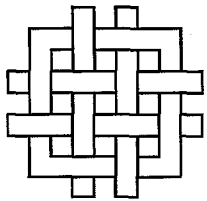


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# LESSONS FROM THE GROUND UP African Development That Works

Peter G. Veit  
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# Foreword

Now that the Cold War is over, political expedience no longer drives wealthy industrial nations to back enormous development projects aimed at keeping “friendly” developing-country leaders in power. In some ways, this change is welcome. In the past, foreign aid has all too often rested on the tacit understanding that governments would siphon off much of the capital while doing little for the impoverished masses whom mega-development projects were intended to benefit.

But recent geopolitical shifts have unwelcome aspects too. In the West, public support for foreign aid waned once containing the Soviets was no longer an issue. The recession that hit Europe and North America in the early 1990s compounded isolationist thinking as wealthy nations turned inward to deal with domestic problems. Simply put, humanitarian concerns at home began pre-empting those abroad. The challenge that developing countries face now is how to do more with less with foreign development assistance—and nowhere is this more urgent than in Sub-Saharan Africa.

Pointing the way is *Lessons from the Ground Up: African Development that Works* by Peter G. Veit, Regional Director for Africa in WRI’s Center for International Development and Environment; Adolfo Mascarenhas, Research Professor at the Institute of Resource Assessment, University of Dar es Salaam, Tanzania; and Okyeame Ampadu-Agyei, Deputy Director of Ghana’s Environmental Protection Agency. As the authors point out,

natural resource degradation hits especially hard in Sub-Saharan Africa because economies there depend more directly on natural resources than do economies elsewhere. Most people in the region are subsistence farmers, and agricultural products, minerals, timber, and nature tourism figure large in national economies.

The authors analyzed 23 case studies of ecologically sound rural development successes in ten African countries to tease out the common factors that make for success. Among these was the recognition by local people that natural resource degradation threatened their livelihoods—and that they could improve their lot by reversing degradation. Also common to the most successful efforts were cultural incentives compatible with sustainable development, secure land-tenure regimes, sufficient organizational and management capacity, access to technical and financial resources for environmental management, and an enabling political climate.

However, even the best community-based resource-management practices are being stifled by contradictory policies, laws, and institutional arrangements. Throughout Sub-Saharan Africa, governments marginalize small farmers, undermining their efforts to manage resources, improve production, and advance themselves—even though they form the backbone of most rural economies and produce 80 percent of the food supply.

The authors argue that Africa’s rural people—the continent’s principal users and caretakers of

natural resources—need secure control of their lands, more authority to make decisions about resource use, and a greater voice in government decisions about policy and laws. Central governments must recognize the contributions of communities, grassroots organizations, and civil society and willingly cede them more authority. In turn, these local players must prepare themselves to take full advantage of such partnership opportunities.

*Lessons from the Ground Up* calls for six broad policy reforms that will boost the prospects of replicating the “success stories” the authors studied:

1. To make national socioeconomic development sustainable, nations should adopt policy and legislative frameworks that clearly articulate the importance of sound resource management for long-term economic growth.
2. To make sustainable development pay, nations should create resource-based economic opportunities in rural areas and realign market incentives and fiscal subsidies that promote unsustainable practices.
3. To encourage local people to invest in natural resource management, nations should reform tenurial laws to protect farmers’ access to land and resources.
4. To ensure the sound planning, implementation, and monitoring that make for successful community-based development, national governments must decentralize, thereby empowering local governments to accomplish these tasks.
5. To build on democratization efforts and ensure a counterweight to business interests,

governments should recognize the value of Non-governmental Organizations (NGOs) as legitimate partners in development, and donor nations should offer financial support to build NGOs’ confidence and capacities.

6. To help small farmers increase their productivity, nations should research ways to improve traditional agricultural practices and expand agricultural extension services to make technical assistance, skills, and information more widely available.

The analyses presented in *Lessons From the Ground Up* extend those found in such WRI studies as *Farmer Innovation in Natural Resource Management: Water Management in Msanzi, Tanzania*; *Public Policy and Legislation in Environmental Management: Terracing in Nyarurembo, Uganda*; *Religious Beliefs and Environmental Protection: The Malshegu Sacred Grove in Northern Ghana*; and *Combining Local Knowledge and Expert Assistance in Natural Resource Management: Small-scale Irrigation in Kenya*. These number among the publications produced by “From the Group Up,” a research and capacity-building program now in its eighth year.

We thank the United States Agency for International Development and The Pew Charitable Trusts for their generous multi-year support of “From the Ground Up.” We also thank The International Foundation, the Atkinson Foundation, the Canadian International Development Agency, the Charles Stewart Mott Foundation, the Albert Kunstadter Family Foundation, the Netherlands Ministry of Foreign Affairs, The Ford Foundation, USA for Africa, and the World Bank for their important support of the program. For their foresight and support, we are deeply grateful.

Jonathan Lash  
President  
World Resources Institute

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# Preface

By the mid 1980s, many governments and donor agencies had come to realize that though traditional approaches to development in Sub-Saharan Africa had frequently failed, many community-based initiatives were succeeding. But while many African communities are already involved in effective self-development, the resources, skills, and experiences of the rural majority remain chronically underutilized. Some government and development assistance agencies are prepared to help, but a major constraint is that the factors and conditions upon which effective community-based development and resource management depend have been poorly documented. Traditional bureaucratic evaluations of failed projects only identified what went wrong and hypothesized about what might have worked.

To help African governments help themselves and their citizens, the Center for International Development and Environment of the World Resources Institute (WRI), collaborated with African development institutions and Clark University's International Development and Social Change Program to initiate an ambitious program known as "From the Ground Up" (FGU) in 1987. Its overall goal was to increase local, national, and international institutions' capacity to promote the community-based management of natural resources.

The methodology was simple: find communities already pursuing ecologically sound self-development on specific plots of land or in pockets of resources, identify the factors behind those

successes, and develop policy options that would help establish similar conditions in other villages.\* By documenting these working examples of successful community-level self-help initiatives, FGU would provide governments and development assistance agencies with models of effective natural resource management to emulate.

Between 1988 and 1991, "From the Ground Up" carried out 23 case studies in ten African nations. (See *Appendixes A, B, and C.*) For each study, a multidisciplinary research team comprised primarily of African social and natural scientists conducted fieldwork, collected data, analyzed the results, and prepared draft reports. Various participatory research methodologies, including Participatory Rural Appraisal (PRA), participant observation, and household surveys, were used (National Environment Secretariat et al., 1991; Molnar, 1989; Ethiopian Red Cross Society and International Institute for Environment and Development, 1989).

Although the technologies of effective community-based resource management are generally

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\*Traditional evaluation procedures consider a development project successful when it meets predetermined, quantifiable goals (e.g., a number of trees have been planted or contoured bench terraces constructed). Though such measurements can suggest how well the project has been implemented, they cannot reveal the extent of the community's involvement or the people's perspectives on the outcomes and hence, the chances for its sustainability (Skinner, 1989). As the principal resource users and primary beneficiaries of any resource-management activity, local people must be the ultimate judges of success.

well known, the less tangible social, economic, and political factors are not. To fill this gap, each case study team solicited local opinion on the cultural, socioeconomic, and political factors and incentives underlying their successful management practices.

"From the Ground Up" then analyzed the 23 case studies to identify the most important elements of effective community-based resource management and to develop general national policy recommendations. Predictably, quantifying these results proved difficult. Effective community-based resource management is a complex process whose specifics usually vary with changing circumstances on the ground. Besides formal workshops convened in Tanzania and Washington, D.C., at numerous informal sessions, the field researchers, together with community-based development experts, reviewed the case-study results in light of relevant academic theory and professional literature.

*Lessons From the Ground Up* is based on the comprehensive, community-oriented understanding gleaned from the 23 case studies and the collective

analyses. It identifies seven key factors associated with effective resource management and spells out six policy options to encourage and facilitate community-based sustainable development. It is designed to provide governments and development-assistance agencies with tangible guidance on how best to bring about similar results.

To spread these findings to a wide and influential audience, WRI is sharing the case studies and their policy implications with governments and the development assistance community through publications, workshops, conferences, and the popular media—radio, newspapers, and television. WRI has already published six case studies and will disseminate this summary report in the same way. We hope and intend that *Lessons* will help promote policies and legislation in support of community-based resource management, increase the allocation of development resources to the grassroots, and foster greater self-reliance and sustainability throughout Sub-Saharan Africa.

P.G.V.  
A.M.  
O.A-A.



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# I. Introduction

Sub-Saharan Africa<sup>1</sup> (hereafter "Africa") is generously endowed with human and natural resources, most of which are significantly underutilized. Most of its more than 614 million citizens (WRI, 1994) are resourceful and resilient. They constitute its greatest asset. About 70 percent of the inhabitants reside in rural regions where they engage in small-scale subsistence farming, animal husbandry, fishing, hunting, and gathering. Small-scale agriculture contributes significantly to local and national economies and to meeting national development needs. For example, in Tanzania, such production contributes an estimated 50 percent of total farm output—including nearly all fruits, vegetables, grains, cattle, and small livestock, and 80 percent of export crops. (Government of Tanzania, 1994).

Compared to other regions of the world, a high percentage of African national and household economies directly depends on the resource base. Agriculture, the mainstay of most national economies, accounts for 31 percent of the Gross Domestic Product (GDP) and more than 55 percent in the value of total exports (excluding the African oil-producing nations) (Cleaver and Schreiber, 1994). Minerals, timber, and tourism among natural resources account for much of the rest.

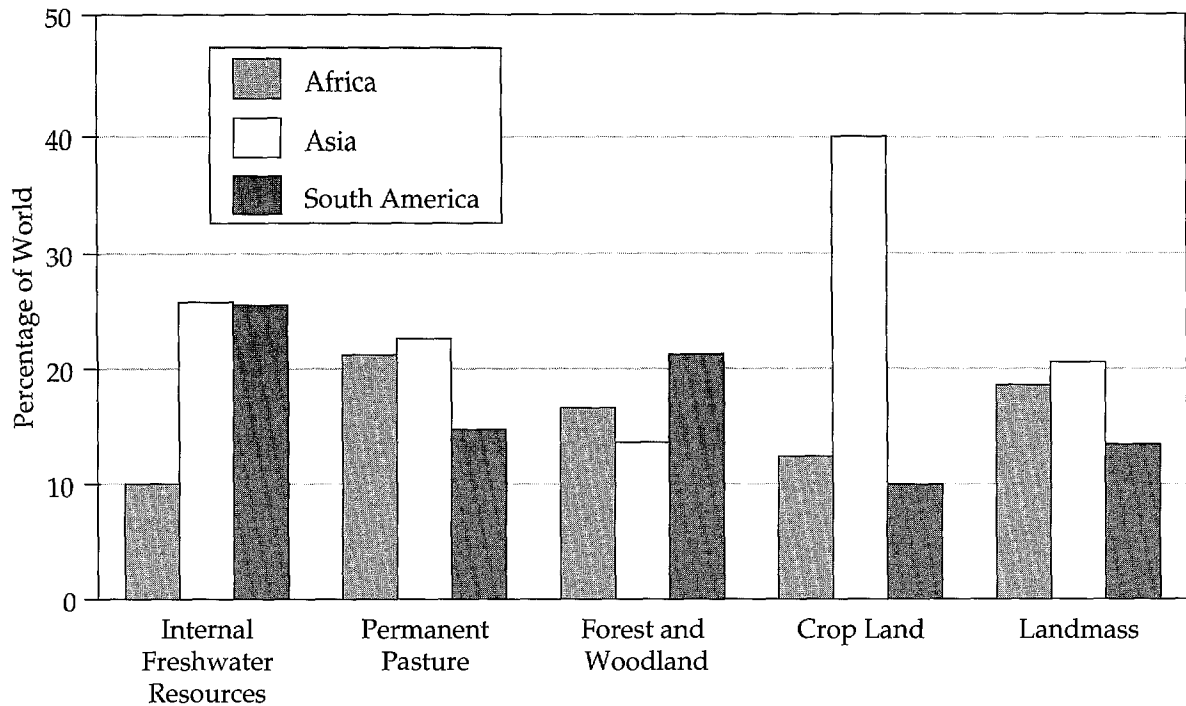
Fortunately, Africa is generously endowed with natural resources which could not only be used to meet its own needs but some of those of the rest of the world (Veit et al., 1995). Less than half of the available cropland is currently cultivated, and only 2.8 percent of that land is irrigated. A mere 1

percent of Africa's approximately 4,500 cubic kilometers of annual internal renewable water resources are currently being utilized for agriculture. Africa's forests, including almost a third of the world's tropical forest cover, could sustainably yield significantly more timber and other products. Only a fraction of Africa's rangeland is being managed as improved pasture, and its fisheries, which already provide protein for millions of Africans, could yield significantly more.<sup>2</sup> (See Figures 1 and 2.)

The rich biodiversity of Africa's ecosystems is crucial from the perspective of realized and potential goods, services, and economic opportunities (medicines, new food crops, and so forth). For example, of the 241 areas richest in plant diversity, 32 are in Africa, with the Cape Coast of South Africa boasting one of the largest number of endemic plant species of any region in the world. Ethiopia is one of the Earth's eight major centers of crop diversity and may prove important for future food supplies (Myers, 1992).

Africa's mineral wealth is proven. West Africa is rich in gold, tin, and iron ore; central and southern Africa is a mother lode of industrial and precious diamonds, copper, and gold. Many minerals of strategic importance abound in Africa: 54 percent of the world's cobalt, 32 percent of its bauxite, 52 percent of its manganese, and 81 percent of its chromium stocks (WRI, 1994). South Africa alone accounts for 84 percent of the world's total reserve base of platinum minerals (U.S. Department of the Interior, 1993).

