AN ANNOTATED BIBLIOGRAPHY ON SUSTAINABLE DEVELOPMENT

A Selective Reference C

Office of Environmental Affairs
the World Bank
1983
TABLE OF CONTENTS

Introduction

Part One  The Concept of Sustainable Development – Its Implications for Society and the Individual

1. General Literature 1
2. Economics 4
3. Social Organization and Political Structures 7
4. International Cooperation 10
5. Science and Technology 13
   * Eco-Science: Theory and Application 13
   * Technological Innovation 14
   * Appropriate Technology and Technology Transfer 14
6. Ethics, Philosophy and Religion 17

Part Two  Issues and Examples of Sustainable Development – Literature on Integrated Planning and Literature Relevant to the Sectors to Which the World Bank Lends

A. Integrated Socio-Economic and Environmental Planning and Management 18
   1. Theory and Examples 18
   2. Environmental Economics 23

B. Sectoral Literature 25
   1. Energy 25
      * Energy Strategies 25
      * Renewable Energy Sources 27
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <strong>Agriculture, Rural Development, and Forestry</strong></td>
<td>32</td>
</tr>
<tr>
<td>* Ecological Agriculture</td>
<td>32</td>
</tr>
<tr>
<td>* Small Farm Development</td>
<td>34</td>
</tr>
<tr>
<td>* Forestry</td>
<td>35</td>
</tr>
<tr>
<td>* Rural Development - Examples and Case Studies</td>
<td>39</td>
</tr>
<tr>
<td>3. <strong>Education</strong></td>
<td>41</td>
</tr>
<tr>
<td>* Innovative Learning</td>
<td>41</td>
</tr>
<tr>
<td>* Environmental Education</td>
<td>43</td>
</tr>
<tr>
<td>* Population Education</td>
<td>44</td>
</tr>
<tr>
<td>4. <strong>Industry</strong></td>
<td>45</td>
</tr>
<tr>
<td>* Resource Conservation and Pollution Prevention</td>
<td>45</td>
</tr>
<tr>
<td>* Product Design</td>
<td>47</td>
</tr>
<tr>
<td>5. <strong>Population</strong></td>
<td>48</td>
</tr>
<tr>
<td>6. <strong>Transportation</strong></td>
<td>50</td>
</tr>
<tr>
<td>* Urban and Intercity Road Transportation</td>
<td>50</td>
</tr>
<tr>
<td>* Rural Roads</td>
<td>51</td>
</tr>
<tr>
<td>7. <strong>Water Supply/Waste Recycling</strong></td>
<td>52</td>
</tr>
<tr>
<td>* Water Supply and Conservation/Sanitation</td>
<td>52</td>
</tr>
<tr>
<td>* Resource Recovery from Solid Wastes</td>
<td>54</td>
</tr>
<tr>
<td>8. <strong>Urban Development</strong></td>
<td>56</td>
</tr>
<tr>
<td>* Urban Planning</td>
<td>56</td>
</tr>
<tr>
<td>* Low-Income Housing</td>
<td>56</td>
</tr>
<tr>
<td>* Low-Cost Construction</td>
<td>58</td>
</tr>
<tr>
<td>C. <strong>Appropriate/Intermediate Technology Information Sources - General</strong></td>
<td>59</td>
</tr>
</tbody>
</table>
INTRODUCTION

In the Fairfield Osborn Memorial Lecture delivered by the World Bank's President, A. W. Clausen, in Washington, D.C., on November 12, 1981, Mr. Clausen spoke about "Sustainable Development: The Global Imperative". In addressing the conditions for economic growth that will achieve lasting improvements in people's lives, he emphasized the close interdependence of economic development and the environment. He discussed the following points:

- first, that if our goal is sustainable development, our perspective must be global;
- second, that human development must allow for continued economic growth, especially in the Third World, if it is to be sustainable; and
- third, that sustainable development requires vigorous attention to resource management and the environment.

In the context of his last point, Mr. Clausen referred to the numerous efforts already undertaken by the various sectors within the Bank to promote economic development that links socio-economic improvements with the protection and conservation of natural resources. "For sustainable development, and wise conservation," he concluded, "are, in the end, mutually reinforcing -- and absolutely inseparable -- goals."

This bibliography concerns sustainable development. Since the limits-to-growth debate initiated by the Club of Rome in 1972, environmentalism, in general associated with purely protective measures, has grown into a more active interest and involvement in development processes themselves. Aside from promoting the preservation of natural and environmental resources as such, environmental conservation now encompasses their wise use and management at levels and in ways that ensure continued productivity. A primary concern is to explore and consolidate patterns of human and economic development that can be supported over the long run by physical and biophysical environments.

In the recent past the signs indicating that we are at the end of an era of indiscriminate economic growth have multiplied and have led to a questioning of current economic theory and practice:

- The problems inherent in the economic system itself are increasing. Most national economies face rising inflation and unemployment. Economic progress has become dependent on a high rate of technological innovation.
- Economic growth in itself has not been able to solve the world's greatest problems: hunger and poverty.
The energy crisis was a demonstration of the extent to which the functioning of modern economies depends on cheap and abundant energy supplies. Energy-intensive production modes and distribution networks can make national economies vulnerable to sudden changes in global political and economic conditions.

The natural environment proves not to be eternally resilient against its use and abuse by mankind. Its carrying capacity is limited. Its resources are exhaustible.

A body of criticism has evolved addressing the underlying goals and values of economic development and focusing on the narrow definitions of economic efficiency and productivity that fail to take into account social and environmental dimensions. The criteria of conventional economics alone are considered inadequate to guide future development because they ignore a timeframe beyond the conventional economic cycle. What in economic theory is termed "externalities" is moved to the core of the discussion on sustainable development. The real cost of economic growth, the way its benefits are distributed, and its potential to secure a basis for living for the generations still to come are the touchstones of "alternative economics." (See also OEA document entitled "An Annotated Bibliography of Environmental Economics," 1981)

The bibliography in hand is intended to serve as a reference guide to World Bank staff and other parties interested in the theory and practice of sustainable development. A single bibliography dealing with such a broad issue can lay no claim to comprehensiveness and must necessarily be incomplete. Also, since there is no widely accepted consensus on what makes development sustainable, any selection of literature, this one included, will be biased. The objective of this bibliography will be, therefore, rather

- to identify and annotate good literature that highlights the major issues involved and to provide a starting-point for further exploration;

- to give an overall perspective of a sustainable future by gathering the many strands of the discussion on, and of the search for, alternative ways of development.

The scope of the literature cited (180 entries in total) ranges from an overall discussion of concepts and strategies to examples of their application and practical knowhow. Accordingly, the bibliography is organized into two parts, a more general one (Part One) and a more specific one pertinent to the sectors to which the World Bank lends (Part Two).
Part One includes literature that:

- in response to the present economic and environmental problems suggests new directions and fundamental changes in economic and social structures;
- analyzes the roots of the crisis and interprets it as a challenge to revise habitual ways of life and ways of thinking;
- discusses the conditions necessary to harness economy and technology to human ends.

As present economic and environmental trends are interrelated and global in scale, Part One includes literature that addresses the broad issues as they relate to the industrialized and to the developing countries.

Part Two includes literature that:

- provides guidance for integrated development and sectoral development, with emphasis on environmental concerns;
- discusses the issues of sustainable development relevant to the different sectors and the contributions every sector can make to sustainable development;
- explores approaches to development that seem to be socially viable, ecologically sound, and economically feasible;
- gives sources of information for further investigation

As this bibliography is mainly intended for World Bank staff and people involved in Third World development, Part Two is compiled in view of the developing countries and cites only those publications addressing the industrialized countries that can be of interest to the developing countries, too.

Most of the listed publications have been selected from recent literature in the attempt to give an idea of important new approaches and a state-of-the-art of the discussion on sustainable development.

As Mr. Clausen pointed out in his Fairfield Osborn Memorial Lecture, The World Bank is concerned with promoting long-term development objectives. At this point in time, however, there is no multisectoral Bank document that articulates this concern and places the Bank's lending policies in this context, nor are project evaluation methods applied that reflect the Bank's interest in sustainable development practices (for example, a systematic upgrading or downgrading of a project's economic rate of return in proportion to its environmental implications). Also, no Bank-wide analysis exists of the totality of long-range impacts -- beneficial and detrimental -- of past Bank projects on communities and
their physical environments. It is our hope that this selection of literature might be an incentive and a basis for further discussions in this direction.

Finally, we wish to thank those people from inside and outside of the Bank who through their advice and willingness to share ideas have helped in the preparation of this bibliography.

Notes:

* The abbreviation "Ref." at the end of an entry indicates that the publication is based on reference material or provides lists of further readings. These references are emphasized in the annotation, if they seem to be particularly useful for a more in-depth study of the topics in question.

* References to periodicals and publication series are marked with (P), information sources with (I). Both are listed at the end of each section.

* Page numbers are given without number of introductory pages.

February, 1983
PART ONE: THE CONCEPT OF SUSTAINABLE DEVELOPMENT -
ITS IMPLICATIONS FOR SOCIETY AND THE INDIVIDUAL

1. GENERAL LITERATURE

BROWN, Lester R.
Building a Sustainable Society
New York: W.W. Norton, 1981
433 p.

Argues that the transition towards a sustainable society is inevitable due to the economic and environmental pressures, and that a major reorientation in population and economic policies is vital to arrest and reverse the trends that erode the global resource base. Part I is a review of the present deterioration of the global environment. Part II outlines the steps that in Brown's opinion are necessary for survival: the shift to renewable resources, the stabilization of the world's population, the protection of cropland, major reforestation of denuded areas, and the departure from wasteful production and consumption.

BROWN, Lester R. and SHAW, Pamela
Six Steps to a Sustainable Society (Worldwatch Paper 48)
Washington, D.C.: Worldwatch Institute, 1982
64 p.

Paper distilling the principal policy recommendations from Building a Sustainable Society.

COOMER, James C. (ed.)
Quest for a Sustainable Society
New York: Pergamon Press, 1979
260 pp.

Nine prize-winning papers from the 1979 Mitchell Prize Competition as part of the Woodlands Conference Series on Sustainable Societies, and three other outstanding entries from this competition. The essays deal with the qualitative aspects of growth and growth policy and discuss which implications the redirection of social values would have for political and economic life.

DALY, Herman E.
Steady-State Economics - The Economics of Biophysical Equilibrium and Moral Growth
San Francisco: W.H. Freeman & Co., 1977
186 pp.
Advocates a "steady-state" or no-growth economy that would be characterized by a constant stock of people and artifacts and a minimum "throughput" necessary to maintain the balance. The notion of growth is interpreted as the development towards maturity or sufficiency. Argues on the basis of the Entropy Law. Also brings to the fore ethical principles, in particular the sense of stewardship of the earth and the extension of brotherhood to future generations and subhuman life.

DALY, Herman E. (ed.)
Economics, Ecology, Ethics - Essays Towards a Steady-State Economy
San Francisco: W.H. Freeman & Co., 1980
372 pp.

Brings together twenty-two new and classic essays on the physical and ethical principles of the concept of a steady-state economy and updates material contained in the editor's previous book on the subject. Among the contributors are Kenneth Boulding, Paul and Anne Ehrlich, Nicholas Georgescu-Roegen, Garrett Hardin, and E.F. Schumacher.

HOLLANDER, Seth
Annotated Bibliography on Population, Resources and Environment Relationships
New York: National Audubon Society, 1982
79 pp.
Contact: Environmental Policy Analysis Department
National Audubon Society
950 Third Avenue, New York, N.Y. 10022

Bibliography focusing on publications covering resources and population from an environmental perspective. Publications are drawn from many subject areas including human ecology, land use, agriculture and food, demography, natural resources, and energy policy.

