

indicate when a nation should no longer pre-occupy itself with the quantitative expansion of its economic activity (growth) and focus instead on its qualitative improvement (development). Unfortunately, there was very little reference in the book to the ISEW, GPI, or any similar macroeconomic indicator of desirable scale. In fact, the concept of optimal scale, which is now widely accepted and referred to by many ecological economists, was never mentioned at all in the book.

Overall, I believe this is a useful albeit deficient book on sustainability/sustainable development indicators. For the person seeking informative essays on methodological issues, institutional considerations, and the policy relevance of sustainability indicators, this book will be of some value. But for the person who is after a template of sorts to measure the sustainability/sustainable development of a nation or society, I'm not so sure.

Philip Lawn

Faculty of Social Sciences, Flinders University, Adelaide, Australia

E-mail address: phil.lawn@flinders.edu.au.

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Marine Natural Resources and Technological Development. An Economic analysis of the Wealth from the Oceans, Marco Colazingari, Routhledge Publishers, 2007, 256 pp, ISBN: 0415958520

Even if "economic analysis" occurs in the subtitle of this book, it is mainly a description of technologies applied to utilize or to investigate the various resources of the ocean. As such, it makes a fascinating reading. To the uninitiated at least it appears encyclopaedic in its breadth. One chapter takes us through ocean exploration. We read about gadgets such as autonomous underwater vehicles, which travel unmanned over several thousand kilometers at a time. Apparently, many of the highly expensive efforts in marine exploration are undertaken for pure science without immediate payoff. Curiosities are steadily being found; deep undersea vents with living creatures adapted to a hostile environment; clathrates (frozen methane) that one day might satisfy our appetite for energy.

Offshore oil and gas technology is dealt with in a chapter of its own. That enormously expensive gadgets are being used in this activity comes as no surprise, given the high prices of these commodities. The development of this technology has been rapid since the energy crises in the 1970s. In the late 1970s oil wells were not drilled in deeper water than about 300 m. By the early years of this century wells were drilled in depths of 2–3 km. Over the same period we have had developments such as horizontal drilling, which has greatly raised the ultimate recovery from offshore fields.

Two chapters deal with activities that are still largely science fiction, renewable energy from the oceans (tidal, current, waves and thermal gradients) and mining of minerals on the ocean floor. The latter created much furor in the 1970s and 80s during the third UN conference on the law of the sea; some thought there were great riches to be obtained from this

activity, while others were concerned that their position in world mineral markets would be threatened. The issue held up the conference for years and led several rich countries, including the US, to refuse to sign the resulting convention. Not much has happened over the nearly thirty years since then. Despite all the talk on the needs for renewable energy, very little is happening on the ocean front, with the exception of offshore wind power, which the author defines as lying outside his scope.

The penultimate chapter deals with the living resources of the oceans. Much of this is devoted to fisheries, but marine biotechnology is also discussed, including pharmaceutical marine research. The economic analysis undertaken in this book is most comprehensive with respect to fisheries. It does not add anything new on the subject, but the author is clearly well informed of what exists and conveys good understanding of the main results. One could take issue with some of the institutional analysis, however. It is emphasized that over-fishing is a global problem, but in what sense is it so? Is it global in the sense of being widespread and occurring in many different places at the same time, or is it global in the sense of requiring solutions where all states cooperate? The author appears to believe the latter to be the case and emphasizes the need for global institutions. But few if any fish stocks migrate so widely that all nations of the world need be involved in their management, not even all coastal nations. Tuna stocks come closest, but most fish stocks are much more circumscribed in their migrations, and many are confined to just one country's exclusive economic zone. Surely, it must give us some pause that the big leap towards better fisheries management, the individual transferable quotas (ITQs), was taken after what probably was the biggest leap ever towards exclusive rights, the establishment of the exclusive economic zone. Without this clarification of the jurisdictional issue in what used to be the high seas, ITQs or any other limitation of fishing activity would probably not have occurred. The current attempts at dealing with fisheries management on the high seas are wrestling with the absence of coastal state jurisdiction and are unlikely to succeed except when access to markets or technology limits the number of players.

Rögnvaldur Hannesson

The Norwegian School of Economics and Business Administration,

Helleveien 30, N-5045 Bergen, Norway

Tel.: +47 55 95 92 60; fax: +47 55 95 95 43.

E-mail address: rognvaldur.hannesson@nhh.no.