**Figure 1. Distribution of Natural Resources by Region, 1994**



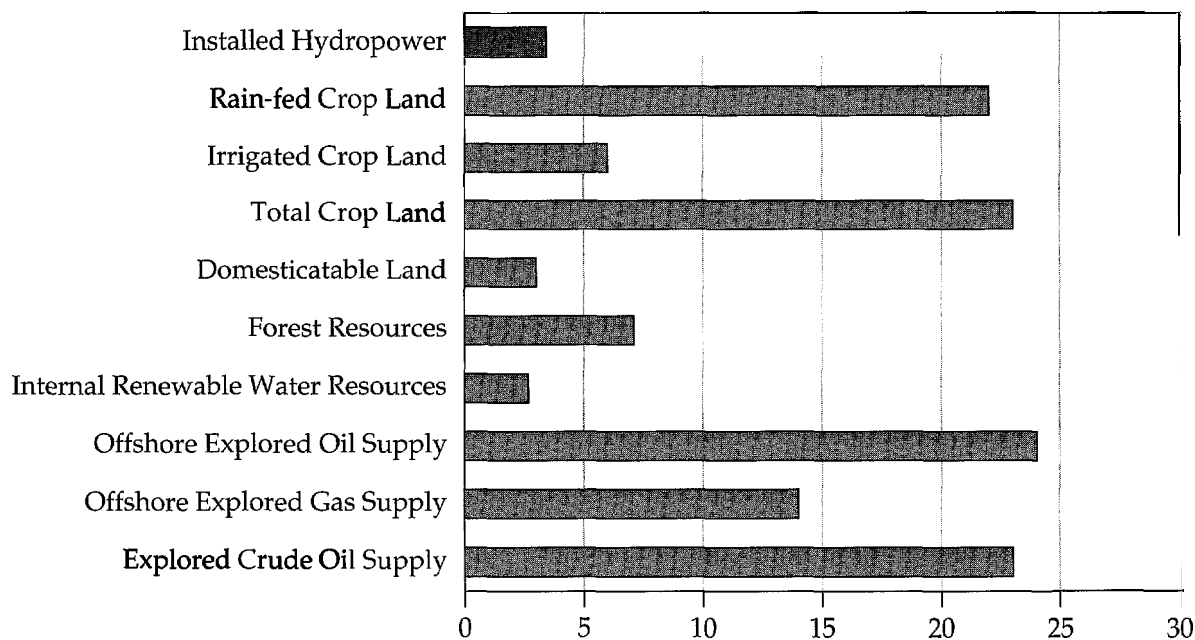
*Source: World Resources 1994-95: Guide to the Global Environment. Washington, D.C.: WRI, pp. 285-89.*

Natural energy resources are plentiful in Africa, but the continent currently consumes only a fraction of them. Proven reserves of petroleum were estimated to be 20.5 billion barrels in 1989, though some experts now speculate that offshore deposits are even larger. Known reserves of natural gas are equal to the equivalent of 250 gigawatts of electricity—20 times current installed hydropower capacity. And currently, Africans are harnessing less than 4 percent of the continent's vast hydroelectric potential (an estimated 300 gigawatts) and an even smaller portion of its geothermal, solar, wind, or biogas potential (World Bank, 1989).

These great human and natural resources notwithstanding, Africa is in crisis. In the first

three decades following their independence, most African nations struggled. Modest social and economic growth during the 1960s gave way to stagnation in the 1970s and outright reversal during the so-called "lost decade" of the 1980s (World Bank, 1989). (See Figure 3.) Among the better documented causes of this retreat are poor agricultural production, a decline in industrial output, poor export performance, increasing levels of imports, a drop in capital investments combined with poor rates of return, and increased borrowing. (See Figure 4.) Between 1985 and 1992, the average growth rate per capita declined by 0.8 percent per annum (World Bank, 1995a). In 1992, the average income level was US\$530 per capita. Today, all but nine of the world's 30 poorest countries are in Africa (World Bank, 1994b).

Figure 2. Exploitation of Potential Natural Resources in Africa, 1994



Source: *World Resources 1994-95: Guide to the Global Environment*. Washington, D.C.: WRI, p. 283.

Complicating Africa's economic development has been its high and increasing population growth rate: between 1961 and 1973, the average annual growth rate was 2.6 percent; between 1973 and 1980, it was 2.8 percent; and between 1980 and 1990, it was 3.1 percent (Cleaver and Schreiber, 1994).<sup>3</sup> For the past 25 years, the fertility rate has remained constant at about 6.5 children per woman, while the mortality rate has steadily declined. Almost half of Africa's population—which is projected to double by the year 2025—is not yet 16 years of age.

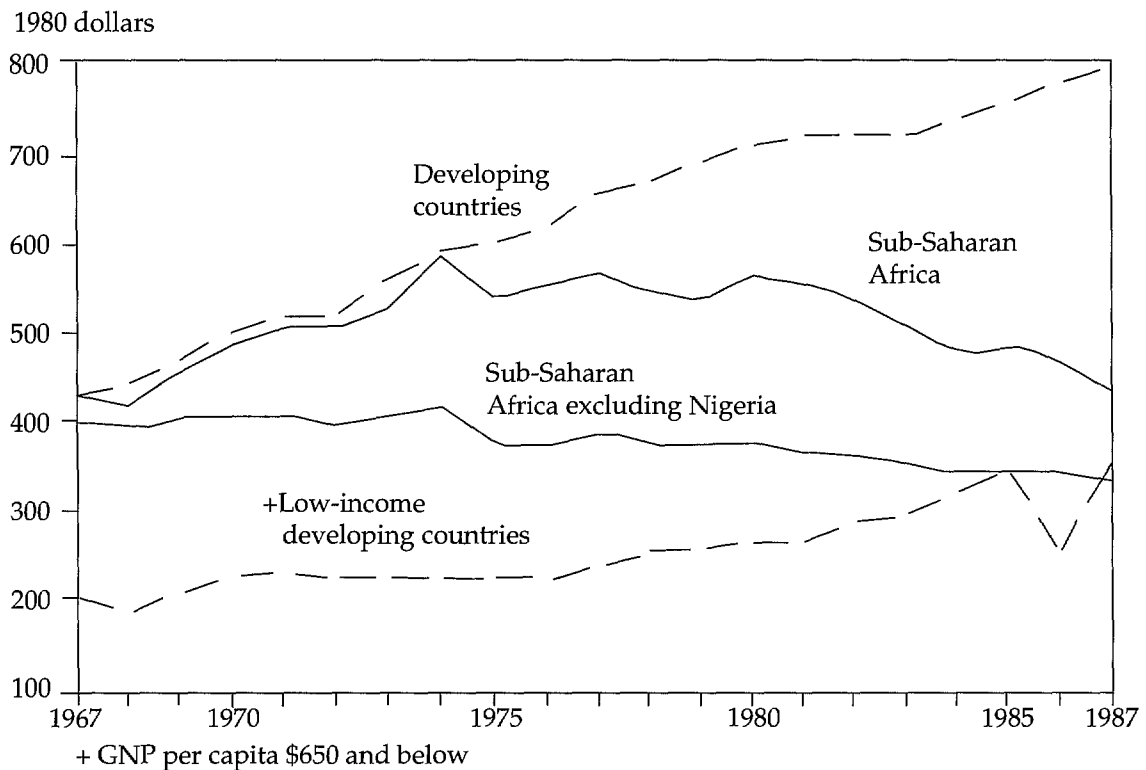
Although poverty and high population growth have had some adverse impacts on the resource base, they remain mostly local as a result of uneven population distribution and, given available technology, the unsuitability of large areas for farming.<sup>4</sup> Africa's population—concentrated on fertile highlands, along waterways, and

in urban or peri-urban areas (principally along coasts)—is moving into cities at the world's fastest rate. In 1990, 27 percent of the population lived in urban areas; by the year 2005, almost 50 percent probably will (World Bank, 1995a; 1994b; 1989).

Nowhere is resource degradation more apparent than in the diminished quality of African soil. More than 44 percent of Africa's land is damaged—22.1 percent is fully degraded; 14.4 percent, moderate to severely; and 7.8 percent, lightly. About 49 percent is caused by overgrazing, 24 percent by inappropriate agriculture, and 14 percent by deforestation (WRI, 1992). Soil degradation diminishes the land's ecological integrity in many ways: by altering crucial soil/water relationships, reducing hydrological capacity, changing local climatic conditions, reducing biodiversity, and contributing to desertification.

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**Figure 3. Gross National Income Per Capita in Sub-Saharan Africa and other Developing Countries, 1967–1987**



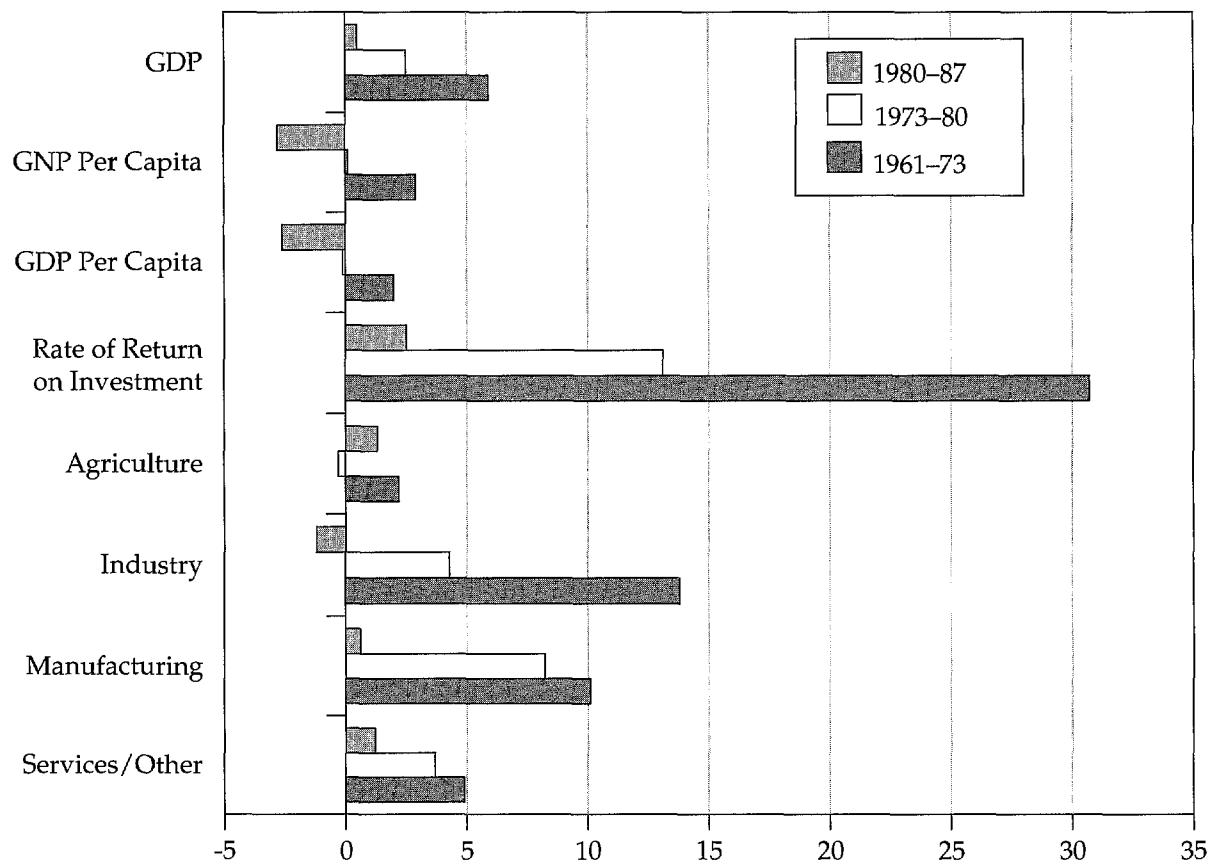
Source: *Sub-Saharan Africa: From Crisis to Sustainable Growth, A Long-Term Perspective Study*. 1989. Washington, D.C.: World Bank.

In Africa, agricultural production rose by only about 2 percent annually over the past 25 years (and only 1.7 percent from 1980–1992)—not enough to keep pace with population increases (Cleaver and Schreiber, 1994). Eighty percent of this increase has come through extending farm lands under cultivation, rather than intensifying production on existing ones (Kates et al., 1993). Much of the expansion has been onto marginal, low-potential lands, including steep slopes, where inappropriate land-use practices have resulted in land degradation through clearing and soil loss through wind and water erosion. Not surprisingly, production per land unit has re-

mained low and, in many cases, declined. Cereal production in Africa is 1.2 metric tons per hectare, less than half the global average of 2.6 metric tons (Cleaver and Schreiber, 1994).

As more and more people are forced to eke out an existence on increasingly depleted lands, the costs—not only to the land but also to current and future well-being—rise. Africa is the only continent where the number of people in poverty is increasing. Even though billions of development dollars have been spent, average Africans are as poor today (allowing for inflation) as they were at the time of independence (World Bank, 1989). By

**Figure 4. Annual Growth Rates of Selected Economic Indicators in Africa, 1961–1987**



Sources: *Sub-Saharan Africa: From Crisis to Sustainable Growth, A Long-Term Perspective Study*. 1989. Washington, D.C.: World Bank.

the year 2000, the ranks of Africa's poor are expected to swell to 265 million (World Bank, 1994b).

Most of Africa's problems trace back to poor decisions, misguided policies, and inappropriate actions promulgated by highly centralized governments (Wunsch and Olowu, 1990). Due in part to the legacy of colonialism and the national focus of international development assistance, governance in Africa has been characterized by top-down economic and social policy-making, blueprint development planning, and intensive state

intervention. Popular participation in public decision-making, decentralization, private enterprise, self-help, and local initiatives have rarely been encouraged or facilitated. Frequently, activists have been strategically undermined by those in power.

It is being shown with increasing frequency and cumulative persuasion that community-based approaches<sup>5</sup> are better suited to effective management of most natural resources and ecosystems than centralized, top-down management (Marshall, 1993; Chambers, 1988; Uphoff, 1986;

Korten and Klauss, 1984). Not only do local people have the best incentive to effectively manage resources—their basic survival and socioeconomic development depend directly on a productive natural resource base—they also generally have access to the information and materials critical to effective management. And they can respond more quickly to changing conditions.

Effective community-based management, while not always democratic in decision-making, usually involves more local people in planning and implementation than does central government management. This broader participation has at least three advantages. First, it taps into the collective knowledge, expertise, labor, and resources of the resource users. Second, it encourages rural people to assert ownership of plans and actions—a critical component of effective implementation. And, third, it promotes the more equitable distribution of costs and benefits.

Although most national governments have been slow to appreciate community-based management, it also better serves their development interests. Besides ensuring more efficient management of valuable resources, it helps husband scarce government personnel and limited public funds which can then be spent on other government services or on community-based development.<sup>6</sup>

Yet, despite restrictive public policies and grim national trends, many individuals and communities throughout Africa have taken charge of their own development and succeeded. Disappointing continent-wide statistics mask gains in thousands of villages where millions of rural Africans are taking part in sustainable development<sup>7</sup> activities (Hudson and Cheatle, 1993; Erdmann, 1992; Conroy and Litvinoff, 1988; Shaikh et al., 1988; Harrison, 1987).

Africa's millions of farmers are its principal resource users and managers. Given the opportunity, authority, and capacity, they have proven time and time again that they can and will adapt to

new circumstances and modify their socioeconomic practices to meet both immediate needs and long-term aspirations in environmentally sound ways. Their efforts show that government inaction, state-sponsored interference, changing circumstances, and modern pressures do not always stop communities intent on managing their resources productively. If anything, the documented failure of most state-run systems to advance the lives of their citizens materially has meant that those who actually depend upon the soils, water, forests, and biodiversity for their livelihood have been compelled to devise their own systems of sustainable resource management.

Africa's recuperation from recent declines will depend in part on how well it can capitalize on proven successes in community-based resource management. To date, the resources, skills, and experiences of the rural majority have not been fully mobilized for development. But some governments are finally beginning to catch on. In the past five years in particular, many African nations have made tremendous strides toward political, economic, social, and environmental reforms. New frameworks for socioeconomic growth and sustainable development have enhanced the performance of community-based management practices already under way and sparked additional activities. In turn, these gains are fostering further efforts by the respective national governments and encouraging other nations to follow suit.

Although much has been written about popular participation and the relationship between community-based development and sound natural resource management (Scoones and Thompson, 1994; Chambers et al., 1989; Paul, 1987; Cernea, 1985), few success stories have been well documented or publicized—even within the nations where they are taking place. Also missing is critical analysis of the key factors behind these successful stories and an assessment of their implications for government and development assistance agencies interested in nurturing community-based development. The following chapters attempt to address these gaps.

