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BOOK REVIEWS

Handbook of Environmental Impact Assessment. Volume 1 Environmental Impact Assessment: Process, Methods and Potential

EDITED BY JUDITH PETTS

xii + 484 pp., 25.5 × 19.5 × 3.5 cm, ISBN 0 632 04772 0 hardback

Volume 2 Environmental Impact Assessment in Practice: Impact and Limitations

EDITED BY JUDITH PETTS

25.5 × 19.5 × 3.5 cm, ISBN 0 632 04771 2 hardback, two-volume set £175.00, Oxford, UK: Blackwell Science, 1999

The objective of this recently published book is stated to be: 'to provide a truly international perspective of the status of EIA, an up-to-date and critical reference in terms of key methodological issues and a discussion of essential improvements in the context of sustainable development' (Vol. 1: Preface, p. xi). This is attempted via two volumes, 38 chapters and 934 pages, contributed by 17 academics, 13 government employees and 15 individuals from the private sector of the environmental assessment (EA) community, stretching the Concise Oxford Dictionary definition of handbook as a '(usually small) treatise, manual, or guidebook'. The first volume aims to cover 'EIA: Process, Methods and Potential', whilst the second covers 'EIA in Practice: Impact and Limitations'. In reality, there is considerable overlap between the two volumes: 'potential' and 'limitations' are two sides of the same coin and the same concepts, references (Sadler, [1996] appears in the bibliography of 19 different chapters), examples, even the same diagrams (in Vol. 2 Fig. 2.1 and Fig. 12.2 are identical), recur throughout the handbook. This inability of different contributors to clearly define and summarize a specific 'territory' devalues this (very expensive) book considerably and is perhaps symptomatic of a discipline which is undergoing a crisis of confidence (see below).

The objective of the book given above has three components and provides a convenient yardstick to evaluate the contribution this handbook makes to the EA literature.

Objective Component 1: *'a truly international perspective of the status of EIA'*

Chapters 5–12 in Volume 2 review the EIA process continent by continent. This kind of comparative review has been completed several times within the EIA literature already, notably by Wood (1995) and Sadler (1996). Extending the coverage to more and more countries does not change their basic conclusion that although the dominant 'western' model for EIA has been introduced in over 100 countries, it has generally failed to bring about significant improvements in the protection of the environment, in spite of its solid theoretical framework. For example, we learn that, in spite of the Philippines and Thailand having EIA legislation since 1978, not one project from over 1000 impact statements has been denied clearance for environmental reasons. In Russia, over 80 000 EIAs were completed in 1994 alone, compared to just 7 in Latvia; this is a 300-fold difference in EIAs per km^2, yet environmental conditions in Russia continue to decline. The reasons for the failure of EIA to live up to expectation are complex and vary from country to country, but include lack of appropriate data, lack of human and financial resources, lack of experience in implementation, lack of authority, lack of political will, and corruption and political instability. Removing these limitations is not easy and has little to do with fine-tuning of EIA procedural details. Unfortunately, Chapters 5–12 of Volume 2 focus most of their attention on the latter and thus overlap badly with many of the other methodological chapters (discussed below), rather than grappling with the thorny problem of how to apply a 'perfect process' under the non-ideal conditions which make up the real world.

Objective Component 2: *'an up-to-date and critical reference in terms of key methodological issues'*

To an 'outsider', the recent proliferation of EA methodologies must be confusing. Although there is only one relatively simple basic structure for environmental assessment, a plethora of variant forms has been developed, each subtly different from one another. In this handbook, there are presentations of two forms of EIA (Environmental and Ecological Impact Assessment), plus CIA (Cumulative Impact Assessment) designed to capture the multiple effects of many projects on one environmental space, then SIA (Social Impact Assessment) to redress the neglect of people in traditional EIA, and COEA (Collaborative/Cooperative Environmental Assessment) to increase the level of public participation in EA. In order to bring EA into the project cycle earlier, we have assessment of PPPs (Policies, Plans or Programmes), better known as Strategic Environmental Assessment (SEA), but with PEA (Policy Environmental Assessment) emerging as an independent sub-discipline. Finally, we are introduced to Environmental Sustainability Assessment (ESA), which attempts to bring the entire sustainability bandwagon into the environmental assessment process (see below). In addition to chapters covering these themes, there are other chapters covering environmental sectors, namely air, water and landscapes, plus project types, namely waste, energy and mining. In almost all cases, the emphasis is strictly on the general process not the technical tools of assessment, with the notable exception of D. Owen Harrop's chapter on air quality assessment (AQA). Although, across the entire handbook, there is a lot of useful methodological information to be gleaned, it is not easy to get at the best of it. Most individual chapters are overviews, providing a surface skim of the subject area which may be meaningful to the initiated, but will not easily 'bring-on' the uninitiated entering this literature for the first time; such users will still need to dig out more detailed information from the chapter references.

