientists, entomologists, human ecologists, nature conservationists, and planners dealing with tropical areas. Biologists and environmentalists will also find the volume of great interest.

The emergence of landscape ecology during the 1980s represents an important maturation of theory. Once enamored with the conceptual beauty of well-balanced, homogeneous ecosystems, ecologists now assert that much of the essence of ecological systems lies in their lumpiness. Patches with differing properties and behaviors lie strewn across the land scape, products of the complex interactions of climate, disturbance, and biotic processes. It is the collective behavior of this patchwork of eco systems that drives pattern and process of the landscape. It is not an end point. This realization of the importance of patch dynamics in itself, however, does not mean that it is a passageway to a new conceptual framework, the internal workings of which remain obscure. The next tier of questions includes: What are the fundamental pieces that compose a landscape? How are these pieces bound together by the boundaries intrinsic to the ecosystem and the admixture of the landscape as mosaic? What do the landscape patches and patch interactions elements help us to understand the workings of landscapes? At the core of these questions lies the notion of the ecosystem, a term with a lineage that even predates ecosystem. Late in the nineteenth century, F. E. Clements realized that the transition zones between plant community ties had properties distinct from either of the adjacent communities. Not until the emergence of patch dynamics theory, however, has central significance of the ecosystem concept become apparent.

This is a stimulating tale of the interplay of observation, experimentation, working hypotheses, tentative conclusions, niggling and weightier doubts and great aspirations, on the part of some part of some students, on varied ecological and other aspects of the regime and role of fire in relevant biomes and ecosystem--mainly in South Africa - and on other pertinent features of fire ecology. The impressive contents is a tribute to conveners and authors alike. One can expect a profound range and depth of interpretation and integration, a closely knit fabric of knowledge, delicately interwoven with wisdom, an exposition and quintessence of information. Admable is the collective vision responsible for selecting appropriate topics, the wide sweeps of the brush painting the nature of the biomes, ably describing the fire regimes - whether in grassland, savanna, fynbos or forest; skillfully defining the effects of such regimes - according to ecosystem - upon aerial and edaphic factors of the habitat, upon constituent biota, individually, specifically and as a biotic community; elucidating the basic implications in the structure and dynamics of the plant aspect of that community and unravelling to some degree the tangled knot of the conservation and dissipation of moisture and nutrients. Moreover, gratitude is owed for efforts exerted to understand the interplay of fire and faunal behaviour and dynamics as well as composition, together with the principle of adaptive responses of organisms of diverse kinds.

Encyclopedia of the World's Biomes is a unique, five volume reference that provides a global synthesis of biomes, including the latest science. All of the book's chapters follow a common thematic order that spans biodiversity importance, principal anthropogenic stressors and trends, changing climatic conditions, and conservation strategies for maintaining biodiversity. The book's contributors include prominent scientists whose work has been recognized by the many awards and honors they have received. The encyclopedia is designed to provide a comprehensive, yet accessible means to up-to-date, definitive articles that go deeper in content than any currently available publication. Offers students and researchers a one-stop-shop for information currently only available in scattered or non-technical sources. Authored and edited by top scientists in the field Concisely written to guide the reader though the text Includes meaningful illustrations and suggests further reading for those needing more specific information

This abundantly illustrated book provides a fundamental introduction to the ecological zones of the geosphere. The revised edition includes more than 70 new figures and tables, plus detailed maps of agricultural regions and soil classification. A large number of new Anglo-American ecological studies are included, along with a discussion of the correlation between northern ecosystems and the carbon dioxide balance in the global atmosphere.

