

Natural Resources Management

April 2000

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Preface

The World Bank Group has embarked on a comprehensive effort to develop a corporate environment strategy. The initial phase of the preparation of the environment strategy has mobilized a large number of World Bank Group staff who work in various Regions and a wide range of sectors. This phase included the preparation of thematic background papers to describe emerging issues for discussion. This report is one of those background papers. It is intended as a vehicle to help a stocktaking process and stimulate a dialogue within the World Bank Group, as well as with its client countries, partners, and other interested stakeholders.

Summary

Natural Resources Management (NRM) refers to the sustainable utilization of major natural resources, such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources provide the ecosystem services that underpin human life. The perspective of this paper is that NRM should contribute to *poverty alleviation,* and that natural resources should be used in a sustainable manner to enhance human welfare. While poverty alleviation and sustainable NRM are generally compatible, difficult tradeoffs may occur at times. Nevertheless the fact remains that without poverty alleviation, the environment in developing countries will continue to degrade, and without better NRM, poverty alleviation will be undermined.

Natural Resources: The Foundation of Livelihoods for the Poor

Natural resources (NR) provide fundamental life support, in the form of both consumptive and public-good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water, and climatic cycles. Soils are the foundation of agriculture, which in turn is the basic building block in the livelihoods of all people. At the genetic level, diversity found in natural life-forms supports the breeding programs necessary to protect and improve cultivated plants and domesticated animals. Wild flora and fauna form the basis of traditional medicine and a significant part of the modern pharmacological industry.

The natural-resources foundation is coming under increasing pressure from both increasing population and higher levels of per-capita economic activity. During the period 1990 to 2030 the world's population is likely to grow by 3.7 billion. Ninety percent of this increase will occur in developing countries. Over the next four decades Sub-Saharan Africa's population is expected to rise from 500 million to 1.5 billion, Asia's from 3.1 billion to 5.1 billion, and Latin America's from 450 million to 750 million. The *distribution* of people between rural and urban areas has important implications for the types of stress placed on the environment. In 1990 most people lived in rural areas, but by 2030 the urban population will be twice the size of the rural population. Developing country cities, as a group, are expected to grow by 160 percent over this period, whereas rural populations will grow by only 10 percent.

While it is very difficult to forecast how per capita income will change in the next 30 years, it is quite clear that the growing population aspires to a higher standard of living. This will often entail an accelerated use of natural resources, both as inputs to the economy, and as recipients of waste. However, the relationship between economic growth and environmental stress is not a linear one, as growth also generates resources to better manage natural resources.

Some Strategic Considerations

This paper examines the links between NRM, rural poverty, and environmental degradation using a "sustainable livelihoods" lens. This lens shifts the analysis of local resource-management options away from NRM and agricultural strategies and toward the multiple, flexible livelihood strategies that people pursue and the institutional and cultural context in

which they thrive. The paper highlights three strategic themes related to the contribution of NRM work to the Environment Strategy: property rights, incentives, and empowerment.

Property Rights

Inefficiencies in the utilization of NR often arise because property rights are not complete, exclusive, enforced, and transferable. In addition, defined property rights and opportunities to exploit weaknesses in the assignment of such rights are often skewed. The result is a "smaller pie" than theoretically possible and a "smaller piece of the pie" for the poor. Policymakers' first order of business should be to: (a) clarify property rights where they do not exist, are obscure, or are in dispute; (b) alter property-rights distribution in the interest of poverty alleviation; and (c) enforce property rights that are compatible with poverty alleviation.

Incentives

Inefficiencies in the utilization of NR arise because private and social prices differ and markets are incomplete or distorted. In addition powerful élites often manipulate incentives to their advantage. The result is lower total welfare, particularly for the poor. Policymakers should: (a) remove policy-induced distortions that undermine sound NRM, (b) complement market signals with taxes/fees that reflect social opportunity costs, and (c) regulate the remaining externalities.

Empowerment

Inefficiencies and inequities in the utilization of NR arise because information is poor and costs and benefits are asymmetrically distributed. As a result sound management of NR often "does not pay" from an individual or local perspective, since others reap the benefits. Several strands of work are required: individual capacity building, provision of basic information and training, building of social capital, and support for honest and transparent institutions that have the confidence of the local population.

Implementation

A growing portfolio in the World Bank focuses on supporting and fostering sustainable livelihoods and creating enabling conditions in which they can thrive. A large number of countries are implementing land-administration reforms combined with market-based land reforms, in which communal tenure and common-property regimes may figure as importantly as individual or corporate title.

The following pages discuss the significance of the institutional framework of NRM efforts, including the role of social capital and the importance of technology that fosters sustainable livelihoods. Constraints to NRM implementation are also discussed, separated into those that are Bank-related and those that are borrower-related. The distinction is important to clarify how project design can address constraints and reduce implementation delays.

Finally, *modalities*, a major aspect of implementation, are discussed, broken down into four aspects of key concern. Implementation modalities include (1) using a holistic approach, (2) applying a long-term perspective, (3) ensuring flexibility, and (4) enhancing monitoring and evaluation.

Natural Resources Management: A Contribution To The World Bank Environment Strategy

Natural Resources Management (NRM) concerns the sustainable utilization of major natural resources such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources produce the ecosystem services that underpin human existence and welfare. Poor people are often critically dependent on natural resources, and suffer most when they are degraded. While poverty alleviation and sustainable NRM are generally compatible, some situations may require difficult tradeoffs. Nevertheless, the fact remains that without poverty alleviation, the environment in developing countries will continue to degrade, and without better NRM, poverty alleviation will be undermined.

