

SOCIAL ORGANIZATION FOR SUSTAINING RENEWABLE RESOURCES

by

Richard B. Norgaard

with

Suzanne Easton, George Ledec, and Laurel Prevetti

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	3
EXECUTIVE SUMMARY	4
1. THE NATURE OF THE ORGANIZATIONAL PROBLEM AND GENERAL RECOMMENDATIONS	10
2. NATIONAL PLANNING AND SUSTAINABLE DEVELOPMENT	37
3. AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS	50
4. ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS	64
5. ROLES FOR INDIGENOUS ORGANIZATION AND KNOWLEDGE	88
APPENDIX: A REVIEW OF ORGANIZATION THEORY	104
BIBLIOGRAPHY	124

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We reviewed the phase one environmental profiles for many countries. The profiles have been funded by U.S.A.I.D. and assembled by various groups in different countries. They provided a wealth of background information which has complemented our own experience with environmental problems and their resolution in developing nations.

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

During the past decade the gains from modern agricultural techniques have been limited by high energy costs; the demand for fuelwood and farm land has resulted in rapid deforestation; and the failure of agricultural modernization in Africa has contributed to famine and environmental degradation. The coincidence between these and other related phenomena has generated a mandate for a major redirection of policy toward sustainable development. Such a shift will entail significant innovations in social organization to maintain renewable resources and to develop and manage renewable resource systems in ways which promote development.

Renewable resources include living species, physical matter such as air and water, and complementary characteristics of the environment such as groundwater basins. Renewable resource systems range from the complex of microbes in a shovel of soil, to the flows of the hydrologic cycle, to the dynamics of our atmosphere. These systems intertwine many components; they have complex, dynamic responses to human intervention; and many are evolving at noticeable rates. For these reasons our knowledge of them will forever be incomplete. This has led ecologists concerned with renewable resource management to favor an adaptive approach that relies on small changes, close

EXECUTIVE SUMMARY -

monitoring, learning, and constant adjustment of the management strategy. This approach to working with the complexities of renewable resource systems parallels the "learning process" approach now so frequently advocated for dealing with the complexities of social systems. "Blueprint" design and "manuals" for management presume a well known, unchanging world. Such is less and less the case as we make the necessary shift from managing parts to managing systems.

While science does not provide universal principles for systems management, the various disciplines, the field knowledge of resource managers, and the cultural knowledge of indigenous and rural peoples do provide insights into system dynamics and the possible consequences of alternative interventions. Better management will come through juxtaposition and consideration of the diverse insights available to different scientists, managers, and people looking at renewable resource systems from different perspectives. Thus we conclude that achieving sustainable development will require strong agencies in the field capable of arguing with each other and with strong agencies at the national level, strong non-governmental organizations ready to argue with each other and the government, and strong indigenous and rural peoples capable of arguing with those who perpetrate the follies of modernization along with the improvements. The strength of each of these social units, however, must be balanced with an ability to listen, interpret, synthesize new strategies, and change.

The juxtaposition of points of view has long been an important part of the Western tradition of democratic decision-making. However, in most models of social decision-making, especially those of economics, debate reinforces social values and emphasizes the pros and cons of specific objec-

EXECUTIVE SUMMARY

tives. How things are and can be are conceptually treated as questions of fact best left to scientists. But in reality, debate in the democratic process has always been over what we know about how things are and can be as well as over objectives. The management of complex systems has been improved through the debate between scientists of different disciplines, between scientists and resource management professionals, between administrators of different agencies, and between indigenous, rural, and urban peoples. We argue that this process of debate over "the facts" between peoples who by training and culture understand the world differently should be strengthened and formalized.

Much of the applied literature on organization for development as well as the perception of organizational issues within bureaucracies themselves is about a decade behind the theoretical literature. The earlier literature emphasized how the rational behavior of the individual in the organization was affected by agency structure, mandates, and incentives. The more recent literature emphasizes the behavior of the organization as a whole rather than the behavior of individuals, how each organization evolves its own ways of perceiving and understanding, and the conflicts between the culture and knowledge of different organizations.

Along with these changes, the theoretical literature is rapidly moving away from the "positive" or "objective" methodology of the natural sciences toward an interpretive/contextual epistemology. This more recent theoretical understanding of knowledge and social organization complements the process of debate as a policy design strategy. Recognition of an interpretive/contextual epistemology would enhance the adaptiveness of bureaucracies to new circumstances and would improve how agencies work together.

EXECUTIVE SUMMARY

Applied studies of social organization for development have identified adaptiveness and articulation as key factors limiting the implementation of complex policies and projects. The new theoretical literature suggests how these limits might be overcome.

This discussion paper consists of five sections and a supporting appendix. Section One introduces the major conceptual issues, describes the state of the art, and presents general recommendations with respect to training and the funding of organizational change. Section Two addresses ways to strengthen the capabilities of and information available to economic planners so that the complexities of sustaining renewable resource systems can be addressed in the course of setting overall development policy. Section Three addresses how agencies with resource management responsibilities might be restructured and bolstered. Section Four discusses how non-governmental organizations can enhance the activities of governmental agencies by providing expertise, political support, and monitoring services, and occasionally acting as intermediaries and direct participants. Section Five describes how indigenous and rural peoples with their cultural knowledge and technologies that have evolved to fit local conditions can contribute to organizing for sustainable development. The appendix presents a review of developments in the theoretical literature, juxtaposing the implications for social organization of the older and newer literature. The paper ends with an extensive bibliography.

The international assistance agencies can help guide the evolution of social organization toward sustainable development in very important ways. The following specific recommendations are presented to help focus discussion within the international assistance agencies on possible courses of action and to serve as a checklist in preparation for their negotiations

EXECUTIVE SUMMARY

with developing countries. The recommendations are elaborated upon in the sections indicated by their respective numbers.

The international assistance agencies should:

1.A. recommend that developing nations restructure their agencies so that renewable resource and environmental protection units are higher in the chain of command.

1.B. encourage and provide assistance for the preparation of national conservation strategies.

1.C. sponsor more training programs in environmental protection and renewable resource management. New and/or expanded programs and facilities should be funded which combine adaptive training and research programs.

1.D. encourage the development of new curricula in the areas of science and government for elementary through high school students which stress the underlying sources of sustainable development and social processes of obtaining sustainability.

1.E. help developing nations find secure funding for the transition in social organization necessary for sustainable development.

1.F. promote programs for environmental rehabilitation.

2.A. encourage developing nations to include individuals with renewable resource management and environmental protection expertise on the boards and staffs of national planning agencies.

2.B. encourage developing nations to establish offices of renewable resource systems and technology assessment.

2.C. encourage developing nations to adopt laws and administrative procedures which ensure that environmental agencies participate in the project planning process at the earliest stages.

2.D. take the lead in the development of environmental accounting techniques, provide training programs and technical assistance, fund the initiation of environmental accounting programs, and sponsor a "clearinghouse" for the exchange of experience and expertise between countries.

2.E. promote the development of planning methodologies which link economic and renewable resource system information.

3.A. encourage developing nations to consider establishing environmental units within all relevant agencies in order to improve coordination between agencies, enhance the adaptability of agencies to renewable resource management opportunities, and reduce the likelihood of making environmental mistakes.

EXECUTIVE SUMMARY

- 3.B. pursue with developing countries the possibility that decentralization of decision-making power will promote sustainable development.
- 3.C. discuss with developing nations whether their organizational structure has sufficient redundancy to provide alternative interpretations of appropriate renewable resource management and avoid irreversible mistakes.
- 3.D. improve how agencies work together through developing and disseminating a richer understanding of the nature and behavior of organizations.
- 3.E. encourage sustainable development by working with resource management agencies to help them develop on-going adaptive management approaches.
- 4.A. work further with NGOs to give them additional legitimacy, enhance their capability, and assist in their funding.
- 4.B. look for opportunities to combine the unique strengths of conservation and development, international and national, NGOs as sources of technical expertise and as intermediaries who can adopt the learning process approach and work with local peoples.
- 5.A. provide arrangements with indigenous peoples as part of the development project.
- 5.B. incorporate the objectives, knowledge, and talents of tribal peoples in development projects as part of an overall strategy to sustain natural resources and their utilization.
- 5.C. improve the technical and cultural training of extension workers to foster the exchange of knowledge with tribal peoples regarding sustainable natural resource management techniques and supporting social organizations.
- 5.D. encourage institutional linkages between tribal peoples and research organizations to facilitate the flow of scientific and indigenous knowledge.
- 5.E. with developing nations in establishing legal tribal land rights.
- 5.F. foster cultural pluralism as an objective within the larger goal of sustainable development.
- 5.G. assist nations work through conflicts between tribal peoples and central governments.
- 5.H. work with central governments and tribal peoples to discover and emphasize common goals.
- 5.I. maintain linkages with indigenous groups through frequent use.

**THE NATURE OF THE ORGANIZATIONAL PROBLEM
AND GENERAL RECOMMENDATIONS**

The institutional dimension of project analysis -- like the social dimension -- has until recently received less attention from development practitioners than the technical, economic, and financial ones. Less is known about what does or does not work in particular circumstances. There is no outside body of established knowledge on which to draw, and there are few reliable and readily transferable institutional models from either developed or other developing countries, especially in circumstances of rapid economic and social change. Developing countries and aid agencies, including the World Bank, have had to invent and adapt institutional solutions to suit conditions that are often demanding. In some countries -- particularly in sub-Saharan africa -- the failures and mistakes threaten to outweigh the lasting successes.

Baum and Tolbert (1935:499)

1.0 INTRODUCTION:

The acceleration in the adoption of energy-intensive, green-revolution agriculture coincided with the rise in petroleum prices. The advantages of 'high-tech' agriculture for many countries were offset by increased difficulties with trade balances, debt repayment capacity, and global interdependencies. The petroleum crisis also highlighted a fuelwood, deforestation, and soil erosion crisis. After decades of development effort by national governments and international agencies, African peoples are less able to feed themselves due to desertification and other mismatches between their social and environmental systems. These dramatic phenomena have led to a awareness in both the developed and developing world of the importance of sustainable agricultural systems. There is a growing consensus that sustainable interaction between people and their environment must be the first criterion of successful development.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Sustainable development is an interaction between people and their environment which provides a high and equitably distributed level of well-being to current generations without jeopardizing the potential for similar levels of well-being for future generations. This definition has the following implications.

1. Although it is impossible to predict with precision the likely interests of future generations, it is prudent to assume that their need for soil, water, forests, fisheries, plant and animal species, energy, and minerals will not be markedly less than our needs. Therefore, adhering to a policy of sustainable development implies using renewable resources in a manner which does not diminish their usefulness to future generations.

2. Depletable, or non-renewable, resources should be used in a manner which does not preclude easy access to them by future generations. For example, it will be easier for future generations to make use of today's scrap metal if it is recycled than if it is dumped as waste in a dispersed manner.

3. Depletable energy resources should be used at slow enough rates or in deliberate patterns so as to ensure an orderly transition to renewable energy resources -- direct solar, wood and other biomass, wind, hydroelectric, and other indirect solar sources -- when depletable energy resources become scarce.

This discussion paper only directly addresses the first implication with respect to sustaining renewable resources though many of the arguments and recommendations are also relevant to the second and third implications with respect to non-renewable resources.

Our understanding of how renewable resource systems function and respond to human intervention is relatively undeveloped. Modern agricultural technologies have increased production in the past by supplanting natural nitrogen fixation mechanisms with fertilizers and by overriding natural pest control systems with chemicals. The production of both fertilizers and chemical pest controls have largely depended upon the use of limited stock resources. These technologies have depressed, and sometimes

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

destroyed, the renewable resource services upon which agriculture was dependent in the past. The transition to sustainable development will involve reducing these negative effects of modern technologies, returning to some traditional uses of renewable resource services, and finding new ways to manage agroenvironmental systems to enhance their productivity. A systems approach will be required.

The need to pay attention to the complexities and dynamics of renewable resource systems follows on a decade during which the international development agencies have put increased emphasis on social systems. The efforts to assist the poorest of the poor, the shift from depending on "trickle down" to an emphasis on providing basic needs, and the increased interest in rural development and the possibilities for less centralized administration have led to a greater understanding of how social organization affects the course and pace of development. Now, along with this increased attention to and entanglement with the complexities of social organization, development agencies must also become increasingly aware of and entangled both with the complexities of environmental systems and the dynamics of systems interaction. Neither the importance nor the difficulties of this challenge should be underestimated.

This paper addresses the merger of the concern with appropriate institutions for development with the concern for sustaining renewable resource systems. Within this intersection, the questions are many and varied:

Are there general forms of social organization which enhance the likelihood of and possibilities for sustainable development based on renewable resources?

Can specialized resource management agencies be effectively linked so that their efforts are complementary, or should agencies with mandates across numerous resources be encouraged?

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

How do the incentives of decision-makers to promote sustainable development change with different forms of bureaucratic organization?

Must we 'tradeoff' the benefits of decentralized agencies -- which can fine tune their efforts to local environmental and social conditions -- against the benefits of centralized agencies -- which can enhance complementary effects and control negative effects between projects? Or is there a way to articulate local and central control so as to capture the benefits of both?

How do the conditions needed to attain sustainable development affect the optimal division between the roles of government and the roles of private enterprise?

Under what conditions might environmental 'watchdog' agencies be especially effective? Can non-governmental organizations be encouraged to monitor and critique the use of Third World environments along the lines they do in the United States and Europe?

Can the cultural knowledge of indigenous peoples about crop and wildlife management be utilized to enhance renewable resource use?

How can sustainable development objectives and information be incorporated at the level of national planning?

Can institutions be devised which will encourage individual countries to pick courses of development which are globally not only sustainable but complementary?

Further questions about social organization for sustainable development can be elaborated much more quickly than answers emerge. Soon, one realizes that questions of social organization must also be addressed in conjunction with other issues such as land tenure and fiscal policies. While we suggest some tentative answers in this paper, our primary objective is to promote constructive discussion within the international assistance agencies and between the agencies and developing countries. To this end we 1) summarize the most important characteristics of our existing knowledge of renewable resource systems management and of the strengths and weaknesses of existing institutions in developing countries, 2) scope out the nature of the organizational questions, 3) present insights from the theoretical literature, 4) suggest profitable avenues for research and experimentation, and 5) otherwise set the stage for the process of discussion. It is through the process

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

of discussion and experimentation that better policies for the sustainable development and management of renewable resources will emerge.

This paper is based on the following general premises about renewable resources, existing institutions, and organization theory:

1. Our Knowledge of Renewable Resources and their Management. a) Renewable resources must be managed in the context of the complex systems of which they are a part. b) Renewable resources range from the smallest microbes to the global stocks of water and oxygen. Systems range in size from the biological and physical interactions in soil to the atmospheric system that encompasses our planet. c) While the science of ecology has determined numerous principles to reduce the likelihood of damaging renewable resources, much less is known about how to work with renewable resource systems to capture their potential contribution to development. d) Given the complexity of renewable resource systems and the specialized nature of Western knowledge, the transition to sustainable development will depend upon an "adaptive" or "learning process" approach.

2. Characteristics of Existing Social Organization. a) Third world nations have evolved development agencies, legal institutions, and social infrastructure based on economic theories of growth as capital accumulation, the expansion of trade, the adoption of modern technologies, and the use of hydrocarbons and other stock resources. b) Existing agencies to protect environmental systems will need strengthening. c) Few existing agencies are well suited to the tasks of promoting sustainable development through the management of renewable resources. d) The public sector in most developing countries is already large. e) Thus organizing for sustainable development will be a process of gradually modifying the nature of existing institutions rather than simply adding on new features.

3. The Role of Organization Theory. a) The dominant conceptions of how organizations should be designed and should operate are rooted in the rational, efficient use of objective knowledge. b) The "adaptive" approach to ecosystem assessment and management complements the emerging "learning process" approach to knowledge and social organization. c) The flexible organization indicated by the "adaptive" or "learning process approach" will conflict with the more rigid structures and behavior justified by objective theories of knowledge.

1.1 OUR KNOWLEDGE OF RENEWABLE RESOURCES:

Renewable natural resources include individual living species (plants, animals, and microbes), ecological systems (the various patterns of inter-

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

action between different species that make up grasslands, tropical rainforests, etc.), and environmental systems (particularly soil, water, and air). These resources sustain life and are self-renewing if not overexploited or otherwise mismanaged. The benefits of renewable resources include many essential commodities (food, fuelwood, and clothing and construction materials) as well as many services (flood and erosion control, the maintenance of a balance of oxygen and nitrogen in the atmosphere, and climate regulation). Our concern with renewable resources, therefore, extends from the services of the smallest microbes to those of the atmospheric system that encompasses us. Furthermore, these extremes are interconnected. Social organization for sustaining renewable resources will in some sense have to match the scope and interconnectedness of renewable resources themselves. This is the ultimate challenge.

The production of many commodities and renewable resource services depends on ecological interactions that are often poorly understood because they are extremely complex. For example, successful Brazil nut (*Bertholletia excelsa*) production requires the presence of enough natural forest to protect the nesting habitat of Euglossine bees, seasonally essential bee food plants, certain orchids and the trees upon which they grow, the insects or humming birds that pollinate the orchids, and large forest-dwelling rodents known as agoutis (World Bank, in press).

Purchased inputs and management substitute for some renewable resource services for the crops now grown in modern agricultural systems. But these inputs are becoming more expensive and other inputs are still only supplied through renewable resource services. For many of the crops that are best adapted to the marginal environments of the Third World, modern substitutes for renewable resource services have not been found because of the complex-

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

ity of the ecological system within which these crops evolved.

While we must address the global interconnectedness of renewable resources, we must look to the most important interactions to guide the design or evolution of social organization for sustainable development. The interconnectedness can be broken into systems, bounded by a geographic area or environmental media, within which important interactions are concentrated. Interactions do, of course, occur between "systems", or within even broader regional, national or global systems. Boundaries will not be precise and will be affected by which interactions we value as "important", or on which we are concentrating our efforts because we know they exist or because we have means to manage them. These boundaries change, of course, as we learn more about interactions and the impacts of our intervening in them and as development objectives change. Ultimately, a "renewable resource system" is a human construct and should ideally be defined in the context of the social organizations affecting how a society interacts with "the" renewable resource system.

The complexities of most renewable resource systems are not well understood. While each system is made up of components which obey the laws of physics and chemistry, the numbers of ways that these could combine to form organisms and the numbers of ways that organisms could interact in renewable resource systems are effectively infinite. Nutrient flows and storage systems differ dramatically, for example, between grasslands, tropical rainforest, estuarine, and coral reef systems. For this reason, Western science has generated only a few "principles" of renewable resource system management, and even these are contested. Science does provide a methodology for acquiring knowledge about each system. But given the unique evolutionary

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

histories of each renewable resource system, science will probably never derive universal principles of management. Western science has proceeded through the understanding of parts of systems as if they functioned independently. The challenges of renewable resource development and management, certainly the difficulties we have had to date, have been strongly rooted in the fact that the parts are connected into systems which are connected to larger systems.

