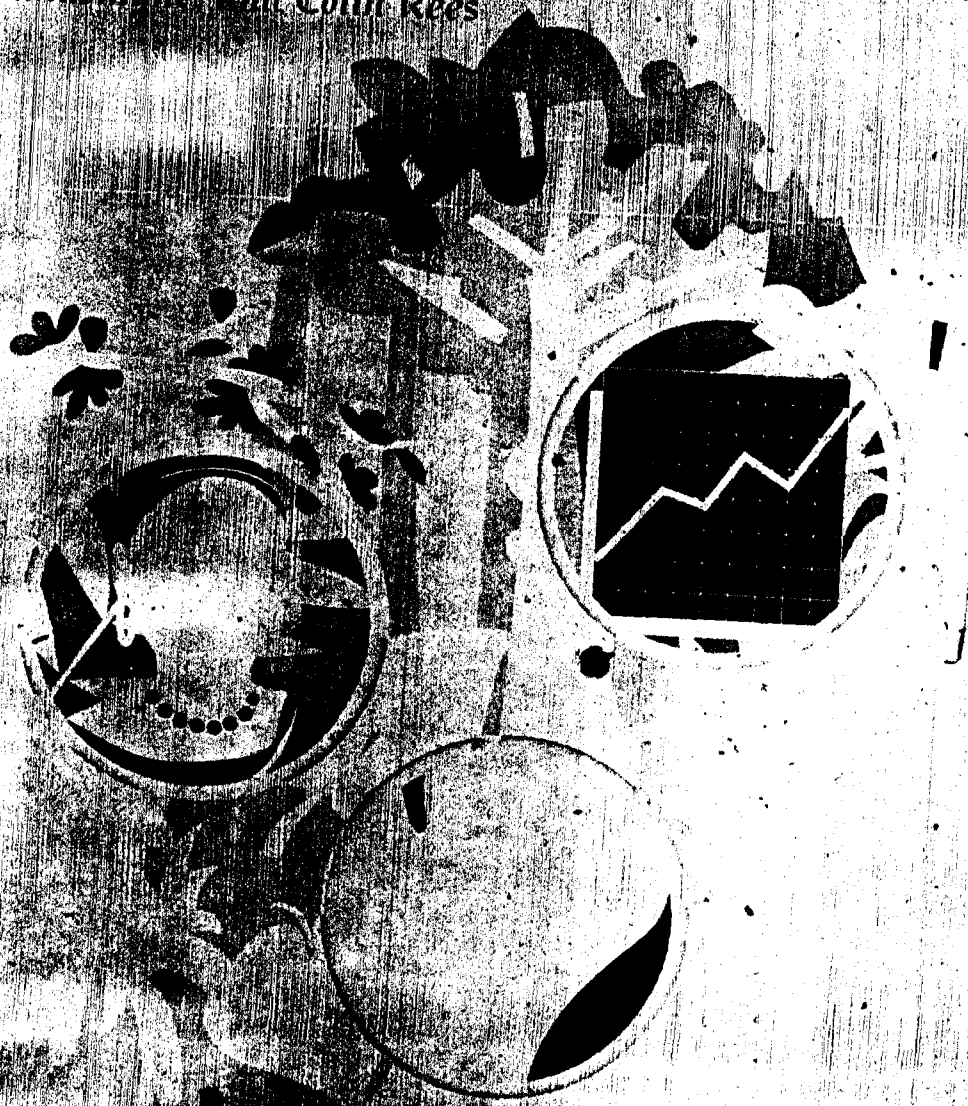


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Making Development Sustainable

From Concepts to Action

by Ismail Serageldin and Andrew Steer, editors
with Michael M. Cernea, John A. Dixon, Ernst Lutz, Sergio Margulis,
Mohan Munasinghe, and Colin Rees





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Ismail Serageldin and Andrew Steer, Editors

***with Michael M. Cernea, John A. Dixon, Ernst Lutz, Sergio
Margulis, Mohan Munasinghe, and Colin Rees***

Alicia Hetzner, Editorial Consultant

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Foreword

In 1987 the World Bank established an Environment Department and embarked on a major effort to incorporate environmental concerns into its lending and advisory activities. The methodologies were refined for Environmental Assessments, and by 1989 the Bank made environmental screening of all investments mandatory. The 1992 *World Development Report* was devoted to the theme of *Development and the Environment* and mapped out a twofold policy strategy that builds on the complementarities between economic development and sound environmental stewardship, and minimizes the trade-offs. In January 1993 a new Vice Presidency for Environmentally Sustainable Development (ESD) was created to take forward the incorporation of sustainability issues into all aspects of the Bank's work.

Progress since these events has been substantial. A good deal has been learned about how to promote development that is sustain-

able, yet much remains to be learned. A number of key relationships among development, society and the environment remain poorly understood, and the Bank (and all other institutions that are seriously involved in development) is ascending the steep incline of the learning curve on numerous institutional and policy issues.

The eight essays in this volume attempt to capture our current thinking on a number of key conceptual, methodological, and practical issues, and to suggest the way forward from here. The first paper, by the Bank's Vice President for Environmentally Sustainable Development, identifies the issues and stresses the need to integrate the approaches of sociologists, ecologists, and economists in sustainable development. The succeeding three articles present each of these perspectives on sustainability. They are followed by articles on how our measurement of progress needs to be deepened; how issues of environmental sustainability are gradually

being mainstreamed into the core of national development policymaking; and how the Bank is seeking to assist its members in a practical way through a fourfold environmental agenda. The epilogue highlights one particularly important area for further research: expanding the capital stock. The volume is rounded out by a selected World Bank bibliography relating to ESD.

The first five articles appeared in a special section devoted to ESD in the December 1993 *Finance & Development*. The editors are indebted to Laura Wallace, Senior Editor of *Finance & Development*, for her invaluable support and assistance in this earlier project, and to Alicia Hetzner for managing the editorial and production processes of the current volume.

Ismail Serageldin
Andrew Steer

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The 1992 Earth Summit alerted the conscience of the world to the urgency of achieving environmentally sustainable development. We know enough to act today, but we must also find answers to the many tough conceptual and technical questions that remain.

As the 1992 United Nations Conference on Environment and Development (UNCED)—the Earth Summit—in Rio de Janeiro drew to a close, its message to the world became clear: without better environmental stewardship, development will be undermined; and without accelerated development in poor countries, environmental policies will fail. The evidence is all around us. In Sub-Saharan Africa “slash and burn” agriculture—in the face of rising population growth—are creating vicious cycles of soil degradation and impaired productivity. In cities like Bangkok, Mexico City, and São Paulo, the polluted air and water are posing a serious health threat. Industrial country emissions of greenhouse gases—threatening a 2–4° centigrade rise in global temperatures over the next century—

show little sign of abatement.

Rio was a signal to the world that after decades of pitting environmental quality against economic growth, policymakers are finally becoming aware of the crucial and potentially positive link between the two. Humanity must learn to live within the limitations of the physical environment as both a provider of inputs and a “sink” for waste. We must recognize that even if environmental degradation does not reach life-threatening levels, it can result in a significant decline in the quality of the world we live in. We must face our responsibilities to other species and the need to protect biodiversity. We must find a way to enable all people, now and in the future, to enjoy clean water, clean air, and fertile soils.

But basic as these concerns may seem, the world today faces a tremendous backlog in providing these basic amenities to the poor and disadvantaged. One billion people—mostly in developing countries—do not have access to clean water; 1.7 billion people do not have access to sanitation; and 2–3 million children die annually because of diseases associated with this lack of water and sanitation. To this situation, we are adding about 90 million people to the global population every year—again, mostly in developing countries. This raises huge challenges for policymakers as they seek to reconcile the needs and aspirations of the growing population with the limitations of the natural world.

Three particular challenges stand out:

Food production. As the world’s population expands to 9 billion over the next 40 years, food consumption will double. Even though the required rate of growth of food production—1.6 percent per year—will be less than the 2 percent achieved for the past 3 decades, agronomists agree that the task is likely to be much more difficult, since many of the sources of earlier growth are no longer available. Two options now exist: intensifying production on land already in use, and expanding into new areas. In the past three decades, intensification has dominated, accounting for over 90 percent of agricultural growth. Whether a new “green revolution” will be able to repeat the remarkable gains in yields is highly uncertain. The challenge will be not only to raise yields but to do so in a less damaging way than in the past. Already, the environmental problems of intensification (chemical and biological runoff, water logging, salinization, and the like) are serious in some areas and, without better policies, will get much worse.

Urbanization and pollution. Ninety percent of the world’s increased population will be located in urban areas, posing formidable problems of social and institutional change, infrastructure investment, and pollution control. Already many municipal authorities are overwhelmed by their current responsibilities—yet the tasks ahead will only grow larger. Making clean water available to

everybody in the next 40 years will require extending service to 3.7 billion more urban residents. Preventing pollution from worsening in some fast-growing countries will require that pollution per unit of industrial output fall by 90 percent between now and 2030.

Human encroachment. As human numbers and the scale of their activities increase, so does the pressure on fragile ecosystems. In the past decade, 7–10 percent of tropical forests and wetlands have been destroyed; important aquifers have been depleted; and coastal zones have been polluted at an unprecedented rate. We now know that income growth need not cause these problems and can help reduce them. But without better policies, the coming decades will witness even worse damage.

“Sustainable development”

The term “sustainable development” was brought into common use by the World Commission on Environment and Development (The Brundtland Commission) in 1987. Calling for development that “meets the needs of the present generation without compromising the needs of future generations,” the Brundtland Commission report, *Our Common Future*, highlighted the need to simultaneously address developmental and environmental imperatives.¹

Since then, substantial work has been undertaken to draw out the operational implications of the concept of sustainable development. This, for example, was the main theme of the World Bank’s *World Development Report 1992*. The Bank’s current work in this area is designed not to generate a general theory of sustainability, but rather to focus on key conceptual issues with potentially important operational impli-

cations (see “The World Bank and the Environment: A Foulfold Agenda”). One thing is sure: we will fail in our efforts unless better progress is made to integrate the viewpoints of three disciplines:

- Those of the **economists**, whose methods seek to maximize human welfare within the constraints of existing capital stock and technologies. Economists are relearning the importance of natural capital.
- Those of the **ecologists**, who stress preserving the integrity of ecological subsystems viewed as critical for the overall stability of the global ecosystem. Some argue for the preservation of all ecosystems, although a less extreme view aims at maintaining the resilience and dynamic adaptability of natural life-support systems. The units of account are physical, not monetary, and the prevailing disciplines are biology, geology, chemistry, and the natural sciences generally.
- Those of the **sociologists**, who emphasize that the key actors are human beings, whose patterns of social organization are crucial for devising viable solutions to achieving sustainable development. Indeed, evidence is mounting that failure to pay sufficient attention to social factors in the development process is seriously jeopardizing the effectiveness of various development programs and projects.

While economists, ecologists, and sociologists would all agree that the others’ concerns matter (see figure 1), they do not see these concerns through one another’s eyes. An economist, for example, would readily acknowledge the importance of social and environmental factors but, as figure 2 shows, would interpret these concerns through an economist’s lens. Social concerns tend to be reduced to questions of inequality and poverty reduction, and environmental concerns to

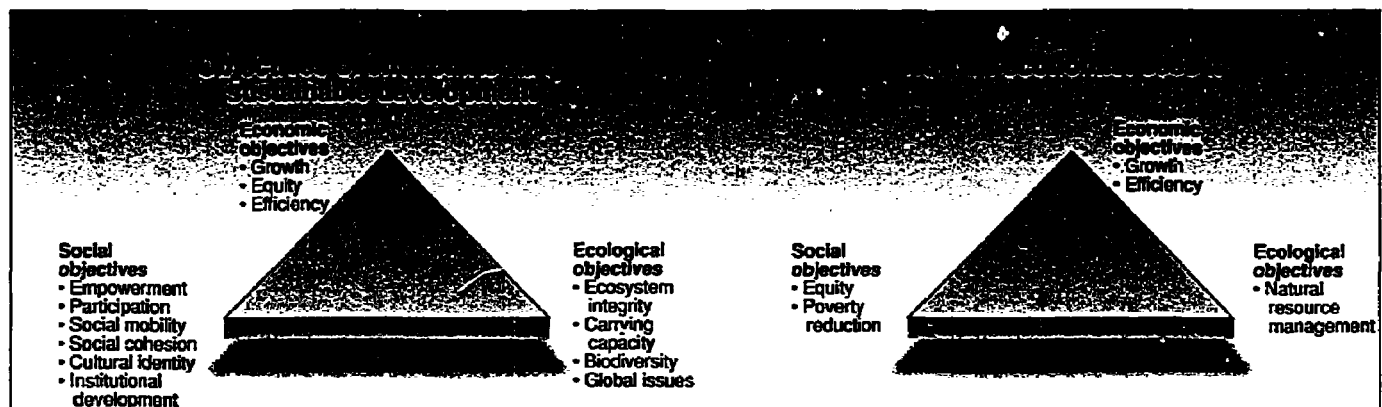
questions of natural resource management. Absent are important concerns such as social cohesion, cultural identity, and ecosystem integrity.

As policymakers seek to bring together experts from each of these disciplines—as equal partners—a number of conceptual and methodological questions need to be addressed. The key unresolved questions fall into four broad categories: valuation, decisionmaking in the presence of thresholds and uncertainty, policy and institutional design, and social sustainability.

Questions of valuation

How should we value the environment? The starting point of good environmental management is to recognize the costs of environmental damage and inject them into the decisionmaking process. But this is easier said than done. As figure 3 shows, it requires the estimation not only of the direct benefits to humans (for example, productivity benefits of good soils and health benefits of clean water), but also of the indirect benefits (for example, watershed protection from woodlands). Further, some natural assets, such as biological diversity, have “option” values that we are not even aware of (for example, providing new medicines in the future) and that are particularly difficult to estimate. Finally, most of us believe that the natural world has an “intrinsic” worth, above and beyond its value to humans; here the best we can do is estimate human perceptions of that value.

A number of techniques—including contingent valuation, replacement cost estimation, and the use of “surrogate” markets—have been developed for estimating the value of nonmarketed environmental services, and the Bank has recently strengthened signifi-



This high degree of uncertainty, however, is no reason for inaction. The dynamics of poverty, demography, and economics often make the costs of inaction even higher than those of action. But uncertainty does demand rigorous environmental assessments, drawing upon the best scientific knowledge available and including careful sensitivity analysis. A key challenge will be to narrow the range of uncertainty and make the "precautionary principle" operationally useful.

How should we prioritize biodiversity? The loss of species is an extreme example of irreversibility, and the uncertainty surrounding the impact of lost biological diversity is an extreme example of our lack of knowledge. Some species are seen to be repositories of key genetic material; others are seen as of marginal genetic significance. But our knowledge in this area is quite limited.

How much priority, then, should we assign to protecting biodiversity? At one extreme, some biologists would like to save everything. The imminent extinction of the white rhino, along with threatened whales and elephants, has galvanized conservation efforts for highly visible causes. But public

willingness to pay to save myriad "lesser" species (minor insects and plants) is much less evident, and the cost of saving all species may be prohibitive. Our present posture is a precautionary one: a rough-and-ready set of disorganized and disconnected initiatives, without any sure knowledge of what might be enough to preserve the world's unique genetic heritage. The challenge is to bring greater analytical rigor to this area.

Policy and institutional design

How should we set priorities?

Faced with a complex array of environmental dangers and limited resources, where should a government start? The problems that seem at first glance to be the most urgent may not in practice offer the best value for the money. In Eastern Europe, for example, despite the obvious need to clean up badly polluted rivers, calculations make clear that for each dollar spent, higher benefits could be secured by reducing air pollution.

One interesting approach to priority setting is found in the work of a team at Harvard University that has developed a framework for ranking various abatement options. The

core of the method, which follows on the US Environmental Protection Agency's pioneering work, consists of deriving a common set of indicators based on impacts on human health, productive assets, and ecological functions. From this matrix of hazards, sorted according to criteria such as their pervasiveness (spatially and over time) and their total consequences (current and future), it is possible to clarify the basis for establishing priorities for addressing different environmental hazards. This methodology is still in its infancy; the next step is to apply it in a number of countries on a pilot basis.

Such analyses may be useful to countries as they draw up national environmental action plans that would enable decisionmakers to view their country's environmental problems as a whole (see "Integrating the Environment into Development Policy-making"). Moreover, to the extent that the process is broadly participatory, the public can be made aware of the options and dangers facing the nation.

What policies work best? Policies for environmentally sustainable development fall into two categories. First are those that clear-

Poverty and the environment

STEPHEN MINK

The struggle to overcome poverty, daunting in itself, looks to be even more difficult in the face of increasingly apparent environmental constraints. A critical question for policymakers thus becomes whether the environmental aspects of poverty can be alleviated by modifying existing approaches, or if a wholly new strategy is required. A brief look at what is known about the reinforcing interplay of poverty and environmental degradation provides some clues.

Environment's impact on the poor

More health problems. The poor are the most vulnerable in terms of exposure to certain types of pollution, such as unclean water that carries infectious and parasitic diseases. They (especially women and children) also suffer disproportionately from indoor air pollution that results from burning unclean, but affordable, bio-fuels. For example, smoke in household kitchens in poor rural areas of The Gambia, India, Kenya, and Nepal routinely have suspended particulate matter concentrations exceeding World Health Organization peak

guidelines by four to five times.

Lower productivity. Environmental degradation depresses the poor's income by diverting more time to routine household tasks such as fuelwood collection and by decreasing the productivity of the natural resources from which the rural poor are most likely to wrest a living. A study of Nepalese hill villages with severe deforestation concluded that time devoted to fuelwood collection was diverting nearly a quarter of household labor normally devoted to agricultural activities, resulting in income loss and declining consumption and nutrition levels.

How poverty affects environment

Constrained time horizons. The very poor, struggling at the edge of subsistence levels of consumption and preoccupied with day-to-day survival, have limited scope to plan ahead and make natural resource investments (for example, soil conservation) that give positive returns only after a number of years. Such short time horizons are not innate characteristics, but rather the outcome of policy, institutional, and social failures.

Constrained risk strategies. The poor's use of natural resources is affected by their facing greater risks, with fewer means to cope.

These risks range from misguided policy interventions in input and output markets to evolving land tenure systems that favor those with greater political clout. The rich array of traditional means for coping with crises—selling stored crops or goods, migration of household members, increasing wage labor, borrowing for consumption, calling on mutual assistance traditions or patron-client understandings—are often unavailable to the poor or are weakening as social norms. This means that the poor will have little choice but to overexploit any available natural resources. Moreover, the poor, especially the women, typically lack access to formal markets for credit, crop insurance, and information (for example, extension services) that provide advice on risk-reducing agricultural practices.

What can be done

As policymakers search for ways to promote environmentally sustainable development, it is becoming increasingly clear that certain win-

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What can be done

As policymakers search for ways to promote environmentally sustainable development, it is becoming increasingly clear that certain win-

ly promote economic growth and improved environmental stewardship. These "win-win" policies include removing general subsidies on resource use, clarifying property rights, and accelerating education and population programs. Such policies should be relatively uncontroversial, needing political will and funding for their implementation. Second are policies that seek to stop environmentally damaging behavior through regulations and incentives. These are more controversial in that, implemented poorly, they can distort the economy and fail to improve the environment. Textbooks and empirical studies tell us that market-based instruments—those that charge polluters for the damage they do—are generally better than quantitative restrictions, yet the latter have dominated policymaking. A major task is to assess the extent to which developing countries can avoid the expensive "command and control" approaches common to industrial countries and thus minimize any trade-offs between income growth and environmental protection.

How should we build capacity for the task? Many well-meaning environmental policies have failed due to the lack of

institutional capacity to get the job done. As a result, countries around the world are seeking to strengthen their institutional capacity; the Bank is assisting over fifty of them. Experience suggests that the organizational structure of institutions is less important than clarity of mandate, adequate resources and technical skills, authority to operate across disciplinary and jurisdictional lines, and accountability for results. Much remains to be learned in this important area, however, both in terms of appropriate institutional design in various sociocultural contexts and in how to enhance the human resource base for effective management.

People-centered development

People are the instruments and beneficiaries, as well as the victims, of all development activities (see Mink box). Their active involvement in the development process is the key to success (see "The Sociologist's Approach to Sustainable Development" and Martin-Brown box). Furthermore, unless we keep foremost in our minds the need to continue to improve the welfare of the people, environmental programs will certainly fail. The

poor, in particular, tend to be the hardest hit by environmental degradation and the least well-equipped to protect themselves, yet, at the same time, they cause much of the damage out of short-term necessity, ignorance, and lack of resources.

The challenge is to make *participation* more than an empty catchword. Practical progress is required at three levels. First, those potentially affected by development projects need to be more involved at the design stage. Second, local knowledge needs to be better used in the design and implementation of programs. Third, we need to build our capacity to assess social impacts of policies and investments—a particularly important, but difficult, task, requiring a different skill mix and a different way of doing business. Indeed, doing business differently will be required in many areas if development is to be truly sustainable.