The ecosystem concept—the idea that flora and fauna interact with the environment to form an ecological complex—has long been critical to the public perception of ecology and to increasing awareness of environmental degradation. In this book an eminent ecologist explains the ecosystem concept, tracing its evolution, describing how numerous American and European researchers contributed to its evolution, and discussing the explosive growth of ecosystem studies. Golley surveys the development of the ecosystem concept in the late nineteenth and early twentieth centuries and discusses the coining of the term ecosystem by the English ecologist Sir Arthur George Tansley in 1935. He then reviews how the American ecologist Raymond Lindeman applied the concept to a small lake in Minnesota and showed how the bias of the environment of the lake interacted through the exchange of energy. Golley describes how a seminal textbook on ecology written by Eugene P. Odum helped to popularize the ecosystem concept and how numerous other scientists investigated its principles and published their results. He relates how ecosystem studies dominated ecology in the 1960s and became a key element of the International Biological Program biome studies in the United States—the program aimed at "the betterment of mankind" specifically through conservation, human genetics, and improvements in the use of natural resources; how a study of watershed ecosystems in Hubbard Brook, New Hampshire, blazed new paths in ecosystem research by defining the limits of the system in a natural setting, and how current research uses the ecosystem concept. Throughout Golley shows how the ecosystem concept has been shaped internationally by both developments in other disciplines and by personalities and politics.

Forest management is a complex process that now incorporates information obtained from many sources. It is increasingly obvious that the physiological status of the trees in a forest has a dramatic impact on the likely success that deal with forest productivity and sustainability require physiological information. This information can only be obtained from an understanding of the basic biological mechanisms and processes that contribute to individual tree growth. This valuable book illustrates that physiological ecology is a fundamental element of proficient forest management. Provides essential information relevant to the continuing debate over sustainable forest management Outlines how modern tools for physiological ecology can be used in planning and managing forest ecosystems Reviews the most commonly used forest models and assesses their value and future

This handy one-volume resource explores all of Earth's major biomes--both natural and human-created--and their characteristic plants and animals. Explains how ecosystems, including food webs and natural cycles, work to move energy around the planet.

North America contains an incredibly diverse array of natural environments, each supporting unique systems of plant and animal life. These systems, the largest of which, are biomes, formulate webs of life that have taken millennia to evolve. Thoroughly illustrated book introduces readers to this extraordinaryarray of natural communities and their subtle biological and geologic interactions. Completely revised and updated throughout, the second edition of this successful text takes a qualitative, intuitive approach to these complex communities. The book is the latest in a series of distinguished, models described in a book that deal with forest productivity and sustainability require physiological information. This information can only be obtained from an understanding of the basic biological mechanisms and processes that contribute to individual tree growth. This valuable book illustrates that physiological ecology is a fundamental element of proficient forest management. Provides essential information relevant to the continuing debate over sustainable forest management Outlines how modern tools for physiological ecology can be used in planning and managing forest ecosystems Reviews the most commonly used forest models and assesses their value and future

Rising temperatures are affecting organisms in all of Earth's biomes, but the complexity of ecological responses to climate change has hampered the development of a conceptually unified treatment of them. In a remarkably comprehensive synthesis, this book presents a comprehensive review of these and other features of the rain forest ecosystem structure, and the ecological processes operating that system. General chapters on abiotic and biotic factors are followed by specific chapters on all major groups of organisms. Prospects for the future are discussed and research needs clearly stated. Also the human exploitation of the systems, its effects and its limits are discussed. The book is extensively illustrated by photographs, graphs, and tables, and comprehensive bibliographies follow each chapter. Author, systematic and subject indices complete the book. It is a must for all ecologists, agriculturalists, foresters, agronomists, hydrologists, soil scientists, entomologists, human ecologists, nature conservationists, and planners dealing with tropical areas. Biologists and environmentalists will also find the volume of great interest.
Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand. We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in biology textbooks. Throughout concepts of Biology, instructors can rely on the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative program that incorporates critical thinking and clicker questions to help students understand—and apply—key concepts.

In nine volumes, explores each of the earth's major ecological regions, defining important features, animals, and environmental issues. The 7-volume Encyclopedia of Biodiversity, Second Edition maintains the reputation of the highly regarded original, presenting the most current information available in this globally crucial area of research and study. It brings together the dimensions of biodiversity and examines both the services it provides and the measures to protect it. Major themes of the work include the evolution of biodiversity, systems for classifying and defining biodiversity, ecological patterns and theories of biodiversity, and an assessment of contemporary patterns and trends in biodiversity. The science of biodiversity has become the science of our future. It is an interdisciplinary field spanning areas of both global and life sciences. Our awareness of the loss of biodiversity has brought a long overdue appreciation of the magnitude of this loss and a determination to develop the tools to protect our future. Second edition includes over 100 new articles and 226 updated articles covering this multidisciplinary field from evolution to habitats to economics, in 7 volumes The editors of this edition are all well respected, instantly recognizable academics operating at the top of their respective fields in biodiversity research; readers can be assured that they are reading material that has been meticulously checked and reviewed by experts Approximately 1,800 figures and 350 tables complement the text, and more than 3,000 glossary entries explain key terms.

