

Global Change And The Terrestrial Biosphere Achievements And Challenges

[#Global Change](#) [#Terrestrial Biosphere](#) [#Climate Change Impact](#) [#Ecosystem Challenges](#) [#Environmental Achievements](#)

Explore the critical interplay between global change and the terrestrial biosphere, reviewing significant achievements in research and conservation while identifying the persistent challenges that continue to threaten our planet's ecosystems.

Each note is structured to summarize important concepts clearly and concisely.

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Global Change and the Terrestrial Biosphere

Global climate change challenges ecologists to synthesize what we know to solve a problem with deep historical roots in our discipline. In ecology, the question, "How do terrestrial ecosystems interact with the other earth systems to produce planetary change?" has sufficient depth to be the focal challenge. This central question is sharpened further as the changes that we may be manifesting upon our planet's systems of land, sea, air and ice can have potential consequences for the future of human civilization. This book provides the depth of the history of global ecology and reviews the breadth of the ideas being studied today. Each chapter starts with a brief narrative about a scientist whose work traces forward into today's issues in global ecosystems. The discussions are framed in a growing realization that we may be altering the way our planet functions almost before we have gained the necessary knowledge of how it works at all.

The Terrestrial Biosphere and Global Change

Summarises understanding of global change interactions with terrestrial ecosystems.

The Terrestrial Biosphere

Terrestrial Biosphere tries to pose the questions which underlie the many-sided debate of how to respond to and influence change: How should we view nature? What do we do for the best - how should we act - what are we trying to achieve and what should we be guided by? In doing so the book introduces and attempts to analyse not only scientific aspects of the debate but also cultural attitudes and values: the notions of ecosystem stability are now challenged and it is also clear that ecosystems are renewable but not repeatable. It finds that prescriptive 'solutions' based on current constructs may not be adequate. Feeling that analysis should lead to advocacy, the author believes that if we can't

improve predictability, we have to increase adaptability which means that ecological and social capacity building should be advocated. This is seen in terms of concepts, institutions, attitudes and values which allow for a plurality of meanings and which can cope with surprise and unforeseen change - and which also facilitates responses to change.

The Terrestrial Biosphere and Global Change

This volume is based on plenary presentations from Challenges of a Changing Earth, a Global Change Open Science Conference held in Amsterdam, The Netherlands, in July 2001. The meeting brought together about 1400 scientists from 105 countries around the world to describe, discuss and debate the latest scientific understanding of natural and human-driven changes to our planet. It examined the effects of these changes on our societies and our lives, and explored what the future might hold. The presentations drew upon global change science from an exceptionally wide range of disciplines and approaches. Issues of societal importance – the food system, air quality, the carbon cycle, and water resources – were highlighted from both policy and science perspectives. Many of the talks presented the exciting scientific advances of the past decade of international research on global change. Several challenged the scientific community in the future. What are the visionary and creative new approaches needed for studying a complex planetary system in which human activities are intimately interwoven with natural processes? This volume aims to capture the timeliness and excitement of the science presented in Amsterdam. The plenary speakers were given a daunting task: to reproduce their presentations in a way that delivers their scientific messages accurately and in sufficient detail but at the same time reaches a very broad audience well beyond their own disciplines. Furthermore, they were required to do this in just a few pages.

Challenges of a Changing Earth

Provides an essential introduction to modeling terrestrial ecosystems in Earth system models for graduate students and researchers.

Climate Change and Terrestrial Ecosystem Modeling

Global Change and the Earth System describes what is known about the Earth system and the impact of changes caused by humans. It considers the consequences of these changes with respect to the stability of the Earth system and the well-being of humankind; as well as exploring future paths towards Earth-system science in support of global sustainability. The results presented here are based on 10 years of research on global change by many of the world's most eminent scholars. This valuable volume achieves a new level of integration and interdisciplinarity in treating global change.

Global Change and the Earth System

Global change involves complex and far-reaching variations in the Earth's systems, and satellite observations have been widely used in global change studies. Over the past five decades, Earth observation has developed into a comprehensive system that can conduct dynamic monitoring of the land, the oceans and the atmosphere at the local, regional and even global scale. At the same time, although a large number of Earth observation satellites have been launched, very few of them are used in global change studies. The lack of scientific satellite programs greatly hinders research on global change. This book proposes using a series of global change scientific satellites to establish a scientific observation grid for global environmental change monitoring from space, and offers the first comprehensive review of lunar-based Earth observation. These scientific satellites could provide not only basic datasets but also scientific support in facilitating advances in international global change research.