Three Key Concerns

Three persistent concerns are consistently raised regarding NRM, particularly in developing countries:

1. *Renewable resources* are utilized beyond their regenerative capacity, which is especially troubling for the poor, whose resource-base tends to be narrow and less easily shifted geographically and sectorally

2. *Nonrenewable resources* are depleted with insufficient savings in man-made, human, or social capital, and with minor benefits directed specifically to the poor

3. The "*sink*" capacity of the environment is overburdened by pollution, which in turn damages human health and ecosystem functions. The poorest frequently pay the human price for this development.

While pursuit of poverty alleviation and sustainable NRM objectives is usually compatible, it should not be denied that there are difficult tradeoffs. For example, in some countries short-term poverty alleviation ("shoot the wild animals, cut down the forest, and plant maize") is in opposition to long-term poverty alleviation ("conserve the ecosystem, and develop ecotourism"). Poverty alleviation must be pursued in the most cost-efficient manner possible, including external costs. For example, riverbed mining that uses hazardous chemicals may be income-generating for some, but for people living downstream resource degradation may be far too costly. A situation-specific cost-benefit analysis is helpful in determining how such tradeoffs should be resolved.

This paper looks at renewable natural resources, broadly defined, with an emphasis on attributes responsible for non-consumptive services, including those provided by ecosystems. It emphasizes the functional relationships among natural resources (such as forests, water, and fisheries) that constitute an important element in the sustainability of ecosystems. The remainder of the paper is organized as follows: section 2 provides some key facts regarding the status and trends of natural resources and section 3 discusses strategic considerations that are paramount in addressing the problems identified. Section 4 proceeds from the policy level to the level of specific interventions, to discuss how to enhance implementation of NRM programs and projects.

Natural Resources: The Foundation of Livelihoods for the Poor

Natural resources (NR) provide fundamental life support, in the form of both consumptive and public-good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water, and climatic cycles. Soils are the foundation of agriculture, which in turn is the basic building block in the livelihoods of all people. At the genetic level, diversity found in natural life forms supports the breeding programs necessary to protect and improve cultivated plants and domesticated animals to safeguard food security. Wild flora and fauna form the basis of traditional medicine and much of the modern pharmacological industry.

The NR foundation is coming under increasing pressure from both increasing population and higher levels of economic activity per capita. During the period 1990 to 2030 the world's population is likely to grow by 3.7 billion. Ninety percent of this increase will occur in developing countries. Over the next four decades Sub-Saharan Africa's population is expected to rise from 500 million to 1.5 billion, Asia's from 3.1 billion to 5.1 billion, and Latin America's from 450 million to 750 million. The *distribution* of population between rural and urban areas has important implications for the types of stress placed on the environment. In 1990 most people lived in rural areas; by 2030 the opposite is expected to be true: urban populations will be twice the size of rural populations. Developing country cities, as a group, are expected to grow by 160 percent over this period, whereas the rural population will grow by only 10 percent. This pattern will vary substantially among regions (World Bank 1992).

Forecasting population growth if difficult, but pales in comparison with any attempt to forecast income growth per capita in the next 30 years. However, it is quite clear that the growing population aspires to a higher standard of living. This will often entail an accelerated use of natural resources, both as inputs to the economy, and as recipients of waste. How this affect the environment is very much dependent on the structure of economic growth, the input-output efficiency in production processes, and the unit rates of pollutants emitted from these activities. Higher income also means more resources to combat environmental damage. New technology enhance efficiency and reduces the amount of NR needed for a given output, as well as the pollution intensity per unit of output. (World Bank 1992, 1999).

Land and Soils

Feeding an additional 80 million people a year requires about 26 million tons of additional grain annually. Soil fertility is the result of natural processes in healthy ecosystems, which include maintaining forests, vegetative cover, and soil biodiversity. A 1990 global assessment of soil degradation found that 1.2 billion hectares—almost 11 percent of the earth's vegetated surface—have been significantly degraded by human activity over the past 45 years. Soil degradation affects more than 900 million people in 100 countries, some of them among the least developed nations. Erosion, salinization, compaction, and other forms of degradation affect 30 percent of the world's irrigated lands, 40 percent of rainfed agricultural lands, and 70 percent of rangelands (Watson and others 1998).

These figures should be seen against the backdrop of the challenge that lies ahead; production on existing land will need to nearly double in the next 30 years. Land is becoming increasingly scarce, and new land taken into cultivation is often marginal compared to what is

removed by degradation or urbanization. Protecting and enhancing this productive base requires a wide-ranging agenda of efforts. (World Bank 1997b).

Scherr (1999) states that, in qualitative terms, it appears that aggregate global food supply will not be seriously threatened during the next 20 years. This conclusion is supported by data reported in *World Resources 1994-1995* (WRI 1994), indicating that global food production per capita has increasedby 20 percent between 1984–86 and 1994–96. Some regional data, however, are of concern. For example, per capita food production in Africa has been slowly dropping during the last 30 years, and in the former Soviet Union food production has decreased significantly since 1990 (WRI 1998).