Ecological principles for development have been formulated and disseminated through the International Union for the Conservation of Nature (IUCN) and other organizations for more than a decade (McEachern and Towle, 1975; Odum, 1976; Poore, 1976; Dasmann and Poor, 1979; IUCN, 1980). The World Bank has adopted policies and procedures for environmental protection (World Bank, 1984) and an operational policy on the protection and management of wildlands (World Bank, 1986). Other international development agencies have adopted their own environmental regulations that are grounded in current ecological knowledge. Similarly, most developing countries now have environmental policies that guide development. These policies reflect, however, the fact that existing ecological knowledge applicable to development is heavily weighted toward the prevention of environmental damage and species loss. These policies will substantially reduce the damage to renewable resources associated with development driven by stock resources.

It is constructive, however, to distinguish between organizing to prevent damage to renewable resources and organizing for development through the use of renewable resources. Given existing development strategies, prevention is necessary to maintain options for using renewable resources in the future. At the same time, because development within areas unsuitable

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

to Western technologies is becoming more pressing and stock resources are becoming depleted and more costly, the transition toward sustainable development based on renewable resources should be initiated now.

Our inability to comprehend the full nature of systems, especially evolving systems, a priori has led both ecological and social scientists concerned with design and management along a similar path of argument. Ecologists have advocated an "adaptive" approach to ecosystem assessment and management (Holling, 1978; Walters, 1986), while social scientists have argued that organization and management must evolve through a "learning process" (Korten, 1980; Johnston and Clark, 1982). Deliberate innovation, monitoring, knowledge accumulation, and social adaptation will be necessary for this evolution to occur. The social learning, or adaptive process must take place locally to regionally to work with the peculiarities of individual resource systems. But the process will also have to occur at the national level to monitor, manage, and adapt to the changes in the broader interactions between systems.

New interactions, however, should be introduced to parts of the system gradually and should be carefully monitored. Renewable resource systems exhibit irreversibilities such as extinction, soil compaction, or the pollution of ground water tables. The existence of irreversibilities also has important general organizational implications. Rules of action within organizations must emphasize the importance of proceeding gradually, monitoring change, and being cautious. The "burden of proof" must be on those who advocate large scale change quickly. Small scale change, meanwhile, is essential for learning. Oversight responsibility for changes wrought by local and regional agencies should be given to national agencies which can

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

question whether too many similar changes are not being introduced across similar renewable resource systems such that species extinction or other irreversible phenomena are likely.

Both renewable resource management and renewable resource development entail choosing between renewable resources. Management entails favoring some resources over others. Transformation entails changing to a new system that is sustainable. In each case, some resources will be lost within the area managed or transformed. If these are endemic (unique) to the area, both management and transformation can result in irreversible losses. Sustainable development does not mean keeping all renewable resources intact. On the other hand, the opportunities for further development -- through combining resources in new ways and learning from how nature has combined them in the past -- are reduced every time renewable resources are lost.

1.2 KEY CHARACTERISTICS OF SOCIAL ORGANIZATION IN DEVELOPING NATIONS:

Effective discussion of organizational change must start with a common understanding of the nature of existing social organization. While organization differs significantly from one developing country to another, three phenomena are "generally" true. First, most developing countries have a large public sector that is already intricately organized and heavily staffed. Second, very few developing countries have agencies with long, continuous histories. Most developing countries are young and the institutional histories of the older developing countries are typically tumultuous. Third, much of the institutional development that has occurred has been designed around existing theory and/or evolved in the context of other national and global institutions.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

These general phenomena have several implications. The installation of appropriate organization for sustainable development will not be a process of simply "filling out" the public sector in ways appropriate to the objective. Organizations will have to change. To a considerable extent agencies have been designed and linked with other agencies based on, or at least justified by, previous theories of organization for development. This means the incongruities between these theories and those supporting sustainable development will have to be confronted. To a considerable extent, resource planning and management agencies have evolved in the context of other national and global institutions. Thus, these broader historical linkages will have to be addressed.

Institutional evolution to date in the Third World has been most heavily influenced by economic theories of development. Most countries have strong institutions affecting the accumulation and use of capital because economic theory has emphasized development as a process of capital accumulation and deployment. Similarly, development has been portrayed as a process of capturing the gains from exchange; hence, most developing countries have encouraged the development of markets and directed the gains through trade and price policies. Agricultural institutions reflect the understanding of development as a process of adopting modern technologies and inputs. The strength of educational systems in the Third World reflects beliefs in how education affects productivity. None of these conceptions of the processes of growth and concomittant institution building reflected a commitment to unsustainable growth. Nevertheless, institutions have been designed, become entrenched, and are justified through understandings of development which did not address the sustainable management of renewable resources and hence may hinder sustainable development.

Our understanding of development through the sustainable use of renewable resource systems differs markedly from earlier understandings of the processes of development. Sustainable interaction with renewable resource systems involves the labor intensive activities of monitoring, research, learning, planning, and management over long time periods. Sustainable development will not be attained simply by establishing mechanisms to foster the accumulation of capital and directing it toward desirable sectors. Sustainable development will not be attained simply by implementing the right physical or even institutional infrastructure. Sustainable development will not be attained simply by getting exchange rates right. There are no "tricks" or "take-offs". Sustainable development entails sustained interaction -- continual monitoring, learning, planning, and reorganizing so that social organization and renewable resource systems coevolve along a path with favorable outcomes for people.

This means that attaining sustainable development will not be a single search for the right social organization but an ongoing process of searching and reorganizing.

The international assistance agencies have acquired significant experience with conceptual incongruities and organizational gridlock through their participation in the planning of projects to help the poorest of the poor. The discussion within the agencies and between the agencies and developing countries must, and fortunately can, at least be based on a common understanding of existing theory and institutional structure. But the discussion should be undertaken with an understanding that there is no clear theory for organizational solutions to sustaining resource systems. Change takes considerable time. Neither most improvements nor most mistakes

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

will be immediately obvious. Some organizational changes will be easy to identify and implement. Yet, for the most part the discussion over organization for sustainable development will be an ongoing, pragmatic process rooted in a common understanding of how existing institutions succeed and fail. Considerable research will be necessary over the coming decades on how institutions affect sustainability much the same as there has been on institutions for reaching the poor.

Different agencies in developing nations can further sustainable development by concentrating on one or more activities: research, education, planning, coordination, and management. These activities can be directed to resource and system protection or transformation or to the production of goods and services while sustaining key resource and system properties. Some agencies will specialize in but one or two of the activities. Others will engage in many of the activities for several of the ends, though usually only with respect to particular resources or regions.

Many developing countries have agencies operating in the familiar "middle ground" of renewable resource management. The existing practices of forest, range, soil, and water management have emphasized particular objectives -- wood production, pasture maintenance, the prevention of soil erosion, and the allocation of water. Some of the resource management agencies in developing countries, for example, the forestry agencies in India, are strong and well staffed. But even relatively strong resource management agencies are typically weak compared to the resource development agencies. In Costa Rica, for example, the Costa Rican Electrical Institute recently undertook hydroelectric feasibility studies along the Pacuare River which is under protected status. The hydroelectric development agency did not

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

request permission from the Forestry Department to clear virgin forest for the study, but went ahead and logged anyway (International Dams Newsletter, 1986). Most management agencies, however, are politically weaker than the Forestry Department in Costa Rica.

For some time, much of the concern with renewable resource management will concentrate on forest, range, soil, and water management where it has not been done before and doing it better where it has been. But these familiar forms of management all refer to easily visible, individual resources of importance to immediate and near-future users. Much of the institutional challenge in the future will be related to the difficulties of extending management from these resources to the interconnections between them. Forest management, for example, can affect the quality and pattern of water supplies, the productivity of fisheries, and the use of floodplains. Management also needs to extend into the intricacies of maintaining renewable resource services of soil micro organisms and out to the complexities of maintaining the global environment.

Many developing countries have established agencies devoted to pollution control, wildland conservation, and other types of environmental protection activities (Baum and Tolbert, 1985; World Bank, in press). Very few agencies, however, are adequately staffed, equipped, or financed in view of the magnitude of their tasks. These agencies also often lack the political influence necessary to enforce adequate natural resource protection. Protected areas in the Amazon, for example, have been little more than lines on the map.

Renewable resource systems can also be developed. Successful agricultural development prior to the introduction of chemical fertilizers and

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

biocides was a process of ecosystem transformation that favored people. Not all historical agroecosystems were sustained. The development of paddy rice over much of Asia, however, was an unusually successful transformation that enhanced nutrient recycling and retention, dramatically reduced competition from weeds, and resulted in far higher yields per unit area than the agricultural systems before paddy.

Many recent agricultural transformations have not been sustainable because of their location, planning, or management. Marginal lands have been developed which are too steep, dry, or infertile. Irrigated land has been lost through salinization because drains were not installed as a part of the initial transformation. Inappropriate crop choice and soil management practices have accelerated soil erosion. Crop loss due to insects has been accentuated through poorly thought-out pest control strategies. Sustainable agriculture entails more working with nature than has typically been the case.

If the options for increasing, or even maintaining, yields through the importation of energy into agricultural systems diminish, development will increasingly depend upon successfully transforming agricultural systems to states that can be maintained through human effort and energy from the sun without importing energy or materials into the system. This has not been the case for modern agriculture. Quite the contrary, through the use of manufactured inputs, natural processes and associated renewable resource services have been overridden and lost rather than enhanced. The transformation to truly sustainable agriculture capable of supporting current and foreseeable population levels will require a substantial redirection and acceleration of agricultural research.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Ecosystem development is a risky process. The uncertainties are only partly reduced through the application of Western scientific knowledge due to its emphasis on the nature of the parts of systems. Indigenous peoples, however, have successfully transformed and maintained sustainable agroecosystems. They did so slowly over centuries in a process that can only be described as "learning-by-doing". The uncertainties can be reduced through the maintenance of reserves in some parts of the system, through learning from how both natural systems and indigenous agricultural systems have evolved, through the development and introduction of new biotechnologies designed to be components in sustainable systems, and through proceeding slowly and cautiously and monitoring the changes

There are few agencies which think of themselves as engaged in renewable resource development. Water agencies, for example, are usually not appropriately staffed to design sustainable transformations. They need more planners with training in soil science, forestry, and agronomy, and perhaps fewer planners with training in structural engineering, to design watershed management strategies to maintain reservoirs and irrigation and drainage schemes to maintain soil systems.

While the protection, management, transformation, and coordination are the primary objectives of resource agencies, other agencies affecting the sustainability of renewable resources may be primarily set up as monitoring, research, educational, oversight, or enforcement agencies. As such, they provide assist resource agencies by providing supporting services. The coordination of their supporting services is frequently difficult. Support agencies frequently assist a variety of other organizations with diverse objectives. It is difficult, for example, to put sustainability on the already overcrowded agenda of the school system. Extension workers find

that farmers are more interested in changes which bring early returns in their own incomes than in improvements which sustain production over the long run for all. Support agencies, like resource agencies, develop their own clientele with immediate objectives. Thus coordinating support agencies for social organization for sustaining renewable resource systems is especially difficult.

1.3 THE ROLE OF ORGANIZATION THEORY:

Theories of social organization affect how we design and implement social systems. For half a century, theorists built upon Weber's conception of bureaucracy as a machine, elaborating upon the conditions and processes which allow officials to efficiently meet their mandates or distract them from the same. Interest group pluralism has been grafted to the machine image making mandate formulation a dynamic process in which the bureaucrat participates. This literature emphasizes the individual official and how agency structure and political conditions affect his or her incentives to make different decisions. Most of the studies on social organization for development apply this realm of theory to specific circumstances. Heaver (1982) presents an excellent review of this realm of theory and its application to development.

Social theory also, however, evolves with practice. During the past two decades the machine image has been supplemented by images of agencies as organisms, cultural systems, political systems, 'brains', and evolving systems with aspects of all of the above. Many schools of thought associated with diverse images are addressing similar phenomena and concerns. The new literature stresses the environment of the organization evolves and affects

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

overall operation rather than how any given, static environment of the agency affects the decisions of individual officials. The more recent theory addresses the organizational nature of knowledge rather than presuming the of objective knowledge which officials access in accordance to agency structure and incentives.

A review of organization theory in the context of the issues of organizing for sustainable development is presented in the appendix to this report. The conceptual literature provides a fantastic lode of hypotheses which enriches the discussion but few clear answers which delimit the process. Though organizational theorists have not achieved a paradigmatic consensus comparable to that of neoclassical economics, they are also not a contentious bunch each arguing that their approach is the only appropriate one. Quite the contrary, most view the diversity of approaches as complementary means of acquiring insights into the complexities of social systems. In this light, the different schools of thought can be used to group and pursue different types of questions for the discussion of social organization for sustainable development.

1.4 GENERAL RECOMMENDATIONS:

Within the developing world, there is tremendous diversity in local cultures, traditional institutions, resource use systems, and environmental problems. It is therefore both difficult and risky to make generalizations about how institutions can be designed to promote sustainable development and made to function effectively. Nonetheless, some generalizations are possible, given the experience to date in efforts at natural resource management by developing country governments. The following recommendations and those provided in subsequent chapters are intended to serve as a "check-

list" or "menu" of institutional strengthening options that can be tailored to the particular needs of different national or sub-national governments.

The following general recommendations are designed to develop a culture or ethic of sustainability, the necessary consciousness and capability to achieve sustainable development. Each government official, whether involved in monitoring, learning, implementation, or oversight, should be constantly aware that sustainability is a key goal, continually asking whether it is being achieved, and constantly ready to adjust behavior to attain sustainability. Organizational culture and individual consciousness are not sufficient, but they are especially necessary where rigid decision rules should be avoided to maintain organizational adaptability. Where fixed mandates and rigid rules are not possible due to the complexity and changing nature of sustained renewable resource interaction, culture and consciousness are even more important.

These general recommendations follow from considerable conceptual and empirical work on how the organizational environment and culture affect how agencies function. To be sure, the effectiveness of organizations and individuals also depends on many other factors. But even if helping the poor is only informed by an understanding of the process as "trickle down", more will trickle under the guidance of agencies and individuals who keep this outcome as a priority and adjust their behavior accordingly. In this same manner, natural resource agencies will come closer to achieving sustainable development if sustainability is emphasized as an important goal of the organization.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Recommendation 1.A. The international assistance agencies should recommend that developing nations restructure their agencies so that renewable resource management and environmental protection units are higher in the chain of command.

The importance of sustainability as an additional objective can be emphasized through reorganization of the agencies so that renewable resource management and environmental protection units are at higher levels. Such a reorganization would give more power to the divisions within agencies that can best promote sustainability. For example, an environmental ministry might be created by those countries which currently only have their environmental unit within another ministry. Within the ministry of agriculture, a deputy ministry might be established to promote soil and water management. The environment ministry or equivalent should be strongly encouraged to monitor and publicize environmental trends. This work can greatly heighten the perception that environmental problems are serious among government officials and public opinion leaders. Once widespread awareness exists, policies to correct environmental problems become more politically feasible.

Recommendation 1.B. The international assistance agencies should encourage and provide assistance for the preparation of national conservation strategies.

Culture and consciousness can be altered through planning exercises. The development and maintenance of a national conservation strategy such as those promoted by the International Union for the Conservation of Nature and Natural Resources (IUCN, 1980) is an example of such a planning exercise. Developing such strategies can encourage people within each agency to think through how their activities relate to renewable resource management as well as how their success with renewables depends on the activities of other agencies. The development and maintenance of a national conservation strategy would necessarily entail coordination between agencies. It could be

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

undertaken with the assistance of non-governmental organizations. Legislative bodies could become involved in the review and discussion. Belize, Fiji, India, Ivory Coast, Nepal, the Philippines, Senegal, Seychelles, Sri Lanka, Thailand, Uganda, Zaire, Zambia, and Zimbabwe have been developing national conservation strategies (IUCN, 1984a). In the very large countries -- China, India, and Brazil for sure -- state or provincial conservation strategies should also be devised.

Many have argued that conservation strategies are just paper exercises. But it is because they are paper exercises that participation can be broadened from the usual lines of perceived authority; people from different agencies can interact with territorial power games being less important; and innovative thinking can take place. The development and maintenance of conservation strategies can help develop the organizational culture and individual consciousness of sustainability. The international assistance agencies have supported such nationwide environmental planning. The World Bank, for example, supported Indonesia's Environmental Sector Review as input for Repelita IV, the fourth national five-year development plan. The international assistance agencies can encourage such environmental planning processes in its member countries on a more or less systematic basis.

The international agencies should encourage developing nations to devise conservation strategies through their policy dialogues. The agencies can assist through the provision of expertise. In cases where the agencies are contemplating becoming involved in very large projects or sectoral work with significant environmental implications, it may be appropriate to make their participation contingent upon the initiation of a conservation strategy or an equivalent.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Recommendation 1.C. The international assistance agencies should sponsor more training programs in environmental protection and renewable resource management. New and/or expanded programs and facilities should be funded which combine adaptive training and research programs.

The lack of trained personnel is frequently a "bottleneck" which limits the effective functioning of agencies concerned with natural resource and environmental management in developing countries. This constraint is particularly severe in many African countries.

To achieve sustainable development, decision-makers and resource managers will have to be better trained in ecology and adaptive systems management. The agencies in the past have had a major influence on the level of training in the areas of agriculture, economics, health, and public administration through the provision of short courses, visiting faculty for schools in developing countries, and scholarships for graduate educations in the United States and Europe. The agencies have also assisted in the development of research and training centers in the developing countries. Similar training programs are now needed with an emphasis on ecological principles, systems thinking, organization theory, and policy formulation for sustainable development.

Resource management and environmental agencies in developing countries frequently find it advantageous to hire short-term consultants, often expatriates. A more appropriate long-term answer is to provide sufficient training in natural resource management fields, particularly applied ecology and other environmental sciences. While such training can be expensive, much of the cost is not recurrent, and investment in environmental training is less costly than many environmental mistakes. Mechanisms for providing environmental training include:

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

1. Relatively short technical training courses in relevant environmental management and assessment areas.
2. Scholarships for advanced training in applied ecology and other environmental sciences, overseas if necessary,
3. Using existing environmental professionals or expatriate consultants for on-the-job training of counterparts, and
4. Interagency loans of environmental personnel.

Existing training programs of the agencies can be complemented with new courses. The World Bank, for example, should support the development of curricula for economists and planners in sustaining renewable resource systems at its Economic Development Institute. The Tropical Agronomy Center for Teaching and Research (CATIE) in Costa Rica is a possible model. It has put more emphasis on the ecological basis of agriculture than other agricultural centers and successfully integrated research, teaching, and extension in a manner whereby all learn from each other. More universities can be augmented with programs such as the Institute of Environmental Studies (IES) at the University of Khartoum. IES integrates field work with development agencies, academic research, and graduate training. IES has facilitated cooperative studies efforts with international agencies, foreign expertise from Clark University in the United States, and researchers in Sudan (for example, Mohamed, Sammani, and Shadad, 1982; Khalifa, Ford and Khogali, 1985). There are many other examples of good, or potentially good, programs. They need to be expanded, used as models for programs in other countries, and strengthened in the area of adaptive systems management.

