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The Human Factor in Ecological Research: An Annotated Bibliography



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Abstract

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As a bibliography of annotated references addressing interdisciplinary environmental research, the collection reviews a broad spectrum of literature to illustrate the breadth of issues that bear on the role of humankind in environmental context. Categories of culture, environmental law, public policy, environmental valuation strategies, philosophy, interdisciplinary research, landscape theory, design, and management will be useful to interdisciplinary research designers, land use planners and managers, academic faculty and students, environmental stakeholder groups, and anyone with interest in people-and-environment relations.

Keywords: Human ecology, interdisciplinary research methods, ecosystem research, interdisciplinary bibliography, environmental policy, landscape design, landscape management.

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Introduction

Most people are somewhat aware of the degree to which their personal activities affect the lives of other creatures that share their neighborhoods. Some people wonder about the ultimate consequences of continuing these organic relations as they are. And a few people actively search for alternative ways to conduct their lives in balance with other species.

Many natural scientists also now recognize the need to study environmental problems in the whole context in which they occur, to question the dualistic perspective of people apart from nature, and to recognize that ecosystems cannot be fully understood without accounting for all (including human) components of the system. This collection of references is intended to pique the interest and curiosity of interdisciplinary research designers, land use planners and managers, academic faculty and students, environmental stakeholders, and anyone with interest in people-and-environment relations about the range of ideas available to inform their thinking on ecological and biodiversity issues.

Rationale

This work is a compilation of a broad range of references from widely disparate fields of inquiry that bear on the study of ecosystems and their inhabitants. The breadth of selections necessarily neglects the depth of any one field and is simply representative of many others.

The term “biodiversity” is taken to mean the variety of living organisms. This variety is of particular value because of the assumption that the evolutionary process is enhanced by the availability of the richness of adaptive options the variety implies. Varieties of habitat are considered necessary to conserve this genetic resource because organisms cannot survive without environments suited to their specific biological needs. The issue of biodiversity with all its attendant implications is, then, one of concern for the future.

Many selections are derived from literature other than the mainstream technical forums in which most natural and social scientists publish. An interdisciplinary effort such as this requires an eclectic array of sources to “cross-pollinate” research thought. Further, all members of the scientific community are also members of the public community, but the converse is not so. It is, then, incumbent upon researchers to inform themselves of the range of ideas emanating from the wider public as the behaviors of all humankind ultimately contribute to the condition of the planet.

The volume of these selections is also purposely weighted toward the philosophical in recognition that values, ethics, and attitudes play a critical role in the ways individual human beings think and, ultimately, choose to act. This phenomenon applies equally to natural and social scientists despite their training in scientific research method. In a recent project where several prominent scientists were commissioned to review a land management plan, they were asked to provide information about their academic and experiential backgrounds (Kiestler and Eckhardt 1994). Most attributed their choice of profession to early exposure to works by Aldo Leopold and John Muir as well as youthful experiences in the wild. These factors were clearly framed in affective and value terms. Despite a dedication to objective, scientific method, these scientists were well aware of the personal lens through which they viewed their work and the world.

Viewing the world of natural science through the lens of behavioral science suggests a heightened degree of complexity that strains the traditional boundaries of inquiry. By adding the human element to the equation, we must account for factors such as gender, culture, economics, religion, philosophy, politics, and a plethora of other issues that traditional experimental designs cannot accommodate. We need new conceptual frameworks; new theories that would make it possible to think in terms of the larger picture. We need new ways to talk about our observations, new units of analysis, new ways to synthesize information so that it is accessible and useful to mainstream human life. These needs call for radically new ways of doing science.

Many of the investigators cited in this work are, as evidenced in the section on theory and methods, beginning to think in interdisciplinary terms and devising new frameworks for integrating their respective interests in more comprehensive and intuitively satisfying conclusions about the ways of the world. Even so, change as profound as this is not without cost. All scientists of all disciplines have been trained to compartmentalize their lives into the strict objectives of experimental design and operational definitions of research plans, apart from the rather more messy arenas of everyday living that include family relations, house payments, potholes, and politics. But research funding is often now beset with the need for proposals to be written with an eye to which management objectives are being satisfied, which constituent interests may be best served, and the ultimate economic benefits that may accrue from the research. Despite rigorous training to the contrary, scientists can no longer afford to operate in the relative isolation of objective inquiry. Political reality now demands something more accessible than science for its own sake and expects resulting information to be value-added rather than value-free.

The consequent costs of these changes to individual scientists and to the venerable institutions they and their activities represent may become as momentous and profound as a basic paradigm shift. Completely new and inclusive conceptual frameworks and theories may require revolutionary research methods with all the resistance and debate that accompanies great change. My own academic tradition suggests that creativity and change often erupt from the margins of society, that new ideas do not often originate out of tradition but develop in the dangerous atmosphere on the fringe. That new constructs are seldom widely accepted in the innovator's lifetime is sobering as well. So, each of us must decide whether our personal proclivities hold us close in to the customary smog of the surface or whether we must dare the thin air of the outer rim of thought. In either case, we will gain most from the groundedness of traditional science that has the lid removed and allows for some fresh air and light to nourish new ideas.

Developing interdisciplinary research efforts may afford just such an opportunity to blend the best of natural and human social science traditions into new methods that address emerging complex issues. We have quantitative research tools heretofore unavailable that may allow greater conceptual freedom in the cross-pollination of theories and methods across disciplines. What we may lack most is the curiosity to peer over the fences of our respective disciplines and see what is going on in other back yards. This bibliography is just such an effort in that it samples freely and widely from what could be glimpsed over the fences.

With this introduction, perhaps the reader will appreciate the breadth of field the following citations represent. This compilation is meant to direct the reader's attention to the fact that biodiversity concerns not only the remaining remnants of wildlife but the life of the planet as a whole; that "bio" means life in whatever form we find it, that "biodiversity" is just as valid a concern among the children in an urban elementary classroom as in a pristine mountain valley, and that Martin Buber's (1970) philosophical concepts of self and other are relevant to the discussion.

Methods

Initially, a comprehensive literature search was undertaken by using most of the readily available databases in the natural and social sciences and in education, with special emphasis on terms with cross-disciplinary implications. An appendix with an alphabetical list of computer database search terms and an index of authors follows the citations.

The bibliography is organized in several topical sections developed from an informal assessment of general content yielded from the literature search.

Acknowledgments

Particular thanks are due to A. Ross Kiester who stated aloud that natural science and social science can and should complement each other. He then put the attitude into action and provided me the opportunity to write this bibliography.

Thanks, too, to reviewers Margaret Shannon, Donna Minnis, and especially Geoffrey Habron for their thoughtful and relevant comments. Geoffrey's indepth review and recommendations for organization were particularly helpful. And a special thanks to Sylvia Kirk whose interest in the project kept her alert to newly emerging material to pass along.

References

Buber, Martin. 1970. I and thou. (Walter Kaufmann translation). New York: Charles Scribner's Sons. 185 p. (Plus index).

Kiester, A. Ross; Eckhardt, Carol. 1994. Review of wildlife management and conservation biology on the Tongass National Forest: a synthesis with recommendations. 281 p. On file with: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331.

References With Annotations

Anderson, L., ed. 1991. Sisters of the Earth: women's prose and poetry about nature. New York: Vintage Books/Random House. 426 p. (Plus bibliography and index).

Culture and Environment

This book is a comprehensive collection of writings by women about the feminine persona of Earth. These writers articulate their senses of relations with Her and the multitude of facets it may reveal in the simple arts of living. There is grandeur, grieving, intimacy, and rage, all springing out of the voices of these women with an authenticity grounded in experience.

Botkin, D.B. 1994. Ecological theory and natural resource management; scientific principles or cultural heritage? In: Chapple, Christopher K., ed. Ecological prospects: scientific, religious, and aesthetic perspectives. Albany, NY: State University of New York Press: 65-81.

The author provides various examples in which cultural assumptions play a role in developing apparently objective scientific views about the environment and the relation of people to it and demonstrates the extent to which these views are based in ancient myths. A case is made for environmental relativism that accepts change as natural. The distinction between natural change and the accelerated rates of change that become problematic to the system and the people that occupy it is an important one.

Bowers, C.A. 1993. Education, cultural myths, and the ecological crisis: toward deep changes. Albany, NY: State University of New York Press. 232 p. (Plus index).

This volume brings together human considerations of many dimensions that directly affect the planetary system. The author proposes that these issues are most often debated in the political arena when, in fact, they are questions of a cultural and spiritual nature that can never be effectively addressed from a political perspective. Bowers cites as problematic "beliefs" the concepts of progress, individualism, rationality, objectivity, power, authority, community, and others. He further asserts that "(h)ow our cultural beliefs contribute to the accelerating degradation of the environment...is the most fundamental challenge we face."

Diamond, Jared. 1993. New Guineans and their natural world. In: Kellert, Stephen R.; Wilson, Edward O., eds. The biophilia hypothesis. Washington, DC: Island Press: 251-271. (A Shearwater Book).

This author describes his experience with various indigenous tribes of both Papua and West Irian, New Guinea, and some of the cultural explanations of phenomena that persist there. These peoples generally do not share the affinity for savannalike environments. In addition their knowledge and interest in local fauna is not attributed to anything more than individual cultural learning.

Griffin, Susan. 1978. Woman and nature: the roaring inside her. New York: Harper and Row. 263 p.

A lyrical, poetic, often raging collection of perspectives on woman in relation to her place in the world. Her world includes the environmental, social, personal, political, economic, mythic, and many of the possible interactions in which woman may participate. Griffin does not preach; she does not demand; she exposes, explicates, and excoriates the social facade that masks the living reality of woman's experience.

Guha, Ramachandra. 1994. Radical environmentalism: a third-world critique. In: Merchant, C. Ecology: key concepts in critical theory. Atlantic Highlands, NJ: Humanities Press International: 281-289.

This author discusses the cultural roots of deep ecology and the tendency of its proponents to co-opt Eastern religious tradition while blending it with values that favor other life forms at the expense of people. The implications of this position for Third World countries are considered together with the fact that most of the Earth's resources are consumed by developed countries who can afford wilderness preservation. Guha recommends directing more emphasis on reducing the rates of consumption in industrialized countries rather than on preserving wilderness.

Inter Press Service, comps. 1992. Story Earth: native voices on the environment. San Francisco: Mercury House. 200 p.

A collection of 18 pieces contributed by political and cultural leaders from a broad spectrum of societies, which address various ecological issues from an other-than-mainstream perspective. These works are intended to be a reminder that the values often held by those in political power are in the numerical minority and that many other people view the Earth in other ways.

Jacobsen, George L., Jr.; Webb, Thompson, III. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. Conservation Biology. 2(4): 375-385.

This examination of biodiversity conservation from the perspective of a geological time scale brings a broad temporal dimension to the discussion. The concept of indicator species is questioned on the basis of the temporal dimension and the premise that species evolve through time more or less independently of one another. The authors regard the preservation of large-scale generalized environments as the key to preserving a full range of species.

Jensen, D. 1995. Listening to the land: conversations about nature, culture, and Eros. San Francisco: Sierra Club Books. 328 p.

A collection of 29 interviews by the author with many of the strongest ecological voices in America today. The subjects of the conversations are as different as the personalities of the people interviewed, but the strong cord linking them all is caring for the Earth and the complex meanings that compose that deep care.

Lewis, Martin W. 1994. Environmental history challenges the myth of a primordial Eden. The Chronicle of Higher Education. May.

In the "Point of View" column in this issue of the Chronicle of Higher Education, Lewis reminds us that effects of people on the environment are not recent phenomena. Although environmental history is a relatively new academic discipline, the effects of human habitation have always taken a toll on the biosphere, and those effects are not unique to Occidental cultures.

Nabhan, Gary Paul; St. Antoine, Sara. 1993. The loss of floral and faunal story: the extinction of experience. In: Kellert, Stephen R.; Wilson, Edward O., eds. The biophilia hypothesis. Washington, DC: Island Press: 229-250. (A Shearwater Book).