This volume represents a first attempt at holistically classifying and mapping ecological regions across all three countries of the North American continent. A common analytical methodology is used to examine North American ecology at multiple scales, from large continental ecosystems to subdivisions of these that correlate more detailed physical and biological settings with human activities on two levels of successional smaller units. The volume begins with an overview of North America from an ecological perspective, concepts of ecological regionalization. This is followed by descriptions of the 15 broad ecological regions, including information on physical and biological setting and human activities. The final section presents case studies in applications of the ecological characterization methodology to environmental issues. The appendix includes a list of common and scientific names of selected species characteristic of the ecological regions.

Dynamic Aquaria is the outgrowth of years of research aimed at studying how to accurately model and construct living ecosystems in mesocosms, microcosms, and aquaria. It is a unique book, presenting scientifically sound information for a growing new area of science–synthetic ecosystem, or the construction of living ecosystems. At the same time, the authors present a thorough examination of how knowledge gained by creating these smaller ecosystems helps us to understand wild ecosystems and biosphere as a whole. For the scientist: n This book presents an array of new approaches, some revolutionary, to the development and operation of experimental ecosystems For the professional aquarist: n This book demonstrates the ever-expanding possibilities for creating functioning ecosystems for educational display For the hobbyist: n The book demonstrates the practical potential for building and operating true, "natural" ecosystems, rather than artificial habitats that house a few selected organisms.

The scope and clarity of this book make it accessible and informative to a wide readership. Its messages should be an essential component of the education for all students from secondary school to university [b] provides a clear and comprehensive account of concepts that can be applied in our individual and collective lives to pursue the promising and secure future to which we all aspire. From the Foreword by Maurice Strong, Chairman of the Earth Council and former Secretary General of the United Nations Conference on Environment and Development (Earth Summit) The most important questions of the future will turn on the relationship between human societies and the natural ecosystems on which we depend. The interactions between natural worlds are the focus of growing attention from a wide range of environmental, social, and human dimensions. Understanding them is critical to achieving the balance involved in sustainable development. Human Ecology: Basic Concepts for Sustainable Development presents an extremely clear and accessible account of this complex range of issues and of the concepts and tools required to understand and tackle them. Extensively supported by graphics and detailed examples, this book makes an excellent introduction for students at all levels, and for general readers wanting to know why and how to respond to the dilemmas we face.

In Volume 1 of this four-volume set, ecological problems of a general nature were discussed from a point of view of human being with this is essential for a full understanding of the more specialized treatment in this and subsequent volumes, for no similar approach is to be found in other ecological handbooks for beginners. This present volume deals in detail with the special ecological relationship ship of the tropical and subtropical zonobiomes I to III. Most ecologists proceed from the basis of their experience in the temperate region to the tropics, with certain one-sidedness and the danger that generalizations made will not be widely applicable. To avoid this, particularly emphasis is laid, in this volume, on the special ecological features and the characteristics of the trop ical and subtropical regions. More specifically, we deal not only with the relationship of the euclimatope to zonal soils and zonal vegetation, but also pay attention to azonal conditions shown in pedobiomes and in the altitudinal belts of mountains. The on this volume and the subsequent volumes the same simple scheme is followed in treating each zonobiome: 1. climate; 2. soils; 3. producers; 4. consumers; 5. decomposers; 6. ecosystems; 7. sub division into biomes; 8. ero biomes; 9. pedobiomes and 10. zonocentokes. Where it has appeared expedient however, we have occasionally deviated from this scheme (see Deserts D, F, G and H).