MEADOWS, Dennis (ed.)
Alternatives to Growth I: A Search for Sustainable Futures
405 pp.

Papers adapted from entries to the 1975 Mitchell Prize and presentations before the 1975 Woodlands Conference. Grouped under the topic areas nutrition and energy, economic alternatives, the politics of equity and social progress, and life styles and social norms.
(Alternatives to Growth II - forthcoming)

NASH, Hugh (ed.)
Progress as if Survival Mattered - A Handbook for a Conserver Society
San Francisco: Friends of the Earth, 1977
320 pp.
Collection of twenty essays on the major topics of alternative politics and economics: population, resources, energy, agriculture, health, education, decentralization, war and defense.

OLTMANS, Willem L. (ed.)
On Growth - The Crisis of Exploding Population and Resource Depletion
New York: Putnam's Sons, 1974
494 pp.
On Growth Two - The World's Leading Thinkers on the Population Explosion and the Exhaustion of Resources
Ibid, 1975
368 pp.

Interviews with seventy noted scientists and intellectuals (first volume) and with about fifty authorities from Third World socialist and Eastern countries (second volume) that reflect the limits-to-growth debate initiated by the Club of Rome in 1972.

PIRAGES, Dennis Clark (ed.)
The Sustainable Society
New York: Praeger Publ., 1977
344 p.

Collection of essays on the economic, political, and social implications of the transition towards a sustainable society. Issues addressed include costs and benefits of energy alternatives, political and institutional changes, equitable wealth distribution, inter-generational justice, new justifications and definitions of property rights, and slowed growth from the perspective of the developing and the socialist countries.

(P) SUSTAINABLE SOCIETIES - The Newsletter of the Woodlands Conference
Contact: P.O. Box 9663, Arlington, Virginia 22209

Quarterly on current issues in sustainable development. Includes contact addresses and literature lists on a regular basis.

(P) WORLDWATCH INSTITUTE PUBLICATIONS
Contact: 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036

"Worldwatch was established to alert policymakers and the general public of emerging global trends in the availability and management of resources - both human and natural. The research program is designed to fill the gap left by traditional analyses in providing the information needed by decision-makers in today's rapidly changing and interdependent world. Worldwatch analyzes issues in a global perspective and interdisciplinary framework."

(Worldwatch brochure)
2. ECONOMICS

APPLEGATH, John  
Human Economy: A Bibliography  
Vol. I - Books  
Amherst, Mass.: The Human Economy Center, 1981  
77 pp.  

Bibliography (partly annotated) on recent literature on human values-oriented approaches to economic issues and on contemporary realities in the areas of resources and ecology.

DONALDSON, Peter  
Economics of the Real World  
248 pp.  

Exposition of the main strands of criticisms of both economics and economic policies. Based on a critical look at economic policy in postwar Britain, the author discusses how the parameters of conventional economics prove to be inappropriate in assessing how people's real needs and concerns are met. Setting his analysis in an international framework, he asserts that the mechanisms that create basic economic injustice are the same at the international as at the national level.  
(Broadcasted as a BBC TV series of the same title)

GIARINI, Orio, and LOUBERGE, Henri  
The Diminishing Returns of Technology - An Essay on the Crisis in Economic Growth  
New York: Pergamon Press, 1978  
122 pp.  

Analysis of the historical links between technology and economic growth. The present decline of the over-all efficiency of technological innovation for economic progress is interpreted as an "internal limit to growth." The authors conclude that, in the future, the productivity of technology will have to be measured in terms of improved autonomy and survival capacity rather than speed of production, economies of scale, and further concentration.

HENDERSON, Hazel  
Creating Alternative Futures - The End of Economics  
404 pp.  

In her collected writings, the author describes current economic and social changes and extracts the patterns of an emerging "counter-
"economy" and social reorganization. Analyzes the shortcomings of traditional economics and argues for a sustained-yield economy based on renewable resources and labor-intensive production. Advocates citizens' and consumers' organizations and more flexible, human-scaled institutions to replace conventional political power.

HIRSCH, Fred
Social Limits to Growth
Cambridge, Mass.: Harvard University Press, 1976
208 pp. Ref.

Analyzes the structural characteristics of modern economic growth and its social foundations. The author interprets three major socio-economic issues - the paradox of affluence, the distributional compulsion, and the reluctant collectivism - as interconnected products of this structure, and reaches the conclusion that the solutions to the problems now facing the economically advanced societies are to be found in the domain of social ethics.

HODSON, H.V.
The Diseconomics of Growth
London: Earth Island Ltd., 1972
239 pp.

Critique of the growth concept in economic theory. Diseconomics are defined as the study of the non-economic outfall - measurable and non-measurable - from the economic system. While acknowledging the poor countries' claims to economic development, the author shows how a zero-growth economy might work, without stagnation, in economically advanced countries. He relates his critique to the issues of environmental damage and repair, population growth, urban problems, and resource depletion.

LEONARD, H. Jeffrey, DAVIES III, J. Clarence, and BINDER, Gordon (ed.)
Business and Environment - Toward Common Ground
435 pp. Ref.

Collection of fifty-five essays that seeks to work against the increasing polarization between businessmen and environmentalists. By clarifying the underlying assumptions of both groups and by exploring opportunities for resolving the antagonisms, this book aims at furthering a constructive discussion on the issues of economic activities and the environment.

SCHUMACHER, E.F.
Small is Beautiful - Economics As If People Mattered
305 pp. Ref.
Book that had a major impact on the current thinking in the development field. The author's critique of economic science addresses the underlying "meta-economic" assumptions regarding man and nature, and states that economic and technological development must embody the four qualities of smallness, simplicity, capital-saving, and non-violence.

THE WOODLANDS CONFERENCE ON SUSTAINABLE SOCIETIES
Future Roles for the Private Sector
In: Technological Forecasting & Social Change, Vol. 22, Number 2 (Special Issue), October 1982
118 pp. Ref.

Issue devoted to a group of winning papers from the 1982 Mitchell Prize Competition as part of the Woodlands Conference Series. The eight essays focus on the key role that the private sector will hold in the construction of a sustainable society and explore innovative ways in which it can link its role as wealth-creator with social objectives. Topics include: the private sector in its socio-economic context and its ability to contribute to a sustainable economy, cooperation between the private sector and small farmers in the LDCs, electric utilities as the key to capitalizing the energy transition, New England as a model for a self-reliant, "mature" region.
3. SOCIAL ORGANIZATION AND POLITICAL STRUCTURES

BARNET, Richard J.
The Lean Years - Politics in the Age of Scarcity
New York: Simon and Schuster, 1980
349 pp. Ref.

The author asserts that theoretically there are ample resources in the world to support the global population projected for the year 2000. He investigates the ways governments and multinational corporations manage and control the global resource systems and argues that resource scarcity is the product of political and economic conditions. Based on his analysis, he outlines the principles of the "politics of survival." Annotated bibliographical chapter.

FERKISS, Victor
The Future of Technological Civilization
New York: George Braziller, 1974
369 pp. Ref.

Examines liberalism as the political philosophy of the Western world in respect to its attitudes towards technology and concludes that it is inadequate to provide guidance to contemporary technologically-based society. Outlines the principles of "necessary utopia" i.e., an ecological humanism that implies man's conscious relationship with nature and with other men.

HARMAN, Willis W.
An Incomplete Guide to the Future
Stanford, Ca.: Stanford Alumni Assoc., 1976
150 pp. Ref.

Social and cultural critique suggesting that society is approaching one of the great transformations of human history. The author discusses how the dominant image of man underlies the ways in which institutions and education are shaped and policies made. He analyzes four basic dilemmas of industrial society involving economic growth, work roles, distribution and technological control and argues that their solution lies in a whole-system change to the "transindustrial society" based on a new image of man.

HEILBRONER, Robert L.
An Inquiry into the Human Prospect (including: Second Thoughts on 'The Human Prospect')
New York: W.W. Norton, & Co., 1975
180 pp.
Five essays on the capability for change of individuals and political systems, capitalist and socialist alike, in view of the present crisis. The author expresses his skepticism whether any society can bring about alterations of the necessary magnitude. The 'Second Thoughts' basically confirm this opinion but give voice to the hope that "gifted leadership" in a democratic society will be able to motivate disparate groups.

HENDERSON, Hazel
The Politics of the Solar Age: Alternatives to Economics
434 pp. Ref.

Collection of the author's most recent essays illuminating her basic critique of conventional economics and her advocacy for the "politics of reconceptualization" that are already influencing every field of society. She discusses the aspects and options of the long-term structural changes in production and consumption patterns towards more human-scaled economics and politics, and explores the role that governments can assume in this process.

JOHNSON, Warren
Muddling Toward Frugality
San Francisco: Sierra Club Books, 1978
252 pp. Ref.

Takes an ecological view of history and suggests that in the future resource scarcity will inevitably shape society in the industrialized countries. The changes will, however, not occur through planned social action, but through a simple "coping behavior" or "muddling along" on the individual or community level. Adaptation will therefore bring about a more frugal economy but also a culture in which each person has more control over his/her livelihood and the social and political circumstances in which he/she believes.

LAPPE, Frances Moore, and COLLINS, Joseph
Food First - Beyond the Myth of Scarcity
467 pp. Ref.

The authors deny the existence of absolute scarcity and assert that every country has the capacity to feed itself. Backed by case studies and statistics from all over the world, they argue that hunger is not caused by insufficient production, poor climate, inappropriate technology, discriminatory trade practices, insufficient capital, or over-consumption in the U.S., but by the fact that the majority of people in every market economy are increasingly cut out from control over productive resources. The task of Americans, they write, consists in
building a movement that supports and promotes self-reliance and
democratization of food production in their own country and abroad.
Extensive reference list.

NEWLAND, Kathleen
The Sisterhood of Man - The Impact of Women's Changing Roles on Social
and Economic Life Around the World (Worldwatch Institute Book)
New York: W.W. Norton & Co., 1979
242 pp. Ref.

Argues from the premise that without women's full participation
humanity's problems cannot be solved. In the framework of the subject
areas of legal status, education, health, mass media, politics, work
and family life, the author discusses the costs, social and economic,
of sex discrimination and points out the potential of women to be "catalysts for social change."

OPHULS, William
Ecology and the Politics of Scarcity - Prologue to a Political Theory
of the Steady State
San Francisco: W.H. Freeman & Co., 1977
304 pp. Ref.

Critique of American political values and institutions, in particular
of the "non-politics of Laissez-faire." The future, as Ophuls
foressees, does not lie in reformist actions but in a fundamental change
or shift to the "systems paradigm." Does not offer any practical
solutions but outlines the political philosophy that would underlie the
steady state. Annotated chapter bibliographies.

STOKES, Bruce
Helping Ourselves - Local Solutions to Global Problems (Worldwatch
Institute Book)
160 pp. Ref.

Argues that the solution to global problems lies at the local level.
In examining the fields of energy, population, housing, food, health,
and employment around the world, the author demonstrates that through
local self-help people can start to change society "from the bottom
up."
4. **INTERNATIONAL COOPERATION**

**BRANDT, Willi (Chairman)**


304 pp.

Report submitted to the UNO as the result of an independent investigation by a group of international statesmen and experts. The central idea of the report is that the massive promotion of economic development in the lesser developed countries of the South is in the best interest of the rich countries of the North. The group gives recommendations as to how international solidarity can be achieved and made effective. Major points include trade liberalization, large-scale capital transfer to the South, an international monetary and tax system, international energy agreements, and disarmament.