Forests

Grasslands, wetlands, and forests provide resources directly to billions of poor people living in rural areas, including timber, fuel wood, fiber, medicine, and food. Forests and wetlands also regulate floods by absorbing rain and recharging aquifers. Flooding exacerbated by deforestation destroys settlements and crops and contaminates water supplies. Siltation accelerated by upstream deforestation clogs dams and reservoirs, rendering many of them useless before they can pay for themselves and contributing to poverty and displacement.

Forest and woodland areas are shrinking at a rate of about 4 million hectares per year in Sub-Saharan Africa (World Bank 1994b). In East Asia deforestation rates per annum range up to a high of 4 percent (Thailand); Indonesia alone loses about 0.7 million hectares of forest every year (Crooks and others 1999). Similar patterns can be seen worldwide. More than one-fifth of the world's tropical forests have been cleared since 1960. Global rates of forest-loss increased from about 12 million hectares per year in the 1970s to over 15 million hectares (0.8 percent of total natural forest cover) per year in the 1980s. During the 1990s deforestation continued at about 13 million hectares per year (Watson and others 1998). Although the global loss of forests is still very high, data suggest that the rate of deforestation may be slowing. It will be difficult to know if this is a trend, however, until the Global Forest Resources Assessment 2000, with a comparable global data set, becomes available (FAO 1999a).

The World Bank is currently involved in a comprehensive review of its forest policy (World Bank 1991) and its implementation record. This paper will not attempt to pre-empt the results of that process.

Water

Water is one of the most important natural resources, and is at the same time becoming an increasingly scarce commodity in many parts of the world.[1] In 1990, 28 countries with a total population of about 335 million experienced "water stress."[2] This figure is expected to grow, according to some predictions, to around 50 countries, affecting some 3 billion people, by 2025. Countries affected by "water scarcity" numbered 20 in 1990; this number is expected to grow to 25 by 2025. The affected population could increase from 131 million in 1990 to between 800 million and 1.1 billion people by 2025. (Engelman and LeRoy 1993). For a regional example of water scarcity, see box 1.

Box 1. Water scarcity in the Middle East and North Africa

According to regional estimates water available per capita dropped from 3,500 cubic meters in 1960 to about 1,500 cubic meters in 1990. This problem is expected to intensify in the coming years due to population growth. By the year 2000 water demand in 14 of the 19 countries in the region is likely to exceed available renewable freshwater supplies. By the year 2025 estimates indicate that water availability will be down to 700 cubic meters per capita.

To promote adaptation to increasing water scarcity, the World Bank recommends that countries in the region increase water prices to encourage conservation and mobilize financial resources for investments, strengthen institutions to mediate water-based conflicts, and introduce integrated water-resources planning and management.

Source: World Bank 1994a.

In addition to water scarcity, the problem of access to safe water supplies and sanitation is also intensifying. Currently, one-fifth of the Earth's population does not have access to safe drinking water, and about one-third lacks adequate sanitation. Between 1990 and 2000 it has been estimated that an additional 900 million people will be born in regions without access to safe water and sanitation (Engelman and LeRoy 1993). The World Health Organization estimates that more than 5 million people die each year from diseases caused by unsafe drinking water and lack of water for sanitation and hygiene (Watson and others 1998). In all countries, poorer populations are the most vulnerable to water-borne diseases.

Fisheries

World marine-capture fisheries production reached a new record of 87.1 million tons in 1996. As in previous years, however, the rate of increase continued to slow. Overall, exploitation of the main fish stocks (in fisheries for which assessment information is available) has remained more or less unchanged since the early 1990s, despite continued technological improvements. Recent reviews estimate that 44 percent are fully exploited, with no room expected for further expansion. About 16 percent are overfished, and there is an increasing likelihood that catches might decrease if remedial action is not undertaken. Another 6 percent appear to be depleted,

[1] A separate background paper on water, *Water Resources and Environment Management Interface,* has been prepared for the Environment Strategy.
[2] Defined as the point at which annual per capita freshwater availability falls below 1,700 cubic meters.

with a resulting loss in total production, and 3 percent seem to be recovering slowly (FAO 1999b).

Based on total inland capture for the period 1984-96, it is clear that increasing use is being made of inland fisheries resources, although the outlook for inland aquatic resources is not encouraging. The average annual increase is about 130,000 tons (about 2 percent per year). Exploitation of freshwater fisheries is most intensive in Asia and Africa[3] (FAO 1999b).

Air Quality

Rates of urbanization and per-capita energy consumption are rising rapidly in developing regions. Without aggressive abatement policies, air pollution will intensify in the coming years. The *World Development Report 1992* estimated that 1.3 billion people were exposed to unsafe conditions by soot and smoke.[4] Globally, estimates of mortality due to outdoor air pollution run from around 200,000 to 570,000, representing about 0.4 to 1.1 percent of total annual deaths. As dangerous as polluted outdoor air may be, however, indoor air pollution is even more lethal. In developing countries some 3.5 billion people continue to rely on traditional fuels for cooking and heating (WRI 1998). Finally, on a global scale, concerns are mounting over the release of greenhouse gases that threaten to upset climatic balances, with wide-ranging impacts.[5]

Biodiversity

The conservation and sustainable use of biodiversity is fundamental to achieving sustainable development and sustainable livelihoods. Natural habitats and their component species and genes provide both goods for consumption and ecological services to maintain healthy environments and economies. The poorest rural people are most dependent on biodiversity and natural resources for their livelihoods, and it is they who suffer first and most severely when those habitats are simplified, degraded, or otherwise impoverished. Biodiversity, however, provides two special challenges for NRM: (1) most of its benefits continue to be considered as economic externalities, and (2) benefits tend to accrue over the long term.