Note

1. *World Commission on Environment and Development (The Brundtland Commission), Our Common Future (New York: Oxford University Press, 1987).*

win" strategies should be harnessed to reverse the downward spiral of worsening poverty and natural resource degradation. They include:

Promoting poverty alleviation. Higher incomes will enable the poor to consider longer-range options for resource use that give better returns. Policymakers should make sure that the macroeconomic policies aimed at reducing poverty through stable and broad-based income growth do not discriminate against agriculture—the principal labor-intensive sector. Policies should also promote rural infrastructure to encourage intensive or extensive farming practices where appropriate. Yet income growth and labor absorption away from environmentally fragile areas can take several generations to appreciably reduce poverty, even under the best of circumstances. There is thus a need for targeted policies to address the immediate consumption and production risks that can confront poor rural households and result in environmental degradation.

Reducing risks and tenure insecurity. Temporary food-for-work programs during droughts can bring immediate benefits through minimizing natural resource "mining" by poor rural households during crises that threaten to push them below subsistence consumption levels. Measures to improve tenure rights—such as

strengthening the legal framework and judicial institutions for resolving land conflicts, revising legislation that requires land clearing to establish title rights, and protecting and supporting common property management to ensure maintenance of traditional access rights by the poor—are also important. In addition, access to credit, whether to permit maintenance of minimum consumption levels or to undertake investments in natural resources, needs to be promoted.

Addressing maldistribution

Improving access to services and infrastructure can reduce environmental problems confronting the poor, especially poor women. Agricultural extension and research services often fail to reach them, and they continue to pay the health, and, therefore, income consequences of inadequate access to safe potable water. Less clear is the environmental outcome of redistributing unequally owned natural resources. Land redistribution may create more jobs and reduce migration to fragile frontier resources. However, in practice, redistribution often involves protracted social upheaval and uncertainty, with owners—who anticipate losing old rights or who doubt the durability of new rights—apt to overexploit natural resources, sometimes converting them into

more mobile assets. A favorable environmental impact may be achieved by concentrating on situations where property rights are already uncertain or redistribution can occur quickly.

Strengthening education and public health programs. Improving access to education, health, and family planning—which is at the center of most poverty alleviation strategies—takes on even more importance when environmental considerations are taken into account. Access to quality education can improve the use of natural resources and enhance options for diversifying incomes away from natural resources. Access to public health services and information can enable the poor to follow preventative measures capable of reducing environmental health risks. Finally, increasing funding of family planning to respond to unmet demand for these services can help lessen the degree to which population growth exacerbates environmental degradation.

This article is based on "Poverty, Population, and the Environment," by the author, World Bank Discussion Paper No. 189 (written as a background paper for World Development Report 1992), February 1993.

Gender and ecosystem management

JOAN MARTIN-BROWN

The World Bank recognizes the critical importance of fully integrating women in ecosystem management to achieve development that is both environmentally sustainable and equitable. There are significant linkages among environmental degradation, the status of women, and poverty alleviation.

In November 1993 the World Bank, in partnership with the Inter-American Development Bank (IDB), United Nations Development Programme (UNDP), United Nations Development Fund for Women (UNIFEM), United Nations Environment Programme (UNEP), and United Nations Sudano-Sahelian Office (UNSO), hosted a three-day International Consultation on Women and Ecosystem Management to examine the interaction between the role of women and the environment in five distinct ecosystems: coastal and wetland areas; rivers, ground water, and lakes; mountains; temperate and tropical forests; and arid and semi-arid lands. The following highlight some of the Consultation's provocative findings.

Each ecosystem poses particular analytical and management challenges in the search for ways to improve women's role as ecosystem resource managers. For example, coastal areas, home to the majority of the world's population, are under increasing competing demands including from fisheries, aquaculture, agriculture, forestry, industries, ports, tourism, and waste disposal. Attempts to reconcile these competing demands too often exclude engaging women and result in blocking their traditional access to natural resources, economically productive endeavors, and food security. It is essential to assess the resource-related roles of women in coastal areas and to incorporate this information into environmental and social assessments of the impacts of economic development.

Water, whether from rivers, groundwater, or lakes, is both an essential and limited resource. Water issues should not be examined outside their ecological and economic contexts, and women, as primary users of household water, and as farmers, should be involved in diagnosing what is essential in protecting and sustaining water resources. The shortage of trained female water managers and water researchers hampers addressing important local, physical, and social dimensions of water management.

Similarly, mountain ecosystems impose their own rigors and opportunities on women. The

inaccessible, ecologically fragile configurations of mountains make them most conducive to small-scale production, and thus primarily engage women. Consequently, women have significant roles as community leaders and control the resources in many mountain communities, while also helping to maintain the biodiversity of these resources whenever possible. To integrate women's unique expertise about seasonal and altitudinal ecological linkages, and micro-environmental diversity, into environmental management, planning must be decentralized. In this regard community organizations and participation are of great importance.

Intimate knowledge of the resource base is a strength that women bring to environmental management. For example, in temperate and tropical forests women and men possess different knowledge bases about forests. However, the secondary status of women in many societies often restricts their access to, or ownership of, forests. They are rarely trained as professional foresters, yet, increasingly, rural populations are dominated by women heads of households. Forest managers and extension workers must be trained to examine the social and cultural contexts of forestry and include women and their traditional knowledge in this examination. At every level of sustainable forestry, women's participation should be mainstreamed.

The water-scarce, generally harsh conditions of arid and semi-arid lands necessitate nomadic life styles. Women are often left behind as men travel with their livestock. The often prolonged absence of men is an important rationale for integrating women in all endeavors related to rain-fed agriculture, erosion abatement, crop irrigation, and marketing schemes. Success in including women depends on varied and complex cultural, physical, and sociological differences and initially may require additional resources in capacity building, but in the long term will lead to sustainable ecological management.

The Consultation's findings concluded, however, that regardless of the type of ecosystem, women have common requirements if they are to be effective ecosystem managers:

- Secure rights to land and other natural resources
- Access to credit, training, and environmental education
- Inclusion in the design and implementation of projects

- Full integration in the selection and development of technologies for community-level application

- Participation in the design and implementation of training programs

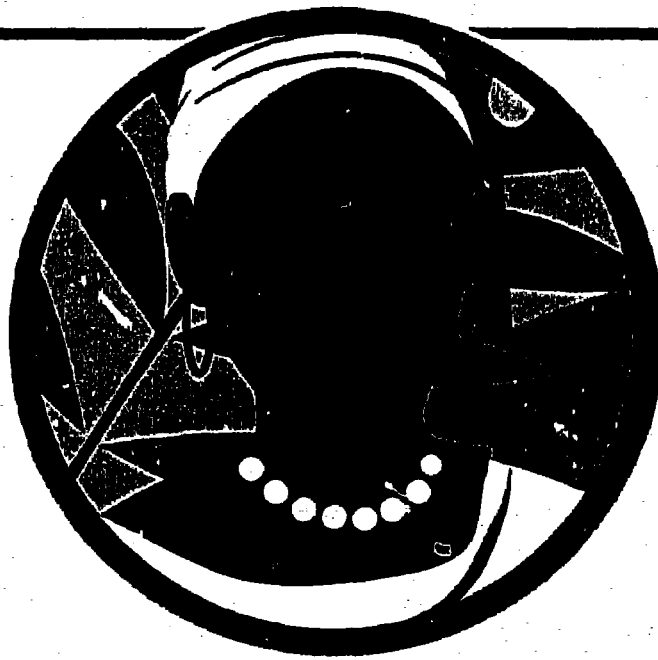
- Engagement in entrepreneurial activities that encourage sustainable production practices

- Assessing the micro-level consequences for women of macro-level policies, as practiced by governments and the private sector.

The Consultation underscored the critical need for improved consultation between women and environment programs within UN and Bretton Woods institutions, and the lack of women/environment NGO cooperation. To address these problems, joint women/environment working groups should be established in international and regional institutions to encourage joint initiatives at the national and grassroots levels. A priority for the working groups is to advance the education of women in the natural sciences, economics, and agriculture—specific to the ecosystem or systems in which they live. Other priorities are to engage in dialogues with women, environment, and development leaders to encourage them to integrate their efforts, particularly in community-based programs, and to recruit the environmental/natural resource expertise of the women at all levels.

Institutions must directly interact with women at the national and grassroots levels if they hope to advance environmental management, and encourage working partnerships between women and men for this purpose.

For a full review of gender and ecosystem management case studies, see IDB, UNDP, UNIFEM, UNEP, UNSO, and World Bank, Final Report on the International Consultation to Advance Women in Ecosystem Management and to Promote Cooperation, Coordination and Strategic Planning among Multilateral, Regional and Bilateral Agencies and Organizations (Washington, D.C.: United Nations Environment Programme, 1994). For information on the nexus relating environment, agriculture, and population, see Kevin Cleaver and Götz Schreiber, The Population, Agriculture and Environment Nexus in Sub-Saharan Africa. Agriculture and Rural Development Series no. 1 (Washington, D.C.: Africa Technical Department, World Bank, 1992) (rev. ed. forthcoming 1994).



The Sociologist's Approach to Sustainable Development

MICHAEL M. CERNEA

The social components of sustainability are no less important than the economic and technical ones.

"Putting people first" in projects improves social organization and increases social capital.

The case for environmentally sustainable development is usually argued in economic and technical-ecological terms. As has happened in other areas, many are tempted to think that if they can "get the economics right," everything else will fall into place. Soothing as this econo-mythical invocation may be, it is nonetheless one-sided. The social components of sustainability are no less important. Indeed, failure to recognize the determinant role of the "social actors" has doomed many programs trying to induce development.

The environment is at risk not from extraterrestrial enemies, but from human beings, including both local and distant resource

users. Thus, the call for "putting people first" in policies and investment programs for inducing development, or for assistance in spontaneous development, is not a radical call: it is a realistic one. It simply means recognizing the centrality of the social actors and their institutions in sustainable development. Sustainability must be "socially constructed"—that is, social and economic arrangements must be made purposively. For this reason building sustainability must be approached as a threefold task—social, economic, and ecological—simultaneously.

A sociologist's "tools"

What does the sociological perspective add to the arsenal of tools for achieving sustainable development? Two sets of elements, at least. First, it provides a set of concepts that help explain social action, the relationships among people, their complex forms of social organization, their institutionalized arrangements, and the culture, motives, stimuli, and values that regulate their behavior vis à vis one another and natural resources. Second, it offers a set of social techniques apt to prompt coordinated social action, inhibit detrimental behavior, foster association, craft

alternative social arrangements, and develop social capital.

Social organization. Incorporating new elements of social and institutional organization into development means much more than reciting empty slogans about "beneficiary participation." It demands competent social analysis and creative social engineering—most important, figuring out which building blocks make up a social arrangement conducive to enduring development. The building blocks of social organization typically include the social actors themselves; the social contract governing relationships (including conflicts) among local users and remote stakeholders; the prevailing cultural systems of resource entitlements—ownership, usufruct, or custodianship; authority systems and enforcement mechanisms; an infinite range of producers' organizations, from family-based systems or water users' associations to large corporate enterprises; labor-exchange networks; and value and belief systems.

If identified and known, these building blocks can be translated and articulated into powerful levers for action-oriented programs; but if they are ignored, they can

wreck expensive programs and curtail sustainability (see box, right). These effects were confirmed once again by a study that examined whether 25 Bank-financed projects in Africa, Asia, and Latin America demonstrated sustainability after their completion. Disappointingly, the study found that over half of them (13 projects) had left no lasting developmental impact 6 to 10 years after completion and had failed to produce the expected flow of benefits. Among the basic causes of nonsustainability were the neglect of sociological factors in project design and the lack of supportive institutions and grassroots participation. In sum, the "social scaffolding" of sustainability was missing. Conversely, all the projects that proved to be sustainable undertook from the outset purposeful institution building. The study demonstrates why sociological, as well as economic and ecological, expertise is needed to promote sustainability in investment programs.

Social techniques. Program designers searching for increased sustainability often are not aware of the vast repertoires of social management "tools" and cultural levers that can be marshalled to mobilize social energy and coordinated action under induced development programs. These tools range from creating public awareness to investing in human capital; from simple consultations to fostering participatory comanagement; from incentive systems to institutional controls; from relying on traditions to changing old practices and introducing innovations; from empowerment to increasing social cohesion; and from economically motivating individuals' behavior to harnessing the power of solidarity, trust, self-organization, and group-embraced values.

These tools can also be combined to change existing social patterns and promote a culture of resource protection and enhancement. In social forestry projects, for instance, planners have several strategic options for tree planting programs: community-centered approaches, household-centered approaches, or small group-centered approaches. The social—not only the technical—strategy must be chosen from the outset, and the goal should always be to build or strengthen the institutional arrangements. When this prescription is not followed, as has happened in many village woodlot schemes designed to provide wood for fuel and to stem deforestation, projects

Dancing societies or labor exchanges?

The cultural map of Tanzania's Sukumaland region is dotted with Mallicha Mbina, the secret dancing societies. To the socially untrained eye, they remain either invisible or seem to be irrelevant for development endeavors. But to the socially perceptive eye, the Mallicha Mbina appear for what they really are: stable, territorially framed, robust, and responsive networks of labor exchange and mutual help—not just groups that perform dances at rituals and feasts.

These groups embody an adaptive strategy to labor scarcity: they help meet the seasonal peak labor demands of individual farms at low costs. A sophisticated yet inconspicuous form of social organization, they have leadership, rules, and role structures, and welfare-relevant functions. They reach beyond primary kinship ties, link microsocial units across dispersed settlements, and efficiently relay mobilization signals to and from the membership through a flexible network of foot messengers.

By mediating labor demands collaboratively, this pattern of social organization shoulders the survival and sustainability of local farming systems under severe environmental constraints. Not harnessing their power would undermine the effectiveness of any resource development program.

and investments perish without trace. In India, for example, because these "community woodlots" were conceived without a sufficient understanding of how stratified the villages were, few people showed up to plant trees on a "common" plot, but many came to collect wood; in the end, the "village" woodlots became government woodlots, wasting money and goodwill.

What role should users play?

One of the crucial—and still controversial—questions is what role direct resource users should have in environmental management. Some policymakers reject the option of entrusting management responsibilities to the users, fearing that the resources will be abused; instead, they advocate state controls. Others plead against government intervention, focusing only on users or markets.

Evidence from many countries suggests that the statist solution, applied exclusively, promises more failure than success. But this does not imply that resource management should be fully entrusted to the users. Policymakers should determine whether the users are always able to exercise management. Taking such ability for granted in all cases is simply naive.

The issue, however, is not just the subjective capacity (or lack thereof) of one or another individual user, or of many users, to exercise management. Rather, the decisive factor is the presence or absence of forms of social organization structurally suited to manage the environment. Otherwise, the individual actions of multiple users may easily combine to produce an adverse system-level outcome. Often, atomistic sets of individual

users need to be organized into interactive, institutionalized, and culturally cohesive groups to acquire the ability to manage, trigger action, and enforce adequate rules, rights, and obligations.

Can traditional patterns of social organization in developing countries perform this role? Disappointment with proliferating, weak, and ineffective government agencies has led some development thinkers to advocate reviving traditional institutions. Under certain circumstances, this social technique can be sometimes effective. But this cannot become a universal, mainstream strategy, because forming institutional structures for environmental management at the local level requires more than simply reviving old institutions or traditions.

Building social capital

The practical alternative is to increase, diversify, multiply, and solidify the various forms of formal organization of rural communities. All over the developing world, the degree of formal organization in rural areas lags far behind that of urban populations, making rural areas especially vulnerable to strong exogenous forces and less able to mobilize their own social potential.

To counteract this vulnerability, development strategies can make a vast contribution by investing not only in the economic and technical prerequisites of sustainability but also in the formation of the socio-organizational structures for enduring development. Along these lines, twin social concepts must inform development policies and actual programs: organizational intensity and organizational density.

The organizational intensity of a development program defines the level of emphasis, high or low, with which a program invests in social "software," building organizational structures and institutional capacity. If used as a compass from the outset, this concept helps calibrate the investments toward explicit institutional goals and helps avoid technocentric models that overlook the social context. Programs that emphasize the construction of an enduring institutional scaffolding for development can be called organizationally intense, while those neglecting it have a low organizational density and a smaller chance for long-term impact. Whenever such an intensive strategy succeeds, the society involved achieves a higher organizational density—an enhanced capability to sustain and propel development.

The concept of organizational density defines, in turn, the frequency and strength of various forms of social organizations that make up a given cultural fabric and the frequency with which individuals participate in multiple networks of socially organized activities. This density varies greatly, of course, by cultural setting and historic time. In the Republic of Korea and Thailand, for example, the organizational density of rural society is considerably higher than in India or Senegal.

An interesting parallel can be drawn between technology and organization. Donor agencies and governments alike have long pursued the transfer of advanced technology through technology-intensive—but not organization-intensive—aid strategies. However, technology, which is the physical capacity, cannot realize its full development potential unless it is embedded within adequate patterns of social organization—the social capital that sustains, uses, and maintains the technology. Thus, creating and strengthening adequate organizational structures, and involving the users of the technology, is no less important than the technology itself.

Indeed, if a high degree of social organization is a strategic resource for development, and if organization enhances the potential of individual actors by mobilizing them and maximizing synergy, then building up the levels of organization in society is an effective way to enhance the endurance and impact of development gains. For this reason, when choices among investment program options are being made, it is legitimate to ask: "What is their degree of organizational intensity?"

How can this degree be enhanced to increase social sustainability?"

Creating organizations is equal to creating new social capital. Appropriate organizations are needed to enhance individuals' social capacity for coordinated action and empower them as agents of development activities. Organizations accomplish this by defining mutual obligations and member rights, by creating sets of specialized roles internal to the organization, by establishing internal authority and accountability systems, by promoting norms and behavioral patterns regarded as useful to the group, and inhibiting those regarded as detrimental. Organizations incorporate important accumulations of human experience and knowledge, which is social capital. And new and growing social capital is indispensable for the social sustainability of development.

Irrigation projects—an area in which the World Bank has long been involved—are a good test case for whether or not development strategies are organization-intensive and purposively construct social sustainability. Many governments have supported irrigation by financing and building the physical infrastructure of large irrigation systems. Without such an infrastructure, irrigation is impossible. But if the institutional structures are not created as well, sustainable irrigation cannot occur.

In practice, irrigation programs have often dealt with institution building by proliferating governmental bureaucracies to manage the irrigation systems. Infinitely less attention has been paid to the creation of stable, culturally appropriate, and institutionally enduring patterns of social organization at the grassroots level. Indeed, while top-heavy irrigation

administrations have multiplied and flourished, the creation of networks of water users' associations, or support for existing ones, has been underrated, and, in some cases, ignored. Since neglecting or bypassing existing grassroots organizations amounts to disinvestment in institutions and in the social capital for development, many of these projects have been undermined, and physical irrigation structures have deteriorated (or even collapsed) much earlier than they would have otherwise.

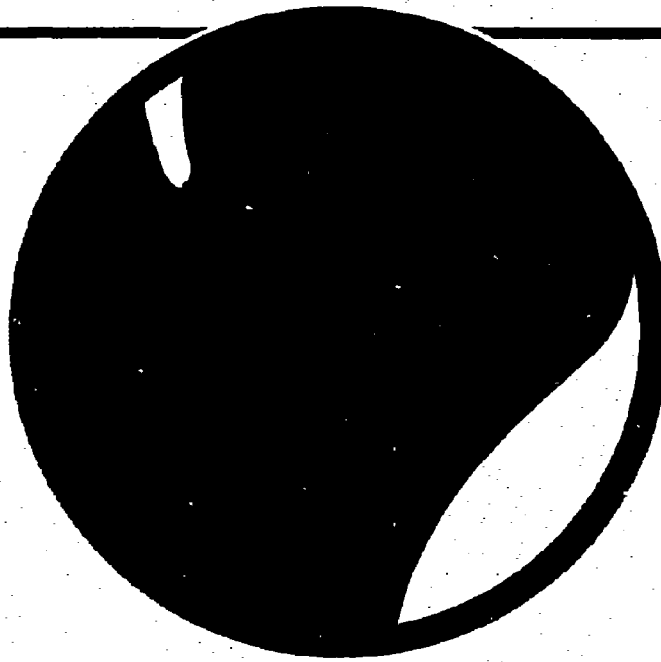
Learning from such experiences, Bank-financed irrigation projects in the 1980s have embraced a more organization-intensive strategy, promoting the creation of water users' associations. The most striking example is probably the innovative irrigation program in Pakistan, which embodies an organization-intensive strategy that has led to higher organizational density and better resource management (see box below). Similar successful approaches have been applied by governments and the Bank in communal irrigation schemes in the Philippines, Sri Lanka, and Thailand. Eastern Senegal has benefited from a uniquely successful program aimed at creating pastoral/grazing associations that have effectively improved grasslands and water management.

In sum, promoting group formation and creating organizations are not easy social endeavors, but they are key avenues for "putting people first" and for designing strategies around social actors. The returns from enhanced degrees of adequate social organization are enhanced welfare, lasting social sustainability for development programs, and better environmental management.