In this linguistic study of the conceptual sense and range of taxonomies for biota in two American indigenous cultures, these authors compared the extent of knowledge of local biota in subsequent generations of these cultures to

. . . evaluate the consequences of losing the three requisite conditions for the expression of biophilia:

1. The loss of biodiversity via habitat degradation or overexploitation of the species
2. The extinction of experience—of hands-on, visceral contact with other forms of life
3. The demise of oral traditions of plant and animal stories (p. 233)

Nelson, Richard. 1993. Searching for the lost arrow: physical and spiritual ecology in the hunter's world. In: Kellert, Stephen R.; Wilson, Edward O., eds. The biophilia hypothesis. Washington, DC: Island Press: 201-228. (A Shearwater Book).

Based on the author's personal experience with indigenous tribes in the far north of the Western Hemisphere, this article recounts cultural perspectives of the inter-connectedness of all species and elements of the planet. People are perceived to be part of this holistic view where there are no separate moralities for different species. This contribution to the collection does not romanticize indigenous culture by claiming that all indigenous people perfectly adhere to these beliefs but provides them as an alternative to more mainstream perspectives on the environment and its value.

The author relates his indepth experiences with indigenous people in Arctic North America in terms of their belief systems about the place of humankind in the natural world, their interactions with the whole of the environment, and their symbiotic regard for fellow elements of the system. He describes a rich heritage of legend and practical adaptations to the demands of physical location that informs the daily practice of life.

Noe, Francis P.; Snow, Rob. 1989. Hispanic cultural influence on environmental concern. *The Journal of Environmental Education*. 21(2): 27-34.

This article reports on a survey of attitudes of users and potential users of boating and national parks in south Florida, by using the New Environmental Paradigm Scale. The study found that cultural factors produced different values about the environment depending on whether the subject was Hispanic and whether he or she participated in a general population survey or a field survey.

Demographic data—especially income, gender, and education—were similar among Hispanics and non-Hispanics in the field survey; subjects were predominantly male, well educated, and with moderate incomes. These subjects were likely to support a human-dominated environment. In contrast, subjects in the general survey tended to be Hispanic female, with less income and education, and tended to favor a more ecologically focused perspective.

Norwood, Vera, ed. 1993. *Made from this Earth: American women and nature.* Chapel Hill, NC: University of North Carolina Press. 368 p. (Plus notes, bibliography, and index).

A wonderfully illustrated volume of biographies of American women who have contributed to the natural sciences, literature, art, politics, and Native American culture in relation to nature. The book was conceived out of an awareness of the virtual absence of the female voice in those arenas of cultural influence.

Rappaport, Ray A. 1967. *Pigs for the ancestors: ritual in the ecology of a New Guinea people.* New Haven, CT: Yale University Press. 311 p.

This classic ethnographic work cites several examples of social orders that work to maximize the viability of the ecosystem, such as the salmon as a totem for Alaska native tribes who developed cultural practices to use the resource while maintaining it. Complex systems of ownership and property-use rights provide normative elements of culture that serve to control the degree to which a resource is used.

Reid, Walter V. 1993. *The economic realities of biodiversity.* *Issues in Science and Technology.* 10: 48-55.

A discussion of "biodiversity prospecting" for previously undiscovered organisms that may have exploitable value and implications for host nations. The author makes a case for profit contributions to indigenous "prospectors" and their countries by organizations that ultimately benefit from these discoveries and for a structure of regulations that would oversee these activities.

Ruether, R.R. 1994. *Ecofeminism: symbolic and social connections of the oppression of women and the domination of nature.* In: Chapple, Christopher K., ed. *Ecological prospects: scientific, religious, and aesthetic perspectives.* Albany, NY: State University of New York Press: 155-168.

This paper traces the cultural origins and relation of social values to women and nature.

Snow, C.P. 1993. *The two cultures.* Cambridge, MA: Press Syndicate of the University of Cambridge. 107 p.

Snow's classic treatise, delivered as the Rede Lecture in 1959 at Cambridge, concerns the apparently dichotomous traditions of science and the humanities. The text of his essay that followed in 1963, "The Two Cultures: A Second Look," is included as well. This contemporary edition also includes an extensive introduction by Stefan Collini that presents the social and scientific context of the work.

Tickell, Oliver. 1994. *Funding dispute could hold up biodiversity treaty.* *Nature.* January: 367.

A brief article in the "News" section providing an update on various problems threatening the ratification of the United Nations biodiversity convention. Particularly at issue was the matter of oversight for the Global Environment facility, which was intended to mitigate economic impacts of conserving biodiversity. Levels of voting representation for donor and recipient nations and responsibility for administering funds were points of contention.

Tonies, J.A. 1989. Understanding and changing cultural attitudes toward the environment. *Journal of Outdoor Education*. 24: 3-10.

This article discusses three historically characteristic attitudes of the dominant American culture: change and progress, optimism and faith in the future, and anti-intellectualism. The focus is on mainstream Eurocentric culture as distinct from the values and mores of the more complex society and in isolation from the environmental context.

Ulrich, Roger S. 1993. Biophilia, biophobia, and natural landscapes. In: Kellert, Stephen R.; Wilson, Edward O., eds. *The biophilia hypothesis*. Washington, DC: Island Press: 31-40. (A Shearwater Book).

This author cites examples of the function of natural selection for the presence of human emotional attachments and fears directed to the environment and other species. Several studies suggested the presence of "biologically prepared learning," or a genetic predisposition for environmental preferences, which are then affected by experiential learning.

Wilson, Edward O. 1975. *Sociobiology: the new synthesis*. Cambridge, MA: The Belknap Press of Harvard University Press. 697 p. (Plus glossary and bibliography).

This classic text explicates the theoretical underpinnings of the evolutionary relations in the biosphere and includes people as an integral segment of the whole. Especially see chapter 27, "Man: From Sociobiology to Sociology."

Worldwatch Institute. 1992. *Conserving biological diversity*. In: *State of the world 1992: a Worldwatch Institute report on progress toward a sustainable society*. New York: W.W. Norton and Company.

This chapter discusses the rate of species loss in various parts of the world, the percentage of protected areas, and the relation of cultural diversity to biological diversity. Protected areas are largely deserts and tundra rather than a broad range of landscape types that represent habitat for a diverse spectrum of species. Moreover, indigenous cultures and "practices that do conserve wildlife also are vanishing as native cultures and territories succumb to the expanding influence of the global commercial economy" (p. 16). Given that protected areas alone cannot ensure that biological diversity will be perpetuated, biodiversity conservation must coexist with areas of human activity by promoting the beneficial cohabitation of all species.

Zimmerer, Karl S. 1993. Agricultural biodiversity and peasant rights to subsistence in the central Andes during Inca rule. *Journal of Historical Geography*. 19: 15-32.

In a historical treatment of agricultural biodiversity as it apparently persisted in the South American Andes, the author postulates that state-imposed agriculture concentrated primarily on the surplus production of a few species of crops, whereas peasant subsistence culture fostered a diversity of species for personal use. Small tracts of land were allocated to individuals by the state in various land types and altitudes to permit a wide spectrum of crops. Subsistence rights in the forms of land areas and water have been maintained throughout several centuries up to the present.

Subsistence agriculture is credited with having preserved the most species but is losing its distinctiveness in present-day societies.

Environmental Law and Public Policy

Alverson, William Suprison; Kuhlmann, Walter; Waller, Donald M. 1994. Wild forests: conservation biology and public policy. Washington, DC: Island Press. 300 p. (Plus bibliography and index).

Organized in four parts, this volume addresses the synthesis of forest science, public policy, legal issues, and a focus on biodiversity from historical perspectives; a historical review of forest management models; emerging forest management models; and observations on the directions of new biodiversity policies. The authors attempt to synthesize forest science, public policy, and legal issues, and focus on the problem of biological diversity from historical perspectives.

The book concludes with the authors' recommendations for forest management policies, including expanded legal definitions and protections for biodiversity.

Bormann, Bernard T.; Cunningham, Patrick G.; Brookes, Martha H. [and others]. 1994. Adaptive ecosystem management in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-341. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 22 p.

Responding to political attention to the concepts of ecosystem and adaptive management, this agency publication presents a landscape planning design that incorporates functions of planning, action, monitoring and evaluation—somewhat after the fashion of strategic planning in the corporate arena.

Collin, R.W.; Collin, R.M. [n.d.]. Equity as the basis of implementing sustainability: an exploratory essay. *West Virginia Law Review*. 96: 1173-1190.

In this publication, two law professors review the historical background of sustainability and the social issues that both affect and are affected by environmental sustainability. Having a legal focus, the arguments pertain largely to human concerns for social equity but with a heightened awareness that some positive wisdom may be gleaned from various cultures relative to stewardship, patriotism, deep ecology, and the broad spirituality of indigenous peoples.

Creswell, L.L. 1988. Federal agency-local government land use negotiations: vulnerabilities of the Federal bargaining position. *Journal of Urban and Contemporary Law*. 33: 3-71.

This commentary on the position of the Federal Government in land use decisions references various precedents in environmental legislative history.

Gore, Al. 1993. *Earth in the balance: ecology and the human spirit*. 2d ed. New York: Plume-Penguin Books USA, Inc. 408 p. (Plus bibliography, notes, and index).

The Vice President of the United States passionately articulates his environmental philosophy in the context of global politics and economies. He concludes that the Earth's ecology needs immediate human intervention and recommends what he terms a "Global Marshall Plan," patterned after the aid plan that helped rebuild Europe after World War II. The global plan consists of five specific strategies: stabilizing the world population, developing environmentally appropriate technologies, introducing comprehensive economic reform based on environmental impact, creating enabling international agreements, and developing cooperative worldwide environmental education programs.

Harding, Anna K.; Holdren, George R., Jr. 1993. Environmental equity and the environmental professional. *Environmental Science and Technology*. 27(10): 1990-1992.

The critical issues of social values and equity are addressed by these authors as they chronicle problems such as nuclear waste and toxic site cleanup as these problems differentially affect minority and low-income citizens. Arguments are outlined for using environmental equity factors as part of the risk-assessment process.

Houck, Oliver A. 1994. Of bats, birds and B-A-T: the convergent evolution of environmental law. *Mississippi Law Journal*. 63: 2.

In a full-issue monograph edition, Houck reviews the history of American environmental law relative to pollution standards, controls, and alternatives based on the best available technology. A hierarchy of investigations is recommended based on the risk posed by the particular agent or source of pollution. Also discussed are natural resources management under the National Environmental Policy Act and its far-reaching effects from implementing the requirements for alternative standards. The Endangered Species Act is likewise reviewed in terms of the history of its implementation and subsequent effects on development and resource-extraction decisions.

Knox, Robert J. 1993. Environmental equity. *Journal of Environmental Health*. 55(7): 32-34.

Citing a general dearth of information on inequitable effects of environmental regulation based on socioeconomic factors, the author suggests, for example, that water quality standards do not allow for varying degrees of exposure to hazards depending on whether fishing is recreational or for subsistence. Some studies demonstrate that locations of hazardous sites do correlate with racial community. Recommendations are for focused research to collect data on environmental health effects by race and income. Criteria for assessing environmental equity are outlined for the new Office of Environmental Equity in the U.S. Environmental Protection Agency.

Keystone Center. 1991. Final consensus report of the Keystone Policy Dialogue on biological diversity on Federal lands. Keystone, CO: The Keystone Center. 96 p. (Plus appendices).

The Keystone Center provides a forum for resolving issues of public policy as they relate to national resources and conducts a natural science educational program. This document records the proceedings of a "dialogue group" composed of representatives from various Federal agencies, congressional committees, environmental organizations, commodity groups, professional associations, and academia. The particular focus of the meeting was on the consequences of government activities and programs and their effects on biological diversity on public lands. The role of humankind was focused primarily on the consumption and the recognized need to integrate human needs into the research, policy, and planning processes.

Losos, E.; Hayes, J.; Phillips, A. [and others]. 1993. Taxpayers double burden: Federal resource subsidies and endangered species. Washington, DC: The Wilderness Society.

These authors cite many examples of resource extraction projects that not only fail to recover the costs associated with that resource but systematically degrade endangered species habitat. Damage created by recreational activities takes an additional toll. Four general recommendations address issues of irreparable environmental damage, user fees comparable to market value, additional fees for disturbance of imperiled ecosystems and species, and job training for displaced workers.

Reid, W.V.; McNeely, J.A.; Tunstall, D.B. [and others]. 1993. Biodiversity indicators for policy-makers. [Place of publication unknown]: World Resources Institute.