Biodiversity is often regarded as a global issue; its widespread decline has cumulative impacts and consequences at the global level. Many of the *benefits* of improving biodiversity conservation and its sustainable use—such as new medicines developed as a result of access to new genetic resources—accrue to mankind as a whole. Nevertheless most of the *costs* resulting from biodiversity degradation, and those associated with its conservation and sustainable use, accrue primarily at the local and national levels.

The World Bank recognizes the need to support the obligations that our clients have assumed under the Convention on Biological Diversity, and is also committed to serve as an implementing agency for the Global Environment Facility (GEF). The GEF remains, to date, the

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[3] The intensity of exploitation in this case is calculated in terms of capture in tons of landed weight, contrasted with surface areas (km^2) of the continents and their lakes and swamps.

[4] See the *Health and Environment* background paper for the Environment Strategy.

[5] *Fuel for Thought (World Bank 1999)* presents the Energy sector's contribution to the Environment Strategy, and provides an updated discussion on the significance of local and global air pollution.

only major mechanism to address these issues, even though the benefits of biodiversity conservation and its sustainable use are the foundations of economic sustainability. (World Bank, 1995).

Many of the world's species are gravely threatened. Various projections suggest that between 1975 and 2015, from 1 to 11 percent of the world's species per decade will be committed to extinction (WRI 1996). If current rates of loss of tropical forests (about 1 percent per year) continue for the next 30 years, the projected number of species that the remaining forest could support would be reduced by 5–10 percent, relative to forests in the absence of human disturbance. This rate of decline would represent 1,000 to 10,000 times the expected rate of extinction without deforestation by humans (Watson and others 1998).

Coastal ecosystems also face a great risk. About 34 percent of the world's coasts are potentially at high risk of degradation, and another 17 percent are at moderate risk (WRI 1996). Fifty-eight percent of the world's reefs are at risk from human activity—about 27 percent are at high or very high risk (WRI 1998). Coral reef systems eroded from destructive fishing practices expose coastal zones to more severe damage from storms

Natural disasters are often amplified because of poor natural resources management. The loss of coastal and inland forests aggravates damage caused by hurricanes and cyclones (such as Bay of Bengal and Hurricane Mitch in Central America). Numerous examples demonstrate that the effects of natural disasters can be mitigated if certain ecological services, such as maintenance of forest cover and wetland conservation, are preserved. A major challenge remains, however, since conserving these habitats is often perceived as an externality to the economic development process.

Climatic Services

Human activities, primarily the burning of fossil fuels such as coal, oil, and natural gas (resulting in about 6 million tons of carbon released per year) and land-use practices, particularly deforestation (amounting to 1 to 2 billion tons of carbon released per year), are changing the atmospheric concentrations of green-house gases that shape our planet's climate. As a result of these human activities, the Earth's temperature has increased by about one-half degree Centigrade this century, and is projected to increase another 1 to 3.5 degrees Centigrade over the next century if atmospheric concentrations of green-house gases continue to increase according to the current pattern (Watson and others 1998).

Watson (1998) reports that "the projected temperature changes will be accompanied by changes in the amount and patterns of precipitation, leading, in many areas, to more floods and droughts. It will also be accompanied by a rise in sea level of 15 to 95 centimeters." These events will cause serious problems for the world's poor, including significant increases in the incidence of malaria and dengue, increased risk of hunger and famine for many who depend on isolated agricultural systems, and displacement of tens of millions of people by rising sea levels.

Nonrenewable Resources

At the global level our concern should not be that "nonrenewable resources will be exhausted," as the "resource" concept evolves dynamically with new technology and discoveries. Indicators such as reserve-to-production ratios and real-price time series highlight this notion. Of real concern, however, is that some countries rich in non-renewable resources are exploiting them without investing sufficiently in human and human-made (produced) capital. That is, their *genuine saving rate is insufficient* for future needs. Empirically this is borne out: most of the mineral-rich countries have exhibited low, or even negative, genuine savings over many years. (World Bank 1997a).

Beyond the question of sustainability, mineral-dependent economies face other important macroeconomic issues, which are often summarized as the "resource curse." The sheer concentration of rent-streams makes corruption and rent-seeking behavior an issue in these economies. The boom-and-bust nature of resource markets creates significant problems for governments that are highly dependent on revenues from natural resources. The tendency to boost subsidies and consumption expenditure during boom times is difficult to reverse when the bust arrives, resulting in soaring government deficits and, ultimately, in inflation and macro instability. Managing resource income requires an ability to buffer revenues, policies to match investment programs to the economy's absorptive capacity for productive investments, and mechanisms for restraining expenditure when resource prices fall.

Strategic Considerations

Discussions on NRM and poverty have often been cast in terms of poverty-driven degradation and led to calls for reducing rural population pressure, for example by creating urban employment alternatives. New evidence has resulted in a shift in the way we understand NRM and the links between rural poverty and environmental degradation. The shift is basically toward a study of how *micro-level institutions* mediate the impacts of the macro environment to foster sustainability. This approach starts with an analysis of how people access and use resources as part of their overall livelihood strategy, and how they adapt to the conditions created by macro policy and political frameworks.

In this context, the United Kingdom Department for International Development (DFID) defines "*livelihood"* as comprising "…the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base." (DFID 1999, adapted from Chambers and Conway 1992.)