**FRIEDRICH EBERT FOUNDATION**

*Towards One World? - International Responses to the Brandt Report*


382 pp.

Responses of world statesmen and well-known academics to the Brandt Report.

**ECKHOLM, Erik P.**

*Down to Earth - Environment and Human Needs* (a publication by the International Institute for Environment and Development)

New York: W.W. Norton & Co., 1982

238 pp.

A report on the state of the global human and natural environment prepared in commemoration of the tenth anniversary of the Stockholm Conference on the Human Environment. In writing about the topics of oceanic affairs, pollution, global atmospherics, croplands and wastelands, deforestation, and biological diversity, the author provides up-to-date information on the world community successes and failures to respond to the environmental crisis as articulated by the Conference. He treats environmental problems as rooted in the political structures and technological trends of society and stresses the links between the fate of the world's poor and the fate of nature.

**FOOD AND AGRICULTURE ORGANIZATION**

*Agriculture: Toward 2000*


160 pp (and Annex)
Presents two scenarios for development strategies in global food production to meet a demand that is expected to double by the year 2000. Outlines the conditions and requirements of the scenarios, that both involve massive increase in off-farm inputs, modernization, and updating of international policy frameworks, and their respective effects on national self-sufficiency and international trade.


Recognizes that development and conservation operate in the same global context and that their goals have to be identical if they are to be successful. The document comprises objectives and priority requirements for conservation and sustainable development and a broad policy framework for international, national, and regional action.

McNAMARA, Robert S. The Year 2000 Committee: A New Initiative In: "Focus," Vol. 4, Number 3, 1982 (WWF publication)

Article describing the program of "The Year 2000 Committee" that has recently been established as a project of the World Wildlife Fund. The Committee's major thrust will be the improvement of scientific and institutional "foresight capacity" and the "strategic management" necessary to understand and moderate the problems that threaten to disrupt the world's environmental, economic, and political systems.


Selection of twenty-eight of the author's speeches given during the period 1974 to 1981 in his capacity as the Executive Director of UNEP. Provides an overview of the issues debated at recent international conferences on subject areas with important environmental dimensions, i.e., population, food, human settlements, desertification, renewable energy and others.

Publication based on a series of seminars that were organized in preparation of the New International Development Strategy by the UNEP and the Regional Economic Commissions of the UNO in 1979 and 1980. Contains the summarized policy recommendations for each region, giving an overview of the issues of, and suggestions for, alternative modes of development on which consensus has been reached.
5. SCIENCE AND TECHNOLOGY

* Eco-Science: Theory and Application

BROWN, M.T., and ODUM, H.T. (ed.)
National Science Foundation and Florida Water Resources Research Center, University of Florida, 1981
166 pp. Ref.

Consensus recommendations of the workshop formulate the need for research to develop a scientific and methodological framework for environmental design and engineering. The workshop papers give a state-of-the-art overview on the issues of changing availability of resources in the landscape and the consequent changes in patterns of urban and regional growth (with focus on energy, water, and wetlands). Chapter reference lists.

EHRLICH, Paul R., EHRLICH, Anne H., and HOLDREN, John P.
Ecology - Population, Resources, Environment
San Francisco: W.H. Freeman & Co. 1977
1053 pp. Ref.

Comprehensive source book providing scientific and up-to-date information on the physical and biophysical systems of the earth, on population growth and renewable resources, and on energy and raw materials resources. The authors compile detailed materials on the various kinds of pollution and on the disruption of ecological systems. The concluding section is devoted to the discussion of social, economic and political changes necessary to respond to the problems presented.
Annotated chapter references.

ODUM, Howard T., and ODUM, Elisabeth C.
Energy Basis for Man and Nature
297 pp. Ref.

Exposition of the principles of energy and the way these shape our culture and economy. The concept of the steady-state economy is discussed in terms of low-energy economy. A language of simple, visual symbols is used to explain energy flows in economic, ecological, and technological systems.
RIFKIN, Jeremy  
Entropy - A New World View  
New York: The Viking Press, 1980  
305 pp.  
Reviews society, its history and economy, in the light of the Entropy Law. Emphasizes the contradictions that exist between the view of the earth as a closed system in terms of matter and a mechanical and linear world view based on the idea of permanent material growth. The author concludes that society is at a point of transition from a "colonizing," wasteful mode of existence to a "climactic" mode of existence where out of necessity the flow-through of energy and matter is kept at a minimum.

* Technological Innovation

NORMAN, Colin  
The God That Limps - Science and Technology in the Eighties (Worldwatch Institute book)  
New York: W.W. Norton & Co., 1981  
224 pp.  
Reviews the history of technological innovation, its role for the economy and its implicit social values since WW II. Demonstrates that present investment policies for technological development reflect the needs of the postwar era and fail to recognize the social needs of the eighties. The author argues that the new technological era based on microelectronics and genetic engineering carries the promise of great benefits for society as well as the danger of social dislocation. Therefore steps have to be taken to channel R&D resources into socially productive areas.

See also: Giarini/Loubergé The Diminishing Returns of Technology (under 'Economics')

* Appropriate Technology and Technology Transfer

ECKAUS, Richard S.  
Appropriate Technology for Developing Countries  
Washington: National Academy of Sciences, 1977  
140 pp.  
Examines the role of technology in developing countries to determine the contents and methods of appropriate technology decisions. Stresses the fact that the criteria for "appropriate" technological choices must be found in the essential social and economic goals of development as well as in their adaptation to a particular country
or sector. The features of development processes and their significance for appropriate technology are discussed for agriculture, small enterprise, and the service sector. Bibliography.

FARVAR, M. Taghi, and MILTON, John P. (ed.)
The Careless Technology - Ecology and International Development
(Record of the Conference on the Ecological Aspects of International Development in Warrenton, Virginia, 1968)
Garden City, New York: The Natural History Press, 1972
1030 pp. Ref.
Classic of the recent history of ecological failures accompanying the introduction of modern technology into developing countries. A comprehensive discussion of case studies gives evidence that any large-scale technology project is an ecological operation with potentially irreversible effects on human health and the ecosystem. The Conference stresses the need to abandon the reductionist approach to technological development, and to make the impact of technological intervention on the whole ecosystem the basis for decision-making. Major topics covered include irrigation and hydroelectric projects, chemical pest control in agriculture, animal husbandry and fisheries, and modern health programs.

GOULET, Denis
The Uncertain Promise - Value Conflicts in Technology Transfer
New York: IDOC (in cooperation with the Overseas Development Council), 1977
320 pp. Ref.
Inquiry both on the philosophical and on the empirical level into the value conflicts in technology transfer to the developing countries. The author demonstrates how the uncritical purchase of technologies can prove to be destructive for genuine development. To harness technology to human ends, LDCs will have to construct a "vital nexus" linking their basic values, their development strategies, and their technology choices. In his conclusion, he reviews current approaches to technology in its cultural and political context. List of references.

JEQUIER, Nicolas (ed.)
Appropriate Technology - Problems and Promises
Paris, OECD, 1976
345 pp. Ref.
Explores the concept and reality of appropriate technology in developing countries. In the introductory part, Jéquier suggests that the major task for developing countries is to create, nurture, and rehabilitate their internal capacity of innovation and invention, and to diffuse new types of technologies and forms of
organization suited to local conditions. He discusses the origins and meanings of appropriate technology, its information and invention systems, and the role that universities, industry, and governments can play in its development. The case studies of the second part give an insight into the successes and problems involved in the implementation of appropriate technology.

See also: Ferkiss The Future of Technological Civilization (under 'Social Organization and Political Structures')
McRobie Small is Possible (under 'Appropriate/Intermediate Technology Information Sources - General,' Part Two)
Schumacher Small is Beautiful (under 'Economics')
6. **ETHICS, PHILOSOPHY, AND RELIGION**

**ANGLEMYER, Mary et al.**  
*A Search for Environmental Ethics — An Initial Bibliography*  
120 pp.  
(446 citations)

An annotated bibliography for works in science, philosophy, religion, education, literature, politics, and economics that reflect the attitudes of groups and individuals toward the environment. Coverage begins with World War II.

**EHRLICH, Paul, and EHRLICH, Anne**  
*Extinction — The Causes and Consequences of the Disappearance of Species*  
306 pp.  
Ref.

Documents and discusses the decimation of animal species that is currently progressing at a quickening pace, due to overexploitation and the destruction of habitats. The authors emphasize the crucial importance that organic diversity has for ecological stability and advocate man's ethical obligation to respect the rights of his co-inhabitants of the earth.

**PARTRIDGE, Ernest (ed.)**  
*Responsibilities to Future Generations — Environmental Ethics*  
Buffalo, New York: Prometheus, 1981  
319 pp.  
Ref.

Anthology of contemporary philosophical essays that, based on the premise that present political and economic choices have vital implications for the future, deal with the moral obligations to posterity.

**SCHELL, Jonathan**  
*The Fate of the Earth*  
246 pp.

Explores up the subject of the threat of human extinction. In writing about the nuclear predicament, the author discloses the irrationality of the doctrine of deterrence and describes in detail how a nuclear holocaust would end all life on earth. He reflects on how the nuclear threat already affects our lives and how it puts into question our sense of purpose and continuity.
PART TWO: ISSUES AND EXAMPLES OF SUSTAINABLE DEVELOPMENT -
LITERATURE ON INTEGRATED PLANNING AND LITERATURE RELEVANT TO THE
SECTORS TO WHICH THE WORLD BANK LENDS

A. INTEGRATED SOCIO-ECONOMIC AND ENVIRONMENTAL PLANNING AND MANAGEMENT

1. THEORY AND EXAMPLES

AHMAD, Yusuf J., and MULLER, Frank G. (ed.)
Integrated Physical, Socio-Economic and Environmental Planning (UNEP-
publ.)
Dublin: Tycooly International Publ. Ltd., 1982
199 pp. Ref.

Series of papers on the issues and objectives of integrated planning and on recent country experiences. Integrated planning in general is defined as "a complex of procedures undertaken ... to accomplish a socially acceptable outcome"; it is viewed both as a framework to thought and as a technique for policymaking requiring the explicit statement of trade-offs between environmental and socio-economic goals.

CARPENTER, Richard A. (ed.)
Dublin: Tycooly International Publ. Ltd., 1980
337 pp. Ref.

A practical approach to capability classification and suitability assessment of tropical forest lands. The objective is to help land-use planners avoid misuse of land and allocate land-uses that are compatible with the ecological characteristics of the land. Rating procedures and their display in map form are presented on two levels of scale: the overview level (national, regional) and the detailed level (local). Examples from Pakistan, Sri Lanka, Japan, Malaysia, India, and New Zealand.

DASMAN, Raymond F., MILTON, John P., and FREEMAN, Peter H.
Ecological Principles for Economic Development
New York: John Wiley & Sons, 1974
252 pp. Ref.

Explores the interrelationships between development and conservation and shows that both must be based on an understanding of ecology if negative side-effects are to be avoided. Emphasis is placed on the ecosystems that are presently under heavy development pressures: tropical humid forests, savannas and grasslands in tropical and
sub-tropical regions, coastal areas, and islands. Problems likely to arise from irrigation, river basin development, from forestry, livestock and agricultural projects, and from tourism are reviewed.

GARDUNO, Manuel Anaya
Technology and Desertification
In: Secretariat of the UN Conference on Desertification, Nairobi, 1977 Desertification, its Causes and Consequences

Review of appropriate technologies and land management practices to combat desertification and to advance reclamation of desertified lands for productive uses in different land-use systems. The analysis of technologies is done according to the principal factors (water, soil, plant, animal, and energy) of the different land-use systems with the intent to take into account a great diversity of ecological, climatological, and socio-economic conditions. Bibliography.