After having been trained, many environmental professionals choose to leave government work for more lucrative jobs in private industry or overseas. This happens despite the "loyalty oaths" which employees are sometimes asked to sign before their training begins. Attrition of this type

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

can be reduced by improving salaries in the relevant agencies. However, a certain amount of attrition is almost inevitable; agencies should therefore plan for it. It has been suggested that three persons should be trained for each one that is needed. Such redundant training can provide a positive externality to the private sector, if the trained staff leave government service but do not emigrate. Sometimes staff trained by environmental agencies leave for higher-paying jobs in other government agencies. While this can constrain the effectiveness of the environmental agency, it may improve the quality of the natural-resource related work of the other agency.

Recommendation 1.D. The international assistance agencies should encourage the development of new curricula in the areas of science and of government for elementary through high school students which stress the underlying sources of sustainable development and social processes of obtaining sustainability.

Over the long run, the most important step is to redesign various aspects of the elementary through high school curricula. Education should emphasize key characteristics of renewable resource systems, emphasize sustainability as a local, national, and global objective on which all depend, and teach science as a continual process of learning how to work with renewable systems rather than as the source of universal principles and technology that free people from nature or allow them to control nature. Similarly, public administration should be presented as a learning process. The international assistance agencies can assist in the development of new curricula through direct funding, loans, the provision of expertise, and assistance in the exchange of ideas between nations on curricula for sustainable development.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Recommendation 1.E. The international assistance agencies should help developing nations find more secure funding for sustainable resource management.

Expenditures on environmental protection and renewable resource management are largely recurrent in nature. They include salaries, basic supplies, fuel, spare parts, and other materials. Since recurrent cost financing is largely provided by governmental allocations, it is vulnerable to drastic cuts during times of financial crisis. Such crises are frequent, if not chronic, for many developing countries. Many resource and environment agencies are unable to function effectively because of insecure funding. Low salaries are also a problem. Ambitious and well trained personnel leave. Less honest employees are more susceptible to corruption. Poorly paid forest guards have been known to supplement their inadequate salary by taking bribes for illegal cutting.

In a variety of situations, renewable resource management and environmental protection agencies may be able to develop sources of financing which are independent of governmental budget allocations. For example, Kenya's Wildlife Conservation and Management Department obtains a sizable proportion of its budget from National Park entry fee revenues. In Colombia, Law No. 56 stipulates that 2 percent of all electricity revenues be automatically allocated for reforestation and watershed management expenditures. This requirement is based on the principle that since the electric power sector benefits substantially from the presence of well-vegetated watersheds above hydroelectric reservoirs, it should contribute to management costs. If environmental-economic linkages such as these are made more explicit to government officials, similar "automatic financing" mechanisms may arise in many other countries, in a variety of economic sectors. The international assistance agencies can help to elucidate these types of linkages and publi-

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

cize them through their policy dialogue.

Most renewable resource management agencies will still require annual governmental appropriations. If appropriations are disproportionately low, they reflect a major political statement on the part of government leaders that the work of these agencies is relatively unimportant. The international assistance agencies should emphasize their concern for stable funding for environmental protection and renewable resource management and assist developing nations in finding solutions to assure steady recurrent funding.

Recommendation 1.F. The international assistance agencies should promote programs for environmental rehabilitation.

Even if social organization for development increasingly enhances sustainability, mistakes -- even under a learning process or adaptive management approach -- will be made. Meanwhile, pollution incidents will occur for which "relief" action is needed quickly. Mistakes need to be corrected so that renewable resource systems which could support future generations are not lost forever. The international assistance agencies can put more emphasis within their own programs on renewable resource rehabilitation and encourage developing countries to establish a permanent capability to engage in short term environmental relief and long term rehabilitation.

The World Bank and the regional banks can play an active role in providing loans for renewable resource rehabilitation. In some cases, the performance of bank financed projects can be enhanced through the rehabilitation of land degraded because of the project itself. In other cases, deteriorated land in the project area limit the benefits gained from the project itself.

SECTION ONE THE NATURE OF THE PROBLEM AND GENERAL RECOMMENDATIONS

Whether investments in rehabilitation appear "economic" will largely depend on the discount rate used. Discount rates are high in part because of the preponderance of unsustainable investment opportunities which not only depend on non-renewable resources for their own operation but reduce the viability of renewable resource systems through pollutants and other side effects. As investments in unsustainable development projects are reduced, investments in rehabilitation will rank higher.

NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

2.0 INTRODUCTION:

Most developing countries have national level planning agencies which establish policies and issue directives with the aim of fostering and guiding economic development. Such plans and directives, however, rarely include objective of sustaining renewable resource systems. The relationships between sustaining renewable resource systems and the specific questions of trade, pricing, or even agricultural policies that national planning agencies typically address are not clear. And yet it is clear that the macro course of development somehow does affect how renewable resource systems are used. The linkages between national economic policies and the use of renewable resources need to become better known and addressed for sustainable development to succeed.

The policies and directives from planning agencies do not effectively address sustainable development for three reasons. First, central planning agencies are typically far removed from the agencies actually affecting resource use. Second, they have little or no information relating development policies to the sustainability of renewable resource systems. And third, the economic theory which guides them only provides limited insight into the interplay between renewable resources and development. The international development agencies can assist developing nations address these three problems of social organization.

2.1 EXPERTISE AT THE NATIONAL PLANNING LEVEL:

Recommendation 2.A. The international assistance agencies should encourage developing nations to include individuals with renewable resource management and environmental protection expertise on the boards and staffs of national planning agencies.

National planning agencies typically have staff who work with the agricultural, resource, and environmental agencies. Sometimes planning boards also include a spokesperson for one or more of these agencies. Frequently, however, planning agency representatives for the resource agencies are not resource managers themselves and are ill-equipped to identify the linkages between national policies and sustaining renewable resource systems. Thus there is still a great need to bring resource managers into the national planning process. Natural resource managers need more power to initiate aspects of national plans and policies that would promote sustainability and to veto aspects suggested by others which would work against sustainability. The international development agencies could pursue the possibilities for bringing the necessary resource management expertise into the planning process in their policy dialogues with developing nations.

National planning for sustainable development will only be possible if there is sufficient expertise within the national planning agency and adequate additional expertise in resource management and development agencies accessible to the planning agency. Recommendation 1.A. suggests the reorganization of agencies so that renewable resource management and environmental units would have directors at a deputy ministry level. These higher level positions should be staffed with individuals with renewable resource management or environmental protection expertise. This would give increased power within the agencies to those most concerned with and capable

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

of promoting sustainability. It would also give the national planning agency access to expertise at the top of the relevant agencies.

Recommendation 2.B. The international assistance agencies should encourage developing nations to establish offices of renewable resource systems and technology assessment.

The international development agencies should consider helping developing nations establish offices of renewable resource systems and technology assessment to advise the nation's executive office, legislature, and planning agency. Such an office, or offices, could advise on the sustainability of specific practices of the resource agencies, possibly superior organization, and the natural resource implications of trade and other "non-environmental" policies. The office could be modeled somewhat along the lines of the Office of Technology Assessment that advises the U.S. Congress and/or the Council on Environmental Quality that advises the President of the U.S. The National Environmental Secretariat of Kenya (Njenga, 1981) and the Presidential Commission on the Environment in Panama might also serve as examples. Assessment agencies could monitor how existing social organization and technologies are affecting the development and management of renewable resources. While these agencies should be advisory, they should advise at the highest levels of government so that they can take a macro look at social organization and how it might best evolve.

Recommendation 2.C. The international assistance agencies should encourage developing nations to adopt laws and administrative procedures which ensure that environmental agencies participate in the project planning process at the earliest stages.

While many developing countries have passed relatively strong laws related to environmental and natural resource management, these laws are

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

often not backed up by detailed, specific environmental regulations, guidelines, or administrative procedures for carrying them out. Though environmental agencies are frequently given authority to "clear" major proposed development projects, they often are not given an opportunity for major input until essentially all design work has already been done. With the design "set in concrete", the environmental agency can do little except to try to "kill" unusually bad projects, an action which is frequently unsuccessful but is always politically costly for the agency.

While various environmental agencies have had the opportunity to participate in the design of some projects at an early stage, the environmental agency in Colombia, INDIRENA, fairly consistently plays an active planning role. This has allowed the agency to tailor projects to reduce their environmental impact and to build features into projects so that renewable resources will be managed better by design.

2.2 ENVIRONMENTAL ACCOUNTING:

Recommendation 2.D. The international assistance agencies, in particular the World Bank, should take the lead in the development of environmental accounting techniques, provide training programs and technical assistance, fund the initiation of environmental accounting programs, and sponsor a "clearinghouse" for the exchange of experience and expertise between countries.

National economic planning in most developing countries is based on economic information maintained in a system of national accounts (SNAs). The World Bank and other development agencies have assisted countries in the development of their SNAs, the training of economists to work as planners with SNAs, and the elaboration of planning techniques that build upon the SNAs. The systems of national accounts, however, do not reflect the flow of

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

services of renewable resource systems, changes in the character of resource systems, or changes in the stocks of non-renewable resources. Furthermore, pollution control and other measures aimed at maintaining renewable resource services at earlier levels are treated as additions to production. Thus national economic planning is not only formally "blind" to the key parameters relating resources, environment, and development but also treats the costs of protecting renewable resource services as if they were final goods.

Renewable resource systems are not considered in the planning process in part because data on their services and condition are difficult to aggregate. Due to the incommensurability of environmental services and the "states" of renewable resource systems, there are no "scientific" solutions to this problem (Norgaard, 1985). Nevertheless, conventions for aggregation and use of environmental information are beginning to be established which can result in improvements in the planning process.

During the past few years the United Nations Environment Program and the World Bank's Office of Environmental and Scientific Affairs have jointly sponsored workshops to develop and disseminate techniques for environmental accounting. As yet, no rules for environmental accounting have been agreed to by the participants in the workshops. The meetings have, however, clarified the state of the art (Huetting, 1980; Peskin, 1981; Theys, 1984; Dixon and Norgaard, 1984; Norgaard, 1985; Repetto et al, 1985; and Serafy, 1985).

Some corrections to the SNAs could be initiated easily. The capital accounts, for example, could be augmented to include natural resource stocks. Alternatively, separate resource stock accounts could be kept for utilization in the planning process. For example, as a stock of petroleum is discovered, a value is placed on the stock and either added to the

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

nation's measure of capital or kept in a separate resource account. As petroleum is extracted, the resource stock value is depreciated. Clearly, when more oil is being used than discovered, the value of the stock is declining, reflecting how use today reduces options tomorrow.

The treatment of flow resources is more complicated. Expenditures for the maintenance of renewable resource services might be kept in separate accounts for special treatment in the planning process. Currently these expenditures are simply included in national income. In fact, they should be treated as a cost of keeping the flows available for the future. The World Bank could help develop new conventions of measurement and accounting so that the services of renewable resource systems are treated on a par with the services of labor or capital.

Very little effort has been expended to date in actually trying to link environmental information with the SNAs. Experience with the difficulties, opportunities to learn by doing, and a system of exchanging lessons between nations is desperately needed.

The international assistance agencies could also encourage developing countries to strengthen separate methods of maintaining environmental information either within economic planning agencies or in separate environmental agencies. If the latter, these should be strengthened and given more formal access to the economic planning process. After considerable debate and discussion, the United Nations Statistical Office published "A Framework for the Development of Environment Statistics" (1984). The framework will assist countries in collecting and keeping environmental data in a useful, uniform manner. The United Nations Environment Program has been encouraging countries to prepare annual or semi-annual "State of the Environment"

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

Reports to stimulate the collection of data on and analysis of environmental conditions. The United States Agency for International Development has helped countries establish environmental data centers and has sponsored numerous environmental profile reports on individual countries (International Institute for Environment and Development, 1986). The International Union for the Conservation of Nature and Natural Resources has also established a data base (IUCN, 1986). All of these efforts should be continued and strengthened.

2.3 ALTERNATIVE PLANNING METHODOLOGIES:

Recommendation 2.E. The international assistance agencies should promote the development of planning methodologies which link economic and renewable resource system information.

The Organization for Economic Development and Cooperation (OECD) has led the discussion on "forward looking" environmental planning and coordination between European nations. Pollution associated with industrialization and changing mixes of energy use have been projected as a function of development and existing pollution controls. Given the projected levels of pollution, the nature and timing of new controls are then considered to attain preferred ambient standards. The approach specifically addresses transnational pollution. The international assistance agencies could take the lead in adopting these techniques to the needs of developing countries, putting their emphasis on renewable resources and the training of planners.

In 1979 the Environment Directorate of OECD commissioned seven studies:

- 1) Environmental Trends, Cost and Policy Issues through 1990.
- 2) The Impact of Environmental Measures on Growth, Productivity, Inflation, and Trade.
- 3) Environmental Policies: A Source of Jobs?
- 4) The Impact of Environmental Policies on Industrial Innovation.

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

- 5) The Benefits of Environmental Policies; 6) More Effective and Efficient Environmental Policies.
- 7) Economic Instruments: Alternative or Supplements to Regulations.

These studies use extensive data and macroeconomic models to explore the relations between development and environment. The studies provided material for the background papers to a major international conference on Environment and Economics held in June 1984 (OECD, 1984). The conference attempted to look into the future and stressed strategic rather than reactive environmental planning.

While the OECD analyses are more descriptive than analytical, they illustrate the "state of the art". Briassoulis notes that there are no well developed integrated economic and environmental models for policy analysis:

The economic component of most models is well established and elaborated, at least in their static versions. The environmental component is partially developed in most models. Some contain only pollution generation relationships, others include pollutant transport models, while very few contain ecological models as the environmental counterpart of the economic component. Finally, the decision-making component is treated, with a few exceptions, in a simple way. In fact, there is no model that incorporates a full simulation of the policy context of an environmental issue (actors, their resources, interactions, etc.) and that relates it to the economic and environmental models (p. 30).

The OECD studies model aspects of the problem one at a time. Proposed reductions in pollutants through regulations on the distances people drive, for example, would not enter the modeling of the auto manufacturing industry and its pollution. The models, in short, are much less complex than the problem. As suggested by Briassoulis, the OECD analyses tackle industrial pollutants better than their transport and address renewable resource systems only indirectly.

The use of national economic-environment models for planning in the U.S. has not progressed as far as in Europe. On the other hand, more models

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

have been built in the U.S. that address the relationships between economic activity and renewable resource degradation. The U.S. Forest Service has models of the implications of alternative land use practices on each of thousands of small parcels or management areas. Numerous models have also been developed which link agricultural policies and practice to soil loss. These modeling techniques could be adapted to conditions and policy questions in developing countries.

More experimentation with and adaptation of models is needed before they will be really useful aids to national planning. Nevertheless, it is better to have what insights can be gleaned from imperfect, partially integrated models than not. Indeed, the macroeconomic models that are regularly used for policy analysis are certainly not integrated at all with the environment, but they seem to provide considerable insight. We should be wary that perhaps the development and use of partial environment-economic models has not progressed rapidly because planners prefer models that give answers, however wrong, over models that give "too many" insights.

The planning methodologies of national planning agencies are strongly rooted in economic theory. These methods can be amended as suggested above through environmental accounting. However, accounting methodologies say nothing about processes, either environmental or economic. Furthermore, economic models, even when amended with environmental factors, retain their basic linear, or at least mechanical, forms. Amended models also typically only consider the economic effects on the environment, not subsequent environmental interactions and their impacts on the economy over time (Norgaard, 1985). Similarly, though considerable effort has gone into augmenting the SNAs through social accounting, we do not have models of the dynamics of social interactions or transactions and how these influence the

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

development of institutions which in turn affect the economy and the environment (Bromley, 1985). The situation is illustrated in Figure 2-A. Economic methodologies used in planning keep track of interactions within the economic system represented by Box 1. Extending economic models so that they include social and ecological impacts expands the analysis to include at least parts of Boxes 2 and 3. But the impact of a change in the economy (Box 1) on the the ecosystem (Box 3) results in subsequent interactions on society (Box 6) and within the ecological system itself (Box 9). These subsequent interactions in turn affect the interactions represented by other boxes and eventually affect the economy (Box 1). None of these subsequent iterations, however, are now modeled.

Figure 2-A. An Integrated Systems Model of Economic, Social, and Ecological Interactions.

	Economy	Society	Ecology
E c o n o m y	1. Economic System	2. Effects of Economic Phenomena on Social System	3. Effects of Economic Phenomena on Ecological System
S o c i e t y	4. Effects of Social Phenomena on Economic System	5. Social System	6. Effects of Social Phenomena on Ecological System
E c o l o g y	7. Effects of Ecological Phenomena on Economic System	8. Effects of Ecological Phenomena on Social System	9. Ecological System

Nor is there any hope that these subsequent interactions can ever be realistically modeled or that we could understand the results of a model that did try to include them. This limitation occurs for several reasons. First, the relationships within social systems and ecological systems, let alone between them, are much more complicated than those in either a market or planned economy. As yet, we do not have formal models for eight of the nine boxes. Second, even if there were formal models, parameters of the future will be uncertain. Realistic prediction entails testing for the sensitivity of assumptions about alternative future conditions. For example, in an analysis of the sensitivity of benefits and costs for a very simple hydroelectric facility, three rates of interest, three future energy scenarios, and three construction periods were investigated, resulting in 27 benefit-cost ratios (Norgaard, 1986). But testing three alternative values for each of three sensitive variables within each of the nine boxes above would result in 27 to the ninth power of combinations, a mere 7.6 trillion or so.

The foregoing presumes that relations within and between the boxes are fixed over time. Unfortunately, such is not the case. Economic and social systems evolve quite rapidly over time. Even within ecological systems, the smaller species, from microbes to insects, evolve quite rapidly. In short, formal, quantitative analysis has a limited role to play in planning due to the uncertainties of the future and the interconnectedness and evolution of problems (Rittel and Weber, 1973; Ascher, 1981; Norgaard and Dixon, 1986).

The limits of formal, quantitative analysis have always been with us. During the past several decades, however, there has been excessive faith in the possibilities of breaking through the limits and too little respect for other approaches to decision-making. Extending national economic planning

so that it addresses how to sustain renewable resource systems will entail both more quantitative analysis and more reliance on qualitative approaches, but proportionately more of the latter.

Norgaard and Dixon (1986) argue for the use of coevolutionary criteria as well as benefit-cost analysis in the design and selection of projects. The criteria are derived from an understanding of development as a process of social system and ecological system coevolution (Norgaard, 1984a, b). These criteria include:

1. Sustain system productivity and diversity,
2. Start small and experiment,
3. Plan to learn from experience,
4. Maintain flexibility,
5. Reduce vulnerability, and
6. Avoid big plans.

While these criteria were selected for project analysis, they could be interpreted for policy formulation and planning as well. The six criteria are not easily quantified. In fact, policy analysts trained in different disciplines -- for example ecology, soil science, and hydrology -- would not even agree on initial rankings of plans by these criteria because each has been trained to look at different attributes and processes. How the six criteria might be aggregated into a single ranking raises additional complications. Disagreements stemming from specialized knowledge and procedural complications are explicit in this approach. In formal, quantitative modeling, however, these disagreements are hidden in diverse assumptions about parameters and in the selection of the mathematical form of the model. With these problems explicit, resolution must come through discussion, interpre-

SECTION TWO NATIONAL PLANNING FOR SUSTAINABLE DEVELOPMENT

tive analysis, and consensus among policy analysts of different backgrounds. When consensus cannot be reached, the plan or policy may well be faulty. By keeping the complexity of reality explicit, the planning process shifts toward one of learning between disciplinary lines of expertise, toward being cautious, and away from optimizing and false confidence.

