SOCIO-ECONOMIC ASPECTS OF NATURAL RESOURCE MANAGEMENT

A Framework for Policy Research

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INTRODUCTION

In many respects, the key to future economic, social and political progress in the poorer countries of the world lies in what happens in the rural areas. This is where the vast majority of the world's poorest, least productive, undereducated and politically marginal people live; and the high birth rates prevailing in rural areas motor the population explosion that makes all economic development efforts in rural and urban areas a rapidly moving target. Reflecting recognition of this fact, the field of rural development has rapidly emerged as one of the most promising and important, and at the same time complex and difficult, for multilateral and bilateral development assistance agencies. For U.S. AID, the central objectives of rural development are: first, to stimulate the self-satisfaction of basic human needs through increased construction, production and trade; second, to accomplish this objective through processes that facilitate widespread participation and ensure reasonably equitable access to economic, social and political opportunities.

These objectives do not always complement each other. In fact, as Jon Moris points out, it is frequently the case in development projects that the second objective is sacrificed in order to accomplish the other:

> The paradox we see repeated in program after program is that in order to meet ambitious production goals, new projects exclude themselves from the very organizational frameworks they are

> claiming to influence. It is time to admit that almost anywhere in the tropics, provided one has a cereal grain crop, plenty of money, a few proven managers, and freedom to work outside of the local administrative system, it is possible to show dramatic production increases in the short run. But such success is not evidence that the long-run capability of the indigenous system has been changed, or that a large numbers of peasants have genuinely benefited (Morris, 1981).

The first objective can sometimes be maximized in the short term without any progress toward the second being made. But, it is increasingly apparent that a dynamic process of rural development cannot be sustained over time without a movement toward more local participation and more equitable distribtuion of the fruits of development.

This long range interdependence between the two sometimes conflicting goals of rural development programs defines one of the major tasks for social science analysis in rural development planning and implementation. A policy-oriented social science research agenda should aim to narrow the interstices between what is possible from an efficiency standpoint and what is sustainable for an institutional perspctive. How can programs and projects that promise to enhance aggregate productivity be made more participatory and equitable? How can public participation and efforts to distribute assets and power be channeled so as not to impede potential gains in production and to ensure necessary organizational discipline and individual incentive?

This paper examines the need for social science research to shed light on these basic questions within the context of one increasingly vital aspect of rural development: the use and management of renewable natural resources. The short-run

conflicts between the goal of inreasing production and that of securing more participation and equity underlie virtually every natural resource-related project in the developing world. Furthermore, since the potential productive contributions of renewable natural resources--land, water, trees, fisheries, animal stocks, agricultural products--are not fixed but instead a factor of past levels of exploitation and the quality of management practices applied over time, the future adverse conseqences of failing to institutionalize the participatory and equity objectives are magnified.

THE RES ARCH TASK DEFINED

A. Natural Resource Degradation

Many so-called rural development projects being planned and implemented in developing countries seek to harness available renewable natural resources for economic development purposes. There are two primary reasons for this. First, as development economists have long pointed out, the most productive investments in underdeveloped areas are those that open up for exploitation abundant natural resources, including fertile soil, lush forest cover and ample fresh water. But, even in areas where available natural resources are more meager or are already being put to extensive use--that is, where the marginal return to investment may be lower--large sums of money are being invested in natural resource-related projects in the rural sector. This is because most poor countries still have a very high percentage of the

population living in rural areas and directly dependent upon the daily yield they can secure from the land. No reasonable development strategy can make the assumption that rapid industrialization and urbanization can provide for the economic improvement of more than a very small portion of these people. For the foreseeable future, then, overall rural development, not to mention the welfare of most rural people, is going to be heavily dependent upon improved productive utilization of basic renewable resources--forests and other vegetative cover, agricultural products, soil and water.

Yet, in many Third World countries--and particularly in the lowest income countries--mismanagement of basic renewable resources is rampant in the rural sector. Once abundant forests are being chopped down far faster than they can be replaced, creating shortages of wood for construction, cooking and heating. Deforestation also has numerous secondary ecological consequences; inducing, for instance, increased soil erosion that undermines future productive capacity of the land and causes serious downstream problems associated with siltation. Although much forest land is cleared for the purposes of increasing agricultural production, forest soils that are not cared for often lose their fertility after short periods of cultivation because they tend to be shallow and subject to hardening and the leaching of nutrients. In many arid areas, the pressures of wood gathering, traditional farming techniques, population growth, and grazing of animals are contributing to desert-like conditions that only decrease further the productivity of marginal lands and

make the rural poor even more susceptible to drought and other natural disasters.

In addition poor natural resource management is making it more difficult or more costly for many developing countries to maintain major capital investment projects designed, ironically to increase production from basic natural resources. In some instances, nearly as much irrigated agricultural land has been removed from production as a result of waterlogging and salinization of soils as has been served by new irigation schemes in recent years. In dry areas, the drilling of deep, mechanically operated wells has frequently stimulated so much concentration and expansion of animal herds that serious devegetation now threatens the productivity of the range within hundreds of square miles. A wide variety of large capital projects--dams, irrigation systems, highways, harbors and navigable river channels--are being threatened throughout the developing world by the inability of these projects to cope with exogenous problems such as siltation, flooding and landslides induced by poor land management practices in the rural sector.

B. Increased Focus on Renewable Resource Management

In response to this situation, there has been a significant increase in concern for renewable resource management by developing country governments, international organizations, development assistance agencies and international private voluntary organizations. Technical assistance in renewable resources management; research devoted to improving the

resiliency and viability of crops, vegetation and animals in arid or otherwise marginal environments; administrative and training packages to enhance institutional capacity to protect resources from abuse and to enforce necessary prohibitions--all have become more critical components of rural development projects.

