

## ENCYCLOPEDIA ARTICLE

## Environmental management

The development of strategies to allocate and conserve resources, with the ultimate goal of regulating the impact of human activities on the surrounding environment. "Environment" here usually means the natural surroundings, both living and inanimate, of human lives and activities. However, it can also mean the artificial landscape of cities, or occasionally even the conceptual field of the noosphere, the realm of communicating human minds.

### Approaches

Environmental management is a mixture of science, policy, and socioeconomic applications. It focuses on the solution of the practical problems that humans encounter in cohabitation with nature, exploitation of resources, and production of waste. In a purely anthropocentric sense, the central problem is how to permit technology to evolve continuously while limiting the degree to which this process alters natural ecosystems. Environmental management is thus intimately intertwined with questions regarding limiting economic growth, ensuring an equitable distribution of consumable goods, and conserving resources for future generations. Environmental management is a response to the increasing seriousness of the human impact on natural ecosystems. With a smaller global population base and a less pervasive use of technology, the environment might be able to recuperate on its own from human misuse, but it is now widely recognized that in many cases positive intervention is necessary if the environment is to recover.

There is, however, considerable disagreement about the course that such intervention should take, which has created a plurality of approaches to managing the environment. "Deep ecology" was born in the 1960s with the rise of movements that renounced technological development and decried the political basis of power and autocracy. However, "shallow" ecologists sought a compromise with those who argued that the solution to the world's environmental problems can come only through the generation of more technology.

Environmental managers therefore fall within a broad spectrum that extends from conservationists to technocrats, from those who would limit human interference in nature to those who would increase it in order to guide natural processes along benign paths. Hence both conservationists and developers are represented. It is hoped that they will come together over the need to make economic development sustainable, without it being undermined by long-term damage to resources and habitats. This is the intention of the United Nations Convention on Environment and Development (the process that began at the Earth Summit in Rio de Janeiro in 1992), though underfunding and lack of commitment at the national level have severely limited the extent to which it has changed the global course of environmental management.

### Participants

Participants in the process of environmental management fall into seven main groups: (1) governmental organizations at the local, regional, national, and international levels, including world bodies such as the United Nations Environment Programme and the U.N. Conference on Environment and Development; (2) research institutions, such as universities, academies, and national laboratories; (3) bodies charged with the enforcement of regulations, such as the U.S. Environmental Protection Agency; (4) businesses of all sizes and multinational corporations; (5) international financial institutions, such as the World Bank and International Monetary Fund; (6) environmental nongovernmental organizations, such as the World Wildlife Fund for Nature; and (7) representatives of the users of the environment, including tribes, fishermen, and

hunters. The agents of environmental management include foresters, soil conservationists, policy-makers, engineers, and resource planners. The main link between these diverse groups of people is the need for accountability in the use of nature's riches. However, though there is much collaboration, relationships are often adversarial as objectives differ among the groups.

Intellectually, environmental management has assumed the status of a multidisciplinary academic field dedicated to furthering the human stewardship of natural resources. Biologists participate by virtue of their links with ecology and their interest in flora, fauna, and habitats. Geographers have a long-standing involvement in the ecology of people's relationships with their surroundings—in other words, in the two-way interaction between human communities and the landscapes that offer opportunities to prosper but that limit activities. Economists have become involved through the need to value environmental goods and services, assess the costs of pollution, and calculate materials balances. Engineers have created the field of ecotechnology, which is dedicated to the practical restoration of degraded or polluted environments. Finally, political scientists are the source of much environmental policy and regulatory know-how. Though these and other disciplines have a hand in environmental management, the links between them are complex, and as a result the field is remarkably diffuse. Indeed, it tends to lack a core of integrated concepts that might give it a clear popular identity. Some common themes of environmental management are as follows:

1. Bilateral and multilateral environmental treaties (transboundary ecological management)
2. Design and use of decision-support systems (practical utilization of environmental data; expert systems for environmental management)
3. Environmental policy formulation and enactment (participatory planning and public consultation regarding environmental programs)
4. Estimation, analysis, and management of environmental risk (risk perception and communication studies)
5. Formulation of environmental regulations (for dumping of wastes, emission of pollutants, and extraction of resources; monitoring and policing compliance)
6. Impacts and management of recreation and tourism (design and implementation of environmentally friendly "ecotourism" programs)
7. Natural resource conservation (designation and management of parks, preserves, and other protected areas; designation and protection of wilderness areas)
8. Positive environmental economics (economic justifications for investment in environmental protection)
9. Promotion of positive environmental values by education, debate, and information dissemination
10. Reduction of adverse environmental impacts
11. Resource evaluation and management
12. "Scoping" and investigation of environmental impacts (design of policies, norms, and procedures to limit impacts)
13. Strategies, methods, and programs for the rehabilitation of damaged environments (postpollution clean-up processes)

## **Improvements**

The need to improve management of the environment has given rise to several new techniques. There is environmental impact analysis, which was first formulated in California and is codified in the U.S. National Environmental Policy Act (NEPA). Through the environmental impact statement, it prescribes the

investigatory and remedial measures that must be taken in order to mitigate the adverse effects of new development. In this sense it is intended to act in favor of both prudent conservation and participatory democracy.

Another technique is environmental auditing, which uses the model of the financial audit to examine the processes and outcomes of environmental impacts. It requires value judgments, which are usually set by public preference, ideology, and policy, to define what are regarded as acceptable outcomes. Audits use techniques such as life-cycle analysis and environmental burden analysis to assess the impact of, for example, manufacturing processes that consume resources and create waste.