Objective Component 3: *'a discussion of essential improvements in the context of sustainable development.'*

Placing EA at the heart of the quest for sustainable development, as suggested in Chapter 2, creates a danger that the EA community stretches itself over too much ground to be effective. Movement towards sustainable development will only occur if two things occur simultaneously, namely profound changes in people's lifestyle attitudes and acceptance of an urgent need to fast-track best environmental practice into the real world environment. Environment guidelines or standards which match what is technically possible, coupled with strong environmental management, are more efficient means for achieving this than invoking ever more complex (external) assessment processes. An introspective, self-ref-

erential EA community makes little contribution to this transition and EA is in danger of finding itself becoming increasingly irrelevant to the development process if it continues to expand but not transform. This may not be a bad thing; indeed, it may be a necessary condition of the success of 'mainstreaming the environment'. The EA community has established itself as a (potential) guardian of the environment against an 'uncaring' development process. But, if a movement towards sustainable development is occurring, then project design will implicitly contain best environmental practice, simply because engineers will think that way. Similarly, policies, plans and programmes will be developed by practitioners who can only design that way, and the Internet will link them all together more efficiently than handbooks like these.

References

Sadler, B. (1996) Environmental assessment in a changing world. Final report of the International Study of the Effectiveness of Environmental Assessment. IAIA and Canadian Environmental Assessment Agency, Minister of Supply and Services, Ottawa, Canada.

Wood, C.M. (1995) *Environmental Impact Assessment: a Comparative Review*. Harlow, UK: Longman: 262 pp.

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Creeping Environmental Problems and Sustainable Development in the Aral Sea Basin

EDITED BY M.H. GLANTZ

xii + 291 pp., figs., maps, tables, 25.3 × 17.7 × 1.8 cm, ISBN 0 521 62086 4 hardback, £50 (US$85.00), Cambridge, UK: Cambridge University Press, 1999

Threat to human existence from wars, hostilities, revolutions and accidents exists along with deterioration of the environment by various economic activities. The last type of environmental deterioration is not less dangerous than the others; in fact it may be more, as it acts permanently and universally. In the case of the Aral Sea, it gradually led to the decrease in the Aral Sea level by 17 m and to a sharp reduction of its area, from 66.9 thousand km^2 in 1960 to 31.9 in 1994. The Sea also separated into two independent basins. The water salinity increased from about 10 ‰ in 1960 to 40 ‰ in the Large Sea and 27 ‰ in the Small Sea (as described in Chapter 3 by V.N. Bortnik), and the former biological community collapsed. Salt dust from the exposed bottom has been distributed by winds and now afflicts terrestrial ecosystems and human health.

The Aral Sea is the easternmost sea in the south of the former Soviet Union, related to the Black Sea and the Caspian Sea in the geological history of its basin, fauna, and flora. What remains of the Aral Sea is now situated in the Kazakh and Uzbek Republics, the latter described by A.N. Krutov in Chapter 12. At the same time, the Aral Sea and its main rivers have now acquired international status and the problem which they represent has gained international recognition as one of the world's principal environmental disasters.

Events such as the Aral disaster being so complex, they demand multidisciplinary investigation by specialists of a new kind capable of assessment and prognostication of such situations. Knowledge in biology, geography, agriculture, sociology, medicine, and various other related fields needs to be combined. As it is hardly possible to achieve this in one person, the social responsibility of teams of experts is growing. The reviewed book is a result of the work of such an international team. All principal components of the problem are considered, including hydrology and geography, aquatic and terrestrial biology, social aspects, and public health. The integration of particular aspects is successfully performed by the editor and co-author, Dr M.H. Glantz.

The problem is also highly professional and cannot be tackled by anyone who is not specially educated. Non-obvious processes and delayed effects of human interference in nature can only be revealed by experts in various fields, including theoretical ecology and biology, genetics, carcinogenesis, and teratology. It may be added that the biological components of any ecosystem are far more sensitive to disturbance than is generally accepted. Such multidisciplinary effort of experts was successfully organized into a meaningful whole by Dr M.H. Glantz for the Aral Sea.

The book includes 13 chapters, each followed by a list of references. Chapter 1 (Sustainable development and creeping environmental problems in the Aral Sea region) is by M.H. Glantz and presents the general characteristics of the situation. It also introduces the notion of 'creeping environmental problems' (CEP) and its special application to the Aral Sea, which has now received what was urgently needed. The ways out are also discussed.

The Aral case stimulates theoretical contemplation of future work in similar situations. Might there be a certain scientific approach capable of discerning principal lines of action amongst so many co-occurring and interacting variables? Failing this, certain interests such as those of particular industries considered important at the time will no doubt tend to be preferred. Will all the various experts necessary be available? How should they be integrated and provide for efficient action?

Chapter 2 'Ecological disaster linked to landscape composition changes in the Aral Sea basin' by E.A. Vostokova describes the general ecosystem consequences of the construction of canals and reservoirs, and the scientific meetings aimed at recognition of the critical situation which have been held at various times. The changes in the Karakum Canal zone are specially described in Chapter 11 (Creeping environmental changes in the Karakum Canal's zone of impact) by N.S. Orlovsky. Chapter 8 (Changes of the rivers' flow in the Aral Sea basin (in connection with the problem of quantitative assessment and consideration of environmental after-effects)) by K.V. Tsytsenko and V.V. Sumarokova specially discusses the impact of long-term fluctuations of river discharge. The consequences concern not only the Sea itself but its wider environment, as described in Chapter 4 (Desertification in the Aral Sea region) by A.A. Rafikov. Chapter 5 (Climatic fluctuations and change in the Aral Sea basin within the last 50 years) by A.N. Zolotokrylin describes the recent climatic events.