Fascinating and diverse, savanna ecosystems support a combination of pastoral and agropastoral communities alongside wild and domestic herbivores that can be found nowhere else. This diversity has made the study of these areas problematic. Ecosystem Function in Savannas: Measurement and Modeling at Landscape to Global Scales addresses some of the discontinuities in the treatment of savannas by the scientific community and documents a range of measurements, methods, technologies, applications, and modeling approaches. Based on contributions from leading authorities and experts on savannas worldwide, the book describes the global savanna biome in terms of its broad ecological properties, temporal dynamics, disturbance levels, and human dimensions. The text examines carbon, water, energy, and trace gas fluxes for major global savanna regions. It looks at quantitative surface properties of savannas that can be retrieved using remote sensing and numerical approaches used to explore savanna dynamics. The authors also discuss how savanna modeling and measurement approaches might be unified. By presenting this confluence of information in a single resource, the book provides a platform for examining synergies, connections, integrative opportunities, and complementarities among approaches and data sources. This information can then be used to harmonize measurement and modeling methods among scales and across disciplinary boundaries. The book builds a bridge across the markedly different perspectives on savannas by which ecologists, biochemists, remote sensors, geographers, anthropologists, and modelers approach their science.

The scientific community has voiced two general concerns: that the environment of the earth is changing and that certain species may become endangered. Some ecologists have argued that these two broad concerns are interrelated and mutually dependent. Past changes in biodiversity have both responded to and caused changes in the earth's environment. In its second edition includes over 100 new articles and 226 updated articles covering this multidisciplinary field from evolution to habitats to economics, in 7 volumes The editors of this edition are all well respected, instantly recognizable academics operating at the top of their respective fields in biodiversity research; readers can be assured that they are reading material that has been meticulously checked and reviewed by experts Approximately 1,800 figures and 350 tables complement the text, and more than 3,000 glossary entries explain key terms.

The Encyclopedia of Biodiversity, Second Edition maintains the reputation of the highly regarded original, presenting the most current information available in this globally crucial area of research and study. It brings together the dimensions of biodiversity and examines both the services it provides and the measures to protect it. Major themes of the work include the evolution of biodiversity, systems for classifying and defining biodiversity, ecological patterns and theories of biodiversity, and an assessment of contemporary patterns and trends in biodiversity. The science of biodiversity has become the science of our future. It is an interdisciplinary field spanning areas of both global and life sciences. Our awareness of the loss of biodiversity has brought a long overdue appreciation of the magnitude of this loss and a determination to develop the tools to protect our future. Second edition includes over 100 new articles and 226 updated articles covering this multidisciplinary field from evolution to habitats to economics, in 7 volumes The editors of this edition are all well respected, instantly recognizable academics operating at the top of their respective fields in biodiversity research; readers can be assured that they are reading material that has been meticulously checked and reviewed by experts Approximately 1,800 figures and 350 tables complement the text, and more than 3,000 glossary entries explain key terms.

Would you rather live in the desert or the grasslands? Middles schoolers can discover new worlds by reading Biomes: Discover the Earth's Ecosystems with Science Activities for
Kids, which discusses the world's biomes in terms of climates, geologies, resources, and organisms! Essential questions, fun facts, and hands-on STEM experiments make this book a fully immersive learning experience!

Explains biomes and ecosystems, discusses the importance of maintaining a healthy diversity among living things and their habitats, and describes ways life is created and sustained.

Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

Encyclopedia of Ecology, Second Edition continues the acclaimed work of the previous edition published in 2008. It covers all scales of biological organization, from organisms, to populations, to communities and ecosystems. Laboratory, field, simulation modelling, and theoretical approaches are presented to show how living systems sustain structure and function in space and time. New areas of focus include micro- and macro scales, molecular and genetic ecology, and global ecology (e.g., climate change, earth transformations, ecosystem services, and the food-water-energy nexus) are included. In addition, new, international experts in ecology contribute on a variety of topics. Offers the most broad-ranging and comprehensive resource available in the field of ecology Provides foundational content and suggests further reading Incorporates the expertise of over 500 outstanding investigators in the field of ecology, including top young scientists with both research and teaching experience Includes multimedia resources, such as an Interactive Map Viewer and links to a CSDMS (Community Surface Dynamics Modeling System), an open-source platform for modelers to share and link models dealing with earth system processes

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