Indeed, in the 1980s, continuing advances in science and technology promise to increase significantly the potential productive contributions from natural resources through improved technical packages to: conserve resource inputs (efficient cookstoves); utilize marginal environments (improved dryland farming techniques); raise productivity per unit of land (newly developed seeds and crops); reduce adverse externalities (no-till farming); and rapidly replace stocks of essential renewable resources such as wood (fast-growing plantation trees).

To deliver these improved techniques to the local level, AID and other development assistance agencies are already spending billions of dollars to implement resource management projects, train scientists and tehnicians, and build up institutional capabilities for natural resource management.

This expanded concern for natural resource management in rural development is particularly manifested at the project level, where donors are sponsoring a growing number of social forestry, agro-forestry, watershed protection, rangeland improvement, and similar projects that directly target natural resource management as a primary objective. In addition, a broad array of resource management components--soil conservation, erosion control, village woodlots, shelter belts, dune

stabilization, revegetation, land rehabilitation--are now almost routinely included in major agricultural, forestry, rangeland or overall integrated rural development projects. In short, it is likely that the pace of new breakthroughs in technology and in technical knowledge, as well as the numbers of project and amounts of money spent to deploy them throughout the developing world, will continue to increase in the coming decade.

C. The Institutional Lag

Despite this outpouring of concern, money and expertise to preserve, enhance and restore the productive potential of renwable natural resources, there is as yet little reason to believe that project-related resource management activities are making substantial progress in reversing the general state of natural resource degradation in many developing countries. In addition, there appears a growing sense of pessimism within development assistance agencies that few of the resource management projects are themselves succeeding. Some have already proven to be obvious failures and many will probably be quietly abandoned as the project cycle runs its course. For example, one observer recently noted that while almost $66 million was allocated to forestry products in the Sahel countries between 1977 and 1979, the wood produced would contribute less than 2 percent of total wood requirements:

> Unfortunately, inadequate design, low survival, and deficient aftercare and followup, singly or in combination, will prevent most projects from having much direct and lasting impact on the well-being of the poorest Sahelians (Winterbottom, 1980).

Although technical packages still must be improved, the most serious problems being encountered by many natural resource management projects, most observers tend to agree, are not fundamentally technical. More often, the problem is that national and local institutional capabilities to mobilize and induce people to promote, implement and maintain the natural resource management projects are lacking.

To a very significant degree, then, technical capability to manage and improve renewable natural resource systems threatens to outstrip the ability of institutions in developing countries to organize people to apply improved techniques at the local level. To help close this gap, there is a growing need for a better understanding of the types of local organizations and incentive systems that best promote community management of natural resources in various circumstances.

This need is reflected by analysts observing a wide variety of natural resource management projects. A recent World Bank report on groundwater development stated:

> There is an urgent need for research to devise appropriate legal frameworks to fit various social and political systems in advance of the period when integrated water development is essential. It is evident that in many countries the trends in groundwater development are leading to lost opportunities, and problems and inefficiencies with which the existing water institutions are unable to cope. The regulation and management problems that are emerging require new and more effective water institutions if the groundwater development momentum is to be maintained (Carruthers and Stoner, 1981).

And an AID forester has pointed out that "a considerable amount of research remains to be done on the socio-economic parameters of rural forestry in the Sahel" (Taylor, 1980).

This, in essence, is the challenge for social science research in the promotion of improved natural resource management. There are two crucial reasons why it is important to advance the current state of social science knowledge about the socio-economic aspects of natural resource management.

1. Protection of Project Investments:

Unless institutional change can keep pace with technical potential, it is likely that many of the present investments being made in an attempt to improve natural resource management and productivity will be squandered. Vernon Ruttan, among others, has pointed out the need to advance social science knowledge as well as scientific knowledge:

> Unless social science research can generate new knowledge leading to viable institutional innovation and more effective institutional performance, the potential productivity growth made possible by scientific and technical innovation will be under utilized. (Ruttan, 1977).

2. Growing Concern Among National Governments:

Beyond the specific need to advance institutional capabilities to ensure the continued success of development projects focusing on improved natural resource management, there is also a broader demand for institutional knowledge. More developing country governments have expressed concern about organizing a response to natural resource degradation, and requested assistance from international agencies in accomplishing this. (U.S. AID, 1979). A better understanding of what types of organizations, incentives, legal frameworks, and institutional alternatives can work under different conditions is necessary if

development assistance agencies are going to be able to respond to the needs of national governments in search of an organizational strategy for improving natural resource management at the local level.

D. The Central Questions for Social Science Research

The desired outcome of a social science research program stressing the socio-economic aspects of natural resource management is assumed to be a set of broad theoretical guidelines to development assistance agencies for producing better institutional designs and increasing effective project implementation. This should ultimately contribute to: a) more efficient utilization of scientific and tehnological knowledge to increase production from renewable natural resource systems; and b) more participatory and equitable rural development.

The actual outcomes are more likely to present a somewhat haphazard record of do's, don'ts and warning signals based on a wide variety of research methodologies and uncontrolled circumstances viewed through the eyes of many individual researchers. Moreover, whatever clearcut generalizations do emerge are likely to be limited to particular geographic regions, political-economic systems, or types of natural resource management schemes. Necessary though it is, no investment in research into the socio-economic aspects of natural resource management is going to culminate in design of a disease-resistant institutional framework or a fast-growing local organizational structure for accomplishing resource management goals.