The foregoing approach structured around coevolutionary criteria is simply one model of a non-quantitative approach that could be used to augment formal, quantitative modeling. All such approaches rely on judgment. Good judgment is difficult to identify and can easily be "incanted" when political favors are in fact being repaid. Objectivity, however, is not guaranteed by formal modeling either. There have been numerous incidences where assumptions and model constraints have been specified to reach foregone conclusions (Cochran, 1978; Bill Keepin, 1985; Michael Thompson, 1985; and Brian Wynne, 1982 and 1985). Nevertheless, an open planning process with participation by other governmental agencies, outside experts, and advisory committees would not only help ensure planning in the public interest but also broaden the base of expertise and knowledge drawn into the process.

AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

3.0 INTRODUCTION:

The international assistance agencies have acquired considerable experience with questions of the structure of national agencies and the responsiveness of officials through recent experiments with decentralizing decision-making, strengthening rural institutions, and increasing aid to the poor. From this experience, one lesson stands out. Regardless of agency structure and the mandates given their officials, the agencies rarely develop particular strategies for particular circumstances or adapt quickly when conditions change. Where agencies need to work together, the difficulties of jointly devising strategies and adapting to particular conditions over time have proven even more difficult. This has led to increased interest in how agencies "articulate".

How agencies "articulate" refers to how the activities of agencies are joined, or how they work together. Articulation is affected by agency structure, mandates, procedures, and how well they communicate with each other. All social units affecting renewable resources -- legislative bodies, governmental organizations, non-governmental organizations, indigenous cultures, and private enterprises -- need to be more adaptive and to articulate much better. Social organization overall must maintain a complex array of information feedbacks and decision-making loops mirroring the most critical processes of the natural system with which society must interact in a sustainable manner. This is, of course, a 'tall order'.

The initial questions about how to reach the poor were framed too much

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

in an either/or context, whether centralized institutions or decentralized institutions are "better". The questions stressed the distribution of relatively independent decision-making authority between the center and the field within a given agency. They also also explored the preponderance of decision-making authority between local agencies and the field offices of national agencies. This emphasis seemed appropriate since the questions addressed reaching the poorest of the poor through integrated rural development projects or through housing projects in metropolitan centers. In either case the poor targeted for assistance are entirely concentrated at the bottom, whether rural or urban. In fact, however, most studies found that strong agencies were needed at all levels for policy to be carried out and effectively tailored to particular conditions (Leonard, 1977; Cochrane, 1983; Esman and Uphoff, 1984).

In the case of renewable resource protection, management, and development, the centralization-decentralization juxtaposition is also inappropriate. Soil resources can only be directly managed at the local level. But soil management can also have significant impacts on stream courses and reservoirs far from where they must be managed. Similarly, the management of more broadly defined systems indirectly affects renewable resources best managed at the local level. The management of industrial and urban pollution, for example, affects acid deposition and the productivity of streams, soils, and forests at a distance. The management of these renewable resources at the local level depends on appropriate national policies and organization to control air pollution.

The existence of strong interdependencies between renewable resource systems indicates that coordination is more important than structure. The

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

important question is not whether strong central or strong local institutions are better or whether agencies should be resource specific with authority across many regions or regionally specific with authority across many resources. Many combinations of resource and supporting agency structure are probably equally effective or ineffective. Effectiveness really depends on how well the agencies adapt to new conditions and work with each other. To maintain sustainability, we need to ask how all agencies can be strengthened and made to work together better.

3.1 POSSIBLE STRUCTURAL ADJUSTMENTS:

While we do not see any ideal structural solutions for improving coordination between agencies, the international assistance agencies should raise structural questions with individual developing nations as to whether particular changes might improve coordination. The following recommendations and elaboration are presented in this context.

Recommendation 3.A. The international assistance agencies should encourage developing nations to consider establishing environmental units within all relevant agencies in order to improve coordination between agencies, enhance the adaptability of agencies to renewable resource management opportunities, and reduce the likelihood of making environmental mistakes.

Coordination between different government agencies is notoriously difficult in developing countries where vertical chains of command within agencies are much stronger than lateral cooperation. Sometimes, agencies zealously guard their turf by seeking to exclude the participation of other agencies. In many countries ministries of agriculture have authority over biocide licensing and are reluctant to coordinate this responsibility with the ministry of environment or ministry of health (USAID, 1981).

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

The difficulties in coordinating with environmental ministries might be partially offset by institutionalizing an environmental capability within each relevant implementive agency. Every major government agency, national and sub-national, which makes decisions with significant environmental consequences might have an environmental advisory unit, staffed with environmental specialists and having clear terms of reference to do environmental advisory work. For a wide variety of development-related government agencies, having in-house environmental advisors should be as routine as having in-house economic advisors. The marginal value of environmental experts is likely to be higher if some are in each non-environmental agency than if all are clustered in one central environmental agency.

Although the agencies have relied on consultants for environmental work in the past, there are advantages to the agencies of having their own environmental staff. Permanent staff can provide a renewable resource "voice of reason" within the agency on a continual basis. Permanent staff can ask questions that would not be asked by consultants who come and go and only wish to complete their contract without raising difficult issues. Permanent staff stay on the job to see that environmental recommendations are in fact followed. Also, permanent environmental staff are needed simply to determine when specialized environmental consultants are needed. The World Bank has made recommendations for in-house environmental staff in the context of conditionality of specific project loans, including the electric power sector loans for Brazil and for Thailand.

Internal environmental units would be most advisable in the ministries and divisions of agriculture and irrigation, land settlement and titling, energy and power, highways and transportation, health, finance and planning. In each case, the role of the environmental unit would be to:

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

- 1) review, comment upon, modify, and (if necessary) veto agency project and policy plans;
- 2) indirectly educate and inspire agency colleagues on environment-related matters; and
- 3) serve as a focal point for coordination of environmental activities with the central environmental ministry and other implementive ministries, as needed.

The recommendation with respect to environmental units within individual ministries does not imply that central environmental ministries or their equivalent are any less useful. These central agencies fulfill roles which cannot be effectively carried out by the smaller, more focused units within implementive agencies. These include nationwide environmental monitoring, dissemination of information on critical environmental problems, environmental coordination of the activities of different ministries, and participation in the national planning process. While these activities are not sufficient to ensure prudent environmental and resource management, they are usually necessary or useful.

Recommendation 3.B. The international assistance agencies should pursue with developing countries the possibility that decentralization of decision-making power will promote sustainable development.

Excessive centralization sometimes gets in the way of sustaining renewable resources. This problem is particularly serious in large, diverse countries such as Mexico; less so in small countries like Belize. For example, because so much environmental work must pass through Mexico's national environmental agency (SEDUE) in Mexico City and because this agency is fairly weak, a serious bottleneck results. Centralization of environmental responsibility also increases the risk that due to incompetence, shortage of funds, or other reasons, the job will not get done at all.

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

Most types of environmental work can be decentralized somewhat, if needed to make implementation more manageable or sensitive to local political concerns and social needs. Recommendation 3.B. suggested environmental units within the major development agencies may increase articulation between the agencies. These units would also be a form of decentralization. There are other possibilities.

Sometimes sustainable development objectives are more successfully attained if the necessary environmental work is "spread out" among a number of environmental implementive agencies. For example, Costa Rica's protected wildland management areas include separate systems of National Parks and Wildlife Refuges, administered by different agencies. While the National Parks prohibit hunting, other "commodity gathering" uses, and private inholdings, the Wildlife Refuges allow them to a limited extent. Thus, the existence of a separate system of Wildlife Refuges allows a greater area and variety of ecosystems to be placed under protected status than if only the National Park system were used. The Wildlife Refuges are therefore effective where National Parks would not be. This is because "buying out" private inholdings would be prohibitively expensive for the government, or because local people depend economically upon the controlled harvest of particular resources. Furthermore, in the event that one agency is relatively incompetent, the system has something of a "backup".

Another type of decentralization results through assigning or building responsibility for environmental work at the sub-national, or even local, levels of government. For example, much pollution control and other environmental work is done at the State level in Brazil. Such decentralization can better accommodate the wide diversity of environmental problems and relevant development conditions present in Brazil, for example,

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

between Sao Paulo and Amazonas, and avoids the bottlenecks that would be likely if everything were done from Brasilia. In Kenya, much of the planning related to natural resource management and development is being decentralized to the District level.

Even National Parks and other wildland management areas are sometimes more profitably managed at a sub-national or local level. For example, Colombia's Cauca Valley Corporation (CVC), a governmental regional development agency, manages the National Parks within the Cauca Valley and its watersheds. This takes some of the administrative load off of INDERENA, the environment and parks agency that is already overextended. While national agencies can set broad environmental standards (e.g., criteria for establishing and terms of reference for managing National Parks), the devolution of management to a more decentralized authority can be effective.

Government agencies can sometimes effectively contract out certain types of environmental work to NGOs. For example, some governmental agencies in Latin America have supported the creation of non-governmental foundations to bypass staff hiring freezes or the prevalence of incompetent, entrenched "deadwood" among agency staff.

Over centralization is typically accompanied by too little local participation. This problem is frequent in watershed management, soil conservation, and other efforts to sustain renewable resources where the habits of large numbers of rural people need to be changed. These people are often paid from project funds to carry out environmental improvements such as terracing and tree planting. When project funds run out, these improvements often fail to be maintained. Where local people have a chance to participate substantially in project planning and implementation, there is a

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

greater likelihood that they will consider the project as their own, and will therefore continue to carry out environmental activities even after project funds run out.

Renewable resource projects that rely heavily on the cooperation of local people are most likely to succeed if there are one or more highly motivated individuals at the local level who are dedicated to making the project work (Zerbe et al, 1980). Thus, project design should be reviewed with the perspective of how to encourage, rather than stifle, the motivation and productivity of such individuals.

Recommendation 3.C. The international assistance agencies should discuss with developing nations whether their organizational structure has sufficient redundancy to provide alternative interpretations of appropriate renewable resource management and to avoid irreversible mistakes.

Social organization for sustaining renewable resource systems should strive to reduce the likelihood of irreversible or highly costly errors. A redundant social structure with "checks and balances" is typically more resilient, or closer to "fail-safe", than one in which each actor or agency has absolute say within his or her domain of decision-making and can impose the same decision across all resource systems (Landau, 1969). Legislatures should retain review and veto powers. Agencies should be able to intervene when other agencies undertake decisions affecting their domain and expertise. Interest groups should be able to press their point through effective and timely administrative or legislative hearings and in some cases have redress through the courts. A prerequisite to this checking process is access to information and the planning process before decisions are implemented. Redundancy can be enhanced in large countries by having both federal and state or provincial agencies managing different resource systems

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

or sharing in the process of managing the same resource systems. Such an approach helps ensure that the same mistake is not made on all resource systems, that learning opportunities are enhanced, and that interest groups and other agencies have multiple means of accessing the process of planning and making decisions.

The international assistance agencies could take the lead in undertaking research and discussing with developing countries how redundancy could be enhanced in social organization for sustaining renewable resources.

3.2 IMPROVING ARTICULATION BETWEEN THE AGENCIES:

Recommendation 3.D. The international assistance agencies can improve how agencies work together through developing and disseminating a richer understanding of the nature and behavior of organizations.

Solutions to the problems of articulation may come through improved understanding of how organizations succeed and fail. Recent developments in organizational theory are fully described in the appendix. The following summarizes important highlights.

The objectives and procedures of agencies start with their mandate and coevolve thereafter with the information and method of explanation each agency acquires with experience. Organizations evolve their own ways of perceiving through the data they admit. They also develop their own ways of explaining things based on how they are organized and what disciplinary methodologies they emphasize for the processing of data into information. Thus organizations can be thought of as perceiving and thinking beings capable in many ways of knowing more than an individual. Agencies do not articulate better "naturally" because their objectives do not overlap and

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

their procedures, information base, and methods of explanation are incongruent. When a President or legislature wants agencies to work together better, they typically broaden the objectives of related agencies and mandate the points at which their procedures must interrelate. But even with mandated coordination, articulation will not succeed if the means of perceiving and methods of explanation, the organizational knowledge, at the articulation point remain incongruent between the agencies.

An understanding of organizations as cultures helps explain why, for example, water development and wildlife agencies are so difficult to coordinate. The water agency "perceives" particular phenomena and interprets these in particular ways in accordance to the experience of the agency and the training of the civil engineers who dominate the agency. Similarly, the wildlife agency perceives the world and explains phenomena according to the biological training of its personnel and very different experience. Neither agency has a way of incorporating the most important information or processes of the other into their organization. Officials in each agency think they are being scientific and rational. And officials in each agency think those in the other agency are narrow-minded and unable to comprehend the realities of development. Officials in each agency need to understand themselves and their counterparts in other agencies as members of organizational cultures.

Interpretive theorists argue that the understanding of social phenomena must be contextual or specific to how meaning has evolved for a culture, for organizations within cultures, and for people within organizations within cultures. Cultures, organizations, and people can learn by confronting new environmental conditions and by confronting each other and exploring alternative interpretations. Confrontations now, however, typically are not

learning experiences. Confrontations are either avoided or they result in hostile defenses of existing ways of understanding and acting. This phenomena is explained, in part, by beliefs in one right way of knowing and doing fostered by our belief in objective knowledge. If an interpretive epistemology of social knowledge were to replace our current concepts of objective knowledge, individuals and organizations would be more open to interacting, learning, and adapting.

Incongruencies in objectives, procedures, information, and ways of knowing inhibit articulation at all levels -- national, state, and local -- and between all actors -- legislative bodies, planning boards, resource specific agencies, indigenous cultures, non-governmental organizations, interest groups, corporations, and individuals. Procedures, information, and ways of knowing are correct and complete for each actor given its limited objectives and understanding of interconnections. Increased articulation to sustainably interact with renewable resource systems will entail an "opening up" of procedures, an expansion of information, and a plurality of ways of knowing by all actors. All actors, in short, will have to become not only tolerant of the organizational culture of other actors but adept at coordinating with it. How this "opening up" might occur is the key question.

The international assistance agencies could sponsor research on organizational culture and interaction and increase the awareness of alternative understandings of organizations. The agencies could lead in the research and discussion of changes that might assist existing organizations to become more open to learning, articulation, and adaptation. Organizational culture and management incentive systems need to reward

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

constructive questioning, learning, articulating, and adapting -- and if necessary, even whistle-blowing -- rather than the appearance of expertise and control through defensive explaining and posturing.

3.3 ON-GOING, ADAPTIVE MANAGEMENT:

Recommendation 3.E. The international assistance agencies can encourage sustainable development by working with resource management agencies to help them develop on-going adaptive management approaches.

The international assistance agencies should set the tone of their negotiations with developing countries by emphasizing that sustainable resource management will not be fostered simply by getting prices right, mobilizing and redirecting capital, investing in appropriate infrastructure, or reorganizing resource agencies. A nation sustains its renewable resources by taking appropriate "steps" each day. These steps change from season to season and year to year with changes in the climate, with learning, with changes in the management of associated renewable resource systems, with changes in social objectives, and as renewable resource and social systems coevolve. In short, sustainable interactions with renewable resource systems are management-intensive, with considerable effort going into monitoring, learning, decision-making, and implementation.

Management has always been a difficult factor to mobilize for development. Capital and purchased inputs can be subsidized. Infrastructure can be invested in directly by governments. Education can be made mandatory. But management is hard to subsidize, difficult to invest in directly, and impossible to mandate. Basically this stems from the fact that the tasks of management are hard to define, and whether the tasks have been done well is difficult to monitor and reward. Learning through doing and adaptation is

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

essential for individual managers and for organizations. On the other hand, because management is nebulous, managers and management organizations tend to develop defensive explanations of the management process and assume defensive postures. Both the explanations and posturing impede constructive discussion of new information that could lead to better interpretations of renewable resource systems and to superior management approaches.

Defining, monitoring, and rewarding renewable resource management are especially difficult because of the complexities of the systems being managed and the absence of clear, scientific criteria of good management practices. Perhaps most important, the effects of different management practices have different distributions -- typically broad, but uneven -- over space, time, and resource sectors and their associated interest groups. This means that both learning by doing and accountability in management are very difficult. 'Successful' defensive explanations and posturing which account for the actions of individuals and the organization tend to be rewarded in situations where openness is especially needed for articulation and interpretive learning.

The programs for the training of managers for sustaining renewable resource systems suggested in Recommendation 1.C. should be interdisciplinary with an emphasis on how different disciplines lead to different insights into possible management practices. They should emphasize monitoring, learning, and adaptation. The programs should not be "professional" in the sense of training people to behave as managers in established ways, but rather should be programs which give managers a "bundle of tools" and the ability to ask questions, communicate, and interpret across disciplines, organizational cultures, and interest groups.

SECTION THREE AGENCY STRUCTURE, ARTICULATION, AND ADAPTIVENESS

Managerial learning can be enhanced if opportunities to learn are increased. Management practices dictated from the center, or agreed upon collectively for national application, reduce the opportunity to learn through diverse local experiments. The belief that the 'right way' can be known a priori for all circumstances encourages uniform practices that reduce learning. Similarly, uniform practices also minimize problems of accountability. Good or bad outcomes may take years to materialize. Whether or not established procedures have been followed can be determined quickly. The international assistance agencies could take the lead in undertaking research and experimenting with ways of cutting through this dilemma of social organization for sustaining renewable resources.

ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

by

Suzanne Easton

4.0 INTRODUCTION:

Non-governmental organizations (NGOs) can serve as important links in social organization for sustainable development. The international assistance agencies have found a variety of interesting ways to work with NGOs in development activities. They have been especially effective as intermediaries between national and local peoples, as "watchdogs" to assure that environmental and cultural aspects of projects are effectively implemented, and as providers of alternative ideas in the planning process. Further integration of NGOs into the development process will enhance the options for achieving sustainable development and complement the institutional redundancy needed for more nearly "fail-safe" strategies. This section provides an initial effort at identifying how NGOs might be further integrated into social organization for sustainable development.

Three principal categories of NGOs are particularly relevant for sustainable development: conservation NGOs, development NGOs, and local NGOs. Apart from certain types of local organizations, these NGOs are typically non-profit, charitable, and/or public interest organizations. While most NGO activity in development has been from foreign organizations, sustainable development will require the participation of national and local NGOs. Local NGOs are now evolving rapidly, especially in Latin American countries where political freedom has recently increased. We can begin to envision an appropriate role for international, foreign, and domestic NGOs given the

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

incentives and contributions they currently or potentially provide. The purpose of this section is threefold: 1) to present a conceptual framework for evaluating the role of NGOs; 2) to examine the limitations and opportunities among the three types of NGOs; and 3) to outline and evaluate the major services and functions of NGOs in sustainable development, stressing those areas where aid agencies might cooperate in their activities.