All through the twentieth century, human efforts mostly resulted in the deterioration of the Aral Sea. Positive efforts were too weak. Water is the central point in the Aral problem. The bulk of water from two big rivers was diverted for irrigation. Not only did irrigation canals divert water from inflow into the Aral Sea but also into the Karakum Canal. In some years, they together consumed all the water from the Amudarya.

The principal crop at which the economy was targeted was cotton. For the irrigation of cotton fields, 51.5% of water in the

Amudarya basin and 34.2% of that in the Syrdarya basin, were used. The reasons for this are discussed. One of them is mentioned, but only briefly at page 161, namely use of cotton by the armaments industry. The last issue is discussed insufficiently; it may have been a key point in the destruction of the Aral.

The consequences are diverse and comprise the aquatic ecosystem and its hydrochemical and hydrophysical medium, the coast and exposed bottom, terrestrial ecosystems, socio-economic issues, and human health. The Aral disaster is a clear case of overexploitation of the natural complex.

Chapter 6 (Priaralye ecosystems and creeping environmental changes in the Aral Sea) by N.M. Novikova describes terrestrial biological communities and changes therein. Special attention is given to the formation of complexes of plants and animals on the dry Aral seabed.

It may be noted that over the last few millennia the Aral Sea has on occasion dried up before its water level rose again. During the Holocene, Sea level fluctuations exceeded 20 m. The recent disaster was accelerated by economic activities and, in its turn, undermined regional economies.

Unreserved discussion on human health under conditions of a collapsed ecosystem is presented in Chapter 7 (Public health in the Aral Sea coastal region and the dynamics of changes in the ecological situation). An important factor for public health is the quality of drinking water. Water from the Syrdarya and the Amudarya has been found to exceed no less than 20 chemical quality standards. Up to 55 kg/ha of pesticides and 400 kg/ha of fertilizers were used in the Aral Sea basin, which from fields later found their way to rivers, human food, and breast milk (Table 7.7); these data are shown in more detail in Tables 12.2 and 12.3. The steady growth of infant mortality is pointed out.

For a long time the Aral Sea was the objective of an exercise in the 'transformation of nature'. The biological components of its ecosystem are described both in Chapter 10 (Fish population as an ecosystem component and economic object in the Aral Sea basin) by I. Zholdasova, combining discussion of both a principal component of the biological community and a commercial object, and in Chapter 13 (Creeping changes in biological communities in the Aral Sea) by N.V. Aladin. In the balanced period, its annual fish catch reached 43.4 million t (1960), but this dropped to almost zero (1980); the fishing industry collapsed and caused regional large-scale unemployment. The fishery vessels remained on the dry seabed and are now a widely-known and pitiful sight.

At various times all kinds of animals were introduced into the Aral Sea, at best without any useful results and sometimes with disastrous consequences. N.V. Aladin offers Table 13.1 which chronologically lists actions taken and results. Introduction of the stellate sturgeon (and the unintended introduction of its two parasites) in 1927–34 resulted in mortality of the indigenous sturgeon in 1934. Various introductions, including Baltic herring, grass carp and silver carp, resulted in a three-fold decrease in fish yields by 1970. Finally, a water salinity of about 40 ‰ killed the whole previous biological community.

This comprehensive book reviews how the present-day destruction was achieved. This is shown, *inter alia*, in Chapter 8 (The impact of political ideology on creeping environmental changes in the Aral Sea basin) by I.S. Zonn. In addition to detailed listing of official actions, it is noted that decision-makers typically neglected scientific recommendations and warnings. The Aral situation is part of the heritage of the former USSR. Scientific elaboration of problems of this kind was commonly retarded and complicated by the prohibition of publication of data on the actual state of the environment by understatements, and unavoidable falsification.

The Aral situation stimulated discussion of the environmental consequences of diverting the flow of great Siberian rivers to the south. Fortunately the plans for such diversion have now been abandoned.

The Aral Sea is not alone in its critical situation. In the same geological family there is the Sea of Azov, connected with the Black Sea by a narrow channel. Its biological system in the 1930s was the most productive in the world and supplied the population with valuable fish. The Sea of Azov did not lose its area, but its quality declined. Nowadays, it is an industrially-polluted pool with biological productivity many times lower than before.

The present book is well printed and bound. I was able to find only a few misprints; L.A. Zenkevich is misspelt on page 282, *D. polymorpha* misspelt on page 215, and there are a few other misprints in Latin names on page 209. There is an alphabetical index, which is generally informative and useful, but while it includes the Amudarya River, somehow the Syrdarya is not included.

The book is a successful step in the estimation of the Aral problem, and it is rich in factual material, advances the theoretical background, and is recommended for all concerned with such problems and also for general and marine ecologists.