This lens broadens the analysis of local resource-management options away from NRM and agricultural strategies to look at the multiple, flexible livelihood strategies that people pursue and the institutional and cultural context in which they thrive. The narrower, technological focus tends to judge strategies as inherently viable or non-viable, without looking at the overall livelihood context within which these strategies are being adopted. It also explicitly assesses the local institutions and political economy that shape who in the society (men, women, indigenous

people, farmers, industrialists) have resource entitlements and access to resources and capital.

Studies using the sustainable livelihoods lens have documented the importance of social capital at multiple institutional levels; the role of environmental entitlements, including land and resource tenure; the values of social and cultural preferences; the income strategies that factor in vulnerability to cyclical events or political risks; and the dynamics of urban-rural remittances from migrants still culturally tied to rural areas. These studies offer a rich set of examples of ways in which local people mitigate poverty induced by environmental degradation or limited resource access. They also show how local people have reversed patterns of degradation, despite less than perfect policy and legal conditions.

A review of Regional contributions to the Environmentally Sustainable Development Strategy, as well as other relevant literature, generates a vast array of recommendations in support of sustainable NRM and hence livelihoods for the poor. Some are general to the point of being bland; some are so specific as to be of limited application. A short text of this character cannot afford great detail—this would be contradictory to its strategic purpose. With no claim to originality, but with a view to selectivity and strategic focus, we choose to highlight the following three themes for the contribution of the NRM work for the Environment Strategy. Each of the themes was explicitly mentioned in Regional contributions from Africa, South Asia, Latin America and the Caribbean, and East Asia and Pacific:

- Property rights
- Incentives
- Empowerment

Property Rights

Inefficiencies in the utilization of NR generally arise because property rights are not complete, exclusive, enforced, and transferable. In addition, defined property rights are often skewed, as are the opportunities to exploit weaknesses in the assignment of such rights. The result is a "smaller pie" than theoretically possible and a smaller *piece* of the pie for the poor.[6]

What can be done? The answer is not simply "assign complete property rights" as many natural resources (grazing lands, local forests and woodlands, etc.) have traditionally been under common management. A common feature is also the high costs of exclusion from access to these resources. There are strong concerns that moves toward privatization would be contrary to poverty alleviation: the rich tend to be the largest landowners after common land is privatized. Excellent examples are available of well-established common-property management regimes that do not meet the criterion of exclusivity, and yet function to the satisfaction of the involved parties and have proven to be sustainable (Ostrom 1990). Nor is the formal issuance of legal titles the essence of this exercise, as *perceived* security and local enforcement are more significant concerns. To summarize, the first order of business should be to:

- Clarify property rights where they do not exist, are obscure, or in dispute

[6] Ekbom and Bojö (1999) review several empirical studies that document the importance of property rights for good NRM.

- Alter property rights distribution in the interest of poverty alleviation
- Enforce property rights that are compatible with poverty alleviation.

The selection of these three points implies that exclusivity (assignment to private individuals and groups) and transferability (the establishment of markets for property rights) are seen as secondary. They may evolve, but are not seen here as equally essential to the task of poverty alleviation. The second point also emphasizes the nature of property distribution. Existing property rights are often skewed, and need to be changed before effective enforcement becomes a priority.

Box 2. Property rights reform: An application in Thailand

In 1984 the Thai Government launched a 20-year land-titling effort, in an attempt to fight rural poverty through the promotion of agricultural intensification and growth. The program received support from three IBRD loans, three corresponding AusAID technical assistance grants, and national resources. The land-titling program sought to provide titles to all eligible landowners, with the aim of strengthening land-tenure security, and thus increase investment incentives and farmers' access to institutional credit.

The first project that the World Bank supported, with a loan of US$35 million, ran from 1985 to 1990 and resulted in 1.7 million titles. The second project, implemented largely from 1990 to 1994, was supported through a Bank loan of US$30 million and resulted in an additional 2 million titles. The third project, begun in 1995 and continuing through 2001, could produce as many as 5 million titles, with Bank funding of US$118 million. The current effort continues the goal of the earlier two projects, and also addresses efficiency in the land offices.

Results

- *Land titles*: 5.5 million to about 2 million rural households (avg. 35% <poverty line), impacting about 10 million people
- *Cadastral maps:* (35,000; 40 percent area)
- *Network of land offices* (150 new offices + staff)
- *Education and training* (>1,000 person years)

Benefits

- Agricultural output up (8 to 27 percent)
- Access to credit improved
- Land values up (>75 percent)
- Access to land title more affordable
- Cost/market value non-documented land: 0.6 to 5 percent
- Increased tax revenue (>US$500 mill./p.a.)

Source: **http://essd.worldbank.org/intranet/icdb.nsf/D4856F112E805DF4852566C9007C27A6/E2DD6E8081B0FFAB85256778004CFB26**

Another interesting example of an innovative approach to property rights, this time in India, is presented in Mearns (1999) and Mearns and Sinha (1999). Their analysis demonstrates the need to enhance the performance of land-lease markets by selective deregulation, reduce transactions costs in land markets, reduce rent-seeking among land-market administrators, promote women's independent land rights, and improve the transparency of land administration. This list illustrates the complexity of addressing basic property-rights issues.

Incentives

Inefficiencies in the utilization of NR arise because private and social prices differ, and markets are incomplete or distorted. In addition powerful élites can often manipulate incentives to their advantage. The result is lower total welfare, particularly for the poor.