GOVERNMENT OF ARGENTINA/OAS/UNEP
Environmental Quality and River Basin Development – A Model for Integrated Analysis and Planning

Presents a methodology for river basin planning based on system analysis. The model shows how the evaluation of environmental impacts can be used at early planning stages. The investigations that were conducted on the possibilities of regional development in the Bermejo River Basin (Northern Argentina) from 1970 to 1975 are taken as a case study.

MacANDREWS, Colin, and SIEN, Chia Lin (ed.)
Developing Economies and the Environment – The Southeast Asian Experience

Series of reports that give an up-to-date summary of the progress made in research, environmental policy design, and resource management in the ASEAN countries. Includes contributions on resource management and pollution control programs in Thailand, Malaysia, Singapore, Indonesia, and the Philippines.

McHARG, Ian L.
Design With Nature
Classic on land-use planning and land development as informed by the environmental sciences. Presents a planning and design technique that inventories and interprets environmental resources in map form which, combined, provide a basis for the spatial patterns of regional and urban growth.

NATIONAL ACADEMY OF SCIENCES/U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Ecological Aspects of Development in the Humid Tropics
Washington: National Academy Press, 1982
297 pp. Ref.

Reviews existing scientific and technical information on agricultural and forestry management practices and resource conservation in humid tropical ecosystems for application in project planning and implementation. Discerns three major components of development that will have to be mixed to secure sustained yield: Parks and forest reserves, natural forest under intensive management, and appropriately selected and designed areas for intensive agricultural production. Appendices with data information and investigation techniques. Chapter bibliographies.

NOVOTNY, Vladimir, and CHESTERS, Gordon
Handbook of Nonpoint Pollution - Sources and Management
666 pp. Ref.

Handbook for identifying area sources of pollution that are responsible for major environmental problems, and for planning and designing abatement measures and appropriate management practices. The authors discuss the causative factors of nonpoint pollution and present calculation and simulation models for assessing magnitudes of environmental damage. Land use activities, in particular urban and agricultural uses, as major nonpoint polluters are treated in detail. Extensive chapter reference lists.

THE ROYAL SWEDISH ACADEMY OF SCIENCES (ed.)
The World's Protected Areas
323 pp
Contact: Pergamon Press, Fairview Park, Elmsford, New York 10523

Fifteen articles on National Parks and other protected areas throughout the world. The issues of land-use planning and management are discussed and illustrated in the context of nature conservation and economic development.
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Environmental Design Considerations for Rural Development Projects
(prepared by Harza Engineering Co.)

Manual prepared to help rural development planners to integrate environmental considerations in the early stages of project plans involving road construction, electrification, water supply and sanitation, irrigation, and small industries. Special emphasis is placed on social and public health. Includes a checklist to assess each major project decision as to its environmental impact, and potential impact matrices for the different project components.

(I) NATIONAL WILDLIFE FEDERATION
1983 Conservation Directory (28th edition)
301 pp.
Contact: National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D.C. 20036

A list of national and international organizations and agencies concerned with natural resource use and management. Gives addresses, description of objectives, names of directors, and publications.

(P) NATURAL RESOURCE TECHNICAL BULLETIN
(published by AID/NPS Natural Resources Information Project)
Contact: Natural Resource Technical Bulletin
International Affairs
National Park Service
Washington, D.C. 20240

Bulletin on research in, and experiences with, economic activities and development that are compatible with natural resource conservation. Includes annotated reference lists on ecosystem studies and productive resource management.

(P) RESOURCE POLICY CENTER PUBLICATIONS
Contact: Thayer School of Engineering, Dartmouth College, Hanover, NH 03755

"The Resource Policy Center ... conducts research in policymaking, particularly as it applies to natural resources, energy, transportation, and the quality of the environment. Special emphasis is placed on the use of computer simulation models for policy design." (RPC- Brochure)
"RFF's studies are in the social sciences and are concerned with the relationship of people to the natural environment - the basic resources of land, water, minerals, and air, the goods and services derived from them, and the effects of production and consumption on environmental quality and human health and well-being. Because it is an important factor in every other area, energy is a particularly active concern." (RFF-Brochure)
2. **ENVIRONMENTAL ECONOMICS**

CARPENTER, Richard A.
Balancing Economic and Environmental Objectives: The Question is Still, How?
Contact: East-West Center, Honolulu, Hawaii 96848

Briefly reviews the integration of environmental assessment into developing countries' economic policy and decision-making in the 1970s. Efforts have been frustrated by the impact-oriented approach, elaborate NEPA-type procedures, and separate environmental agencies. The author discusses the changed context for environmental impact assessments in the 1980s and emphasizes that improved information and analysis methods are being devised to aid managers in balancing immediate returns against sustainable productivity.

HUFSCHMIDT, Maynard, M., and HYMAN, Eric L. (ed.)
Economic Approaches to Natural Resource and Environmental Quality Analysis
Dublin, Ireland: Tycooly International Publ. Ltd., 1982
380 pp.

Explores the applicability of environmental economics and multiple objective planning to Third World countries. Approaches and techniques used in environmental economics are outlined and their relevance to developing countries discussed. National aspects and country experiences described for Malaysia, Indonesia, Sri Lanka, Ecuador, and Western Australia.

HUFSCHMIDT, Maynard M., JAMES, David E., MEISTER, Anton M., BOWER, Blair T., and DIXON, John A.
Environment, Natural Systems, and Development: An Economic Valuation Guide (East-West Center publication - forthcoming)
Baltimore: Johns Hopkins University Press, 1983
352 pp.

Guide to the application of different valuation techniques to changes in the natural systems and in environmental quality resulting from development activities. Extended cost-benefit analysis, environmental quality valuation from the benefit side or from the cost side, and multiple-activity economic-environmental quality models are presented as major approaches. The authors provide a basis for considering the relevance of any one technique to different economic systems and types of projects, and illustrate the techniques by case study materials.
THE WORLD BANK (Office of Environmental Affairs)
An Annotated Bibliography of Environmental Economics
26 pp. (approx. 100 citations)

Bibliography of publications on the interfacing of natural resources and economic systems. Topics covered include cost-benefit analysis, welfare economics and techniques of analysis, evaluation of pollution effects, policy issues, and macroeconomic impacts of environmental protection. Last section on the limits-to-growth debate.

WILLIAMS, Julia
Honolulu, Hawaii: East-West Center, 1982
Contact: Environment and Policy Institute, East-West Center, Honolulu, Hawaii 96848
24 pp (81 citations)

Selection of publications dealing with the usefulness of various assessment methods and techniques presently employed or being developed, and providing guidelines to the formulation of comprehensive environmental assessments.
B. SECTORAL LITERATURE

1. ENERGY

* Energy Strategies

DUNKERLEY, Joy, RAMSAY, William, GORDON, Lincoln, and CECELSKI, Elizabeth
266 pp. Ref.

The authors see the necessity to devise strategies for the transition to an altered regime of energy supply in the oil-importing countries of the Third World. Their recommendations focus on the increase of domestic supplies, nonrenewable and renewable, the improvement of energy efficiency, and the rethinking of economic development in the light of rising energy costs. A brief review of the major directions in energy strategy as discussed in current literature is included.

HAEFELE, Wolf (program leader)
Energy in a Finite World - Paths to a Sustainable Future
(Report by the Energy Systems Program Group of the International Institute of Applied Systems Analysis, Laxenburg, Austria)

Comprehensive scientific analysis of the global energy system. The potential of the different energy sources to meet future demand (assumed to be three to four times higher in 2030 than in 1975) is assessed. Supply constraints, various levels of supply-demand balance, and consumptive and investive modes to use energy resources are discussed. Considers the large-scale development of both solar and nuclear energy technologies essential to achieve a sustainable energy system in the future.

LOVINS, Amory B.
World Energy Strategy - Facts, Issues and Options
San Francisco: Friends of the Earth, 1975
132 pp. Ref.

Concise overview on the debate on future energy demand and possible alternatives to meet this demand. Stresses that present short-term planning will severely restrict future options.
LOVINS, Amory B.
Soft Energy Paths - Towards a Durable Peace
232 pp. Ref.

Discusses two possible approaches to future U.S. energy strategy that are ultimately distinguished by their socio-political implications: the "hard path" representing an extrapolation of the recent past and the "soft path" requiring slowed and eventually zero energy growth, the development of decentralized energy technologies, and the abandonment of nuclear power as a dangerous technology. Advocates the necessity and the feasibility of the latter approach.

LOVINS, Amory B., and LOVINS, Hunter L.
Brittle Power - Energy Strategy for National Security
Andover, Mass.: Brick House Publishing Co., 1982
486 pp. Ref.

Shows how the centralized energy system of the U.S. is prone to major supply disruptions and highly vulnerable to disturbances from outside - war, sabotage, natural disasters - thus representing a threat to the nation's security. The authors illustrate their views by tracing how these vulnerabilities apply to four specific cases: liquefied energy gases, oil and gas, centralized power stations, and nuclear power. They advocate the development of an alternative, more resilient energy system based on decentralization, end-use efficiency, and sustainable energy sources.

SIDDIQI, Toufiq A. (Project Coordinator)
A Summary of Current and Planned Activities of the Project
Honolulu, Hawaii: East-West Center, 1981
21 pp. Ref.

The goals of this project are to analyze how the natural resource and environment base affects, and is affected by, the formulation of national and international policies for energy, to review scientific and economic data that could be helpful in the formulation of energy-environment policies, and to examine the usefulness of evaluation and simulation models for energy-environment systems. Lists of workshop and conferences, 1980-81, on specific topics in energy and the environment and of project-related publications.

STOBAUGH, Robert, and YERGIN, Daniel (ed.)
New York: Ballantine Books, 1979
496 pp. Ref.
Study on the benefits, risks, and possibilities of the different energy sources. Authors make a case for conservation as "the key energy source," for solar power, and for the reservation of hydrocarbons for premium uses. The prudent use of already existing and planned nuclear power plants is considered inevitable.

THE WORLD BANK
Energy in the Developing Countries
92 pp. Ref.

Discusses the energy problem of the 1970s, and the perspective for this decade. States that by tapping reserves of oil, gas, coal, and hydroelectric and forest resources and by vigorous conservation efforts, oil-importing countries could halve their energy imports by 1990. Outlines measures for saving energy without reducing economic growth. Proposes a program for World Bank lending.

* Renewable Energy Sources

BACH, Wilfrid, MANSHAND, Walther, MATTHEWS, William H, and BROWN, Harrison (ed.)
New York: Pergamon Press, 1980
295 pp. Ref.

The purpose of the Conference was to examine in detail the economic, social, health, and environmental implications of the large-scale utilization of alternative forms of energy before they are widely adopted. To set the issue in a comprehensive context, the discussion includes the consideration of short- and long-range strategies, national and international energy policies, developing and industrialized countries, and urban and rural communities.

CECELSKI, Elizabeth, DUNKERLEY, Joy, and RAMSAY, William
Household Energy and the Poor in the Third World
152 pp. Ref.

Preliminary study for a research project on energy economy patterns of the poor in the developing countries. According to the findings, energy is used with great inefficiency in many parts of the Third World, and opportunities for important savings exist. The impact of cultural and institutional factors and of the distribution of income on the dissemination of new technologies is emphasized. Bibliography on existing literature and documentation.
EARTHSAN/DEVELOPMENT FORUM

Contact: Earthscan, 10 Percy Street, London, W1P ODR, UK

Three booklets briefly reviewing the available resources, technologies, economics, and prospects for the energy sources under consideration at the Conference. Covers solar energies (including biomass, biogas, alcohol, firewood, and animal power) and non-solar energies (hydro, peat, oil shale, tar sand, tidal wave, ocean thermal, wind, geothermal).