Sustainable development is an approach to the design and implementation of development projects and programs that firmly links conservation and development as equal goals. It seeks to ensure that the demands that development efforts place on natural resources do not degrade the ability of those resources to satisfy human needs over the long term (RARE, 1985). Sustainable development may include project level conservation activities such as using watershed management and soil protection practices to increase agricultural yields and reduce costs as well as international efforts focused on conserving resources of biological or economic significance. NGOs have been found to play important roles both at the project level and at the highest levels of policy making.

Little empirical study has been carried out to evaluate on a broad scale the role of NGOs in development, particularly resource management based development. Information is lacking on the niche usually filled by these organizations, their comparative effectiveness, their unique contributions, and the variety of NGOs involved in resource management and development. Most often, evidence occurs in the form of case studies exemplifying the "success" or "failure" of a particular organization. The work herein takes the approach of cautiously pulling together pieces of information to find patterns of appropriate roles for NGOs. It is a comprehensive analysis of NGO participation in natural resource development projects.

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

4.1 A CONCEPTUAL VIEW OF NGOS IN DEVELOPING COUNTRIES:

Taking a broad conceptual view of NGOs as a specific organizational type enables a clarification of their unique functional role in societies and development processes. NGOs' distinct characteristics result largely from their non-governmental status. They differ most significantly from government agencies in the motives which drive their activities. Public agencies are part of a larger government which seeks to run a country with all the competing interests and associated economic and political pressures. The severity of these pressures on governments of developing countries often constrain the activities of their natural resource agencies (Morell, 1985). These agencies use public funds to carry out programs perceived to be within the appropriate boundaries of government operations, although these may differ according to the government's political orientation. NGOs, on the other hand, usually obtain the majority of their funds privately and are accountable to their membership and funding sources. Their motives rise out of perceived needs that are not adequately being served by existing institutions (Greenstein and Polsby, 1975). While government organizations must constantly balance competing interests and pressures, NGOs usually represent more specific interests for which they mobilize resources. Consequently, NGOs can fulfill roles which are either inappropriate or not possible for government agencies.

A variety of other attributes of NGOs differ quite markedly from those of government agencies. These include size, leadership, funding, staff resources, technical resources, value premises, linkages with other organizations, membership, and clientele. There are important distinguishing characteristics between the three types of NGOs -- conservation, development and local -- as well as certain trends in their capacities and

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

activities.

The theoretical literature on non-governmental organizations is framed in terms of "interest groups" politics (Greenstein and Polsby, 1975). This literature sheds some light on interest group formation and conditions under which groups arise and flourish. Interest groups whose primary purpose is to seek representation of their interests in government policy and programs are far more widespread in developed nations and seem to appear as countries become more developed (Greenstein and Polsby, 1975). Political systems also vary considerably in the power and extent of their interest group activity. In the U.S., a traditional commitment to pluralism fostered a role for volunteer associations as legitimate political links between the individual and the state (Greenstein and Polsby, 1975). While no country equals the U.S. in the extensive contribution made by interest groups, the presence of NGOs under a variety of conditions in developing countries confirms that factors other than the general level of "development" contribute to their creation and degree of influence.

There are two major schools of thought with respect to the factors that affect interest group formation. Interest groups can be seen as "input units" which contribute significantly to demands upon political structures in society. In this sense, they are agents of socialization, communication, and mobilization. Alternatively, interest groups represent "outputs" of the larger socio-political structure. For example, the process of industrialization is a motivation for the creation of labor unions, or a disappearing natural resource base can lead to increased environmental activism. Most analysts now agree that interest groups really are both - they are the objects and consequences of political and social activity as well as mechan-

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

isms for the articulation of demands (Greenstein and Polsby, 1975). Interest groups often form when people become dissatisfied over some disturbing process of social change.

There is also considerable evidence that increasing social differentiation leads to the creation of more interest groups. In rural sectors of developing countries, peasants have shown little capacity to organize on their own for the purpose of representing class interests. Most organization has resulted from outside stimulus (Migdal, 1975). There appears to be a need for benefits to accrue to the individual by way of inducements for participation to occur. Such participation is very costly to the individual, in terms of time, effort, and money, particularly in poor rural areas of developing countries. A major reason that many developing countries have comparatively few NGOs is that these resources are very scarce.

Several important conclusions can be drawn. The social and political context of many developing countries, while improving, may still not be conducive to the development and effective operation of NGOs. In most developing countries, NGOs are new, they lack legitimacy, and their role is still uncertain. For this reason, we cannot expect rapid NGO development or effective operation unless they are given major impetus.

Recommendation 4.A. The international assistance agencies should work further with NGOs to give them additional legitimacy, enhance their capability, and assist in their funding.

The international assistance agencies are already working quite well with many NGOs at various levels in diverse countries. The agencies should continue and increase the level of their work with NGOs because these organizations have substantial "growth potential" to serve special roles

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

described in subsequent subsections. "NGO-building" must address the following basic issues. The first step in a process to foster interest group activity would appear to be the need to legitimize the existence of these organizations. This requires a major international support network and strong linkages with legitimate institutions. Second, if organizations are to build on a prevailing dissatisfaction with government programs and decisions, taking a certain degree of control away from government agencies, it is likely that confrontation with government agencies will develop. This could ultimately be productive, as it has been in the U.S. for achieving certain conservation aims. But with suspicious and insecure governments, NGOs will have more difficulty playing either a constructive critical or a project implementation role. Third, domestic organizations are unlikely to have the technical and financial resources necessary to operate effectively. Support from international assistance agencies could be especially important for assuring domestic NGO participation.

4.2 NGOS IN SUSTAINABLE DEVELOPMENT:

Due to the tremendous heterogeneity of NGOs and the roles they have played in different situations, a consistent terminology has yet to arise in the literature or in popular usage. Conservation activities have been termed environmentalist, preservationist, and protectionist with varying connotations for each. NGOs, external to the community, which provide development assistance are often known as private voluntary organizations (PVOs). Local organizations, not typically referred to as NGOs, include a wide variety of locally based economic and cultural groups. We limit discussion to three categories: conservation NGOs, development NGOs, and local NGOs. These are not necessarily mutually exclusive. Academic and other

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

private organizations are excluded from discussion.

Conservation NGOs. The first category includes those organizations commonly known as conservation or environmental organizations. These value systems of these organizations place great importance on the interconnectedness of the natural environment and human well-being. They often advance both the ethical and utilitarian values of nature. This duality is expressed in the opening lines of IUCN's World Conservation Strategy:

Human beings, in their quest for economic development and enjoyment of the riches of nature, must come to terms with the reality of resource limitation and the carrying capacities of ecosystems, and must take account of the needs of future generations ... if the object of development is to provide for social and economic welfare, the object of conservation is to ensure Earth's capacity to sustain development and to support all life (IUCN, 1980:1).

The presence of conservation organizations has grown steadily in developing countries since the 1972 United Nations Conference on the Human Environment in Stockholm. Prior to that time, developing countries perceived concern for the environment by developed nations as a threat to their own economic development (Leonard and Morell, 1981). Since then, the international conservation organizations have worked diligently to adapt their message to third world conditions and spread the environmental movement to developing countries. Some international organizations have fostered national affiliates in developing countries. At the same time, national conservation organizations have arisen independently in response to national environmental crises.

There are striking differences between the conditions that spawned environmental values in the U.S. and those which exist today in developing countries. In the 19th century, rapid industrialization and urbanization in

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

the U.S. were accompanied by a century of evolving values characterized by a "discontent with civilization" (Nash, 1976). Thoreau and others longed for a romantic past with values tied to the aesthetics of nature. The damming of Hetch Hetchy Valley in Yosemite National Park in 1916 was a key event in the early organization of the conservation movement. For the next fifty years, the primary emphasis was on wilderness preservation. The fear of a "Silent Spring" (Carson, 1962) due to pesticide poisoning of wildlife followed by the Santa Barbara oil spill marked the transition to concern for the total environment. With this transition, environmentalism became a major grass roots, political force. Environmental problems were generally perceived as the problems of an over-consumptive, industrialized, and technological society.

In contrast, foreign conservationists and development specialists alike view the environmental problems of developing countries to be largely a product of poverty and overpopulation such that basic survival often dictates inappropriate resource use. This contrast alone helps explain why conservation has taken on a very different meaning in developing countries. Sustainable development attempts to embrace development needs in the process of promoting conservation. Much of the environmental concern comes through an overview of the development crisis from the vantage available to foreign and international conservation groups, scientists and governments. From the grassroots level, the environmental crisis is frequently seen as a problem of who has secure access to which resources and who has management control.

International conservationists have begun to realize that successful operations entail a major reorientation in the strategies and structure of their organizations. For example, organizations have had to learn how to work through international channels and with foreign governments. Organiza-

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

ions have also had to re-educate themselves on the source of environmental degradation and socio-economic implications of protection and management. The most important challenge ahead for international conservation organizations is to learn to work with and involve local people and organizations.

Several other trends in the environmental movement are worth mentioning. Organizations have grown tremendously over the last two decades from somewhat informally run membership groups to large, bureaucratic enterprises with \$1 million plus annual budgets and highly professional staffs. The groups have also become more specialized and arrayed into a variety of issue areas. Their growth has been coupled with increasing technical expertise, increasing linkages with governmental and other institutions, and increasing political influence. The high degree of legitimation and success in the U.S. has allowed conservation organizations to step into the international arena with wide acceptance and credibility.

The number of conservation groups in developing countries has grown considerably since 1972. These groups have increased environmental awareness, but most are only beginning to have direct impacts on policy formulation, project implementation, and enforcement. Formal conservation groups in developing countries tend to be middle class and urban based. However, there has also been significant less formal, rural activity with regard to certain issues. Success can be seen most visibly in the area of increased awareness of environmental problems on the part of developing country governments and international agencies, institution building (a dramatic increase in the number of natural resource agencies and environmental NGOs in developing countries), and education of professionals in development assistance programs.

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

Development NGOs. Non-governmental development organizations are those groups that historically have had programs geared to promoting and implementing development projects in the Third World. Their value system places highest priority on meeting basic human needs. These organizations operate on a variety of levels and include a diverse array of orientations within this general value system. Their growing interest and activity in natural resource management, coupled with their relatively long history of experience in developing countries, presents unique opportunities for promoting sustainable development. They include international and national non-profit agencies such as OXFAM, CARE, and Save the Children; church sponsored organizations such as American Friends Service Committee, Catholic Relief Services, and CODEL (Coordination in Development); and specific national groups within individual developing countries.

These groups operate almost exclusively on the project level, providing services for planning, implementation, and evaluation of development projects. Projects have often been oriented towards education, health, and agriculture. However, in recent years, many of these organizations have adopted environment programs which promote social forestry, watershed management, range rehabilitation, and soil protection.

Most of the development NGOs have been well-received by governments and maintain a respectable reputation among donor agencies. In several instances, these organizations have proven more effective than government agencies in achieving development objectives. Since the 1960's, there has been a growing recognition of the importance of these NGOs in development and a tendency to view them as insulated from the problems that plague government sponsored projects. Hyden (1983) describes five advantages of NGOs in development: 1) NGOs are much closer than government to the poorer

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

section of society; 2) NGO staff are usually highly motivated and altruistic in their behavior; 3) NGOs operate economically; 4) NGOs are more flexible due to their small size and the decentralized nature of their decision-making structures; and 5) NGOs are independent of government.

Although detailed empirical studies are lacking, there is some evidence that these organizations can be more effective under certain conditions. In 1982, an anthropologist, Gerald Murray, led, what is believed to be a remarkably successful social forestry project in Haiti. The project was funded by USAID and used NGOs rather than government agencies as routes to reaching the peasants (Murray, 1986). Three development NGOs, all church affiliated, were awarded grants totaling \$8 million. While the anthropological approach of the project has been credited with its success, there has been wide recognition that willingness to operate through NGOs was also a key factor. Moreover, the project also resulted in building the capacity of non-governmental organizations to serve the development needs of rural populations (Murray, 1986).

The picture for development NGOs is not all rosy and it is becoming clear that NGO sponsored projects often suffer from many of the same fundamental design, participation, and evaluation problems as government projects. A lack of coordination between NGOs and government and/or international agencies has resulted in a lack of involvement by NGOs in national planning and international programs, a lower availability of technical information, and inadequate data and evaluation of their activities (Grainger, 1984). A lack of research and development support in the natural resource field is characteristic of these organizations and they typically suffer from low technical capacity (Grainger, 1984).

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

Local NGOs. Local NGOs, better known simply as local organizations (LOs), have received a great deal of attention in the literature by development specialists (Esman and Uphoff, 1984; Korten, 1980; Korten and Uphoff, 1981; and Uphoff, 1984). Local organizations, as defined by Esman and Uphoff (1984), include those organizations that are locally controlled, accountable to the local community and development oriented. The three main types include local development associations, cooperatives, and interest associations that are organized around a common function such as water management.

Local participation is considered essential for accomplishing broad-based rural development (Leonard, 1983). Evidence strongly suggests that where programs have failed, there has been a lack of local support and involvement. However, local organizations themselves also have a high failure rate but often because they have not been the focus of development programs. Eliciting and sustaining effective local participation requires some configuration of organizations that are accountable and responsive to their members. Local organizations can provide three important functions in development efforts where other organizations usually lack - efficiency, equity, and empowerment (Esman and Uphoff, 1984).

Local organizations contribute to the efficiency of project design and implementation in several ways. They can provide more accurate and representative information, better adaptation of programs to meet local conditions, group communication and education, local resource mobilization, local technical knowledge, and more cooperation in new programs. There is considerable debate as to whether local organizations typically improve the position of the poorer, weaker sectors of rural society. Empowerment opportunities present the most controversy, since local elites often tend to

SECTION FOUR RULES FOR NON-GOVERNMENTAL ORGANIZATIONS

dominate these organizations (Esman and Uphoff, 1984). The uncertainty evidenced in equity and empowerment contributions presents important implications for the role of intermediary NGO's in serving to build the capacities of local organizations in these areas.

Managing and protecting natural resources poses special problems for local participation. The environment is often already degraded; resources may be scarce; resources are often communally owned; there is high uncertainty due to the variability of the natural environment and the unknown behavior of others relative to the resources; and natural resources are often critical to the livelihood of local people (Doan, 1984). The question which needs to be addressed is: Under such circumstances, how can NGOs (and governments) facilitate maximum local participation and control in promoting sustainable development? The answer lies in developing appropriate incentive mechanisms for eliciting local involvement with careful consideration of the distribution of costs and benefits among individuals and groups.

Evidence suggests that local organizations are most likely to be effective when they originate from the initiatives of local people. But given the difficulty of local initiative under the conditions mentioned, incentives from outside agencies are most often required. Consequently, the nature of support activities used to foster local participation and control take on primary importance. Should outside organizations work with existing local organizations or establish new ones? How can local leadership and member participation be improved? How can outside organizations serve as promoters, facilitators, catalysts, and organizers? The answers to these questions will often be context and task specific. There are many different ways of providing incentives for certain resource management activities, of

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

organizing decision-making by locals, of mobilizing local resources, and of managing conflict at the local level. There is no tried and true formula; rather local conditions and a learning process approach should be used to develop appropriate and effective means for encouraging local participation.

The Chipko organization in India provides a good example of how an effective local forestry organization can be further stimulated by outsiders. Chipko began in the early 70's as a local movement in protest of logging operations by a private company which threatened the forest-based livelihoods of local residents (Baker, 1981). It has since become an advocate of ecological concerns and human rights of the hill people, promoting social forestry and conservation practices through popular education and mass communication. While outsiders were important catalysts to the organization, its success was due to its leadership being in local hands (Doan, 1984). Chipko participants now organize villages and clusters of hamlets to practice sustainable forestry. The organization has also acquired political clout through education and organizing, and has set an example for locally controlled social forestry elsewhere (Doan, 1984). Significantly, Chipko began in response to a perceived external threat to the livelihood of locals and was tied directly to cultural values.

Conservation, development, and local organizations, in conjunction with government and donor agencies, make up the basic institutional forms which can promote sustainable development. However, the importance of relationships between these different levels of effort and understanding should be underscored. Inadequate capacity exists in each type of NGO, requiring a considerable degree of institutional reinforcement, redundancy and support from donor and government agencies. The following section describes more specifically the available opportunities for the three types of NGOs in

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

sustainable development, with an emphasis on the importance of linkages between the different organizational forms and levels.

4.3 IMPORTANT ROLES FOR NGOS.

This section outlines the major services and functions of NGOs in sustainable development efforts. It is based on their current and potential activities, given what we know about the particular strengths and weaknesses of these organizations.

Education and Promotion of Values. Sustainable development promotes a value reorientation which embeds environmental values into the culture and consciousness of a society at all levels. Education for this purpose can provide an important incentive to officials and local people for other types of activities. Conservation organizations have focused a great deal of their effort on education programs by conducting conferences, providing educational materials to educators and professionals in developing countries, and working with other institutions - governmental and non-governmental - to infuse people with the values and ethics of sustainable development. This has probably been the area where they have been most successful. They often provide high quality information on the types of natural resource problems now confronting developing countries (Leonard and Morell, 1981). Most importantly, they have furthered international awareness of the relationship between environment and development.

However, such values alone cannot improve resource use where economic incentives do not exist. Spontaneous environmental protest in developing countries seems to occur only when problems arise due to a lack of vital public services, or when degradation from one sector of the economy

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

threatens the economic livelihood of a particular group (Morell, 1985). Few examples exist where the rural sector has organized to protest deforestation, soil erosion, or similar problems in which the people most obviously affected by the degradation are also the ones who promote it out of economic necessity (Leonard and Morell, 1981). While education and value infusion by large organizations is extremely important, particularly at higher levels of decision making, they will have limited value under prevailing rural conditions in most developing countries unless accompanied by economic incentives.

In special cases, particularly with locally controlled movements such as Chipko, local organizations can serve to reinforce the values of the culture which reflect long-held beliefs about the use of natural resources. Efforts such as these are often tied to religious or other strong cultural dimensions of the society, and for this reason may be more successful. The degree to which local organizations can use education and value reinforcement as incentives for sustainable development may depend on their linkages with other organizations. External organizations can offer resources and technical support needed to undertake projects as awareness begins to motivate increased interest and activity on the part of local groups.

It is important to recognize that the promotion of conservation values through education can provide a basis upon which to build sustainable development programs. Successful programs can only be realized to the extent that local people have strong incentives, in the form of social, economic and cultural imperatives, to participate.

Resource Protection for Development. While protection of natural resources in the form of parks and reserves may appear to be an arrogant if

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

not imperialistic pursuit by foreigners given the needs of poor countries, there is strong evidence to suggest that protected areas not only benefit local people but serve the long term interests of developing nations as well. Reserves can protect important watersheds, prevent extinction or depletion of animal and plant species used for subsistence purposes or species of economic importance, and provide foreign exchange to governments and jobs to local people. Unfortunately, in many instances, parks have not been designed and managed with this in mind. For example, Manu National Park in Peru has been managed under strict enforcement guidelines, with the intent of prosecuting and convicting outsiders who hunt animals and cut wood (Munn, 1986). More attention to ways in which locals can be made allies in reserve management is needed.