These authors outline a conceptual framework for identifying biodiversity indicators that would support policy decisions. They cite the need for specific indicators or measurements for wild species and their genetic diversity, for the diversity of habitat, and the diversity represented by domesticated crops and livestock. The rationale and criteria for each of these measurements are described along with information as to the availability of data to support the assessments.

Rohlf, Daniel J. 1991. Six biological reasons why the Endangered Species Act doesn't work—and what to do about it. *Conservation Biology*. 5(3): 273-282.

The author examines the scientific and legal problems inherent in the Endangered Species Act and calls on biological scientists to participate in the translation of defensible science into public policy as reflected in laws that affect nature.

Sample, V. Alaric. 1991. Land stewardship in the next era of conservation. Milford, PA: Grey Towers Press. 43 p.

This document chronicles the historical background, current thinking, and the critical elements of social values relative to conservation in the United States. It is the product of a 2-day symposium for a 28-member invited panel from various professional disciplines from governmental agencies, resource management groups, and environmentalists. Notable by their absence from the participant list were social scientists. The group distilled from the discussion four "guiding principles" for land stewardship, called the "Grey Towers Protocol."

Seager, Joni. 1993. Earth follies: coming to feminist terms with the global environmental crisis. New York: Routledge. 332 p. (Plus index and notes).

To redefine the issues of environmental concern, Seager takes on the military establishment, corporate culture, government bureaucracy, the mainstream ecological movement, and several alternative environmental movements, including deep ecology and ecofeminism. She further recommends a framework of feminist analysis for environmental problems as a tool to be added to existing resources for addressing ecological problems.

Stankey, George H.; Clark, Roger N. 1992. Social aspects of new perspectives in forestry: a problem analysis. Milford, PA: Grey Towers Press. 33 p.

This document outlines the process by which a set of policy recommendations and a program of research were developed by the Consortium for Social Values of Natural Resources. The intent was to incorporate perceived social values for forest resources into policy management in the future by focusing on "people, places, and processes." Six problem areas were articulated, along with a set of problem-solving strategies. These authors raise an important research question: "Are the values held by foresters ...at variance with the wider society or do foresters represent simply a microcosm of the society at large?" (p. 28).

Stone, Christopher D. 1973. Should trees have standing? Toward legal rights for natural objects. Los Altos, CA: William Kaufmann, Inc. 101 p.

Organized in two sections, the author begins with a four-chapter commentary on the meaning and implications of legal standing status for nonhuman organisms and natural objects. The operational definitions of property rights are questioned and subjected to logical arguments. Part two of the book consists of a collection of significant U.S. Supreme Court opinions pertaining to the environment.

Tulane Environmental Law Journal. 1994. Biodiversity symposium. 8: 1.

This special issue of this journal is dedicated to a collection of biodiversity issues and the institutional mechanisms by which people seek to address them. As the author of the preface states, biological diversity "is a new organizing principle for life on earth...." (p. 1). The articles in this issue cover species protection, ecosystems and the Endangered Species Act, marine and international issues, property rights implications, wetlands protection, and pollution control.

Wilkinson, Charles F. 1992. Crossing the next meridian: land, water, and the future of the West. Covelo, CA: Island Press. 376 p.

This comprehensive history of resource and land use in the American West includes discussions of the legal relations among Federal agencies, economic interests, environmental concerns, and scientific research. References to biodiversity illustrate the need for a perspective on the environment with a much longer temporal range than is currently in practice.

Environmental Valuation

Bengston, D.N.; Xu, Zhi. 1995. Changing National Forest values: a content analysis. Res. Pap. NC-323. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 29 p.

This paper is an indepth evaluation of prior work on the content analyses of expressions of human environmental values followed by a detailed account of a forest-values classification and the research that supported its development. Methods and procedures for computer coding the content of a broad sampling of valuation literature were presented, along with the texts of coding dictionaries for each group of values represented. Finally, conclusions drawn from statistical analyses suggest that the findings are relevant to issues of ecosystem management.

Bingham, Gail; Bishop, Richard; Brody, Michael [and others]. 1995. Issues in ecosystem valuation: improving information for decision making. *Ecological Economics*. 14: 73-90.

This report of the Ecosystem Valuation Forum sponsored by the U.S. Environmental Protection Agency outlines the problems in developing a framework for assessing human valuation for ecosystems. The group reported basic difficulty in defining the terms for such a valuation process, as well as in the issues to be addressed by them. Decision-process methods, defining variables of interest, and data sources were of particular interest.

Brown, T.C. 1984. The concept of value in resource allocation. *Land Economics*. 60(3): 231-246.

This article presents a detailed treatment of the concepts and assumptions behind the use of "value" as a way for people to regard the context of their existence and the bases on which they make decisions about land use. After this conceptual grounding, the author reports on research into the "appropriateness of economic measures of value" and subsequent conclusions about the limitations of price-based assessments of land use value.

Daniels, Steven E.; Daniels, Barbara J. 1986. The impact of below-cost timber sales on community stability. *Western Wildlands*. 12(1): 26-30.

This research uses hypothetical case studies to describe the potential economic effects of below-cost timber sales to resource-dependent communities. The authors demonstrate the small fraction of benefits realized through a highly inefficient system that they suggest amounts to a welfare subsidy for the timber companies. For one of the examples, the strategy actually produced a greater economic loss of income than if no subsidy at all had been provided.

Daly, H.E. 1995. Reply to Mark Sagoff's "carrying capacity and ecological economics." *BioScience*. 45(9): 621-624.

This article is the **Roundtable** response to Sagoff's article comparing utilitarian and ecological economics in the same issue of the journal. Daly suggests that Sagoff's position is essentially to reject altogether economic analysis of environmental value from a philosophical and ethical perspective. Daly offers an alternative to Sagoff's apparent dualism by recommending the combination of instrumental and intrinsic values in ecological valuation studies.

Ehrlich, Paul R.; Ehrlich, Anne H. 1992. The value of biodiversity. *Ambio*. 21(3): 219-226.

A general discussion of the issues involved in the valuation of biological diversity in terms of four basic factors; ethical, aesthetic, direct economic, and indirect economic. The authors document the degree to which species diversity is currently being lost and the likely consequences of continuing that rate of loss.

Faber, Malte; Manstetten, Reiner; Proops, John. 1992. Toward an open future: ignorance, novelty, and evolution. In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. *Ecosystem health: new goals for environmental management*. Washington, DC: Island Press: 72-91.

These authors discuss the term “ecological economics” in the context of the common Greek root, meaning “house,” and point out two opposing perspectives. First, the view that nature is part of the human “household” on the Earth and second, the perspective that people are part of the whole Earth household. The distinctions are critical because they define the core of values that inform ecological decisionmaking.

The assertion is made that most human society has operated on the Faustian assumption that conditions of human life can be brought under the control of humans and their mechanical and scientific agents. This reductionistic perspective is giving way to the position that “the future...is open: we cannot know everything that will happen.” A taxonomy of ignorance is presented to evaluate the kinds of attitudes that may prevail in a given situation, as a tool for approaching environmental policy discussions.

Gray, G.C. 1993. *Wildlife and people: the human dimensions of wildlife ecology*. Urbana, IL: University of Illinois Press. 260 p. (Plus index).

Following a chronicle of social science research pertaining to wildlife ecology, this volume outlines various strategies to assess human interactions with and effects on the biosphere. Of particular note are discussions of economic valuation, wildlife law, policy, and administration as they have evolved in American society. As do several other recent publications, this work articulates the need to evaluate the viability of certain values endemic to American society and proposes alternative frameworks that may offer solutions more compatible with a sustainable environment.

Gregory, Robin; Lichtenstein, S.; Slovic, P. 1993. Valuing environmental resources: a constructive approach. *Journal of Risk and Uncertainty*. 7: 177-197.

These authors propose an approach to estimating public valuation of ecosystem resources that builds on contingent valuation strategies by injecting multiattribute utility theory and decision analysis. The rationale for such an approach is that not all dimensions of value that people hold for qualities of the environment can be expressed in economic terms based on traditional cognitive structuring of the issues. The strategy outlined provides techniques for translating nonmarket values into market, monetary values.

Hackett, P.M.W. 1992. The understanding of environmental concern. *Social Behavior and Personality*. 20(3): 143-148.

This brief but dense article introduces the author’s interpretation of the ways individual personal meaning inform expressed environmental concern. The author suggests that concern will be expressed in increasing intensity depending on perceived relevance to the individual. Implications for application to the issue of biodiversity are outlined.

For many years there has been a recognition by both environmental conservation professionals and by social science academics with interest in environmental conservation, that personal and social awareness, and subsequent concern regarding the quality of the natural environment, lies at the heart of environmental protection (p. 143).

Hayden, F.G. 1993. Ecosystem valuation: combining economics, philosophy, and ecology. *Journal of Economic Issues*. 27(2): 409-420.

An openly anthropocentric discussion of the need for interdisciplinary communication in the environmental modeling process, with one stated purpose being "...to demonstrate that a purely environmental problem does not exist," and that every element of a system operates within an interactive matrix of itself and many other systems.

Hibbard, Michael. 1990. Changing times in Oregon communities: small towns and communities in the other Oregon. *Western Wire*: 12-14.

This piece is a brief excerpt from an earlier article (*Community Development Journal*, volume 24, issue 2, April 1989) that comments on the lack of community leadership in small, economically distressed communities. The author cites several sources of aid toward economic diversification that often go unused for lack of local leadership and provides recommendations for identifying "catalyst" agents in state and educational agencies.

Jakes, P.; Harms, J. 1995. Report on the socioeconomic roundtable convened by the Chequamegon and Nicolet National Forests. Gen. Tech. Rep. NC-177. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 62 p. (Plus appendices).

Two upper Midwest National Forests convened a group of 18 Federal employees, academics, commodity industry representatives, and consultants to determine the degree to which methods and data are available and in practice to evaluate the human dimension of environmental issues. The major point on which they could agree was the need for information about constituent perceptions and valuations of ecosystems and their resources. Recommendations included emphasizing future research in these areas by hiring social scientists to study economic and social issues relative to the environment and to advise public land managers on these questions.

Kellert, Stephen R. 1993. The biological basis for human values of nature. In: Kellert, Stephen R.; Wilson, Edward O., eds. *The biophilia hypothesis*. New Haven: Yale University Press: 42-69.

This author has published extensively on human preferences for various characteristics of the environment. From these studies, a typology has emerged to classify those values in terms of utilitarian, naturalistic, ecologicistic-scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic, and negativistic categories. Cross-cultural study using the typology is described relative to American and Japanese societies.

Kellert, Stephen R. 1984. Wildlife values and the private landowner. *American Forests*. November: 27-29.

This brief article discusses five values that may inform management decisions for private landowners beyond economic considerations: recreation, ecology-science, utility, aesthetics, and ethics. The point is also made that well-managed lands appreciate in property value.

Koch, Niels Elers; Kennedy, James J. 1991. Multiple-use forestry for social values. *Ambio*. 20(7): 330-333.

This article provides a brief and general overview of the history of forestry practices and associated social perceptions of natural resource uses in several Western countries. Social values for forests reflect general social trends of change in moving from a primarily utilitarian view to a wide range of values. The authors caution forest managers to understand and be responsive to these changing values and to reflect these changes in policy and practice decisions.

Machlis, Gary E.; Force, JoEllen. 1988. Community stability and timber-dependent communities. *Rural Sociology*. 53(2): 220-234.

A broad overview of the status of research on resource-dependent communities that defines several outstanding issues. Specifically, conceptual frameworks are needed that incorporate such factors as community stability, resource dependency, and multidisciplinary studies from several theoretical perspectives.

Machlis, Gary E.; Force, J.E.; Balice, R.G. 1990. Timber, minerals, and social change: an exploratory test of two resource-dependent communities. *Rural Sociology*. 55(3): 411-424.

The authors report a test of the hypothesis that the relations between change in the rate of resource production and social change in resource-dependent communities is causal. Two communities in northern Idaho, one timber dependent, the other mining dependent, were examined on various resource and community variables. The authors regard the research as case studies from which to derive methods that may be useful in future studies. They identify two areas of inquiry that may be particularly fruitful: the degree to which community residents use alternative coping strategies and the broader spectrum of social issues such as "the political economy of resources" (p. 422).

McBeth, Mary K.; Foster, Richard H. 1994. Rural environmental attitudes. *Environmental Management*. 18(3): 401-411.

