Review: Earth System Analysis for Sustainability
By Hans Joachim Schellnhuber, Paul J. Crutzen, Wiliam C. Clark, Martin Claussen and Herman Held (Eds.)

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Hans Joachim Schellnhuber, Paul J. Crutzen, Wiliam C. Clark, Martin Claussen and Herman Held (eds.) *Earth System Analysis for Sustainability*. MIT Press, Cambridge, Mass. with Dahlem University Press, Berlin. ISBN 0 262 19513 5. 454pp., RRP $(US) 38.00

This is the broadest examination of the factors shaping sustainability yet undertaken and makes a significant contribution to our understanding of global systems. At the same time, the book basically derives its understandings from an astro-biological (and so inevitably Eurocentric) perspective and gives minimal attention to the socio-political environments that shape the human response to sustainability issues. Obviously, to have dealt with these constraints would have demanded at least one further study on the same scale and would be unrealistic in the current context. So I am not criticizing those responsible but rather from my own social science perspective pointing to one of the many further research tasks in this very complex field.

The book is based on one of the Dahlem workshops, a series of international and multi-disciplinary intellectual assemblies that focus on extending our understandings of major scientific questions. But they are certainly much more than the usual knowledge exchange and re-integration, being structured "*. . . to identify gaps in knowledge, to pose questions aimed at directing further inquiry, and to suggest innovative ways of approaching controversial issues. The overall goal is not necessarily to exact consensus but to search for new perspectives, for these will help direct the international research agenda."* (p. xiii)

This volume opens by defining the global arena as the Anthropocene, as a geo-epoch in which human beings play a significant role in reshaping the planet. This perspective certainly serves to emphasize the importance of human understanding – but it leaves many of us deeply aware of the extent to which our political institutions are still unable to accept and respond to such a responsibility. But the current volume exemplifies the extent to which the scientific community is coming to grips with it. The Dahlem program, situated as it is at the epicenter of German intellectual action, is also demonstrating the power of the *Wissenschaft* concept – a perspective that is more comprehensive than the Anglophone concept of knowledge and

embraces the integration of the processes by which knowledge is achieved. The discussion then moves to the crucial issue of assessing evidence for the role of major transitions or disturbances in the history of the Earth in shaping the evolution of life and of the geo-systems that support life. Thus, the two opening chapters set the scene for the series of analytic discussions that follow, with each examine specific aspects of Earth Systems, including:

* The conditions which are necessary for the support of life
* Possibilities of life in other parts of the universe
* The co-evolution of both geosphere and biosphere
* Operation of the quaternary earth system, including oceanic and atmospheric circulation; and role of major ice-sheets
* The human-environment interaction, including the modifications of land, coastal and atmospheric systems
* Assessing the altered functions of the Earth system
* Intellectual and other cerebral elements in the Earth system

Finally, the implications for sustainability are examined and provide a key integrative theme for the book as a whole. The conceptual device of integrated systems analysis in order to gain a holistic view of complex phenomena and events is increasingly utilized in such studies. But the present book will present a challenge to the comprehension of many people; its coverage of the Anthropocene era is indeed thorough and so the reader must keep integrating the many ideas presented in order to understand the whole. The very issue of sustainability is complex at almost any level; here it is dealt with at the broadest possible level. I can only say it is the sort of book that demands time and concentration; one cannot usefully just dip in and out. But it is indeed an extremely valuable basis for any serious interest in the idea of sustainability. In order for the book to prompt further thought and action it may need a “Readers Digest” treatment, in which its essence can be conveyed to both general readers and political leaders.

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