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The Globalization of Ecological Thought

BY HAROLD A. MOONEY

xxiv + 153 pp., 24.8 × 17.3 × 1.2 cm, no ISBN, ISSN 0932 2205
hardback, DM 59.00, Excellence in Ecology Series No. 5,
Oldendorf/Luhe, Germany: Ecology Institute, 1998

The field of ecology has traditionally been dominated by scientists attempting to unravel the workings of natural systems, investigating interactions between plants or animals and one or more components of a pristine physical environment, or else interactions amongst the organisms themselves. Moreover, the research efforts of silviculturists and other applied ecologists have generally been dismissed by such scientists as being irrelevant to advances in 'pure' ecology. But the ever more widely over-utilized and otherwise seriously disturbed global biosphere, with the immense implications of such disruption for the welfare of human society, is finally intruding upon a still small, as yet underfunded, but slowly growing fraction of academic ecologists.

The monograph under review here is in essence the scientific memoir of a distinguished US plant physiologist (and Professor of Environmental Biology at Stanford University) who has devoted the past few decades of his career to the seemingly tireless promotion and organization of the ecological dimensions of global change. Those efforts have been pursued both at the international level via such intergovernmental agencies as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and at the transnational level via such non-govern-

mental organizations as the International Council of Scientific Unions (ICSU).

The author has been at the core of most of the many projects he describes, so is extremely well placed to set forth the political, financial and other tribulations of the origins of those projects, their accomplishments to date, and what they still need to do. Moreover, any aspect of this denouement can be readily explored in greater depth by referring to the almost 300 citations, over 40 of which have been the responsibility of the author himself either via authorship or editorship. Indeed, this monograph was commissioned by the Ecology Institute of Oldendorf/Luhe, Germany, in association with a prize it bestowed upon the author.

It is the elucidation of the internationalization and transnationalization of the scientific study of the deteriorating global biosphere and the policy implications that flow from this, the author's 'globalization of ecological thought', that forms the crux of this monograph. That elucidation is the real strength of the work and is sure to become a basic source for future historians of bioscience. A further aspect of great value is the clarity with which gaps in knowledge are enumerated that remain to be filled in order to assess the ecological implications of such causes of global change as the increased loading of the atmosphere with carbon dioxide and other greenhouse gases.

The introductory summary of insults to which the global biosphere is being increasingly subjected, and the empirical manifestations of those insults (e.g. inordinate increases in the rates of plant and animal extinctions, depleted ocean fisheries, the ever more troublesome introductions around the world of invasive alien species, and the losses in so-called ecosystem services to human society) provide a useful primer, but may not really have been necessary for those who will be attracted to this book and for which there exist a significant number of more detailed expositions.

Even less useful will be the introductory summary devoted to the development of ecological and closely related biogeographical thought during the nineteenth and twentieth centuries. This exposition of the antecedents to biospheric thinking is both fragmentary and superficial. For example, Andreas F.W. Schimper receives inadequate attention, and neither Moritz Büsgen nor Ernst Münch receives any. Even more disturbing, Vladimir I. Vernadsky, the great pioneer in this field, is not mentioned even in the section devoted to Russian contributions; nor is Konstantin D. Glinka.

An unfortunate weakness of the central subject matter of this monograph is the rather uninformed references to several of the major multilateral environmental treaties, so important to worldwide international environmental collaboration. Their crucial role in such collaboration (both of those referred to and of those overlooked) seems not to have been fully appreciated. Moreover, references made to treaty obligations or constraints to which the states parties (not the states signers) have agreed should have been identified as to specific article (and thus also with the recognition that preambular portions of treaties are not binding, but merely hortatory). The 1992 Convention on Biological Diversity (UNTS 30619) does of course have considerable value, but is given undue credit here for the globalization of ecology when in fact it clearly undermines such internationalization. And finally, despite substantial emphasis in this text on USA contributions to the globalization of ecology, and on the importance of both the Convention on Biological Diversity and the 1982 Law of the Sea Convention (UNTS 31363), nowhere is it mentioned that the largest stumbling block by far to the effective implementation of those two treaties is the intransigence of the USA in refusing to become a state party to either of them. The great importance of accepting the strictures of the 1997 Kyoto Protocol to the 1992 Convention on Climate Change (UNTS 30822) is also properly stressed, but again without noting the similar US dereliction here.

Selected additional points that make this monograph somewhat less useful than it might be are noteworthy. First, the book contains no index. Second, in reading this text, you are drowned in an ocean of acronyms and other abbreviations. It is true that some 60 of them are explained albeit minimally in an appendix, but each entry should have been more completely identified (by year of origin, location, parent organization, and so on); and the list is frustratingly incomplete. Third, Table 26 (p. 102) makes no sense, while Figure 20 (p. 66) is loaded with unexplained entries. And fourth, the editing will be considered too lax by many, given its four dozen or so minor lapses (misused words, small grammatical errors, slight inconsistencies, missing citations, and so on).

So in conclusion, this monograph is at its most valuable in recording how ecology is being increasingly globalized (i.e. both internationalized and transnationalized), despite the traditional reluctance of many 'pure' ecologists to accept their obligation to society to come to terms with the real world. And, as the author properly points out, this emerging globalization of ecology has been greatly facilitated by a number of factors, most important amongst them being: the growing spread of English as the worldwide language of science; the vastly increased abilities for scientists to communicate with each other via fax and e-mail; the growing development and availability to the civil sector of society of remote-sensing technology; the development of enormously advanced computational powers; and the increased sources of relevant funding, both public and private. To this compilation must clearly be added the tremendous efforts of the author to help make it all happen.

