Population Decline

Systematics, Ecology and the Biodiversity Crisis

edited by Niles Eldredge, *Columbia University Press, 1992. $61.50 hbk (ix + 220 pages) ISBN 0 231 07528 6*

There is a touch of irony in drawing attention to the importance of systematics in attempts to stem the biodiversity crisis. For years systematics has itself been in decline. Like those of so many plant and animal species, populations of systematists have fallen in size, have become more 'over-aged' in their age-profile, and have been existing on a declining resource base (their bit of the science budget). The irony would perhaps be made yet more complete if growing recognition of the need to do something about the biodiversity crisis resulted in a revitalisation of the discipline of systematics.

There are signs, as yet a little faint, that such a revitalisation might indeed take place. Many observers argue, however, that a major obstacle remains. That is that too great a proportion of both the scientific and the broader community is ill-informed as to what systematics is, what systematists do, and why both are relevant in the fight to understand and to reduce extinction rates.

By those who have perceived it, there have been several attempts to overcome this problem. This book provides a further contribution to this process, in the words of its editor it is 'a frank attempt to heighten awareness of the real and potential importance that systematics has for understanding, and perhaps even helping to alleviate, the present-day biodiversity crisis'.

The book's origins lie in a symposium held at the American Museum of Natural History, and entitled 'The Role of Museums in the Biodiversity Crisis'. The title of the volume reflects its contents better than would that of the meeting. Its thirteen chapters, some of which were not presented at the symposium, cover a broad range of topics, from considerations of latitudinal gradients in species richness (Stevens) and the relation between ecology and evolutionary biology (Eldredge), to the roles in the biodiversity crisis of zoological gardens (Flesness) and third world museums (Vanzolini). In some chapters authors strive hard to emphasise the links between particular facets of systematics and one or more aspects of the study of biodiversity, in others the links are rather more implicit than explicit. Whilst all the authors are based in institutions in the New World, they draw on examples which are globally distributed.

In the main, this is not a book of new ideas. Rather, it is a compilation of viewpoints and perspectives, many of which are placed in fresh contexts and with unfamiliar examples. It is a measure of the book's success that there is something here for those who would regard themselves simply as systematists, ecologists or conservationists, as well as for those who already recognise the artificiality of such distinctions. Thankfully, there is very little which has obviously become redundant or outdated since the manuscripts were written. Perhaps the most apparent developments which have taken place are those in incorporating phylogenetic relationships into decisions as to which areas to prioritise for conservation.

One can always identify gaps in the coverage of multi-authored volumes. There is, nonetheless, one sense in which this volume can be construed as a missed opportunity. There is little in the way of a concerted attempt by most authors to present an agenda for the future development of the relationship which has been espoused between systematics and the biodiversity crisis. In this respect it perhaps reflects how little attention has been paid to such an agenda more broadly. There is, however, an urgent need for a priority-setting dialogue between the practitioners of conservation biology and of systematics. Without such, both disciplines will be the poorer. More pragmatically, the predicted time to extinction of populations of systematists and of other species will not increase as much as it otherwise should.

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Ecological Economics

Sustainable Investment and Resource Use: Equity, Environmental Integrity and Economic Efficiency

by Michael D. Young, *UNESCO and Parthenon, 1992. £30.00 (xvi + 176 pages) ISBN 1 85070 381 7*

Ecological economics starts with the basic idea that the economy is a subset of the larger ecological life support system[1]. The two are so interdependent that it is senseless to separate them – yet this is exactly what our traditional academic disciplines have done. Michael Young has produced a comprehensive and lucid synthesis of the new field of ecological economics, ranging from basic tenets and changing perceptions of the ecology – economy link, to a full range of prescriptions for effective change to a sustainable system.

Ecological economics represents a search for a new transdisciplinary synthesis. This synthesis should be based on an 'overlapping consensus'[2]. According to Young, 'a consensus that is affirmed by opposing theoretical, religious, philosophical and moral doctrines is likely to be a just one and, in a resilient fashion, likely to thrive over generations'. A key overlapping consensus that has emerged surrounds the goal of sustainable development, a form of economic progress that 'maintains the ecological processes and functions that underpin it' and reaps the 'benefits of improving the quality of life now without denying future generations a similar opportunity'.