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## II. Elements of Effective Community-Based Resource Management

**T**wenty-three case studies of effective community-based natural resource management were prepared as part of the "From the Ground Up" program. (See *Preface, Chapter VI and Appendixes A, B, and C.*) In each case, success came from an interdependent mix of incentives, catalysts, capacities, and opportunities governed by local circumstances.

During the collective analyses, the participating field researchers grouped these factors into seven broad categories:

- Risks to livelihood;
- Opportunities for economic growth;
- Cultural incentives;
- Security in land and resources;
- Organizational and management capacity;
- Technology and resources for environmental management; and
- Political support and legitimacy.

Throughout these discussions, case studies that highlight critical issues are cross-referenced where appropriate in the text. (*Summaries of 14 case studies appear in Chapter VI.*)

The discussion that follows proceeds from three assumptions. First, the core elements themselves are grouped by function and not form and focus on the contribution made to effective resource management. The identification of "management" for example, as a key factor does not minimize the other contributions to community development made by charismatic local leaders,

viable village institutions, or outside facilitators. But while charismatic local leaders are not always present and cannot be created according to plan, ensuring that the management contributions are made is feasible.

Second, people make decisions, including resource management choices, based upon perceptions about their circumstances. Their beliefs generally reflect a personal mixture of direct observations, past experiences, and credible third-person accounts. In rural areas, those perceptions often rest on extremely limited information or even suspect evidence. For example, individuals might fear risks to livelihood where none really exist or may not recognize ones that are actually there. In the discussions of core elements that follow, what determines local resource users' actions are their *perceptions* about the seven factors, which does not necessarily match their actuality.

Third, this analysis does not assess the relative importance of the seven core elements of effective community-based resource management. Nor does it test and verify causal links. Although all elements were present in most of the cases studied, it does not follow that effective community-based development will automatically occur.

### Risks to Livelihood

For most rural people, resource management is a means of boosting agricultural productivity to meet important social and economic needs. For

this reason, community-based resource management is usually based on sustainable use, not conservation. When basic subsistence or socio-economic development are inexorably tied to a productive natural resource base and no practical alternatives exist, people husband those resources to the best of their ability.<sup>8</sup> In Nangodi, Ghana, for example, where much of the village land is unusable because of the black flies that cause river blindness, the farmers build stone-line terraces so that they can continuously cultivate available land. (See Case Study 1.)

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***Community-based resource management is usually based on sustainable use, not conservation.***

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The more people value a resource, the more they will safeguard it. Most often, the resource's worth derives from local perceptions of how it boosts welfare and development.<sup>9</sup> If local people depend on resource-based household economies or fear losses in productivity, the more they are likely to invest in effective resource management techniques. In Kpayee, Liberia, diamond miners from neighboring Guinea and Mali—armed with government permits—have degraded many of the wetlands used for paddies. Because the villagers are powerless to change licensing procedures or improve mining practices, their farming continues threatened. Rice, however, is both a principal subsistence and a major cash crop. With few alternative means of livelihood, people have organized to reclaim some of their land. (See Case Study 2.)

Dangers to rural livelihoods when the productivity of a resource base is threatened can originate from various sources within the community and outside it. Whether natural or man-made, threats may materialize, gradually, as in the case of population increases or long-term climate change, or suddenly, as a result of natural disas-

ters, civil unrest, mass immigration, policy and legislative reform, or wholesale political changes.

Diversifying household economies by improving agricultural techniques (for example, growing multiple crops in varied plots) and participating in off-farm activities (trading, mining, hired labor), is a common way to reduce the pressure on critical resources, counterbalance declining productivity, and reduce risks to livelihood. The Nkebotok people who live in the lush forest along the Turkana River in northern Kenya not only farm nine species of sorghum but also herd, hunt, gather, and pan for gold, for instance. The result: decreased pressure on individual resources, less exploitation, increased agricultural production, and more secure livelihoods.<sup>10</sup>

Ecologically rich and diverse environments generally provide multiple economic opportunities. In Lyamungo on the slopes of Mt. Kilimanjaro in Tanzania, the favorable climate, fertile soils, and good water supply—coupled with access to farmland in the dry plains below—allow the villagers to earn money in several ways, including growing vegetables, coffee, fruit, maize, and producing milk. As a result, the farmers depend less on any one natural resource, economic activity, and source of livelihood. (See Case Study 8.)

In general, local resource users in Africa are well informed about the impact of sound management on resources, the conditions essential for effective implementation of alternative practices, and the consequences of inappropriate action. They also understand the often-complex relationships between resource-management practices and productivity, even though they may be unaware of the underlying scientific explanations or the range of ecological consequences—especially those outside the community—that can stem from good resource management. Local knowledge springs from a wealth of personal and collective experiences, both historical and contemporary.

Farmers can easily identify marginal or degraded land. They know such lands are susceptible to resource degradation, and they understand that they risk concomitant loss of productivity



without careful management. The more scarce or fragile the resource, the more farmers will invest to maintain or restore its productivity. For example, the farmers in Nyarurembo Subparish, Uganda, know that steep hillsides are highly susceptible to wind and water erosion; that barren, unprotected hillsides can quickly lose significant amounts of soil; that inappropriate farming practices can make productivity plummet; and that, once lost, fertility can be restored only through long-term natural processes of soil development, costly chemical inputs, or labor-intensive applications of inorganic fertilizers. As a result, they practice soil management in various ways, such as terracing. (*See Case Study 13.*)

Given the generally poor socioeconomic conditions prevalent throughout rural Africa, local resource users rarely have the time or capital to invest in land and resources that do not provide significant returns. Resources considered immaterial or marginal to their livelihood are thus often neglected, even by individuals or communities that manage other resources—or even the same one—effectively in other areas. In some cases, land and certain resources, such as wildlife, may actually be degraded purposely to protect other resources considered more valuable. (Western and Wright, 1994; Kiss, 1990).

Similarly, when local people perceive that resource productivity is satisfactory, they often channel their time and money into more pressing priorities. Although production systems are frequently improved—often in ways that are environmentally sound such as green manuring and multiple cropping—with limited resources and competing demands, rural Africans must often defer response to environmental threats until they become reality, production declines, and welfare suffers. For example, shifting cultivators often respond to increasing pressure on land by reducing the fallow period or extending cropping cycles; herders, by keeping their cattle on seasonal pasture longer; and irrigators, by constructing additional furrows from the main canal. Eventually, however, such intensified use degrades the land, and these incremental liabilities can lead to collapse of the system. In essence, this

is short-term crisis management. What is needed is long-term strategic planning.

The level of risk that triggers investment in improved resource management varies among individuals and communities. The costs and benefits of the practice, the productivity of the associated economic activity, and the value of its outputs all vary with time and circumstance. When local people understand risks and can cover the costs of alternative responses, they are more likely to address root causes rather than fall victim to a costly crisis.

When a large investment proves necessary, however, it often takes a crisis that disrupts production and significantly lowers welfare to catalyze action. In Msanzi, Tanzania, the villagers did not take on the high labor costs of constructing an irrigation system until droughts and floods brought crop losses and famine, and once the new system was in place they failed to invest in the fundamental improvements called for by increased use until the main canal collapsed, threatening basic subsistence. (*See Case Study 11.*)

## **Opportunities for Economic Growth**

Profit powerfully influences behavior and decisions. Local economic opportunities and market incentives that make environmental conservation profitable promote effective community-based resource management. Environmentally sound economic activities that yield higher benefits (e.g., less costly, less risky, more efficient, quicker to pay off) than degradation will replace it.

Given the importance of small-scale agriculture in Africa, economic opportunities and market incentives for environmentally sound farming and animal husbandry practices are particularly important. In some cases, local attempts to capitalize on economic opportunity are consistent with natural resource management. For example, meeting subsistence needs or capitalizing on market opportunities for nuts, fruit, fodder, poles, or fuelwood usually involves protecting natural

forests, establishing tree plantations or orchards, or engaging in agro-forestry. If properly managed, trees and forests with perennial vegetative cover will "manage" soil and water better than will annual cropping, which leaves soil exposed for several weeks or months each year. In Goviefe-Agodome, Ghana, farmers organized themselves into a mobilization squad to take advantage of cash-cropping opportunities through agro-forestry on unutilized marginal land. When they mature, the annual crops are sold at local markets, while the trees become future fuelwood, fodder, building poles, and power-line poles. Significant profits were realized the first year. Most were divided equally among the members, thus encouraging continued, and inviting new, participation. (See Case Study 3.)

People take part in long-term, environmentally sound economic activities, including resource management that ensures continued productivity, only if they believe that market incentives and critical resources are likely to remain available long enough to realize a profit. For example, people will plant trees for future timber sales only if they believe the demand won't slacken before the trees mature and only if they have other ways to support themselves in the interim. If people perceive only fleeting market opportunities, or foresee their own participation as short-term, then long-term investments of capital, resources, and labor are likely to seem unwarranted. As a result, they will invest only enough to maximize short-term productivity. Often, this approach results in resource degradation.

Market forces, economic policies, and a range of fiscal instruments, such as tax breaks and subsidies, are particularly influential in creating economic opportunities and in providing incentives for people to adopt sound natural resource management practices. At present, local sales matter more to most household economies than international markets do. For example, farmers in Mazvihwa and Vungowa Communal Lands, Zimbabwe, sustainably cultivate small wetlands, commonly referred to as *dambos*, whose cash crops include rice, maize, groundnuts, sunflowers, and vegetables. Produce from *dambos* (which is sold locally)

in many cases accounts for more than half of the family's income—a principal motivation for the farmers to sustainably cultivate the wetlands. Since *dambos* are also important for food crops,<sup>11</sup> potable water, dry season pasture, and other purposes, the average farmer with *dambos* is better off than the farmer without them. (See Case Study 14.)

Conversely, economic opportunities coupled with fiscal incentives that work against community-based resource management generally lead to environmental degradation. For example, maize production increased in Rukwa Region, Tanzania, when the government made available such subsidized agricultural inputs as chemical fertilizers and pesticides; set a single price (thus ignoring differentials in transportation costs and basically subsidizing Rukwa maize); and instituted national food security policies obligating official marketing organizations to purchase all available maize. Responding to these incentives, the Rukwa farmers increased their maize production so much that a community irrigation system collapsed from overuse. Only after these subsidies resulted in environmental degradation did villagers take measures to safeguard the resource base. (See Case Study 11.)

Evidence shows that organic farming can be as *productive* as high-input agriculture (Faeth, 1993). When changes in the resource base are included in calculating farm income, resource-conserving production practices can compete economically and financially with conventional ones. But when policies subsidize practices that degrade resources, "modern" agriculture tends to be more profitable—even after factoring in the cost of these inputs, as well as the long-term economic costs of resource degradation. In short, subsidies and other policies that encourage inappropriate use of natural resources can lead to significant economic and fiscal losses, as well as environmental ones.

Economic analysis that fails to measure changes in the productivity of natural resources often makes farming practices that degrade the resource base look more productive than those that conserve it. But the same economic opportu-

nities in the absence of inappropriate subsidies—or where inputs don't get delivered—often results in cash cropping based on the use of organic inputs, integrated pest management, multiple cropping, and other quite environmentally sound soil- and water-management practices. In Mofindor, Sierra Leone, for example, farmers cultivate coffee and cocoa under a natural forest canopy that establishes an ideal micro-climate. Farmers prefer managing the natural forest to planting introduced tree species for a number of reasons: the trees are already mature; the natural forest yields a range of products (e.g., game, herbs and medicinal plants, fibers, etc.), and the management costs are significantly lower. In addition, the government cannot provide the package of subsidized inputs—including exotic shade trees and chemical inputs—needed for “modern” coffee and cocoa production. (See Case Study 4.)

## Cultural Incentives

Resource management is most likely and more likely to be sustainable when a culture—a shared system of values, beliefs, and attitudes, grounded and governed by traditional norms—encourages environmentally sound management practices. Throughout rural Africa, the lands and resources protected for sociocultural purposes derive their value from religious fulfillment, social prestige, or other intangible benefits. In Malshegu, Ghana, for example, the villagers have, for more than three centuries, restricted land and resource use in a sacred forest grove—as well as a surrounding buffer zone—that they believe is the home of an important traditional god. Protecting the sacred grove fulfills a religious and an ecological need. (See Case Study 5.)

Although economic opportunities and monetary gains often drive human behavior, cultural values sometimes take precedence. When they do, meeting cultural obligations can sacrifice certain economic opportunities but can promote sound resource management.<sup>12</sup>

In many cases, local leaders have solicited the support of religious and cultural leaders in efforts

to govern resource use. For example, in Um Sarha, Sudan, the village *sheikh* has laid down local rules and regulations governing the use of communal pasture. He seeks and receives the support of the local religious leader, the *khalifa*, and related institutions. In neighboring El Sadda, where a similar rangeland-management system is operating, the *khalifa* also serves as the head of the village. (See Case Study 10.)

Although many community-based resource management practices have their roots in the prevailing culture, some originate outside the community. For example, bench terracing was made mandatory by the colonial British administrators in Kenya and was abandoned after independence, in part, to repudiate colonialism. More than a decade later, when soil erosion jeopardized local livelihoods, the people returned to the practices because the villagers knew they worked. By 1991, villagers in Katheka had constructed more than 20 kilometers of terraces and 100 check dams to protect soil and harvest rainwater for agriculture. (See Case Study 9.)

While some aspects of culture encourage sound natural resource management, others restrict the adoption of environmentally friendly practices, discourage ecological management, or even invite resource degradation. For example, in some societies, important religious ceremonies or other social events occur between growing seasons when the demand for agricultural labor is low. During such times, sufficient labor to manage resources may not be available.

In general, religious beliefs, ingrained divisions of labor, and traditional authority strongly influence resource management.

**Traditional Religion.** In many parts of Africa, where religion significantly shapes daily life and behavior, religious leaders wield considerable social power. Along with the government, Christianity, and Islam, indigenous African religious beliefs are still strong. In many societies, for example, it is either forbidden to kill certain animals or they may be hunted only in certain restricted and regulated ways. In the villages of Gwainyea,

Bellemu, and Foequelleh, Liberia, the Gbeleya River is regarded as the home of the gods of fertility and rain, and all fishing is prohibited. In addition, fish are considered sacred, and villagers often make sacrifices to them for protection and good fortune. In other local streams and rivers, fishing is allowed only along certain stretches during the dry season. Such measures ensure that these rivers will not be fished out. (*See Case Study 6.*)

**Traditional Divisions of Labor.** Cultural divisions of labor sometimes restrict the work of a particular sex or age group. Resource-management practices that require or would benefit from the input of traditionally excluded individuals are thus hard to start. For example, in most African societies, land management is primarily a female responsibility. But women, already overburdened with household and child-rearing responsibilities, rarely have the time, even during the agricultural off-season, to undertake such labor-intensive resource management practices as the construction and maintenance of bench terraces. In some cases, work groups have been organized, labor-saving technologies obtained, or work schedules adjusted to undertake necessary (usually agricultural) activities and help overcome this culturally imposed bottleneck.