What can be done? To summarize, the first steps should be to:

- Remove policy-induced distortions that undermine sound NRM
- Complement market signals with taxes/fees that reflect social opportunity costs
- Regulate remaining externalities.

Some governments subsidize energy,[7] which results in higher emissions and more rapid depletion of resources. Others subsidize water, which leads to over-utilization and rapidly emerging scarcity. While these interventions are well intentioned, at least from the point of view of the interests they serve, they have social costs that can be documented—although it is sometimes difficult. The World Bank has an important role in this respect. It is in a unique position to perform the solid analytical work required and to forcefully channel the results into dialogue at the country level.

Removing subsidies is technically straightforward, but finding the right level of environmental taxation is not. Nevertheless, many developing countries are making progress (World Bank, 2000). Fine-tuning market signals is never an exact science. Agreeing on the basic rules of behavior through environmental legislation and regulation can set the stage for more specific intervention by governments, the Bank, and other actors. Environmental Assessments can be instituted to weed out the most damaging projects.

Box 3. Creating incentives for wildlife conservation

The Lupande Development Project in Zambia sought to involve the local community directly in the protection of wildlife and to share with it the benefit of wildlife revenues. A Village Scout Program was instituted to provide training and employment for locals. It is reported that poaching has dropped considerably since pre-project levels, and the Scout Program is being extended into new areas.

The Herero Community Game Guards in Namibia have taken a similar approach. Poaching in the area has dropped and wildlife has begun to return. This has stimulated tourism in the Kaokoveld, which has given rise to a crafts industry. The community now levies a tax on all tourists who spend a night on their land.

Source: IIED 1994.

The opportunities created by *markets*, particularly new markets created by environmental valuation—carbon sink funds, certification, ecotourism—represent an increasingly important element in sustainable livelihoods. Murphree and Hulme (1999) referred to a "new conservation" based on a belief in the contribution that markets can make to the achievement of conservation goals. They propose that this model, which treats biodiversity conservation as simply one form of natural resource use, exists side-by-side with the "old orthodoxy" of conservation purely as

[7] See Fuel for Thought (World Bank 1999) for details.

state-enforced protection. While capturing private-sector resources and market forces is clearly an important new direction for conservation practice, some caveats are needed. First, we must be realistic about the existing and potential level of demand for products and services derived from biodiversity-friendly land uses. Second, it is important to distinguish between market forces that favor biodiversity conservation in and of itself, and those which involve exploitation of specific biological resources, whether on a sustainable or unsustainable basis.

Empowerment

Inefficiencies and inequities in the utilization of NR arise because information is poor and costs and benefits are asymmetrically distributed. The result is that sound management of NR often "does not pay" from an individual or local perspective, as others will often reap the benefits. If the local forest is managed by a distant Ministry that may issue logging permits without local consultation, why should the villagers conserve the forest? If wildlife is managed by central government, and tourism revenues accrue to external entrepreneurs while wild animals damage local crops—what is wildlife more than an opportunity to compensate for a protein-deficient diet?

What can be done? Several strands of work are required:

- Capacity building on an individual basis and provision of information and training
- Building of social capital through decentralization and empowerment, and supporting institutions that are honest and transparent and have the confidence of the local population.

Box 4. Empowerment: Joint forest management in Andhra Pradesh, India

Since 1992 Andhra Pradesh (AP) has embarked on an ambitious program of joint forest management (JFM). As of March 1998, some 3,665 Forest Protection Committees had been formed at the village level, with oversight of almost 900,000 hectares, of which some 170,000 hectares had been treated. This movement is said to engage about 650,000 people, and 150 NGOs are associated with the implementation of JFM in AP.

The World Bank is already involved in forest rehabilitation and conservation through the Andhra Pradesh Forestry Project, with an IDA credit of $77.4 million. This project was launched in 1994 with the main objectives of supporting the regeneration and afforestation of degraded forests, plantation forestry, expansion of community forestry, research and protected areas management After reconstruction in early 1997, it has achieved good results in terms of regeneration of degraded forests and JFM support.

Source: World Bank (1994b) and World Bank staff.

Implementation

The sustainable livelihood lens has important impacts on our understanding of poverty-environment linkages, and also leads to different, more comprehensive, sets of actions to complement the wider development dialogue. A growing portfolio in the World Bank focuses on supporting and fostering sustainable livelihoods and creating the enabling conditions in which they can thrive. A large number of countries are implementing land- administration reforms combined with market-based land reforms, in which communal tenure and common-property regimes may figure as importantly as individual or corporate title.

Many examples of positive local scenarios can be cited. Community wildlife preserves managed for sport hunting in southern Africa result in protected areas established coterminously with indigenous territories, where indigenous people's livelihoods become a force for conservation. Water-user's associations that buy and sell water rights to gain efficiency and equilibrium in water distribution and organize for collective system maintenance have been established. Community forestry enterprises linked to international timber and certification markets are emerging; as are cooperatives producing organic foods or coffee, which revitalize traditional agricultural systems with new technologies.

In all of these examples, the *institutional framework*, including the building and use of social capital, is a key element in success. Projects that successfully support such initiatives have included significant resources for human capital development, organizational strengthening, negotiations, and other institutional skills. Community-level organizations have also developed relationships with higher-level institutions, and through them mobilized support for their interests and advocated a positive policy environment for their activities. This has occurred with varying degrees of success, but is always a key element of their strategy.