Young then goes on to elaborate the differing concepts and assumptions underlying conventional economics, ecology and ethics, in order to aid communication and to search for overlapping consensus. Economics contributes by focusing on economic efficiency and resource rights. Ecology contributes by focusing on ecosystem functioning and environmental health and integrity. Ethics contributes by focusing on distributional consequences and fairness. Young's lucid jargon-free discussion of these issues provides a basis for future transdisciplinary dialogue

and ultimately leads him to a set of eight 'constraints' and 33 specific policy prescriptions to implement them. The list of constraints and prescriptions is itself somewhat overlapping and redundant, however. Goals, constraints and prescriptions are mixed. The fundamental consensus is that we need to maintain 'natural capital' in order to assure sustainable ecological functions and services and preserve future opportunities[3–5]. The other constraints and prescriptions Young includes in his list are either subsets of this goal (i.e. maintaining environmental quality, maintaining future options, efficient resource use, maintaining the aggregate value of mineral stocks and conditionally renewable resources), or specific methods to achieve it (i.e. avoiding government failure, stopping population growth, redistribution of wealth to poor countries).

The remainder of the book is devoted to the design of sustainable resource rights systems and macro and micro economic policy opportunities for achieving sustainable development. There is much of use here. Young argues that by designing overlapping conditional systems of resource use and property rights to cover the many different aspects of natural capital within a region, we can set the stage for sustainable use. The success of either command and control regulation or market based incentives for sustainable management are predicated on having an adequate, legally viable resource use and property rights system. Changing these systems of explicit and implicit rights are likewise often the most difficult and neglected step in implementing (i.e. the former Soviet Union) or enlarging the scope (i.e. western Europe and the US) of market-based systems of allocation. The resource use and property rights system, laws and regulations set the stage and largely determine the goals for an economy, while competitive markets are efficient tools to help society achieve its goals. As Young points out 'competitive markets are excellent servants but bad masters'.

Emphasis in the micro policy section is on a mixed approach that makes maximum use of market incentives on the condition that the underlying system of rights is in place and safe minimum standards are preserved. The well-known 'polluter pays' principle of Pigouvian taxes for pollution and the 'user pays' principle for resource use are advocated, along with the use of deposit-refund and security-deposit schemes for persistent pollution.

One topic that is not given enough emphasis is the issue of scientific uncertainty. Setting user fees and pollution charges is fraught with uncertainty because our understanding of the full impacts of human activities on the ecological life support system will always be severely limited. While Pigouvian taxes have achieved broad consensus in the economics community, they have by and large been rejected by the environmental community on the suspicion that the environment would be undervalued and the taxes set too low. The 'precautionary principle' (when in doubt about environmental impacts, err on the side of caution) has recently gained broad consensus in the environmental community as the preferred approach to uncertainty[6]. Linking this principle with the polluter pays principle has produced the 'precautionary polluter pays principle' (the 4P approach) in the form of refund-able environmental assurance bonds that combine features of deposit-refund systems, Pigouvian taxes and erring on the side of environmental caution[7–9]. Such policy instruments may ultimately achieve the broad overlapping consensus necessary for political feasibility, fairness and sustainability.

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Global Change, International Politics and Anaerobic Metabolism

Climate Change: Science, Impacts and Policy (Proceedings of the Second World Climate Conference)

edited by Jill Jäger and Howard L. Ferguson, *Cambridge University Press, 1991. £24.95 pbk (xiii + 578 pages) ISBN 0 521 42630 8*

Microbial Production and Consumption of Greenhouse Gases: Methane, Nitrogen Oxides, and Halomethanes

edited by John E. Rogers and William B. Whitman, *American Society for Microbiology, 1991. $64.00 ($49.00 for members of ASM) (viii + 298 pages) ISBN 1 55581 035 7*

In the past five years or so, the issues associated with global change have become a major driver of research in the environmental sciences. The impacts on priorities and funding have been most dramatic in the atmospheric sciences, but increasingly ecologists are focusing their research on the causes and consequences of environmental change – issues which are increasingly central to global change research. The involvement of ecologists in global change research is pervasively influencing the direction of the field, in ways that are likely to be clearer with hindsight than at present. However, these two books illustrate both the context in which the ecology of global change is relevant, and some of the scientific directions of the field. Neither title suggests areas where ecologists would have been prominent ten years ago, and yet both volumes contain considerable contributions from ecologists. The significant number of ecological or related papers in Jäger and Ferguson reflects a sea change in the relationship of the ecological and geophysical sciences.

Global change has increased the attention given to extrapolation of process rates to large areas. The problem of extrapolation is central to ecological contributions to global change because of the need to understand the integrated contribution of the biosphere to global phenomena. It is also important to understand the effect of global changes in climate on biological processes over large areas, as climate change could affect the