Data derived from an environmental attitudes survey of rural residents in Idaho demonstrated that concern for the integrity of the environment is of mutual interest to long-term residents and newcomers. The authors recommend that environmental organizations and local residents explore common ground to the benefit of both and of the environment.

Montgomery, Claire A.; Pollak, Robert A. 1995. Valuing and measuring biodiversity for comparing land-use alternatives. In: *Proceedings of the IUFRO 20th World Congress; 1995 August 6-12; Tampere, Finland*. [Place of publication unknown]: [Publisher unknown].

An economics-based analytical framework is presented for demonstrating comparative values of landscapes in the context of regional information and local values. The authors argue for different sets of valuation strategies based on whether they are associated with direct local use or more general, broadly based values.

Norton, Bryan G. 1995. Evaluating ecosystem states: two competing paradigms. *Ecological Economics*. 14: 113-127.

A comparison of the positions held by mainstream economists and ecological economists relative to valuing environmental factors. Norton maintains that the emergence of concern for whole ecosystems and their welfare has exceeded the capacity of existing assessment methods. He argues for a "two-tiered" assessment system based on scale of effect where individual human decisions, based on a local scale and having less than a human lifespan, can be evaluated by using traditional economic techniques but that large-scale ecosystem issues need to be examined from a broader, morally based system. A decision-sorting scheme is presented to determine the conditions under which each set of criteria should apply.

Orr, David W.; Ehrenfeld, David. 1995. None so blind: the problem of ecological denial. *Conservation Biology*. 9(5): 985-987.

This brief opinion piece deals with public perceptions and the polarization of attitudes about the condition of the American environment. Specific examples of beliefs that deny the evidence of eroding quality in the environment are discussed, and recommendations are provided to raise the level of discourse in public policy circles.

Reid, Walter V. 1993. The economic realities of biodiversity. *Issues in Science and Technology*. 10: 48-55.

A discussion of "biodiversity prospecting" for previously undiscovered organisms that may have exploitable value and implications for host nations. The author makes a case for profit contributions to indigenous "prospectors" and their countries by organizations that ultimately benefit from these discoveries and for a structure of regulations that would oversee these activities.

Solow, A.; Polasky, S.; Broadus, J. 1993. On the measurement of biological diversity. *Journal of Environmental Economics and Management*. 24: 60-68.

Addressing the "calculus of biodiversity," this article proposes one approach to the quantification of species conservation. The authors stress the difficulty of devising methods to quantify a concept as ill-defined as "biodiversity." The methods outlined are intended for use in making conservation decisions.

Stern, Paul C.; Dietz, Thomas; Kalof, Linda. 1993. Value orientations, gender and environmental concern. *Environment and Behavior*. 25(3): 322-348.

Asserting that "environmentalism has not been linked to a socio-psychological model," (p. 323) the authors use concepts of altruism to discuss three value orientations that people may take toward the environment. First, egoism, is defined as concern specifically for the self; the second is a general interest in all human welfare; and third, a more global, biospheric orientation that is ascribed primarily to deep ecologists. A survey of 349 college students attempted to distinguish differences in ecological orientation between men and women.

Swaney, James A.; Olson, Paulette I. 1992. The economics of biodiversity: lives and lifestyles. *Journal of Economic Issues*. 26(1): 1-25.

The authors discuss the costs associated with preventing losses to biodiversity, the inferred costs of not doing so, and the difficulty of such estimations, given the lack of understanding of the range of species that now exist.

The authors review basic tenets of neoclassical and institutionalist economic approaches and appeal to readers to make the "connection between lives and lifestyles." The remainder of the article describes a litany of examples of exploitation of the resource areas of many indigenous cultures by the developed nations citing statistics that remind the reader that "...developed countries constitute 26 percent of the global population, yet consume 80 percent of the world's energy" (p. 9).

Tickell, Oliver. 1994. Funding dispute could hold up biodiversity treaty. *Nature*. January: 367.

A brief article in the "News" section providing an update on many problems threatening the ratification of the United Nations biodiversity convention. Particularly at issue was the matter of oversight for the Global Environment facility, which was intended to mitigate economic impacts of conserving biodiversity. Levels of voting representation for donor and recipient nations and responsibility for administering funds were points of contention.

Tobey, James A. 1993. Toward a global effort to protect the Earth's biological diversity. *World Development*. 21(12): 1931-1945.

This article discusses the need to preserve biological diversity in the tropical rain forest areas of the world where it is most concentrated. Three countries represent more than 50 percent of the world's rain forests: Brazil, Indonesia, and Zaire. This article proposes a mechanism by which the economic costs of preserving biological resources could be shared by other countries who also have a stake in such preservation. The author proposes the use of a cost-benefit structure to organize and finance a "global biological diversity recurrent cost facility to be financed by all major nontropical countries" (p. 1942).

Vining, Joanne. 1987. Environmental decisions: the interaction of emotions, information, and decision content. *Journal of Environmental Psychology*. 7: 13-30.

This article reports on a complex study of cognitive processes involving decisions about a particular environmental site. Generally, the study found that emotions bear strongly on decision outcomes despite attempts by information providers (such as authors of environmental impact statements) toward objectivity and neutrality. Results of the study with 524 college student subjects indicated that context was also an important issue in terms of emotional state at the time decisions are made.

Because the subject sample was relatively homogenous, further study needs to focus on other populations by age, ethnicity, gender, and socioeconomic status before this information could be usefully applied to ecosystem management.

Whitelaw, W. Ed.; Niemi, Ernest G. 1989. The greening of the economy. *Old Oregon*. 69(3): 26-27.

Two local economists speculate on the degree to which an attractive environment constitutes a "value-added" dimension to the ability of employers to draw and retain a quality workforce in Oregon. They point out that many workers are not now willing simply to relocate to where the work is. Other factors, such as the quality of the local environment, are often deciding factors in whether a prospective employee is willing to relocate.

Wilson, Edward O. 1991. Biodiversity, prosperity, and value. In: Bormann, F. Herbert; Kellert, Stephen R., eds. *Ecology, economics, ethics: the broken circle*. New Haven, CT: Yale University Press: 3-10.

In an essay that recounts the degrees to which biological diversity and habitat are being lost, Wilson urges human societies to think in global terms rather than with concern only for local environments. He cites how little is known about the numbers, distributions, and value to people of existing species. Three issues are recommended for focus by the combined natural and social sciences: a complete survey of biological species; integration of environmental issues into the mainstream of social science; and the blending of conservation issues with other modes of development in the Third World countries.

Worcester, R. 1993. Societal values and attitudes to human dimensions of global environmental change. In: *Proceedings, international conference on social values*. Complutense University of Madrid; 1993 September 28; World Wide Web, CIESIN Home Page, Human Dimensions Kiosk. <<http://www.ciesin.org/kiosk>>

A presentation of results of several surveys of environmental attitudes among various demographic groups of British citizens. Additional data are presented from studies conducted in several European, British Commonwealth, and other nations.

Anon. 1997. *Proceedings of the international conference on outdoor ethics; 1987 November 8-11; Lake Ozark, MO. Arlington, VA: [Publisher unknown]. Sponsored by the Izaak Walton League of America, Inc.*

The documented presentations of individuals representing various stakeholders in the biodiversity discussion, ranging from the U.S. Fish and Wildlife Service, to private and corporate landholders, and to educators. Positions advanced illustrate basic mainstream values pertaining primarily to wilderness and recreational lands and socially acceptable behaviors in relation to the land and other organisms.

Berry, Donald L. 1985. *Mutuality: the vision of Martin Buber*. Albany, NY: State University of New York Press. 121 p.

An indepth treatment of Buber's conceptualization of the I-Thou relation and its applications to the natural world. A hierarchical framework of thresholds of relations is applied to nonhuman entities with the "sub-threshold" relating to physical elements such as air, fire, earth, and water; "pre-threshold" to plants; and "threshold" to animals.

Ethics, Values, and Philosophy

Bormann, F. Herbert; Kellert, Stephen R., eds. 1991. Ecology, economics, ethics: the broken circle. New Haven, CT: Yale University Press. 484 p.

This collection of pieces is derived from a Yale University lecture series in the School of Forestry and Environmental Studies. Contributors are well-known specialists in fields of species diversity, agriculture, values and ethics, pollution and waste, and economics.

Bronowski, Jacob. 1965. Science and human values. rev. ed. New York: Harper and Row. 119 p.

Based on a series of three lectures that Bronowski gave at the Massachusetts Institute of Technology in 1953, this book articulates the human values that underpin modern scientific inquiry. Bronowski argues that the standards of discourse held as ideal in the scientific community would well serve the larger society. He maintains that the search for truth in science is supported by "dissent, freedom of thought and speech, justice, honor, human dignity and self-respect" (p. 68). He does regret, however, in the preface of this edition, not having addressed other human values of "tenderness, kindness, human intimacy and love" (p. xiii). The last piece in this volume is a dramatization of a dialogue meant to demonstrate the distinctions between schools of thought on issues of valuation.

Buber, Martin. 1970. I and thou. (Translation by W. Kaufmann). New York: Scribner and Sons. 185 p. (Plus glossary and index).

This classic of philosophical literature focuses on the nature of human perception of self (I) and other (it or you). These basic perceptions provide explanatory power for the ways in which individual persons regard other species. The I-thou relation implies active reciprocity between the elements. The most elemental person-environment relation is the carbon dioxide-oxygen transaction between humans and plants. The vital reciprocity of this relation requires much more of the partners than the I-it mode demonstrated by regarding nature only in terms of resource commodities. These perspectives describe the polarity of assumptions underpinning the common practice of science.

Callicott, J. Baird. 1994. The land aesthetic. In: Chapple, Christopher K., ed. Ecological prospects: scientific, religious and aesthetic perspectives. Albany, NY: State University of New York Press: 169-183.

Callicott provides a strong case for the aesthetic value of the natural environment and grounds much of his argument in the writings of Aldo Leopold and John Muir. He traces the evolution of human appreciation for the natural world through several centuries in terms of the philosophical constructs prevalent during those times, particularly focusing on dualistic perspectives.

Chapple, Christopher K., ed. 1994. Ecological prospects: scientific, religious and aesthetic perspectives. Albany, NY: State University of New York Press. 236 p. (Plus index).

This volume is a collection of contemporary essays that address multidisciplinary issues related to whether "living forms of the planetary system we know as Earth or *Gaia*, merit protection" (p. ix). It is a dialectic that examines the relation of a wide range of human ideas to various conditions of life and the changes perceived to be taking place in those conditions.

Devall, Bill 1988. Simple in means, rich in ends: practicing deep ecology. Salt Lake City, UT: Gibbs-Smith Publisher. 224 p.

A strong and personal explication of the philosophy and practical roots of deep ecology. Devall traces the history of the movement along with its practical implications for lifestyle and communities. Ethics, values, and concepts of ecological justice are also major themes of this world view and life way that the author addresses indepth.

Eckberg, D.L.; Blocker, T.J. 1989. Varieties of religious involvement and environmental concerns: testing the Lynn White thesis. *Journal for the Scientific Study of Religion*. 28(4): 509-517.

Based on the hypothesis that asked whether there is a measurable "disdain" for nature which grows from acceptance of Biblical authority, these authors conducted a survey of environmental attitudes and Biblical beliefs of persons identifying themselves as Protestant religious conservatives. The study found that belief in the Bible was positively correlated with "use of the environment for the economy" and negatively correlated with protection of the environment, concern about local air, water, and waste disposal.

Holling, C.S. 1994. An ecologist view of the Malthusian conflict. *Beijer Reprint Series*. 36: 79-103.

Philosophical perspectives about the ability of the human species and environmental factors to adapt to the accelerating rates of population and environmental change are discussed. The author suggests that these increasingly dramatic effects are overwhelming human capacity for adaptation and will subject the planet to the cataclysmic consequences of the interactive effects of these changes.

Jacob, Merle. 1994. FORUM: sustainable development and deep ecology: an analysis of competing traditions. *Environmental Management*. 18(4): 477-488.

The author compares philosophical and value perspectives of ecological traditions that seem to be in conflict: "shallow" ecology, which is anthropocentric and "deep" ecology, which is biocentric. Shallow ecology is characterized by its focus on environmental management as a tool for human benefit, and deep ecology embodies a set of values that views people as but one element in the system with no more intrinsic value than other species.