An innovative approach to water use: Pakistan

In the late 1970s, Pakistan started a vast program for improving on-farm water management, assisted through a series of three successive Bank-financed projects (stage three is still ongoing). The program's environmental and economic goals were typical for irrigation projects: improving the husbandry of the farmer, vital resources of water and land, reducing seepage and losses, controlling bank erosion, and increasing irrigation effectiveness. However, the Pakistani projects broke new ground by recognizing the key role of the local actors—the water users. Legislation was enacted to empower farmers to form water users' associations along each watercourse and help in canal lining, thereby creating grassroots social structures for sustainable water management.

Although covering all of Pakistan's 100,000 watercourses requires much more work, the creation of some 4,000 users' associations, despite their ups and downs, is already an extraordinary accomplishment. By investing in building organizational capacity, the water management program complements the physical canal network with a new social infrastructure, improving environmental management by increasing the organizational density of Pakistan's rural society.



The Ecologist's Approach to Sustainable Development

COLIN REES

As ecologists take on a larger role in economic decisionmaking, they bring a systemwide perspective, a long-term view that underscores prevention, and a package of ecological practices that reinforce sound socioeconomic development.

Traditionally, ecology—the structure and function of the natural environment—was of little relevance to those interested in human affairs. But in recent years the situation has changed, reflecting a more sophisticated perception of the way humans influence the use and conservation of natural resources. Whereas natural resources were once considered a “free good” and unlimited growth prevailed, today’s attitudes embrace three fundamental ecological principles:

- Human economic activity is a subsystem that operates within a larger, but finite,

ecosystem. Disorder of the ecosystem (for example, depletion and pollution) eventually interferes with the life-support systems sustaining the economy.

- As expanding economic activity and growing human populations use increasing amounts of natural resources and produce ever-increasing volumes of waste, the limits (or carrying capacities) of ecosystems are being exceeded.

- Some development impacts will, if drastic enough, cause long-term, and even irreversible, environmental changes. For example, when tropical forests are felled and soil exposed, the minerals (already in short supply) are leached by the rain and the soil hardens, preventing forests from regenerating and crops from being re-established.

As a result of the new awareness, ecologists now play a vital role in defining human use and management of forests, wetlands, and coastal areas and in balancing the interactions among humans, livestock, and the plants and soil supporting them. Ecologists also have a growing involvement in the design and implementation of development projects, as governments move to protect air

and water quality, conserve natural resources, and support economic development with sound environmental management.

The challenge for ecologists is how best to measure and predict what happens to the relevant natural system, or ecosystem, when development takes place. They might be asked to advise on where to locate an industrial plant and how the resulting pollutants should be treated—essentially measuring the absorptive capacity of a receiving lake or river. They also might be asked to predict harvests and stocks of natural resources, based on which factor is in least supply and its availability (for example, nutrients in tropical agricultural soils). When the structure and processes of an ecosystem are understood, equations can relate essential traits in a predictive model.

Initially, development concerns were local pollution and health whereas now concerns are regional and global. As ecologists become increasingly drawn into the development process, they are helping to shape the new, more environmentally aware development agenda. For them, the strategy is threefold: (1) encouraging the integration of ecological

considerations into economic and sectoral development policies, (2) devising anticipatory and preventive strategies for development projects, and (3) demonstrating that sound ecological policies also benefit development.

A systemwide approach

Ecologists bring a systemwide perspective, focusing on the dynamic nature of complex environmental problems, with their multitude of links and indirect effects. Many of these effects are manifest either at distant locations (downstream effects) or in the future (the gradual depletion of soil nutrients). In forest management, for example, harvesting usually induces significant changes in the forest ecosystem (as measured by such indicators as topsoil depth and infiltration capacity), which in turn affect productivity. But changes also occur off site, with soil loss leading to a potential decrease in fish production and reduced reservoir storage capacity.

For the past ten to fifteen years, ecologists have relied on national conservation strategies, environmental profiles, environmental sector reviews, and ecological or natural resources profiles to help move sustainable use higher on the political agenda and strengthen the relevant agencies in many countries. These tools also have proved useful in determining the optimal use of natural resources on a sustainable basis, the nature and dynamics of social and technological change, trade-offs between total exploitation of natural resources and their conservation, and benchmark indicators in the integration of conservation with development.

In the last two to three years, the World Bank, along with other aid agencies, has adopted another of the ecologists' tools: environmental action plans (EAPs). By March 1994, some thirty-three developing countries had completed such plans, and others were in the process of preparing them. These plans describe a country's main environmental problems and identify policies, institutional measures, and investments that address them. Although these plans are still in a formative stage, they are beginning to play a role in preventing serious and irreversible environmental degradation.

Prevention better than cure

As policymakers have come to realize that curing degraded ecological systems is

Valuing ecosystems: The Bintuni Bay mangroves

The precise economic value of ecological assets is difficult to assess. This is owing partly to the lack of information on the "market value" of ecological goods and services, and partly to uncertainty about the dynamics of ecosystems, as well as problems of quantifying certain "nonmarket" values.

Nonetheless, in 1991, policymakers in Indonesia tried to quantify ecosystem benefits before deciding what to do with one of the largest remaining mangrove forests—304,000 hectares surrounding Bintuni Bay in Irian Jaya. One proposal urged conserving most of the area; another, expanding exploitation for the production of woodchips for export. At risk were the economic benefits of near-shore shrimp and fish, as well as the livelihood of local inhabitants and protection from farmland erosion.

A Canadian-funded cost-benefit analysis compared the proposals, taking into account links with the other economic benefits of the different ecosystem functions (fisheries, timber, minor products and local uses, erosion control, and existence values). The study concluded that a selective cutting approach covering 25 percent of the total mangrove area would maximize the asset value of the resource. However, an important caveat was the extent of uncertainty about actual links among ecosystem functions, meaning the penalty for "guessing wrong" could be quite high. A more conservative approach might have been in order, including adopting additional measures (such as selective cutting and replanting) to mitigate the adverse effect that timber cutting might have on the different ecosystem functions.

extremely expensive, time-consuming, and often impossible, environmental policies aimed at anticipating significant ecological and socioeconomic impacts—rather than simply reacting to them—have taken on new importance. For example, tropical forests, grasslands, coral reefs, mangroves, and many other unique habitats are rapidly being destroyed; species extinction is accelerating; and in eight of the world's seventeen ocean fishing areas, the amount of fish caught between 1987 and 1989 exceeded the lower range of the estimated sustainable catch.

But the application of anticipatory and preventive environmental policies raises more difficulties. Such policies may require action in advance of both scientific certainties and political acceptance of demonstrated adverse impacts. Moreover, the knowledge needed to predict environmental damage is often weak or absent. To address these difficulties, ecologists increasingly rely on environmental assessments (EAs) aimed at determining the potentially significant environmental impacts of a proposed development project. Since October 1989, the World Bank has required that all proposed investment projects be screened in this manner, leading to the redesign of numerous projects. In the Lower Guayas Flood Control Project in Ecuador, for example, a flood control channel was rerouted to spare a reserve that contained the threatened Horned Screamer bird and the last of western Ecuador's tropical dry forest.

Although EAs may continue to be the predominant environmental planning technique for the foreseeable future, a key drawback is that they operate on a piecemeal, sectoral basis, often precluding a comprehensive and integrated view (for example, multiple use of natural resources and the capacity to consider common waste collection, treatment, and disposal systems). Likewise, the degree to which a particular project's exploitation of resources (energy and raw materials) is at variance with overall regional needs may go unappraised. An important step toward full integration of ecological factors into mainstream economic decisionmaking must now be to expand the application of environmental assessments so that they can provide guidance to policy-based lending—which, after project lending, is the second-largest use of Bank resources.

Good ecology/good economics

Ultimately, ecologists will be effective in influencing policy only if they can demonstrate that sound ecological policies will promote, not hinder, sustainable economic development. This requires a partnership with economists—a partnership that is being developed, in estimating both the economic cost of damaged ecosystems and the economic benefits of conserving such systems (see box above).

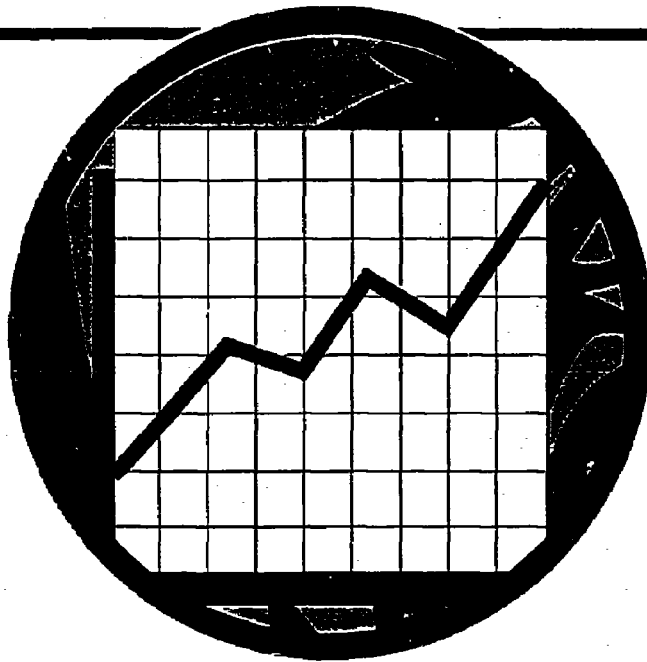
Even so, the structure of government decisionmaking often works against the best policies being adopted. Natural resource

agencies—which typically are charged with both regulating and promoting natural resource use—have found it difficult to move from exploitation to sustainable use, in part because of the intense competition for increasingly scarce budgetary resources and the consequent pressure to produce results that can be reflected quickly in improved economic performance. In addition, well-defined and generally accepted measures of environmental and natural resource manage-

ment performance are in short supply. This may explain why a central agency with broad powers to protect the environment is often unable to persuade, for example, a forestry department to develop forests on a sustainable basis, or an agriculture department to regulate the use of fertilizers and pesticides.

The answer to these problems lies in restructuring these institutions. Consensus suggests that a new facility at the highest levels of policy formulation is needed so that

environmental policies cutting across the jurisdictional lines of existing agencies can be identified and analyzed. In all this, economic analysis has a major role to play. Through natural resource assessments, economic tools can help determine the desirability of environment-related projects, their design and location, the need for introducing new incentives or removing misguided ones, and the policy instruments necessary for sustainable development.



The Economist's Approach to Sustainable Development

MOHAN MUNASINGHE

Environmental economics helps move us closer to sustainable development by better incorporating environmental and social concerns into conventional decisionmaking. It involves a novel synthesis of existing economic principles and their extensions.

Historically, the development of the industrialized world focused on economic output, so, not surprisingly, the postwar model adopted by developing countries was growth dominated. But in the 1960s the equitable growth model was developed to incorporate social issues such as poverty alleviation and income redistribution. In the 1980s the model was broadened again to embrace the concept of sustainable development—reflecting increasing concerns about the environment.

Economic growth still overshadows the other objectives, following the example of the industrialized countries that began to tackle their environmental problems only after achieving major economic objectives. But policymakers worldwide increasingly are trying to find sustainable options. The goal is to maximize the net welfare of economic activities while maintaining or increasing the stock of economic, ecological, and sociocultural assets over time (to ensure the sustainability of income and intragenerational equity) and providing a safety net to meet basic needs and protect the poor (thereby advancing intergenerational equity). Environmental economics contributes to this search by helping to incorporate environmental and social concerns into economic decisionmaking. It offers policymakers both a better way of tracing environmental and social impacts, and improved decisionmaking tools.

Environmental economics as a field is not really new. Over the past two decades, existing economic principles have been built on and extended, particularly in valuing environmental and social impacts that often are not well reflected in market transactions. But it is

only recently that we have begun to apply these concepts to developing countries and, in the process, influence decisionmaking mainly at the project level. In the past few years environmental economists also have begun to take an interest in macroeconomic policies.

While the underlying basis of this approach is economic optimization and efficient resource allocation, practitioners recognize that these concepts may not be easy to apply to some environmental and social objectives—such as preserving the dynamic resilience of ecological systems to withstand shocks, promoting public participation, or reducing conflicts. In these cases they often rely on other techniques, such as multicriteria analysis, to facilitate trade-offs among different goals.

Tracing impacts

The first way environmental economics improves policy analysis is by helping to trace the impacts of decisions at various levels.

Project level. Traditionally, economists have relied on cost-benefit analysis to help determine whether a project is worth

undertaking. Following the Bank's 1989 guidelines on environmental assessments and recent advances in valuing impacts, this type of analysis increasingly is being adapted to better account for environmental and social concerns, despite special problems.

First, some inputs and outputs are not correctly priced by the market. One example is externalities—the beneficial (or harmful) effects that are imposed on others but cannot be reimbursed by (or charged to) the originator. Unfortunately, externalities are often difficult to measure in physical and monetary terms. Another example is open-access resources—typically, assets usable by all without payment, such as a lake or public highway—which are difficult to value and tend to be overexploited since user charges are negligible.

What can be done? The value of an externality can be assessed based on its shadow price or economic opportunity cost, and a charge imposed. But if this is not possible, policymakers can impose regulations and standards that set physical limits on perceived external damages, or better define property rights, thereby encouraging improved natural resource management.

Second, with well over 1 billion poor worldwide living on less than \$1 per day, national policymakers often seek to reduce the income gap between rich and poor groups. This goal may justify giving greater weight to benefits and costs that accrue to the poor relative to the rich. Such formal weighting schemes seldom are used in project evaluation. More direct methods, such as poverty assessments and targeting disad-

vantaged groups, have proved more useful.

Sectoral level. Studies show that sector-wide actions—water and energy pricing policies, investment programs involving a series of projects, or administrative measures such as improving land tenure—often have stronger environmental and social impacts than individual projects.

The basic rule for efficient pricing of a scarce resource (or service) such as water (or transport) is that price should equal the cost of providing a marginal (additional) unit of output. However, in many countries such resources are subsidized. Raising prices closer to efficient levels is essential to reducing their wasteful use, thereby realizing both economic and environmental gains. Environmental-economic analysis has helped in this regard. First, it reinforces the need for both efficient pricing and additional charges to cover external impacts. For example, if automobile exhaust causes respiratory problems, marginal cost-based fuel prices should be supplemented by pollution taxes corresponding to the additional environmental or health damage. Second, this type of analysis encourages long-run, comprehensive resource planning.

Macroeconomic level. Economywide policies (both sectoral and macroeconomic) have an effect on the natural resource base, but the complicated interactions are not well understood. No simple generalizations are possible, but many instances of environmental damage stem from market failures and policy distortions, exacerbated by poverty. Broad policy reforms that promote efficiency or reduce poverty also should help the environment, but some reforms may have negative environmental effects, depending on pre-existing (and often localized) constraints (that is, inadequately defined property or resource rights).

The solution is not necessarily to modify the original broader policies (which have conventional socioeconomic goals), but rather to design complementary measures that will mitigate the negative effects or enhance the positive impacts of the original policies on the environment (see "Are Economywide Policies Good for the Environment?" by Mohan Munasinghe, Wilfrido Cruz, and Jeremy Warford, *Finance & Development*, September 1993).

Many aspects of macroeconomic policy are based on the standard system of national

Table 1
Valuation techniques for valuing the environment

Mode of behavior	Market type		
	Conventional market	Implicit market	Constructed market
Based on actual behavior	Effect on production Effect on health Defensive or preventive cost	Travel cost Wage differences Property values Proxy goods	Artificial market
Based on intended behavior	Replacement cost Shadow project		Contingent valuation

The most useful valuation methods look at how environmental changes affect directly observable behavior valued in conventional markets.

Effect on production. Impacts valued by the effect on the quantity, quality, or production costs of marketed outputs.

Effect on health. Impacts valued as output lost due to sickness or death, including foregone earnings and costs of health care or prevention.

Defensive or preventive costs. Ex-post costs of mitigating damage caused by environmental impacts provide a minimum estimate of original damage costs (for example, the extra costs of purifying polluted water).

A second set of methods seeks to value intended actions in markets.

Replacement cost. Future cost of replacing an impaired environmental resource by an equivalent asset assuming that the original resource was at least as valuable as the replacement expense.

Shadow project. Closely related to replacement cost—involving cost of special project designed to offset environmental damage caused by another project (for example, cost of new reforestation scheme to replace forest area inundated by hydro-dam).

If direct market valuation is impossible, indirect market data may be used to determine implicit values.

Travel cost. Willingness of tourists to pay a surplus over the normal price to visit a recreational site. Demand (for example, frequency of visits per year) is first related to variables such as visitor income and price—including entry fees, travel costs, and opportunity value of time.

Wage differences. Wage premium needed to compensate for working in polluted or hazardous environment, after first accounting for other wage determinants such as age and skill level.

Property value. Willingness of property buyers to pay extra for real estate in cleaner neighborhoods.

Proxy goods. Market value of a substitute for an environmental asset that itself is not marketed.

Where market data cannot be used, a final group of methods simulate market-like behavior, using marketing experiments or surveys.

Artificial market. Willingness to pay for an environmental asset determined on an experimental market (for example, home water purification kit marketed at various price levels to assess demand).

Contingent valuation. Willingness to pay for an environmental asset or willingness to accept compensation for its loss, determined by direct questions. The method is most effective if respondents are familiar with the asset (for example, drinking water quality).

accounts (SNA). To incorporate hitherto neglected environmental impacts into GNP and other related measures of income and output, the SNA should be environmentally adjusted. A start has been made through satellite accounts containing environmental data that will supplement traditional SNA data (see "Measuring Environmentally Sustainable Development").

International level. Regional impacts (such as acid rain) and global issues (such as ozone layer depletion, global warming, biodiversity loss, and pollution of international waters) have raised concerns. These pervasive and long-term problems have led to new ideas on uncertainty, irreversibility, and time discounting. For example, even when impacts are uncertain, sustainability suggests that limits should be imposed on resource degradation, particularly if future consequences could be irreversible and catastrophic. This precautionary approach underlies the emerging consensus on limiting greenhouse gas emissions to avoid possible global warming. Efforts are also under way to improve mitigation mechanisms to mobilize and allocate resources efficiently and equitably (for example, the Global Environment Facility).

Better decisionmaking tools

Environmental economics also offers policymakers a variety of tools to value impacts and improve development decisions.

Valuation techniques. The basic aim of environmental valuation is to determine the total economic value of a resource (see figure 3 in "Making Development Sustainable"). Total economic value has two parts: use value and nonuse value. Use values can be broken down into three types: (1) direct use values, determined by the known contributions an environmental asset makes to production or consumption (food, recreation); (2) indirect use values, including the benefits derived from functional services that the environment provides to support current production and consumption (for example, ecological functions); and (3) option values, or the willingness to pay now for future benefits expected from an existing asset (biodiversity). Nonuse values occur even though the valuer may have no intention of using a resource; one category—existence values—arises from the satisfaction of merely knowing that the asset exists (for example, rare species).

The next hurdle is to estimate these values. The basic concept underlying valuation

techniques is an individual's willingness to pay for an environmental service or resource. (In economic terms, this is the area under the Hicksian demand curve that indicates how demand varies with price while keeping the user's welfare level constant.) A related measure is what people are willing to accept as compensation for environmental damage. Valuation methods may be categorized, as shown in table 1.

Multicriteria analysis. Sometimes a single criterion—putting costs and benefits in monetary terms—cannot be used. This might be the case for biodiversity loss. Another approach, called multicriteria analysis, draws on nonmonetary measurements. It clarifies the most important attributes or goals, eliminates many irrelevant options, and makes the final trade-off process more transparent, while also providing the decisionmaker with more flexibility of choice (see box below).

Application. Currently, almost 200 World Bank projects are subjected to environmental analyses each year, of which about 60 undergo comprehensive environmental assessments. The practical use of a wide range of techniques is being tested in several Bank studies involving forestry, agriculture, energy, and water projects. One example is

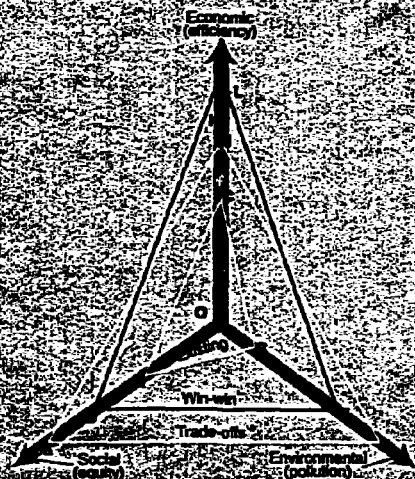
Multicriteria analysis: When valuation falls short

Multicriteria analysis offers policymakers an alternative when progress toward multiple objectives cannot be measured by a single criterion (that is, monetary values). Take the case of drinking water—an essential element of sustainable development—illustrated in this figure. While the economic value of water is measurable, its contribution to social and environmental goals is not easily valued monetarily. Outward movements along the axes trace improvements in three indicators: economic efficiency (net monetary benefits), social equity (service to the poor), and environmental pollution (water quality).

How are policy options assessed? First, triangle ABC describes the existing water supply in which economic efficiency is moderate, social equity is low, and overall water quality is worst. Next, triangle DEF indicates a "win-win" future option in which all three indices improve, as could occur with a new water supply scheme that provided cleaner water, especially to the poor. The economic gains would include cheaper water and increased productivity from reductions in waterborne diseases; social gains would

accrue from helping the disadvantaged; and wastewater treatment would reduce impure water discharges and overall water pollution.