GIBBONS, John H., and CHANDLER, William U.
Energy - The Conservation Revolution

Interdisciplinary study of the value of energy conservation in building, transportation, and industry, and its technical and institutional opportunities and constraints to success. Special attention is paid to the cost-effectiveness of higher energy productivity and to the methods of "delivering" energy conservation measures. The authors base their recommendations on a critical review of recent forecasts projecting exponential growth in energy demand and on the analysis of internal and external costs of the main energy sources (including environmental and health costs). Though focusing on the U.S., a book of wider interest.

NATIONAL ACADEMY OF SCIENCES

Energy for Rural Development - Renewable Resources and Alternative Technologies for Developing Countries

Study on low-power energy sources applicable on the village level in developing countries. The first part, directed to decision-makers and planners, describes the relevant technologies and their potential. The second part, directed to the specialist, gives details on equipment, costs, recent developments, and information sources.

Supplement, ibid, 1981 (240 pp.): Information on new technologies developed after publication of original volume and on advances made in the technologies described. Bibliography on small-scale energy technologies.
TAYLOR, Robert P.
Rural Energy Development in China
276 pp. Ref.

Study and literature review of rural energy development of the last 30 years in China, which is currently leading the world in the popularization of small hydroelectric plants, small coal mines, and family-sized bio-digestors. The author blends the analysis of the technical opportunities for alternative energy sources with the examination of the institutional patterns within which they must be adopted and exploited. Extensive reference list.

THE WORLD BANK
Renewable Energy Resources in the Developing Countries (1980, 33 pp.)
Mobilizing Renewable Energy Technology in Developing Countries:
Strengthening Local Capabilities and Research (1981, 52 pp.)
Alcohol Production from Biomass in the Developing Countries (1980, 69 pp.)

Three publications on the potential and implementation of renewable energy programs and the role of the Bank in renewable energy development in the developing countries.

U.S. CONGRESS (Office of Technology Assessment)
Energy from Biological Processes
Vol. 1: ibid, 195 pp., Ref.

Report evaluating the energy potential of various sources of plant and animal matter. Four biomass fuel cycles - wood, alcohol fuels, crop residues or grass and legume herbage, and animal wastes - are described, including their technical features, economics, environmental and social effects, and potential to replace conventional fuels. Policy options for their introduction into U.S. energy supplies are discussed. (Vol. 2 presents the analysis underlying Vol. 1.)

WORLDWATCH INSTITUTE
Papers on Renewable Energy Sources:
Energy and Architecture: The Solar and Conservation Potential
(C. Flavin) (No. 40)
Wood: An Ancient Fuel with a New Future (N. Smith) (No. 42)
Rivers of Energy: The Hydropower Potential (D. Deudney) (No. 44)
Wind Power: A Turning Point (C. Flavin) (No. 45)
Electricity from Sunlight: The Future of Photovoltaics
(C. Flavin) (No. 52)
Papers discussing the potential of renewable energy sources to meet future energy demands.

See also: National Academy of Sciences, Firewood Crops (under 'Agriculture, Forestry')

(I) SMALL DECENTRALIZED HYDROPOWER PROGRAM (SDH)/NRECA:
Publications and Updated Summaries of Activities
Contact: 1800 Massachusetts Avenue, N.W., Washington, D.C. 20036

Program established in May 1980 under a cooperative agreement between the National Rural Electric Cooperative Association (NRECA) and the U.S. Agency for International Development. Its objective is to enhance NRECA's technical capabilities in the area of small (1 MW or less) decentralized hydropower and to make this expertise available to developing countries. The SDH Program provides technical assistance to AID, foreign governments, and private organizations in project design and implementation.

Contact: IPSEP, 124 Spear Street, San Francisco, CA 94105

Newsletter (occasionally published) of the IPSEP, that was established by the Friends of the Earth Foundation. Through its newsletter, IPSEP provides access to technical and economic data, analytic methods, and institutional concepts for appropriate technology worldwide and circulates annotated summaries of key findings to interested parties and decision-makers.

(P) SOLAR ENERGY
Published by The International Solar Energy Society, Victoria, Australia
Contact: Pergamon Press, Inc.
Maxwell House, Fairview Park, Elmsford, NY 10523

Journal with predominantly scientific and technical articles on solar energy; also on thermal and wind energy, biomass conversion, and photovoltaics.
WORLD SOLAR MARKETS (A monthly briefing on renewable energy developments.)
Published by The Financial Times, London
Contact: FT Publications, Inc., 75 Rockefeller Plaza, New York, New York, 10019

Newsletter reporting on recent experiences and developments in renewable energy business (with focus on solar energy) throughout the world.

See also: Appropriate/Intermediate Technology Information Sources - General.
2. AGRICULTURE, RURAL DEVELOPMENT, AND FORESTRY

* Ecological Agriculture

ALTIERI, Miguel A., LETOURNEAU, Deborah K., and DAVIS, James R.
Developing Sustainable Agroecosystems

Article analyzing the ecological and socio-economic aspects of developing agroecosystems that are self-sustained, energy-efficient and less dependent on external resource input. Reference list.

COX, George W., and ATKINS, Michael D.
Agricultural Ecology - An Analysis of World Food Production Systems
San Francisco: W.H. Freeman & Co., 1979
721 pp. Ref.

Provides a scientific basis for understanding the ecosystem concept and for applying this understanding to the development of ecologically sound agricultural practices. The authors compile extensive information on the ecological and historical context of agriculture and the intimate interrelationships of agroecosystems and natural ecosystems. To secure and increase a sustainable food production in the future, they argue, it is indispensable to design a human strategy for agriculture possessing a broad ecological rationale. Chapter reference lists.

HILL, Stuart
Basic Technics in Ecological Farming
OTT, Pierre
The Maintenance of Soil Fertility
Basel: Birkhauser Verlag, 1982
365 pp.
Contact: Rodale Research Center
R.D. 1, Box 323, Kutztown, PA 19530

At the Montreal Conference, technical papers were presented in the subject areas of agri-silviculture (temperate and tropical), legumes, organic fertilizers, animal husbandry, energy analysis, community development, training, and social factors for tropical agriculture (abstracts in English, French, and German, most papers in English).
The Brussels Conference focused mainly on soil fertility (most papers in French).
NOVOTNY, Vladimir, and CHESTERS, Gordon (cross-reference)
Management Practices of Nonpoint Pollution Control: Source Control Measures. In: ibid, Handbook of Nonpoint Pollution (see under 'Integrated Socio-Economic and Environmental Planning and Management, Theory and Examples') pp. 437-458
Ref.

Discusses management practices designed to keep soil and pollutant losses from agricultural lands within acceptable limits. Treats principal types of cropland erosion control practices including conservation tillage, terracing, vegetation contour strips and surface covers, and practices for control of pesticides losses from agricultural applications.

SAMPSON, R. Neil
Farmland or Wasteland - A Time to Choose. Overcoming the Threat to America's Farm and Food Future
422 pp. Ref.

Comprehensive study on the heavy pressures put on America's agricultural lands. Correlates issues such as the high rate of loss of prime farmland to other uses, accelerated soil erosion, growing competition for water, and increasing demand for forest products and new energy crops. Suggests conservation farming as a practical possibility and stresses the need for changes in national and local policies to support a sustainable instead of an exploitative farming system.

TILLMAN, Robert E.
Environmental Guidelines for Irrigation (United States Man and the Biosphere Program and U.S. AID publication)
74 pp. Ref.

Guidelines and environmental checklist for the identification of potential negative impacts resulting from irrigation projects. The guidelines rely on a multidisciplinary approach to irrigation planning, that includes the consideration of ecological, socio-economic, and public health factors. Annotated reference list.

U.S. CONGRESS (Office of Technology Assessment)
Background Papers for Innovative Biological Technologies for Lesser Developed Countries - An Office of Technology Assessment Workshop, November 1980
(Report prepared for the Committee on Foreign Affairs, U.S. House of Representatives)
511 pp. Ref.
Provides information on biological technologies that could help developing countries to enhance soil productivity and increase food supplies while minimizing reliance on expensive chemical fertilizers, and that could contribute to the development of sustainable and productive agroecosystems. The technologies discussed include those based on underexploited plant resources, multiple cropping, biological nitrogen fixation, mycorrhizal fungi as fertilizer substitutes and the utilization of zeolites.

(P) DIVERSITY
Published by the Laboratory for Information Science in Agriculture.
Contact: 419 Canyon, Suite 320, Fort Collins, CO 80521

News journal (published bi-monthly) on plant genetic resources research and international activities in germplasm conservation.

(P) IFOAM (International Federation of Organic Agriculture Movements)
Contact: IFOAM Bulletin
Rodale Research Center, R.D. 1, Box 323, Kutztown, PA 19530

Quarterly of the International Federation of Organic Agriculture Movements, that was founded in 1972 to provide a link among the diverse bodies concerned with promoting and researching the ecological development of agriculture. Contains information on activities and experiences throughout the world. Literature reviews on a regular basis.

* Small Farm Development

FREEMAN, Orville L., and KAREN, Ruth (cross-reference)
The Farmer and the Money Economy: The Role of the Private Sector in the Agricultural Development of the LDCs.
In: The Woodlands Conference, Future Roles for the Private Sector (see under 'Economics', Part One).
pp. 183-200

Winning Paper of the 1982 Mitchell Prize Competition. The authors suggest that the most effective method to increase agricultural productivity requires the involvement of the private sector, i.e., small landholders (1-5 acres) would be grouped around a corporate core which would provide technical, financial, and educational inputs and market the output. The paper offers empirical data from case histories and derives policy implications for the public and private sectors.
GILBERT, E.H., NORMAN, D.W., and WINCH, F.E.
Farming Systems Research: A Critical Appraisal (Rural Development
Paper No. 6).
East Lansing, Michigan: Michigan State University, 1980
135 pp. Ref.
Contact: MSU Rural Development Papers
     Department of Agricultural Economics
     206 International Center
     Michigan State University, East Lansing, MI 48824

A state-of-the-art paper on farming systems research (FSR) in the
Third World. Reviews the literature on farming systems, evaluates
FSR in international institutes and in national agricultural
institutions in the Third World, and recommends what can be done to
expand and improve FSR in order to develop technology that is
appropriate for the majority of small farmers.

HARWOOD, Richard R.
Small Farm Development - Understanding and Improving Farming Systems
in the Humid Tropics
160 pp. Ref.

Suggests that a combination of traditional practices and modern
technologies is the key to a more successful development of the
world’s small farms. Discusses small farm production systems that
foster efficiency in conditions of limited resources and emphasizes
critical aspects at present overlooked or neglected. Includes a
list of sources of information and an annotated bibliography on
small farming systems.

See also: Appropriate/Intermediate Technology Information Sources -
General

* Forestry

CHANDLER, Trevor, and SPURGEON, David (ed.)
International Cooperation in Agroforestry (Conference in Nairobi,
1979): German Foundation for International Development (DSE)/Inter-
national Council for Research in Agroforestry
469 pp. Ref.

Twenty-seven contributions on the concept and implementation of
agroforestry. Agroforestry practices, in many cases derived from
traditional bases, and their ecological aspects are discussed for
arid and savanna ecosystems, mountain ecosystems, and the humid
tropics. The Conference stressed that agroforestry was an integrated land management system designed to provide long-term ecological stability on marginal lands while sustaining the production of food and wood. French and Spanish abstracts. Bibliography.