Machlis, Gary E. 1987. Outdoor ethics in America. In: *Proceedings of the international conference on outdoor ethics; 1987 November 8-11; Lake Ozark, MO.* Arlington, VA: Izaak Walton League of America, Inc.: 11-14.

Documenting a panel discussion entitled "Outdoor Ethics: A Social and Psychological Perspective," the author raises issues that are inherently personal and reduce the discussion to the level of private, individual decisions about behavior. The distinction is made between proposed and enacted ethics. Certain criteria are outlined as pertinent for a practical outdoor ethic: it should be attainable with no internal contradictions, general with specific examples, postulate solutions to difficult problems such as competing interests and rights, and articulate an American vision that is globally related.

Nash, Roderick Frazier. 1989. The rights of nature: a history of environmental ethics. Madison, WI: University of Wisconsin Press. 290 p. (Plus notes and bibliography).

An engaging and readable account of multicultural perspectives through the history of concern for the environment. Nash weaves together strands of thought from biological sciences, religion, philosophy, psychology, economics, deep ecology, and politics to provide a holistic temporal view of the relation between people and the context from which they take life. In doing so, Nash puts into perspective the role of Judeo-Christian tradition in attitudes toward the environment as compared with other traditions and social environmental movements.

Page, Talbot. 1992. Environmental existentialism. In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. Ecosystem health: new goals for environmental management. Washington, DC: Island Press: 97-121.

In a discussion of the practical motivations for valuing ecosystems, Page traces the problems of values to their origins in the meanings implicit in disciplinary perspectives. Taking the various disciplines of science, philosophy, and health as "villages," he reduces the dualisms between them to the differences between "meaning" and "value." Finally, Page reconciles the apparent dichotomies into a unified, whole process that has profound implications for ecosystem health for both immediate and distant futures.

Partridge, E., ed. 1981. Responsibilities to future generations: environmental ethics. Buffalo, NY: Prometheus. 308 p. (Plus bibliography).

This collection of chapters is dedicated to ethical and responsibility issues related to the future of the environment and subsequent generations. In the five parts of the book, 24 authors address issues such as duty to posterity, issues and perspectives, the rights of future generations, concern for future generations, and applications. A forward by Stuart Udall frames the issues in terms of stewardship.

Reed, M.G.; Slaymaker, O. 1993. Ethics and sustainability: a preliminary perspective. *Environment and Planning*, 25: 723-739.

A framework for applying different attitudes and ethics to the relations of people to the environment, based on geographic scale. Planetary, global, regional, and local scales are associated with "ethical expressions" that pertain to each scale. This paper illustrates the degree to which natural scientists are becoming more willing to engage issues of ethics and values as they increasingly account for the human species as part of the environmental system.

Rolston, Holmes, III. 1991. Environmental ethics: values in and duties to the natural world. In: Bormann, F. Herbert; Kellert, Stephen R., eds. *Ecology, economics, ethics: the broken circle*. New Haven, CT: Yale University Press: 73-96.

Rolston outlines a collection of issues to which, in his view, responsible humans should be sensitive. Pointing out that "(o)ne form of life has never endangered so many others," he refers to extinctions as "superkilling." At the same time, Rolston positions his arguments in anthropocentric, hierarchical language that denies sentience to any species other than people. He concludes the essay with a discussion of human value theory.

Skolimowski, Henryk. 1981. Ecophilosophy: designing new tactics for living: ideas in progress. Boston/London: Marion Boyars. 117 p.

This volume represents the seminal publication of Skolimowski's theoretical perspectives relative to the synthesis of science and philosophy. After tracing the philosophical heritage of science and the dualism that prevails in the present, he offers a different paradigm that incorporates spirituality with philosophy and empirical science.

Skolimowski, Henryk. 1988. The origin and meaning of eco-philosophy. *Communitas*. 75: 29-30.

In this brief article, Skolimowski summarizes his conceptualization of ecophilosophy as contrasted with the mainstream analytical philosophy on which empirical science and Western political systems are based.

Skolimowski, Henryk. 1992. Ecological spirituality and its practical consequences. *Teilhard Review*. 27(2): 43-53.

This article represents a further refinement of Skolimowski's conceptual framework, blending ecological considerations into philosophical frames of reference. Spirituality is the focus that unifies several dimensions of the human ecological experience.

Stern, Paul C.; Dietz, Thomas; Black, J.S. 1986. Support for environmental protection: the role of moral norms. *Population and Environment*. 8(3,4): 204-222.

The motivation that drives participation in environmental activism is examined from the perspective of moral imperatives. The issues of ascribing responsibility and consequences of activities are hypothesized to be central to what appears to be altruistic behavior. The paper reports results of a pilot study that seeks to identify variables relevant to the issue.

General Issues

Anglemyer, Mary; Seagraves, Eleanor R., comps. 1984. The natural environment: an annotated bibliography on attitudes and values. Washington, DC: Smithsonian Institution Press. 268 p.

This broadly inclusive collection of references with 857 entries is organized by subject headings and well indexed. The collection covers the many human concerns about the natural environment covering subjects such as philosophy and religion, humanities, economics, and politics. This volume follows an earlier publication entitled "A Search for Environmental Ethics: An Initial Bibliography" published in 1980. Citations in the 1984 volume do not duplicate those of the 1980 version.

Bartelmus, P. 1994. Environment, growth and development: the concepts and strategies of sustainability. New York: Routledge. 163 p. (Plus index).

The author brings together some of the political, economic, and scientific issues articulated at the "Earth Summit on Environment and Development" in Rio de Janeiro in 1992 and several other international conferences and frames them in terms of sustainable development for human society.

Botkin, D.B. 1990. *Discordant harmonies: a new ecology for the twenty-first century.* New York: Oxford University Press. 241 p.

This volume documents several historical views of the Earth, nature, and their dynamic processes and evaluates those from the perspective of current changes in thinking about ecology and biodiversity. Botkin questions the basic notion of sustainability by recognizing that "...an extraordinary thing was discovered: even the largest and one of the longest lived of all organisms (sequoias) requires disturbance to persist" (p. 3).

The author invokes the Gaia hypothesis as a reminder that humankind is only one of millions of species that is subject to forces that may be affected by what we do but that ultimately cannot be manipulated to our own precise ends, even if we could agree on what those should be.

Burton, I.; Timmerman, P. 1989. Human dimensions of global change—a review of responsibilities and opportunities: Proceedings, reconciling the sociosphere and the biosphere symposium; 1988 September; Tokyo, Japan. In: *International Social Science Journal*; 41: 295-456.

In a special issue of this journal, a selection of papers is presented from the symposium. This paper outlined the dimensions of global change that can be attributed to human activity and cites development and the arms race as primary factors. The authors identify the sources of change, its consequences, and the management of change as elements that need to be addressed by global leaders to control the rate of environmental impact of human activity.

The authors further outline issues for a research agenda to be undertaken by the Human Dimensions of Global Change group and a discussion of its relation to the International Geosphere-Biosphere Programme.

Callicott, J. Baird. 1994. The wilderness idea revisited: the sustainable development alternative. In: Chapple, Christopher K., ed. *Ecological prospects: scientific, religious, and aesthetic perspectives.* Albany, NY: State University of New York Press: 37-63.

This chapter of a collection of essays presents a historical critique of the concept of wilderness and the relation of people to it, particularly in terms of Eurocentric religious heritage. A discussion follows of several models of sustainable development and how they might apply to developed areas of North America.

Callicott, J. Baird 1992. Aldo Leopold's metaphor. In: Costanza, R.; Haskell, B.D., eds. *Ecosystem health: new goals for environmental management*. Washington, DC: Island Press: 42-56.

In a section of this chapter entitled "The crumbling cornerstones of biological conservation," the author takes issue with the time-honored assumption that species diversity equals ecosystem stability and questions the anthropocentric biases on which it rests. A case is made for the view that the effect of people on the landscape is no more unnatural than the effects of other species and that pure, untrammelled wilderness never existed. The logical conclusion of such reasoning is provided in a quote from Kristin Shrader-Frechette (1989), which asserts that extinguishing species is a natural consequence of strong forces in nature, natural disasters as well as human effects.

Callicott subsequently suggests that the concept of environmental health may provide an answer to this debate in that degrees of functioning are the objective criteria for judging landscape health.

Carr, D.; Donoghue, L.; Emery, M. 1995. Human dimensions of global change research within the USDA Forest Service. In: Preprint volume of the 6th symposium on global change studies; 1995 January 15-20; Dallas, TX. Boston, MA: American Meteorological Society: 49-53.

A status description paper that outlines social science research activity in the Forest Service in terms of identified needs, current research, and perceived future needs.

Clark, W.C. 1989. The human ecology of global change: Proceedings, reconciling the sociosphere and the biosphere symposium; [Dates of meeting unknown]; [Location of meeting unknown]. In: *International Social Science Journal*; 41: 315-345. (Special issue).

This article defines basic issues that must be addressed in developing a comprehensive approach to an environmental research agenda that take into account all manner of interacting factors that affect global change—both human-generated and naturally occurring factors. Clark provides a systems framework that illustrates some of the connections between biotic and geospheric systems as well as several examples of global-scale analyses already underway. In addition, issues of human attitudes and values are discussed in terms of spatial scale and cultural context. Finally, the author submits a comprehensive set of research questions extracted from the literature that appears to represent the most pressing issues for the study of people in relation to global change.

Clawson, M. 1977. *Man, land, and the forest environment*. Seattle: University of Washington Press. 72 p.

The compiled texts of three lectures presented by Clawson were published with the support of the Geo. S. Long Fund during the author's tenure as the Walker-Ames professor at the University of Washington. They serve as an example of the "multiple use-sustained yield" thinking that prevailed during the period. The author was a strong proponent of the forest-as-commodity perspective. "The only way in which more timber can be grown on many national forest areas is to cut the timber now standing" (p. 46).

Committee on Geological Sciences. 1972. The Earth and human affairs. San Francisco: Canfield Press. 143 p. (Plus index).

A perspective on diversity dating from the 1970s that traces the relation of environmental condition to human activity through time. Many factors are taken into account such as agricultural and forestry practices, biological diversity and habitat integrity, mining practices, wastes and pollution, effects on water forms, soil degradations, and catastrophic natural hazards.

Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. 1992. Ecosystem health: new goals for environmental management. Washington, DC: Island Press. 256 p. (Plus index).

This work begins with a section dedicated to philosophy and ethics as a prelude to discussions of science and policy that articulate definitions of ecosystem health and ways to study them.

Crosby, A.W. 1994. The homogenization of the planetary biome. In: Chapple, Christopher K., ed. Ecological prospects; scientific, religious, and aesthetic perspectives. Albany, NY: State University of New York Press: 25-36.

The author provides a historical account tracing the rates of loss of species from prehistory to the present. The human dependence on a relatively few species for survival puts great populations at risk in the future as in the past. Recommendations for mitigating this risk include changing public perceptions about consumption and moving beyond the Darwinian view of the world to a more integrated and inclusive paradigm. The author recommends the Gaia hypothesis as having promise.

Ecological Society of America. 1996. The report of the Ecological Society of America Committee on the scientific basis for ecosystem management. World Wide Web Ecological Society of America Homepage, Reports Section, [<http://www.sdsc.edu/ESA/ecmpage.htm>]. 44 p. (Plus references and appendices).

This position paper outlines the criteria for a scientific approach to ecosystem management. Addressing directly the interaction of human social and ecological issues, the paper outlines eight major issues as deserving consideration: sustainability, goals of management, sound ecological models, complexity and connectedness, recognition of the dynamic character of ecosystems, context and scale, humans as ecosystem components, and adaptability and accountability.

Ehrenfeld, D. 1993. Beginning again: people and nature in the new millennium. Oxford, England: Oxford University Press. 216 p. (Plus index and bibliography).

This work attempts to characterize the next century in terms of the ways people will interact with the environment and other species. The volume draws heavily on cultural context to help identify the issues that are likely to confront decisionmakers and society at large in the coming years. The challenge is to confront the value and cultural assumptions that inform these decisions and to evaluate them relative to their probable consequences.

Gatto, M. 1995. Sustainability: is it a well defined concept? *Ecological Applications*. 5(4): 1181-1183.