The atmosphere, surface and subsurface waters, growing plants, minerals, and so on, are sometimes considered to be beneficial resources. The process of exploitation often involves risks to the user, and if these are magnified the resource may turn into a hazard—for example, when excesses of water generate destructive floods. Similarly, pollution has been defined as “a resource in the wrong place at the wrong time.” Thus the process of environmental management can be considered one of limiting resource usage to its more benign forms, thus reducing risks and hazards, and using human ingenuity to transform pollutants into recycled resources. This involves some thorny problems. For example, no human activity is completely devoid of risk, and few environmental pathologies have ever been eliminated. Moreover, even full-scale recycling is not without costs; for example, the energy required to reclaim waste materials will usually be generated at the expense of at least some pollution. In this sense, one of the most salutary lessons of recent decades has been that the so-called benign generators of electrical power—the renewable sources based on winds, tides, solar radiation, or waves—involve potentially large costs in terms of how they modify landscapes. This has limited their attractiveness in relation to nonrenewable sources, and has demonstrated the need to broaden the analyses that feed into decision-making about the environment so that hidden and unexpected costs are given their full weight. Thus, as the field has evolved, it has become correspondingly more sophisticated in its treatment of the variables that are considered when formulating policy.

### **New challenges**

All of the main environmental problems of the late twentieth and early twenty-first centuries fall under the environmental management field. Most problems are controversial. Tropical deforestation, ozone depletion, and global warming have fueled debate over strategies for the management of the global environment. Transboundary pollution and the international exploitation of resources (for example, the appropriation of raw materials in one country and the patenting of their genetic derivatives in another) have underlined the need for bilateral, and often multilateral, agreements about sharing responsibilities. Radiation emissions, toxic waste issues, and hazardous material spills have emphasized the need for secure and standardized methods of treating pollutants. The production of organic chemicals, for example, grew by more than two orders of magnitude during the second half of the twentieth century, and there was a corresponding growth in the number of catastrophic pollution episodes.

Environmental management has risen to meet many of these challenges. The field has expanded from a purely governmental preserve to one that encompasses the private sector as well. Indeed, the manufacture of pollution control equipment and the institutional management of environmental hazards have turned into growth areas. Yet the successes must be seen against a backdrop of deepening environmental crisis. Relentless population pressure, the unfettered nature of international capital, and the exposure of a record of significant environmental mismanagement in eastern Europe are examples of remaining problems.

**David Alexander**

### **Bibliography**

- M. Atchia and S. Tropp (eds.), *Environmental Management: Issues and Solutions*, 1995

- R. S. Dorney, *The Professional Practice of Environmental Management*, 1987
- T. O'Riordan (ed.), *Environmental Science for Environmental Management*, 1995
- R. Welford (ed.), *Corporate Environmental Management: Systems and Strategies*, 1996
- R. R. White, *Urban Environmental Management*, 1994
- G. A. Wilson and R. L. Bryant, *Environmental Management: New Directions for the 21st Century*, 1997

### Additional Readings

- S. Boehmer-Christiansen, Politics and environmental management, *J. Environ. Plan. Manag.*, 37(1):69–85, 1994
- S. M. Born and W. C. Sonzogni, Integrated environmental management: Strengthening the conceptualization, *Environ. Manag.*, 19(2):167–182, 1995
- R. Buckley, *Perspectives in Environmental Management*, Springer-Verlag, Berlin, 1991
- M. E. Colby, Environmental management in development: The evolution of paradigms, *Ecol. Econ.*, 3:193–213, 1991
- R. U. Cooke and J. C. Doornkamp, *Geomorphology in Environmental Management: A New Introduction*, 2d ed., Oxford University Press, Oxford, 1993
- D. Ercal (ed.), *Environmental Management in Developing Countries*, Development Centre of the Organisation for Economic Co-operation and Development, Paris, 1991
- International Chamber of Commerce (Paris), *The Business Charter for Sustainable Development: Principles for Environmental Management*, 1990
- M. Jacob, Sustainable development and deep ecology: An analysis of competing traditions, *Environ. Manag.*, 18(4):477–488, 1994
- A. Kreimer and M. Munasinghe (eds.), *Environmental Management and Urban Vulnerability*, World Bank, Washington, DC, 1992
- A. Krol, Environmental management: Issues and approaches for an organization, in M. D. Rogers (ed.), *Business and the Environment*, Macmillan, London, 1995
- P. J. May (ed.), *Environmental Management and Governance: Intergovernmental Approaches to Hazards and Sustainability*, Routledge, New York, 1996
- B. Mitchell, *Resource and Environmental Management in Canada: Addressing Conflict and Uncertainty*, 2d ed., Oxford University Press, Oxford, 1995
- B. Nath et al., *Environmental Management*, 3 vols., VUB Press, Brussels, 1993
- P. R. Pryde, *Environmental Management in the Soviet Union*, Cambridge University Press, Cambridge, 1991
- S.-O. Ryding, *Environmental Management Handbook*, Lewis Publishers, Boca Raton, FL, 1992
- R. Welford and A. Gouldson, *Environmental Management and Business Strategy*, Pitman, London, 1993
- Environmental Management
- U.S. Department of Energy Environmental Management Programs
- Global Environmental Management Initiative

---

### How to cite this article

David Alexander, "Environmental management", in AccessScience@McGraw-Hill,  
<http://www.accessscience.com>, DOI 10.1036/1097-8542.757564

---

Copyright ©2007 The McGraw-Hill Companies. All rights reserved. Any use is subject to the Terms of Use and Privacy Notice. Additional credits and copyright information. Customer Privacy Notice



a silverchair information system

The McGraw-Hill Companies logo, consisting of the text 'The McGraw-Hill Companies' in a white, italicized, serif font, set against a horizontal gradient bar that transitions from red on the left to orange on the right.