Accepting the fact that no absolute solutions are likely to emerge for the problem of institutional design, the difficult questions are: a) how to structure the unruly and unscientific research agenda so that it leads to accrual of more refined operational prescriptions and a broader base of experiential knowledge for use in institutional design; and b) at what level(s) and via what methodologies should research be conducted?

As a start, there appears a need for social science research to contribute to improved knowledge in at least three broad areas:

1. The complex socio-political-economic causes that often underlie the lack of adequate natural resource management practices in developing countries.

2. The range of factors that stimulate different responses by peoples to the specter of continuing degradation of the natural resource base upon which they depend; why do some people flee the problems, others remain but continue as ever, and far fewer undertake collective actions to change the situation?

3. The administrative arrangements, institutional configurations, or incentive structures most likely to promote better natural resource management under different political-economic circumstances and within different types of natural resource-oriented projects--

irrigated agriculture, rainfed agriculture, commercial timber production, social forestry, rangeland management, etc.

Although development research has not generally focused on natural resource management as a separate compartment, there is currently a growing body of social science research of relevance to these questions. Careful review of the findings, lessons, and omissions that emerge from these efforts is an essential exercise.

REVIEW OF EXISTING RESEARCH

A. Causes of Natural Resource Mismanagement

To the extent that there has been a dominant (if atheoretical) paradigm explaining the causes of much rural environmental deterioration in developing countries and guiding international efforts to amerliorate the problems, it has centered around two broad assumptions:

a) that traditional systems of land-based production are/were inherently consumptive of soil fertility and other natural resource stocks and only perpetuable under low population densities;

b) that rapid population growth in the second half of the 20th century has fundamentally undermined the operability

of pastoralism, shifting cultivation, and other traditional renewable resource-dependent systems; that is, population growth has inexorably pushed rural peoples to exceed the carring capacity of the land around them under their traditional technologies.

Conveniently, these assumptions tend to push in the direction of more modernization, more technology, more elaborate and Westernized management systems--they cast the ecological predicament facing developing countries as primarily a problem of improving techniques and lowering the birthrate.

But this perspective often ignores substantial historical evidence that many traditional systems, under a wide range of population densities, ecological terrain and technological sophistication, prospered because of elaborate rituals and management of natural resource systems that permitted intensive exploitation without inducing degradation. In some cases, it was the introduction of modern technology that led to a breakdown of such management strategies (Horowitz, 1979; Lawry, 1983). Conversely, the social anthropology literature is rich with examples of the elaborate rituals and maintenance procedures adopted by some cultures over time in the face of very rapid population growth with a limited natural resource base on which to draw (Boserup, 1965; Geertz, 1963; Wilkenson, 1973).

Increasingly, social science analysts have come to view the abuse of natural resources at the local level as resulting from more complex causes than the continuation (out of ignorance) of

traditional techniques under conditions of rapid population growth and limited resources. Instead, it is often seen as a fundamental manifestation of much broader social-political-economic imbalances prevailing in rural areas in many developing countries (Leonard, 1981a). Some of the causal factor examined include: maldistribution of resources or access to resources within social systems; the decline of traditional cultural values, rituals, or patron-client relationships that previously organized people to manage the land; uncertainties such as war, civil strife, or tenuous land tenure situations that vastly alter the calculus in favor of current consumption; the sudden foreclosure of existing resource management strategies (especially in the case of extensive strategies such as pastoralism) as a result of artificial political boundaries or the exercise of political power by some groups over others (Murdoch, 1980; Sprague, 1980; Eckholm, 1975; Spooner, 1982; Leonard, In Press).

This view of natural resource mismanagement as deeply embedded in the socio-economic fabric of society is increasingly endorsed by scientists and development technicians who see that infusions of technology and capital have not, by themselves, led to improvements in land management techniques or increased productive utilization of natural resources on a sustainable basis (Altieri, et. al., 1983).

In essence, recent studies argue that it may be more useful to view natural resource deterioration as resulting from serious socio-political-economic imbalances that alter or undermine the

willingness or ability of some or all groups to expend part of their present labor and capital to maintain their productive base for the future. Such a perspective obviously raises questions of major importance for development assistance agencies intent today on reducing the ecological problems that threaten economic development in rural areas in a very large number of developing countries. The fundamental point may be that often externally conceived resource management projects fail because they focus on treating the symptoms without eliminating the underlying causes.

B. How Do People Respond to Local Natural Resources Degradation?

To date, most of the existing literature deals primarily with one aspect of this question: what inhibits people from joining together to take collective action to improve management of common property or unlimited access resources, even when all suffer from not doing so?

The most important body of literature that provides insights into this question can be broadly lumped under the heading of public choice theory. In examining the problems of natural resource management, public choice theory seeks to identify reasons why individual rational actors are compelled to take actions that ultimately reduce their welfare and nevertheless resist collective action to change the outcome.

The concepts which are central to public choice explanations of why people fail to take collective action in the face of endemic overexploitation of natural resources (tragedy of the commons, "free rider" and externality problems, "lemon" problems,

assurance problems) have been widely applied to a variety of situations in developing countries. These include overgrazing of rangelands (Runge, 1981); cutting of scarce trees for fuelwood (Thomson, 1981); poor management of irrigation systems (Freeman and Lowdermilk, 1981); and overexploitation of fisheries (Bailey, 1983).

What emerge from this literature are strong arguments that collective management of natural resources will only be possible when effective means are found at the local level to: exclude noncontributors from benefits, ensure some measure of equitable distribution of benefits, decrease insecurity and vulnerability of individual contributors, improve information about the assets and capabilities of others with whom collective action might be undertaken, and build a feeling of mutual trust that all will contribute to the attainment of the collective good.