**Traditional Authority.** Traditional cultural practices empower certain individuals or groups—usually male elders who control household earnings. For example, in most societies, customary tenure systems restrict women as individuals from owning land, even though they are its primary managers and thus know best how to use it. Without control over productive resources or access to capital and other vital inputs, women are severely handicapped.

The aspects of these three powerful cultural institutions—religious beliefs, divisions of labor, and authoritative hierarchies—that encourage natural resource management deserve support. Cultural values, attitudes, and beliefs that work against effective resource management can often be modified by altering the behaviors associated with them. But reshaping ingrained culture-based behavior requires sufficient incentives or alterna-

tive means of accommodating long-standing preferences.

## Security in Land and Resources

The relationship between land tenure and resource management is complex. Yet, real or perceived security about access to and control of land and other productive resources increases the likelihood that local resource users will make long-term investments essential to sustainability (Lynch and Talbott, 1995). Evidence shows that the level of investments people make increases in direct proportion to their sense of security. Even limited measures, such as a shift from short to long-term leases, encourages more sustainable management practices (Bruce and Migot-Adholla, 1993; Bromley, 1992; Migot-Adholla et al., 1991; Lawry, 1990a; Magrath, 1989). For example, farmers in the adjacent villages of Njoguini, Gitero, and Kabati in Kenya organized themselves into a cooperative in the mid-1970s to purchase land. By the mid-1980s, families had completed registration and obtained title deeds which gave them the security needed to make large labor and capital investments in a joint irrigation scheme. (*See Case Study 7.*)

In most cases, African governments seem aware of the relationship between tenurial security and effective natural resource management. If a decrease in that security is likely to have adverse repercussions on national coffers, governments usually avoid taking actions that might diminish it. For example, the Kilimanjaro region, including Lyamungo Parish, has long been Tanzania's major coffee-producing area. So as not to disrupt production, the region was exempted from colonial and post-independence tenurial interventions, including the practice of mandatory resettlement of residents into villages ("villagization"). Today, most land in the region is still held according to customary tenure and coffee continues to be the region's and Tanzania's principal export crop. (*See Case Study 8.*)

Despite expansive state claims of ownership and various government interventions, most land

in Africa continues to be held in customary tenure (Riddell and Dickerson, 1986). These arrangements—which emanate from the community, are legitimated by it, and primarily controlled from within—share a number of general characteristics (Hoben et al., 1992).

- Community authorities, be they village chiefs, lineage heads, or elders, are responsible for overseeing the allocation of land according to customary tenure rules, arbitrating disputes among community members,<sup>13</sup> and protecting the property rights of the group and its individuals;
- Subject to community oversight, customary tenure systems provide owners with rights of access to and control of land use, as well as the right to inherit, lend, rent, sell, or give the land or its resources away;
- The property rights of individuals and communities are usually contingent upon an affiliation with the group that controls the land;
- Individual property rights are usually created by the investment of capital or labor (e.g., clearing land, planting trees, constructing an irrigation system). Uncleared land is rarely subject to exclusive individual property rights; and
- Land and other resources that require little or no labor, or which by nature are easily shared (i.e., pasture, woodland, forest, irrigated plots) are controlled and managed by the concerned individuals and communities. Usually, only members have access and user rights.

Throughout Africa, bundles of customary tenure rights and responsibilities provide people with security in their land and resources and sufficient incentives for investing their time, effort, and material. For example, in Goviefe-Agodome, Ghana, the local self-help group—the Mobilization Squad—got permission from the Queen Mother (the village leader of local women) to use of 100 acres of abandoned communal land. Cus-

tomary tenure made the farmers feel secure enough to plant teak seedlings (that will eventually be sold as utility poles), even though harvesting won't take place for 25 to 40 years. (See *Case Study 3*.)

Unlike most static state-managed systems, customary usage rights and management responsibilities adapt fairly quickly to changing political, socioeconomic, and ecological circumstances. For example, as land becomes scarce and pressure increases, many traditional tenure systems have evolved from landholdings for extended families into systems based on household or individual tenure. In Nyarurembo, Uganda, where fathers traditionally divided their land equally among all their sons, many now give their entire holdings to the eldest son to ensure that he at least has enough land to support a family. Today, more women are also obtaining land rights, often through purchases, and they are often exercising these newly acquired privileges to protest against, for example, the sale of land by husbands. (See *Case Study 13*.)

Over time, however, traditional customary tenure has given way to legal state ownership. The process started during the colonial era. To secure their access to productive lands and valuable natural resources, Europeans took advantage of the undocumented nature of traditional rights to declare most land and natural resources to be the property of colonial nations.<sup>14</sup> Although the legal abolition of indigenous rights did not curtail customary tenure throughout most of isolated rural Africa, its extent and effectiveness were reduced.

The African elites who rose to power in the first wave of independence tended to maintain the colonial tenure system, largely so they could assume the same powers as colonial rulers once had. In fact, many strengthened their control on land and valuable resources to consolidate their power within the central government. Today, those governments legally own most land and valuable resources in Africa.<sup>15</sup>

In most countries, leaseholds (individuals and groups, including communities and corporations)

are the only legally sanctioned form of land rights available (Bruce and Migot Adholla, 1993; Migot-Adholla et al., 1991; Riddell and Dickerson, 1986). Most place conditions on lessees regarding land and resource use, and many allow customary tenure practices to continue, but afford customary rights holders no real legal protection. In most countries, customary rights can no longer be passed on from one person to another, either by succession or sale, and new customary tenure can be acquired only with the government's consent.

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*As arable land grows scarcer and the competition for it intensifies, the tenurial security of rural people is increasingly undermined.*

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As arable land grows scarcer and the competition for it intensifies, the tenurial security of rural people is increasingly undermined. Indeed, even though customary tenurial rights are usually held in perpetuity, many governments appropriate such land (and even terminate leases) without even notifying the occupants. In such cases, the evicted party is usually entitled to be resettled and compensated, but only for standing crops, erected structures, and other so-called "developments." Labor-intensive improvements, such as bench terraces and irrigation systems, are rarely considered compensable developments.

Throughout Africa, more and more land is being appropriated by government for state purposes or by powerful elites. For example, in most of Africa, the network of protected areas is increasing and their level of protection is being upgraded (Western and Wright, 1994; Wells and Brandon, 1992; Hannah, 1992). Though common property—pasture, forests, wetland—may appear to be "vacant," "idle," or "unclaimed," such land is often productive, well managed, and critical to local welfare (Bromley, 1992; Lawry, 1990b;

Magrath, 1989). Thus, even in conservation projects, many communities lose both control of the land and the incentives to manage it well.

Expanded market opportunities for non-traditional agricultural exports in Ghana have resulted in some small producers losing their land to local elites and large-scale farmers (Ampadu-Agyei, 1995; Thrupp et al., 1993). In Tanzania, government wheat farms alienated Barbaig herders from their traditional dry-season pasture (Lane, 1993; 1990; Lane and Pretty, 1990). Local people work hard to maintain access to their land, but often lack the political power to hang on to it. In some countries, they have little viable, legal recourse—an open invitation to turmoil and civil strife.

The variation among countries makes it difficult to generalize about the impacts of tenure reform. However, where land reforms have been effectively implemented, they have generally produced unanticipated and often problematic results, including resource degradation. For example, a major aim of Tanzania's *ujamaa*, and "villagization," programs were to bolster agricultural productivity by concentrating people in planned settlements and forcing them to establish communal farms. The land and resources were redistributed by administrative order, not codified law, and local people thus had no legal recourse (Hoben et al., 1992; World Bank, 1992b). Most people resettled in Msanzi lost their traditional land, and the village's original residents had to divide their plots with the newcomers. The resulting intensified pressure on land immediately surrounding the new planned villages triggered significant degradation, reduced productivity, and made life harder for villagers. (*See Case Study 11.*)

In many African countries, the attempt to create a uniform, centrally administered tenurial system has created gaps between policy, law, and practice. Generally speaking, tenurial policies throughout Africa have been poorly implemented, and supporting legislation has been poorly enforced. The government mandate to manage and control land far outstrips institutional and logistical capacity.

Furthermore, government-sponsored cadastral surveys and other titling procedures are progressing slowly. In some countries, such as Tanzania, leases cannot be granted until a land-use management plan has been prepared and approved (Hoben et al., 1992). Even when they have been completed, government-imposed "development" conditions on lessees are often inappropriately specific, poorly enforced, and ineffective. Often, they fly in the face of sound resource management. Commonly, for example, inhabitants must clear the land to gain title—a surefire path to deforestation, loss of vegetative cover, and soil erosion. Yet, evidence suggests, imposing conditions is inappropriate or ineffective in shaping small-scale farmers' behavior (Bruce and Migot-Adholla, 1993; Migot-Adholla et al., 1991; Lawry, 1990a; 1990b). Yet, many governments advocate adding *environmental* conditions to leaseholds in the hopes of improving resource management (Kamugasha, 1987).

The unrealistic nature of national tenurial policy and legislation means that, despite their lack of legal status, customary tenurial systems continue to characterize land allocation and day-to-day resource management in rural Africa. Proscribed adjudication processes and institutions notwithstanding, local land disputes are still resolved primarily in traditional arbitration. And despite their statutory vulnerability to state usurpation, most rural farmers in Africa have not been personally threatened with eviction. Consequently, most rural households have confidence in their customary tenure and perceive that their land and other holdings are secure.

Increasingly, however, governments and local elites are taking land from indigenous people so more rural farmers are becoming familiar with the details and implications of official tenure policy and laws. Government/farmer, local elite/farmer, and farmer/farmer disputes over land and resources now clog local courts and administrative agencies. Although most local people recognize that their national government lacks the political will and the capacity to effectively enforce its land laws; these suits make all farmers increasingly concerned about their security.

Some Africans—individuals and groups—work within the system and seek to gain leaseholds, while others are trying to change the tenure laws to increase everyone's security. For example, in Tanzania, two rural residents took the government to court in 1993 and successfully overrode a 1992 law that outlawed customary tenure on village land (Land Tenure Study Group, 1995; Shivji, 1995). However important and necessary, these actions add to the uncertainty most people feel as a result of difficulty in obtaining leaseholds due to high procedural costs, logistical obstacles, and entrenched government bureaucracies. Perceived security is eroding as a result, and many people now invest less in preserving a resource base they might soon lose.

## Organizational and Management Capacity

Effective resource management, whether on individual/household or communal land, often depends on the coordinated actions of a group of resource users. Good organizational and management skills underpin success in the *development* (planning and evaluation, construction, operation, and maintenance), *management* (resource acquisition, allocation, and distribution), and *organization* (decision-making, resource mobilization, communication, negotiation, and conflict resolution) of resource-management activities.

At the household level, decision-making and actions related to land use and resource management are often culture based. Such processes usually distinguish rights according to gender and age, and, as such, tend to be very inequitable. In most rural African societies, elder men dominate local decision-making even though women perform most of the work. Although household decision-making is not necessarily participatory, established processes can result in timely decisions about how to mobilize local land, labor, capital, and knowledge quickly and effectively. For example, in Mbale District, Uganda, where several families are involved in fish farming, the ponds are maintained and fish populations managed mainly by families. (Outside labor is usually

needed to help construct ponds and water channels.) Pond owners—all men—make the critical decisions and control the profits. But even though women have little say, the ponds are well managed and the wetlands used sustainably. (*See Case Study 12.*)

The organization of common property management at the community or village-cluster level is generally more complex than at the household level. More resource users have wider ranging interests and capabilities, and larger ecological domains are both more diverse and more interdependent (Bromley, 1992; Lawry, 1990b; Ostrom, 1990; Magrath, 1989).

When group cohesion maintains common property management, it is often the result of extended kinship ties, a common ethnic identity, similar socioeconomic conditions, interdependent social and economic activities, shared interests, and mutual perceptions of problems, priorities, opportunities, and responsibilities. These commonalities keep competition, disputes, and envy within bounds and increase the prospects for cooperation, and, hence, effective resource management.

In Katheka, Kenya, traditional *mwethya* groups have been revitalized to construct and maintain bench terracing, check dams, and cut-off drains. Historically, men and women in these groups were organized along clan or family ties, but today they are mostly made up of women with similar interests and goals from the same farm neighborhood or household cluster. The change in composition and the cultural divisions of labor focusses the group's activities—land husbandry and resource management are traditionally women's responsibility. (*See Case Study 9.*)

Many common property management systems are developed and organized by local-level institutions (Murphree, 1994; 1993; Chambers, 1988; Uphoff, 1986; Kortzen and Klauss, 1984; Leonard and Marshall, 1982). The best of these offer effective leadership, promote member participation, ensure sound financial management, maintain direct links between planners and implementors, boast a broad constituency, and enjoy the support

of local leaders and other formal and informal village-based organizations.

Small-scale irrigation systems number among the most intricate of common property regimes. Most effective community-based schemes are managed by well-organized users' groups. For example, the Kenyan communities of Njoguini, Gitero, and Kabati each established a local users' group to develop and manage a proposed irrigation system. When it became clear that a single scheme was the best option, the three communities established a nine-member executive committee to oversee its construction and management. The three village-level institutions remain active in managing related local affairs. (*See Case Study 7.*)

Most local leaders and institutions rely on village rules, regulations, and guidelines as well as customary users' rights to govern land, regulate resource use, and manage associated systems. These rules may stem from community initiatives addressing perceived needs or from local interpretations of public policy and legislation. Many are grounded in traditional culture—often religious beliefs—which helps ensure community-wide support, local vigilance, and better implementation and enforcement. The authority, legitimacy, and influence of the leaders and institutions over their constituencies (as well as over interested resource users and exploiters from outside the local group or community) are instrumental in establishing and enforcing such rules.

Many of Africa's most viable, community-based resource management institutions are traditional (e.g., village chiefdom, *mwethya* groups). Some are formed specifically to manage the critical resource and to control economic activity, while others, preexisting, have broader roles and responsibilities. As government and local chapters of other external institutions (e.g., village development committees in Gambia, mobilization squads in Ghana, resistance councils in Uganda, village councils in Tanzania) become increasingly established and influential at the village level (and traditional authority, undermined by the external groups, wanes), traditional village groups often become marginalized and ineffective in environ-



mental management. Proliferating village-based institutions, be they traditional or external, are squabbling over loyalty and responsibilities as their reach and work overlap with each other.

Local leaders, including institutional leaders, can play important roles in organizing and operating resource-management systems. They can help promote and legitimize the system, advise and guide local actions, encourage communal efforts, facilitate organizational meetings, mobilize labor and other resources, and establish links with external development-assistance agencies. Villagers usually characterize effective leadership as honest, committed, imaginative, and accountable. In traditional societies, it is also often hierarchical—or soon becomes so if the group earns some legitimacy and success.<sup>16</sup>

Although most leaders are not directly paid for their services, they do reap the rewards of office, including power, prestige, respect, and ultimate decision-making authority. In Um Sarha and neighboring El Sadda, Sudan, the village leader (the *sheikh* and *khalifa*, respectively) also heads up the village institution that oversees rangeland-management practices. He takes the lead in organizing the grazing areas, establishing pasture-use schedules, enforcing tribal customs and codes of behavior related to pasture use, protecting communal water sources, and running the local courts. (See *Case Study 10*.)