In a lengthy letter to the editor of this journal, the author raises the central issue of whether current definitions of sustainability are valid and functional and cites at least three that are grounded in specific disciplines. Gato further recommends that policy debates would be more fruitfully focused on issues that are more descriptive of scientific realities.

Gilligan, Carol. 1982. *In a different voice*. Cambridge: Harvard University Press. 184 p. (Plus index and references).

Although Gilligan's book does not directly address environmental issues, it does provide a philosophical background for evaluating these issues from an alternative perspective. As Gilligan investigated male-dominated theories of human development, she discovered profound, qualitative differences in the ways women perceive and evaluate value-laden information and the choices that result from those perceptions. The value orientations of women as described by Gilligan can inform the ways in which biodiversity research is defined and the questions that are asked and can provide important insights into making appropriate ecosystem management decisions.

Grumbine, R. Edward. 1992. *Ghost bears: exploring the biodiversity crisis*. Washington, DC: Island Press. 290 p. (Plus notes and glossary).

A personal account of the effect of diminishing biodiversity on many factors. The author explores the legal aspects, issues in management for biodiversity, as well as ethical and psychological dimensions of the problem. Grumbine's admonition to "think big and think connected" addresses the scope of needs represented by the biodiversity crisis.

Haskell, Benjamin D.; Norton, Bryan G.; Costanza, Robert. 1992. What is ecosystem health and why should we worry about it? In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. *Ecosystem health: new goals for environmental management*. Washington, DC: Island Press: 4-19.

The introductory chapter for this volume addresses at the outset the value issues inherent in the process of operationally defining such concepts as "ecosystem health." The authors identify specific standards based on the human medical model to be applied as criteria for determining the condition of an ecosystem. They further discuss whether ecosystem health should be the province of scientific theory or public policy.

Lovelock, James. 1988. *The ages of Gaia*. New York: WW. Norton and Co. 252 p. (Plus index).

During the 1970s, Lovelock first proposed the hypothesis that the planet Earth is a dynamic organism whose systems are made self-regulating by the life that inhabits it. This volume restates the basic concepts of the framework, chronicles the progression of recent scientific thinking about the hypothesis, and places it in the context of human history and philosophy.

Merchant, C., ed. 1994. Key concepts in critical theory: ecology. Atlantic Highlands, NJ: Humanities Press International, Inc. 383 p. (Plus index).

One volume in a series offered by the publisher about critical theories on a broad range of themes. This work is arranged in seven sections covering historical views of nature; environmental economics and politics; deep, social, and socialist ecology; ecofeminism; environmental justice; spiritual ecology; and postmodern science. The writers represented in these selections are generally on the progressive edge of environmental thought where disciplinary boundaries have little meaning and provocative ideas have a voice.

Miller, R.B. 1991. Social science and the challenge of global environmental change. *International Social Science Journal*. 43: 609-617.

This author describes a recent shift in social science focus to global issues and sees the discipline as playing an important, interpretive role. Directly addressing the traditional chasm among fields of scientific inquiry, he regards the social and natural sciences as constituting two legs of the same person. A quotation is illustrative:

...because of the analytically messy essence of human behavior that is the subject of social science—socioeconomic research on global change will inevitably introduce an exponential increase in the complexity of research on global change, which will make many natural scientists uneasy and will lead some to try to avoid, dismiss, or ignore the human dimensions. It is critical for both social scientists and natural scientists to recognize and combat this tendency (p. 614).

Myers, N. 1991. Biological diversity and global security. In: Bormann, F. Herbert; Kellert, Stephen R., eds. 1991. *Ecology, economics, ethics: the broken circle*. New Haven, CT: Yale University Press: 11-25.

A powerful argument for preserving biological diversity that puts the mass extinctions of species now taking place on the Earth into the perspective of geological time. Myers compares the amount of time it will take the planet to recover from nuclear waste, from depleted ozone and the greenhouse effect; soil cover losses; and the losses of tropical forests to the incomprehensibly longer periods required for the evolutionary process to recover from the extinction of species taking place over a mere 50 years. He further recommends simply using a portion of the military budgets now being expended on political “security” to help secure the more critical global security of species. The author suggests that the sheer magnitude of the issues demand careful consideration and immediate action.

Odum, E.P. 1992. Great ideas in ecology for the 1990's. *BioScience*. 42(7): 542-544.

A catalogue of 20 basic concepts that Odum believes should be included in an undergraduate ecology curriculum. As Odum says “. . . ecology is no longer a subdivision of biology but has emerged from its roots in biology to become a separate discipline that integrates organisms, the physical environment, and humans—in line with *oikos*, root of the word *ecology*” (p. 542).

Oelschlaeger, Max, ed. 1992. The wilderness condition: essays on environment and civilization. Washington, DC: Island Press. 345 p. (Plus appendices and notes).

An eclectic collection of writings that focuses on the intricacies of culture and language as they pertain to the natural world. The authors represent a mosaic of thoughtful perspectives on the role of people in the planetary order.

Page, Talbot. 1992. Environmental existentialism. In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. Ecosystem health: new goals for environmental management. Washington, DC: Island Press: 97-121.

In a discussion of the practical motivations for valuing ecosystems, Page traces the problems of values to their origins in the meanings implicit in disciplinary perspectives. Taking the various disciplines of science, philosophy, and health as "villages," he reduces the dualisms between them to the differences between "meaning" and "value." Finally, Page reconciles the apparent dichotomies into a unified, whole process that has profound implications for ecosystem health for both immediate and distant futures.

Partridge, E., ed. 1981. Responsibilities to future generations: environmental ethics. Buffalo, NY: Prometheus. 308 p. (Plus bibliography).

This collection of chapters is dedicated to ethical and responsibility issues related to the future of the environment and subsequent generations. In the five parts of the book, 24 authors address issues such as duty to posterity, issues and perspectives, the rights of future generations, concern for future generations and applications. A foreword by Stuart Udall frames the issues in terms of stewardship.

Pearce, D.W. 1993. Commentaries: saving the world's biodiversity. *Environment and Planning A*. 25: 755-757.

This brief article demonstrates the rate of land use conversion to agricultural uses worldwide with its consequent loss of biodiversity. Three causes are cited as contributing to the failure of societies to conserve biodiversity; lack of valuation of the consequences of land degradation; government subsidies that directly encourage degradation; and lack of value for measures that would prevent degradation.

Plumwood, Val. 1993. Feminism and the mastery of nature. New York: Routledge. 239 p. (Plus notes, bibliography, and indices).

This book is a comprehensive discussion of feminist theory as it pertains to concerns for and interaction with the natural world. Basic tenets of logic, philosophy, and ethics are recast in terms that move beyond the cultural limitations of what Plumwood terms "phallogocentric" definitions and address various environmental issues.

Polasky, S.; Jaspin, M.; Szentandrasi, S. [and others]. 1995. Bibliography on the conservation of biological diversity: biological-ecological, economic, and policy issues. Unpublished. On file with: Oregon State University, Corvallis, OR 97331. Also available online: <polaskys@ccmail.orst.edu>

An in-progress collection of references focused on the various activities concerning biodiversity such as research, policy, and planning decisions deriving from it. Economic issues are of particular interest.

Reed, M.G.; Slaymaker, O. 1993. Ethics and sustainability: a preliminary perspective. *Environment and Planning*, 25: 723-739.

A framework for applying different attitudes and ethics to the relations of people to the environment, based on geographic scale. Planetary, global, regional, and local scales are associated with "ethical expressions" that pertain to each scale. This paper illustrates the degree to which natural scientists are becoming more willing to engage issues of ethics and values as they increasingly account for the human species as part of the environmental system.

Rolston, Holmes, III. 1991. Environmental ethics: values in and duties to the natural world. In: Bormann, F. Herbert; Kellert, Stephen R., eds. *Ecology, economics, ethics: the broken circle*. New Haven, CT: Yale University Press: 73-96.

Rolston outlines a collection of issues to which, in his view, responsible members of the human species should be sensitive. Pointing out that "(o)ne form of life has never endangered so many others," he refers to extinctions as "superkilling." At the same time, Rolston positions his arguments in anthropocentric, hierarchical language that denies sentience to any species other than people. He concludes the essay with a discussion of human value theory.

Sagan, D.; Margulis, Lynn. 1994. Gaian views. In: Chapple, Christopher K., ed. *Ecological perspectives: scientific, religious, and aesthetic perspectives*. Albany, NY: State University of New York Press: 3-9.

A brief history of the Gaian perspective of life and Earth in what is termed a "metascientific" theory that accommodates the totality of the interrelatedness of the planetary system.

Sagoff, Mark. 1995. Carrying capacity and ecological economics. *BioScience*, 45(9): 610-620.

In the "Roundtable" section of this publication, Sagoff raises concerns about the strategies taken by environmentalists to justify their positions through the use of sophisticated, though still utilitarian, ecological assessments. He suggests that these attempts suffer the same philosophical and moral deficiencies that mainstream economic valuations of the environment do; that is, their focus is exclusively on human-centered use values and ignores intrinsic and existence values.

Sagoff, Mark. 1992. Has Nature a good of its own? In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. *Ecosystem health: new goals for environmental management*. Washington, DC: Island Press: 57-71.

This article outlines two dichotomous perspectives on ecological science, that of biotechnologists and bioconservatives. The differentiating factors reduce to the perception of nonhuman life and its context as merely "natural resources" to sustain the human condition or whether all life and processes have inherent value. Sagoff cites several examples of each perspective and specifically focuses on ecological health and intrinsic value.

Schneider, S.H.; Boston, P.J., eds. 1993. Scientists on Gaia. Cambridge, MA: The MIT Press. 433 p. (Plus list of conference participants and index).

The ongoing discussions of the merits of the Gaia hypothesis resulted in a 1988 conference of the American Geophysical Union devoted exclusively to the theory and its multidisciplinary implications. This volume collects the proceedings and arranges the issues in sections on the philosophical and theoretical foundations of Gaia; mechanisms-sulfur; mechanisms-oxygen; mechanisms-carbon and biomass; other mechanisms; Gaia, catastrophes, and other planets; and political implications.

The representation of well-regarded institutions and researchers demonstrates the extent to which the Gaia hypothesis has matured to the status of theory. The range of opinions is by no means narrow or the theory without detractors.

Sjöberg, Lennart. 1989. Global change and human action: psychological perspectives: Proceedings, reconciling the sociosphere and the biosphere symposium; [Date of meeting unknown]; [Meeting location unknown]: In: International Social Science Journal; 41: 413-433. (Special issue).

This author surveys several psychological theories about human environmental behavior. For example, behavior modification relies on the reward-punishment approaches of the legislative and punitive control of relations between people and the environment. Rationality and cognitive psychology exhibit their own limitations in that attitudes about elements of the environment tend to be grounded in culture, values, and beliefs that are sometimes resistant to "rational" discussion. Little serious investigation of these issues exists apart from surveys of attitudes that seem to be weakly correlated to actual behavior.

Skolimowski, Henryk. 1988. Eco-philosophy and deep ecology. *The Ecologist*. 18(4/5): 124-127.

In pointing out what he regards as the philosophical shortcomings of the deep ecology movement, the author advocates for his own concept of an "eco-theology" that is presented as accounting for those limitations. Ecophilosophy, as herein described, articulates a Eurocentric perspective of the environment and the role of people in that apparently an a priori assumption is that "man" occupies a position apart from other organisms. A hierarchy of life that is implied calls for stewardship on a linear journey toward an "Omega Point" of "ultimate perfection." Although intending to transcend traditional theologies by incorporating ecology, ecophilosophy seems to be trapped within them.

Soulé, Michael E. 1991. Conservation: tactics for a constant crisis. *Science*. 253: 744-749.

The author evaluates the human social dimensions of biodiversity conservation by considering component factors in light of economics, cultural perspectives, population pressures, political stability, and the likelihood of implementing available preservation strategies. In view of the magnitude of the issues at stake, Soulé argues for the simultaneous application of many forms of conservation practices to allow for varying degrees of success.

Suter, Glenn. 1995. Adapting ecological risk assessment for ecosystem valuation. *Ecological Economics*. 14: 137-141.

The author provides a brief commentary on the difficulties inherent in and the limitations of developing a monetary valuation for ecosystem characteristics, particularly in an effort to predict the probabilities of loss.