C. Institutions and Incentives to Promote Better Resource Management

Recent contributions to the literature tend to arrive at similar conclusions with regard to institutional considerations. Generally, they argue that attempts to stimulate better resource management practices in the rural sector will depend on the extent to which institutions, laws, collective organizations, incentives and governmental programs:

a. facilitate and are sensitive to local inputs and participation;

b. ensure that benefits of investment in natural resource management practices will accrue to those who make the investments.

These conclusions tend to translate into proposals for:

1. Localization:

More devolution of decision-making power and control in project areas to local beneficiaries.

2. Privatization:

The establishment of formal rights of tenure that protect and institutionalize the vested interests that individuals and groups acquire as a result of managing the natural resources in areas traditionally regarded as common property or open access--tree tenure, land title, grazing rights, water use rights, etc.

3. Marketization:

More use of the market to allocate goods and services when there is an obvious demand and where these can be separated into discrete packages, on the assumption that active market demand will lead to prices on items such as fuelwood and agricultural products that will create economic incentives for natural resource management to enhance long-term production.

D. Conflicting Institutional Pressures:

Yet, two strong tendencies make it difficult to actually make rural development efforts be more participatory, draw better links between effort and reward, and be more responsive to market forces. First, national governments continue to be strongly biased toward centralized, regulatory/administrative approaches. Second, external supporters of development projects, despite the best of intentions, generally place project efficiency above local participation in planning and implementation of rural development projects.

Moreover, there is an underlying awareness even among advocates of localization, privatization, and marketization that these concepts can only be selectively applied to natural resource management tasks and projects.

Decentralized planning and administration may indeed increase the degree to which local communities participate and share the goals of rural development projects, but it may come at a sacrifice in the ability to make important technical resource management decisions (size of herds on grazing lands, level of timber harvest that is sustainable) and to manage multi-faceted resource development projects such as large river basin management schemes. Furthermore, sometimes there is simply no substitute for the exercise of central political power to halt tragedy of the commons situations. A good example is President Nyerere's complete ban on grazing in the entire Kondoa catchment area of Tanzania to arrest deforestation and desertization (Tosi, et al., 1980).

Privatization ensures that putative managers of natural resources will receive benefits, but creates inequities and may exacerbate problems of smallholders of agricultural and grazing lands (Lawry, 1983). For a resource such as groundwater, private removal of a common property stock is particularly problematical because in effect it can lead to monopolization of water by those who can afford expensive mechanized pumping equipment (Carruthers and Stoner, 1981).

Similarly, there are limits to the ability of markets to provide collective goods and to positively reinforce natural resource management.

AN AGENDA FOR FUTURE RESEARCH

A. Some Generalizations

From the literature of several different social science disciplines, there emerges increasing consensus around four key points relating to the socio-economic aspects of natural resource management. These can be stated briefly.

1. Overall Socio-Economic Circumstances Cannot Be Ignored:

It is difficult to encourage or mobilize people to manage their local natural resources for long-term sustainability in the context of a wide array of political, economic and social circumstances that oppress them. That is, although sweeping changes to reduce corruption, distribute land more equitably, reduce urban bias, etc may not solve all natural resource problems, they would make solutions more possible.

Obviously, this does not mean that development assistance efforts should focus only on inducing broad system-wide changes or that they should not become involved in local resource management projects until the overall policy and institutional milieu is supportive. The challenge is to find ways to work at the local level so that the "rig of the system" does not end up undermining the success of resource management projects or reducing people's willingness or ability to participate in natural resource management programs. The oft-cited example in Ethiopia, where local laborers in a rural reforestation program purposely planted seedlings upside down (Thomas, 1974), clearly illustrates what can happen when people perceive that they will not receive their due benefits from otherwise positive natural resource management projects.

2. Barriers Exist to Management of Both Private and Common Property Resources:

People are generally reluctant to join in collective efforts to manage the natural resources upon which they depend (even in the face of obvious degradation) because of the costs, risks and uncertainties associated with collective action. The tendency in recent years has been for donors to view this as a problem which must be solved primarily through the granting of exclusive rights to individuals and corporate groups for the exploitation of geographically-bounded areas (pastures, water, forest, etc.). But, many private property-oriented projects are faring little better than those that demand collective stewardship over a particular resource base.

The problem, whether addressed through solutions stressing collective management or privatization, is to reduce individual and collective uncertainty and risk through adherence to some set of viable institutional rules, violation of which is constrained by threat of social and legal sanctions. Until the challenge to control natural resource abuse becomes one of isolating deviant actors, rather than one of changing fundamental modes of behavior, neither private nor collective resource management schemes are likely to succeed.

3. Local Participation Is Essential to the Success of Resource Management:

Efforts to build organizations for effective natural resource management as a basic element of rural development will fail unless they are genuinely paticipatory at the local level, are sensitive to local conditions, reduce the problem of free riders through exclusion of noncontributors from benefits, and provide some modicum of reward for individual initiative.

This institutional challenge at the local level is too often viewed as one of building new institutions to initiate and organize programs to manage natural resources. Recent studies emphasize the potential for orienting and supporting already existing institutions, or even reviving traditional institutions, to take up the task of resource management in rural areas. Too often, donors have proliferated new task-specific institutions and organizations at the local level--for obvious political, ideological, economic or bureaucratic reasons--which have had no organic link to the local rural community and social structure.