Scientific Satellite and Moon-Based Earth Observation for Global Change

This fully updated third edition provides a modern synthesis and review of the latest advances in understanding native vegetation across Australia.

Australian Vegetation

Representing the definitive reference work for this broad and dynamic field, The International Encyclopedia of Geography arises from an unprecedented collaboration between Wiley and the American Association of Geographers (AAG) to review and define the concepts, research, and techniques

in geography and interrelated fields. Available as a robust online resource and as a 15-volume full-color print set, the Encyclopedia assembles a truly global group of scholars for a comprehensive, authoritative overview of geography around the world. Contains more than 1,000 entries ranging from 1,000 to 10,000 words offering accessible introductions to basic concepts, sophisticated explanations of complex topics, and information on geographical societies around the world Assembles a truly global group of more than 900 scholars hailing from over 40 countries, for a comprehensive, authoritative overview of geography around the world Provides definitive coverage of the field, encompassing human geography, physical geography, geographic information science and systems, earth studies, and environmental science Brings together interdisciplinary perspectives on geographical topics and techniques of interest across the social sciences, humanities, science, and medicine Features full color throughout the print version and more than 1,000 illustrations and photographs Annual updates to online edition

International Encyclopedia of Geography, 15 Volume Set

A marvelously illustrated look at the world's diverse forests and their ecosystems The earth's forests are havens of nature supporting a diversity of life. Shaped by climate and geography, these vast and dynamic wooded spaces offer unique ecosystems that shelter complex and interdependent webs of flora, fungi, and animals. The World Atlas of Trees and Forests offers a beautiful introduction to what forests are, how they work, how they grow, and how we map, assess, and conserve them. Provides the most wide-ranging coverage of the world's forests available Takes readers beneath the breathtaking variety of wooded canopies that span the globe Profiles a wealth of tree species, with enlightening and entertaining natural-history highlights along the way Features stunning color photos, maps, and graphics Draws on the latest cutting-edge research and technology, including satellite imagery

The World Atlas of Trees and Forests

Earth is home to an estimated 8 million animal species, 600,000 fungi, 300,000 plants, and an undetermined number of microbial species. Of these animal, fungal, and plant species, an estimated 75% have yet to be identified. Moreover, the interactions between these species and their physical environment are known to an even lesser degree. At the same time, the earth's biota faces the prospect of climate change, which may manifest slowly or extremely rapidly, as well as a human population set to grow by two billion by 2045 from the current seven billion. Given these major ecological changes, we cannot wait for a complete biota data set before assessing, planning, and acting to preserve the ecological balance of the earth. This book provides comprehensive coverage of the scientific and engineering basis of the systems ecology of the earth in 15 detailed, peer-reviewed entries written for a broad audience of undergraduate and graduate students as well as practicing professionals in government, academia, and industry. The methodology presented aims at identifying key interactions and environmental effects, and enabling a systems-level understanding even with our present state of factual knowledge.

Ecological Systems

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

Open Ecosystems

This book examines the impacts of global change on terrestrial ecosystems. Emphasis is placed on impacts of atmospheric, climate and land use change, and the book discusses the future challenges and the scientific frameworks to address them. Finally, the book explores fundamental new research developments and the need for stronger integration of natural and human dimensions in addressing the challenge of global change.

Global Change and Terrestrial Ecosystems

The issues arising from rapid global integration have generally been treated in isolation by most academic works. This volume examines the many pitfalls of globalization from the perspective of impoverished and indigenous peoples, including the widening wealth gap, the struggle for restoration of dispossessed lands and cultural rights, global warming and ecological annihilation, and the experiences of women in underdeveloped regions. The United States' growing prison industrial complex is discussed. The

author concludes with a call for reassessing current ways of living and proposes recreating cultures of conservation and sustainable economies. Instructors considering this book for use in a course may request an examination copy here.