After realizing such "win-win" gains, other available options would require trade-offs. In tri-



angle GHI, further environmental and social gains are attainable only at the expense of sharply increasing costs. In sharp contrast, to the

move from ABC to DEF, which is unambiguously desirable, a policymaker may not make a further shift from DEF to GHI without knowing the relative weights that society places on the three indices. Such preferences are often difficult to determine explicitly, but it is possible to narrow the options: Suppose a small economic cost, FL, yields the full social gain DG, while a large economic cost, IL, is required to realize the environmental benefit EH. Here, the social gain may better justify the economic sacrifice. Furthermore, if budgetary constraints limit costs to less than FK, then sufficient funds exist only to pay for the social benefits, and the environmental improvements will have to be deferred.

A recent Bank study of power system planning in Sri Lanka demonstrated the versatility of this technique. For example, end-use energy efficiency measures provided "win-win" options (that is, they were superior to all alternatives on the basis of air quality, biodiversity loss, and economic costs). Conversely, several prominent hydropower projects could be excluded because they performed poorly in terms of both biodiversity loss and economic costs.

the study on Madagascar, which investigated forest management policies involving the proposed creation of the Mantadia National Park. The study demonstrated how a variety of valuation tools, including effects on production (opportunity cost), travel costs, and contingent valuation could be applied under difficult developing country conditions. The study found that:

- Using the land that would be set aside for the new park, the average local household produces 487 kilograms of rice worth about \$128 per year from 1 to 2 hectares of land. Fuelwood, the only other economically important forest product collected, is worth about \$58 per household per year. The net cost imposed on villagers by creating the park ranges from \$90–110 per household per year, based on both the opportunity cost of foregone production and contingent valuation estimates.

- In the foreign tourist survey, the average visitor had 15 years of education, earned over \$59,000 per year, and spent almost \$2,900 per visit to Madagascar. Tourists were willing to pay \$80–120 to visit the proposed new park, primarily to see lemurs unique to Madagascar.

- The net welfare loss to all villagers from creating the park was about \$0.6 million, using a present value of 10 percent. For all foreign tourists, the corresponding benefit was over \$2 million.

Results such as these will help determine how scarce forest and capital resources can be better allocated and provide guidance on future pricing policy for park protection, biodiversity management, and revenue generation. But they also highlight an interesting issue, particularly for a country that is both economically poor and ecologically rich. Willingness to pay is fundamental to the economic approach but tends to overemphasize the greater ability to pay of richer foreign visitors. If conflicting claims to park access were determined purely on this basis, the tendency would be to exclude poor local villagers (with minimum monetary compensation). Here, the social-equity aspects of sustainable development can be invoked to protect the basic rights of local residents, perhaps by ensuring a minimum degree of access to park areas.

A unifying matrix

One tool that unifies the key elements of the environmental economist's approach to sus-

tainable development is the action impact matrix (table 2 provides a greatly condensed version). The matrix promotes a more integrated view, by meshing economic decisions with environmental and social impacts. The organization of the table facilitates the tracing of impacts and coherent articulation of policies and projects, while the individual elements focus attention on valuation and other methods of assessing specific impacts to determine action priorities.

As a first step, a preliminary matrix may be prepared, using existing data to assess the most significant impacts (even qualitatively, as shown in table 2). Next, the tools of environmental economists may be used to quantify and value the magnitudes of such impacts more precisely, refining the matrix. Then policies and projects may be systematically modified to make them more sustainable. For example, economywide reforms

involving exchange rate depreciation may make timber exports more profitable and lead to severe deforestation of open access areas. Possible remedies might include introducing complementary policies that control access or assigning property rights to the forest, thereby encouraging better management. Project 1 (a hydroelectric dam) may also exacerbate forest loss through inundation. The answer perhaps would be to modify the dam or implement a shadow project to reafforest an equivalent area elsewhere. In this fashion, the table helps articulate a consistent set of more sustainable policies and projects that address serious issues at all levels, in order of priority.

For more information, see *Environmental Economics and Sustainable Development*, by the author, *World Bank Environment Paper no. 3, 1993*.

Activity/Policy	Main Objective	Main Objective (Impact) on Environment/Sustainable Development			
		Land	Air	Resource	Other
Investment in forest sector	Improve macroeconomy and sector	Positive impact on land use and forest cover	Positive impact on air quality	Positive impact on resource management	Positive impact on other environmental issues
Exchange rate	Improve trade balance and economic growth	(-)	(-)	(-)	(-)
Energy policy	Improve economic and energy efficiency	(-)	(-)	(-)	(-)
Other					
Complementary social and environmental policies	Main objective of local social and economic market improvement	Positive impact on land use and forest cover	Positive impact on air quality	Positive impact on resource management	Positive impact on other environmental issues
Market-based	Reverse negative impact of market forces	(-)	(-)	(-)	(-)
Nonmarket-based	Reverse negative impact of market forces and policy distortions	(-)	(-)	(-)	(-)
Investment projects	Improve economic and social conditions	Investment decisions made more consistently with local policy and institutions			
Project 1 (Hydro dam)	Use of local labor (cost-benefit analysis, environmental assessment, etc.)	(-)	(-)	(-)	(-)
Project 2					
Project 3					
Project 4					
Project 5					
Project 6					
Project 7					
Project 8					
Project 9					
Project 10					

Measuring Environmentally Sustainable Development

ANDREW STEER AND ERNST LUTZ

A broader understanding of development requires broader measures of development that encapsulate social, equity, and environmental concerns. Care must be taken that aggregate measures of progress do not conceal more than they reveal. But promising work is underway to "green" the national accounts.

"The gross national product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages; the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage; neither our wisdom nor our learning; neither our compassion nor our devotion to our country; it measures everything, in short, except that which makes life worthwhile."

—Robert F. Kennedy, 1968

Measures of the overall income and output of a nation—the national accounts—give a highly imperfect indication of a nation's well-being. Besides the well-known gaps in coverage, such as unpaid household work, at least four sets of additional information are required to make any kind of conclusive

judgment on trends in human well-being.

Inequality and poverty. Aggregate income figures do not necessarily indicate trends in the incidence of poverty. While the correlation between national income growth and poverty reduction is strong, and earlier notions of income inequity tending to rise at early stages of development (the "Kuznets Curve") have now generally been debunked (see *World Development Reports 1990, 1991*), household surveys are required to shed light on income and expenditure patterns of the poor. Reasonably good progress has been made in the past decade to standardize survey methodologies, and about forty to fifty countries (accounting for 80 percent of the population of developing countries) now undertake household surveys, producing fairly professional poverty assessments. Nonetheless, it is still difficult to compare the incidence of poverty across countries.

Human resources. Increased aggregate income does not always buy improved human resource indicators. Recent concerns about declining educational attainment in industrial countries illustrate this point, as does the apparent variation in human development achievements at similar income levels (see, for example, *The Progress of Nations*, UNICEF, September 1993). Data on key indicators—such as infant mortality, literacy, school enrollment, and access to medical facilities—are available for almost all countries, but the reliability of these data varies greatly, with indices often calculated indirectly from highly partial data and sometimes from extrapolation of earlier estimates. Significant resources are being devoted to strengthening field measurement and to

standardizing definitions, but much remains to be done.

Environment. If growth in aggregate income significantly damages the environment, it may counteract some (or possibly all) of the welfare gains from income growth and undermine future growth prospects. Knowledge about environmental conditions is particularly inadequate, due partly to conceptual problems (for example, how to define soil depletion, loss of natural habitat, and air pollution) and partly to the fact that mechanisms often simply are not in place to measure the raw facts. Increased efforts have been made in the past few years to help countries with environmental monitoring and to compile internationally comparable statistics. For example, the Global Environmental Monitoring System, managed by the UN Environment Program, collates data on air and water pollution in some 150 countries. But in most situations, resources have been inadequate, and the quality of information and comparability across countries remains poor.

Social, political, and spiritual aspects of welfare. Measures of "economic" welfare fail to capture the social, political, and spiritual aspects of human well-being, which often are much more important. Many of these aspects cannot be measured in any quantitative sense, of course, which may tend to diminish their importance in the minds of policymakers. Recent years have seen the refinement and growing use of indicators of political and civil liberties, gender and racial bias, and the incidence of crime and violence. At the same time, a growing number of governments and aid agencies have been developing and using the tools of

social assessment in investment planning and appraisal. These tools have tended to focus on project-level decisions (such as how social and cultural cohesion might be affected by particular investment programs). Much less is known about the social impacts of broader development trends, such as urbanization and market liberalization.

Where does this state of affairs leave policymakers? Clearly, they need better basic facts on the development concerns listed above, but they also need to see these basic facts aggregated into policy-relevant indicators of progress. Both of these steps—measurement and aggregation—pose tough challenges for the noneconomic dimensions of development. This article reviews some of the current issues in the search for development indicators and describes one particularly promising area in which the aggregates are environmentally adjusted.

Indicators of development

One of the reasons for the excessive focus on the economic aspects of development is that it is easier to measure what is transacted in the marketplace than what is not. What to measure and where to measure it are more intuitive, and the "numeraire" (common unit of account) enabling aggregation is straightforward—money.

Such easy calculations are not available for many other aspects of development, especially social concerns and environmental issues. For example, with over 300 different toxic pollutants—many of them highly localized—how can pollution in any aggregate sense be monitored? Or, in view of the many types of soil degradation (erosion, salinization, loss of moisture or nutrients, and waterlogging), how can the aggregate state of a nation's land resources be captured?

Aggregation, of course, requires a numeraire. In this regard, important work is now underway to derive relationships ("dose-response functions") between various forms of environmental damage and human health, economic productivity, and human amenity values, which would provide a numeraire, thereby enabling aggregation. Thus, for example, different pollutants would be multiplied by both their health impacts and the affected population. Areas affected by different types of soil damage would be multiplied by estimated impacts on such factors as future yields. However, resources allocated

to such work have been modest and research programs often poorly coordinated.

Care needs to be taken in searching for aggregate measures of progress, so that the single indices chosen do not conceal more than they reveal. Housing is an example. Traditionally, simple measures of housing have been the norm: Do people have housing—yes or no? But with the movement away from direct government provision of housing toward "enabling strategies," and a growing recognition that housing involves much more than bricks and mortar, it became clear that richer measures were needed. This realization led, in 1990, to the creation of a Housing Indicators Program, sponsored jointly by the UN Center on Human Settlements and the World Bank.

Data have now been collected from fifty-three countries covering 80 percent of the world's population, drawing on extensive surveys of demand and supply factors and the recognition that there are many dimensions to good housing (for example, reasonable space and ventilation, access to a footpath, proximity to employment, affordability). While attracted to the possibility of deriving an aggregate measure of housing services, researchers on this project have concluded that in the absence of a meaningful numeraire, any such aggregate index would not help policymakers. The methodology adopted is being extended to other areas, including urban environmental issues, water, sanitation, and transportation.

If adding apples and oranges is a problem at the subsectoral level, it is much more so at higher levels. Proposals have been made over the years for aggregating measures of education, health, nutrition, income, and civil liberties. However, in the absence of a substantive numeraire, most of these proposals have involved merely adding together normalized indices. Critics of these indices argue that such aggregations are inevitably arbitrary and thus potentially misleading. Supporters, however, contend that even if the indices are arbitrary, the purpose is to force nonmonetary elements of well-being to the forefront of development policy. The Human Development Index (HDI) of the UN Development Programme, the best known of such indicators, illustrates this point. By aggregating indices of life expectancy, educational attainment, and per capita income—the same indicators used in the World Bank's

"Basic Indicators" table—the HDI has provoked an outpouring of views (many critical) on its methodology and findings, thus serving its purpose well.

"Greening" the accounts

Deriving aggregate indices using a common numeraire is conceptually preferable to the ordinal approach of the HDI but is practically much more difficult. Adjusting the national accounts to reflect broader development concerns is one commonly proposed route. No credible approach is available to make adjustments based on social or income distributional concerns, but methods for making environmental adjustments have been available for some time. Adjustments to take into account environmental factors are particularly warranted. First, unlike human development indicators, which are generally positively correlated with income, environmental conditions sometimes worsen with economic growth. If the benefits of increased income are offset by deteriorating health conditions, it is desirable to subtract from income a measure of the current costs of such damage. Second, to the extent that national accounts data are used to gain a picture of the economy's capacity to produce on an ongoing basis, it is necessary to recognize that such capacity depends on natural (and human) capital as well as on humanmade capital stock. Net capital accumulation figures thus need to reflect the changing stocks of all forms of capital.

At this stage most efforts at natural resource and environmental accounting have been restricted to creating physical accounts that parallel conventional national accounts rather than estimating the money values of resource loss and environmental damage, thereby adjusting the "core" accounts themselves (figure 1).

Norway, for example, the country with perhaps the longest interest in resource accounting, has put its efforts into refining physical stock estimates in key sectors such as oil, minerals, fish, forestry, and hydropower. The Netherlands, another country with a history of concern in this area, has endeavored for over a decade (so far unsuccessfully) to derive monetary measures of the loss of "environmental functions." France is trying the most ambitious system yet—"patrimony accounting"—which is aimed at analyzing and describing the natural environment in its

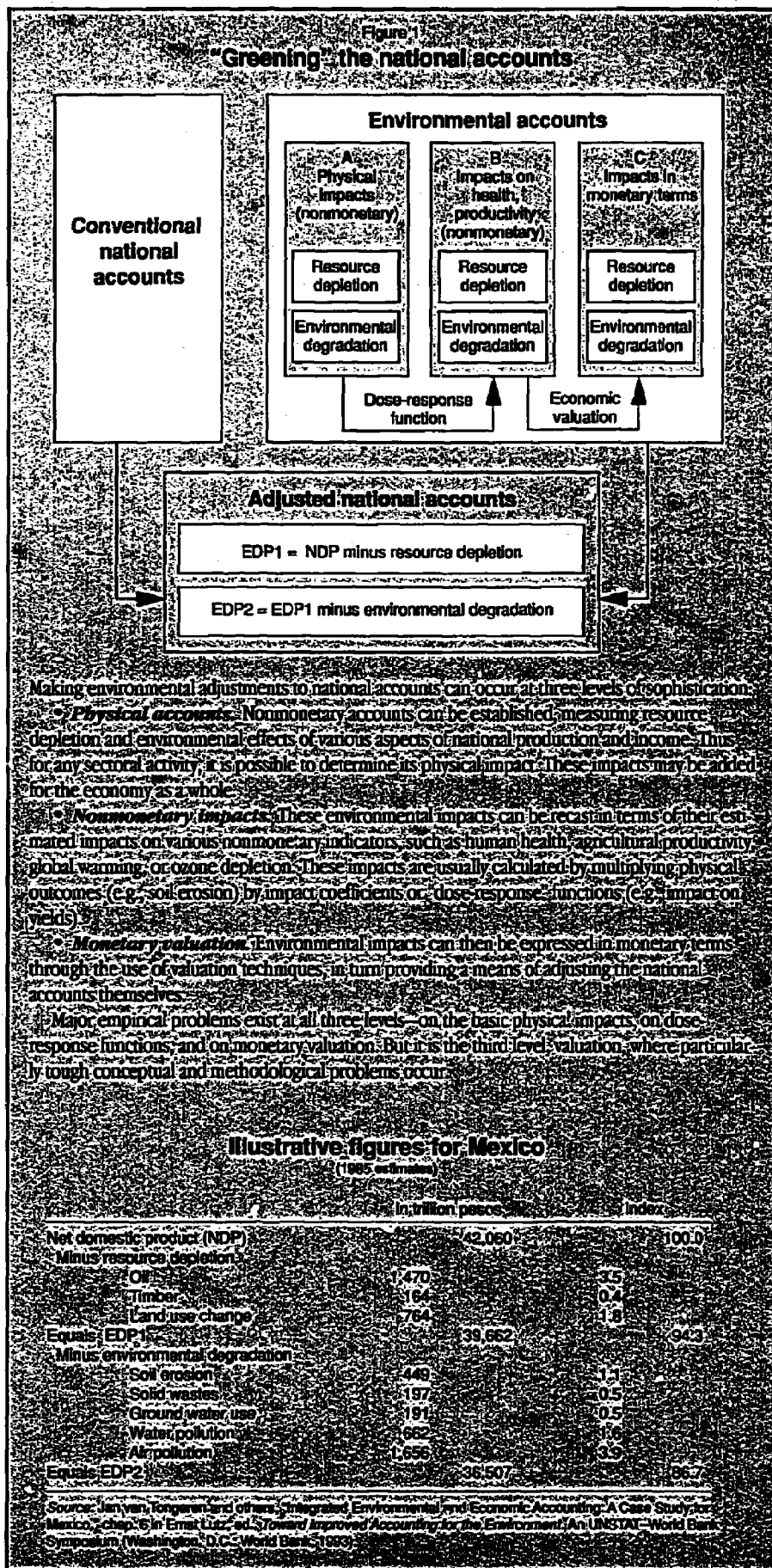
three basic dimensions: economic, social, and ecological. The system is to have seven levels, ranging from specific resource data at level one to aggregate welfare indicators at level seven. However, only limited resources have been available for implementation, which so far has been limited to the physical data at level one. US efforts in this field have been restricted to collecting data on pollution abatement expenditures, although President Clinton recently committed his administration to produce environmentally adjusted accounts during his term.

Nevertheless, there is now movement on several fronts. One reason is that in Agenda 21, the major policy document of the June 1992 Rio Earth Summit, 178 nations committed themselves to "expand existing systems of national accounts in order to integrate environmental and social dimensions in the accounting framework, including at least satellite systems of natural resources in all member States." Second, in 1993 the UN Statistical Commission adopted a revised System of National Accounts (SNA) after a decade of work, altering the accounting procedures for member countries.

Although countries will not be required to fully integrate environmental concerns into the core accounts, it is suggested that they prepare "satellite" accounts, comprising both physical and monetary units, consistent with the core accounts. For this purpose, in December 1993 the UN Statistical Office issued a handbook called *Integrated Environmental and Economic Accounting*, which provides detailed guidance.

As part of the preparations for the SNA revision, the World Bank collaborated with the UN Statistical Office and country authorities in Mexico and Papua New Guinea to see how practical the new methodology and handbook would be. The results of the two case studies (backed up by another study in Thailand) proved not only the viability of the approach but also the sensitivity of the findings to assumptions made.

Since most countries' national accounts do not even calculate depreciation of man-made capital to derive net domestic product (NDP), the first task of these studies was to make such estimates. Two sets of "environmentally adjusted net domestic product" (EDP) calculations were made. The first (EDP1) deducted estimates of resource depletion (such as oil, mineral, and timber



extraction) from NDP. The second (EDP2) further deducted estimates of the monetary value of environmental degradation (such as air and water pollution, waste disposal, soil depletion, and groundwater use).

These calculations are much easier said than done. Numerous judgments were required in choosing methodologies for estimating money values for both depletion and degradation, and in most instances indirect estimates were required. For example, ideally, the impact of pollution on health and future productivity would be estimated and a monetary value placed on such costs (discounted back to the present, when damage occurred in future years), which would then be deducted from income and investment. Unfortunately, knowledge is inadequate for such calculations even in the most advanced industrial countries. Instead, an indirect measure—estimating the cost of reducing pollution to “acceptable” levels—was used. A similar approach was employed to calculate the costs of soil erosion, but a host of conceptual challenges and methodological choices remain.

In the case of Mexico—a relatively advanced developing country with severe environmental problems—EDP1 was estimated as 94 percent of NDP for 1985 (the only year for which data were adequate), and EDP2 was estimated at 87 percent of NDP (see table in figure 1). In Papua New Guinea—a country at a relatively early stage of development, with a large extractive industry—EDP1 was estimated at 92–99 percent of NDP for the 1986–90 period and EDP2 at 90–98 percent. These figures raise awareness of the need to adjust for environmental costs but in themselves give little guidance to policymakers. Sectoral accounts, however, provide more insight.

“Green” accounting also offers policymakers insights into the long-term productive capacity of a nation—through the investment and capital accounts. Figure 2 shows the estimated impact of resource depletion and environmental damage on Mexico’s productive base in 1985. But care must be taken in interpreting the findings. A careless interpretation might conclude that with an apparently negative real investment rate after adjusting for national resource depletion and environmental degradation, the productive capacity of the economy had actually declined. But such a conclusion would require that other aspects of the nation’s productive capacity also be assessed. Human capital formation and technological progress are particularly important. Broadening our understanding of productive capacity to include these elements should have a high priority.

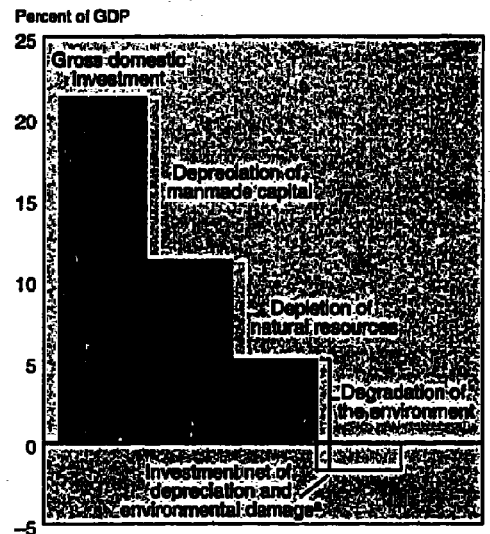
A richer measure

It is clear that a broader understanding of development requires broader measures of development. Heavier investment than in the past is required simultaneously at three levels: basic data collection, research into the relationships between such data and human welfare and economic development, and the derivation of policy-relevant indicators at different levels of aggregation.