4. National Commitment and Support Are Vital:

Despite the absolute necessity of local participation, there remains an obvious need for both central government and intermediate level decisionmaking to ensure proper attention is paid to natural resource management at the local level--both to protect the interests of smallholders and those without access to their own land, trees or water, and to enforce sanctions in some cases that may be quite unpopular at the local level.

Unless national governments develop the will to implement the necessary legal and economic changes to alter resource abuse at the local level and allocate the necessary administrative and economic resources to support such efforts, the success of local resource management programs is, at best, going to be limited to discrete geographical areas. A few model resource management projects may be nurtured by extraordinary local leadership and external inputs from development assistance organizations, but a widespread rural resource management program that makes a difference in terms of affecting overall rural welfare will not emerge.

One point that is worth stressing, too, is that successful institution-building at the local level is no substitute for effective decentralization of the national governmental bureaucracies whose support for local institutions is important. As one observer noted recently:

> ...unless the government bureaucracy is appropriately decentralized, efforts at creating local capacity through active, effective local organizations will founder in most LDCs. Local organizations can build a platform on which rural people can stand to reach up to the bureaucracy

> and make their voices heard. But, the government has to be brought lower so that it is more accessible and can listen consistently to what people are saying (Uphoff, 1980).

B. Building on These Generalizations

There are many lessons for donor agencies to glean from this evolving social science perspective of the problems encountered by development projects that aim to stimulate better management and increase sustained productive utilization of renewable natural resources. However, gaps remain that make it difficult to use the accumulated wisdom of social scientists to: a) develop better agency strategies for attacking the problem of natural resource mismanagement in the rural sector; and b) refocus the design of natural resource management projects. Two broad areas can be identified where the advancement of social science knowledge might permit the eventual extraction of policy-relevant guidelines to enhance the chances that natural resource management projects will fulfill their technical potential and are sustained after external support is ended.

1. Identifying the Stimuli to Collective Action:

In order to know how improved management of natural resources can be promoted at the local level under the artifact of induced rural development, it would be helpful to know more about some of the circumstances in which collective action has been undertaken to promote natural resource management on a spontaneous basis. That is, what special ingredients have induced some local communities or local groups, in spite of all the institutional and behavioral obstacles already noted, to take

steps to manage the natural resource at their disposal or to redesign the institutional rules that govern natural resource use; steps which have enhanced their collective and individual welfare and helped to stave off the specter of a declining natural resources base?

There are numerous, if isolated, examples of such spontaneous activity at the local level in rural areas in many countries under a very wide variety of political, economic, and ecological circumstances--community land terracing, protests against tree cutting, village tree planting for windbreaks and firewood supplies. Although many examples of un-induced local natural resource management efforts have been chronicled in journalistic reports or duly noted in agency country and sector studies, few have been the subject of scholarly work searching for their relevance to development projects depending upon the mobilization of people and design of institutions. Superficially at least, the natural resource problems encountered, the barriers to collective action and establishment of better institutional rules, and the general state of non-support from the national level often appear similar to the situations that prevail in rural communities that have not taken any steps to ease the degradation of their natural resource base.

2. Balancing Conflicting Institutional Demands:

As recognition sinks in that localization, privatization and marketization are not the all-purpose panacea for rural development problems that some envisoned, research must focus more on identifying the desirable mix of institutional approaches

to natural resource management in specific circumstances. In particular, development assistance providers, as well as national governments, need much better information on how to strike a balance between conflicting demands in natural resource maangement efforts for:

a. centralized and local control over resource projects.

b. public and private access to, responsibility for, and benefits from agricultural lands, pastures, irrigation water, groundwater, watershed areas, timber supplies and other natural resource sytems.

c. market and nonmarket processes for allocating incentives and rewards for natural resource management.

C. Some Preliminary Observations

There is no one set of institutional configurations and rules that will optimalize management of local natural resources. What works will vary enormously between different political and economic systems and according to the uses, divisibility, and demand for various "products" produced from improved natural resource management.

It may be a fact of political life that viable resource management schemes in the Francophone countries of the Sahel have to depend more on effective strategies for decentralizing organs of the national government than on creating autonomous local

organizations to protect and manage revegetation schemes. Institution of a system of private tenure rights to pasture in a large geographical area where seasonal rain patterns make certain pastures viable only during certain times of the year is a recipe for disaster. By nature, groundwater is a "fugitive" resource, available for use only to those who have the wherewithal to capture it, and therefore subject to monopolization by a limited few; irrigation water, by contrast, is a public good, whose allocation is more easily controlled by a central user organization. In groundwater development, the major challenge is to regulate the rate of exploitation and to allocate shares of the underground supply of water on a more equitable basis than that of pumping prowess. For irrigation, the challenge is to institute collective management procedures to maintain the system and exclude free-riders. In forested watershed areas, the institutional challenge is to induce local inhabitants to reduce consumption of the vegetation in order to provide a public good--reduced soil erosion and sedimentation--whose major benefits will be accrued by people downstream.

Obviously, all of these circumstances call for very different institutional arrangements for mobilizing people to manage resources at the local level. Nevertheless, there are some behavioral and institutional characteristics that cut across many of the specific political, geographic and ecological circumstances; one task of social science research is to identify some of these more universal tenets. Some observations that appear relevant to the overall challenge of institutional design

and which future research might examine more carefully are noted below.