This review might well end by echoing the author's advice to academia to become more interdisciplinary, to engage more heavily in internationally and transnationally broad-based scientific endeavours, and to translate and transmit scientific findings to the public.

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Requiem for Nature

BY JOHN TERBORGH

xii + 234 pp., 23.5 × 16 × 2 cm, ISBN 1 55963 587 8 hardback, US$24.95, Washington DC: Island Press, 1999

I recommend that any conservationist prone to disillusionment and despair should avoid John Terborgh's *Requiem for Nature*. For the stoic environmentalist, student or researcher, this book is an indispensable assessment of the current conditions and future prospects for biodiversity on planet Earth. Terborgh, an ecologist who has extensive experience in the field, is in a unique position to make that assessment. He concludes that given the current social and political climate in the tropical countries which house much of the world's terrestrial biodiversity, the likelihood of preserving what fragile ecosystems remain intact, is slim to none. He further explains that most of the conservation efforts implemented up to this point in tropical regions have been based on 'little more than wishful thinking' and have been a waste of time. However grim Terborgh's

assessment may be, the reader cannot help but be drawn into his passionate and eloquent presentation of the naked truth, namely that if we are to save nature, there must be immediate and sweeping changes in our international priorities.

The national parks of tropical countries are theoretically the last reservoirs for the biodiversity of the regions concerned. In actuality, they are plagued by misguided science and poor management. The author explains that the protected areas almost never correspond to ecologically critical habitat. Parks are usually located to preserve scenic vistas, or on land that is not in high demand. Reserves are also too small and fragmented to maintain ecosystems. Top predators usually become extinct, leading to an overabundance of herbivores which overgraze and tip any balance of nature into a downward spiral. Furthermore, the national parks that do exist are often nothing more than 'paper parks', where restrictions against squatting, logging and agriculture are not enforced. Parks are understaffed and frequently ignored by politicians.

Terborgh argues that the protection of nature for posterity requires rock solid institutions. In the developing nations the 'overall lack of social, economic and political maturity results in institutional weakness and instability'. He feels that for the developing world, nature has only utilitarian value and, as a consequence, short-term thinking about use of natural resources prevails. The author frequently points to the management of national parks in the USA to contrast the poor performance of those in the tropics. He observes that the adoption of Western norms and institutions (democracy, urbanization, education, low birth rates, and so on) is a precursor of successful conservation.

It is obvious that the author is a biologist and not a geographer. If the latter were the case, he would recognize that it is the West that is indirectly causing much of the biodiversity loss in the tropics. I would encourage him to examine three important links between the industrialized nations and the loss of tropical biodiversity. (1) Resource extraction from developing countries fuels the industries of the first world. This is especially evident in the tropical forests of Ecuador, where USA oil companies are building the roads that open up the forests to colonization. (2) The increasing pressure exerted on more and more remote regions in the tropics is a result of the land procuration of the colonial period and now the era of economic imperialism. (3) Developing countries are in such a frenzy to increase their economic output in large part because they have crippling debts to the West and to Western international organizations. Terborgh fails to indite the industrialized nations and their patterns of gross overconsumption for their role in the destruction of the Earth's biodiversity.

Terborgh argues that the international community needs to restructure both its priorities and approach regarding the preservation of biodiversity. He is ruthless in criticizing conservation organizations for their flashy campaigns to save particular species, because these campaigns fail to recognize the root of extinction problems and fail to suggest long-term solutions. Like governments, these organizations bow to pressures to increase their constituency by producing frequent and often superficial 'successes'. Terborgh also rejects the more recent 'integrated conservation and sustainable development problems' (ICDPs), which represent a collaboration between conservation organizations and development agencies to reduce pressure on national parks by alleviating poverty. The author argues that 'it makes little sense to talk about village-level forestry cooperatives when big players are wheeling and dealing in billion-dollar contracts signed at the level of ministers and presidents'. He insists that the 'top down' approach is essential to conservation.

The author makes an essential distinction here between conservation and development. So long as it refers to ecological posterity for human benefit, sustainable development makes perfect sense. However, if the mass extinction of the species left on Earth is to be prevented, for their own sake, utilitarian values cannot be relied upon. According to the author, the burden of proof of the value of ecosystems lies with the conservationists when it comes to resource extraction, because the short-term economic gain from destroying the forest always outweighs the potential benefits of preservation. However, I would argue that 'top down' solutions are not as simple as Terborgh makes them out to be. He would have countries relinquish their own property to an international 'watchdog' organization entrusted with the protection of these biologically-rich global commons. It seems unlikely that the politicians of the Third World will voluntarily bend to Western imperatives in such a drastic way, and even if these agreements were secured, they would represent only a temporary solution. So long as desperate poverty and antagonistic relationships between the peasantry and the parks persist, pressure will continue to be exerted on these fragile ecosystems. While working at the grass-roots level to build interest in conservation and strengthen community economy is time-consuming, the effects are lasting. Success with these methods have been demonstrated in villages of Botswana and Kenya, where rural people have entered into partnerships with parks authorities.