In emphasizing the limitations of overall income as an indicator of development, however, it is important not to “throw the baby out with the bathwater.” Income is still the best measure of people’s command over many of their commodity needs. Appropriately adjusted, real income remains a useful

Figure 2
Shrinking Investment?

Estimated impacts of adjustment for depreciation of humanmade and natural capital in Mexico for 1985



a. This is not intended as an accurate representation of the change in the nation’s productive capacity, since it excludes important components of human capital accumulation and technological change.

Source: Jan van Tongeren and others, “Integrating Environmental Accounting: A Case Study for Mexico,” chap. 6 in Ernst Lutz, ed., *Toward Improved Accounting for the Environment. An UNSTAT-World Bank Symposium* (Washington, D.C.: World Bank, 1993).

indicator of progress, especially for governments of democratic countries, in which citizens are better able to voice their preferences on how a nation’s wealth and income should be allocated. There is even some indication that rising incomes promote such regimes.

However, neither income nor any other single indicator can or should encapsulate development progress. A richer set of indicators is needed, and remedial efforts are urgently required on those components of development that cannot be measured in the marketplace.

For details see Peter Bartelmus, Ernst Lutz, and Jan van Tongeren, Environmental Accounting: An Operational Perspective,” in Ismail Serageldin and Andrew Steer, eds., Valuing the Environment: Proceedings of the First Annual International Conference on Environmentally Sustainable Development (Washington, D.C.: World Bank, 1994); Shaobua Chen, Gaurav Datt, and Martin Ravallion, Is Poverty Increasing in the Developing World? World Bank Policy Research Department Working Paper (Washington, D.C.: World Bank, 1993); Ernst Lutz, ed., Toward Improved Accounting for the Environment (Washington, D.C.: World Bank, 1993).



Integrating the Environment into Development Policymaking

JOHN A. DIXON AND SERGIO MARGULIS

The traditional approach, whereby environmental concerns are addressed as "add-ons" to development policymaking, needs to be replaced by one in which the costs of environmental and social damage are embedded in the decisionmaking process from the beginning.

In the two years following the Rio Earth Summit, countries around the world increasingly agree that addressing environmental and social concerns is an important priority for governments and citizens alike. But until recently—and in many situations even today—these problems have been addressed as "add-ons," after the core of economic decisionmaking has been made. Evidence is mounting that this approach is inefficient—and often ineffective. A new approach is highly desirable in which the costs of environmental and social damage are embedded in all calculations from the beginning, and thereby taken into account much earlier in the decisionmaking process. A start is being made in this direction.

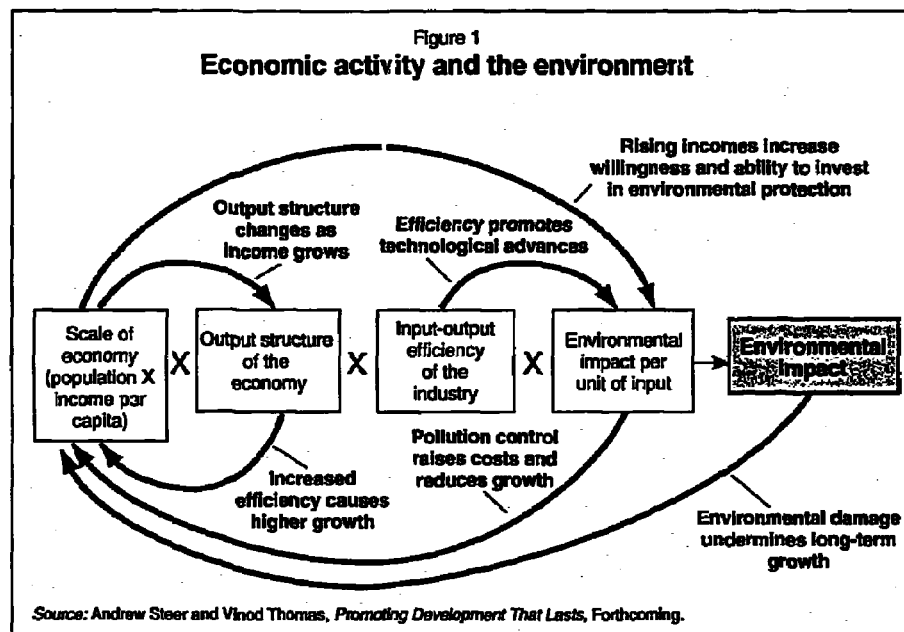
Opening the "black box"

Traditionally, we had a simplistic view that growth was unavoidable but bad for the environment. Take, for example, the industrial revolution in the West, in which heavy industry, fueled by natural resource extraction

(and, in some cases, exploitation of the resources of colonies) led to rapid economic development. No attempt was made to understand the connections between growth and the environment. Analytically, a "black box" model was assumed whereby economic growth inevitably produced environmental damage. In fact, a hundred years ago the common pictorial representation of modernity and economic progress was factory smokestacks emitting clouds of black smoke.

Environmental concerns—pollution of the air and water or natural resource degradation—were treated as "add-ons," if they were considered at all. When environmental problems became severe enough to receive attention, the approach used was to set an end-of-pipe emissions or technology standard. At the firm level, this placed the emphasis on treatment rather than producing less waste.

We now realize that the links between economic growth and the environment are complex, and an effort must be made to understand and untangle these connections. Rather than assuming a "black box" that hides the connection between economic changes and environmental outcomes, policymakers now explicitly identify connections between economic policy and the environment. This knowledge can create more favorable environmental outcomes as well as permit rational assessment of the remaining trade-offs between growth and environmental objectives. Figure 1 illustrates some of these links. Environmental impacts are determined by the scale and structure of the economy, as well as by the technology and efficiency with which resources are used. Some of the feedback loops are positive; for example, increasing efficiency in resource use



both conserves natural resources and produces fewer negative environmental impacts per unit of output. Other links are negative—such as the growth-reducing impacts of major pollution control expenditures. Figure 1 illustrates the numerous points at which policy interventions can reduce environmental impacts.

In addition, we now realize that although economic growth often results in increased pollution and consumption of resources, growth also will facilitate solutions. Figure 2 from the *World Development Report 1992: Development and the Environment* illustrates how rising economic activity can, with the right policies and institutions, help

address environmental problems. Three patterns emerge:

- Some environmental problems, such as inadequate potable water or poor sanitation, decline as incomes increase. Increasing incomes provide the resources for public services such as expanded sanitation, improved water supply, and rural electrification. In addition, when individuals no longer have to worry about survival, they can devote their resources to profitable investments in improved environmental services and conservation; these positive synergies between economic growth and environmental quality must not be underestimated.
- Some problems, like particulate and sulfur

dioxide levels in the air, initially worsen but then improve as incomes rise and mitigating steps are taken. Most forms of air and water pollution fit into this category, as do some types of deforestation and encroachment on natural habitats. To make improvements, countries must deliberately introduce policies to ensure that additional resources are devoted to dealing with these environmental problems.

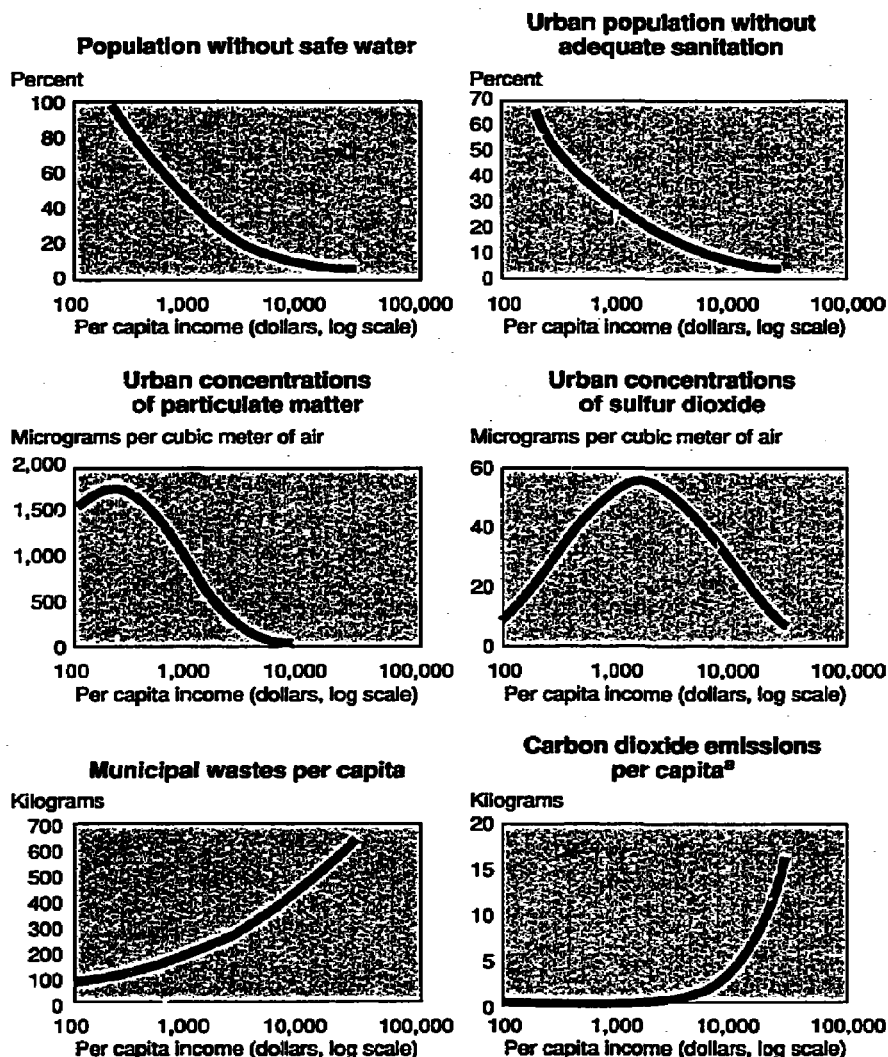
- Some indicators of environmental stress worsen as incomes increase. Examples include emissions of carbon and nitrogen oxides and municipal solid waste. Abatement is relatively expensive, and the public perception is that the costs of inaction are low—often because they are borne by someone else. The key, once again, is policy. Usually there are few incentives to cut back on emissions or waste, and until such incentives are put into place—through regulation, charges, or other means—damage will continue to increase.

Mainstreaming the environment in national policy planning

Opening the “black box” and seeking greater transparency between economic policymaking and environmental impacts create the possibility for incorporating environmental concerns in all levels of economic decision-making. To do this, policymakers are confronted by two important tasks. Initially, governments need to correctly identify national priorities, that is, decide what needs to be done and in what order; second, they must modify national economic policy (see figure 1) to promote positive synergies and minimize adverse environmental impacts (the “how” of improved environmental management).

Setting priorities. The costs of not taking the environment into account are often very high. For example, in Hungary, air pollution and acid rain result in US\$100 million yearly in agricultural losses, and another US\$50 million in damage to forests. Individuals are also affected by air pollution and degraded landscapes: a recent World Bank study found that the annual costs in Mexico City of health-related effects of air pollution might be on the order of US\$1 billion. In other cases amenity and recreational values were also important. In Santiago, Chile, air pollution is recognized as creating a double loss: it is responsible for numerous

Figure 2
Environmental indicators at different country income levels



Note: Estimates are based on cross-country regression analysis of data from the 1980s.

a. Emissions are from fossil fuels.

Source: World Bank, *World Development Report 1992: Development and the Environment* (New York: Oxford University Press, 1992), 11.

Selection of criteria in Nigeria

Frequently the quantitative data needed to conduct a benefit-cost analysis are not available. Therefore, subjective criteria must be identified to attach priorities to environmental problems. Nigeria has identified the following criteria and indicators for ranking environmental problems:

Criterion	Indicator	Indicator explanation
Economic growth	Impact on NNP	Effect of environmental degradation on economic growth
Equity	Population	Number of people affected by environmental degradation
Environmental quality and human health	Qualitative ranking	Extent to which the problems threaten the overall integrity of environmental resources and human health
Renewable resource integrity	Life index ranking	Extent to which the problem threatens the overall integrity of renewable resources

health impacts (including both premature death and sickness) and causes a psychic loss, when residents complain that they "can't see the Andes." Both impacts are important and have helped create the political will to take action.

Not all environmental problems can be addressed at once. Realizing that limited resources have to be used carefully, policy-makers must set priorities for environmental interventions and then select the correct response from their "policy toolkit." Recently, many countries have been involved in the process of preparing national environmental strategies, partly as a result of Agenda 21, adopted at the 1992 Rio Earth Summit. These planning exercises take many different forms. The Bank has contributed to this effort by supporting preparation of National Environmental Action Plans (NEAPs) by International Development Agency (IDA) countries. The Bank is also encouraging International Bank for Reconstruction and Development (IBRD) countries to prepare NEAPs or equivalent documents. By March 1994, 33 countries had completed NEAPs; an equal number should be completed by the end of 1995.

Ideally, environmental priorities should be identified on the basis of costs and benefits. The costs of different environmental problems give one measure of the benefits society receives from preventing the same problems from occurring. Prevention is not costless, however, and the environmental benefits have to be compared to the expenses associated with new policies or investments. How-

ever, most national plans do not analyze environmental problems and investment options within an economic framework, and thereby ignore the trade-offs between benefits and costs. Even when a country sets priorities in a NEAP, it frequently does not identify the criteria used. The Nigeria NEAP is one good example of the use of qualitative criteria to set environmental priorities; the criteria are evaluated both quantitatively, and qualitatively (see box above). Equity concerns, for example, are measured by the number of people affected by different forms of environmental degradation.

Back-of-the-envelope estimates from a number of countries suggest that the costs of environmental problems can be as high as 5 percent of a country's gross domestic product (GDP). Consideration of economic costs is thus essential in identifying priorities and selecting efficient and effective policies. In the Ghana NEAP, economic analysis was used

to set priorities (see box below). Estimates were made of the gross annual costs of a number of environmental problems, and soil erosion was identified as the largest environmental damage cost.

Modifying government policies.

Fortunately, in many cases good economic policy also can be good for the environment. Policies that reduce or eliminate subsidies can produce direct savings to the national economy as well as environmental improvements. These are called "win-win" solutions because they benefit both the environment and the economy and are examples of the positive links illustrated in figure 1.

Harnessing the positive impacts.

Subsidies for energy and water are examples of two of the most promising candidates for "win-win" policy reform. For example, many countries subsidize energy, thereby promoting inefficient energy use and increasing environmental problems associated with fuel production and combustion, while bearing large economic costs from the subsidies. Energy subsidies in developing countries amount to some \$230 billion annually; correctly pricing electricity tariffs to reflect real costs of production would save an estimated \$125 billion per year. Although subsidies are a problem in all countries, the impacts of subsidies, both economic and environmental, are particularly severe in the poorer countries, in which growth in energy demand is extremely high.

Water is also commonly subsidized, again leading to inefficient use, environmental problems, and shortages in many areas. For example, in Cyprus, Morocco, and a number of other water-scarce countries, prices charged for water reflect only a small proportion of the actual cost of supplying water.

Comparing monetary damage estimates

In Ghana, "back-of-the-envelope" monetary damage estimates were made for four sectors. A comparison of these estimates (below) revealed that soil erosion has the highest economic cost. This information helped to bring natural resource management issues to the forefront of the development planning process.

Problem	Gross annual cost (million Cedis)	Percent of total
Soil erosion (crops)	26,000	63
Land degradation (livestock)	2,790	7
Forestry	10,843	26
Health	1,672	4
Total	41,305	100

This leads to inefficient water use, which is particularly alarming in a country faced with severe water shortages and sharply rising costs of new supplies. In Morocco, for example, a recent analysis found that irrigation charges covered less than 10 percent of the cost of new supplies, and urban consumers paid only half the new water cost. Reducing the subsidy and increasing water prices would decrease water demand by about a third and reduce the government's fiscal subsidy. There is an economic impact, however: reducing the subsidy would also lead to a small decline (about 0.65 percent) in GDP.

Although each "win-win" policy is good for economic efficiency and the environment and can generally pay for itself, it may be politically difficult to implement. Many reforms often involve losers (for example, the farmer who received free irrigation water, or the consumer of heavily subsidized fuel), and their resistance can slow policy change.

Breaking the negative links. For every situation with attractive "win-win" opportunities, however, there are many more situations in which policy reform is necessary to break a negative link, the "win-lose" situation. These policies force individuals and firms to internalize externalities, and take into account the environmental consequences of their actions. To do this, one has to go beyond the "black box" and clearly trace the links, and responsibilities, between economic activities and environmental problems. Whereas in the past industries treated the air and water as costless sinks for their pollution, they now increasingly realize that they have an obligation to take environmental damage costs into account.

Setting emission standards or ambient levels is a first step toward forcing firms to internalize parts of the costs of environmental damage. These steps are not costless, however. Sizable expenses are associated with regulatory measures and associated investments to reduce pollution. In developed countries these investments typically average 2 to 3 percent of annual GNP, although the costs may be higher in the early years. Japan, for example, made major investments in air and water pollution control in the 1960s, when its

per capita income level was similar to today's heavily polluted, middle-income countries like Mexico or Taiwan. Japan now enjoys the benefits of a much cleaner and healthier environment, and annual pollution control costs are reduced to a more affordable level.

How much environmental control is both desirable and affordable? The challenge is to balance overly stringent standards that may retard growth and be too expensive for the benefits created, with lax standards that impose major health and resource costs on the population and lead to high clean-up costs in the future. An estimate for the United States indicates that environmental regulation was responsible for a drop in GNP growth of 0.191 percentage points over the period 1973-85. Sometimes the investments in new technology are quickly recovered. In Japan, for example, the steel industry switched from polluting open hearth furnaces to the basic oxygen furnace. This change reduced air pollution and produced major energy saving, such that, for the Nippon Steel Company alone, its initial \$100 million investment was repaid in two to three years.

Economic analysis can help identify the environmental damages associated with different levels of pollution. This information is used in the "polluter pays" principle—the "Pigouvian tax"—in which the costs of specific environmental damage are estimated and imposed on polluters. With this new approach, each industry or economic activity can decide whether to continue to pollute, and pay the appropriate charge, or reduce its output of pollution. Innovative policies are being developed to expand the ability of firms to respond. The use of Transferable Pollution Permits and the development of the pollution "bubble"¹ allow firms to work together to reduce pollution more efficiently and cost-effectively.

Creating the will for action

If we can now open the "black box" and trace the links whereby improved development policymaking yields both economic and environmental benefits, why is faster progress not being made? Why do subsidies and dis-

tortions persist around the world? The answer is that by ignoring environmental concerns, individuals and firms receive direct financial benefits from using the air and water as a dumping ground for wastes, or by over-harvesting forests or fish stocks. These individual gains come at the expense of larger social costs.

Implementing improved policies will not happen without improved information, public participation, and the creation of political will. Sometimes it takes a disaster to create the will to act—the Minamata disease episode in Japan, which created awareness of the dangers of unregulated disposal of toxics in the environment, or the Bhopal chemical disaster, which focused attention on the location of industrial facilities and need for additional safeguards. Deforestation in the Brazilian Amazon has focused worldwide attention on the problems of tropical forest management, protection of biodiversity, and greenhouse gas emissions. In other cases local nongovernmental organizations (NGOs) or citizen-led "green" movements pressure politicians to make needed changes. Whatever the cause, information on environmental degradation and its impacts is essential to create the national will for policy reform and a willingness by individuals and firms to accept personal financial costs to obtain larger social benefits. Only then will it become possible to implement policies to make meaningful change.

Note

1. The pollution "bubble" is an environmental management concept in which an imaginary bubble is placed over a city and a target ambient air pollution level in that space set. Rather than the regulation or control of each polluter individually, the focus is on the pollution level in the broader airshed and efficient ways to reach the target level. Polluters can help reach the established level by working with one another, for example, by exchanging tradable permits. This approach gives flexibility in finding the most cost-efficient way to reduce overall pollution.

The World Bank and the Environment: A Fourfold Agenda

JOHN A. DIXON AND ANDREW STEER

The preceding papers in this volume have attempted to capture current thinking on key conceptual and methodological issues relating to environmental sustainability. But how does the World Bank, the largest provider of development finance and advisory services in the world, seek to put these principles into everyday practice?

The World Bank's environmental activities—which involve policy dialogue, lending, technical assistance, research, and aid coordination—comprise a fourfold agenda:

1. Assisting countries in building on the positive links between economic development and the environment
2. Assisting countries in breaking the negative links between economic development and the environment
3. Addressing potentially adverse environmental impacts of Bank-financed projects
4. Confronting global environmental challenges, primarily through participation in the Global Environment Facility (GEF).

This article summarizes recent activities in each of these areas.