1. Some Circumstances Under Which People React:

Social scientists ranging from scholars of federalism to economic historians to psychologists have long pondered the question of what catalyzes previously docile and atomized people to join together for the purposes of collective political action. The most often cited reason is external threat or aggression; a common enemy that prompts people to take action in their collective defense. There are clearly examples in the area of natural resource management: Tuareg pastoralists in the Sahel petitioning authorities to turn off borehole pumps because the increased water availability has lured outside ethnic groups into traditional Tuareg grazing areas contributing to environmental deterioration (Riddell, 1982); previously unorganized peasants in Southeast Asia effectively protesting industrial pollution that has drastically reduced their crop yields (Leonard and Morell, 1981). This type of situation, where natural resource degradation can be blamed on an external source, appears to be the most likely of all to prompt collective action to ameliorate the problem.

A second type of reaction to resource degradation occurs as a long-term evolutionary response to a situation under which population growth or changing natural resource constraints threaten to gradually undermine a group's ability to sustain its level of production. Anthropologists and economic historians have often seen impending resource scarcity as the hardship that

has stimulated innovation--as in the shift in England from wood fuel sources to mineral fuel sources that helped spawn the industrial revolution (Zimmerman, 1965)--or involution--resulting in elaborate social schemes for highly intensive exploitation of a limited resource base by a dense population (Boserup, 1965; Gertz, 1963).

However, history is replete with societies that did not respond to such challenges and instead dispersed, faced famine, or suffered economic decline (Thirgood, 1981; Eckholm, 1976; Leonard, In Press; Hughes, 1975). The question which may be of relevance to development planners in the Sahel, Nepal, Haiti, and many other places undergoing severe environmental stress is when hardship stimulates people's wits and when it does not.

A much less-studied phenomenon is that of people taking collective action to improve their natural resource base when there is no clear external aggressor or impending disaster. One intriguing observation that has been made by several students of development is that such action often is the culmination of a series of collective experiences that have the effect of dispelling mutual distrust and isolation.

For example, Albert O. Hirschman recently observed grassroots development projects in six Latin American countries. In each instance, poor people had initiated collective endeavors on their own to improve their condition. He concluded that in every case the most important prerequisite was

a previous, if failed and fledgling, record of cooperative effort:

> ...having thus dispelled mutual distrust, forged a community and--perhaps most important--created a vision of change, they were now ready for joint endeavors that required much greater sophistication and persistence (Hirschman, 1981).

What Hirschman called the "Principle of Conservation and Mutation of Social Energy" has been noted by other analysts as well. Jon Morris points out that donor agencies often overlook

> ...the great motivational significance of generating local self-confidence. Confidence must be nourished by small successes in day-to-day affairs; it cannot be bought. It grows out of group pride in a gradually widening mastery of problems that cannot be solved by individual action (Morris, 1981).

The implications of this notion for development assistance agencies may that they are putting too much stress on the need to find appropriate institutions and administrative structures that induce community management of natural resources, and not enough on the processes that spark people to formulate their own collective responses. When seen in the context of the tendency to stress project efficiency over local participation and local institutional design, it is important for development assistance agencies to confront the possibility that many of the projects they classify as "successful" may be failures from the standpoint of preparing people to develop their own organizations and institutional rules. Paradoxically, some of the supposed "failures" may help lead to long-term success in the implementation of better resource management strategies if in the process local people have gained experiencein working together.

2. Building Up From Small-Scale Successes:

Hirschman's Law may argue for more emphasis on beginning with a micro-project focus in many areas where natural resource degradation is occurring. One internationally supported project that appears to be succeeding in its stated goals of reversing natural resource degradation and increasing production is the Machakos Integrated Development Project (MIDP) sponsored since 1979 by the European Economic Community (EEC) and the Kenyan government. The secret to the apparent success of land rehabilitation efforts carried out thus far under the Machakos project, says one recent report, is the focus on small natural catchment or subcatchments (watershed basins) as planning and action units, and the provision of technical and planning assistance as well as financial incentives for local citizens to implement a catchment resource plan. "In every case," the report notes, "the success of the catchment work depends on the extent and enthusiasm of local participation and the commitment of local leadership" (Ford, 1983).

Local participation appears to be the key in most cases where serious natural resource deterioration that has occurred as a function of population pressures and underdevelopment in marginal areas has been reversed. Since they must deal through national national governments, international donors often have a difficult time ensuring, even when they want to, that projects which are dependent upon local cooperation--as all natural resource management projects inevitably are--actually elicit

it. This is one reason why many of the most successful land rehabilitation efforts being carried out in developing countries today started out without or still do not have large external capital inputs. Another good example is the HADO project in Tanzania, already noted above (Tosi, et al. 1982).

3. Role of Intermediaries:

The more successful natural resource management efforts supported by international development assistance agencies seem to be those where the donors work through intermediaries to get resources transmitted to local institutions and to put incentive systems in place at the local level. Thus, reforestation and shelterbelt efforts initiated and built up from the very local effort by the private voluntary organization CARE, with support from U.S. AID, appear to have been far more successful than the projects run directly by AID. Between 1975 and 1979, for example, CARE has sponsored a windbreak scheme in the Maggia Valley of Niger that has established more than 250 kilometers of trees (CARE,1983). AID and other organizations are consequently considering more cooperation with private voluntary organizations and groups such as the Peace Corps to reach out to the local level and build programs on the basis of popular support and local labor (US AID, 1982a).

Another possibility often mentioned for stimulating more local support for land management is increasing the use of the World Food Programme and the U.S. Food for Peace Program assistance to organize local food for work projects. In fact, a recent report by U.S. AID concluded that Title II Food for Work

donations used for remuneration for labor and contributions to WFP will be "responsible for planting as many as two or more times the number of trees over a four-year period than are expected to be planted by U.S. AID in connection with all of the 77 ongoing forestry-related bilateral assistance-funded projects in 37 countries worldwide" (U.S. AID, 1982a).