The authors argue that with the cultivation of trees, marginally productive lands and wastelands can be made productive for food supply. They present the concept of what they call "three-dimensional forest farming," the three dimensions being the trees, the harvest from the trees to feed livestock, and the animals and animal products. They discuss theory and history of forest farming and give detailed know-how for layout and operation of multiple-use forest farming schemes.


Report on the global extent of ecological stress, its political causes and human consequences. Rampant deforestation and desertification cause the accelerating destruction of the land's productivity. To prevent ecological debacles and the irreversible undermining of the world's food production systems, the author calls for agricultural reforms, massive tree-planting campaigns and a slowdown in world population growth.


Overview of plantation silviculture throughout the tropics with the purpose of setting it in the context of economic development and the wider impacts plantations have on the environment. The potential of tropical tree plantations for future world wood supply is considered very high. Part IV discusses ways of integrating plantation forestry and agriculture, the role forestry plantations can play in protective afforestation, and the conditions for sustained productivity in tropical forestry plantations. Extensive bibliography.

This study is an attempt to bring together existing knowledge and ideas on community forestry, which is defined as forestry activities intimately involving local people and aimed at directly benefitting the rural community. It discusses the principles of community forestry, the problems and opportunities that arise, policies and programs as well as specific production and management systems and technical considerations. Annotated reference list on community forestry and related issues.

FOOD AND AGRICULTURE ORGANIZATION
Guidelines for Watershed Management (FAO Conservation Guide)
Rome: FAO, 1977
293 pp.
Ref.
Eighteen papers on erosion evaluation and control methods, watershed management principles, land classification and land-use planning, slope rehabilitation by terracing, remote sensing for watershed management, and water quality measurements.

MYERS, Norman
Conversion of Tropical Moist Forests
205 pp.
Ref.
Survey on widespread conversion patterns in tropical moist forests, in particular resulting from forest farming, timber trade, cattle raising, and firewood cutting, and their impact on these fragile ecosystems. Country-by-country documentation of the forms and degrees of tropical conversion and the efforts undertaken by governments to safeguard their tropical forest resources. Remote sensing is presented as an important device to monitor ongoing conversion trends.

NATIONAL ACADEMY OF SCIENCES
Firewood Crops - Shrub and Tree Species for Energy Production
237 pp.
Ref.
Detailed descriptions of fuelwood species for the humid tropics, tropical highlands, and arid and semi-arid regions. Special consideration is given to pioneer species that are particularly vigorous and adaptable, that have other uses in addition to providing fuelwood and that are characterized by nitrogen-fixing ability, rapid growth, and ability to coppice. In an introductory part, the potential and significance of fuelwood plantations as a renewable energy source, and questions of fuelwood management are treated. Appendix on efficient wood-burning devices. Selected reading list per species.
SPEARS, John
Rehabilitating Watersheds
In: Finance & Development, March 1982, pp. 30-33

Article that, based on recent World Bank experiences, reviews new approaches to watershed management and to socially oriented forestry projects in watershed areas. The key to arresting current degradation of upland catchment areas is seen in enabling small farmers to establish appropriate farming practices (for example, stall feeding, regulation of upland grazing, and contour plowing and planting) combined with physical measures to check erosion and flooding.

THE WORLD BANK
Forestry (Sector Policy Paper)

Policy paper documenting a shift of priorities in Bank lending policy from industrial forestry towards rural development forestry and environmental forestry. The importance of afforestation projects for resource conservation and the impact of forestry projects on the welfare of indigenous people are stressed. Outlines the Bank's role in developing new concepts and packages of technology.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (Bureau for Development Support)
Forestry Resources Development Assistance: A Selective Bibliography of Reports

Abstracts of publications on the issues of reforestation and social forestry development in the developing countries. Includes references to general works, government policies and programs, and technical and geographical reports.

See also: Carpenter Assessing Tropical Forest Lands: Their Suitability for Sustainable Uses (under 'Integrated Socio-Economic and Environmental Planning and Management, Theory and Examples')

See also: Appropriate/Intermediate Technology Information Sources - General
Rural Development - Examples and Case Studies

CRITCHFIELD, Richard
Villages
388 pp. Ref.

In the tradition of the traveler anthropologist, the author writes about peasant life in the Third World and about fundamental cultural adjustments taking place in the world's villages today. As the major elements of this change, he sees the adaptation of contraception and rising food production through modern farming practices. In summarizing his experiences, he takes a basically optimistic outlook on the future.

DIXON, Ruth B.
Rural Women at Work - Strategies for Development in South Asia (Resources for the Future publication)
Baltimore: Johns Hopkins Press, 1978
228 pp. Ref.

Outlines a model for the development of producer cooperatives owned and operated by women. The model incorporates elements designed to promote rural development, improving the status of women and encouraging marriage and birth planning. Five examples of successful employment schemes for women in rural areas are described.

GOULET, Denis
Survival with Integrity - Sarvodaya at the Crossroads
105 pp. Ref.

Discusses the economic and political context - present and future - of the Sarvodaya Shramadana Movement in rural Sri Lanka. The author analyzes the essential value choices faced by the Movement and sees the need for it to relate itself to the national level, in particular to define its position within the process of economic growth and modernization promoted by the government. He also addresses the question whether, in spite of its heavy dependence on external aid, the movement will be able to protect its core values of self-reliance and voluntary service.

HARRISON, Paul
Inside the Third World
510 pp. Ref.
Investigation of the main problems and trends as they affect the central questions of poverty and inequality. The themes explored in this context include geographical and historical roots of poverty, primitive technology, landlessness, debt, mechanization, ecological threats to agriculture, rural exodus and rapid urbanization, unemployment, overpopulation, malnutrition and disease, education, women's lot, international economy, and national political instability. Lists of recommended reading per chapter.

HARRISON, Paul
The Third World Tomorrow — A Report from the Battlefront in the War Against Poverty
384 pp. Ref.

Travel reports describing how models of development involving people's participation, self-help, cooperatives, and small-scale appropriate technologies are put into practice in countries of the Third World. Gives a survey of exemplary projects for each field, such as the People's School in Bangladesh, the Preethi family planning program in Sri Lanka, or the self-built and managed townships in the Sahel, with a brief outline of the major problems to be solved.

WILDE, Ton de
Use of Technology: Rural Industrialization in Sri Lanka
242 pp. Ref.

Study evaluating the success of the Divisional Development Council Scheme in Sri Lanka at the national and the village level. In an introductory chapter, the dominant development theories for LDCs advocating either rapid industrialization and international trade or self-reliance and expansion of local markets are reviewed. In this context, the study aims at contributing to the latter approach by focusing the attention on the microeconomic aspects, i.e., the people and their environment, to explain success or failure in rural industrialization efforts.
3. EDUCATION

* Innovative Learning

BOTKIN, James W., ELMANDJRA, Mahdi, and MALITZA, Mircea
No Limits to Learning - Bridging the Human Gap (A Report to the Club of Rome)
New York: Pergamon Press, 1979
159 pp. Ref.

Reconsiders global issues such as energy, maldistribution and mal-orientation of science and technology, cultural identity, and the arms race, focusing primarily on the human element rather than on the material constraints to growth. Innovative and societal learning is seen as a prerequisite to resolving any of these issues. As an alternative to "learning by shock," the authors propose the development of "anticipatory and participatory learning".

COOMBS, Philip H., and AHMED, Manzoor
Attacking Rural Poverty - How Informal Education Can Help
(Prepared for The World Bank by the International Council for Educational Development)
Baltimore: Johns Hopkins University Press, 1974
292 pp. Ref.

Study of concepts and examples of nonformal education in developing countries. Particular attention is paid to approaches that have the potential to promote rural development, i.e., training and extension programs for small farmers, artisans, craftsmen, and small entrepreneurs, and community self-help. In their recommendations, the authors emphasize that in the development of future programs greater attention should be paid to integration, decentralization and equity.

FRIEDMAN, Yona
Immediate Education for Survival
In: Invention Intelligence (published by Government of India), May 1981, p. 209-215
For information contact: Mr. Friedman, 42 Boulevard Pasteur, 75015 Paris, France

Introduction to Friedman's "Immediate Education for Survival" concept and UN project which uses simple cartoons to explain practical physics and appropriate technologies to the, often illiterate, man-in-the-street. The basic goal-oriented courses are diffused through wall-journals with the purpose of inciting people to invent a new popular technology.
PAIN, Abraham
Education and Productive Work

Issue containing the working documents and recommendations of the "Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania" in Colombo, 1978, and an annotated bibliography (303 citations) on the integration of production and education. Productive work undertaken as a part of education is considered an innovative approach to learning and an important opportunity in advancing self-supporting higher-level educational institutions and programs.

RENSBURG, Patrick van
The Serowe Brigades - Alternative Education in Botswana
74 pp.

Describes the formation and educational concept of the Serowe brigades originated in 1965 as an outgrowth of Swaneng Hill School at Serowe (of which the author was Principal at that time). The 'brigades' system aims at providing employment and vocational training for a large number of primary school leavers. By combining education with production young people are given the opportunity to mobilise and create resources whilst learning, to help pay for their education. The author stresses the relevance of this type of education for rural development and its potential as a vehicle for the assimilation of new ideas and thinking.

RENSBURG, Patrick van
The Foundation for Education with Production - A New Force for Educational and Social Transformation
In: Education with Production (Journal of the Foundation for Education with Production), Vol. 1, No. 1, pp. 7-19
Contact: FEP, P.O. Box 20906, Gaborone, Botswana

Article by the co-founder of the Serowe Brigades and director of the recently established FEP. The FEP supports the transformation of education by acting as a clearing house for information and experience, by helping to establish national and regional committees for educational innovation, and by setting up its own educational projects. At the same time, it realizes that the creation of learning systems which meet the needs of the people can only be successful in cooperation with national liberation movements and workers' organizations.
Environmental Education

UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION
Connect-UNESCO-UNEP Environmental Education Newsletter (Quarterly)
Contact: UNESCO, 7, place Fontenoy, 75700 Paris, France

Issue summarizing the activities of the International Environmental Education Programme (IEEP) during the last seven years. The objectives of the IEEP are described on three levels: the development of a general awareness of the necessity of environmental education, the development of concepts and methodological approaches in this field, and the efforts for incorporating an environmental dimension into the educational process of UNESCO member state.

UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION (Environmental Section)
Environmental Education
71 pp. (335 citations)

Selected and annotated bibliography of recent publications on the subject updating a former bibliography published by the IBE.

UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION
Trends in Environmental Education
244 pp. Ref.

Articles presenting the nature and philosophy of environmental education and its methodological approaches at the different levels of formal and informal education. List of organizations involved in environmental education.

(I) CENTER FOR ENVIRONMENTAL EDUCATION
Directory of Environmental Education Resources - A Guide to National and International Organizations that Provide Information on the Environment
Washington: Center for Env. Ed., 1980
55 pp.
Contact: 1925 K Street, N.W., Suite 206, Washington, D.C. 20006

Includes 279 information sources and indicates help available for eleven different areas from audiovisuals to technical
assistance and workshops. A subject guide groups the information sources under 20 different environmental interest categories.

* Population Education

ZIMMERMAN, Margot L., and PERKIN, Gordon W.
Print Materials for Non-Readers: Experiences in Family Planning and Health
(Program for the Introduction and Adaptation of Contraceptive Technology, PIACT, Paper 8), Seattle, 1981
39 pp. Ref.
Contact: Canal Place, 130 Nickerson Street, Seattle, WA 98109

Paper describing the development of culturally sensitive pictorial print materials intended to inform an illiterate audience about family planning. The proposed approach has been successfully used in projects conducted by PIACT and is considered also very promising for areas of development other than family planning.