1. BUILDING ON THE POSITIVE SYNERGIES BETWEEN DEVELOPMENT AND THE ENVIRONMENT

The Bank recognizes the importance of supporting development activities and policies that also have large potential benefits for the environment. The search for synergy between development and the environment is a central message from the Rio Earth Summit. Two propositions are now widely agreed:

a. Investing in people—alleviating poverty, addressing population growth, and developing human resources—is essential for environmental sustainability. A central theme of the *World Development Report 1992: Development and the Environment* as well as Agenda 21 is the strong relationship among poverty reduction, population growth, and environmental stewardship. Improved primary health care, education, family planning, sanitation, water supply, and rural development, for example, are central elements of any strategy for sustainable development. Allocation of property rights and improving the status of women also yield high environmental returns.

b. Promoting the efficient use of resources benefits both the environment and the economy. Most governments still subsidize the consumption of vital resources such as energy, water, wood, and agricultural chemicals. Although they may be justified in specific situations, these practices lead to inefficient resource use and fiscal costs while creating unnecessary environmental problems. Other important policies that can yield environmental and efficiency gains include those directed at promoting more open trade and

investment (facilitating technology transfer and more efficient use of resources), improved management of state-owned utilities (to reduce waste and expand the coverage of environmental services), and macroeconomic stability that helps investors develop a longer-term outlook.

The following discussion of the Bank's activities in these two areas will be selective. A fuller presentation is found in the companion publication to this volume, *Making Development Sustainable: The World Bank and the Environment, Fiscal 1994*.

Investing in people

Addressing population growth and developing human resources. It is now widely accepted that the links between poverty, high population growth, and environmental degradation are circular and mutually reinforcing. Interventions in this area include resource development investments that seek to improve the material well-being of the poor; human development interventions that improve health, nutritional, or educational status; and social development interventions to ensure that the poorest are not excluded from the benefits of development. New World Bank lending in education, for example, is about \$2 billion per year (fiscal 1993 and fiscal 1994).

Targeting poverty reduction. Lending specifically targeted to the poor and most vulnerable, monitored under the Bank's Program of Targeted Interventions (PTI), totalled some \$9.5 billion for over 130 projects during the past two years. For instance, lending for population programs has increased—over 60 population projects,

representing more than \$1 billion in commitments, are now under implementation. In other cases modest amounts can have major impacts. To reach those usually ignored by the formal credit sector, the Bank provided \$2 million in grant funds in fiscal 1994 toward setting up the Grameen Trust. This Trust will provide seed capital and start-up funds over the next 5 years to some 30 or 40 micro-credit schemes modeled on the very successful Grameen Bank in Bangladesh. The Grameen Bank is an innovative, micro-level program that provides credit to the extremely poor, who are almost always women in rural areas.

Strengthening agricultural research and extension. Increasing crop yields and adopting new technologies can improve the welfare of farmers, reduce environmental damage, and reduce the pressure to convert new land to agriculture. The Bank lent over \$4 billion in the past year for some 48 agricultural sector projects. To support international agricultural research, a wide-ranging revitalization of the Consultative Group on International Agricultural Research (CGIAR) was launched. The Bank may contribute up to \$40 million per year to the CGIAR and will help match other donor contributions. The CGIAR system of 17 agricultural research centers around the world is reorienting its work towards developing more sustainable land and water management practices, improving global genetic resource banks, and targeting water scarcity and its management.

Investing in water supply and sanitation. Another major lending area with important synergistic effects for the environment is water supply and sanitation projects, which provide significant economic, social, and environmental returns. Major investments in the past year to assist large municipalities to expand potable water supply, improve sanitation services, and strengthen public utilities include projects in Algeria; Shanghai, China; Surabaya, Indonesia; and Mexico. The Shanghai project, for example, will help China's largest city invest in measures to halt the rapid deterioration of surface and ground water. Earlier projects in India and Indonesia were designed to increase potable water supplies to some 7 million inhabitants of villages, a majority of whom live below the poverty line.

Clarifying property rights of the poor. There is growing evidence that pri-

vate investment in environmental protection increases with secure land tenure. The Bank is thus expanding its support to projects that clarify property rights, whether it is land holdings of poor farmers or land titles for urban squatters. In Mozambique a recent loan supports government efforts to clarify land ownership and plan infrastructure and other investments to assist the resettlement of returnees after the civil war. In Chile an irrigation development project is improving the efficiency and operation of irrigation schemes by regularizing water rights. Land classification components are contained in recent projects in Guinea-Bissau, Indonesia, Paraguay, and Uruguay.

Promoting efficiency while enhancing the environment

The Bank has also continued to support countries' efforts to promote more efficient use of resources, thereby leading to less waste and less consumption of raw materials. Efforts in this area are focused on improving energy efficiency, eliminating subsidies in other sectors, and understanding the links between economy-wide policies and the environment.

Increasing energy efficiency and removing subsidies. Under present trends, consumption of commercial energy in developing countries will rise sixfold in the next forty years, posing great environmental challenges. Improved energy efficiency clearly is vital, and the World Bank is very active in helping its members in this effort. Supply side efficiency can be enhanced by improved management in power generation and by reducing losses of electricity (amounting to over 25 percent of total electricity produced in many countries)—and both are central to the World Bank support to the sector. So too, on the demand side, are pricing issues. Subsidies on energy use in developing countries and countries in transition amount to around \$230 billion per year (see previous article). Reducing these would improve economic efficiency and improve the environment. Eliminating energy subsidies in Eastern Europe, for example, would reduce air pollution in half from 1990 levels.

The health impacts of biomass combustion can be very severe. Extending modern energy sources to the poor yields important efficiency, environmental, and health benefits. The Bank has lent more than \$2 billion

for rural electrification over the past twenty years. In certain areas, renewable energy sources also show promise: for example, the Bank is supporting a major program for renewables (including solar energy) in India, and this year financed two geothermal projects in the Philippines.

Eliminating natural resource subsidies. Energy is only one type of resource that is often subsidized and used inefficiently. Other underpriced resources include water and sanitation, and agricultural inputs such as pesticides and fertilizers. "Implicit" subsidies are also now increasingly recognized, such as those given to logging enterprises from inadequate stumpage fees.

In the water sector, misguided irrigation subsidies encourage overuse with resulting environmental problems and inadequate supplies for many farmers. Urban water supply and sanitation are plagued by low user fees that set up a vicious cycle of low revenues for the public utilities, poor and insufficient supply of services, and consumer dissatisfaction. Water losses from leakage or illegal diversions are rampant. For example, in most Latin American cities up to 40 percent of the total water supply is unaccounted for (versus only 8 percent in Singapore, a city with an extremely efficient public water utility). Foregone water revenues in Latin America are estimated to cost up to \$1.5 billion per year.

Similar tales of natural resource subsidies and their negative impacts on the environment (not to mention lost revenues) can be told for many other natural resources including forests and fisheries. Several recent Bank loans are designed to help countries as diverse as Bhutan, Mexico, and Poland improve natural resource pricing and management.

Understanding the links between economywide policies and the environment. Economywide policies also have important impacts on how natural resources are used and levels of air and water pollution. In the past year the Bank has undertaken a review of the links between economywide policies and the environment. Among the main lessons learned are:

- Measures for restoring macroeconomic stability generally will yield environmental benefits, since instability undermines sustainable resource use.
- Removal of major price distortions, promotion of market incentives, and relaxation

of other constraints, which are among the main features of adjustment-related reforms, generally will contribute to both economic and environmental gains.

- Unintended adverse side effects may occur when economywide reforms are undertaken if other market or institutional imperfections and distortions persist. Therefore, specific measures that remove such policy, market, and institutional difficulties not only are environmentally beneficial in their own right but also are critical complements to broadening economywide reforms.

2. ASSISTING COUNTRIES IN ENVIRONMENTAL STEWARDSHIP

The World Bank actively assists countries to improve environmental management. Three elements are involved: providing financial resources for environmental investments, providing support for national and regional environmental planning, and deepening and disseminating knowledge about environmentally sustainable development.

Investing in the environment. In the two years since the Rio Earth Summit, the Bank committed a record \$4.4 billion in new loans and credits for 48 projects specifically designed to strengthen countries' management of the environment. This amount brings the current active portfolio to roughly \$9 billion for some 120 primarily environmental projects (see figure 1 for information on both annual lending and the total environmental portfolio).

The Bank finances three broad types of environmental projects. Over the past two years lending for *pollution control and the urban environment* (the "brown" agenda) amounted to \$2.7 billion and included large projects for pollution control in diverse countries including Algeria, Brazil, China, India, Indonesia, Korea, Mexico, Togo, and Turkey. In Mexico, for example, the Bank has lent \$1.2 billion for four projects to improve air, water, and solid and hazardous waste management.

In the same period, lending for *natural resources and the rural environment* (the "green" agenda) amounted to \$1.4 billion and included projects in Bhutan, China, Egypt, India, Pakistan, Poland, and Turkey. The Third Forestry Development Project in Bhutan is helping this small landlocked country improve management of forests, its most important natural resource.

Finally, lending for environmental *institution building*, which traverses the "brown" and "green" agendas, amounted to another \$270 million and included projects in Bolivia, Chile, China, The Gambia, Ghana, Korea, Morocco, and Pakistan. Institutional development in Chile and Mexico, for example, is crucial as these countries grapple with the environmental problems brought on by rapid economic growth and industrialization.

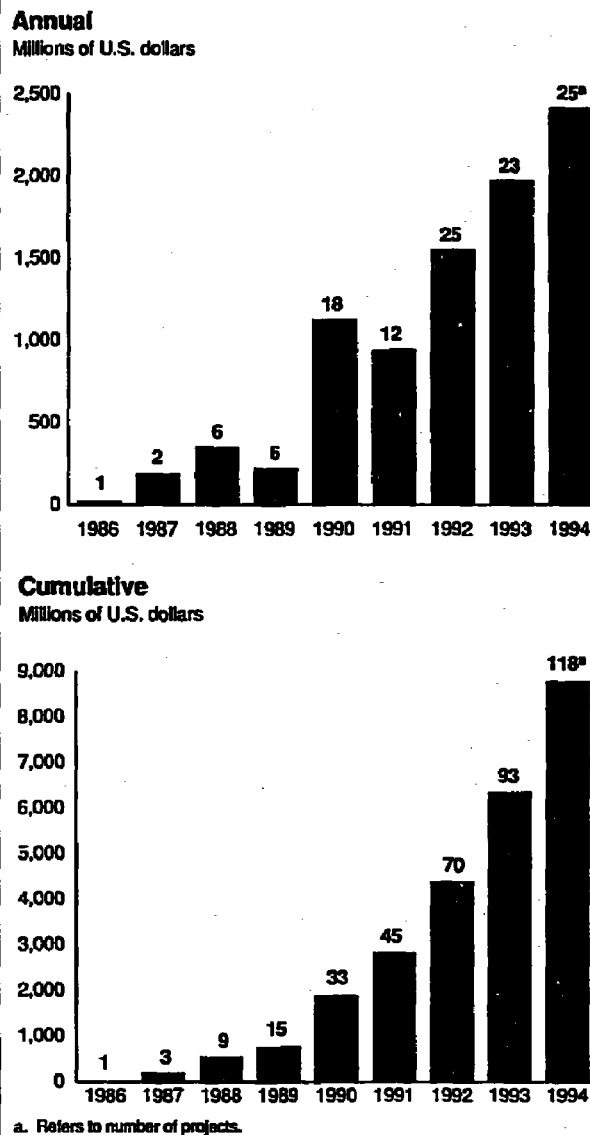
Supporting environmental planning.

The Bank is also supporting countries as they prepare national environmental action plans (NEAPs). By mid-1994 over thirty countries had prepared NEAPs or equivalent documents, and the number is anticipated to double by the end of 1995. A number of the first action plans are now entering the implementation phase. In addition to national plans, regional plans and strategy have also been developed. A regional environmental action plan was prepared for the nations of Central and Eastern Europe (and approved by a major ministerial conference in 1993); in Asia, a recent Bank study focused on the identification of an environmental strategy for this rapidly growing region.

Building the knowledge base. Environmental policies, projects, and plans are only as good as the knowledge upon which they are based. The Bank's program of policy analysis and research has resulted in several important policy and best-practice papers that have become operational during the past few years. These include a water resources management paper, an operational policy directive on forestry, an agriculture sector review paper, and an operational directive on

Figure 1

World Bank environment lending, fiscal 1986-94



agricultural pest management.¹ Applied research in Chile, Indonesia, and Mexico has yielded important insights into the links between environment and development, especially the connection between urban air and water pollution and health effects.

3. MITIGATING ADVERSE IMPACTS

To be effective, the Bank's lending must be environmentally and socially sustainable. To ensure this outcome, it is essential that the Bank assess and mitigate unwanted environmental impacts. This goal is reflected in the use of project and regional or sectoral environmental assessment (EA) and the special attention paid to the challenge of resettlement.

Mainstreaming environmental assessment of projects. Since 1989, all investment projects proposed for Bank financing have been "screened" for their potential environmental consequences. As a result of screening, more than half of all projects are then subjected to environmental analysis. A review of environmental assessment (EA) experience in the past two years confirms that borrowers are making more productive use of environmental assessment in Bank-financed operations. One indication of this is the increasing percentage of recently approved operations requiring full environmental assessment; more projects in more sectors and subsectors are being scrutinized through environmental assessments.

Bank experience in the use of environmental assessment to enhance project design is growing. This enhancement occurs in three main ways:

1. By having EA be part of the project identification and early preparation process, thus contributing directly to other technical and feasibility studies
2. By using EA to analyze and recommend alternatives even if EA is not a central part of project preparation
3. By identifying additional components and measures to enhance a project's environmental dimensions.

Examples of good practice are found in recently approved projects in Brazil (urban transport), Croatia (highways), Estonia (district heating), Indonesia (urban development), Mexico (solid waste management), and Paraguay (natural resources management). Marked progress has also been achieved with respect to public consultation in the EA process although improvements are still required. However, one weak link continues to be the analysis of project alternatives from an environmental perspective.

Introducing sectoral and regional EAs. A new dimension is the increasing use of sectoral and regional EAs. Sectoral assessments are particularly helpful in projects involving a large number of subprojects (for example, roads, irrigation, and industrial and agricultural credit lines), many of which may not have been identified at the time of appraisal. The past year also witnessed presentation of the first two regional environmental assessments to the World Bank's Board of Directors.

Addressing resettlement issues. The special problems of resettlement continue to receive attention. Involuntary resettlement has accompanied development in both industrial and developing countries. Bank-financed programs account for a small share (around 3 percent), but still significant number, of people who will be displaced by development projects worldwide. Operations in the Bank's active portfolio are expected to involve the resettlement of 2 million people over the next 8 years. The Bank has a responsibility to help borrowers ensure that every effort is made to restore, and where possible improve, their livelihoods.

A Bank-wide resettlement review, covering 192 projects, was completed in April 1994 and released to the Board of Directors and the public.² The review found that the Bank had achieved significant progress in three major areas: influencing the resettlement policies of borrower countries; assisting borrowers in avoiding or reducing the scale of displacement; and helping borrowers improve the ability of resettlers to restore their incomes. However, the review also found that actual performance by borrowing agencies often has not met agreed standards. The Bank's management recommended concrete remedial actions including improved initial analysis of resettlement issues, increasing borrower commitment, enhanced project monitoring, and additional funding.

Enhanced social analysis of projects. There is a growing recognition that the participation of stakeholders in the selection and design of projects can improve decisionmaking, strengthen ownership of projects, and help poor and disadvantaged groups. The Bank has coordinated efforts to incorporate social concerns into its development work by using the techniques of social assessment (SA). Not only are the poor often the primary natural resource managers, but also they are the least able to avoid harm from changes in their environment. Efforts have been made to explicitly include the social dimension in such areas as community forestry and biodiversity conservation in Brazil, Colombia, Ecuador, India, and Siberian Russia. A *Participation Sourcebook* is being prepared to document best practice for improved participation in projects.³

4. ADDRESSING GLOBAL AND REGIONAL PROBLEMS

Bank attention to global and regional environmental concerns has expanded dramatically over the past few years, whether through international agreements such as the Global Environmental Facility (GEF) or through its own lending operations.

Managing global problems. Through its role as an implementing agency of the Montreal Protocol and the Global Environmental Facility (GEF), the Bank is addressing four sets of issues: (1) global warming, particularly the effects of greenhouse gas emissions from the use of fossil fuels and the destruction of carbon-sequestering forests; (2) loss of biological diversity through the degradation of natural habitats and the overuse of natural resources; (3) pollution of international waters through oil spills and the accumulation of wastes in oceans and international river systems; and (4) depletion of stratospheric ozone due to emissions of chlorofluorocarbons (CFCs), halons, and other gases.

As one of the GEF's three implementing agencies (together with the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP)), the Bank is responsible for managing the Facility's portfolio of investment projects, many of which are co-financed by regular Bank loans and credits. The Bank has helped the GEF to emerge as an important catalyst for the integration of global environmental concerns into national development goals. Through grants and concessional funding, the GEF enables developing country governments and private companies to address global environmental issues that they would otherwise be unable or unwilling to undertake, in the process demonstrating a new approach to global cooperation.

In March 1994 representatives from more than 70 countries agreed to restructure and replenish the GEF, and donors agreed to provide more than US\$2 billion to the Core Fund for commitment over three years. These funds will be contributed over and above resources channeled to regular official development assistance.

Improving analysis of regional issues. The Bank's work on protecting regional commons focuses primarily on regional seas and river basin programs.

Implementation of environmental action programs for the Baltic, Black, and Mediterranean Seas and the Danube River Basin accelerated over the past year. The Bank also helped launch new regional initiatives for the Aral Sea in Central Asia and Lake Victoria in East Africa; these initiatives required coordinating actions among several countries to protect these precious common resources. In addition, the Bank has dedicated increasing effort to issues of soil degradation and desertification at the regional level, as illustrated by its active role in the drafting of the International Convention to Combat Desertification, begun by the 1992 session of the General Assembly of the United Nations and completed in June 1994.

Building capacity for the task

Implementing the Bank's large environmental agenda requires the institution to strengthen its internal capacity for environmental work and to improve communication and collaboration with the international community. To respond, the Bank has changed its institutional structure, increased environmental staffing, and developed new lines of external communication.

Strengthening internal capacity. A major institutional change was the launching of a new Vice Presidency for Environmentally Sustainable Development (ESD) in January 1993. This move was combined with strengthening of environmental capabilities in the departments directly responsible for project preparation and supervision. The ESD Vice Presidency in particular was charged with providing policy guidance, giving technical support to projects under preparation and implementation, and disseminating best practices for the Bank's overall environmental work.

To meet its growing environmental commitments, the Bank has greatly strengthened its skills mix. From only three staff a decade ago, the complement of technical environmental staff now stands at almost 300. In line with the policy of mainstreaming environ-

mental concerns into the Bank's work, most of the recent increase was in the regional Country Departments.

Environmental concerns are everyone's responsibility, and training of Bank staff in environmental issues is also growing. A new course, "Fundamentals in Environmental Management," was introduced and is taught six times each year. An additional 21 environmental courses have been taught over the past year, many of them more than once, with almost 600 staff participating.

Reaching out to the international community. Implementing the Bank's environmental agenda requires building partnerships and effective communication with the international community. The Bank has sought to increase dialogue with nongovernmental organizations (NGOs) and improve cooperation with other members of the UN system. Expanding Bank-NGO discussions have been fruitful for all concerned and have addressed a broad range of—often controversial—issues such as the links between adjustment and macroeconomic policies and the environment, the preparation of NEAPs, resettlement, and public access to information.

The Bank firmly believes that openness about its activities fosters accountability and transparency in the development process, facilitates coordination of interested parties, stimulates useful debate among policymakers and affected populations, and broadens understanding of development challenges—all of which ultimately enhance the quality of Bank-supported operations. To this end, the Bank has established an independent Inspection Panel, and has adopted a new policy on information disclosure that makes a greater range of environment-related documents publicly available.

The challenge ahead

An important transition is underway in the World Bank's environmental work. The key elements include a shift in emphasis from the design and codification of Bank policies

to their implementation on the ground; a stronger focus on the development of institutional capacity for environmental management at the country level; a greater recognition of the need to embed environmental concerns into sectoral work; and an increased emphasis on the social aspects of environmentally sustainable development. Since the Rio Earth Summit, the Bank has made important progress in this transition, but more remains to be done.

There remains a large unfinished intellectual agenda: many basic relationships between development and the environment remain poorly understood, and the Bank is still on the steep incline of its learning curve on numerous key institutional and policy issues. Meeting the rapidly growing requests from borrower countries for technical and project assistance requires ongoing strengthening of the Bank's technical skills base. Finally, the rapid expansion of environmental lending and the Bank's relative inexperience with environmental projects will require a stronger emphasis on supervision and building partnerships with others.