John Terborgh's research and presentation on global biodiversity is unparalleled in its readability and scientific thoroughness. While the book is lacking in its assessment of the social and economic factors leading up to the extinction crisis that now plagues us, it is just the proverbial slap in the face we need to realize the urgency of the problem.

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Against the Grain: Biotechnology and the Corporate Takeover of Your Food

BY MARK LAPPÉ AND BRITT BAILEY

i + 163 pp., 26 × 15 × 1.2 cm, ISBN 1 56751 150 3, US$14.95, Monroe, ME, USA: Common Courage Press, 1998

It is appropriate to compare Rachel Carson's *Silent Spring* with the present book, which illustrates the problems with biotechnology. Going one step further than Carson, the authors convey the message that 'transgenic' food cannot only harm the human body, but will also lead to the devastation of agriculture by way of homogenized crops. This 'drastic' change in the evolution of plants, according to Lappé and Bailey, is due to corporate strategies to make profit rather than to meet human need. Therefore, they conclude, the direction of food production has 'severe' implications for the future global food supply.

Lappé and Bailey's book tackles three areas of concern with biotechnology. Firstly, how does 'altered' food interact with the human body? Secondly, what would its presence in crops mean for the evolutionary process of agriculture? Thirdly, who is responsible for the promotion of the (potentially negative) technology? It has not been ascertained, for example, whether or not the herbicide,

bromoxynil, is toxic to animals, including humans. The toxin of *Bacillus thuringiensis* (Bt) which is used to kill insects, is also a cause for worry because insects will eventually generate resistance and higher levels of pesticide use will in due course be required. A growing number of major companies in the USA, such as Dow Chemical and Monsanto, as well as in other (mostly) industrialized nations are developing 'non-labeled' biotechnology-based agricultural commodities.

Currently, there is no conclusive evidence that genetic engineering is harmful to the human body. For example, there is no known case of fatality caused on its own by an altered food. The authors, however, place more emphasis on the long-term effect of such products, including the disruption of the organisms in micro-ecosystems. In addition to the possibility of intoxicating micro-ecosystems, which are essential for the sustenance of plants, crops genetically altered to resist insects or diseases will eventually fail, because agriculture based on monoculture leaves plants susceptible to catastrophes. That is, biodiversity is a necessary element in order to protect crops from 'blight or depredation'. As Lappé and Bailey write: 'Historically, such variation and diversity have assured protection of food supplies' (p. 98). The reason why we are moving from this 'traditional goal', they write, lies in economic factors. Mainly, this means that biotechnology companies, particularly those based in the USA, have a vested interest to stay above their competitors by holding a monopolistic control on a particular crop or several crops, for the sake of making profits.

The book, though intended to inform readers of the dangers of biotechnology, is deficient in coming up with some definitive approaches to deal with the problems identified. Besides the lack of any real solutions, the book fails to present facts or evidence of whether genetic engineering affects animals, including human beings. Furthermore, Lappé and Bailey could have elaborated more about the negative impacts 'transgenic' technology and business would have on food security, especially in the poorer countries.

Against the Grain, however, is clearly written, and easy to understand, and constitutes a worthwhile text. It should be commended for its honest (and passionate) description of the current trend in food production and distribution worldwide. Whether describing the chemical make-up of the insecticides, detailing farming operations, or placing emphasis on the critical interactions between corporations and government concerning agriculture, Lappé and Bailey's writing succeeds in helping the reader to understand fully the process of genetically engineering food. In this way, the book can be used for future reference as it facilitates 'consumer sovereignty', particularly with regard to the decision as to whether or not to purchase genetically altered food or transgenic seeds. For those interested in finding out exactly what is contained in the ingredients of their food, such as mothers feeding their newborn with 'baby-formulas', 'old-time farmers' buying seeds to prepare for the next season, or, more generally, students and scholars investigating the corporate methods of gene introduction into the world's food supply, the materials contained in this book are vital to learning. I highly recommend this book.

Reference

Carson, R. (1999) *Silent Spring.* Penguin: 336 pp.

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Environment Scotland: Prospects for Sustainability

EDITED BY ELEANOR MCDOWELL AND JAMES MCCORMICK

x + 221 pp., 22.6 × 15.6 × 2.9 cm, ISBN 1 84014 899 3 hardback, £37.50, Hampshire: Ashgate, 1999

There are only so many ways one can weave the words sustainability and environment together and still produce something new, but insert 'Scotland' and you at once have a new fabric. The book comprises twelve essays culled from a 1997 conference that examined the social, urban, rural and economic environment from a Scottish perspective, slipping in a few sideways glances at the forthcoming Scottish Parliament. 'A theoretical treatment of sustainable development', state the editors, 'is not the stuff of popular politics. Once unpacked into its constituent parts it should make sense to ordinary people'. The idea is good. However, at £37.50, I fear the book will not penetrate far into the body politic.