Another type of intermediary which has received far less attention from development assistance agencies has been fostered recently in India. Despite increasing government concern with massive natural resource problems in recent years, there are major constraints on how much the central government itself can actually accomplish to reverse the trends. This is particularly true in the case of social forestry programs designed to help some 50 million people living in marginal environments that are in heavily deforested, hilly, arid and unirrigated regions. A recent report pointed out the drawbacks of relying solely on government-backed institutions to implement these programs, which must embrace a wide range of activities, including local tree planting, integrated land management, water conservation, and pasture development:

> Both in theory and practice, the success of social forestry programs requires the participation of the people in planting and protecting trees and in the equitable sharing of benefits. At present, forest departments are the main implementers of social forestry programs. It will take much time and effort for the forest service to shed its traditional custodial role. Even a more appropriately oriented forest service, like any other bureaucracy, would continue to suffer from internal procedural limitations and external political pressures. While efforts are needed to bring about constructive changes within the forest service, complementary structures, namely community-based and intermediary organizations, are

> also needed. Non-governmental initiatives can generate innovations in participative community organization, in designing incentive systems and support services, and in popularizing social forestry for the needs of the people. In the long run, such organizations can complement governmental efforts and increase the pace of afforestation through community mobilization. (Ford Foundation, N.D.)

Efforts have been made to find an organizational model that might help overcome the constraints on government, but a limitation has been that non-governmental organizations have only had very limited technical, managerial and financial resources. Thus the Ford Foundation has recently helped to create a new non-governmental umbrella organization to provide technical, managerial, informational, and financial help to local organizations which are or could be active in wasteland development.

The Society for Promotion of Wastelands Development (SPWD) proposes to concentrate its activites in regions that are considered fragile ecosystems yet hold considerable potential for wastelands development. Initially it will work especially by operating a series of demonstration projects in a number of Indian states to show the potential production of wasted lands in a variety of regions and climates. This model, if it proves successful in India, might be worthy of emulation in other developing countries; and development assistance agencies may wish to explore ways to assist such non-governmental, clearing house organizations. With less flexibility than private foundations have to pass over governmental institutions, the challenge to multilateral lenders is to find some creative solutions to the dilemma.

4. Incentives for Local Organizations:

As was the case in the United States, institution of well-organized local natural resource management will require a combination of national oversight and fiscal support, intermediate oversight and technical assistance provided at the regional levels, and user-member organizations that are relatively autonomous, but respond to a system of incentives to induce better natural resource management. The creation of a top-to-bottom framework for soil conservation in the United States in the 1930s is the most obvious model of an integrated effort to balance central-local, private-public land management responsibilities using both market incentives and government fiat.

One possible means of emulating the U.S. experience is through ongoing efforts to assist developing countries to provide better and wider agricultural extension services. Generally, agricultural extension programs focus on stimulating production. Land conservation is equally as important. Indeed, the success in the United States in reversing land deterioration and increasing productivity in response to severe land degradation in the Great Plains in the 1930s was largely accomplished through conservation-related ag-extension programs. Through assistance and demonstration projects by the newly created Soil Conservation Service, and through national and state funds and incentives for the creation of local soil conservation districts, many of the most destructive practices of farmers and ranchers were altered and land recovered in a remarkably short time (The Future of the Great Plains, 1936).

The political-administrative situations obviously differ enormously in the Third World. Still, the use of project loans to help developing countries establish some national down to local network of technical assistance, subsidies, and incentives of soil conservation districts might prove both profitable and an important step for rural development.

To accomplish this, one possibility is for lenders to stimulate local soil conservation measures by earmarking loans for establishment of block grant or commercial discount loan funds at the national level. National government departments, in the case of block grant funds, or national banks, in the case of commercial discount funds, would be allocated sums of money for disbursement in grants or discounted low-interest loans to local groups and organizations that take specified steps to institute soil conservation measures. Both of these approaches have been used by international lenders to stimulate local community development projects and entrepreneurial activities (Chambers, 1974). The application of such funds to soil conservation could parallel efforts undertaken by the U.S. government during the Depression to provide low interest loans and direct financial subsidies to farmers instituting soil conservation measures and establishing a soil conservation district at the local level.

5. The Role of Women:

Though underexplored, the role of women is in many respects central to all natural resource management issues confronted by development planners. Research is needed in several areas to shed more light on the role that women must play in efforts to improve the success of resource management projects.

First, in project design, women have consistently been overlooked despite the fact that they are often the major constituents of social forestry, watershed management, and other interventions that seek to alter the way people relate to the land at the local level. One observer notes that "program after program has failed because participation of women, so essential to the effort's success, was overlooked" (Hoskins, 1981).

In fact, in may places it is the women whose lives are most significantly affected by natural resource degradation. As gatherers of firewood, for example, they must wander further and expend more time as deforestation increases. This means that the support and mobilization of women can be an essential starting point for any efforts to stimulate local action to initiate better land management programs.

Finally, there are examples in some areas where women have collectively become advocates of resource protection and sought to reverse environmental deterioration. For example, in India, as the recent State of India's Environment Report noted, the Chipko movement to stop deforestation for commercial and domestic use "is very much a feminist movement," sometimes setting "wife against husband and mother against son" (The State of India's Environment 1982).

In some cases, then, an activist stand by women may be key to facilitating natural resource management at the local level.