Terrestrial Ecosystems in a Changing World

This volume includes revised versions of most of the presentations made at the International Conference «Understanding the Earth System: Compartments, Processes and Interactions" held on November 24-26, 1999 in Bonn. The Conference was organized by the German National Committee on Global Change Research as part of the Bonn Science Festival 1999-2000. The Bonn Science Festival (Wissenschaftsfestival Region Bonn) was organized and funded by sfg Strukturförderungsgesellschaft Bonn/Rhein-Siegl Ahrweiler mbH. The generous support for organizing the conference and printing this volume by sfg is gratefully acknowledged. Additional financial and organizational support for separate workshop sessions and publications have also been provided by the German Federal Ministry for Science and Research, BMBF and Germany's major research funding agency, Deutsche Forschungsgemeinschaft. The editors wish to gratefully acknowledge the help, advice and especially patience of many individuals who have contributed to this volume. The contributions are intended to document the debate on crucial issues of the emerging concept of earth system science and to stimulate the necessary scientific discussion. While every effort has been made on the part of the editors to ensure consistency in terminology, style and methods of quotation, the variety of contributors has inevitably resulted in certain discrepancies. E. EHLERS Bonn, February 2001 T. KRAFFT Contents Part I Panorama: The Earth System: Analysis from Science and the Humanities Chapter 1 Understanding the Earth System - From Global Change Research to Earth System Science 3 E. EHLERS and T. KRAFFT Chapter 2 Earth System Analysis and Management. 17

The Cost of Globalization

An essential, up-to-date look at the critical interactions between biological diversity and climate change that will serve as an immediate call to action The physical and biological impacts of climate change are dramatic and broad-ranging. People who care about the planet and manage natural resources urgently need a synthesis of our rapidly growing understanding of these issues. In this all-new sequel to the 2005 volume Climate Change and Biodiversity, leading experts in the field summarize observed changes, assess what the future holds, and offer suggested responses. From extinction risk to ocean acidification, from the future of the Amazon to changes in ecosystem services, and from geoengineering to the power of ecosystem restoration, this book captures the sweep of climate change transformation of the biosphere.

Understanding the Earth System

This book provides a synthesis of the past decade of research into global changes that occurred in the earth system in the past. Focus is achieved by concentrating on those changes in the Earth's past environment that best inform our evaluation of current and future global changes and their consequences for human populations. The book stands as a ten year milestone in the operation of the Past Global Changes (PAGES) Project of the International Geosphere-Biosphere Programme (IGBP). It seeks to provide a quantitative understanding of the Earth's environment in the geologically recent past and to define the envelope of natural environmental variability against which anthropogenic impacts on the Earth System may be assessed. A set of color overhead transparencies based on the figures in the book is available free on the PAGES website (www.pages-igbp.org) for use in teaching and lecturing.

Biodiversity and Climate Change

The Earth as Transformed by Human Action is the culmination of a mammoth undertaking involving the examination of the toll our continual strides forward, technical and social, take on our world. The purpose of such a study is to document the changes in the biosphere that have taken place over the last 300 years, to contrast global patterns of change to those appearing on a regional level, and to explain the major human forces that have driven these changes. The first section deals strictly with the major human forces of the past 300 years and the second is a detailed account of the transformations of the global environment wrought by human action. The final section examines a range of perspectives and theories that purport to explain human actions with regard to the biosphere.

Paleoclimate, Global Change and the Future

Essays link Gaian science to such global environmental quandaries as climate change and biodiversity destruction, providing perspectives from science, philosophy, politics, and technology. Gaian theory, which holds that Earth's physical and biological processes are inextricably bound to form a self-regulating system, is more relevant than ever in light of increasing concerns about global climate change. The Gaian paradigm of Earth as a living system, first articulated by James Lovelock and Lynn Margulis in the 1970s, has inspired a burgeoning body of researchers working across disciplines that range from physics and biology to philosophy and politics. *Gaia in Turmoil* reflects this disciplinary richness and intellectual diversity, with contributions (including essays by both Lovelock and Margulis) that approach the topic from a wide variety of perspectives, discussing not only Gaian science but also global environmental problems and Gaian ethics and education. Contributors focus first on the science of Gaia, considering such topics as the workings of the biosphere, the planet's water supply, and evolution; then discuss Gaian perspectives on global environmental change, including biodiversity destruction and global warming; and finally explore the influence of Gaia on environmental policy, ethics, politics, technology, economics, and education. *Gaia in Turmoil* breaks new ground by focusing on global ecological problems from the perspectives of Gaian science and knowledge, focusing especially on the challenges of climate change and biodiversity destruction. Contributors David Abram, Donald Aitken, Connie Barlow, J. Baird Callicott, Bruce Clarke, Eileen Crist, Tim Foresman, Stephan Harding, Barbara Harwood, Tim Lenton, Eugene Linden, Karen Litfin, James Lovelock, Lynn Margulis, Bill McKibben, Martin Ogle, H. Bruce Rinker, Mitchell Thomashow, Tyler Volk, Hywel Williams