Notes

1. *World Bank, Water Resources Management. A World Bank Policy Study (Washington, D.C.: World Bank, 1993); World Bank Operational Policy 4.36 "Forestry"; Agriculture and Natural Resources Department, Agriculture Sector Review (Washington, D.C.: Agriculture and Natural Resources Department, World Bank, 1993); World Bank Operational Policy 4.03 "Agricultural Pest Management."*

2. *Environment Department, Resettlement and Development: The Bankwide Review of Projects Involving Involuntary Resettlement, 1986-1993 (Washington, D.C.: Environment Department, World Bank, 1994).*

3. *Environment Department, Participation Sourcebook (Washington, D.C.: Environment Department, World Bank, Forthcoming).*

Epilogue: Expanding the Capital Stock

ISMAIL SERAGELDIN AND ANDREW STEER

S*ustainable development means ensuring that future generations have as many opportunities as we have. Ensuring that this will be possible for the increased populations of the future requires increasing the world's stock of "capital." Four types of capital—which are often strong complements but weak substitutes for one another—need to be recognized.*

Sustainable development is about development progress; it certainly is not a doctrine of "no-growth" environmental protectionism. But it is about a particular form of progress. Specifically, sustainable development places the focus on two groups of disenfranchised people: the poor of today and the generations of tomorrow. Its goals are to increase opportunities, improve livelihoods, and reduce the risk of disease or impoverishment—for the 1 billion people who live below the line of acute poverty and the 2 billion who live not much above it, for the 1.7 billion who lack even basic sanitation services, the 1.4 billion who breathe badly polluted air, the hundreds of millions of farmers who are threatened by soil depletion or natural disturbance, and the 2.5 billion who yet cannot enjoy the benefits of modern energy.

Meeting the need for productive jobs, education, health, and infrastructure requires gains in productivity, pro-poor targeting of programs, and an expansion of the capital stock. But sustainable development also requires that such progress be *sustained*: today's progress must not be achieved at the expense of the tomorrow's citizens. This is a more difficult concept to grapple with. Here again, it is helpful to focus on the need to preserve—and given the expected future growth of population, to expand—the capital stock to ensure the option of enjoying at least the same flow of income and services in the future as exist today.

Four types of capital

We need to recognize at least four categories of capital: humanmade or "fabricated" capital (machines, factories, buildings, and infrastructure), natural capital (as discussed in many works of environmental economics), human capital (investments in education, health, and nutrition of individuals), and social capital (the institutional and cultural bases for a society to function).

Humanmade capital. Most economic analysis focuses on the first category, humanmade capital, which is also the most measurable. Consistent with our tendency to "treasure what we measure," more efforts have gone into ensuring a rising stock of this type of capital than any other. For this reason discussions of sustainable development rightly tend to focus on the other forms of capital, since it is there that remedial analysis and action are needed.

Natural capital. This is the stock of environmentally provided assets (such as soil, sub-soil minerals, forests, atmosphere,

water, wetlands) that provide a flow of useful renewable and non-renewable goods and services, which may be marketed or unmarketed. As we have moved from an "empty world" to a "full world," these environmentally provided assets have become increasingly scarce; thus it is appropriate that attention should shift from concern about the adequacy of human-made capital to concern about the adequacy and effective use of natural capital. The services derived from natural capital can be greatly expanded when such capital is cultivated—that is, combined with human-made and human capital, as in agriculture. However, care must be taken that increased yields derived from increasing applications of other factors do not mask an underlying deterioration of the basic natural capital stock. There is growing evidence that this may be happening in many parts of the world, for example, in arable agriculture and forestry, where continued increments of complementary inputs are ensuring ever-increasing yields while vital ecological and physical services are being eroded. Substituting non-natural capital for natural capital is possible in the short to medium term but eventually is limited. Thresholds can be crossed, after which yields will decline, often sharply, regardless of how many other inputs are supplied. Deepening our understanding of sustainability in such situations of cultivated natural capital is a high priority.

Human capital. In the last three decades very considerable progress has been made in recognizing the importance of human capital formation; investment in people is now seen to be a very high return investment, especially in developing soci-

eties. The entire mainstream paradigm of development has been expanded to include investment in human resources as an essential, possibly the most essential, ingredient of development strategy.¹

Investments in health and education and nutrition are increasingly central parts of national investment strategies. Nevertheless, we still have difficulties, methodologically, to define the monetary value of such investments, even if ingenious proxies, such as the discounted differential income stream, are used. However, even the most conservative measures in such proxies lead to an overwhelming positive value to such investments.

Less clear is the link between such investments and the shifting economic realities of an aging population profile in the industrialized countries and the persistence of unemployment and underemployment in many societies, both industrialized and developing. The negative and corrosive impacts of such phenomena on the social fabric and well-being of society as a whole, not only the individuals concerned, deserve more research and policy attention.

Social capital. The last observation leads directly to the fourth form of capital. Without a degree of common identification with the forms of governance and of cultural expression and social behavior that make a society more than the sum of a collection of individuals, it is impossible to imagine a functioning social or economic order. The myriad institutions that we take for granted as essential premises of a functioning society must be grounded in a common sense of belonging by its members, and the institutions must reflect a sense of legitimacy in their mediation of conflicts and competing claims. In short, if that social capital is inadequate, the resulting failures make it impossible to talk of either economic growth, environmental sustainability, or human well-being. Examples are all too painfully evident from Somalia to Yugoslavia to Rwanda.

But what constitutes this social capital? It is a difficult question, and the definition is clearly different from and broader than that of individual human capital. It is based on inclusion, participation, and the promotion of an enabling environment. Yet it is more. The most ambitious work to date on this subject has been the effort to deal empirically with the link between good governance and development. This requires efforts at defini-

tion and measurement which face formidable methodological obstacles, but, happily, headway is being made.

In a landmark study presented in *Making Democracy Work: Civic Traditions in Modern Italy*, Professor Robert D. Putnam of Harvard University and colleagues have made a convincing case that the existence of civic community is not only the precursor and guarantor of good governance but also the key to sustained socioeconomic development.²

Strong civic community is defined as a preponderance of *voluntary horizontal associations*, in contrast to *hierarchical vertical associations*, and the *density* of these voluntary horizontal institutions throughout the society. The Putnam study found a matrix of voluntary horizontal associations in prosperous, rapidly developing northern Italy while the less developed, less effective south of Italy is characterized by autocratic vertical institutions.

But which is cause and which is effect? Does northern Italy have a dense network of horizontal institutions (choral societies, soccer clubs, parent-teacher associations) because it is rich and can afford them? Or is it rich because it has good, responsive government nurtured by long-standing citizen involvement in many such voluntary institutions? The evidence suggests the latter. The 20-year study documents a strong causal link between civic traditions and the effectiveness of governments to promote sustained socioeconomic development. The Italian case has potentially vital relevance for a deeper understanding of how to promote environmentally sustainable development. Questions remain as to how to measure social capital, and as to whether and how it is possible to "invest" in such capital. Similarly, the causal impacts—for good or bad—of economic development on civil society still are not known. These areas of research need to be addressed.

Sustainability and the capital stock

How does the above view of capital stock enlighten our understanding of sustainability? It clearly enables us to set aside the simplistic view that sustainability requires leaving to the next generation exactly the same amount and composition of natural capital as we found ourselves, and to substitute a more promising concept of giving future genera-

tions the same, if not more, opportunities than we found ourselves. In other words, the stock of capital that we leave them, defined to include all four forms of capital, should be the same if not larger than what we found ourselves. This new paradigm immediately opens the door for substituting one form of capital for another. Arguably, it is the most worthwhile to reduce some natural capital, for example, reducing the amount of oil in the ground, to invest in increasing human capital, for example, educating girls. The question then becomes, in the language of development economists, of the degree to which we can:

- Measure each kind of capital
- Define the production function, in terms of the degree of substitutability and complementarity between the different kinds of capital, and how these may change in a dynamic context
- Define (in the absence of a common numeraire) an "exchange rate" for the different kinds of capital, accepting that it, too, may be dynamic.
- Define sustainability in terms of a context of thresholds within which the more efficient (highest return) activities could be selected, in such a way that individual investments and entire strategies could be meaningfully evaluated.

Such an approach ultimately may be comprehensive and rigorous, but it is a long way off. A good way to think about proceeding is in a series of short steps. We have already made great strides in incorporating human capital into conventional economic analysis, and we are starting to incorporate various aspects of natural capital. This is where we should invest our primary efforts now, significantly improving our understanding of the interlinkages between these three kinds of capital. Social capital will take longer to elaborate, and in the meantime can be left to the political processes in each country to arbitrate.

This brings us to the definition of sustainability in terms of the maintenance of these four types of capital while producing an increasing stream of benefits to individuals and society as a whole.

Sustainability has several levels—weak, sensible, strong, and absurdly strong—depending on how strictly one elects to how to the concept of maintenance or non-declining capital.³

Weak sustainability is maintaining total capital intact without regard to the composition of that capital among the four different kinds of capital. This would imply that the different kinds of capital are substitutes, at least within the boundaries of current levels of economic activity and resource endowment.

Sensible sustainability would require that in addition to maintaining the total level of capital intact, some concern should be given to the composition of that capital (among natural, human-made, human, and social). Thus, oil may be depleted so long as the receipts are invested in other capital, for example, human capital development, elsewhere, but, in addition, efforts should be made to define critical levels of each type of capital, beyond which concerns about substitutability could arise. These levels should be monitored to ensure that patterns of development do not promote a decimation of one kind of capital, regardless of what is being accumulated in other forms of capital. This degree of sustainability still assumes that human-made and natural capital are to a large extent substitutable, but recognizes that they are also complementary. The full functioning of the system requires at least a mix of the different kinds of capital. Since we do not know exactly where the boundaries of these critical limits for each type of capital lie, it behooves the sensible person to err on the side of caution in depleting resources (especially natural capital) at too fast a rate.

Strong sustainability requires maintaining different sub-components of capital intact

separately. Thus, for natural capital, loss of forest in one area should be replaced by new forest of a similar type elsewhere, and receipts from depleting oil should be invested in sustainable energy production. This assumes that natural and man-made capital are not really substitutes but complements in most production functions and that even within capital types, there is limited substitutability. Thus, a sawmill (human-made capital) is worthless without the complementary natural capital of a forest.

Absurdly strong sustainability would never deplete anything. Non-renewable resources—absurdly—could not be used at all; for renewables, only net annual growth rates could be harvested, in the form of the overmature portion of the stock.

Pragmatism has to be our abiding concern in both the development of new measurements and methodologies and in the pursuit of policies and investments. Operationally, this translates into encouraging the growth of natural capital by reducing our level of current exploitation; investing in projects to relieve pressure on natural capital stocks by expanding cultivated natural capital, such as tree plantations to relieve pressure on natural forests; and by increasing investment in human resources, particularly of the poor who are both the victims and the unwitting agents of economic degradation in many of the poorest societies on earth.

Methodologically, it is better to follow the wise advice of Nobel laureate Robert Solow, who advocated a series of imperfect steps to improve our current work rather than an

interminable debate about the "perfect" formulation.⁴ With this approach must come a major effort at improving our data bases for the different kinds of capital, especially the physical stocks and flows of natural capital, and the interaction of these into coherent views of ecosystem integrity and resilience at the regional as well as the global level.

It is a tall order, and it will be a long journey before the concept of sustainability sketched here is operational in a meaningful sense. But the longest journey starts with a single step, and on this journey many steps have already been taken.

Notes

1. See World Bank, World Development Report 1991: The Challenge of Development (New York: Oxford University Press, 1991).

2. Robert D. Putnam (with Robert Leonardi and Raffaella Y. Nanetti), Making Democracy Work: Civic Traditions in Modern Italy (Princeton: Princeton University Press, 1993).

3. Ismail Serageldin, Herman Daly, and Robert Goodland, "The Concept of Environmental Sustainability," in Principles of Sustainable Development, ed. Wouter van Dieren (Amsterdam: Institute for Environment and Systems Analysis, Forthcoming 1994).

4. Robert M. Solow, "An Almost Practical Step toward Sustainability." 40th Anniversary Lecture (Resources for the Future, Washington, D.C., October 1992).

APPENDIX 1

Selected World Bank Bibliography on Environmentally Sustainable Development

EDITED BY JOHN KELLENBERG

Major World Bank Policy Statements

Poverty: World Development Report 1990. New York: Oxford University Press, 1990.

This volume addresses the most pressing issue facing the development community: how to reduce poverty. The most effective way to achieve rapid and politically sustainable improvements in the quality of life for the poor focuses on ensuring productive use of the poor's most abundant asset—labor—accompanied by the provision of social services, especially primary education, primary health care, and family planning.

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

This Report is the fundamental statement of World Bank views on the links between development and the environment. It stresses the need to take advantage of "win-win" links between efficient income growth and the environment, and where tradeoffs exist between income growth and environmental quality, the costs and benefits of alternative policies must be carefully assessed.

Infrastructure for Development: World Development Report 1994. New York: Oxford University Press, 1994.

The link between infrastructure and development and ways in which developing coun-

tries can improve both the provision and the quality of infrastructure services are the subjects of this *WDR*. The Report identifies inadequate institutional incentives for improving the provision of infrastructure as the basic cause of poor past performance.

Making Development Sustainable: The World Bank Group and the Environment. Environment Department Annual Report. Washington, D.C.: World Bank, 1994.

This annual report illustrates the emerging fourfold agenda of the World Bank's work in relation to the environment. The report emphasizes the need to assist countries in environmental stewardship, to minimize the adverse impacts of World Bank-financed investments, to build on the synergies between development and the environment, and to address regional and global environmental challenges.

Sectoral Policy Papers

Agriculture

Agricultural Sector Review. Washington, D.C.: Agriculture and Natural Resources Department, World Bank, 1993.

This review was prepared in response to growing concern in the World Bank about the decline in volume and performance of lending for agriculture. The review points out that agriculture is a problematic sector in which success is elusive but argues that the

critical role the sector can play for the sustained alleviation of poverty justifies continued attention by the World Bank.

Energy

Energy, Efficiency, and Conservation in the Developing World. A World Bank Policy Paper. Washington, D.C.: World Bank, 1993.

The demand for energy is growing rapidly in developing countries. This paper concludes that continuing efforts to address country-wide policy and institutional issues are the most important means by which to maximize energy efficiency gains in developing countries.

Environmental assessment

Environmental Assessment Sourcebook. Vol. I, II, and III. Washington, D.C.: Environment Department, World Bank, 1991.

The purposes of the World Bank's policy and procedures for environmental assessment are to ensure that development options under consideration are recognized early and taken into account in project design. Volume I addresses policies, procedures, and cross-sectoral issues; Volume II presents sectoral guidelines; and Volume III focuses on Energy and Industry projects.

Forestry

Assisting Forest Reform: Implementing the World Bank's Forest Sector Policy. Washington, D.C.: World Bank, Forthcoming 1994.

This report is a review of World Bank forest sector implementation experiences over the past three years and gives a preliminary assessment of the guidance and direction provided by the Bank's 1991 Forest Policy Paper. After examining critical questions raised about the World Bank's role in the forest sector, the review affirms the directions set in the 1991 policy and calls for greater efforts to disseminate the Bank's perspective on needed reforms.

The Forestry Sector. A World Bank Policy Paper. Washington, D.C.: World Bank, 1991.

The need for protection and conservation of natural forests has led to a substantial review of the World Bank's policies. This policy paper identifies two key challenges: to slow the alarming rates of deforestation, especially (although not exclusively) in the tropical moist forests, and to ensure adequate planting of trees to meet the rapidly growing demand for fuelwood in developing countries.

Participation and social policy

Participation Sourcebook. Washington, D.C.: Environment Department, World Bank, Forthcoming 1995.

This resource is intended to help World Bank task managers, as well as others collaborating with them, to support participatory approaches in the development process.

The World Bank and Participation: Report of the Learning Group on Participatory Development. Washington, D.C.: World Bank, 1994.

Participatory development is a process through which stakeholders influence and share control over development initiatives, and the decisions and resources that affect them. This report details the work of the Learning Group on Participatory Development, which was launched in December 1990.

Population in Developing Countries. Washington, D.C.: Population, Health and

Nutrition Department, World Bank, Forthcoming 1994.

This paper examines the changes in population dynamics and in the policy environment that have produced a consensus that population policy objectives should be integrated with broader social development goals, and that population strategies should build on the linkages between demographic behavior and social and economic progress.

Resettlement and Development: The Bankwide Review of Projects Involving Involuntary Resettlement 1986-1993. Washington, D.C.: Environment Department, World Bank, 1994.

This report analyzes involuntary resettlement operations under World Bank-financed development projects between 1986 and 1993, based on a Bankwide review carried out in 1993-94. It presents the scale and composition of resettlement under Bank-financed projects, assesses the implementation of resettlement programs, and documents steps taken to improve performance.

Water and urban development

Toward Environmental Strategies for Cities. Urban Management Program Series 18. Washington, D.C.: World Bank, 1994.

This paper describes a strategic approach to urban environmental planning and management that is based on participation, building commitment, and choosing effective policy interventions.

Water Resources Management. A World Bank Policy Paper. Washington, D.C.: World Bank, 1993.

This policy paper urges that a new approach be taken with regards to projects financed by the World Bank and member countries. Such a policy seeks to address problems related to fragmented public investment programming, excessive reliance upon overextended government agencies, lack of financial accountability and user participation, and investments and regulations that have neglected water quality, health, and environmental concerns.

Urban Policy and Economic Development: An Agenda for the 1990s. A World Bank Policy Paper. Washington, D.C.: World Bank, 1991.

Rapid demographic growth will add 600 million people to cities and towns in developing countries during the 1990s, about two-thirds of the expected total population increase. This paper analyzes the fiscal, financial, and real sector linkages between urban economic activities and macroeconomic performance.

Regional Policy Papers

Environmental Action Programme for Central and Eastern Europe. Washington, D.C.: World Bank, Forthcoming 1994.

The Environment Action Programme provides a framework and guide for identifying the highest priority problems in Central and Eastern Europe, as well as for developing realistic, efficient, and cost effective solutions. The report is intended to serve as a basis for each country to set its own environmental priorities, and to improve and promote cooperation among Eastern and Western nations.

A Partnership for Environmental Progress: The World Bank in Latin America and the Caribbean. Washington, D.C.: World Bank, 1994.

Latin America and the Caribbean face environmental problems that have attracted worldwide attention. Global interest has focused particularly on the loss of tropical rainforests. However, air and water pollution directly affect far more people in the region. This report elaborates means to simultaneously improve economic and environmental management, reviews the World Bank's investments to support these efforts, and stresses the urgency of strengthening institutions and improving people's participation in projects.

The Population, Agriculture and Environment Nexus in Sub-Saharan Africa. Agriculture and Rural Development Series no. 1. Washington, D.C.: Africa Technical Department, World Bank, 1992 (rev. ed. Forthcoming 1994).

This paper explores the interlinkages between population growth, agricultural stagnation, and environmental degradation in Sub-Saharan Africa. It postulates the policy changes that have to be implemented to make intensive, market-oriented agriculture profitable. Such economic growth in rural areas is necessary to create an economic sur-

plus usable for environmental resource conservation and to provide the economic basis for the demographic transition to lower population fertility rates.

Toward an Environmental Strategy for Asia. World Bank Discussion Paper 224. Washington, D.C.: World Bank, 1993.

This paper discusses the nature and magnitude of environmental problems in Asia, explores technical and policy approaches to solving these problems, and documents World Bank experience in assisting Asian countries to deal with environmental problems.

Global Policy Papers

Facing the Global Environment Challenge: A Progress Report on World Bank Global Environment Operations. Washington, D.C.: World Bank, 1994.

This bimonthly publication profiles up-to-date information on developments in the World Bank's environment work. In addition, the report reflects the Bank's collaboration with the Global Environmental Facility to integrate global environmental concerns into the World Bank portfolio of projects.

Greenhouse Gas Abatement: Investment Project Monitoring and Evaluation Guidelines. Washington, D.C.: Global Environment Coordination Division, Environment Department, World Bank, 1994.

The Global Environment Facility is a multilateral funding program created to support projects that yield environmental benefits but would not otherwise be implemented because of inadequate economic or financial returns to project sponsors. This set of guidelines addresses one of the four types of projects: biodiversity preservation, pollution reduction of international waters, greenhouse gas emission reduction, and control of ozone-depleting substances.

Guidelines for Monitoring and Evaluation of GEF Biodiversity Projects. Washington, D.C.: Global Environment Coordination Division, Environment Department, World Bank, 1992.

Monitoring and evaluation of biodiversity conservation programs is a topic of major concern among conservationists, planners,

biologists, and funding agencies. More than thirty projects to conserve biodiversity were supported by the Global Environment Facility during its pilot phase. These guidelines serve to integrate principles of conservation biology with socioeconomic analysis.

Environmentally Sustainable Development Proceedings Series

Serageldin, Ismail, and Pierre Landell-Mills, eds. ***Overcoming Global Hunger: Proceedings of a Conference on Actions to Reduce Hunger Worldwide*** hosted by the World Bank and held at The Bender Arena, The American University, Washington, D.C., November 30–December 1, 1993. Environmentally Sustainable Development Proceedings Series no. 3. Washington, D.C.: World Bank, Forthcoming 1994.

The Hunger Conference was planned in a participatory fashion over months of discussions among nongovernmental institutions. The conference brought together hunger experts from all over the world who presented papers, collected here, and participated in a frank airing of views, including disagreements. Out of this conference arose a clearer understanding of how the involved groups can proceed jointly, in a more phased and realistic way, against short- and long-term world hunger.