In an excellent overview, the editors put the other contributions in context. David Silberg's review of the meaning of sustainable development is one of the best analyses which I have come across. Tony Gloyne and Alan Hutton put their fingers on the key to the long-term issue, namely as to where will the energy come from to drive the economy. They see a strong case for seriously developing renewable energy, and in this regard, as in many other aspects of sustainability, Scotland is better placed than most European countries, and certainly better placed than the rest of the UK. It is a pity they did not examine the many problems (technical, economic and environmental) associated with developing renewable energies. They point out that any move towards sustainability requires a 'fundamental shift in the base of taxation away from incomes and towards energy and resource'. Unfortunately, this is outside the competence of the devolved Scottish Parliament. Indeed, any hope that the Scottish Parliament might help to drive Scotland towards a more sustainable state gets little support in these essays. The wish is clearly there, but so is the recognition that the devolved powers are too meagre for the job in hand.

The other essays competently cover the expected terrain, namely transport, land reform and planning. There is a tedious presentation on European Environmental Management Systems, which has no specific Scottish dimension. Curiously, outside Andrew Raven's contribution on land, there is nothing on Scotland's actual physical environment. Not a word about the hills, glens and lochs that for all the past ecological depredations, still offer us one of the finest areas of natural beauty in the world. Is this not also what sustainability is about? There is no discussion of Scotland's relatively abundant environmental space, which provides scope unavailable in the rest of the UK. Still, this is a good and useful book, albeit too pricey. Get it from your library.

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Environmental Impact of the Offshore Oil and Gas Industry

BY STANISLAV PATIN (TRANSLATED FROM RUSSIAN BY ELENEA CASCIO)

425 + xi pp., 23.5 × 15.7 × 3.3 cm, ISBN 0 9671836 0 X clothbound, no price given, East Northport, NY, USA: EcoMonitor Publishing, 1999

This volume sets out to provide an 'environmental analysis of [the] main factors of the oil and gas industry's impact on marine life, fish stock and fisheries in shelf water'. It builds on Russian experience in this area, Russia being the region with the highest proven maritime oil and gas resources, but gives only a recent history of their exploitation. Dr Patin has more than 40 years experience of marine pollution studies and, more recently, he has been involved in environmental studies with the Russian oil and gas industries. He therefore brings a wealth of practical experience to the text. As in all translated works, there are the odd word substitutions, but far fewer than is often the case. The writing style is generally accessible but at times rather emotive in tone, although, of course, this could be the result of the translation process.

The work is well illustrated with 87 figures, including two black and white photographs and 69 tables. The figures are clear and informative. The tables are useful compendia of often large amounts of factual information. There is a context-setting introduction that includes a discussion of recent developments in Russia; in common with all chapters, it contains a numbered series of conclusions and a bibliography. Chapter 2 reviews anthropogenic impacts on the hydrosphere and the present state of the marine environment. I found this the least useful section. It discusses non-polluting impacts, such as fishing, as trivial, and then tries to contrast oil and gas pollution with other forms of pollution. It draws heavily on the GESAMP (Group of Experts on the Scientific Aspects of Marine Pollution) reports, but I found the necessary condensing of material to be too subjective. Chapter 3, in contrast, is packed with well presented, accurate and up-to-date information. It considers the impacts of the oil and gas industry on the 'marine environment and fishing' from geological survey through to decommissioning, and includes material relevant to the recent debates on the fate of the expired offshore structures. The facts are clearly presented, although the overtones are rather value laden.

Chapters 4, 5 and 6 deal with the geochemistry and toxicology of oil, natural gas and 'chemicals and waste' from the offshore industry. They have a common structure and represent compendia of geological, chemical and toxicological data. Chapter 6 includes consideration of drill muds and oil spill control compounds, the latter concluding with a brief discussion of the ecotoxicological consideration of applying dispersants to spilt oil.

Chapter 7 looks at the ecological and fisheries implications of offshore oil and gas development. It includes coverage of accidental spills, routine discharges, long-term effects and the effects, both real and perceived, on fisheries. The final chapter addresses environmental management and regulation. It examines external frameworks, both international treaties, and national schemes, and the specifics of monitoring programmes. It fails to mention company-based environmental management regimes such as environmental auditing.

The book closes with a general conclusions section. Amongst these conclusions is a telling comparison between the North Sea offshore oil production estimates production losses of 10^{-4}–10^{-3}%, in Siberia, onshore Russian production estimates losses of 1–2%: with developments offshore will Russia be able to cut losses by 1000 times? It is small snippets based on the author's experience in the poorly documented Russian sector that enliven much of the volume.

At the end of the book I am no wiser than when I started as to the intended readership. The style, both the accessibility and the slightly emotive language, suggest a senior undergraduate/masters level, but the price and the three bulky compendium chapters will handicap it in this market. The professional will find the new information on Russian activity interesting, but the bulk of the information is drawn from sources such as GESAMP, ICES (International Association for Impact Assessment) and industry/conferences that are already widely available. The well-referenced (the most recent reference is 1998 and there are over 700 in the volume according to the publishers!) text, the clear figures and tables, and the style will, I am sure, make it a popular text in any specialist library. The rather light index will reduce its usefulness as a reference text, however.