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Sustainability or Collapse? An Integrated History and Future of Peoples on Earth, Robert Costanza, Lisa J. Graumlich, Will Steffen (Eds.), The MIT Press, Cambridge, MA (2007).495 pp, ISBN-13: 978-0-262-03366-4

Each year evidence mounts of an epochal shift underway in the state of our planet and the dynamics governing its evolution. We monitor the expanding suite of interactions knitting ecosystems

and societies into an integral global system, but cannot know what kind of world will emerge in the course of this transition. The future is deeply uncertain, subject to indeterminate contingencies, bifurcations, and human choices now and in the decades ahead. Fearsome dangers may lie in wait as we drive the biosphere into a *terra incognita* of unprecedented conditions, patterns, and processes.

The challenge of comprehending this unfolding transition and steering it toward a sustainable and salutary course has stimulated a new area of inquiry. The field of global system studies promises to blossom into one of the fruitful scientific enterprises of this century. Yet these are early days of the nascent discipline, a time for proposing conceptual frameworks, identifying key researchable questions, and probing components of the overall problem (and, more mundanely, establishing the curricula and career tracks for a new generation of sustainability professionals). In this agenda-setting spirit, a group of several dozen prominent historians, archeologists, ecologists, and global modelers attended the Dahlem Workshop in 2005 to launch a multiyear project with the felicitous acronym IHOPE (Integrated History and future Of People on Earth). *Sustainability or Collapse* is the report of that meeting.

The distinctive aim of the project is to link two key research foci: studies that look back at the evolution, adaptation, and collapse of earlier socio-ecological formations and analyses that look forward to the global future. Of course, a volume promising “an integrated history and future of peoples” is likely to raise both expectations and eyebrows, for few tasks are as worthy or as daunting. This tall order entails no less than a macro-science of co-evolving social and environmental systems, arching across the astonishing diversity of the past and the many planetary possibilities of the future. In actuality, the book’s aims are more modest than its title suggests: to frame initial research strategies and offer indicative case-study examples as a point of departure.

Nevertheless, the ultimate goals of IHOPE are ambitious indeed: to develop a coherent data-rich description of human–environment change over the past millennia; to test system models that can account for this history; and, based on this experience, to provide improved methods for projecting the future of the global system. The project places a heavy emphasis on developing models, whereby new approaches and tools for prospective global simulations are informed by historical experience, even calibrated and validated to historical data.

Following an introductory overview, the book is structured in four sections that correspond to the working groups of the workshop. Each addresses issues related to the interactions of society and environment at a different time scale—millennial, centennial, decadal, and the future. Each section includes thematic and case-study chapters, based on workshop papers, followed by a “group report.” Most of the papers are incisive and sophisticated, such as Tainter and Crumley’s analysis of the role of climate change in destabilizing the overly rigid and complex Roman Empire and Grove’s correlation of the anomalous global weather induced by a strong El Niño episode and the revolutionary upsurge of the late eighteenth-century. But busy readers will want to focus on the group reports on broad directions for developing IHOPE’s trans-historical framework on the interplay of human and environmental change.

Not for the casual reader, the book succumbs to the common banes of meeting reports: excessive jargon (here compounded

by the multiple disciplines represented) and editorial laxity. These chapters bound across a wide range of styles, vocabularies, and perspectives, more a collection of discrete contributions than a coherent whole. Still, those engaged in related research will find in *Sustainability or Collapse* a stimulating snapshot of a thoughtful group of colleagues confronting the critical challenge of enhancing the spatial, temporal, and thematic integration of socio-ecological studies. The book’s sophisticated formulation of critical research challenges, and thought-provoking speculations on how to address them, are reasons enough to recommend it to this research community.

IHOPE’s aim of linking future and historical studies faces fundamental epistemological and ontological problems. If one takes such notions as emergence and irreducibility in complex systems seriously, as these authors do, the grand synthesis they propose has inherently limited scope. Certainly, an important weak coupling seems indisputable: insights and lessons gleaned from the study of earlier societies’ patterns of adaptation and collapse can enrich our understanding of the world going forward. However, *Sustainability and Collapse* envisions a stronger connection, linking cross-temporal data sets and overarching models, even validating prospective global models through simulation of past experience. Yet if the planet is indeed in the midst of a process of structural reorganization, a turbulent transformation from a “before” to an “after,” with reshaped wholes, parts, and dynamics, then the algorithmic relations of such models would need to undergo a corresponding shift in structure, a prospect not on the near horizon.

An appreciation of the inherent limits of contemporary models and methodological strategies would direct greater attention to such critical issues as the policy implications of deep scientific unpredictability; critical thresholds and uncertainties in the global transition; the roles of human values, culture, agency, and political mobilization; and more modest ways of linking qualitative and quantitative descriptors in global scenario construction. Still, by formulating bold on-point questions, even if grand answers may prove elusive, this book stands as a significant way-station on the long journey to an adequate science and practice of global change.

Paul Raskin

Tellus Institute, 11 Arlington Street, Boston,
MA 02116, United States

E-mail address: praskin@tellus.org.

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