The Earth as Transformed by Human Action

Globalization and telecoupling are enhancing the complexity of the coupled socio-ecological system constituted by the interaction between the global ecosphere and the anthroposphere. As a result, the demand for tools to identify transformative innovations, assess future risks, and support precautionary decisions for sustainability is growing by the day in business and politics. Scenarios are a means of simplification, reducing the real-world complexity to a limited number of essential factors to analyze their interactions and support policy formulation, with indicators as communication and monitoring tools. In particular, in a time of "fake news" and "alternative truths" a critical reflection amongst producers and users of scenarios and indicators is overdue—the capability for critical self-reflection is what distinguishes science from pseudo-science, and is a condition of trust. The authors of this book test established measurement and modeling approaches against new challenges, assess the weaknesses of prevailing innovation theories and the political-ideological embedment of archetypical scenarios, highlight deficits in taking the physical basics into account, and the need to understand global interaction and the stepwise process of energy transitions, point out technical as well as conceptual weaknesses in data collection, harmonization and indicator generation, always with a view to solving problems.

Gaia in Turmoil

Forests are valued not only for their economic potential, but also for the biodiversity they contain, the ecological services they provide, and the recreational, cultural, and spiritual opportunities they provide. The *Ecological Forest Management Handbook* provides a comprehensive summary of interrelated topics in the field, including management con

Scenarios and Indicators for Sustainable Development—Towards A Critical Assessment of Achievements and Challenges

"Where were you when I laid the foundation of the earth?" God asks Job in the "Whirlwind Speech," but Job cannot reply. This passage—which some environmentalists and religious scholars treat as a "green" creation myth—drives renowned ecologist H. H. Shugart's extraordinary investigation, in which he uses verses from God's speech to Job to explore the planetary system, animal domestication, sea-level rise, evolution, biodiversity, weather phenomena, and climate change. Shugart calls attention to the rich resonance between the Earth's natural history and the workings of religious feeling, the wisdom of biblical scripture, and the arguments of Bible ethicists. The divine questions that frame his study are quintessentially religious, and the global changes humans have wrought on the Earth operate not only in the physical, chemical, and biological spheres but also in the spiritual realm. Shugart offers a universal framework for recognizing and confronting the global challenges humans now face: the relationship between human technology and large-scale environmental degradation, the effect of

invasive species on the integrity of ecosystems, the role of humans in generating wide biotic extinctions, and the future of our oceans and tides.

Ecological Forest Management Handbook

Earth is the only planet known to have fire. The reason is both simple and profound: fire exists because Earth is the only planet to possess life as we know it. Fire is an expression of life on Earth and an index of life's history. Few processes are as integral, unique, or ancient. Fire on Earth puts fire in its rightful place as an integral part of the study of geology, biology, human history, physics, and global chemistry. Fire is ubiquitous in various forms throughout Earth, and belongs as part of formal inquiries about our world. In recent years fire literature has multiplied exponentially; dedicated journals exist and half a dozen international conferences are held annually. A host of formal sciences, or programs announcing interdisciplinary intentions, are willing to consider fire. Wildfire also appears routinely in media reporting. This full-colour text, containing over 250 illustrations of fire in all contexts, is designed to provide a synthesis of contemporary thinking; bringing together the most powerful concepts and disciplinary voices to examine, in an international setting, why planetary fire exists, how it works, and why it looks the way it does today. Students, lecturers, researchers and professionals interested in the physical, ecological and historical characteristics of fire will find this book, and accompanying web-based material, essential reading for undergraduate and postgraduate courses in all related disciplines, for general interest and for providing an interdisciplinary foundation for further study. A comprehensive approach to the history, behaviour and ecological effects of fire on earth. Timely introduction to this important subject, with relevance for global climate change, biodiversity loss and the evolution of human culture. Provides a foundation for the interdisciplinary field of Fire Research. Authored by an international team of leading experts in the field. Associated website provides additional resources.

Foundations of the Earth

This anthology provides an historical overview of the scientific ideas behind environmental prediction and how, as predictions about environmental change have been taken more seriously and widely, they have affected politics, policy, and public perception. Through an array of texts and commentaries that examine the themes of progress, population, environment, biodiversity and sustainability from a global perspective, it explores the meaning of the future in the twenty-first century. Providing access and reference points to the origins and development of key disciplines and methods, it will encourage policy makers, professionals, and students to reflect on the roots of their own theories and practices.