Most leaders of effective community-based resource-management systems are longstanding local residents, but outsiders can also effectively facilitate local resource management. For example, traditional regional leaders, public administrators, extension officers, and development-assistance officials (i.e., NGOs and donor agencies) often provide the organizational and management skills that enable community members to plan, undertake, and maintain sound practices.

Outside facilitators are particularly important in initiating regional resource management activities. In Nyarurembo, Uganda, the local agricultural extension officer is the principal figure orga-

nizing and coordinating the terracing work under way in several neighboring communities. The officer hails from the area (though not from a participating village) and enjoys an outstanding relationship with the local farmers. (See *Case Study 13*.) In such cases, the appropriate management skills must be passed on to the members of the communities if the practices are to survive the departure of the external facilitator.

## Technology and Resources for Environmental Management

All environmental management practices make some demands on technology, material, and resources. Most effective community-based management practices make use of local land, natural resources, labor, indigenous knowledge, and capital. However, they also benefit from external inputs, which as the case studies illustrate, can make or break implementation.

Not only are different natural resources best managed by different techniques, but also the same resource may need various management approaches, depending on its use and local circumstances. For example, fish-pond management practices differ with species of fish. In Mbale District, Uganda, common carp, Nile tilapia, and local catfish are the most common species cultivated. The fish farmers know that the three species have different requirements for breeding and fast growth, including water temperature, food, and pond vegetation, and they work at getting conditions just right for the species or combination of species they are cultivating. (See *Case Study 12*.)

Environmental management practices also vary with the type, quality, quantity, and timing of needed resources. Bench terracing and stone-lined terracing are labor-intensive, while managing natural forest or rangeland by restricting local use through village rules and regulations requires little labor. Environmental management practices that make minimum demands on resources and that rely mainly on those that are locally available appeal more to poor rural households than those

that require costly external inputs and, especially, those entailing high up-front costs. Managing natural ecosystems is often less labor intensive than installing external systems and landscapes. For example, villagers in Gwainyeya, Bellemu, and Foe-quelleh, Liberia manage the fish populations in local rivers and streams through various community rules and regulations based in traditional religious beliefs. When violations occur, the perpetrators are severely punished. (See Case Study 6.)

Households and communities vary greatly in the amount and quality of resources at their disposal. Large families generally can provide more labor than smaller ones. Established families tend to have more land, more influence in community decisions, and a better fix on local constraints, potentials, and options than recent immigrants. Such differences can help stratify societies especially because those with more resources are more likely to succeed at resource management. In general, households with access to more capital and resources have greater flexibility in using both. They can take greater risks and capitalize better on socioeconomic opportunities than poorer households.

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***Poverty and environmental degradation feed on each other in myriad ways, particularly in resource-based household economies.***

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Poverty and environmental degradation feed on each other in myriad ways, particularly in resource-based household economies. Most significantly, poverty keeps small-scale farmers from gaining access to critical inputs, thus limiting their management options and constraining sustainable development.

Without the resources to participate and invest effectively, local people are often better off not even trying new management practices. For

example, why establish an orchard or woodlot if one does not have access to seedlings or the time and resources needed to ensure that the plants will survive to maturity? If a farmer clears land for the orchard and then fails to get the seedlings, the soil will be needlessly eroded by wind and water.

With limited economic options and few savings, degradation of critical resources makes the poor—those most reliant on a productive resource base—particularly susceptible to crises (i.e., drought, price fluctuations, civil strife). And poverty makes recovering from such events difficult, perpetuating the downward spiral of social malaise and ecological degradation. For example, poor people are often the most exposed to environmental risks—as hired laborers working with health hazards and as those least able to afford a clean environment (e.g., to purchase clean water or the technology to make local water safe).

The principal resources available to rural households for environmental management are capital, land/natural resources, labor, and indigenous knowledge.

**Capital.** Capital, which could be used to purchase all or most inputs for resource management, is in short supply in most of rural Africa. Most households and communities are hard-pressed to generate even the small amounts needed to purchase basic materials or hire labor. What little money they do have generally goes for basic necessities. Yet, many effective community-based resource-management practices require some local capital and often rural Africans manage to produce it. Such investments underscore the importance of environmental management and the confidence people have in those specific practices.

**Land and Natural Resources.** Relatively few rural African families are completely landless. Still, available land and critical natural resources are often locally scarce. Uneven population distribution (i.e., concentrations in urban and peri-urban areas and fertile regions), finite arable land

and vast stretches of low-potential land, the extensive production systems that continue to dominate traditional livelihood practices, and, increasingly, land alienation and speculation by government and powerful elites all contribute to this scarcity.

Farm productivity is often constrained when natural resources are scarce or when cultivated land is otherwise unproductive—when, for instance, water or critical soil nutrients are limited. In many cases, small amounts of inputs can improve productivity, but only significant sums can make the land highly productive, so opportunities for resource management and sustainable development are sometimes missed. Not so in Nangodi, Ghana, where two-fifths of the community land is uninhabitable because of the presence of river blindness. Much of the unaffected land was covered with stones, boulders, mining pits, and bunkers from an abandoned gold mine. With few options, the farmers first collected the stones to reclaim lost farmland, then used them to construct stone-lined terraces to improve soil and water management. Despite the semi-arid conditions, the land is today continuously cropped without any apparent loss of productivity. (*See Case Study 1.*)

**Labor.** Human labor is both the principal energy source for most agricultural activities in Africa and rural people's primary agricultural investment. Most rural farmers rely primarily on their immediate family members for labor—and, hence, tend to have large families. The use of household labor, which is limited by family size and composition, is governed by many factors, including cultural divisions based on gender and age.

Households also rely on labor from members of their extended family, traditional work groups, and hired hands. Rural households commonly join small, temporary working groups based on reciprocity, especially during peak labor seasons. Most group members are family or neighbors sharing common goals, though hired labor is becoming more popular and possible in rural Africa as households gain increasing access to money

and as local population rises and unemployment increases, driving down labor costs.

Increased labor often compensates for limited capital, technology, and material. Improving agricultural productivity in Africa thus usually involves investing more in labor. As a result, family labor is becoming an increasingly scarce resource in most rural households, one that can significantly limit land use and constrain environmental management.<sup>17</sup> Seasonal labor peaks, in particular, can set limits on environmental management and make intensifying or expanding agricultural production difficult.<sup>18</sup>

**Indigenous Knowledge.** Indigenous knowledge consists of dynamic insights, information, practices, and experiences, as well as beliefs, ideas, and perceptions. Such knowledge grows out of many years of personal experience and is generally handed down from generation to generation (Richards, 1992; Thrupp, 1991; 1989; McCorkle, 1989). Most rural Africans have an acute understanding of the potentials and constraints of their traditional land and natural resources—especially women who are the principal resource managers. For example, in Msanzi, Tanzania, the development and adoption of irrigated agriculture came about when local innovators drew on culture-based knowledge first to design a basic water-management system and then to adapt it continually to changing socioeconomic and environmental conditions. Such knowledge must be incorporated if economic activities are to be both environmentally sound and economically productive. (*See Case Study 11.*)

As socioeconomic and ecological circumstances change, new insights grow out of informal experimentation and adjustments, and local knowledge is modified and adapted to meet new challenges and opportunities. Evidence indicates that in times of crises, experimentation by local farmers increases (Richards, 1992; 1985).

Increasingly, local conditions and practices are shaped by state agencies, development policies, global market forces and other broad political and economic influences. In many cases, state

interventions have undermined local capacity to experiment and adapt. More generally, when changes are significant or rapid—as they are increasingly becoming—adaptation based on trial-and-error may be too slow to keep pace. For example, resettled farmers, migrants, and other newcomers are usually unfamiliar with the capacities and constraints of their new land. Although many experiment with various farming systems, they tend to rely, at least initially, on the practices they know best—those they employed on their traditional land. If these practices are ill-suited to their new land, degradation ensues, productivity falls, and social well-being declines.

The case study sites exemplify effective, local self-help initiatives. Yet, most of these communities received critically important support from external agencies at some point. Some practices and related production, such as irrigation for cash cropping, were even dependent (at the time of the research) on a regular flow of external goods and services, market information, and transportation. In many cases, the external support came after the community negotiated an agreement with the external agency. In a few study sites, the new technology was forced on the local people, though in none is this still the case.

Given the scarcity of arable land, productive natural resources, and household labor, as well as the limitations of indigenous knowledge, external assistance is becoming more and more necessary for effective community-based resource management. Indeed, external assistance is becoming an important supplemental source of the ideas, knowledge, information, technologies, skills, capital, and material needed to meet modern challenges.

That said, most rural farmers don't get external assistance when they need it. And when it does reach the community, it often does more harm than good. For example, in Mofindor, Sierra Leone, households manage a canopy of natural forest to shade their coffee and cocoa trees in part because the government has not been able to provide the package of exotic shade tree species recommended. If it did, and the farmers were

enticed or coerced into planting an exotic forest cover, the local natural resource base would deteriorate and with it—in all likelihood—human welfare. Many of the tree species that make up the natural canopy have economic value. (See *Case Study 4.*)

## Political Support and Legitimacy

Government support of community-based resource management legitimizes such efforts and makes them easier for others to adopt. Such support can come in the form of political statements and declarations, presidential decrees, government policy, national or local legislation, and project assistance. In any of these forms, it lends credibility to those who practice environmental management and sanctions government and donor support to such efforts. It also encourages local people to practice effective environmental management, village institutions to address resource management, and government officials to support community efforts.

Government support usually makes the most difference when it is translated into project assistance that reaches communities and supports local initiatives. But supportive public policy and legislation *without* project assistance *can* still encourage communities to address resource-management issues and enable the national staff charged with implementing policy (such as local government extension- and law-enforcement officers) to nurture local action. For example, Ghana's government has come to understand the importance of traditional religion in natural resource management and—it follows—in the development of policy, legislation, and appropriate actions to facilitate local efforts. National forestry policy recognizes the cultural importance of sacred forest groves and those within forest reserves remain accessible to the local people. Further, a proposed draft bill would empower traditional authorities to proclaim forests and other areas sacred and to set the conditions for their protection. These and other government efforts have encouraged and eased Malshegu's efforts to safeguard its sacred grove. (See *Case Study 5.*)

Legitimacy can be established even where farmers may not know the specific terms or implications of supportive policies and legislation. In many cases, the mere *perception* of government interest in community development and resource management has been enough to stimulate local actions. For example, in Nyarurembo Subparish, Uganda, a district soil-conservation bylaw has been a driving force behind effective terracing practices. The bylaw promotes soil conservation and empowers local authorities to implement and enforce management practices. But, as it also calls for inappropriate local actions (e.g., it requires the construction of bunds), it has gone unenforced. Instead, the agricultural extension officer has endorsed and the farmers have adopted alternative terracing activities developed in partnership with the villagers. This is possible, in part, because the villagers do not know the specific mandates and implications of the bylaw and they perceive the authorities' power and actions as legitimate. (See *Case Study 13.*)

Political statements can also be effective, especially when they come from high officials. For example, in Katheka, Kenya, where revitalized *mwethya* groups are now constructing bench terraces, check dams, and cut-off drains to better manage scarce soil and water resources, Kenya's broad political environment was supportive from the start. In the early 1970s, government interest in rural development and soil- and water-conservation through self-help initiatives was revived. The president gave encouraging speeches and special rural development programs supported by international donors were launched. Although the highly visible national efforts did not reach Katheka, they did legitimize the work of the community's *mwethya* groups. (See *Case Study 9.*)

Central government and the development assistance community often overestimate the need for translating public statements into formal policy, or for supporting formal policy with legislation and project assistance. Furthermore, laws and other legal instruments need not be litigated or interpreted by the court to be effective. While many policies and laws are neither well implemented nor enforced, they still often affect rural behavior

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and community practices. The resources and time needed to reform institutions or establish new ones, to repeal old laws, and to promulgate supporting legislation, could often be better spent supporting ongoing local resource management.

Still, however, political statements, as well as policy, legislation, and programs that contradict or undermine community-based resource management can disrupt local decision-making, discourage local actions, or encourage people to try things that degrade the resource base—even if these words and actions are not effectively implemented or enforced. Such postures can also limit local actions in response to government-endorsed environmental problems. In Kpayee, Liberia, diamond miners—mainly migrants from neighboring Guinea and Mali—have permits from the Liberian government that allow them to mine diamonds on all state land. (In Liberia, all land is state-owned.) The miners have no legal obligation to restrict their operations to non-agricultural land or to restore the land after they abandon their pits. The central government does not consult local villagers when it grants permits, and they have been unable to influence government licensing policies and procedures or to control mining practices. With government backing the miners, the only option left to the villagers is to restore their degraded land once the miners leave. (See *Case Study 2.*)

Recognizing the fact that repealing and reforming policy and legislation that contradicts effective community-based resource management

may take some time, some governments have made clear policy statements and taken definitive actions to make local people aware of the change in position. For example, in the 1940s, the government of Rhodesia (now Zimbabwe) believed that wetlands were fragile ecosystems that were best left undisturbed and passed several laws to restrict or prohibit their use. In most parts of the

country, wetland cultivation was curtailed. But in the wetlands in Mazvihwa and Vungowa Communal Lands, the central and local governments recognized that farmers had long cultivated these wetlands sustainably and that little alternative land is available in any case, so it turned a blind eye and allowed local farmers to continue their practices. (*See Case Study 14.*)

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## III. The Policy Context

### An Historical Perspective

To justify centralized control, colonial powers and, more recently, independent African governments have argued that small-scale production cannot drive economic growth and that local people cannot manage land and resources well. These arguments, based on a deep mistrust of local peoples' knowledge and capacity to manage their own resources, as well as on self-serving desires to control have led most African governments to restrict and regulate local land and resource use. Thus, most African governments, imitating their colonial predecessors, have assumed legal ownership over the land and control over the allocation and utilization of most national resources—ostensibly to “safeguard” those resources “in the public interest.” Then, in the “national interest,” central governments have declared much land and many resources off-limits to local people.<sup>19</sup> In the remaining “public” lands, local use of resources is controlled through conditions on leaseholds, highly regulatory policies, and other mechanisms.

Sectoral policies and legislation govern the use of specific natural resources (soil, water, wildlife), ecosystems (forests, wetlands, rangelands) and land-use practices (agriculture, logging, tourism). Most such laws emphasize conservation and full protection or maximize short-term economic gains for the government, usually at the expense of long-term sustainability, sound resource man-

agement, and the welfare of local people. Many governments rely on command-and-control mechanisms, sanctions, and other punitive actions or threats for implementation. Such policies interrupt traditional resource use, threaten local livelihoods, and engender conflicts and mistrust.<sup>20</sup> Effective implementation of regulations that contradict community needs usually requires costly enforcement measures that few African governments can afford. As a result, official policy and local action typically diverge.