Technology plays an important, but different, role in projects fostering sustainable livelihoods. It is a given in such contexts that the technology will change and be adapted by the users, and that what should be maximized is not the return to a single resource—corn production per hectare, timber growth per hectare—but rather combining productivity with the sustainability of the overall landscape and maintaining flexibility in the face of changing market demand, changing labor availability, or natural disasters. Technologies should also be promoted or adopted with a gender lens, making sure that women as well as men control access to resources and financial capital and benefit from productivity.

Constraints to NRM implementation are better separated into those that are Bank-related and those that are Borrower-related. The distinction is important to guide project designs that will address the constraints and prevent implementation delays.

The points below presents some of the major *Bank-related constraints* experienced during implementation.

- The importance of a participatory approach in NRM projects has become more widely accepted in the Bank. This is worthwhile but time-consuming, and tends to slow design and implementation.
- The large number of rigorous Bank policies in operation to guide design and implementation

of NRM projects has steadily increased over the last few years, making them more complicated and costly to manage

- In some cases, external attention and criticism with respect to particular projects have consumed considerable resources.

The next list presents some of the major *Borrower-related constraints* noted during implementation.

- Weak counterpart institutions continue to negatively affect implementation.
- Policy and legal frameworks are often not suited to implementing cross-sectoral interventions.
- The participatory approach has required a difficult and slow evolution in attitudes of both local populations and responsible agencies.

Because NRM activities realize returns over long periods of time, they are rarely viewed as priorities by important decision-makers in client countries, and budgets allocated to their development and management are very limited.

Having considered some major strategic themes in approaching NRM, it is appropriate to consider the more down-to-earth aspects of implementing these interventions in client countries. A major element of the implementation of NRM activities is modality.[8]

Modalities can be broken down into four aspects of key concern, which are reflected in the regional contributions to the NRM section of the strategy: (1) taking a holistic approach, (2) applying a long-term perspective, (3) ensuring flexibility, and (4) enhancing monitoring and evaluation (M&E).

The first concerns the need for a holistic approach that can handle poverty alleviation and environmental conservation at the same time. This generally means building both natural and social capital simultaneously, as exemplified in Box 5.

Box 5. The Meso-American Biological Corridor

Historically, Central America represented an unbroken chain of forest habitats linking North and South America. Over the last 100 years, however, these habitats have been severely degraded and people have been forced to farm on steep slopes, with negative environmental and economic consequences. The patterns of unsustainable natural resources management have resulted in poverty and civil unrest.

Since the return of peace to the region in the 1990s, a new vision for sustainable development has emerged. The Mesoamerican Biological Corridor is a sustainable development vision adopted by the Central America Commission on Environment and Development on behalf of the eight countries of the region.

A series of Bank projects is supporting improved natural-resources management and agriculture in the densely populated regions, to alleviate rural poverty and improve productivity, and thus reduce the need for emigration to more biologically rich areas. The Bank's projects are complemented by GEF projects addressing habitat conservation and the maintenance of ecological services and biodiversity. The result is a new program of assistance to the region in which environment and development are supported simultaneously. The concept of a "biological corridor" has served to organize people around this sustainable development vision.

Source: World Bank 1997; World Bank 2000.

The second point concerns the need for a *long-term perspective* on NRM. Experience with NRM projects has been that they have been too short-lived to have a significant impact. Important instruments to address this problem are (a) long-term lending, such as loans made possible through Adaptable Program Loans (APLs), and (b) the creation of Trust Funds and other innovative financial mechanisms (see box 6) that can, in principle, finance NRM activities in perpetuity.

Box 6. Innovative financial mechanisms for long-term sustainability

Several new instruments aimed at helping finance the recurrent costs of biodiversity conservation, and thus increase the sustainability of biodiversity conservation, have emerged. Environmental Trust Funds have been established in more than 50 countries, many of which have been financed through debt-for-nature swaps and GEF funds. These funds are designed to maintain capital in real terms, and only use the excess returns for implementation activities. In some cases, however, these funds can use the principal slowly over time (sinking funds). A recent evaluation of experience to date with conservation trust funds highlights the need to maintain transparent governance structures with strong civil society participation and minimal government interference for success to be achieved.

Other new and promising financial mechanisms aim at creating markets for biodiversity when the benefits of its conservation can be easily identified. In Costa Rica, for example, a new Bank-GEF project is supporting a program to provide payments to farmers who maintain forest cover and thus ecological services (water capture and habitat conservation). When the water is used downstream by mini-hydroelectric plants, the user pays for these services. When the benefits accrue to the nation as a whole (such as in the case of habitat conservation), payments will come from a trust fund established for this purpose. Therefore a real market is created that brings together buyers and sellers of ecological services, creating firm incentives to achieve biodiversity conservation. Trust Funds, however, are expensive to establish and manage. It is proposed that they be assessed as an instrument for long-term implementation. Furthermore, it is proposed that

a study of the very early APL experience be undertaken. Have they become an accepted instrument for NRM interventions?

Flexibility is a third and major theme in assessments of NRM interventions. Enhanced community participation has put new and unorthodox demands on project management. It is sometimes argued that World Bank administrative and procurement procedures are unfit for the needs of NGO-implemented and community-based NRM activities. This area should be thoroughly researched as part of the preparation of this strategy. The hypothesis, to be verified or negated, would be that "the Bank's current procedures do not provide for the flexibility that is needed to undertake effective and community-based NRM projects."