Serageldin, Ismail, and Andrew Steer, eds. ***Valuing the Environment: Proceedings of the First Annual International Conference on Environmentally Sustainable Development*** held at The World Bank, Washington, D.C., September 30–October 1, 1993. Environmentally Sustainable Development Proceedings Series no. 2. Washington, D.C.: World Bank, 1994.

Successful development can occur only when the social and ecological aspects of development are integrated with economic aspects. The necessity for attaching an economic value to the depletion of natural resources and the priority of water as an environmental concern were the main themes of this two-day conference.

Serageldin, Ismail, and June Taboroff, eds. ***Culture and Development in Africa:***

Proceedings of an International Conference held at the World Bank, Washington, D.C., April 2 and 3, 1992. Environmentally Sustainable Development Proceedings Series no. 1. Washington, D.C.: World Bank, 1994.

The role of culture—"a people's technology, its manners and customs, its religious beliefs and organization, its system of valuation, whether expressed or implicit"—was the theme of this World Bank conference, co-sponsored by The Government of Norway, The Government of Sweden, The Rockefeller Foundation, UNESCO, and the World Bank. The causes of social phenomena are studied and understood in the context of a broadened analytical perspective that transcends economics, but does not abandon it.

Environmentally Sustainable Development Occasional Paper Series

Cernea, Michael M. ***Sociology, Anthropology, and Development: An Annotated Bibliography of World Bank Publications 1975–1993.*** Environmentally Sustainable Development Occasional Paper Series no. 3. Washington, D.C.: World Bank, Forthcoming 1994.

True development must be people-centered and gender conscious. This compendium makes easily available the breadth and quality of the non-economic social work done at the World Bank.

Narayan, Deepa. ***The Contribution of People's Participation: Evidence from 121 Rural Water Supply Projects.*** Environmentally Sustainable Development Occasional Paper Series no. 1. Washington, D.C.: World Bank, Forthcoming 1994. This study is based on systematic quantitative and qualitative analysis of 121 rural water supply projects funded by many agencies throughout the developing world. The analysis shows that beneficiary participation consistently was the most significant factor contributing to functioning water systems and enhanced local capacity.

Additional Publications

Anderson, Dennis. ***Economic Growth and the Environment.*** Working Paper Series 979. Washington, D.C.: Office of the Vice

President for Development Economics, World Bank, 1992.

The paper argues that efficient solutions to environmental problems improve a country's economic growth prospects, and, conversely, policies that improve economic growth prospects will enable environmental problems to be addressed.

Bernstein, Janis D. *Alternative Approaches to Pollution Control and Waste Management: Regulatory and Economic Instruments*. Urban Management Program Series 3. Washington, D.C.: World Bank, 1993.

The paper presents an overview of the most common strategies and policy instruments—regulatory and economic—used in developing and developed countries to achieve pollution control and waste management objectives.

Bhatnagar, Bhuvan, and Aubrey Williams, eds. *Participatory Development and the World Bank—Potential Directions for Change*. World Bank Discussion Paper 183. Washington, D.C.: World Bank, 1992. This volume contains the revised and edited papers presented at an international workshop on participatory development, held at the World Bank, Washington, D.C., in 1992. Experience shows that projects tend to be more sustainable and yield higher returns when they involve the intended beneficiaries. The papers explore ways that individuals, communities, and public and private institutions can enhance participatory development.

Birdsall, Nancy, and David Wheeler. "Trade Policy and Industrial Pollution in Latin America: Where Are the Pollution Havens?" *Journal of Environment and Development* 2(1) (Winter 1993). Economics and environmentalists alike commonly assume that greater economic "openness" will lead to increased industrial pollution in developing countries. This paper challenges the "pollution haven" hypothesis, arguing that liberalization of trade regimes and increased foreign investment in Latin America have not correlated with pollution-intensive industrial development.

Birdsall, Nancy, and Andrew Steer. "Act Now on Global Warming—But Don't Cook

the Books." *Finance & Development* 30(1) (March 1993).

This article argues against lowering the discount rate in evaluating investments in environmental protection. While policies to address greenhouse warming should be enacted immediately, the authors claim that meeting the needs of future generations will be possible only if investible resources are channeled to projects and programs with the highest environmental and economic rates of return.

Braatz, Susan, Gloria Davis, Susan Shen, and Colin Rees. *Conserving Biological Diversity: A Strategy for Protected Areas in the Asia-Pacific Region*. World Bank Technical Paper 193. Washington, D.C.: World Bank, 1992.

This paper posits that setting up comprehensive and well-managed protected areas systems is the most practical way to preserve the greatest amount of the world's biological diversity and the ecological processes that define and mold it.

Cernea, Michael, and Scott Guggenheim, eds. *Anthropological Approaches to Resettlement—Policy, Practice and Theory*. Boulder, Col.: Westview Press, 1993.

This volume summarizes different approaches to resettlement from theoretical and applied perspectives. It shows how recent research has advanced thinking on the best ways to analyze involuntary displacement and on the role of displacement in the development process.

Cernea, Michael. *The Urban Environment and Population Relocation*. World Bank Discussion Paper 152. Washington, D.C.: World Bank, 1993.

This study examines social and environmental consequences resulting from the involuntary relocation of various population segments due to urban development.

Cernea, Michael, ed. *Putting People First: Sociological Variables in Rural Development*. 2d ed. New York: Oxford University Press, 1991.

This book addresses sociological and anthropological issues that are central to induced, or planned, rural development. This edition highlights more explicitly the issues related

to (a) natural resources management—particularly water, forests, and fisheries; (b) the environmental implications of development programs; and (c) the development of human capital through investments in forming grassroots organizations and promoting participation.

Cleaver, Kevin, Mohan Munasinghe, Mary Dyson, Nicolas Egli, Axel Peuker, and Francois Wencelius, eds. *Conservation of West and Central African Rainforests*. World Bank Environment Paper 1. Washington, D.C.: World Bank, 1992.

Selected papers presented at the Conference on Conservation of West and Central African Rainforests in Abidjan in 1990 discuss issues ranging from the most recent scientific knowledge on rainforests to African governments' emerging forest strategies, the concerns of international nongovernmental organizations, and how to promote greater cooperation among all groups concerned.

Cropper, Maureen, and Charles Griffiths. "The Interaction of Population Growth and Environmental Quality." *Population Economics* 84(2) 1994.

The study of interactions between population growth and the environment has a long history. This article addresses the issue of whether population pressures have a significant effect upon environmental degradation. The authors examine the effect of such pressures on deforestation in sixty-four developing countries.

Cruz, Wilfrido, and Mohan Munasinghe. *Economywide Policies and the Environment*. Washington, D.C.: Environment Department, World Bank, Forthcoming 1994.

Although macroeconomic policies are not directed towards influencing the quality of the natural environment, they may affect it for good or bad. This paper argues that there are significant pay-offs for both the World Bank and its borrowers in attempting to better understand such impacts and to act on them.

Dasgupta, P., and K.G. Mäler. *Poverty, Institutions, and the Environmental Resource Base*. Environment Paper 9. Washington, D.C.: Environment Department, World Bank, 1994.

This paper identifies possible links between rural poverty, fertility behavior, and the local environmental resource base in poor countries by drawing on empirical evidence from anthropology, demography, economics, and the environmental sciences. The authors argue that poverty and institutional failure are both moot causes of environmental degradation and that the latter may well be a cause (and effect) of high fertility rates.

Davis, Shelton H., ed. *Indigenous Views of Land and the Environment*. World Bank Discussion Paper 188. Washington, D.C.: World Bank, 1993.

This report introduces the environmental values and perceptions of a small number of indigenous peoples living in geographically dispersed parts of the world. These perspectives have great significance both for national policies toward indigenous peoples and for internationally-funded development projects.

Dixon, John, Louise Fallon Scura, Richard A. Carpenter, and Paul B. Sherman. *Economic Analysis of Environmental Impacts*. London: Earthscan Publications, Ltd., Forthcoming 1994.

This is a revised edition of a book on economic valuation of environmental impacts first published by Earthscan in 1988. The forthcoming edition contains text examples, vignettes of cases, and nine full case studies of the application of economic valuation techniques to environmental impacts.

Dixon, John, Louise Fallon Scura, and Tom van't Hof. "Meeting Ecological and Economic Goals: Marine Parks in the Caribbean." *Ambio* 22 (2-3) (May 1993). Marine parks increasingly are being established to protect endangered marine ecosystems and the biological diversity that they support. This paper examines the trade-offs between protection and use, as well as means of producing economic benefits while still yielding protection benefits.

D'Silva, Emmanuel, and Simmathiri Appanah. *Forestry Management for Sustainable Development*. EDI Policy Seminar Report 32. Washington, D.C.: World Bank, 1993.

This report is based on the papers and discussions of a seminar organized by the Economic Development Institute of the

World Bank and the Forest Research Institute Malaysia. The paper's main message is that behind the crisis in Asian forestry lie failures that are associated with economic policy, institutional change, and technological improvement.

El-Ashry, Mohamed T. "Meeting the New International Environmental Challenges—The Role of the Global Environment Facility." Address to Nordic Policy Seminar, Scandinavian Seminar College, Copenhagen, Denmark, October 28, 1993.

This speech aims to refocus the attention of governments on an instrument for helping developing countries deal with their potential contributions to maintaining the global commons. The history and future goals of the Global Environment Facility are set out.

Falloux, Francois, and L. Talbot. *Crisis and Opportunity: Environment and Development in Africa*. London: Earthscan Publications Ltd., 1993.

This book describes the process by which environmental concerns are incorporated in the economic and social development of African nations. A special emphasis is placed on National Environmental Action Plans (NEAPs), a process of environmental planning developed in Africa, largely by Africans, that is being undertaken in other developing and developed countries.

Hettige, Hemamala, Robert Lucas, and David Wheeler. "The Toxic Intensity of Industrial Production: Global Patterns, Trends and Trade Policy." *American Economic Review Papers and Proceedings* (May 1992).

This paper investigates recent changes in the international distribution of industrial pollution. The authors examine the relationship between the toxic intensity of industrial production and the level of economic development, the impact of Organisation for Economic Co-operation and Development environmental regulations on global changes in toxic intensity, and the relationship between trade policy and the toxic intensity of industrial production in developing countries.

Jodha, N.S. *Common Property Resources: A Missing Dimension of Development Strategies*. World Bank Discussion Paper 169. Washington, D.C.: World Bank, 1992.

Disregard of common property resources and their productive potential is a major missing dimension in rural development strategies in developing countries. This paper argues that due to the convergence between potential common property resources-centered policies and the emerging concerns for participatory development, environmental sustainability, and poverty alleviation, common property resources could be made an effective component of rural development strategies in areas such as the dry regions of India.

Kellenberg, John, and Herman Daly. *Counting User Cost in Evaluating Projects Involving Depletion of Natural Capital*. Environment Working Paper 66. Washington, D.C.: Environment Department, World Bank, 1994.

To the extent that World Bank project evaluations fail to account for the opportunity cost of depleted natural capital, economic rates of return on projects will be misleading. Citing twenty-three mineral, energy, forestry, fisheries, and livestock projects, the authors encourage the use of World Bank "best practices."

Klemas, Victor, and others. *Environmental Information Systems for Coastal Zone Management*, World Bank Technical Paper. Washington, D.C.: World Bank, Forthcoming 1994.

The authors provide a detailed technical overview of environmental monitoring requirements and available measurement and sensing techniques as well as recommend practical data management strategies for developing an environmental information system for marine and coastal resource management.

Kreimer, Alcira, and Mohan Munasinghe, eds. *Environmental Management and Urban Vulnerability*, World Bank Discussion Paper 168. Washington, D.C.: World Bank, 1992.

This paper discusses issues concerning the relationship between environmental degradation and disaster vulnerability in urban centers as well as effective, environment-based strategies for managing risk.

Larsen, Bjorn. *World Fossil Subsidies and Global Carbon Emissions*, Working Paper

Series 1256. Washington, D.C.: Office of the Vice President for Development Economics, World Bank, 1994.

The author presents evidence on the level of fossil fuel subsidies and their implications for carbon dioxide emissions. He concludes that substantial fossil fuel subsidies prevail in a handful of large, carbon-emitting countries. Removing such subsidies could substantially reduce national carbon emissions in some countries.

Larson, Jeri. *Financial Mechanisms for Sustainable Conservation*. AFTES Working Paper no. 1. Environmental Policy and Planning Series. Washington, D.C.: Africa Technical Department, World Bank, 1993.

The paper explores the use of trust funds, endowments, and foundations for financing biodiversity conservation. It describes the issues involved in setting up long-term financial mechanisms and gives detailed examples of five conservation funding mechanisms operating in South America and the Philippines.

Leitmann, Josef. *Rapid Urban Environmental Assessment: Lessons from Cities in the Developing World*. Vol. 1 and 2. Washington, D.C.: World Bank, 1994. This two-volume series presents a low-cost, rapid, locally managed and participatory means of rapid urban environmental assessment. Volume 1 presents techniques and summarizes results from a number of cities; Volume 2 is composed of tools that can be directly applied in the field by practitioners and researchers.

Low, Patrick, ed. *International Trade and the Environment*. World Bank Discussion Paper 159. Washington, D.C.: World Bank, 1993.

This volume is concerned with the international aspects of environmental policy and the relationship between environmental concerns and nations' use of the standard tools of international economic policy.

Lutz, Ernst, ed. *Toward Improved Accounting for the Environment*. Washington, D.C.: World Bank, 1993. This volume deals with the question of how to better account for natural capital in an integrated way within the usual economic

accounting framework. It also describes the progress in recent years in conceptualizing and implementing the proposed approaches and measures.

Mink, Stephen D. *Poverty, Population, and the Environment*. World Bank Discussion Paper 189. Washington, D.C.: World Bank, 1993.

By stressing the overlap between poverty alleviation and reduced environmental and demographic stresses, this paper points to the paramount importance of promoting broadly based income growth strategies and increasing investments in human resource development.

Munasinghe, Mohan. *Environmental Economics and Sustainable Development*. World Bank Environment Paper no. 3. Washington, D.C.: World Bank, 1993.

This paper reviews concepts and techniques for the valuation of environmental impacts that enable environmental considerations to be explicitly considered in the conventional cost-benefit calculus used in economic decisionmaking.

Norse, Elliot. *Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making*. Washington, D.C.: Island Press, 1993.

The book aims to provide up-to-date information and the wisdom of world experts to leaders in governments, industries, international governmental organizations, and non-governmental organizations that are responsible for saving, studying, and using the wealth of marine life. It serves as a companion volume to Global Biodiversity Strategy (1992).

Oates, Wallace E., and Maureen L. Cropper. "Environmental Economics: A Survey." *Journal of Economic Literature*, vol. XXX (June 1992).

The article reviews the theory of environmental regulation focusing on key policy instruments for the control of externalities: effluent fees, subsidies, and marketable emissions permits. The authors also address the measurements of the benefits and costs of environmental programs and review cases in which benefit-cost analyses have been used to set environmental standards.

Pearce, David W., and Jeremy J. Warford. *World without End: Economics, Environment, and Sustainable Development*. New York: Oxford University Press, 1993. This book explores how growth can become environmentally sustainable. Subjects range from how to measure sustainable development to the relation between population and environment to market paradigms and pollution to terms of trade and the environment.

Sharma, Narendra, ed. *Managing the World's Forests*. Dubuque, Iowa: Kendall and Hunt, 1992.

This book provides numerous perspectives on world forests and on the political economy of forest management. Diverse views on key forestry issues, and solutions needed to accelerate the transition to the sustainable use of forest products are presented.

Serageldin, Ismail. "The Challenge of a Holistic Vision: Culture, Empowerment, and the Development Paradigm." In *Culture and Development in Africa: Proceedings of an International Conference held at the World Bank, Washington, D.C., April 2 and 3, 1992*. Environmentally Sustainable Development Proceedings Series no. 1. Ismail Serageldin and June Taboroff, eds. Washington, D.C.: World Bank, 1994.

This address presents a vision of development that goes beyond the economic and financial aspects of development to encompass increased participation, accountability, and institutional pluralism among development partners.

Serageldin, Ismail. "Agriculture and Environmentally Sustainable Development." In *Agriculture and Environmental Challenges: Proceedings of the Thirteenth Agricultural Sector Symposium*. Jitendra P. Srivastava and Harold Alderman, eds. Washington, D.C.: World Bank, 1994.

This speech presents a framework for environmentally sustainable development and addresses the role of the World Bank in promoting long-term sustainability.

Serageldin, Ismail. *Development Partners: Aid and Cooperation in the 1990s*. Stockholm: Swedish International Development Authority, 1993.

Real progress lies in empowering the poor, the weak, and the marginalized to become the producers of their own bounty and welfare, not the recipients of charity or the beneficiaries of aid. This book describes the multifaceted world of development assistance, gleans lessons from four decades of international aid efforts, and addresses the specific case of Sub-Saharan Africa as the most profound development challenge.

Serageldin, Ismail. *Saving Africa's Rainforests*. 2d ed. Washington, D.C.: Office of the Vice President, Environmentally Sustainable Development, World Bank, 1993. This book addresses the root causes of Africa's deforestation. It is derived from closing remarks to the Conference on Conservation of West and Central Africa Rainforests sponsored by the African Development Bank, the International Union for the Conservation of Nature (IUCN), and the World Bank, and held at the African Development Bank in Abidjan, Côte d'Ivoire, November 5-9, 1990.

Sorsa, Piritt. *Competitiveness and Environmental Standards: Some Exploratory Results*. Working Paper Series 1249. Washington, D.C.: Office of the Vice President for Development Economics, World Bank, 1994.

This paper argues that contrary to common perceptions, higher environmental standards in industrial countries have not tended to lower their international competitiveness. Among the author's findings about what determines trade flows in environmentally sensitive goods, Sorsa notes that environment spending is unlikely to have caused shifts in comparative advantage in most industries.

Steer, Andrew. "The Environment for Development." *Finance & Development* 29 (2) (June 1992).

The belief that the environment serves as a constraint on economic development has given way to acknowledgement of the complementarity of development and the envi-

ronment. Halting policies that foster excessive resource use, clarifying property rights, accelerating education and family planning programs, accelerating agricultural extension and research, and investing in sanitation and water supply are policies that are both economically efficient and good for the environment.

Yates, Alan, and Agnes Kiss. *Using and Sustaining Africa's Soils*. Agriculture and Rural Development Series no. 16. Washington, D.C.: Agriculture Department, World Bank, 1992.

This paper summarizes the information presented at a seminar on "Managing the Fertility of African Soils: Meeting Economic and Environmental Needs," cosponsored by the World Bank's Africa Technical Department. It reviews the status of knowledge about African soils and management technologies, identifies gaps in that knowledge, and proposes actions required to fill those gaps.

APPENDIX 2

Biographies

Michael M. Cernea is the World Bank's Senior Adviser for Social Policy and Sociology, working in the Environment Department. He holds a Ph.D. from the University of Bucharest. He is the editor of *Putting People First: Sociological Variables in Development*.

John A. Dixon is a Senior Environmental Economist in the Pollution and Environmental Economics Division of the Environment Department of the World Bank. He was educated at the University of California at Berkeley and at Harvard University, where he earned his Ph.D.

John Kellenberg is a consultant in the Director's Office of the Environment Department of the World Bank. He is a Ph.D. candidate at Johns Hopkins University.

Ernst Lutz is a Senior Economist in the Land, Water, and Natural Habitats Division of the Environment Department at the World Bank. He holds a Ph.D. from the University of California at Berkeley.

Sergio Margulis is a Natural Resource Economist in the Land Water and Natural Habitats Division of the Environment Department of the World Bank. He holds a Ph.D. from the University of London.

Joan Martin-Brown is Advisor to the Vice President, Environmentally Sustainable Development, at the World Bank. She was educated at Georgetown University and the John F. Kennedy School at Harvard University. She was Associate Regional Director for North America and Chief of the Washington Office of the United Nations Environment Programme (UNEP) for twelve years.

Mohan Munasinghe is Chief of the Bank's Pollution and Environmental Economics Division. He has postgraduate degrees from Cambridge, MIT, and McGill. From 1982–86 he was Senior Advisor to the President of Sri Lanka.

Stephen D. Mink is a Senior Economist in Middle East and North Africa Country Department 1, Agriculture Operations, of the World Bank. He was educated at Princeton

University and the Food Research Institute at Stanford University, where he earned a Ph.D.

Colin Rees is Chief of the Land Water and Natural Habitats Division of the Environment Department of the World Bank. He holds a Ph.D. from the University of Wisconsin. He headed the Environment Unit at the Asian Development Bank from 1981–88.

Ismail Serageldin is Vice President, Environmentally Sustainable Development. He was educated at Cairo University and Harvard University, from which he holds a Ph.D. He has written widely on issues of poverty, equity, environment, and sustainability.

Andrew Steer is Director of the World Bank's Environment Department. He was educated at St. Andrew's University, Cambridge University, and the University of Pennsylvania, from which he holds a Ph.D. He was Staff Director of *Development and the Environment: World Development Report 1992*.