Not only have most central governments proven themselves both incapable of and ineffective at managing the natural resource base, but also their policies generally work against the principal resource users and hinder the community-level productivity upon which true national development and poverty alleviation depend. As a result, communities become isolated and their production and resource-management practices are undermined. In this management vacuum, “open access” conditions lead to increasing over-exploitation of resources and environmental degradation (Bromley, 1992; Ostrom, 1990; Lawry, 1990b). Open access also allows “land grabbing” by government and elite speculators (even though land speculation is proscribed in most nations). Equally detrimental, many communities have lost the organizational capacity and infrastructure for local initiatives and self-help and now regard local economic development and resource management as a government responsibility.

## **Winds of Change**

As their state-run economies and resource bases deteriorate, many African governments have become painfully aware of the shortcomings of large, centralized bureaucracies and narrow, short-sighted development. With the help of donor agencies, some have launched far-reaching political, economic, and, in some cases, environmental reforms over the past decade.<sup>21</sup>

### ***Political***

In the immediate aftermath of the independence movement of the early 1960s, undemocratic single-party, authoritarian regimes dominated the continent. With the end of the Cold War, most African governments have—often because of international pressure—through constitutional reform and other legislation relaxed their control over their citizens, legalized political opposition, allowed more freedom of expression and of the press, and increased protection of persons and property against arbitrary state action.

More than 30 African countries have held popular elections in the past five years, including South Africa where internal and world pressure finally ended apartheid. Five of the eight new democracies created worldwide in 1993 and 1994 were established in Africa, (Smith, 1994; Karatnycky, 1994). Reluctant rulers continue to be challenged, and though occasional reverses in the movement for democracy are to be expected, “the age of the dictator and ‘president-for-life,’ while not yet over, is waning” (Harsch, 1994, pp. 2–3). For example, in Zaire, Kenya, Uganda, and elsewhere, pressure from local opposition parties is mounting while in Tanzania, Mali, Zambia, and Mozambique, reforms aimed at creating an independent judiciary are afoot. Even if all African countries do not switch fully and permanently to multiparty democracies in the next few years, the new democracies that have emerged point to a trend toward greater political freedom that will be hard to reverse.

Political liberalization has created opportunities for Africans to organize themselves, to mobilize local resources, and to participate in govern-

ment decision-making. NGOs, private companies, and other independent groups, such as traditional grassroots organizations, are not only working to help communities, but are also pressing for greater political reforms and helping to ensure that governments remain “transparent,” participatory, and accountable. Indeed, for many local farmers, the right to associate freely, participate in independent organizations that defend members’ interests, and elect their own representatives to local governmental institutions have been the greatest accomplishments of democratization and pluralism (Kalambry, 1994). In some countries—among them, Uganda and Ghana—local governments were democratized before central government was. This kind of devolution of authority means far more to the rural people than the creation of a centralized, multiparty democracy that allows few opportunities for true grassroots participation.

### ***Economic***

Positive transformations have not been limited to politics. Between 1980 and 1991, some 34 African countries launched economic adjustment programs principally supported by the World Bank and the International Monetary Fund (van de Walle, 1994). These reforms are based on the recognition among many policy-makers and donor agencies that the private sector is the true engine of growth and development and that governments should take a more hands-off approach to economic and social affairs. Government’s role, they reason, should be to expedite the work of the private sector, including businesses, farmers, NGOs, and other informal sector operatives.

Recent economic programs call for devaluing currency, removing price controls and subsidies (particularly in agriculture), augmenting domestic savings, encouraging investments or making them more efficient, privatizing state operations, diversifying the economy, increasing merchandise exports, and reducing defense spending and other government outlays. Most African countries have also tried to “right-size” government bureaucracies by streamlining ministries and departments and reforming public policy and legis-



lation. For example, in Tanzania, Uganda, Zambia, Ghana, and Nigeria, even the parastatals responsible for agricultural marketing and input supply have been replaced by private merchants. In Ghana, where performance-linked pay in the customs bureau was introduced as part of public sector reform, revenue doubled in just three years (World Bank, 1994a; 1989).

Thanks partly to these macroeconomic reforms, 21 sub-Saharan African countries posted positive per capita growth rates between 1988 and 1993. Tanzania, Ghana, and Uganda reversed decade-long declines in economic performance, while Botswana, Mauritius, and Guinea-Bissau sustained their previous high levels of growth even though commodity prices fell drastically when the industrialized world slipped into a prolonged recession.

The statistics speak for themselves. In 1994, the economies of 12 African countries grew by more than 5 percent. Average growth in 21 countries in East and Southern Africa jumped from 1.5 percent to 3.7 percent between 1993 and 1994. Seven countries in southern Africa, including South Africa, fared even better, moving from 1.2 to 3.8 percent. There was even a turnaround in 10 Central African countries where negative growth slowed from -4.8 to -0.4 percent. Growth declined in only 11 African countries in 1994, down from 17 in 1993 (United Nations, 1994).

## ***Environment***

The interactive relationship between development agendas and political liberalization presents new challenges and opportunities for natural resource management. As African policy-makers increasingly connect a productive resource base, economic growth, and social development, and as international pressure for environmental conservation mounts, governments are paying more attention to sound environmental management. Most African countries have undertaken national-level environmental planning efforts, such as Tropical Forestry Action Plans, National Conservation Strategies, National Biodiversity Strategies, and National Environmental Action Plans (NEAP).

NEAPs are the most comprehensive environmental planning efforts currently under way in Africa. They seek to link environmental management with social and economic development by defining a set of policy actions, institutional reforms, and related investments to make national and local development strategies more environmentally sustainable (World Bank, 1995b; Margulis, 1995; Falloux and Talbott, 1993).<sup>22</sup> Of the 21 countries that have prepared and endorsed NEAPs, almost half of them did so in 1994. (The World Bank-supported NEAPs are required for IDA replenishment). Madagascar, Mauritius, the Seychelles, Benin, Burkina Faso, Ghana, and the Gambia are already implementing their NEAPs (World Bank, 1995b; Lampietti and Subramanian, 1994). Botswana, Namibia, South Africa, Swaziland, and Zimbabwe are either preparing or implementing a NEAP-like environmental strategy.

The NEAP exercises show that long-overdue structural reform is needed to improve natural resource management. From the perspective of governments and donors, the most essential environmental reforms involve issues of central government, such as developing environmental policy and legislation, reforming national institutions, developing environmental impact-assessment (EIA) guidelines, and establishing environmental standards. In a growing number of countries, line ministries are also beginning to reform sectoral policies, to repeal laws that contradict sustainable development, and to develop policies that facilitate effective natural resource management.

## **A Call for Action**

Governments can encourage and facilitate community-based natural resource management by changing national policy, legislation, and institutions and taking other such steps. Although many of the national political, economic, and environmental reforms under way are steps in the right direction, nowhere are they sufficient.

Most of the reforms enacted in the past ten years have been in support of national objectives.

The initial focus on such macro-level reforms was justified by the need to create framework policy, legislation, and institutions as bases for activities, including community-based resource management. But this shallow focus on national objectives has prevented governments from involving the majority of their citizens or taking action to support them. While macroeconomic indicators are improving in many countries—suggesting both financial growth and social development—few benefits have trickled down to the grassroots. Even in countries such as Ghana, which have made significant economic strides in the past few years, 40 percent of the population (1993 figures) still lives below the poverty level—down from 43 percent in 1988 (Sarria and Shams, 1991; Temel and Roe, 1994). More often, national improvements have come at the neglect of local people, and in many cases, at their expense.

Sound national political, economic, and environmental policy is a necessary but insufficient condition for community-based resource management. The national political changes under way do help create the political space that larger segments of society need to take part in government decision-making processes. And macroeconomic reforms can help create the right mix of capacities, incentives, and opportunities for local people to make better use of Africa's natural endowments and, in doing so, improve their own welfare. But these reforms alone cannot spark and nurture community-based development and resource management. Only broadening the developmental agenda can do that.

To date, too little attention has been directed to national reforms and actions that support community-based sustainable development. Even where political will exists, it has rarely been translated into supportive policies and targeted actions. Three decades of ingrained centralized thinking have made many governments strategically uninformed, operationally inexperienced, organizationally ill-equipped, and philosophically indisposed to empowering communities, strengthening local development capacity, and supporting grassroots initiatives.

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Most governments remain reluctant to hand responsibilities and authority over to local governments or to strengthen civil society. Despite the contributions of local people to social and economic development, many governments still view their rural citizens as passive, poor, and helpless. Such governments see their role as supplying the lacking technical expertise, management skills, and resources. And, despite the comparative advantage of local administrations to support community-based development, most central governments still view local officials as uninterested in (and often even hostile to) national interests and also incapable of effective administration.

Some exceptions exist. For example, in Uganda and Ghana, central government is democratizing and strengthening local governments so that they can increasingly take charge of resource management decisions and facilitate community-based development. Donor agencies, NGOs, the private sector, and the international development assistance community have been supporting these government efforts to design policies and actions that help local authorities take on new responsibilities and that support rural people.

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## IV. Recommendations

**B**ased on the analysis of the core elements, the "From the Ground Up" researchers, with support from outside experts, came up with six broad policy recommendations for promoting effective community-based resource management. Each recommendation reflects an initiative or action currently under way in one or more African nations that appears to be improving community-based resource management. All recommendations are in line with the government's new role of supporting regulation, coordination, and extension services to encourage and facilitate community-based resource management. The assumption behind all is that African governments will continue to democratize and to move forward with needed macroeconomic reforms.

### **Policies in Support of Sustainable Development**

The case studies in Chapter VI reveal that most African nations need national framework policies and legislation to link socioeconomic development with environmental management and to articulate the importance of sound resource management for long-term economic growth and social development. Such policies and legislation should clearly enunciate the country's sustainable development goals and its specific objectives.

A sound sustainable development policy provides an overarching national goal. In turn, this common goal guides all national and local government policy and legislation<sup>23</sup> by coordinating

the country's social and economic policies with long-term resource management and by ensuring that resource policies recognize opportunities for sustainable use. Such a framework reduces conflicts and contradictions across public policy, encourages coordination and collaboration among ministries and the various levels of local administration, and, as the case studies illustrate, helps legitimize environmental management and encourage effective community-based resource management.

This policy is not, however, a blueprint for specific actions at any level. Precise mandates are inappropriate here since line ministries and local governments must have the flexibility to develop appropriate sectoral and sub-national policy, local laws, and compliance strategies. Policy statements should be flexible enough that local people can develop land use and resource-management practices that meet both national and district priorities, while addressing local needs and circumstances.

Until recently, no sub-Saharan African country has had a national sustainable development policy supported by legislation. Not surprisingly, many national policies and laws violate long-term natural resource-management criteria, including the need for community-based management, and some resource-specific policies contradict sectoral economic growth and development policies.

Certain economic policies invite the overexploitation of resources, while some environmental

policies proscribe any local use. Rarely is the middle ground—sustainable use—the cornerstone of national socioeconomic development policy. For example, while the links between the Structural Adjustment Program policies and natural resource management are complex, some economic/fiscal policies, especially those that are pro-growth, have had adverse environmental impacts (Repetto and Cruz, 1992; Sarria and Shams, 1991). In many countries, the pressure for economic growth is such a priority that the natural resource base has been allowed to suffer. For instance, gold mining, deemed critical to Ghana's economic development, has taken a largely overlooked toll on human welfare and local resources. (Temel and Roe, 1994). Likewise, the devaluation of the local currency and other reforms have so stimulated export production, including that of timber and non-traditional agricultural products, that the environment has been damaged and associated health problems have ensued (Ampadu-Agyei, unpublished; Thrupp et al., 1993).<sup>24</sup>

Recently, several countries—including The Gambia and Uganda—have prepared national environmental or sustainable development policies and passed supporting legislation. In addition, several governments are reforming sectoral policies and legislation, while local governments review their own laws. The development assistance community's recent shift from project assistance to supporting policy reform has provided much-needed financial and technical assistance (Rock and O'Keefe, 1994; Brinkerhoff et al., 1992).

Some institutional reform has also been undertaken, often under the NEAP umbrella, perhaps most obviously through the creation of several new "apex" institutions. For example, the Environmental Protection Agency (Ghana), the National Environmental Authority (The Gambia), and the National Environment Management Authority (Uganda), are all mandated to coordinate environmental and natural resource policy, legislation, information, environmental impact assessments, and environmental standards (Greve, 1995; Dorm-Adzobu, 1995).

That environmental matters are now routinely discussed in some cabinets and parliaments is encouraging—a sign of increasing political will. These and other environmental reforms are an excellent start toward effective resource management in general and community-based management in particular. Such efforts should be applauded, encouraged, and further supported.

## **Market Incentives for Natural Resource Management**

Rural Africans need economic opportunities and fiscal arrangements that properly value natural resources and provide economic incentives for them to manage their resource base effectively. The case studies illustrate that resource management, while often shaped by cultural norms, is essentially an economic issue—natural resources are well managed when they are productive, critical to economic activities, and vital to improving human welfare. In other words, local people practice effective resource management more often when it yields greater socioeconomic returns for their labor and investments than other forms of land use do.

The use of market forces to shape human behavior and ensure effective resource management has several advantages over command-and-control regulations (Faeth, 1993; Repetto et al., 1992).<sup>25</sup> Correct pricing in Africa's increasingly competitive and active private sector and market incentives appeal to most people's aspirations for self-improvement. When entrepreneurs and aspiring communities try to take advantage of opportunities for environmentally sustainable economic growth and social development, self-motivated and facilitated implementation will save government the high costs of traditionally enforcing regulations. Environmentally sensitive tax systems, for example, can generate much-needed public revenue (for both central and local governments) by making those who degrade the environment pay more than those who manage resources better.

To date, however, relatively little attention has focussed on identifying those fiscal arrangements

that generate revenue, encourage resource management, and discourage resource degradation. Such considerations are particularly timely now that many governments are launching sweeping financial policy reforms as budget constraints tighten and the private sector expands.

A three-pronged approach can make sustainable development profitable. First, governments should help create resource-based economic opportunities for Africa's rural population.<sup>26</sup> In many cases, significant progress on this front is occurring. For example, the governments of Ghana, Uganda, and Kenya are encouraging the production and export of non-traditional goods (especially agricultural ones), by promoting local goods abroad, identifying international market opportunities, providing credit, devaluing the local currency, offering foreign exchange retention schemes, facilitating local production, and easing import/export regulations (Ampadu-Agyei, 1995; Thrupp et al., 1993). Several non-governmental groups are also experimenting with the marketing of non-timber forest products, such as nuts, medicinal plants, and herbs. So far, mostly unprocessed natural resources have been exported, but resource-dependent activities can become even more financially attractive through value-added processing or exporting wood products or canned fruit.

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*Sustainable practices must yield higher net benefits than unsustainable ones.*

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Second, sustainable practices must yield higher net benefits than unsustainable ones. To date, few governments have established the right mix of market incentives and command-and-control mechanisms to make sustainable production profitable. The reasons for this failure are often specious. Too often, governments erroneously conclude that sustainable production is less productive and less profitable than unsustainable

practices. Subsidies and other fiscal instruments that devalue the former or make the latter more profitable remain widespread in Africa. In addition, economic analysis usually fails to measure declines in productivity of overexploited natural resources, frequently making farming practices that degrade look more productive than those that conserve. When such subsidies disappear and the environmental costs of unsustainable production are accurately counted (or when declines in the resource base are included in calculating farm income), resource-conserving production practices can often compete economically with environmentally unsound practices. Through various economic and fiscal instruments, such as higher taxes and fees, market incentives can add value to resource-management activities, make sustainable production competitive or more profitable, and discourage environmental degradation.