Sustainable development demands that the establishment and management of protected areas be set within the social and economic development of the countries involved (McNeely and Miller, 1982). Parks need to be protected for people rather than against them. Moreover, parks need to be a productive allocation of resources for alternative uses rather than a waste of resources (McNeely and Miller, 1982).

The critical questions that conservationists must answer are: 1) How will the lives of local people be affected by establishment of the park? 2) Under what conditions can protection benefit local residents and the government to the extent that incentives will exist over the long term to protect and maintain the park? 3) What types of organizational arrangements are necessary between government, NGOs and local organizations for successful management? 4) How does the protection activity fit into an overall strategy for sustainable development? Again, the degree of local participation

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

is critical as well as the incentives provided by outside organizations. For example, if reserve status will restrict use of subsistence resources, access to alternative resources or income may be an appropriate incentive to encourage compliance.

Inter-organizational Activities. A major accomplishment of NGOs in promoting sustainable development has been their ability to establish strong working relationships with government agencies in many developing countries. Such relationships have been critical to the establishment of a worldwide system of protected natural areas, establishment of natural resource agencies, the development of national conservation strategies, and a growing commitment by governments to natural resource management. For example, The Nature Conservancy has been instrumental in helping the Costa Rican government, and several other Central and South American countries, identify important natural areas, establish parks and manage them effectively.

The inter-organizational networks achieved for the purposes of sustainable development over the last decade are indeed impressive, if only for the diverse set of organizations represented. Coalition building and communication facilitation provide for the necessary cooperation and participation of a variety of organizations, agencies, governments, and experts. Most recently, the New York Times reported that the World Wildlife Fund had officially joined hands with many religious leaders to promote the conservation of natural resources for helping the world's poor (Shabecoff, 1986). Organizations such as the IUCN, the Environmental Liaison Center, and the Global Tomorrow Coalition have many member organizations representing conservation, religious, development, and human welfare interests. These umbrella organizations (among others) have made great strides in establishing worldwide linkages and networks for sharing information and providing

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

mutual support.

Conservation organizations may benefit from developing stronger linkages with development NGOs in order to gain from the latter's experience in local development activities. While we have witnessed a decade of important networking activity, increased "on the ground" operations will test the ability of organizations to translate concepts into results. Networks must increasingly involve local organizations and local leaders from developing countries.

Watchdog Role. While such a role will always be politically sensitive, both national and international organizations can be especially effective as "watchdogs" for monitoring the invasion of protected areas, industrial pollution, toxic waste discharges, and other environmental abuses. Cases of extreme degradation have served as catalysts for the emergence of new political groups previously thought to be marginal participants in politics (Leonard and Morell, 1981). As previously mentioned, there is the likelihood that strained (if not hostile) relations will develop with government agencies. However, there are many examples where pressure, simply in the form of public outcry, has led to government response. This has proven particularly effective where international pressure has been brought to bear upon national governments. In Puerto Rico, a church-supported NGO involved in grass roots mobilization on toxic waste issues is regarded with strong animosity by government officials. However, the organization has been able to bring national attention to severe health hazards in Puerto Rico and has thus stimulated action by the Environmental Protection Agency (personal observation of the author, 1984).

As new environmental laws and regulations come into effect in develop-

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

ing countries, there will be increasing opportunities to monitor governmental enforcement. NGOs can sometimes assist their governments in enforcement efforts, given the limited resources of the natural resource agencies. In Costa Rica, The Nature Conservancy and World Wildlife Fund have been closely involved in efforts to protect Corcovado National Park from incursions by gold miners.

Also worth mentioning is the role U.S. environmental organizations play in monitoring federal agencies and international donor agencies. These groups have been influential in educating and promoting consideration of sustainable development strategies among these agencies. Such groups as the Natural Resources Defense Council (NRDC) have also gone to court to protest certain economic development activities of these agencies, when considered to be in conflict with U.S. environmental laws. The instrumental role played by U.S. conservation organizations in passing the recent legislative mandate to World Bank representatives, that they promote greater attention to environmental concerns, is another case in point (Williams, 1986).

Sources of Expertise and Research. Non-governmental organizations contribute significantly to research efforts and are important sources of expertise on the natural systems of developing countries, current environmental threats, and sustainable development. Many NGOs provide consultants to aid agencies and development banks. For example, the World Bank has hired consultants from IUCN's Conservation Monitoring Center. In addition, conservation organizations conduct and sponsor research and maintain important natural resource data bases. For example, the Nature Conservancy has been collecting information on biological diversity and conservation problems and opportunities in several Latin American countries through a sophis-

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

ticated biogeographical information system (Mann, 1985). The Conservation Monitoring Centre of the IUCN serves a similar function.

Development NGOs have also contributed to project evaluation studies aimed at understanding social and environmental processes. The International Council for Research in Agroforestry (ICRAF), based in Nairobi, has promoted and coordinated agroforestry research since its establishment in 1978 (Grainger, 1984). OXFAM America just completed an extensive investigation of 14 projects in Africa initiated and operated by NGOs (Seidman, 1986). There are considerable additional opportunities for aid agencies to utilize the expertise and research capacity of NGOs.

Intermediary Organizations. NGOs can serve useful roles as intermediary organizations between government agencies and local people or local organizations. Development organizations are particularly well suited for this role, due to their experience and reputation in promoting and assisting local organizational development (Esmann and Uphoff, 1984). These organizations can often provide services to the rural poor in a manner that is relatively free from the paternalistic and bureaucratic operations of government agencies. Development NGOs readily adopt a learning process approach and provide incentives for local participation because these NGOs are typically small and unobtrusive. At the same time, by developing stronger linkages to conservation organizations, and government and donor agencies, they can increase their understanding of natural systems and improve their technical capacities.

Institution Building. Several NGOs have played a large part in building institutions for conservation and sustainable development. The Nature Conservancy and World Wildlife Fund have helped to establish conservation

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

NGOs in several Latin American countries. They have been careful to work through government agencies and maintain a policy of training nationals to lead and operate the organizations. In addition, development NGOs have built up effective local organizations in areas such as social forestry. For example, CARE, established 250 km of windbreaks in the Majia Valley of Niger which stimulated other villages to organize and request assistance for establishing their own windbreaks (Grainger, 1984).

Environmental Rehabilitation. Environmental disasters continue to occur in both developed and developing countries. Severe erosion, deforestation, and other environmental degradation have in many situations created crises of international concern. NGOs, in conjunction with government and aid agencies, can strengthen technical capacities for dealing with such environmental disasters to minimize human suffering and protect important natural resources. In much the same way that the Red Cross is equipped to provide emergency food and medical aid, NGOs can provide timely and effective assistance toward erosion control, tree planting, and protection of important habitats and species. Apart from crisis situations, environmental rehabilitation will take on an increasingly important role at the local level to meet the development needs of people living in degraded environments.

Funding Arrangements. The extreme financial problems of developing countries hinder their ability to promote sustainable development and conservation. As privately funded institutions, NGOs provide financial resources which augment those of governments. NGOs have generated several million dollars over the past decade for international conservation alone. However, this is only a small fraction of the financing which these organizations need to achieve their full potential. It is therefore highly appro-

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

appropriate that large donor agencies assist in financing NGOs, particularly in those areas where they have proven exceedingly effective such as education, institution building, data collection, and working with local organizations. Seed money to NGOs would be beneficial in building capacities in other areas such as environmental rehabilitation, protected area management, and natural resource development project implementation.

Recommendation 4.B. The international assistance agencies should look for opportunities to combine the unique strengths of conservation and development, international and national, NGOs as sources of technical expertise and as intermediaries who can adopt the learning process approach and work with local peoples.

The effectiveness of NGOs in most developing countries is limited by the extent of their legitimacy, their access to information, and the resources available to them. NGOs are most effective where central governments are either very open, very secure, or nearly non-functional. The international assistance agencies could increase the effectiveness of NGOs by assisting in the process of political opening, by finding special circumstances whereby NGOs can assist in agency funded projects, and by deliberately paying more attention to NGOs to help identify projects and to monitor projects.

There is a great deal that must be learned before the opportunities in promoting sustainable development by NGOs can be realized. No grand design exists for appropriate NGO participation. The process of institutional development is perhaps inherently unplannable. It requires a learning process approach where organizations can integrate and develop in a desirable direction (Thompson and Warburton, 1985).

The ultimate barrier to solving the problems of rural environmental

SECTION FOUR ROLES FOR NON-GOVERNMENTAL ORGANIZATIONS

degradation in developing countries may be that few governments are in a position to undertake the far-reaching social reforms required, and certainly not in the absence of effective pressure from the rural populace (Morell, 1985). This makes the potential support role of NGOs particularly appealing. "The emergence of strong public advocacy for environmental action on rural problems may be more important than any other factor in achieving sustainable development in the Third World" (Morell, 1985:168).

ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

by

Laurel R. Prevetti

5.0 INTRODUCTION.

Development projects include such diverse schemes as the establishment of fuelwood plantations and the damming of rivers for hydroelectric power generation. Though the differences between projects are vast, a common thread of issues exists among them. Generally, a population of tribal or historically isolated rural people live in close proximity to the natural resources to be developed and probably use these resources for food, fodder, fuelwood, and other basic needs. These people may be indigenous, isolated rural, or others who have derived their own approaches to resource management more or less independently of Western science over a long period, in some cases millennia. The closely related terms "tribal", "indigenous", and "native" people will be used interchangeably to denote all populations that have evolved their own knowledge, technology, and social organization under circumstances little influenced by "modernization". This appendix explores the benefits of including native peoples in the development process and addresses how national and state governments can articulate with these people to realize sustainable natural resource development objectives.

The benefits of incorporating native peoples in development activities are based on the contribution of indigenous knowledge and social structures toward the success of development projects. These benefits are best explored in the context of the environmental problems which face both develop-

ing and developed nations.

The environmental crisis is as critical in the developed world as the developing. Although the developed world has more opportunity to mitigate ecological damage due to its ability to pay for remedial measures, the crisis is a crisis of modernization for both worlds. The scale of the crisis and its coincidence with modernization call into question the fundamental nature of Western science, technology, and institutions.

However, many indigenous cultures, albeit frequently at lower population levels, have interacted with renewable resource systems in a sustainable way for very long periods. Their knowledge of the flora and fauna includes its uses, life cycles, and responses to ecosystem alteration. Experience, trial and error, and other adaptive mechanisms continue to form and modify their knowledge and management techniques (Brokensha et al., 1980). Their social organization has also frequently evolved through a process of innovation and selection which supports the refinement and utilization of their knowledge. Conversely, modern scientists confess their substantial ignorance about how to manage these ecosystems for sustained economic production and gain. Thus, tribal social organizations and knowledge should be maintained so that we can learn from their success (McNeely and Pitt, 1985).

The least disturbed renewable natural resources of developing countries are usually located in rural areas primarily inhabited by indigenous peoples. These areas are often viewed by national government officials as having exceptional potential for development. Conflicts between national governments' and indigenous peoples' perceptions of the potential for development of these areas have led the Bank to develop a specific policy:

It is not the Bank's policy to prevent the development of areas presently occupied by tribal people. However, the Bank will assist projects within areas used or occupied by such people only if it is satisfied that best efforts have been made to obtain the voluntary, full, and conscionable agreement (i.e., under prevailing circumstances and customary laws) of the tribal people or that of their advocates, and that the project design and implementation strategy are appropriate to meet the special needs and wishes of such peoples. (World Bank, 1982:1)

This policy provides a valuable first step towards involving indigenous peoples in the development process. However, the World Bank and other donor agencies can do much more. Assuming that the affected indigenous peoples consent to the project, policies such as that of the Bank could encourage the active participation of indigenous people in the development project. In this way, they would not be passive observers to activities in their own environment.

Indigenous participation can improve development projects by contributing unique information on the natural resources targeted in the project. This indigenous knowledge may include specific understanding of 1) the flowering, fruiting, and other life cycles of flora; 2) the reproductive activities, territories, and feeding habits of fauna; 3) the uses of the flora and fauna; and 4) techniques for managing the biota. While this knowledge might contain some elements recognized by Western science, the knowledge itself is a resource that can contribute to the development potential of the region. Much has been written on the importance of direct participation by local peoples to the success of development projects (Chambers, 1983).

Development projects, however, are almost always sponsored by national governments and designed by people living outside of the target area who do

not share the local cultural understanding of resources. For example, when a government designs a project to harvest the commercially valuable species from native forests to increase exports of high quality hardwoods, it is not uncommon for the people living in or near the area to object strenuously. Frequently, indigenous populations are using related resources in ways central governments cannot understand. Conflicts between development projects and the livelihoods of local people can destroy both the indigenous culture and the success of the development program. However, conflict can be minimized by improving the communication and coordination of natural resource development programs between national governments and indigenous peoples. Specific recommendations regarding how to improve communication and coordination are presented in the next section.

If development is viewed as creating opportunities for improving the standard of living and self-reliance of a nation's population, then indigenous knowledge can provide additional development options (Marks, 1984). "Cultural pluralism", or in other words, the simultaneous participation of many diverse cultures in the development process, augments the potential for realizing development goals due to the range of possible solutions presented by each group. Cultural pluralism is becoming an objective for development and therefore, tribal peoples are among the cultures which should be preserved to maintain diversity and development potential. The preservation of cultural knowledge through improving the well-being of tribal peoples should be an integral part of the development process.

Articulation between national governments and indigenous peoples to promote sustainable development is inhibited by historic conflicts over land title. Indigenous peoples frequently do not have rights to land as private land holders. Indigenous groups have typically been given weak titles to

land collectively, but these rights are insecure, not well specified, and incongruent with the people's historic use of land and current understanding of just use. Where indigenous people's rights to land are especially insecure, it is almost impossible for the indigenous people and development agencies to have a common understanding of their respective roles in the design, implementation, and operation of a development project.

Cultural differences in approaches to collective decision-making, contracts, and knowledge impede effective linkages. Both development agencies and indigenous peoples must be secure, aware of their own strategies and aware of the strategies of the other to establish a working relationship. This is rarely the case.

A variety of institutional arrangements are possible between indigenous peoples and national governments. Given the diversity of governmental structures and bureaucracies throughout the developing world, a discussion of specific linkages is not possible. Instead, three general situations where linkage is important will be explored: (1) the implementation of development programs; (2) the provision of extension services; and (3) the operation of research agencies.

5.1 IMPLEMENTATION OF DEVELOPMENT PROJECTS.

Recommendation 5.A. The international assistance agencies should provide institutional arrangements with indigenous peoples as part of the development project.

The institutional arrangements between the development agency and indigenous population may be formal. For example, a representative of the indigenous people may work on the design of the project and be given veto

powers to help ensure that the project would not destroy the resources or cultural features valued by the natives. Alternatively, the institutional arrangements may be informal. Agency personnel could meet with a segment of the indigenous population to discuss project objectives and learn how the plans might be adjusted to avoid conflicts.

Successful coordination has proven relatively easy when the project has been initiated by small, non-governmental organizations. For example, in the relatively isolated Talamanca region of southeast Costa Rica, traditional farmers of Indian descent were dependent on cacao as their cash crop. One year, they suffered dramatic losses due to a cacao disease. In response, two North Americans who had been living in the community for six years designed a project which encouraged the farmers to diversify their crops and thereby reduce their economic dependence on cacao. The farmers met in small groups to decide which crops they would like to grow and the North Americans obtained seed from research institutions. A nursery was established for each group. Once a week, the farmers would go to the nursery and work the soil, plant seeds, and care for the seedlings. Once the plants were ready for outcropping, they were distributed to the participating farmers.

The institutional arrangement in this case was formed at the community level where the farmers organized themselves and communicated their desires for particular types of crops. The farmers also directly participated in the operation of the project. Each group and associated nursery was small enough so that participation and quality work were assured. The project was also a success because the direct participation did not take a substantial amount of time (personal observation).

Unsuccessful coordination with indigenous populations is more common. In India, for example, the central government established a fuelwood plantation in response to a community's dire need for firewood. The plantation required significant amounts of labor which the community was expected to provide, but could not, due to the immediate demands of tending their farms and collecting firewood from distant locations for current consumption. Had the central government planned the project with the community, it would have learned that there was no excess labor to invest in the plantation (Dogra, 1986).

Many successful development projects are designed by the indigenous population rather than brought in from the outside. For instance, the Kuna Indians of Panama wanted to establish a park along the boundary of their reserve to prevent encroachment by slash and burn agriculturalists and cattle ranchers. The Kuna contacted Panamanian agencies and other Central American institutions for financial and technical support and received both. Their knowledge of these institutions was rooted in their previous experience with the agencies through their participation in the planning processes of other projects. Thus, when the Kuna decided they wanted a park, they had access to agencies and knew how to work with them. The park has been successfully implemented and the Kuna are working as park guardians and managers (Chapin and Breslin, 1984).

Recommendation 5.B. The international assistance projects should incorporate the objectives, knowledge, and talents of tribal peoples in development projects as part of an overall strategy to sustain natural resources and their utilization.

Linkages between the indigenous culture and the development agency should be made as early as possible during project design and in a manner

which recognizes how tribal peoples collectively make decisions. The development agency must be "open" to indigenous objectives, knowledge, and talents, just as the indigenous people must make accommodations in their approach to work effectively with national agencies.

The establishment of a dialogue between the development agency and tribal peoples can occur in many ways. First, in the planning stages of a project, the development agency may survey the target area to determine the potential for project development. The survey should include an exploration of the needs, goals, and opinions of native peoples living in the region with respect to the proposed project. The survey, then, performs two functions: (1) It is a tool by which communication is established between the agency and the tribes and (2) The results of the survey can be directly incorporated into project design (World Bank, 1985).

The dialogue between the agency and the native peoples can also be initiated with the assistance of non-governmental organizations (NGO) which are familiar with the target area, know the people who live there, and are trusted by these people. In this way, the NGO is an intermediary between the two groups until a relationship of trust is established. In addition, the development agency can obtain background information from the NGO which would assist in future communication with the tribal peoples (World Bank, 1985).

Another method for improving communication between the development agency and native peoples is through the building of formal institutions which support and serve the interests of native populations (World Bank, 1985). Many developing nations already have indian affairs agencies, however many of these agencies are not always supportive of maintaining native

populations. Instead, the donor agency could require the establishment of an organization to give native peoples a voice in project decisionmaking. The mandate of the new agency would be to work with tribal peoples to determine their long term needs, assess the current uses of the resources, and allow direct participation in the design of projects. These new institutions could be a formal arrangement at the national level or an informal organization established on a project-by-project basis. The donor agency could enforce this arrangement by making it contingent on the provision of funds.

5.2 AGRICULTURAL AND FORESTRY EXTENSION.

Most developing countries have extension services modeled after those of the United States, whereby people trained in modern agricultural techniques extend the knowledge of national and international agricultural and forestry research centers to rural peoples. Since extension workers communicate with rural peoples as a part of their day to day work, they might be in an ideal position to link indigenous cultures to modern governments. Thus, extension workers could exchange the best of cultural knowledge and organizational approaches to sustaining renewable resource systems with those of the government.