Taylor, B. 1994. Earth First!'s religious radicalism. In: Chapple, Christopher K., ed. *Ecological prospects: scientific, religious, and aesthetic perspectives*. Albany, NY: State University of New York Press: 185-209.

The author suggests that the activities of one of the more militant environmental organizations can be described in terms of religious fervor and demonstrates the extent to which values usually associated with religious faith characterize the beliefs and actions of a significant segment of this group. Conflicts in these values, however, have given rise to divisions that define the various factions.

United Nations Environment Programme. 1994. Note by the Interim Secretariat on the terms of reference for the meeting. In: *Proceedings, open-ended inter-governmental meeting of scientific experts on biological diversity; 1994 March 15-19; Mexico City*. [Place of publication unknown]: [Publisher unknown].

This paper is a record of proceedings of the United Nations Environmental Programme meeting related to biodiversity, in which existing programs of research were to be identified, subsequent research agendas developed, and current methods and research techniques inventoried. Included in the recommendations were items that addressed measuring sustainability and recognized the potential value of ethnography, sociology, and anthropology in the research efforts.

Wall, D. 1994. *Green history: a reader in environmental literature, philosophy and politics*. New York: Routledge. 273 p. (Plus bibliography and index).

This selection is included in the methodology section because it provides an example of the scope of background literature and information necessary to provide a context for current research. The study of biological diversity takes place in a historical context, both in terms of human society and geological timeframes.

Wilson, Edward O. 1993. Biophilia and the conservation ethic. In: Kellert, S.R.; Wilson, Edward O., eds. *The biophilia hypothesis*. Washington, DC: Island Press: 31-41. Chapter 1. (A Shearwater Book).

This paper is the opening chapter, in which Wilson argues for the existence of "the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature." He further proposes that biophilia is an evolved human characteristic that links us to the whole of the biosphere. This author is the original and leading proponent for the notion of biophilia.

The volume consists of 15 chapters in six sections, with essays by authors from various disciplines and perspectives; most of the authors discuss human culture and values as they relate to biodiversity.

Wilson, Edward O. 1992. The diversity of life. New York: W.W. Norton and Co. 424 p. (Plus index, glossary, and notes).

In a broadly comprehensive treatise on biological diversity, Wilson addresses complex issues concerning the vast diversity of species and the peril in which most now stand. With a wealth of examples, he illustrates how much is yet to be discovered on the planet. Although many thousands of species have been identified, biologists estimate that these probably represent only a tenth of species on Earth today. And those now alive are only a small number of species that have at one time lived on the planet.

In his customary eloquent prose, Wilson chronicles the decline of diversity in many parts of the world, some efforts underway to remedy the situation, and appeals for an individual as well as national environmental ethic as a philosophical base on which to make conservation decisions.

Alpert, P. 1995. Incarnating ecosystem management. *Conservation Biology*. 9(4): 952-955.

In the "Comments" section of this publication, Alpert provides recommendations for ways to implement ecosystem management strategies that transcend the boundaries of traditional science. He suggests means for incorporating land managers, planners, and the general public into the process of hypothesis construction and testing and data collection. These strategies may not only enhance research activity and maximize the effects of research funding but would help in educating constituents and building consensus about land use decisions as well.

Bennett, John W. 1993. Human ecology as human behavior: essays in environmental and development anthropology. New Brunswick, NJ: Transaction Publishers. 349 p.

This series of essays outlines the basic theories and concepts of human ecology, followed by reviews of several bodies of work in Asia, North America, east Africa, and Canada.

Berger, J.; Sinton, J.W. 1985. Water, earth, and fire: land use and environmental planning in the New Jersey pine barrens. Baltimore, MD: The Johns Hopkins University Press. 228 p.

An account of an ecoregion case study of the New Jersey Pine Barrens using a discipline-integrated method. Drawing on sociological case studies, participant observation, history, economics, hydrology, and biology, the authors develop a multifaceted, well-balanced understanding of this ecoregion. The human population of the region is considered for both positive and negative effects on the landscape and other species.

Bohm, David. 1994. Postmodern science and a postmodern world. In: Merchant, C., ed. *Ecology: key concepts in critical theory*. Atlantic Highlands, NJ: Humanities Press: 342-350.

A prominent physicist calls for a serious and immediate move of scientific enterprise from the traditional, mechanistic paradigm to a more holistic view of the universe and its workings, based on quantum theory. "A postmodern science should not separate matter and consciousness and should therefore not separate facts, meaning, and value" (p. 343).

Brown, J. 1985. An introduction to the uses of facet theory. In: Canter, D., ed. *Facet theory: approaches to social science*. New York: Springer-Verlag: 17-57.

A descriptive and introductory chapter that outlines the primary tenets of facet theory as devised by Louis Guttman and others. Facet theory is defined as a metatheory “because it is about how theories themselves are specified and tested” (p. vi). It is generally used as a procedural framework within which disparate aspects of a problem are subjected to standard procedures of inquiry and evaluated by means of a set of unique analyses designed particularly for the method. The concept “embrace(s) both qualitative and quantitative data within the same theoretical model (which) provides a powerful basis for cumulative research” (p. xi).

Burch, W.R., Jr.; DeLuca, D.R. 1984. *Measuring the social impact of natural resource policies*. Albuquerque, NM: University of New Mexico Press. 216 p.

This comprehensive discussion covers various research techniques and the social issues that bear on their application. Of particular interest is chapter 4, “Social Cycles and Human Resource Systems,” in which several cycle theories are combined in a conceptual framework for the study of human social systems. A potentially innovative framework, however, is hampered by seriously outdated citations of human development theory, particularly those referencing family studies literature.

Burch, Wm. R., Jr. 1971. *Daydreams and nightmares: a sociological essay on the American environment*. New York: Harper and Row. 175 p. (Plus bibliography). (Part of the Harper and Row Monograph Series in Sociology.)

The author reviews academic thought relative to the perceived need to account for the human factor in the study of the environment and a call for a unified perspective of science and nature. Predating Lovelock’s Gaia hypothesis, “the perspective is global in that the elements which partake of the system, as all elements, are equally essential if balance is to be maintained—the soil, its micro-organisms, the air and its bacteria, the high plants and animals—all are uniquely bound together in this awesome, self-regulating mechanism of nature” (p. 103).

Canter, D., ed. 1985. *Facet theory: approaches to social science*. New York: Springer-Verlag. 306 p. (Plus index and author list).

A general overview of a set of research methods and analysis techniques that are purported to move beyond the strict statistical empirical analyses of hypothesis testing. The strategy depends on cumulative and multidimensional scaling techniques and the computer analysis programs that support them.

A series of 12 contributors explicate the concept and theories of the approach, along with some examples of applications and specific methods.

Capra, F. 1994. Systems theory and the new paradigm. In: Merchant, C., ed. Ecology: key concepts in critical theory. Atlantic Highlands, NJ: Humanities Press: 334-341.

A commentary on the historical background of the profound changes now taking place in scientific thinking with regard to theory and research method. Capra provides a simple outline of five points that illustrate the major aspects of these changes. He further advocates for the integration of all sciences; natural, humanities, and social, in a revitalized perspective that focuses on a holistic process of inquiry. Finally, Capra expects to see the integration of “ecologically oriented ethics” into scientific investigation and urges practitioners to discard the fiction of “value-free” science.

Dogan, M.; Pahre, R. 1989. Hybrid fields in the social sciences. In: Reconciling the sociosphere and the biosphere symposium; [Date of meeting unknown]; [Meeting location unknown]. International Social Science Journal; 41: 457-470. (Special issue).

A commentary on the pattern of development in scientific disciplines toward specialization, which creates gaps in the knowledge base. This phenomenon appears to generate hybrids of inquiry to fill the remaining space. The use of terms and concepts among disciplines; such as “role,” “structure,” “homeostasis,” “system,” and “human ecology,” illustrate the point. Popper is quoted as follows: “The difficulty of discussion between people brought up in different frameworks is to be admitted. But nothing is more fruitful than such a discussion; than the culture clash which has stimulated some of the greatest intellectual revolutions” (Popper 1970:57).

Emery, M.; Paananen, D.M. 1995. Humans, forests, and global environmental change: planning a social science research agenda. Gen. Tech. Rep. NE-212 Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 22 p.

A report of the proceedings of a set of meetings sponsored by the Forest Service, Northern Global Change Program, and convened at the John F. Kennedy School of Government at Harvard University and at Pittsburgh. Through these discussions, a proposed agenda for integrating human dimensions into global change research was devised. Relevant human factors were identified and strategies recommended to address these issues.

Greene, H.W. 1994. Systematics and natural history, foundations for understanding and conserving biodiversity. American Zoologist. 34: 48-56.

A fresh reminder of the role of these two related disciplines and what they have to offer biodiversity research. The author points out that much is yet to be done to acquire missing information about species, their numbers and habitats, even in the most well-studied areas of the United States.

Hackett, P.M.W. 1992. The understanding of environmental concern. Social Behavior and Personality. 20(3): 143-148.

A brief article reviewing publications related to facet theory applied to research on environmental issues. The author’s own research is referenced in terms of the degrees to which dimensions of scale are relevant in the valuation of environmental issues.

Hågvar, S. 1994. Preserving the natural heritage: the process of developing attitudes. *Ambio*. 23(8): 515-518.

This article discusses the importance of human attitudes about the environment in achieving conservation of species and natural habitats. The author presents a matrix for discussing environmental attitudes based on four levels of insight and three temporal scales.

Hawley, A.H. 1986. Human ecology: a theoretical essay. Chicago: University of Chicago Press. 168 p. (Plus notes, references, and index).

In this book, the principles of a theory of human ecology are articulated with precision. Each chapter concludes with a series of assumptions and hypotheses on which the section was based. The concepts of "environment" and "ecosystem" are treated with specificity as they relate to the human species. Moreover, the "biophysical" realm is distinguished from the "ecumenic," which denotes variables that pertain to people, whether they are social or economic.

Processes of ecosystem change are conceptualized and described in terms of various facets of cumulative change.

Hines, J.M.; Hungerford, H.R.; Tomera, A.N. 1986. Analysis and synthesis of research on responsible environmental behavior: a metaanalysis. *The Journal of Environmental Education*. 18: 2, 1-8.

These authors used the Schmidt-Hunter metaanalysis techniques to evaluate the factors associated with environmentally responsible attitudes and the relative strength of those factors. From the study, they developed a model that represented the factors and the relations among them.

Holder, J.; Lane, P.; Eden, S. [and others], eds. 1993. Perspectives on the environment: interdisciplinary research in action. Andershot, England: Avebury, Ashgate Publishing Limited. 180 p.

Initially focused on Europe, this publication represents the early work of the Interdisciplinary Research Network on Environment and Society that seeks to integrate natural and social science in addressing global environmental issues. This collection of articles derives from the proceedings of the first Network conference held in Britain in 1992. It is organized in four parts entitled "Green Ideology," "Business, Finance and Environmental Regulation," "European Environmental Policy: A Comparative Assessment," and "Urban Environmental Problems: East and West."

Holling, C.S.; Sanderson, Steven. [In press]. Dynamics of (dis)harmony in ecological and social systems. In: *Rights to nature*. Washington, DC: Island Press. Chapter 4.

This thoughtful and detailed application of ecological systems theory to human social systems views them as part of a whole although recognizing the differences that distinguish them. The careful research and breadth of literature cited lends weight to this argument for integrating natural and social approaches to ecosystem study.

Kaufman, H.F. 1953. Sociology of forestry. In: Duerr, W.A.; Vaux, H.J., eds. Research in the economics of forestry. Washington, DC: Charles Lathrop Pack Forestry Foundation. 475 p. (Plus bibliographies: 113-119).

A historical and forward-looking perspective of the role the social sciences may play in integrating the interests of humankind into the research and policy considerations of the natural environment. The author identifies 11 potentially fruitful areas of social research: community stability; social history of forest use; policymaking process; balancing population and resources; forest conservation; forestry education and public relations; marketing of forest products; impact on welfare and family life; religion, arts, and culture; personal qualities demonstrated by forest personnel; and personality types molded by forest life.

Despite the fact that these recommendations were made more than 40 years ago, little has been done to develop such a balanced and integrated research agenda.

Kellert, Stephen R. 1996. The value of life: biological diversity and human society. Washington, DC: Island Press. 263 p. (Plus index and notes).