Third, government must help ensure that now valuable resource-dependent economic activities remain in the hands of local people, including women and the poor. So far, governments in Africa have failed at this task. Evidence shows that, as resource-based production and economic activities become more valuable, the government creates new institutions and policies that enable the privileged few—government bureaucrats and powerful elites—to increase their control over productive resources, economic activities, and profits (Dove, 1993). To reverse this longstanding pattern requires a deliberate political decision to develop rather than retard the progress of rural people—and the will to carry it out. This will be partly manifest in government programs that provide resource security, that restrict monopolies, and that help small-scale producers realize economic and market advantages by establishing trade unions or manufacturers' associations.

## **Security in Land and Productive Natural Resources**

Resource tenure policy, legislation, and practices should facilitate the evolution of tenurial laws that provide and protect farmers' access to

land and resources, that encourage sound land use and management, and that contribute to socioeconomic development. The case studies demonstrate that security in land and resources encourages local investment in natural resource management.

While many rural Africans believe that customary tenure practices afford them effective land security, few have *real* claims since the state usually owns and controls most of the land and resources. As the need for arable land rises, so does its value and the competition for it. Powerful outsiders' requests for government leases on rural land occupied by customary tenants have increased. As a result, rural Africans are being increasingly evicted or otherwise alienated from their traditional lands. Local courts are now inundated with land disputes and litigations, and the adverse way in which many are being resolved is a source of growing civil unrest (Shivji, 1994; Bruce and Migot-Adholla, 1993; Hoben et al., 1992).

As they experience first-hand the loss of land and become more knowledgeable about legal matters, many rural citizens realize that they have been entirely ignorant of the tenuous nature of their hold over local land and resources. Until this issue is resolved, investment in sustainable management practices will fall and resource degradation rise.

Land-use policies that do not provide individuals and communities with enough security over resources should be repealed. In their place, new policies and laws that explicitly define the rights and responsibilities of property ownership should be installed.<sup>27</sup> Although *de jure* ownership is not necessary to ensure security, *de facto* ownership should certainly provide better protection than a lease does. Among the pervasive problems with leases is the fact that their interpretation and (re)negotiation are often left to the discretion of government officials who might have a vested interest in revocation. In addition, otherwise conducive leases can be substantially compromised by the granting to nonresidents of supervening rights.

Private property ownership brings into play a range of rights with regard to the use and disposal of land and resources at various ownership levels—individual, household, extended family, community, village-cluster, and others. Having a variety of freeholds is critical because private individual or household ownership does not always accommodate the important relationship among communal possession, resource management, economic development, and rural livelihoods. Resources such as forest, pasture, wetlands, fisheries, and wildlife are often best managed by communities or village clusters (Bromley, 1992; Ostrom, 1990; Lawry, 1990a; 1990b).

National tenure policy and legislation must include and build on the *effective and equitable* aspects of customary tenure rights, minimize potential disruptions, support the evolution of tenure systems, and offer real security in land and investments. A few countries have established procedures for incorporating aspects of customary tenure into legal tenure (Bruce and Migot-Adholla, 1993; Riddell and Dickerson, 1986). In Senegal and Botswana, local land administration institutions handle customary land allocations for subsistence farming and rural homes, and leases for residential plots in town and for commercial agriculture, ranching, and other for-profit uses. Their appeals and supervision systems address land disputes and ensure compliance with public legislation, thus tying local institutions to national ministries. These procedures recognize the variability of customary tenure systems particular to each region and the damage possible from imposing a single property rights system on the entire nation. As local circumstances change, tenure policy and legislation must be flexible enough to allow property rights and responsibilities to change as well.

Individuals and groups of people marginalized by customary tenure systems should be carefully protected by official tenure systems. For example, many traditional systems deny ownership and inheritance or significantly restrict women's access to land and resources (Land Tenure Study Group, 1995; Sigot et al., 1995; Shivji, 1994).<sup>28</sup> Because women, with fewer rights and less say in

the use of that land than the owners, are Africa's principal resource managers, management practices would be significantly improved were they given more ownership rights and greater decision-making authority. Without jeopardizing existing effective management practices, government tenure policy should strategically address these and other weaknesses of customary tenure systems.

The delegation of proprietorship over land and resources to individuals and communities requires the state to relinquish considerable responsibilities and authority. But governments retain eminent domain over all land and should have the power to exercise some authority over it. For the good of the nation and all its citizens, governments can and should also continue to directly manage some land and resources.

Statutory regulations, such as national and sub-national zoning restrictions on private property are well-established means of controlling unsound land development, speculation, monopolies, and landlessness. Such regulations have long controlled land use in urban areas. In Ghana, for example, cutting down a tree in any urban area without a government permit and a specific replacement plan is prohibited. Although they should refrain from too strict control of private property, African governments should make better use of such regulatory opportunities.

Effective implementation of these new tenure policies should follow their promulgation. In some cases, land and resources may need to be surveyed and property titles/deeds delivered.<sup>29</sup> But property rights are not—nor should they necessarily be—contingent on state grants or formal documentation: community-based property rights by definition, of course, emanate from communities. If local communities practice sustainable management, or at least aspire to do so, and want government to recognize their community-based property rights, the basic components of successful state-community management initiatives are largely in place. If a mutually beneficial and supportive agreement or contract can be reached, the odds increase

that the resource base will be protected by local stewardship. If governments and communities fulfill their responsibilities, such an agreement can provide a cost-saving alternative to formal deeds or state management.

## **Decentralization for Sustainable Development**

Effective, community-based sustainable development and environmental management requires sound planning, implementation, and monitoring, all of which work better with good information, financing, and legislation. Most central governments in Africa cannot provide all of these. The case studies suggest that responsibilities should be delegated to the public administration best suited to the task at hand or to support communities in doing so.

In general, local officials are better positioned than the central government to work directly with communities and local farmers to help identify real needs, provide training, and offer the technical assistance, financial support, and other resources necessary to facilitate community efforts in sustainable development (ARD, 1992; McKay and Gow, 1990; World Bank and Istituto Italo-Africano, 1989; Hage and Finsterbush, 1987; Leonard and Marshall, 1982). For example, sustainable development planning responsibilities should be close enough to the grassroots to maximize genuine local participation.

As central governments relinquish some of their roles to local organizations, NGOs, the private sector, communities and local governments will take on correspondingly more, including responsibilities in development and resource management. This situation is welcome: local governments have several advantages over central governments in working with rural farmers. As the distance between government and people (i.e., between the taxpayer and public action) shrinks, accountability and openness usually increase. The case studies show that local governments are more likely to be constructively influenced by community participation and in turn to

have a greater impact on farmer decision-making and behavior than are national governments.

Many countries in Africa have decentralization policies, legislation, and programs, but only a few have spurred real community-based resource management. On much of the continent, local government structures are poorly developed, and traditional authority structures have eroded. The result is often the management vacuum that is a root cause of much failure in local development. In some cases, responsibilities have been relocated to inappropriate administrative levels; in others, authority and capability have not accompanied the new responsibilities. In still others, central government appointees who are often political party functionaries or sycophants continue to control local government.

In many cases, decentralization turns out to mean simply the addition of another layer to the already obstructive bureaucratic hierarchy (Murphree, 1994; 1993; Chambers, 1988). Historically speaking, when a new government comes to power, it creates new local-level administrative structures, frequently without dismantling old systems or without concern about existing traditional community-level organizations. The administrative responsibilities of these proliferating public institutions overlap, especially in the crucial environmental management activities of policy-making, tax collection, information management, arbitration, and enforcement. In the end, bureaucrats are often as confused about their mission and reach as are the individuals and groups they are supposed to serve and the external agencies (including donors) that seek to support them.

Fortunately, change is afoot. In Uganda, for example, the central government is effectively eliminating the subparish as an administrative level (Veit, 1994; 1993). In Uganda and Ghana, district boundaries have been redefined to improve local administration and accountability (Dorm-Adzobu and Veit, 1991). In both countries, local government officials, now elected directly by the people, have increased authority. As government decentralizes to the most appropriate level, superfluous

administrative levels or structures should stand out, making realignment to levels appropriate to ecological, political, and ethnic realities easier.

Once roles and functions have devolved, the various levels of local government must have the authority to perform their new responsibilities properly. For example, effective implementation of development plans often requires the power to establish local laws and the jurisdiction to generate government revenue for local development purposes. Few local governments in Africa have such authority; as a result, most can't fulfill their responsibilities (Murphree, 1994; 1993).

The case studies show that activities to strengthen local governments may involve training in participatory policy-making, drafting legislation, development planning (rural and peri-urban), information collecting and analysis, tax collecting, financial management, and other administrative duties. Empowering local governments may also call for developing new procedures and guidelines in accordance with sustainable development responsibilities and providing such basics as vehicles and fuel for transport or pencils and paper for record-keeping.

Decentralization does not mean that central government should relinquish all its responsibilities or support for community-based development and resource management. Indeed, central government has its own comparative advantages and should retain certain related responsibilities and authority. For example, it should establish national goals and objectives, articulate them in national policy and legislation, develop Environmental Impact Assessment guidelines, prepare minimum environmental standards, coordinate environmental information, facilitate regional and international actions, and ensure effective central/local government collaboration (Kakuru et al., 1995).

Central governments must also work to make decentralization effective. On the one hand, they must help ensure that local governments operate fairly. On the other, they must make sure that line ministries—whose authority and direct influence



by decentralization are reduced—do not undermine local governments by, for example, establishing overly restrictive or otherwise inappropriate sectoral policies and legislation. Such policies could deprive local governments of the flexibility to craft strategies and actions unique to their districts—one of the principal advantages of decentralization.

## **Independent Inputs into Government Decision-Making**

The case studies show that the more national governments recognize local needs, resources, and constraints, the better they can support community-based resource management. Grassroots organizations, NGOs, and other not-for-profit groups can help ensure that government policies promoting socioeconomic development are environmentally sound, socially acceptable, and equitable (NATURAMA, 1995; Sibanda, 1994; Putnam, 1993; Swartzendruber and Njovas, 1993a; 1993b; Bratton, 1990; Diong, 1995; Burman, 1995). By helping to mobilize citizens and the private sector to participate in policy dialogue and legislative reform, governments can build on the tide of democratization.

Recent central and local governments' efforts at "right-sizing" and empowering the private sector have generally focussed on supporting the business community, which is commonly viewed as the engine of economic growth. But institutions driven by profit motives do not always make decisions in the best interest of the majority or advance the common good. Crucial, but less quantifiable concerns—such as sustainable development and social equity—are frequently neglected when balance sheets guide developmental policy.

Although private citizens, NGOs, and other independent groups have become increasingly involved in project design and implementation, independent input into public policy-making is still scant. Some NGOs do not even see it as their role to participate in policy-making, partly because they fear that such activities will make them less

independent—at least in the eyes of their donors who often support them precisely because of their independence (NATURAMA, 1995, Swartzendruber and Njovas, 1993a; 1993b; Burman, 1995). Correcting this imbalance requires both encouraging reform in the policy of some NGOs and sensitizing government personnel to the value of independent information.

NGOs' capacity should be strengthened so they can better provide information, autonomous ideas, recommendations, and expertise of practical use to government decision-makers shaping public policy and legislation. NGOs should also become versed in environmental law—so they can understand and help further ensure environmental rights and related government responsibilities. At present, strategic participation often appears to depend on personal connections with senior government officials. Only rarely do effective NGO activities on the ground capture the attention of policy-makers, and even when NGOs provide relevant information, it rarely reaches governments—local or central—in the right form or at the right time.

NGOs must establish their legitimacy in the eyes of government. They should develop skills in the most influential policy participation tools, such as policy research, litigation, advocacy and lobbying, successful demonstration projects, public demonstrations, or working with the popular media. And NGOs should come to better understand the policy-making process and the windows of opportunity for independent input. In this regard, the role of independent intermediary institutions—groups dedicated to influencing policy-makers and legislation in support of their constituencies (such as, for example, NGO consortiums, networks, public interest groups, women's associations, and farmers' cooperatives)—provide potentially vital links between the local people and the government.

Groups concerned with land and natural resource management are particularly important in this regard (Veit et al., 1995; Swartzendruber and Njovas, 1993a). All economies that depend on natural resources are vulnerable to degradations

in the resource base. NGO leaders concerned with community-based development and the environment have been increasingly forced into more political activity to make their work, which depends in great part on sound government, pluralism, and equitable policies, legislation, and solid institutions, effective. According to Wangari Maathai, the outspoken force behind Kenya's Green Belt Movement, "only an informed and involved community can stand up for the environment and demand development that is sustainable and that is friendly to the environment" (Maathai, 1994, p. 30).

On the other hand, government must learn to value information and ideas from NGOs and other independent groups. Even with political liberalization, pluralism, democratization, and civil society's growing desire to participate in government decision-making, in most countries policy-making is still generally considered government's domain. Despite efforts toward democracy, many legal obstacles and bureaucratic hurdles to NGO participation in policy reform persist. Governments need to learn to welcome independent information relevant to public decision-making. To date, policies have evolved principally in response to crises, primarily behind closed doors, rather than through formal, structured processes. Crisis-motivated policy-making often takes place in an information vacuum, so, even those NGOs with the capacity to participate in policy reform have had trouble preparing themselves for it.

Increasing government openness and public participation in it will occur when policy-making and legislative reform processes become formal enough that NGOs can understand them and prepare for involvement in them. NGOs have to know when and how their information can have its greatest impact. Governments may have to establish policy research capacities within ministries and departments, guarantee access to public information and facilitate opportunities for public input into pending policy and legislation decisions. Citizens should be given legal rights to appeal government decisions and legislation. And governments need to create opportunities

for NGO participation by working more closely with the popular media, organizing regional consultations (for example, including NGO representatives on government policy-making committees), and sharing draft policies more widely.

Governments should recognize that many NGOs are legitimate partners in development, that their ideas and opinions are valid, and that they can contribute to better policy-making. In Burkina Faso, the second Chamber of Congress now has several NGO representatives (NATURAMA, 1995) while in the Kasese District of Uganda, NGO officials are ex-officio members of local government committees (Veit, 1994). The more government sees NGOs as legitimate, the more their input and involvement will be requested. For example, health ministries often request the assistance of professional doctors—both private practitioners and those affiliated with NGOs—when preparing a new policy or program. Similarly, independent economists and attorneys often help develop new fiscal policy and legislation.

To date, few African governments, donor agencies, and even private foundations support the policy reform work of local NGOs, often considering such support both politically and financially risky (Swartzendruber and Njovas, 1993a). If governments and donors value NGO activities, they can and should build confidence and further encourage NGO activities through financial support.

## **Support for Community-Based Resource Management**

Governments, particularly local administrations, should increase direct support (i.e., technical assistance, training, financial and resource flows) to community-based development and resource management. Despite the enormous contribution of rural farmers to national economies, small-scale producers receive little public technical support and a disproportionately small share of government revenues. Thus, the local population generally pays for more than its share of central government services, most of which go to urban populations. This trend should change.