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Environment, Scarcity, and Violence

BY THOMAS F. HOMER-DIXON

xvii + 253 pp., 24.1 × 16.3 × 2.4 cm, ISBN 0 691 02794 3 hardback, US$27.95 (UK£19.95), Princeton, NJ, USA: Princeton University Press, 1999

That environmental conditions have an impact upon national and international security has become ever more widely recognized over the past 15 years or so. Such interaction between environment and security has been increasingly studied during this period by scholars professing a variety of disciplines, amongst them especially environmental science, political science, peace studies, and military science, with the result that there are now available many hundreds of relevant articles and dozens of books. More recently, environmental security (as the subject is generally referred to) has escaped the bounds of academia to become an important policy, research, and action issue for the United Nations, the North Atlantic Treaty Organization (NATO), the International Committee of the Red Cross, and the military ministries of a growing number of world powers. By way of example, the environmental security budget of the Pentagon now exceeds US$3 thousand million per annum.

Of the several scholarly institutions currently focusing upon environmental security (amongst them the International Peace Research Institute in Oslo and the Swiss Peace Foundation in Bern), one stands out with particular clarity, namely the Peace and Conflict Studies Program of the University of Toronto, under the direction of Thomas F. Homer-Dixon. Indeed, Homer-Dixon has in recent years published a series of seminal papers serving to cut an incisive swath through much of the superficial, lax, sensationalist, and otherwise perfunctory literature in the field.

The three terms in the title of the monograph under review are not self-explanatory. 'Environment' here refers specifically to the Earth's major renewable natural resources' 'scarcity' specifically refers to shortages in those resources brought about either by their

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depletion or degradation, and 'violence' specifically refers to armed conflict (warfare). The aim of the book is to elucidate how, and the extent to which, environmental scarcities might contribute to the incidence of armed conflict, whether directly, which the author considers less likely, or indirectly, which the author deems more likely.

Of the text's eight chapters, three (Chapters 1, 2 and 8) provide more or less repetitive summaries of the main thrust of the book. Chapter 3 offers a superb review of the relevance of the exponential increase in human numbers that the world has been experiencing in recent decades. Chapter 4 deals with the sources of environmental scarcity. Chapter 5, perhaps the most valuable in the book, explores the nature and importance of the intervening social factors in the presumed progression from environmental scarcity to armed conflict. Chapter 6 examines the extraordinary difficulties, especially for Third-World countries, in coming to grips with environmental scarcity. Chapter 7 explains the various types of armed conflict. Three of the chapters are augmented by appendices to explain some of the more arcane political-science methodology employed. And not to be overlooked are the 62 pages of endnotes, many of which provide important extensions of the text and references to the considerable literature, in the latter of which Homer-Dixon is quite frank when it comes to exposing some of the less useful available literature; sensitive authors beware!. By way of example, the notes include an incisive debunking of the oft-quoted though simplistic arithmetic model for human 'impact' on the environment as being determined by human 'population' times human 'affluence' times 'technological' impact (I = PAT).

In-depth examination of several carefully-selected armed conflicts from the many in progress around the world (most of those case studies having been carried out by colleagues under Homer-Dixon's guidance) do, indeed, suggest that environmental scarcity has contributed indirectly to the onset of some of them. These findings, in combination with the essentially inevitable future increases in human numbers, with expectations of continuing environmental deterioration, with low expectations for technological fixes, and with his own elaborate theoretical framework, have led the author to conclude that obvious causal connections between environmental scarcity and armed conflict will not be generally discernible until some time well into the twenty-first century. That Homer-Dixon finds little current evidence for an obvious relationship between environmental stress and armed conflict does not come as a great surprise to me, given that the global environment has become ever more seriously degraded in recent decades, during a period when the frequency of armed conflict throughout the world has not been increasing or has even declined a bit.

Homer-Dixon predicts that intensified environmental scarcity in the coming decades can be expected to lead to armed conflicts, especially to non-international (intrastate) armed conflicts, but probably not to international (interstate) armed conflicts. He concludes that those armed conflicts are most likely to take several specific forms, especially to intrastate ethnic clashes arising from the resulting refugee movements; and to intrastate insurgencies, banditry, and governmental overthrows arising from the resulting losses in economic productivity and thus in means of livelihood. On the other hand, he dismisses as implausible such potential causes of future armed conflict suggested by others as air or water pollution, dam construction, logging, global warming, ozone depletion, or losses in biodiversity, and all quite correctly so in my view. Moreover, Homer-Dixon considers it unlikely that shortages of freshwater resources or of ocean fish stocks will lead to interstate armed conflict, although this time my confidence in his prediction is less firm.

The author indicates that he has written this monograph for a general audience, a suggestion that I cannot readily support. Rather, the level of complexity and the pedagogical approach taken throughout should commend this work to the attention particularly of upper-level undergraduate and graduate students majoring in either environmental or political science. In fact, it ought to be made obligatory for them to read this text, both for its substantive content and for the virtuosity of the analytical methods employed. The book will also prove valuable to those scholars in this or related fields who have not had the opportunity to read the various major articles that Homer-Dixon has published during the course of the 1990s, or else would like to have them on their shelf conveniently gathered between two covers in polished and integrated form.

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