Such, however, is rarely the case. First, extension workers frequently are not allowed to work with peoples whose land title is disputed. Second, the efforts of extension workers are always constrained by whatever budget crisis the national government is experiencing at the time. Gasoline, automobiles in good repair, and materials are funded from the current budget, which is usually inadequate. Third, extension workers have been trained in Western science and invariably perceive their role as extending

modern techniques to those ready to receive it. Rarely does the extension worker bring the needs, let alone the ideas and experience, of the farmers who are trying to modernize back to the agricultural research institutes. Thus, legal and economic constraints, coupled with cultural arrogance, prevent the extension linkage from functioning as an ongoing channel of communication between the national government and indigenous peoples.

Recommendation 5.C. The international assistance agencies should improve the technical and cultural training of extension workers to foster the exchange of knowledge with tribal peoples regarding sustainable natural resource management techniques and supporting social organizations.

At the Tropical Agricultural Center for Research and Training (CATIE) in Costa Rica, extension agents are taught to be sensitive to the local needs of rural populations. Mobile seminars have been effective in bringing the classroom out to the field where specific problems and opportunities can be discussed. These courses encourage dialogue between instructors and students, blending the roles so that each teaches the other. A program in agroforestry and watershed management has incorporated indigenous technologies and stimulated creative solutions to low soil fertility and erosion (Prevetti, personal involvement).

Similarly, the Kuna Indians and CATIE both have benefited from the mobile seminars. Technical assistance has been delivered, but equally important, communication linkages for future exchanges have been kept intact. CATIE personnel will be familiar with the needs and modus operandi of the Kuna when they seek technical assistance again. On the whole, there is a great potential for improving extension operations in developing countries (Archibold et al, 1985).

Extension services also provide important links to research institutes.

Agents who are sensitive to traditional practices can take their observations and questions of indigenous peoples back to scientists for investigation. This point is discussed further in the next section.

While extension services have been legally, economically, and culturally constrained, they can provide an important connection between indigenous peoples and central governments. Training programs can increase the effectiveness of extension services in communicating with indigenous peoples and in learning from traditional land management practices. With a stronger extension link, development agencies would be in a better position to respond to the proposals of indigenous peoples. As a result, the quality of many rural development projects might improve.

5.3 AGRICULTURAL AND FORESTRY RESEARCH.

Recommendation 5.D. The international assistance agencies should encourage institutional linkages between tribal peoples and research organizations to facilitate the flow of scientific and indigenous knowledge.

Linkages with research agencies provide another type of institutional arrangement between indigenous peoples and national governments. Indigenous knowledge and the questions of indigenous peoples can be incorporated into research programs. Furthermore, indigenous peoples themselves can be incorporated within the process of setting research priorities. Opportunities also exist to involve tribal peoples and their techniques into research programs. Such linkages would accelerate and expand the scope of the advancement of formal knowledge and enrich communication networks, thereby enhancing the application of new technologies by both indigenous and rural peoples.

SECTION 5 ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

Specifically, developing linkages between indigenous peoples and research institutes would:

1. Expand modern understanding of the nature of renewable resource systems by incorporating indigenous knowledge of the management and uses of flora and fauna not now known to Western science.
2. Allow indigenous knowledge and techniques to be considered as an alternative in the selection of land management approaches.
3. Sustain a linkage between the central government and indigenous peoples that can be accessed and expanded for subsequent education, extension, or financial assistance.

"On-farm diagnostics" are currently being used to a limited extent by research institutes to select crop varieties and management practices. This approach involves working directly on farms to solve specific problems. While using farms as "experimental laboratories" can enhance linkages between researchers and farmers, the farmer's understanding of problems is frequently not taken into account. Instead, a "foreign" solution is typically introduced which might not be appropriate to the agricultural conditions, skills, objectives, or schedule of the farmer (Richards, 1985). The relationship between researchers and users can be improved if communication between farmer and scientists is opened to allow discussion from all points of knowing. In short, the interpretive/contextual approach to knowledge, as discussed in the Appendix, is much needed in the linkage between researchers and indigenous peoples. Each needs to learn how to interpret what the other is saying, why they are saying it, and how it can further their own interests.

Agricultural researchers and extension agents can learn how farmers themselves adapt and select inputs and techniques to attain their farming objectives. For instance, new inputs and techniques can be provided direct-

SECTION 5 ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

ly to farmers to incorporate and test within their own farming conditions, rather than have inputs and techniques pre-selected through experiment station trials or through experiments on "someone else's" farm. Richards (1985) argues that scientists still have much to learn about the diversity of conditions under which new inputs and techniques might prove fit. This argument is especially true in the case of indigenous peoples because their knowledge and objectives are different from those of other rural peoples.

An adaptive view of science can assist in the communication between research institutes and indigenous communities. Scientific information can be exchanged in both directions. Instead of searching for "universal truths", scientists might recognize that under specific environmental and cultural conditions, flexible implementation strategies are more successful.

Additional benefits to science can occur from the interaction with indigenous peoples. Information regarding medicinal and other uses of plants, ecosystem dynamics, and management techniques could be exchanged. Thus, the knowledge regarding resources would be expanded and could potentially benefit the all segments of the nation's population.

All three forms of institutional arrangements with indigenous peoples -- project implementation linkages, extension connections, and research communications -- need improving to capture the full benefits of indigenous knowledge, technology, and organization for sustainable development.

5.4 CONCLUSION.

Open communication between indigenous peoples and national governments will contribute to the design and implementation of sustainable development. The three categories of linkages addressed in the previous sections can all

SECTION 5 ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

be enhanced by the following recommendations:

Recommendation 5.E. International assistance agencies should work with developing nations in establishing legal tribal land rights.

The greatest barrier to linkages between cultures has been that the resource basis of indigenous culture has been insecure. With their rights to land always subject to reinterpretation by central governments, few indigenous peoples find it possible, let alone advantageous, to link with central governments. From their point of view, linkages threaten what little they have (World Bank, 1982).

Recommendation 5.F. The international assistance agencies should foster cultural pluralism as an objective within the larger goal of sustainable development.

The "arrogance of humanism" (Ehrenfeld, 1978) and the "myths of modernization" (Olafson, 1982; Young, 1982) are major stumbling blocks to communication with indigenous peoples. No doubt, they carry cultural baggage that also impedes understanding. Adoption of the interpretive/contextual approach to knowledge described in the Appendix would greatly enhance articulation.

Recommendation 5.G. The international assistance agencies should assist nations work through conflicts between tribal peoples and central governments.

Conflict is frequently the initial contact between indigenous peoples and governments when natural resources are being considered for development. Although conflict can deepen distrust, it is almost always possible to turn conflict into a working relationship. In some cases, conflict initiates the dialogue which leads to creative solutions. For example, in Gopeshwar,

SECTION 5 ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

India, access to the forest was almost always limited to wealthy corporations which could afford to purchase harvest permits. Trees, meanwhile, were much needed by the local people for their own use. This conflict produced the now famous "Chipko" movement. Direct confrontation gradually evolved into cooperative relations, local management of the forest, and access by local people to the forest's resources (Radhakrishna, 1985).

Conflict does not automatically turn into communication. It helps when the indigenous population is organized around a clear concern and well-defined objective, rather than frustrated by a vague, disparate discontent. The government must be secure and have employees empowered to be able to listen to and work with indigenous people toward a better relationship. Political pressure on the government by a third party frequently helps (World Bank, 1985). Working through conflict takes time and resources and all parties must be patient yet persistent.

Recommendation 5.H. The international assistance agencies should work with central governments and tribal peoples to discover and emphasize common goals.

The sustainable development and management of renewable resource systems by both central governments and native peoples require considerable overlap in objectives. The government may have broader goals, such as enhancing export earnings, and indigenous populations may be especially concerned about protecting cultural sites; however, both must share broad common goals, such as resource protection and employment generation, in order for them to plan and work together.

Recommendation 5.I. The international assistance agencies should maintain linkages with indigenous groups through frequent use.

SECTION 5 ROLES FOR INDIGENOUS INSTITUTIONS AND KNOWLEDGE

The only way communication linkages work in the long term is through frequent use. For this reason, a few institutional linkages used often for multiple purposes will probably be more successful than many linkages only used rarely.

Modern cultures and indigenous cultures do not articulate easily. On the other hand, the gains from articulation between extremes can be great as long as the linkage does not destroy the weaker, inevitably indigenous, culture. Critical renewable resource systems have and continue to be used by tribal peoples. Where excessive population growth or other disturbances, such as rapid technological changes and breakdowns of old values, have not occurred, native peoples continue to use knowledge and techniques which have evolved over centuries in a sustainable manner. Some of the knowledge and techniques, indeed even aspects of their organization, are of value to developing societies. Where indigenous populations have grown too rapidly or where they have been crowded onto too little land, articulation is needed to find a sustainable future.

A REVIEW OF ORGANIZATION THEORY

A.0 INTRODUCTION:

The image of bureaucracy as a mechanical system of command and control which can be optimally arranged to take care of problems seems to dominate the thinking of most participants in development organizations, national and international. Though there are disadvantages to the new images and reasons why the old image has proven so "fit", the development agencies may want to take the lead in exploring how the new images might help third world nations to reorganize to sustain renewable resource systems.

Organization theory has developed important new directions since Weber characterized the ideal type of bureaucracy as an efficient machine. These new conceptualizations, however, are not well reflected in the applied studies on decentralization, reaching the poor, the strengthening of rural institutions, and farming systems. Authors writing on organization for development occasionally use the language and metaphors of the new literature, but the new directions in theory do not appear to be the basis for developing their recommendations. The major challenge to thinking about social organization for development, the "learning-process" approach, developed through inductive reasoning based on the repeated failure in the field of "blueprint" approaches (Korten, 1980). This appendix shows how the new directions in organization theory complement the empirical findings from the third world. Theory and observation together present a strong argument for taking a new path, a direction especially needed for sustaining renewable resource systems.

A.1. THE ORGANIZATION AS A MACHINE:

Max Weber continues to have a profound influence because he explored so many different ways of understanding social organization. Nevertheless, he is most well known for his description of an "ideal type" of bureaucracy as analogous to an efficient machine for rationally reaching social objectives. This image of organization actually preceded Weber. With the rise of Western science and the success of its technology, many argued that social ills stemmed from non-rational behavior and that people should use the scientific method to pattern social discourse, organization, and pursuit of common objectives (see, for example, Karl Pearson, 1892 and Frederick Taylor, 1911). Thus it is not surprising that the rational machine image was developed and expanded by subsequent theorists while many of Weber's other approaches to understanding organization were left nearly idle. According to Weber, modern officialdom functions in the following specific manner (condensed from Weber in Rourke (ed) 1986).

I. There is the principle of fixed and official jurisdictional areas, which are generally ordered by rules, that is, by laws or administrative regulations.

1. The regular activities required for the purposes of the bureaucratically governed structure are distributed in a fixed way as official duties.

2. The authority to give the commands required for the discharge of these duties is distributed in a stable way and is strictly delimited by rules concerning coercive means, physical, sacerdotal, or otherwise, which may be placed at the disposal of officials.

3. Methodological provision is made for the regular and continuous fulfillment of these duties and for the execution of corresponding rights; only persons who have the generally regulated qualifications to serve are employed.

II. The principles of office hierarchy and of levels of graded authority mean a firmly ordered system of super- and subordination in which there is a supervision of the lower offices by the higher ones.

III. The management of the modern office is based upon written documents ('the files'), which are preserved in their original or draught form.

IV. Office management, at least all specialized office management -- and such management is distinctly modern -- usually presupposes thorough and expert training.

V. When the office is fully developed, official activity demands the full working capacity of the official, irrespective of the fact that his obligatory time in the bureau may be firmly delimited.

VI. The management of the office follows general rules, which are more or less stable, more or less exhaustive, and which can be learned. Knowledge of these rules represents a special technical learning which the officials possess."

The efficient machine image continues to pattern thought on organization and administration. Extensions and counter arguments, especially with respect to rationality and efficiency, were built upon or juxtaposed to Weber through the 1960s. Bureaucrats, for example, frequently do not seem to be optimizing as rationally as posited by theory, but this was "explained away" as "satisficing" behavior which is rational given imperfect information and uncertainty (Simon, 1945; March and Simon, 1958) or as "adaptively" rational given changing knowledge and constraints (Cyert and March, 1963). Attempts to apply systems analysis to explain bureaucratic behavior were also predominantly mechanical analogies (Melcher, 1969). Economists described the limitations of social organization in terms of transactions costs -- the effort that goes into monitoring, analyzing, conveying information, collectively deciding, and enforcing decisions -- the friction that limits the effectiveness of organizational machines (Coase, 1937; Arrow, 1974; Williamson, 1975).

Though other images of organizations have arisen, the dominant image and the one first taught still stresses efficiency and rationality. This is best documented in the following introduction from a still widely used text on organization theory by Amitai Etzioni (1964, but in its 29th reprinting and used as a supplementary text at the University of California, Berkeley).

APPENDIX A REVIEW OF ORGANIZATION THEORY

In contrast to earlier societies, modern society has placed a high moral value on rationality, effectiveness, and efficiency. Modern civilization depends largely on organizations as the most rational and efficient form of social grouping known. By coordinating a large number of human actions, the organization creates a powerful social tool. It combines its personnel with its resources, weaving together leaders, experts, workers, machines, and raw materials. At the same time it continually evaluates how well it is performing and tries to adjust itself accordingly in order to achieve its goals. As we shall see, all this allows organizations to serve the various needs of society and its citizens more efficiently than smaller and more natural human groupings, such as families, friendship groups, and communities. (p.1.)

Finally we can also say that the modern organization is generally more efficient than the ancient or medieval species. Changes in the nature of society have made the social environment more congenial to organizations and the art of planning, coordinating, and controlling has developed with the study of administration. (p.2.)

The problem of modern organizations is thus how to construct human groupings that are as rational as possible, and at the same time produce a minimum of undesirable side effects and a maximum of satisfaction. (p.2.)

Islam and Henault (1979) argue that the early efforts to assist developing countries build better administrative systems were also almost entirely rooted in Weber's view of primitive and ideal types of bureaucracy. Administrative agencies in developing countries were seen as fragmented, without well established objectives, and pre-scientific, hence ineffective. Amitai Etzioni again provides the general perception of the time:

... most of these countries are less differentiated, less "worldly" in their orientations, and less ascetic than the Western ones, and ... the typical citizen is more oriented to short-run gratifications than to long ones, and is less achievement-oriented. While many of these societies have shown a growing appetite for the goods and services that efficient and effective modern organizations can provide, in few of them has there developed the intense commitment to the kind of behavior rational organization requires (p.113).

Considerable effort by development assistance agencies during the 1950s and 1960s went toward training administrators and assisting in the reorganization of agencies so that they could further economic goals (Kubr and Wallace, 1983; Ozgediz, 1983; Paul, 1983). Objectives were made explicit,

administrative 'building blocks' were rationalized, functional specialization was developed, scientists were used in appropriate positions, and authority was more closely delegated along hierarchies (La Palombara, 1963; for a less value laden treatment of cultural values, see Lasswell, Lerner, and Montgomery, 1976). Much of the rationalization of bureaucracy was associated with centralization for state-directed development. Esman and Uphoff (1984) argue:

Equivalent theories in the political realm supported this position, including the view of Huntington (1968) that popular mobilization should be restrained; of Myrdal (1968) that the "soft state" needed to be hardened so as to enforce "discipline" on the unruly or impassive masses, and of Binder and associates (1971) that the state should "penetrate" the periphery to tie it into national development objectives.

During the 1960s and early 1970s in the United States, the efficient machine image culminated in efforts at bureaucratic reform through programmed planning and budgeting systems (PPBS), management information systems (MIS), and other formal rules and organizational structures. These and other attempts to formalize bureaucratic processes were also carried to developing countries. These efforts were only partially successful for two reasons. First, developing societies were in fact extremely differentiated, worldly, and rational but in ways few Westerners understood (Geertz, 1967). Second, top down planning has had similarly mixed results for similar reasons in the developed world (Hall, 1980). One of the great strengths of the now extensive applied work on local organization for development has been its emphasis on the richness and individuality of cultural relationships and rationality.

Until the mid-1970s, international development agencies themselves emphasized top down planning as if the future unfolded and agencies could

APPENDIX A REVIEW OF ORGANIZATION THEORY

implement ideal plans "mechanically". The review of development planning experience by Waterston (1965), for example, is almost entirely devoted to the problems of getting plans right in the first place and then getting subordinate agencies to implement them. Such an approach favored large, capital intensive projects where local management was of not especially important or could be undertaken in a rote manner. This misconception of appropriate organization is no longer held, but, as indicated by the quote at the beginning of this appendix, the complexities of institutional realities are being addressed case by case with little guidance from recent theory.

One of the reasons organizations must be more responsive than a "machine" is because they are not simply administrative extensions of presidents or legislative bodies. An agency's mandate is never so well stipulated nor frequently redefined that the agency does not need to make political choices. Heads of state and legislatures do not stipulate precisely to whose tastes the pie should be cooked nor how it should be divided each day. Furthermore, the agency can garner security and a larger budget by catering to those who will lobby the politicians (Crozier, 1964; Ilchman and Uphoff, 1971). This dynamic can be described in the machine image, indeed the term "machine politics" refers specifically to the feedbacks between the clients of bureaucracies and politics. "Interest group pluralism" and other models of this process have been appended to the machine image. The emphasis on the incentives of the individual official are retained, but incentives now come from engagement in the political process and become dynamic through the maintenance of clientele for the agency. Richard Heaver (1982) presents a good summary of this expansion of the Weberian model and the insights it brings to the design of rural development in third world countries.

A.2 BEYOND THE MECHANICAL IMAGE:

During the past two decades, numerous new models for thinking about organizations have been explored. The mechanical model was applied without regard to the environment in which the organization was supposed to perform. Emery and Trist (1965) argued that the organization, like an organism, had to adapt to the nature of the political, legal, technological, and economic environment in which it operated. Unstable environments, for example, "selected" for more information gathering, more frequent planning, adaptive managers, and flexible structure. Bureaucracies with diverse clients with disparate demands evolved structures and processes suitable for political accommodation, while bureaucracies with homogeneous clients and demands could be orderly and scientific. Thus the image began to shift toward the organic, and metaphors began to come from the biological, instead of physical, sciences. Organizations began to be viewed as organisms evolving to fit an environmental niche and later as evolving to hold niches in an "ecological" system of interacting organizations (Campbell, 1969; Emery and Trist, 1973; and Hannan and Freeman, 1979).

This shift in image from the machine to the organism is especially important to the conception of organizations for sustaining renewable resources. Rather than emphasizing optimal planning, structures, and decision rules, it highlights how agencies must constantly adapt to new information, environmental conditions, objectives, and relations with other organizations. Agencies, as noted again and again in the empirical literature, do not in fact adapt as quickly as necessary to avoid mistakes. But this may be in part because those in organizations continue to hold the machine image themselves.