In this work, Kellert provides a much-needed typology of values with which people regard their fellow creatures and the environment. By outlining nine distinct values and the ways in which they are expressed, Kellert provides an important conceptual framework from which to construct future research. This work illustrates several cultures in which the values are expressed and discusses implications for biodiversity conservation and endangered species, as well as education and ethics.

Kuhn, Thomas S. 1970. The structure of scientific revolutions. Chicago: University of Chicago Press. 210 p.

A classic treatise that examines the human social processes involved in scientific paradigm change. Kuhn uses examples from several research disciplines and develops a relatively simple and generalizable framework for understanding the historical processes of change in formal thought. Three sequential phases emerge from this analysis: The awareness of anomalies within the existing paradigm; outward recognition of anomalies and attempts to accommodate them within the existing paradigm; and the emergence of an alternative framework that accounts for the anomalies, often accompanied by resistance to change from established tradition.

la Riviere, J.W.M. 1991. Cooperation between natural and social scientists in global change research: imperatives, realities, and opportunities. *International Social Science Journal*. 43: 619-627.

The recognition of the need for interdisciplinary cooperation traces back to the 1970s, but few venues and mechanisms exist with which it may be productively organized. This article provides a simple model for "division of tasks" based on traditional, dualistic assumptions about people and the rest of the biosphere. Existing prejudices are recognized and proper deference paid to traditional scientific method. Several examples are provided of international, cross-disciplinary cooperation, usually based on specifically defined need or emergency responses to wars or natural disasters.

Likens, G.E. 1992. Ecology, ecosystems and environmentalism. In: Likens, G.E., ed. The ecosystem approach: its use and abuse. Nordbunte 23, W-2124. Oldendorf/Luhe, Germany: Ecology Institute: 127-142.

In this piece, Likens discusses research efforts directed toward acid precipitation assessment and the political and legal context in which it has taken place. He provides a series of recommendations to enhance the efficacy of complex and multidisciplinary research efforts such as those investigating global change. He further recommends the more specifically focused term "human-accelerated environmental change" to incorporate the human component in land use change, toxification of the biosphere, invasions of exotic species, and loss of biotic diversity.

Machlis, Gary E.; Forester, D.J.; McKendry, J.E. 1994. Biodiversity gap analysis: critical challenges and solutions. Contrib. 736. Moscow, ID: Idaho Forest Wildlife and Range Experiment Station, University of Idaho. 59 p.

This paper briefly summarizes an invitational workshop for scientists involved in applying gap analysis to sociological issues. A pilot project for the state of Idaho was outlined by Machlis, the workshop host. The project demonstrated emerging theory, method, and applications for integrating socioeconomic and gap-analysis data for the benefit of various end users, ranging from research scientists, public school teachers, and land use planners.

Marston, E.H. 1992. Unexamined scholarship: the land grant universities in the inland West. In: Naiman, R.J., ed. Watershed management: balancing sustainability and environmental change. New York: Springer-Verlag: 479-498.

This article is a strong critique of the western land grant institutions and the research conducted there. The author cites lack of independence from the priorities of funding sources and failure to adapt to new social priorities relative to public and private natural resources.

Mazaika, Rosemary; Lackey, Robert T.; Friant, Stephen L. 1995. Ecological risk assessment: use, abuse, and alternatives: Proceedings of a symposium; 1994 November; Corvallis, OR. In: Human and Ecological Risk Assessment; 1(4): 336-458. (Special publication).

This symposium was hosted by the Center for the Analysis of Environmental Change, which supports and encourages research activity from an interdisciplinary perspective and periodically provides a forum for events of this kind. Speakers provided insights to environmental issues from such diverse perspectives as the "underlying paradigm" of ecological risk, specific methodological concerns, the political implications of risk assessment to the role of society in these issues, questions of human spirituality, legal issues, and the limitations of the concept of environmental risk assessment.

Pettus, Alvin M.; Giles, Mary B. 1987. Personality characteristics and environmental attitudes. Population and Environment. 9(3): 127-137.

In a study whose subjects are college students, the authors surveyed 74 women students on perceived locus of control, openness of belief system, perceptions of self, and their relation to several environmental issues.

Ravetz, J.R. 1986. Usable knowledge, usable ignorance: incomplete science with policy implications. In: Clark, W.C.; Munn, R.E., eds. Sustainable development of the biosphere. Cambridge, MA: Cambridge University Press: 415-434.

This broad-ranging treatise covers the relation of science to policy decisions in the face of multiple uncertainties, both scientific and social, and the stakes involved in both spheres. The author calls for research that transcends disciplinary boundaries and where the investigations recognize the magnitude of prevailing ignorance.

Robinson, J.B. 1991. Modeling the interactions between human and natural systems. *International Social Science Journal*. 43: 629-647.

This paper discusses methods for modeling flows of physical energy in the global environment, the human decision process, and for combining the two in an interactive framework. The elements of the design, however, maintain the separation between the human decision (behavior) processes from the concrete outcomes in the environment. The author further describes a method for modeling alternative future scenarios based on both specific data and by way of decision processes.

Young, G.L. 1994. The case for a 'catholic' ecology. *Human Ecology Review*. 1: 310-319.

This article provides a definitive argument for integrating natural and social sciences that would consider people in an ecological context. The article specifically addresses the rationale for such an integrated scientific discipline and the need to approach the complexity involved. Further, the author argues for the definition of a comprehensive ecology in which the human factor is taken into account in methods appropriate to the impact of the species on the environment.

Beatty, M.T.; Petersen, G.W.; Swindale, L.D., eds. 1979. Planning the uses and management of land. Madison, WI: American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. 1028 p. (Plus bibliography and index).

This volume of 10 sections, 40 chapters, and 68 contributors is based on the premise that the natural environment is primarily a repository of resources for human use.

Bell, G. 1992. The permaculture way: practical steps to create a self-sustaining world. London: Thorsons. 240 p. (Plus appendices and index).

The permaculture method of landscape design and human involvement in biospheric processes is described in popular language. The basic design principles are defined and explained in a how-to format that provides an introduction to a complex conceptual framework for landscape design with particular application to the British Isles and Europe.

Canter, D. 1977. The psychology of place. New York: St. Martins Press. 198 p.

Beginning with a historical account of the evolution of thought and interdisciplinary blending of geography and other social sciences, this volume expands theoretical perspectives on the study of people in space. The role of human perception and imaging is seen by the author as "... a growing theory and the instruments associated with it, (that) appear to provide the possibility for a new basis for environmental decision-making" (p. 157). The subjects of biodiversity and wilderness are notable in this volume by their absence, possibly accounted for by the publication date and concentrated focus on urban and interior environments. It does, however, serve as the context within which theory and methods of a discipline evolve.

Jackson, Wes. 1991. Nature as a measure for a sustainable agriculture. In: Bormann, F. Herbert; Kellert, Stephen R., eds. Ecology, economics, ethics: the broken circle. New Haven, CT: Yale University Press: 43-58.

Jackson's chapter in this volume specifically addresses agricultural practice in terms of the comparisons between contemporary monoculture and an alternative method. Several historical references provide a context for his work at the Land Institute, which are derived from literature, mythology, and values. He outlines several specific research questions concerned with agricultural productivity and the practicality of the philosophy behind them.

Lee, R.G. 1992. Ecologically effective social organization as a requirement for sustaining watershed ecosystems. In: Naiman, R.J., ed. Watershed management: balancing sustainability and environmental change. New York: Springer-Verlag: 73-90. Chapter 4.

This chapter is a commentary on the degree to which social systems bear on the success or failure of management strategies for sustaining ecosystems based on an evaluation of the unit of spatial scale and whether public or private "goods" are involved.

Mollison, Bill. 1992. Permaculture: a designer's manual. Tyalgum, Australia: Tagari Publications. Available from: Permaculture Resources, 56 Farmersville Road, Califon, NJ 07830.

This handbook of comprehensive landscape and human lifestyle design strategies is based on a conceptual framework developed by Mollison and David Holmgren in 1974. The system integrates human activity, natural geophysical processes and biodiversity in a sustainable relation that is mutually beneficial to all elements. The text is detailed and specific, with applications to various climatic and geographic locations.

The permaculture method is supported by a network of publications and teaching venues throughout the English-speaking world, including Australia, North America, the British Isles, and continental Europe.

Norton, Bryan G. 1992. A new paradigm for environmental management. In: Costanza, Robert; Norton, Bryan G.; Haskell, Benjamin D., eds. *Ecosystem health: new goals for environmental management*. Washington, DC: Island Press: 269 p.

In this chapter, Norton takes on the broad issues implied in the concept of paradigm change in environmental management that include human ethics and values, structural and temporal scales, systems analysis, and the boundaries of science and policy. The author outlines a structure for ecological management based on axioms of dynamism, relatedness, hierarchy, creativity, and differential fragility as concepts around which to organize research and management activity. The central value for this design is the “centrality of the goal of protecting biological complexity. . . .”

Nuberg, I.K.; Evans, D.G.; Senanayake, R. 1994. FORUM: future of forest gardens in the Uvan uplands of Sri Lanka. *Environmental Management*. 18(6): 797-814.

This study of the agricultural and traditional social and cultural practices in forest gardens in a central upland area of Sri Lanka regards the region as a case study for evaluating the sustainability of various land use practices.

Steinitz, Carl. 1990. A framework for theory applicable to the education of landscape architects (and other environmental design professionals). *Landscape Journal*. October: 136-143.

Steinitz outlines a theoretical framework within which six types of questions develop the landscape modeling process. The process involves a structured sequence of investigation to provide information for models of representation, process, evaluation, some types of intervention, effects, and decisions. For certain purposes, such as education and interim stages of planning, the framework may be used in reverse order.

Steinitz, Carl. 1993. A framework for theory and practice in landscape planning. *GIS Europe*. July: 43-45.

This report is an example of regional land use planning based on the author’s design framework. The Snyderville Basin in Utah was studied under the framework, which produced a series of five “alternative futures” based on computerized simulations of the consequences of each design choice.

Wright, P.C. 1994. Ecological disaster in Madagascar and the prospects for recovery. In: Chapple, Christopher K., ed. *Ecological perspectives: scientific, religious, and aesthetic perspectives*. Albany, NY: State University of New York Press: 11-24.

This case history describes an ecological restoration and preservation project on the island of Madagascar that went beyond assigning protected status to threatened wildlife and their habitat. In a long-term comprehensive program, the economic, social, and cultural realities of the human population were integrated with the needs of other species. The project planning and implementation involved several years of multi-agency funding, intergovernmental cooperation, and a multidisciplinary collection of projects ranging from biodiversity research, agriculture, forestry, education, scientific training, ecotourism, park management, socioeconomics, and health.

Appendix

Bibliography Search Terms

Anthropogeography
Anthropology and biodiversity
Archeology and biodiversity
Biodiversity
Biodiversity and conservation
Biodiversity and economics
Conservation and economics
Biological prospecting
Biophilia
Biotechnology and developing countries
Cultural dimensions of biodiversity
Deep ecology
Ecofeminism
Ecology and ethics
Ecology and politics
Economics of biodiversity
Ecosystem management
Environmental ethics
Environmental attitudes

Environmental protection and ethics
Environmental psychology
Environmental value
Human ecology
Human ecology and philosophy
Human ecology and religion
Human environmental behavior
Human-animal relations
Indigenous people and biodiversity
Land assessment method
Landscape design and biodiversity
Law and biodiversity
Nature conservation and ethics
Philosophy and the environment
Philosophy of nature
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Social aspects of biodiversity
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Sociobiology
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Sustainable agriculture
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Eckhardt, Carol, comp. 1998. The human factor in ecological research: an annotated bibliography. Gen. Tech. Rep. PNW-GTR-429. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 45 p.

As a bibliography of annotated references addressing interdisciplinary environmental research, the collection reviews a broad spectrum of literature to illustrate the breadth of issues that bear on the role of humankind in environmental context. Categories of culture, environmental law, public policy, environmental valuation strategies, philosophy, interdisciplinary research, landscape theory, design, and management will be useful to interdisciplinary research designers, land use planners and managers, academic faculty and students, environmental stakeholder groups, and anyone with interest in people-and-environment relations.

Keywords: Human ecology, interdisciplinary research methods, ecosystem research, interdisciplinary bibliography, environmental policy, landscape design, landscape management.

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