Finally, it is hardly news that *monitoring and evaluation* is a weak point in many NRM projects. They tend to be diverse, and many interventions yield only indirect economic benefits (such as soil and water conservation leading to incremental yields). Many NRM projects also include considerable "social capital building," and focus on supporting community priorities in non-NRM sectors first, while building trust and social organization. M&E of NRM projects therefore tends to be complex, but is helpful in rigorously defining outputs and outcomes in addition to providing a description of the process involved (Kalala and others 1998). Even if results are not always encouraging, they serve to re-direct and focus the attention of project managers, and feed into the design of the next generation of projects. Good conceptual models are available (World Bank 1998) but it is anarea that should be reviewed for best practice examples. In particular, the much-discussed issue of building social capital requires a thorough study.

Together, these modalities present a formidable agenda for NRM operations. They can only succeed in a policy environment that has addressed the fundamentals of poverty alleviation: clear and enforced property rights to natural resources, conducive incentives, and local empowerment for NRM.

References

Brown, L.R. 1998. "Struggling to Raise Cropland Productivity." In *State of the World*. Washington, D.C.: Worldwatch Institute.

Crooks, R., and others. 1999. *Natural Resources Management*: *A Strategic Framework for East Asia and the Pacific*. World Bank East Asia and the Pacific Region. Washington, D.C.

Engelman, R., and P. LeRoy. 1993. *Sustaining Water*: *Population and the Future of Renewable Water Supplies*. Population and Environment Program, Population Action International. Washington, D.C.

Ekbom, A., and J. Bojö 1999. *Poverty and Environment: Evidence of Links and Integration into the Country Assistance Strategy Process*. Discussion Paper No. 4, Environment Group, Africa Region, World Bank. Washington, DC.

Food and Agriculture Organization. 1999a. *State of the World's Forests*. Rome: FAO.

———. 1999b. *The State of World Fisheries and Aquaculture 1998.* Rome: FAO.

Kalala, M., A. Lachance, A. Martella, and G. Compaore. 1998. *Bilan de Realisations & Resultats de L'evaluation D'impact par les Beneficiares et les Equipes D'appui.* Programme National de Gestion des Terroirs (PNGT) Burkina Faso. World Bank, Washington DC.

Mearns, R. 1999. *Access to Land in Rural India*. Policy Research Working Paper 2123. World Bank, Washington, DC.

Mearns R., and S. Sinha, 1999. *Social Exclusion and Land Administration in Orissa, India*. . Policy Research Working Paper 2124. World Bank, Washington, DC.

Ostrom, E. 1990. *Governing the Commons: the Evolution of Institutions for Collective Actions.* Cambridge University Press.

Scherr, S.J. 1999. *Soil Degradation*: *A Threat to Developing-Country Food Security by 2020?* Food, Agriculture, and the Environment Discussion Paper 27. Washington, D.C.: International Food Policy Research Institute.

United Nations Environment Programme. 1997. *Global Environment Outlook*. New York and Oxford: Oxford University Press.

Watson, R.T., and others. 1998. *Protecting Our Planet, Securing Our Future*: *Linkages Among Global Environmental Issues and Human Needs*. Washington, D.C.: United Nations Environment Program, U.S. National Aeronautics and Space Administration, World Bank.

World Bank. 1991. *The Forest Sector. A World Bank Policy Paper*. Washington, DC.

_____. 1992. *World Development Report 1992*: *Development and the Environment*. New York: Oxford University Press.

———. 1994a. *Forging a Partnership for Environmental Action*: *An Environmental Strategy Toward Sustainable Development in the Middle East and North Africa*. World Bank Middle East and North Africa Region. Washington, D.C.

_____. 1995. *Mainstreaming Biodiversity in Development. A World Bank Assistance Strategy for Implementing the Convention on Biological Diversity*. Environment Department Papers, No. 29. Washington, DC.

———. 1996. *Toward Environmentally Sustainable Development in Sub-Saharan Africa. A World Bank Agenda*. Africa Region. Washington, DC.

———. 1997. *Nicaragua Atlantic Biological Corridor Project.* The World Bank. Washington D.C.

———. 1997a. *Expanding the Measures of Wealth: Indicators of Environmentally Sustainable Development*. ESSD Studies and Monographs Series 17. Washington, DC.

———. 1997b. *Rural Development: From Vision to Action. A Sector Strategy*. ESSD Studies and Monographs Series 12. Washington, DC.

———. 1998. *Guidelines for Monitoring and Evaluation for Biodiversity Projects*. Environment Department Papers, No. 65. Washington, DC.

_____. 1999. *Fuel for Thought: Environment Strategy for the Energy Sector*. Washington, DC.

_____. 2000. *Greening Industry: New Roles for Communities, Markets, and Governments.* A World Bank Policy Research Report. Oxford University Press.

_____. 2000. *The World Bank Group and the Global Environment: A Progress Report.* Washington, DC.

World Resources Institute. 1994. *World Resources 1994-95*: *A Guide to the Global Environment--People and the Environment*. New York: Oxford University Press.

———. 1996. *World Resources 1996-97*: *A Guide to the Global Environment--The Urban Environment*. New York: Oxford University Press.

———. 1998. *World Resources 1998-99*: *A Guide to the Global Environment--Environmental Change and Human Health*. New York: Oxford University Press.