Fire on Earth

Humboldt and Jefferson explores the relationship between two fascinating personalities: the Prussian explorer, scientist, and geographer Alexander von Humboldt (1769–1859) and the American statesman, architect, and naturalist Thomas Jefferson (1743–1826). In the wake of his famous expedition through the Spanish colonies in the spring of 1804, Humboldt visited the United States, where he met several times with then-president Jefferson. A warm and fruitful friendship resulted, and the two men corresponded a good deal over the years, speculating together on topics of mutual interest, including natural history, geography, and the formation of an international scientific network. Living in revolutionary societies, both were deeply concerned with the human condition, and each vested hope in the new American nation as a possible answer to many of the deficiencies characterizing European societies at the time. The intellectual exchange between the two over the next twenty-one years touched on the pivotal events of those times, such as the independence movement in Latin America and the applicability of the democratic model to that region, the relationship between America and Europe, and the latest developments in scientific research and various technological projects. Humboldt and Jefferson explores the world in which these two Enlightenment figures lived and the ways their lives on opposite sides of the Atlantic defined their respective convictions.

The Future of Nature

The Reader is the first comprehensive history of the noosphere and biosphere. Drawing on classical influences, modern parallels, and insights into the future, the Reader traces the emergence of noosphere and biosphere concepts within the concept of environmental change. Reproducing material from seminal works, both past and present, key ideas and writings of prominent thinkers are presented, including Bergson, Vernadsky, Lovelock, Russell, Needham, Huxley, Medawar, Toynbee and Boulding, and extensive introductory pieces by the editors draw attention to common themes and competing

ideas. Focussing on issues of origins, theories, parallels and potential, the discussions place issues in a broad context, compare and contrast central concepts with those of the Gaia hypothesis, sustainability and global change, and examine the potential application of noospheric ideas to current debates about culture, education and technology in such realms as the Internet, space exploration, and the emergence of super-consciousness. Literally the 'sphere of mind or intellect', the noosphere is apart of the 'realm of the possible' in human affairs, where there is a conscious effort to tackle global issues. The noosphere concept captures a number of key contemporary issues - social evolution, global ecology, Gaia, deep ecology and global environmental change - contributing to ongoing debates concerning the implications of emerging technologies.

Humboldt and Jefferson

Environmental and human catastrophe looms ever larger for planet Earth. From the need to build sustainable cities to house growing billions to transforming the international trade system to tackling run-away climate change, positive, powerful action is ne.

The Biosphere and Noosphere Reader

This book is the result in bringing together experts from many fields and persuading them to tell us what they have learned about the current changes.

Surviving the Century

Outlines elements of International Geosphere-Biosphere Program (IGBP), a research program designed to describe interactive physical, chemical, and biological processes that regulate earth's environment in order to understand major issues of global change as influenced by human actions.

Planet Under Stress

Comprehensive Remote Sensing covers all aspects of the topic, with each volume edited by well-known scientists and contributed to by frontier researchers. It is a comprehensive resource that will benefit both students and researchers who want to further their understanding in this discipline. The field of remote sensing has quadrupled in size in the past two decades, and increasingly draws in individuals working in a diverse set of disciplines ranging from geographers, oceanographers, and meteorologists, to physicists and computer scientists. Researchers from a variety of backgrounds are now accessing remote sensing data, creating an urgent need for a one-stop reference work that can comprehensively document the development of remote sensing, from the basic principles, modeling and practical algorithms, to various applications. Fully comprehensive coverage of this rapidly growing discipline, giving readers a detailed overview of all aspects of Remote Sensing principles and applications. Contains 'Layered content', with each article beginning with the basics and then moving on to more complex concepts. Ideal for advanced undergraduates and academic researchers. Includes case studies that illustrate the practical application of remote sensing principles, further enhancing understanding.

Mountain ecosystem services and climate change

Over the last few decades, unprecedented global population growth has led to increased demand for food and shelter. At the same time, extraction of natural resources beyond the Earth's resilience capacity has had a devastating effect on ecosystems and environmental health. Furthermore, climate change is having a significant impact in a number of areas, including the global hydrological cycle, ecosystem functioning, coastal vulnerability, forest ecology, food security, and agricultural sustainability. According to the Intergovernmental Panel on Climate Change (IPCC), only immediate and sustained action will prevent climate change causing irreversible and potentially catastrophic damage to our environment. This book presents various scientific views and concepts, research, reviews, and case studies on contemporary environmental issues in changing climate scenarios and highlights different adaptation measures. Increasing awareness of modern-day patterns of climate change, it addresses questions often raised by environmental scientists, researchers, policymakers and general readers.