Population Education in the Schools
In: Population Reports, Series M, No. 7, March-April 1982
42 pp. Ref.
Contact: Population Information Program
The Johns Hopkins University
Hampton House, 624 North Broadway, Baltimore, MD 21205

Population education, as a supplementary to family planning, is designed to teach children in school about basic population issues and, in many cases, encourage them eventually to have smaller families. The article defines the rationale of the concept, evaluates country experiences of the 1970s and addresses the topics of curriculum planning, teacher training, and teaching materials. Bibliography and list of contact addresses.
4. INDUSTRY

* Resource Conservation and Pollution Prevention

BRUNNER, David L, MILLER, Will, and STOCKHOLM, Nan (ed.)
The Real World of Environmental Decision Making
Chapter 5 in: ibid, How should decisions be made?, Stanford, CA:
Committee on Corporate Responsibility, Graduate School of Business,
1981. pp. 81-126

Three case studies considered representative examples for companies
attempting to comply with environmental laws within competitive
industries. As common recommendations emerge the early public
involvement in facility planning to avoid later confrontations, and
a clear definition of objectives and consistent enforcement of
pollution control legislation to enable rational corporate planning
and compliance.

ELKINGTON, John
The Ecology of Tomorrow's World - Industry's Environment
318 pp. Ref.

Documents how increasing consumer awareness, high prices for energy
and raw materials, and stricter environmental vetting procedures on
the one hand and an expanding "environmental business" on the other
create a changing social and economic climate for industrial produc-
tion and marketing. The author discusses the ways in which this
situation will influence future industrial activities and inven-
tories positive examples of responsible industrial management.

INTERNATIONAL CHAMBER OF COMMERCE/FEDERATION OF SWEDISH INDUSTRIES
World Industry Conference on the Environment (Stockholm April 19-22,
1982)
145 pp.
Contact: United States Council for International Business
1212 Avenue of the Americas, New York, NY 10036

The Conference was held to report on recent examples of industrial
pollution abatement and to discuss how the international industrial
and business community can further contribute to environmental
protection and resource management. The Conference marks a general
shift from purely defensive pollution control to an increasing
offensive to make prevention and resource conservation profitable.
Topics covered in the Conference papers include cooperation between
UNEP and industry, economic aspects of environmental protection, the
environmental challenge in the developing countries, and successful
examples in the pulp and paper, iron and steel, chemical, food, and
mining industries.
The concept of low- or non-pollution industry rests upon the elimination of the causes of pollution instead of end-of-the-line measures, the reduction of energy and raw materials inputs, and the creation of resources out of waste materials. Appropriate site selection, manufacturing integration, and programs encouraging innovative engineering design are ways to achieve industrial production that is less wasteful and less polluting. Numerous examples from different industrial branches.

The World Bank (Industrial Projects Department)
The Potential for and Alternative Approaches to Industrial Energy Conservation in Developing Countries (in preparation)
Washington: The World Bank
(including bibliography on energy conservation in industrial projects)

United Nations Environment Programme
Industry and Environment - The Next Decade
Industry and Environment, Special Issue No. 3, 1982
Contact: UNEP, Industry and Environment Office
17, rue Margueritte, 75017 Paris, France
63 pp.

Fifteen articles by noted politicians and businessmen on recent achievements in, and projections for, industrial production compatible with environmental protection. Country experiences (Kenya, Egypt, the Philippines, Mexico, and Nigeria) and case studies in different industrial branches are presented.

See also: Gibbon/Chandler Energy - The Conservation Revolution
(under 'Energy, Renewable Energy Sources')
The World Bank An Annotated Bibliography of Environmental Economics (under 'Integrated Socio-Economic and Environmental Planning and Management, Environmental Economics')
* Product Design

OVERBY, Charles
Scarce Resources: Technology Assessment and Materials Policy: A Year with the Office of Technology Assessment (Session 1658, pp. 163-173)
Contact: American Society for Engineering Education
11 Dupont Circle, Washington, D.C. 20036

Companion papers. Author assumes the transition of the industrialized countries towards a "conserver" society in the near future, induced by resource scarcity and limited ecological carrying capacity for wasteful consumption. Proposes changes in product design towards better recyclability, remanufacturability, and durability as important options in this direction. Governmental action to introduce technical solutions are considered indispensable and possibilities for public policies with varying degrees of enforcement are briefly explored.

PAPANEK, Victor
Design for the Real World: Human Ecology and Social Change
New York: Bantam Books, 1972
375 pp. Ref.

Brings forth the thesis that designers should design for use and real human needs and not for style and planned obsolescence. The author provides a large number of ideas and examples of inexpensive, long-lasting, highly useful products for both the industrialized and the developing countries. Extensive bibliography.

UNIDO
Monographs on Appropriate Industrial Technology, Vols. 1 to 6

Series of monographs based on documents prepared for the UNIDO Forum on Appropriate Industrial Technology held in New Delhi in 1978. Vol. 1 covers the conceptual and policy framework for appropriate industrial technology. The remaining volumes give summary articles of current developments in low-cost transport (Vol. 2), paper and small pulp mills (Vol. 3), agricultural machinery and implements (Vol. 4), energy for rural requirements (Vol. 5), and textiles (Vol. 6).

See also: Appropriate/Intermediate Technology Information Sources - General.
5. **POPULATION**

CUCA, Roberto, and PIERCE, Catherine S.
*Experiments in Family Planning: Lessons from the Developing World* (World Bank publication)
Baltimore: The Johns Hopkins University Press, 1977
276 pp.

Comprehensive review of ninety-six family planning experiments in developing countries and evaluation of the tested approaches. Includes a brief description of the evaluated projects and a bibliography.

McNAMARA, Robert S.
*Address to the Massachusetts Institute of Technology on the Population Problem* (April 1977)
Washington: The World Bank, 1977
57 pp.

Analyzes the current trends in world population growth which is marked by a general decline. Discusses the factors that appear to be most influential for the reduction of fertility: health, education, broadly distributed economic growth, urbanization, and the enhanced status of women. Suggests the actions that governments and others must take to help solve the population problem.

RIDKER, Ronald (ed.)
*Population and Development - The Search for Selective Interventions* (Resources for the Future publication)
Baltimore: The Johns Hopkins University Press, 1976
468 pp.

Papers by population specialists investigating probable socio-economic determinants of fertility amenable to policy manipulations and ways in which these determinants can be favorably utilized to decrease fertility. The topics selected include the effects upon fertility of income distribution, education, nutrition and health, mortality, residential location, and female employment. Bibliography.

ROSS, John A. (ed. in chief)
*International Encyclopedia of Population* (Center for Population and Family Health/International Institute for the Study of Human Reproduction/Faculty of Medicine, Columbia University)
750 pp. (2 vols.)

First general summary of data and knowledge available in the field of population and population-related issues. Chapters on ecology, education, family planning, population and development, and resources and population are included. Chapter bibliographies.
Regional Aspects of Family Planning and Fertility Behaviour in Indonesia
(World Bank Staff Working Paper No. 462 by D. Chernichovski, O.A. Meesook)
63 pp.

This paper discusses the recent decline in the population growth rate of Indonesia which has been achieved at a relatively low level of income and socio-economic development. It briefly reviews the history and organization of the family planning program in Indonesia and attempts to identify those factors which have been responsible for its success.

(I) POPLINE
Produced by the Population Information Program, Johns Hopkins University and the Library/Information Program, Center for Population and Family Health, Columbia University
Contact: Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, MD 21205

Computerized literature search service. Offers bibliographical citations and abstracts on specific subjects within the field of family planning and population. (Searches free of charge.)

See also: Zimmermann/Perkin Print Materials for Non-Readers
Population Education in the Schools (both under 'Education, Population Education')
6. TRANSPORTATION

* Urban and Intercity Road Transportation

EDWARDS, John D.
pp. 381-415 Ref.

Discusses the various negative environmental impacts resulting from traffic (urban and intercity) and the factors influencing their magnitudes and daily variances. Also addresses traffic as a catalyst for urban sprawl. Different approaches to the control and reduction of these impacts are discussed: legal and administrative means, design and planning techniques, land-use control, multi-disciplinary facility planning, and innovative transportation modes.

SHARP, Clifford, and JENNINGS, Tony
Transport and the Environment
Leicester University Press, 1976
228 pp. Ref.

Examines the impact of transportation operations on the environment. Social costs of transport -- noise, air pollution, visual intrusion, and the severance of communities -- are studied together with policies that might reduce them. The role of central and local government is considered, with particular attention to methods allowing for environmental benefits when planning new transportation investment.

THE WORLD BANK
Relieving Traffic Congestion: The Singapore Licensing Scheme
(World Bank Staff Working Paper No. 281, by Peter L. Watson, Edward P. Holland)
286 pp. Ref.

Report on the effects on traffic, air pollution, and people's attitudes of the Area Licensing Scheme. The scheme was introduced in Singapore in 1975 and is generally regarded as a successful attempt to reduce traffic congestion during rush hours. Besides analyzing the changes in traffic volumes and patterns, the report documents the clear abatement of carbon monoxide concentration in the air that resulted from the scheme.
See also: McHarg Design with Nature (A Step Forward - Chapter on Highway Route Selection) (under 'Integrated Socio-Economic and Environmental Planning and Management, Theory and Examples')

* Rural Roads

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (Office of Evaluation)
Socio-Economic and Environmental Impacts of Low-Volume Rural Roads

Report summarizing the economic, social and environmental impacts of AID's rural road activities and the influence of rural road construction on other aspects of rural development. The working team gives recommendations how to avoid the observed problems in future projects.

See also: U.S. AID Environmental Design Considerations for Rural Development Projects (under 'Integrated Socio-Economic and Environmental Planning and Management, Theory and Examples')

See also: Appropriate/Intermediate Technology Information Sources - General
7. WATER SUPPLY/WASTE RECYCLING

* Water Supply and Conservation/Sanitation

BAUMANN, Duane D., BOLAND, John J., SIMS, John H., KRANZER, Bonnie, and CARVER, Philip H.
The Role of Conservation in Water Supply Planning
118. pp.
Ref.

Defines water conservation as the reduction in water use or water losses that brings about a simultaneous increase in social welfare. Discusses patterns of residential, industrial, and agricultural water use and problems and opportunities for the introduction of water conservation measures. Assesses the adequacy of knowledge of the available water conservation measures and stresses the importance of an integration of water conservation planning into general water resources planning. Reference list.

BOLAND, John, DZIEGIELEWSKI, Benedykt, BAUMANN, Duane, and TURNER, Chuck
Analytical Bibliography for Water Supply and Conservation Techniques
230 pp. (+Appendix A: 179 pp; 308 citations)

Information designed to assist planners in the application of the planning methodology described in The Evaluation of Water Conservation for Municipal and Industrial Water Supply: Procedures Manual developed by the U.S. Army Corps of Engineers. Appendix A contains abstracts of selected literature on water conservation planning.

RYBCZYNSKI, Witold, POLPRASERT, Chongrak, and McGARRY, Michael
Low-Cost Technology Options for Sanitation - A State-of-the-Art Review and Annotated Bibliography
184 pp.

Comprehensive technology review and annotated bibliography describing alternative approaches to collection, treatment, reuse, and disposal of human wastes. The propagation of adequate sanitation and sewerage is considered an indispensable complement to clean water supply.
THE WORLD BANK (Transportation, Water, and Telecommunications Department)
Appropriate Technology for Water Supply and Sanitation - Technical and Economic Options
124 pp.