6. The Special Problems of Marginal Lands:

One continuing controversy in AID circles is how to deal with environmental degradation where it is occurring because of

intense exploitation by poor people and animals of lands that are of marginal productive potential in the first place--very arid range areas, hillside agricultural zones and upland watersheds, for example. Generally, there is an antipathy within the World Bank, given other more productive investment choices for filling loan quotas, to projects that are perceived as helping marginal cultivators in marginal areas become better marginal cultivators. This sentiment has become more prevalent in AID as well.

Nevertheless, there are several very significant reasons why more attention to land degradation problems falling into this category is going to be thrust upon multilateral and bilateral assistance agencies. For one thing, it is increasingly the case that some land degradation problems associated with "underdevelopment" and overexploitation of marginal lands pose serious threats to more highly productive lands--especially in countries where essential upland watersheds are heavily populated with poor people living off the land--Nepal and Ethiopia being two good examples.

A second reason why the degradation of marginal lands is likely to become more a problem that development agencies must address is the increasing reality that many countries simply cannot afford to take a triage attitude to marginal areas. This is because population pressures are already high in more fertile areas, because urban to rural migration is already stretching the absorptive capacity of most cities, and because high fertility rates in rural underdeveloped areas are a major contributor to

such problems. It is estimated that 800 million people now live in marginal zones where climate, lack of water, soil characteristics or slope of the land inhibit production and increase environmental fragility.

Related to this problem, however, is the fact that many supposedly marginal areas which are currently suffering from severe environmental deterioration as a result of overexploitation actually offer significant potential for economically productive investments. This potential has often been overlooked by national government and international development assistance agencies.

A recent report by the Rockefeller Foundation and the Centro Agronomico Tropical de Investigacion Y Ensenanza (CATIE) strongly emphasized this point in relation to the steep slopes and highlands that are the home of millions of tropical America's poorest farmers and landless peasants (CATIE, 1981). A major conclusion of this report was that the hillside areas are and will be even more important than generally thought to the economies of all the countries in the region. It noted a number of potential means by which more rural investment in these hillside zones could contribute substantially to overall national development and lamented the fact that most external development assistance has to date gone to support activities on flat lands under good soil and climatic conditions, while "the hillside zones which are marginal and densely populated, have been overlooked."

A final reason why rehabilitation of marginal lands should command more attention from donors is that there is, in the 1980s, increasing promise that coming years or decades will bring significant new breakthroughs in scientific understanding of and enhanced technological capabilities for food production on marginal and arid lands. The potential importance of such developments for world food production and the welfare of mankind far exceed the contributions made by the so-called "Green Revolution." It would, of course, be a tragic irony for many poor countries if large areas of their marginal lands were already hopelessly desertified by the time modern technology is finally ready to contribute the means for improving their welfare. Presumably, as such breakthroughs become more imminent, the systematic, appraisal of marginal lands in developing countries that could benefit from improve land management--terracing, erosion control, soil conservation schemes, protective revegetation, etc.--prior to the application of new techniques will become a matter of greater priority for development assistance agencies.

In many respects, then, the challenge to develop workable "institutional packages" to further improve resource management at the local level are most important in marginal areas. Here it is least likely that people will take collective action or design institutional rules that reverse the problem of environmental destruction unless external sources find ways to stimulate them to do so. The social science research agenda outlined in this paper is consequently more applicable and more urgent for the

problems of marginal lands than for management of fertile farmlands or extensive commercial forests, or even large-scale irrigation projects. In all these more productive areas, the long-term institutional problems may be less acute because the economic incentives for resource management are greater and barriers to collective action and clear rule-making procedures are lesser than in marginal areas.

RESEARCH RECOMMENDATIONS

The challenge to social scientists in the area of natural resource management is to come up with better institutional policy prescriptions that help development assistance agencies realize the technical potential of the resource management projects they sponsor or support. Thus far, social science analysis has done an adequate job in outlining the socio-economic-political factors that have caused projects to fail, and it is increasingly possible to predict institutional designs that will fail. The question is whether social science research can help to increase the institutional successes in addition to explaining the failures.

The key to improving the institutional packages for development projects lies not with the development of any foolproof set of maxims. Instead, what is needed is the long-term construction of a larger information base from which development planners can draw when facing particular situations where the institutional aspects of a natural resource management program are weak. To this end, two broad approaches to designing

a social science research agenda to address problems of natural resource management can be recommended:

A. Coordinating Existing Research and Development Project Experience

1. Conferences and Meetings:

A series of conferences and meetings bringing both social science researchers and development assistance officers working in the natural resource field together to exchange experiences and discuss different successes and failures in local institutional design would be a first step. This could facilitate the dissemination of "local lore" and stimulate interregional and intersectoral borrowing of innovative institutional structures and incentive systems.

2. Paper Series:

The establishment of a central outlet for brief social science papers dealing with various aspects of natural resource management would provide a means of taking advantage of the work currently being done throughout the developing world by social scientists. In addition, this would provide a clear incentive for work that focused primarily on the socio-economic aspects of natural resource management, since many current publications are oriented more to the ecological perspective or are highly specialized from a disciplinary standpoint.

B. Sponsor Case Study Research

A number of valuable location-specific case study research projects can be identified from the agenda of research questions outlined in this paper. These include but are not at all limited to case studies that examine:

- a series of instances where people have successfully undertaken collective action to improve the resource base upon which they depend;

- induced resource management projects sponsored by local groups or private voluntary organizations that succeeded because they found appropriate institutional frameworks for funneling external assistance while preserving local initiative and autonomy;

- the different ways that public works, food for work and other inducement programs have provoked people in marginal areas, to provide a public good through improved resource management, even though they do not stand to otherwise benefit directly from their actions;

- the role and potential of women in the organization and in determining the success or failure of resource management projects.

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