Global Change in the Geosphere-biosphere

Featuring contributions from leading experts in the field, Climate Change and Managed Ecosystems examines the effects of global climate change on intensively constructed or reconstructed ecosystems, focusing on land use changes in relation to forestry, agriculture, and wetlands including peatlands. The

book begins by discussing the fragility of ecosystems in the face of changing climates, particularly through human caused increases in atmospheric GHGs. The chapters delineate how and why the climate has changed and what can be expected to occur in the foreseeable future. They identify the potential adaptation responses to reduce the impacts of a changing climate. Using this information as a foundation, the chapter authors examine what is known about the impacts of climate on agricultural, forested, and wetland ecosystems. They illustrate the importance of these ecosystems in the global carbon cycle and discuss the potential interaction between terrestrial and atmospheric carbon pools under changing climatic conditions. The book delineates what needs to be done to ensure continued stability in these ecosystems. It includes a description of activities that have been undertaken in the past to identify gaps in understanding GHG emissions from agriculture, forests, and wetlands and their mitigation, as well as current research initiatives to address these gaps. The book presents an overview of how economic reasoning can be applied to climate change and illustrates how terrestrial carbon-uptake credits (offset credits) operate within the Kyoto Protocol framework. By identifying gaps in the current understanding of adaptation of mitigation strategies, the book underscores the need to make management of these ecosystems part of a global solution.

Comprehensive Remote Sensing

We are at a watershed of history. The human race is now so numerous and its technological power so great that we are having an unprecedented impact on the biosphere, the entire planet. The need to control this impact is giving rise to a new kind of politics - the politics of the planet. The most urgent problem we face is that of climate change. This book gives a vigorous and candid account of how governments tentatively felt their way to the first international agreements on climate change and the ozone layer, how these work, and the long-term implications for global governance. It points to the roles that businesses and ordinary citizens can play, and the changes we can expect in our daily lives. This is an area in which politics, technology and economics meet. In this sweeping and energetic book, the author goes on to look at the major planetary issues that confront us now or that are close over the horizon, and the ethical issues of our relationship to our environment that they raise. Amid the dangers, he finds ground for hope. Anyone with an interest in the human condition as we spin further into the new century will find this an enlightening and rewarding book. Originally published in 2000

Contemporary Environmental Issues and Challenges in Era of Climate Change

Each issue of Transactions B is devoted to a specific area of the biological sciences, including clinical science. All papers are peer reviewed and edited to the highest standards. Published on the 29th of each month, Transactions B is essential reading for all biologists.

Climate Change and Managed Ecosystems

Scientists have long sought to unravel the fundamental mysteries of the land, life, water, and air that surround us. But as the consequences of humanity's impact on the planet become increasingly evident, governments are realizing the critical importance of understanding these environmental system-sâ€"and investing billions of dollars in research to do so. To identify high-priority environmental science projects, Grand Challenges in Environmental Sciences explores the most important areas of research for the next generation. The book's goal is not to list the world's biggest environmental problems. Rather it is to determine areas of opportunity thatâ€"with a concerted investmentâ€"could yield significant new findings. Nominations for environmental science's "grand" challenges were solicited from thousands of scientists worldwide. Based on their responses, eight major areas of focus were identifiedâ€"areas that offer the potential for a major scientific breakthrough of practical importance to humankind, and that are feasible if given major new funding. The book further pinpoints four areas for immediate action and investment.

Managing the Planet

It is clear that international law is not yet equipped to handle the "ecological goods and services" that exist simultaneously within and outside of all states. The global commons have always been understood as geographical spaces that exist only outside the political borders of states. A vital good such as a stable climate exists both within and outside all states, and shows traditional legal approaches to be ecological nonsense. With the recent possibility of measuring and monitoring the state and functioning of the Earth System through the Planetary Boundaries framework, it is now possible to define a "Safe Operating Space of Humankind" corresponding to a biogeophysical state of Earth. In this sense,

the Common Home of Humanity is not a planet with 510 million square kilometres, but is a specific favourable state of the Earth System. Recent major scientific advances anticipate a legal paradigm shift that could overcome the disconnection between ecological realities and existing legal frameworks. If we recognize this qualitative and non-geographic space as a Common Natural Intangible Heritage of Humankind, all positive and negative “externalities” end up being included within a new maintenance system of the Common Home.

Philosophical Transactions

Global Climate Change