Discusses the program planning necessary to provide socially and environmentally acceptable low-cost water supply and waste disposal. Reports on the findings of a research project on "Appropriate Technology for Water Supply and Waste Disposal in Developing Countries." (The project reviewed technologies, social/behavioral factors, economic and financial aspects, suggested technical improvements and new applications for traditional technologies, and developed selection criteria.)

TILLMAN, Gus
Environmentally Sound Small-Scale Water Projects (publ. by Coordination in Development and Volunteers in Technical Assistance)
New York: Codel, 1981
142 pp. Ref.
Contact: VITA, 3706 Rhode Island Ave., Mt. Rainier, MD 20822

Booklet written for community development workers in developing countries who are not technicians in the area of water resources. It is meant to serve as a general guide for planning small-scale water projects which protect and conserve natural resources in a manner which allows sustainable development to take place. Specific areas covered: Sanitation and waste treatment, water and agriculture, aquatic products, water and energy.

WIJK-SIJBESMA, Christine van
Participation and Education in Community Water Supply and Sanitation Programmes: A Literature Review (Technical Paper No. 12, International Reference Centre for Community Water Supply)
Leidschendam, Netherlands, 1979
204 pp.
Contact: International Reference Centre for Community Water Supply Information Section
P.O. Box 140, 2260 AC Leidschendam, Netherlands

Water supply and sanitation projects have proved to be more successful and better maintained if the community is involved in the preparation and implementation of plans. This paper reviews conclusions from a wide literature on the subject and is a general guide to project work that involves community participation.
"Water Reuse in the Future"
221 pp.
Contact: AWWA Research Foundation
6666 West Quincey Avenue, Denver, CO 80235

Abstracts giving a state-of-the-art of current research and projects in water reclamation and reuse in the U.S. The papers focus on the technology, economics, and institutional background of industrial, agricultural, domestic, and recreational reuses. The history of water reuse, nationally and internationally, is reviewed.

* Resource Recovery from Solid Wastes

GUNNERSON, Charles G., and KALBERMATTEN, John M. (ed.)
Appropriate Technology in Resource Conservation and Recovery
(Proceedings of a session sponsored by the Research Council on Environmental Impact Analysis of the ASCE Technical Council in Atlanta, Georgia, October 1979)
New York: American Society of Civil Engineers, 1980
214 pp. Ref.

Six contributions to the workshop addressing historical, economic, technological, institutional, and participatory aspects of municipal waste recycling. Includes reports on Asian bioconversion systems, European refuse-fired energy systems, and recent U.S. Department of Energy research on waste recycling technologies.

NAGAR, B.R.

Suggests that organic recycling including biogas technology can help in partially solving the energy and food crisis in the developing countries. For adopting organic recycling on a large scale, a new multidisciplinary strategy is recommended. Emphasizes the necessity to study the local ecosystems to make use of the whole range of available resources and to take into consideration economic, political, and cultural constraints to find suitable recycling technologies. Bibliography on issues and technologies.
NATIONAL ACADEMY OF SCIENCES
Food, Fuel, and Fertilizer from Organic Wastes
154 pp. Ref.

Report examining opportunities for the utilization of organic wastes and residues commonly found in the poorer rural areas of the world. Major technologies presented are aquaculture farming methods and fungal conversion for food production, treatment of crop residues and animal manure for feed production, biological and thermochemical waste conversion into fuel, and composting and treatment of waterborne wastes for soil improvements. Small- and large-scale integrated systems that combine several aspects of waste reuse are also described. Chapter bibliographies and research contacts.

THE WORLD BANK (Transportation, Water and Telecommunications Department)
Resource Recovery from Municipal Solid Waste - An Annotated Bibliography (Review Copy)
271 pp. (approx. 230 citations)

Abstracts on environmentally sound management and recycling techniques for municipal solid waste of domestic, agricultural, and industrial origin. Keyword index.

See also: Appropriate/Intermediate Technology Information Sources - General
8. **URBAN DEVELOPMENT**

* **Urban Planning**

ARORA, Chauth Ram


Paper outlining a methodology for land-use planning based on environmental resources as exemplified at Carlisle, Mass.: Environmental resource maps depicting aspects of the geology and hydrology of Carlisle, which may affect land-use, are printed on transparent mylar. Either a single map or a combination of maps may suggest possible but mutually exclusive land-uses or a sequence of land-uses.

See also: McHarg *Design With Nature*

Novotny *Handbook of Nonpoint Pollution* (both under 'Integrated Socio-Economic and Environmental Planning and Management, Theory and Examples')

* **Low-Income Housing**

DAVIDSON, Forbes, and PAYNE, George

*Urban Projects Manual* (prepared for the Overseas Development Administration, London; pre-publication copy)

London: Clifford Culpin & Partners, 1980

Pragmatic guide to low-income housing projects and slum upgrading. The methodology (based on the approach to the Ismalia Projects, Egypt) integrates social and environmental concerns into project preparation and implementation.

FATHY, Hassan

*Architecture for the Poor - An Experiment in Rural Egypt*

Chicago: University of Chicago Press, 1973

233 pp.

Describes in detail Fathy's plan for building the village of New Gourna in Egypt (in the 1940s), which was based on the adaptation of traditional building methods and space patterns, and the use of local materials. The author strongly advocates housing derived from
traditional forms of architecture, instead of imitating forms imported from the West. Also, the people themselves should be intimately involved in the design, building, and ownership of their own housing.

INTERNATIONAL DEVELOPMENT RESEARCH CENTER
Low-Income Urban Shelter Projects – An Annotated Bibliography of Research Funded by IDRC and IBRD
Ottawa/Washington: IDRC, 1982
61 pp. (126 citations)

Abstracts of the major research outputs on the evaluation by IDRC and IBRD of four of the first IBRD-financed low-income housing projects (El Salvador, Zambia, Senegal, and the Philippines). The valuation exercise was undertaken to assess the effectiveness of innovative approaches in low-income shelter and to suggest guidelines for future shelter, sites and services, and slum upgrading projects.

TURNER, Alan (ed.)
The Cities of the Poor
New York: St. Martin's Press, 1980
316 pp.

Book written by consultants in urban development in the Third World. Presents methods and techniques for the various aspects of community planning and self-help housing for low-income groups, and describes the role of the consultant in project preparation and implementation. Chapters on project planning, social needs, employment creation, administration and finance, development standards, and environmental evaluation and design.

TURNER, John F.C. and, FICHTER, Robert (ed.)
Freedom to Build
301 pp.

Twelve essays examining from a variety of perspectives the participation, or lack of participation, of people in the construction and ownership of their housing, and offering concepts for self-help in housing, both for the industrialized and the developing countries. The authors contend that if dwellers lose control over their own housing, shelter becomes a commodity of reduced value to the individual and often an inordinate expense to society.
* Low-Cost Construction

AGARVAL, Anil

Mud, Mud - The Potential of Earth-Based Materials for Third World Housing

London: Earthscan Publications

100 pp. Ref.

Contains country surveys on the use of mud in low-income housing construction to demonstrate the potential of earth-based architecture in a variety of climates and cultures. Points out that with rising prices for conventional construction materials such as cement, mud as a traditional building material may gain in importance again, in particular if construction techniques are improved.

Low-cost Construction for the Urban Poor

The Urban Edge, May 81 Issue (Vol. 6, No. 5)

4 pp.

Issue noting new publications and projects on the subject. Particular attention is paid to the work of organizations that undertake a useful combination of research, publications, and programs in developing countries.

See also: Appropriate/Intermediate Technology Information Sources - General
C. APPROPRIATE/INTERMEDIATE TECHNOLOGY INFORMATION SOURCES - GENERAL

BRAND, Steward (ed.)
The Next Whole Earth Catalogue: Access to Tools
New York: Random House, 1980

Guide to basic information, resources, tools, and skills for self-sufficient and ecologically-aware lifestyles.

CARR, Marylin
Economically Appropriate Technologies for Developing Countries - An Annotated Bibliography (Intermediate Technology Development Group publication)
London: ITDG, 1981
123 pp. (308 citations)

Selected publications on intermediate technologies. Intermediate technologies are considered cheaper and more labor-intensive than high technology, and in many cases more efficient than traditional methods. Gives reference lists to intermediate technologies in agriculture, low-cost housing and construction, and infrastructure. Lists of background readings, technical handbooks, and bibliographies.

DARROW, Ken, KELLER, Kent, and PAM, Rick
Appropriate Technology Sourcebook - A Guide to Practical Books and Plans for Village and Small Community Technology
Stanford, California: Volunteers in Asia
Contact: AT Project, Volunteers in Asia, Box 4543, Stanford, CA 94305

Abstracts of a wide range of published technical information and background reading. Selected material is primarily oriented towards small-scale technology activities in poor countries. Volume II includes new topic areas: forestry, aquaculture, nonformal education, small enterprise and transportation.

McROBIE, George
Small Is Possible (A Factual Account About Who is Doing What, Where, to Put into Practice the Ideas Expressed in E.F. Schumacher's "Small Is Beautiful")
332 pp. Ref.

Describes the formation and work of the Intermediate Technology Development Group and its counterpart organizations overseas, and the activities of alternative technology movements in Britain, the U.S.A. and Canada. The common goal of these groups is to create lifestyles
and technologies "on a human scale" that are low-cost, sparing in their use of resources, non-violent to nature and therefore sustainable. Includes Schumacher's last talk on appropriate technology for the industrialized countries. Annotated background reading list for appropriate technology in developing countries and list of organizations and information sources.

U.S. DEPARTMENT OF COMMERCE (National Technical Information Service)
Appropriate Technology Information for the Developing Countries - Selected Abstracts from the NTIS Data File
484 pp. (approx. 2,500 citations)
Contact: Terence L. Lindemann
NTIS, Office of International Affairs
5285 Port Royal Road, Room 306 YT, Springfield, VA 22161

Abstracts of publications on smaller-scale, labor-intensive, and low-cost technologies, both revived traditional and modern ones. In the context of this bibliography, appropriate technology is defined as information which can be adapted and applied to directly improve the quality of life of low-income groups.

(P) AID RESOURCES REPORT
Published by U.S. Agency for International Development
Contact: AID Resources Report, Room 209, SA-18, Bureau of Science and Technology, Washington, D.C. 20523

Bi-monthly report identifying and describing promising approaches to development. With focus on projects and research involving decentralized development and appropriate technologies.

(P) APPROPRIATE TECHNOLOGY
Intermediate Technology Publications Ltd.
Contact: ITDG, 9 King Street, London, WC2E 8HN, U.K.

Quarterly on issues, projects, and research relating to appropriate and intermediate technology in industrialized and developing countries.

(I) SOCIALLY APPROPRIATE TECHNOLOGY INFORMATION SYSTEM (SATIS)
Contact: TOOL, Mauritskade 61a, 1091 Amsterdam, Netherlands
or: Office of Science and Technology, The World Bank

International association and information exchange system for appropriate technology. Information is classified under the headings: man and society; energy and power; water and sanitation; agriculture, forestry, and fisheries; food production; manufacture and services; building and construction works.
SATIS also publishes updated selections of appropriate technology publications. (Working languages: English, French, and Spanish).

(P) TRANET - Transnational Network for Appropriate/Alternative Technologies
P.O. Box 567, Rangeley, ME 04970
(Quarterly)

"A newsletter/directory of, by and for those individuals and groups around the world who are actively developing Appropriate/Alternative Technologies." Contains annotated bibliographies on AT.