APPENDIX A REVIEW OF ORGANIZATION THEORY

The image of organizations as cultural systems also complements the biological view. Sociologists, since at least Durkheim at the turn of the century and Weber soon after, have argued that there are corporate and bureaucratic cultures which differ in Japanese, German, and Latin societies. Historically, however, there was a tendency to think that modernization would bring bureaucracy toward Weber's "ideal" type such that these cultural differences were only of temporary interest. Organizations are now thought of as entities which evolve and maintain their own cultures within the process of modernization (Deal and Kennedy, 1982; Frost et al, 1985).

Founders of organizations, especially if they are charismatic leaders, can have disproportionate impact on the formation of organizational culture. The culture of each organization, however, also evolves slowly in reaction to its changing environment, including encounters with the cultures of other organizations. Operating procedures determine the flow, aggregation, and interpretation of information from managers in the field to the policy makers at the top of the agency. They also determine the flow, respecification, and elaboration of orders from the top to the field. These stated and unstated objectives and procedures define an agency's identity or culture. They are followed in accordance with the use of indicative language. An expansion of goals and multiplication of operating methods, or simply rapid changes in limited objectives and well defined procedures, can send agencies into an identity or cultural crisis.

Also complementing the general shift toward the biological image, there has been considerable emphasis on the necessity of organizations to learn and adapt (Dunn, 1971; Friedman, 1979; Michaels, 1973; Holling, 1978; Korten, 1980; Johnston and Clark, 1982). This literature stresses how learning can be built into organizational design and how it needs to be

built into the culture of organizations. Though some of this literature is strictly evolutionary, most is presented more as an amendment to the machine image. Perhaps for this reason, it is the most frequently referenced in the literature on organization for development.

Lastly, the literature on social organization has been heavily influenced during the past few decades by an acknowledgment of how technology has driven societies to increased specialization and unexpected interdependence. On top of this specialization, a macro level of organization has evolved to control unforeseen and undesired side effects (LaPorte, 1975). Many theorists have contemplated how technology drives social change, and most of these have lamented the consequences (Sorel, 1908 <1969>; Ellul, 1954; Galbraith, 1967; Winner, 1977; Sclove, 1986). The new literature, however, stresses how the complexity of social organization and feedback loops in industrial societies is much greater than the traditional theoretical literature ever acknowledged. As a result, the new literature stresses that earlier ideas of planning and rationality are simply too simple (Winner, 1975). To date, the technology and social complexity literature has developed interesting descriptions of the consequences of complexity and of adaptive social organization to deal with complexity. However, no theoretical explanations have been developed to explain how technologically-induced complexity can be handled better or how societies, on balance, are better off with technology and its complications. Perhaps for these reasons, there is a strong tendency for authors associated with this literature to argue that technology, as a driving force, should be screened by political or administrative processes before implementation (Ellul, 1954; Galbraith, 1969; Winner, 1977; Sclove, 1986).

A.3 EPISTEMOLOGICAL FOUNDATIONS OF ORGANIZED ACTION:

Conventional ideas of rationality are called into question by all of the new literature on organization. For example, Palumbo (1985) notes:

What is crucial about the focus on macro-organizational behavior is the complexity of joint action. The large number of participants, perspectives, and decision points necessary for the completion of a program brings into stark relief the problems associated with injecting prospective rationality into organizational behavior. As successful implementation in such ambiguous circumstances requires mutual adaptation amongst the actors involved, the only kind of rationality that seems to exist in organizations is retrospective as opposed to prospective. Retrospective rationality involves explaining events after they have occurred, whereas prospective rationality is an attempt to predict and control events before they occur. Although at times organizations attempt to be rational in the prospective sense, most often they are rational only in the retrospective sense. Hence, organizational behavior is rational, but only in the sense that organizations act first, then analyze what they did, rather than the other way around (p.4.).

This passage highlights the difficulties of collective rationality and how people and organizations perhaps only rationalize after the fact. It, however, raises three questions. First, why is it that people within organizations frequently believe prospective rationality -- in the classical sense of information collection and informed, objective decision-making -- is not only possible but that they and the organization are usually practicing it? Second, what is appropriate prospective behavior for people and organizations? And third, how should organizations and people relate? These questions beg a review of how our beliefs have developed in the past.

Early Western scientists set out to understand a static world as God had created it. They envisioned the acquisition of knowledge as a process whereby individual minds investigate nature's parts and processes. The mind has been thought of as an independent entity that perceives and interprets. Asking questions, thinking, and acting neither influence the underlying principles which govern nature nor affect the mind itself. Like the mind,

APPENDIX A REVIEW OF ORGANIZATION THEORY

nature in the dominant world view also just exists. The world just is and the mind just perceives and interprets. In this way, people and the natural world have been juxtaposed from the beginning of Western thought. The emphasis on the objectivity of knowledge stems from this static juxtaposition of mind and nature.

Conventional western thought on knowledge has several other important characteristics. First, there has always been a strong emphasis on useful knowledge. Second, science is interested in universal phenomena. These two characteristics are complementary, for universal knowledge is more useful because it can be applied anywhere. Third, the world can be conceived of as consisting of many atomistic parts which can be described and "known" independently of each other. Fourth, the parts are related in a systematic manner that can be known. Knowing, in this case, entails being able to predict the effect on the whole system of a change in one of the parts. Prediction requires that the system can be described in a manner which is tractable, which can be described logically, or mathematically, so that "if this, then that" statements can be made. For knowledge to be universal, neither the nature of the parts nor the nature of the relationships can change. The relative proportion of the parts and the relative strengths of the relationships, however, can change.

This Western "world view" might be illustrated as in Figure A-1. We observe nature, derive theories about universal characteristics of natural parts and relationships in nature, test theories against nature, design technologies and social organization based on theories, and thereby modify nature. But we only modify the proportions of the parts and relative strengths of the relationships. The universal nature of the parts and

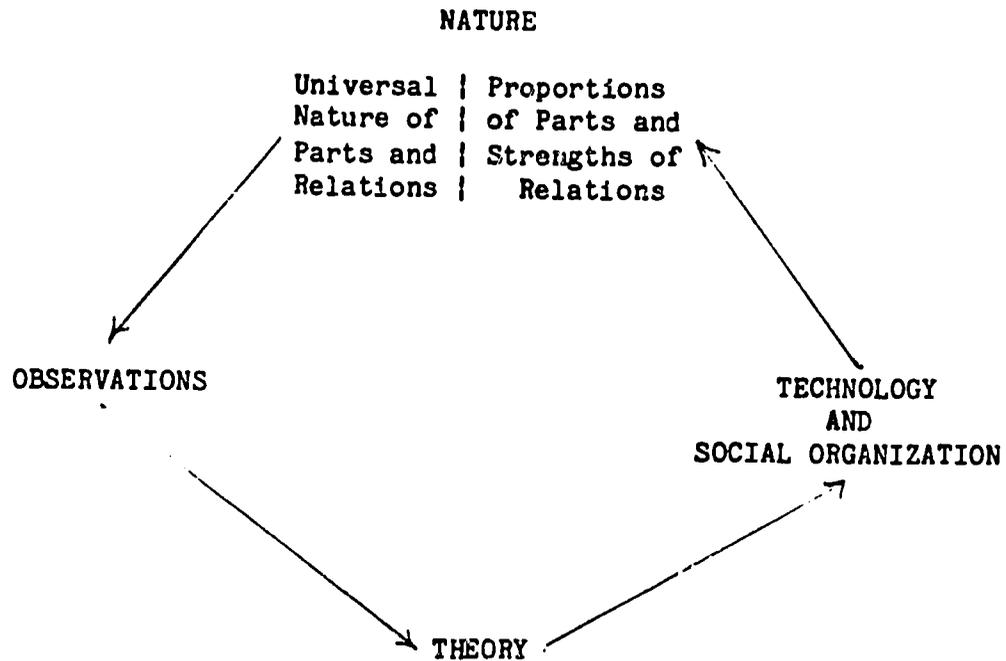


Figure A-1. The dominant, or mechanical, world view.

relations remain unchanged.

With nature unchanging, knowledge about nature can accumulate over time. The idea that science is cumulative, that we are coming closer and closer to knowing all there is to know about the parts and relations in nature, is deeply embedded in Western thought. Once in a while, scientists lament that there may be an infinite amount to know, but few question that we do not continue to know more about the unchanging principles of nature. This belief in the accumulation of scientific knowledge complements the Western belief in progress.

This dominant world view is characterized as mechanical partly because Newton's mechanics was the most important breakthrough in this way of think-

ing and partly because scientists and philosophers have used machines as analogies for natural and social systems ever since (Randall, 1976:253-281,308-386). The parts and relationships of a machine do not change, but the relative strengths of the relationships do change when a machine changes speed, turns, or stops. Thus Weber's description of the "ideal type" of bureaucracy with his stress on fixed rules, lines of authority, rationality, and efficiency is merely another illustration of the dominant, mechanical world view.

The dominant world view, with its emphasis on objective knowledge of a natural world operating on universal principles, has increasingly come under attack. First, there is the problem of complexity. The laws of physics with respect to motion, the attractive forces, and heat are universal. The ways in which molecules chemically react are invariant. But the numbers of ways that the simple parts and relationships studied by the physicist and chemist can combine to form complex biological organisms, let alone ecological systems with human participants, is essentially infinite. Hence, there is no reasons to expect to find universal principles for the management of renewable resource systems apart from people, let alone with people involved.

Second, natural and social systems are not only complex but constantly changing. Both the parts of systems and the relationships between parts are constantly evolving. The rate of evolution, of course, varies from the incredibly slow in the case of geological processes (though only on the average) and the larger species with longer life spans to the incredibly fast in the case of microorganisms and social organization. Hence, there is another reason to not expect universal principles.

Third, there is a nexus of problems associated with objectivity, consciousness, intentionality, and free will. People are not apart from nature let alone from their social systems. Learning changes knowledge, how people act, and the dynamics of the interactions between peoples and between people and nature. Knowing, once it is in any sense used, changes what is thereafter important to know.

Fourth, people do not independently perceive and know either the natural or the social world. Each of us perceives through our social organization. Each is dependent on others for his or her special knowledge of everything from daily events to scientific findings. Furthermore, information is collected, conveyed, and accumulated through social organizations -- weather services, research institutes, universities, bureaucracies, corporations, news networks, and political systems. Culture in general and social organization in particular direct the perception, transmittal, and retention of information. Knowledge reflects the values, the ways of thinking, the technologies for perceiving, transmitting, and retaining information, and the social organization of each culture. And as noted above, each of these factors also affects what there is to know.

Fifth, organizations not only transmit information but acquire knowledge themselves. They learn and acquire organizational knowledge that is more than the sum of the knowledge of the individuals in the organization. Organizations perceive through the research and knowledge of their individual members, but this information is filtered and processed by the organization as if it were a brain. Organizations also use their knowledge to make decisions which cannot be accounted for by the knowledge and preferences of individuals within the organization. Organizations make mistakes which sometimes encourage them to change their ways. And when

organizations succeed, they grow and are replicated.

Sixth, learning is mostly a process of trial, error, and selection. Deductive reasoning, hypothesizing, experimenting, and testing play an important role in generating trials, but the only real experiment and test must be conducted in practice.

These differences between conventional and the emerging knowledge and epistemology have been described by anthropologists, literary critics, philosophers, physicists, planners, policy scientists, and others in many different yet complementary ways (Ziman, 1968; Toulmin, 1972; Geertz, 1973; Rittel and Webber, 1973; Campbell, 1974; Booth, 1979; Rorty, 1979; Rappaport, 1979; Rabinow and Sullivan, 1979; Brunner, 1982; Vayda, 1983; Grene, 1985).

We are our own knowing subject. How we organize and act stems from how we know. And when we learn to know differently, we organize and act differently. But we learn through doing and, to a large extent, as members of organizations. Indeed, in many cases it is the organizations that learn and know. There is no way to step outside of ourselves and our organizations and know them objectively. Even if we could, the knowledge would not be universal, for knowing it would change how we organize, act, learn, and know. But we are not of one way of knowing or all members of the same organization or culture learning the same thing. We intermesh like many observant, thinking dancers on a large stage rather than like the passive gears of a clock.

Without positivism, prediction and prescription are lost. The efficacy of positive social science, however, has never been persuasive. Further-

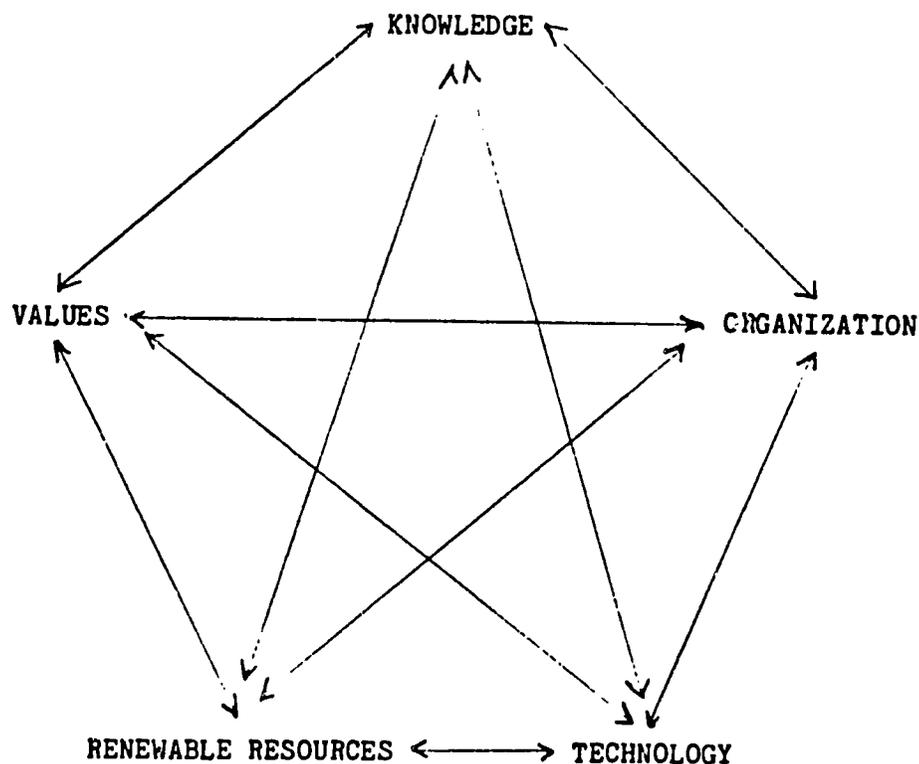
more, many theorists are beginning to see false beliefs in positivism as a cause of the rigidity of modern organizations. The belief in objectivity and universality has slowed organizational learning and prevented articulation with other disciplines, organizations, and cultures. This theoretical diagnosis is surprisingly complementary with the applied analyses on social organization for development. Again and again, the diagnoses of the organizational difficulties of development indicate that agencies are not sufficiently adaptive, that success comes through the ability to monitor, learn, and respond to surprise rather than through attempting to rationally plan and control the agency's interaction with people, other organizations, and changes in the natural environment.

There is a very important difference between this new world view and that of Western science with respect to social organization for sustaining renewable resources. In the new view, people are included as a part of evolving local renewable resource systems. The nature of each system has evolved to reflect the nature of the people -- their social organization, knowledge, technologies, and values. Characteristics of many species have been selected by people for centuries. Desirable biological relationships have been maintained with the help of people. What species and varieties are selected and which relationships are assisted depend on people's values, what they know, how they are socially organized to interact with their environment and biological system, and the techniques available to them.

Similarly, the nature of the people reflect some of the characteristics of the physical environment and biological system. Different physical terrains and climates and their associated biological systems -- alpine, tropical rainforest, savanna, and desert -- lead to different ways of knowing, select for different forms of social organization, support different

technologies, and encourage different values. People have evolved differently in different renewable resource systems.

And so human culture molds renewable resource systems while renewable resource systems mold culture. Each puts selective pressure on the other. People and their biological systems have coevolved. The ecosystem, in this view, includes the knowledge system, value system, social organization, and technology of the people along with the biological system. This, of course, is a much bigger ecosystem than most ecologists have been willing to ponder, but 'human ecologists' have been contemplating ecosystems in this sense for several decades.



FigureA-2 The coevolution of knowledge, values, social organization, technology, and renewable resources.

APPENDIX A REVIEW OF ORGANIZATION THEORY

The system in Figure A-2 illustrates a coevolutionary world view (Norgaard, 1984 and forthcoming). Innovations or changes occur in each of the components of the ecosystem: knowledge, organization, values, technology, and renewable resources. Whether these innovations or changes are maintained depends on whether they prove fit with respect to the other components as indicated by the arrows in the figure. Since each component puts selective pressure on the others, each reflects characteristics of the others. Hence each can only be understood in the context of the whole.

The context can be interpreted as cultural. Organizations, technologies, and renewable resource systems can only be understood through their cultural context. There is no absolute way of knowing. One can only interpret contextually.

Our capacity to understand is rooted in our own self-definitions, hence in what we are. What we are is a self-interpreting and self-defining animal. We are always in a cultural world, amidst a 'web of signification we ourselves have spun.' There is no outside, detached standpoint from which to gather and present brute data. When we try to understand the cultural world, we are dealing with interpretations and interpretations of interpretations (Rabinow and Sullivan, 1979:6).

The shift from positivism and mechanical world views to an interpretive/contextual understanding and evolutionary world views opens up new ways of thinking about social organization for the the protection, management, development, and coordination of renewable resource systems. This alternative world view is becoming well established in the social sciences. It complements the observations, personal experience and and thinking of many who have worked with social organization for development. Most report that optimal organization is not a useful concept; it varies from place to place and time to time. Both strong local and strong national agencies are often desirable. On the other hand, difficulties with articulation between agencies and cultural ways of knowing seem to be almost universal (Leonard,

APPENDIX A REVIEW OF ORGANIZATION THEORY

1977; Esman and Uphoff, 1984; McNeely and Pitt, 1985).

If the shift toward an interpretive/contextual understanding of knowledge can be encouraged and institutionalized through discussions within the international development agencies and between the agencies and developing countries, several things might occur. First, organizations would better understand themselves, their limits, and how they have constrained interpretation and the accumulation of contextual knowledge in the past. Second, organizations may begin to devise structures and reward systems to enhance the use of the interpretive/contextual approach and to accumulate such knowledge. Third, organizations would be better able to work with other organizations -- local and national, public and private, scientific and non-scientific, and indigenous -- if they were open to an interpretive/-contextual approach to knowledge. And fourth, organizations would better be able to adapt to change with less emphasis on the idea of universal principles and one right way of collecting information and making decisions.

On the other hand, there are some very serious barriers to the adoption of the interpretive/contextual approach to understanding. First, responsible behavior, especially individual behavior, will no longer be justified in terms of absolute procedural rights and wrongs justified by "right thinking". Accountability will rest on judgments as to whether the interpretive process was sufficiently followed and a "reasonable" decision reached. Second, if organizations indeed function better together they will lose much of their individual organizational identity, individual claim to having contributed to the public good, access to and support from special interest groups, and individual claim to special financial backing from politicians. Third, the hierarchies of expertise and justification for

action associated with a positivist understanding of knowledge often provide a modern institutional guise for old class structures. These barriers to the adoption of an interpretive/contextual approach to understanding and working together may take a long time to erode.

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