The case studies illustrate that self-help resource-management efforts that rely primarily on local labor and indigenous knowledge have built-in limits. Most community-based development works only if critical inputs come from outside. Properly targeted external assistance, even in small amounts, can significantly improve local environmental management. Communities that seek out such assistance are more likely to achieve sound environmental management than those that merely wait for help to find them.

Well-targeted investments in resource-management practices can significantly boost the yields of many traditional crops. In some cases, however, only improved technologies or new crops or varieties can achieve improved yields per unit of land or labor. Because labor is particularly scarce in many rural households, small-scale labor-saving technologies could speed the adoption of other, more effective, resource-management practices.

The case studies also show that ideas and skills that build on familiar practices and parent technologies are more likely to be accepted by rural resource users than externally developed or unfamiliar practices. Resource-management practices compatible with prevailing culture are more likely to be adopted than new ones. At present, however, research on methods for improving traditional local practices and techniques is limited, and agricultural research institutions rarely work closely with local farmers and innovators to improve existing production practices (Scoones and Thompson, 1994; Richards, 1992; 1985; Thrupp, 1991; McCorkle, 1989). As a result of these shortfalls, imported technologies continue to dominate

development assistance programs and failure rates continue to be inordinately high.

The case studies reveal that technical assistance and shared skills and information often do more for local development than material goods or direct capital. Basic training in managerial skills is paramount to effective community-based resource management, partly because colonialism, bureaucratization, and economic transformation have cumulatively undermined traditional community organization. Similarly, environmental education on the links between resource management and production, as well as on the range of ecological benefits of environmental management (both on and off the farm), can provide additional incentives for community-based resource management.

Government resources and donor support targeted for the grassroots are often best channeled through local governments (ARD, 1992; World Bank and Istituto Italo-Africano, 1989; Leonard and Marshall, 1982; Veit, 1994; 1993). Historically, donor financial and technical assistance have gone primarily to the central government, even when assistance is locally targeted. Resources often never reach their intended destination. Increasingly, however, donors are bypassing central governments and working directly with local governments and independent groups that have comparative advantages and don't have central government's shortcomings. Donors of all sorts are following various strategies to provide more direct local support. One common approach is to establish a fund to award small grants for community and NGO activities.<sup>30</sup> Small-scale, input-oriented programs that provide assistance directly to the grassroots certainly deserve support.

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## V. A Call for More Action

Throughout sub-Saharan Africa, political turmoil, economic hardships, population increases, and natural disasters have put tremendous pressures and demands on production systems and environmental management practices. As a result, the effective use of natural resources has never been more crucial, particularly for the rural poor whose survival depends on the local resource base.

Much has been written about the benefits of popular participation in development and the success of bottom-up approaches. Participatory approaches promote learning and adaptation, effective communications and access to information, and actions that both recognize socioeconomic and ecological diversity and respond to local demands. By emphasizing the needs and skills of rural people, participatory programs have begun to harness Africa's human assets—especially local peoples' knowledge, experience, expertise, and energies.

While participatory approaches to project design and implementation are becoming increasingly common in development initiatives led both by governments, and donors, many such programs divorce involvement and responsibility from authority and capacity. All too often, local elites can co-opt the leadership of participatory programs or collaborative arrangements (Murphree, 1994; 1993). When they do, the end result is unlikely to be sustainable local development or community empowerment for self-development.

The 23 "From the Ground Up" case studies testify to the wealth of unheralded local knowledge and capability in rural Africa and the interest and desire of millions of rural resource users to manage their own resources. Community-based development will grow as more responsibility, authority, and capacity end up in the hands of the resource users. Viable participation means giving communities proprietorship over critical resources. It means entitling them to determine the mode and extent of management and use, giving them rights of access and inclusion, and allowing them to benefit fully from management. It also means strengthening local leadership and institutions so they can effectively exercise these rights, responsibilities, and resources.

While community-based resource management is certainly not the only approach that can reverse socioeconomic decline and environmental degradation in Africa, ample evidence—including the 23 case studies—suggests that it should be a major component of reform. Until recently, however, wide-scale, effective community-based development has been rare. The political liberalization, economic reform, and environmental planning under way in some countries are certainly steps in the right direction, but these efforts could easily collapse without further encouragement and support. To date, most have focussed too narrowly on meeting national goals and objectives in ways that are neither environmentally sustainable nor socially equitable.

Governments and the international development assistance community should empower local people to be the agents of their own development. New policies, legislation, and institutional capacities that promote community-based sustainable development, broaden participation, and enhance flexibility in decision-making are urgently needed. Coupled with targeted on-the-ground support, such actions will help spread the community-based development already in limited effect in most African countries. Indicators of conditions for effective community-based development should also be developed, and local impacts of national policy reforms should be monitored to evaluate community needs to better target assistance. At the grassroots level, local governments, NGOs, and business have particularly important roles to play and responsibility to bear.

Collectively, these recommended reforms constitute a revolution in environmental manage-

ment comparable to the sweeping political and economic reforms currently afoot in many African nations. These changes will not occur quickly. But the reforms already in place in several countries indicate that some governments are seriously rethinking their ideas about the interdependent dynamics of governance, development, and the environment. Given the clear benefits of community-based resource management, policy and programming changes in support of local development should become increasingly common in the years ahead.

For Africans—especially for the millions of impoverished rural resource users—the sooner these changes occur, the better. As the case studies indicate, human potential is there. What is necessary is the political will and capability to affect those changes on nationwide scales. The costs in resource degradation, poverty, and human suffering of continuing the status quo make this effort essential.

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## VI. Case Studies From the Ground Up

### Case Study 1—Ghana: Risks to Livelihood and Stone-Lined Terracing in Nangodi

**N**angodi village lies in the Upper East Region of northern Ghana, near the border with Burkina Faso. The land is characterized by rolling hills and Sudan-Guinea savannah woodland. The soils are shallow, embedded with stones and boulders, prone to erosion, and generally infertile. The average annual rainfall is 1,040 millimeters with one wet season. The area experiences high temperatures and the annual *harmattan* (dry seasonal wind from the Sahara). Only a few crop species are cultivable, and there is only one planting per year.

Nangodi was established about 1900 when a small group of Nabdam people left their homeland to flee drought and famine. Over time, they were joined by other Nabdam. These original inhabitants used various shifting cultivation practices.

In the late 1920s and 1930s, two events significantly changed village life. Toward the end of the 1920s, gold deposits were found on Nangodi land; in 1933, a commercially exploitable reef was discovered; and the following year, a mill was opened. The gold boom, however, was short-lived: production ceased when World War II began.

The same period saw an unprecedented increase in river blindness (onchocerciasis) along the banks of the nearby Red Volta River. Many riverside settlements disappeared altogether as

the inhabitants retreated from the breeding sites of the carrier blackfly. Two-fifths of Nangodi's land became uninhabitable, and the village, by then a booming mining town, had to accommodate most of the displaced population. In the 1920s, Nangodi's population was only about 100 people; by the 1940s, it had risen to 3,600.

With the collapse of the gold boom in 1940, the demand for agricultural land increased. Since indigenous farmers already occupied all cultivable land in the lowlands, recent immigrants were forced to eke out a living as best they could from the rocky hillsides. An estimated 85 percent of the land around the village had been covered with stones, boulders, mining pits, and abandoned bunkers—all remnants of the mining activities. Shortened bush-fallow cycles, farming on slopes, and other inappropriate practices brought on serious soil erosion and chronic food shortages.

Shortly thereafter, famine struck. The elders of Nangodi met with the *tendana*—the village leader responsible for land and traditional religious matters—to figure out why the harvest was so poor. After consulting with his fetish, the *tendana* informed the elders that the god of the land was annoyed by all the stones scattered about. The *tendana* decreed that all the stones should be gathered together into heaps. As a result, some farmland was reclaimed and productivity increased. Many farmers then decided to reduce the stone heaps to get even more land by using them to mark the boundary lines between plots and between different crops on the same plot.

The farmers soon realized that the stone boundaries trap and collect soil washed down by the rain and wind. These farmers then laid the stones along the contours of their land to establish permanent terraces. Over time, these terraces were improved. Although the farmers still do not use any instruments to lay the contours, the terraces are now constructed more precisely. The base of the terrace walls are built with larger stones while the smaller ones are used to fill gaps. The remaining spaces are sealed with mud and soil. Before and during planting, the farmers break the ground above the terrace to loosen the soil and facilitate terrace development. Although the height, width, and spacing of the terraces vary with the steepness of the slope, most terraces are about half a meter high and one meter wide.

Today, most farmers intensively cultivate the small terraced plots around their compound. The most common crops are millet, guinea corn, and groundnuts. Soil fertility is maintained through manuring, rotating crops, and mulching, but yields depend heavily on rainfall. More often than not, the farms provide sufficient food, but rarely do they produce much surplus for sale. Still, terracing enables the farmers of Nangodi to continuously cultivate the same plot. As a result, Nangodi can sustain a much larger population than it otherwise would.

### **Case Study 2—Liberia: Risks to Livelihood and Land Reclamation in Kpayee**

Kpayee village is located in Nimba County, northern Liberia, a low-lying region with some minor uplands. The settlement itself is almost completely surrounded by wetlands. Secondary forests with remnant pockets of high-canopy primary rainforest characterize the uplands while swamp vegetation predominates in the lowlands. Scattered throughout are diamondiferous sediments. The average annual rainfall totals about 2,000 mm, with a single long wet season; average monthly temperatures range between 18.4 and 33.7 degrees Centigrade.

The area was settled by members of the Gio ethnic group during the 1800s. The village of Kpayee was established when people moved across the nearby Kponye river. At that time, land was plentiful, and shifting cultivation was the main agricultural practice. The principal crop was upland rice. As the population increased and cash cropping opportunities emerged, farmers switched to paddy. They then constructed ridges and channels to improve water management, turned the swamp soil to kill or stunt weeds, and nursed and transplanted rice seedlings. During the dry season, groundnuts, beans, or potatoes were cultivated in the paddy fields. Once cultivation in the swamps was intensified, cash crops—principally coffee, cocoa, and kola nuts—came to dominate the upland farms.

In the late 1950s, diamond mining began. To find the diamonds, the miners—mainly migrant Mandigos from neighboring Mali and Guinea, who at the time of the field research (1990) accounted for roughly 50 percent of the local population—dig a series of shallow pits, especially in the more easily accessible swamplands. The central government grants them permits to mine on all state land (in Liberia, all land is state-owned). The villagers are not consulted during the granting process and have little control over the mining practices. In addition, the miners have no legal obligation to restrict their operations to non-agricultural land or to restore the land when they abandon their pits.

As a result, many swamps previously cultivated are now dotted with abandoned diamond pits. Swamps with such pits cannot be cultivated, and mining activities have jeopardized local agriculture and livelihoods. By 1990, they had become the single most important threat to land management and agricultural production, not only in Kpayee, but in many Liberian communities. Government took no actions to protect the land and ensure local well-being.

Kpayee's land-reclamation effort was initiated by a farmer whose swampland had been degraded by diamond mining. His indigenous composting method involved four steps. First, the vegetation

around each abandoned pit is cut and allowed to begin to decay. Second, a layer of this decaying organic matter is put into the pit and covered by a layer of soil from the overburden dug by the miners. Third, after it settles, a second layer of organic matter is added and the pit is completely filled with the remainder of the overburden. Fourth, the organic matter and soil are then mixed and compacted by individuals stamping their feet on the surface of the filled diamond pit.

This farmer's success encouraged other villagers to adapt the same techniques. Inspired by these results, the Town Chief acquired an extensive tract of degraded swampland from an individual land owner (customary tenure) on behalf of the community and helped organize the village to reclaim the land for communal rice cultivation. To undertake the reclamation work, follow-on cultivation, and community-development efforts, the Town Chief and his council of elders organized two main working groups of roughly 300 members, each headed by a chairman and a secretary.

At the time of this study, over 10 hectares of degraded wetland had been reclaimed for the communal farm. The land had been subdivided into 32 paddy plots separated by ridges to hold water and nutrients and connected by narrow water channels. In 1988, the community sold 50 bags of rice at L\$20.00 per bag to licensed buying agents of the Liberian Produce Marketing Corporation. The sale of rice from the communal paddy was the major source of development funds for the village. From the proceeds, Kyapee has constructed a school and access road and established an interest-free loan service for community members.

### **Case Study 3—Ghana: Economic Opportunities for Resource Management in Goviefe-Agodome**

The community of Goviefe-Agodome is situated in Volta Region on the main road linking Accra with the major food-producing area to the north. With a mean annual rainfall of 1,500 mm, which falls during two wet seasons, the region is periodically swept by drought. No surface rivers

or streams flow near the village, and the soils have low to medium agricultural potential.

Shifting cultivation is the most common agricultural practice, and maize and cassava are the principal subsistence crops. Population increases are putting pressure on the available land. Since the early 1960s, farm holdings have been fragmented, fallow periods have been shortened and cropping periods extended, soil erosion and water runoff have increased, and crop yields have declined. Most farmland is privately owned with customary titles held by individuals, households, or extended families. Communal ("stool") land is held in trust by the village chieftaincy, which includes the village chief, the queen mother, their supporting regents, and a council of elders.

In 1983, six villagers responded to government encouragement and organized a local mobilization squad (mobisquad), a community-level volunteer development group, to improve their own and the community's socioeconomic well-being. In part because they had the government's political support, they were able to secure that of the village leadership and residents too. The queen mother gave them the use of 40 hectares of abandoned communal land.

In 1986, the mobisquad (then 41 members) established a 4.8-hectare communal farm of cassava, maize, and cocoyams. About 1,000 teak and 2,000 *leucaena* seedlings were planted alongside the food crops. The latter improve soil fertility and provide fodder and fuelwood (for sale and local use) while teak is a cash crop. (Untreated power line poles fetch about \$135 each.) The sale of the crops and the fuelwood and charcoal that resulted from clearing the farm earned the mobisquad about U.S. \$2,500 that year. The group divided most of the profits equally among its members, but spent some of the money to launch two community projects, an improved latrine and a clinic.

The next year, the mobisquad (then 52 members) planted 9.6 hectares of cassava, maize, pepper, and cowpeas, and it added a two-hectare, monocropped cotton farm. A tree nursery of



about 5,000 teak and *leucaena* trees was also established. These efforts netted the mobisquad about U.S. \$4,000. The group used some of the money to leverage World Vision (a U.S. private volunteer organization) support to complete the improved latrine, and spent an equal portion on external technical assistance to train members in project management and youth mobilization. The remaining \$1,700 was divided equally among themselves. The group also opened a bank account and began offering its members small loans.

That same year, the group also established an executive committee that organized weekly *durbars* (traditional community meetings) to identify needs and establish work schedules, manage funds, and establish links with external agencies. Members worked a half day each week on mobisquad activities for most of the year, and two to three days each week during planting and harvesting.

In 1988, the mobisquad (then 62 members) planted 12 hectares of cotton, 12 hectares of food crops, and another 5,000 teak and *leucaena* seedlings. That year they earned over U.S. \$4,000, half of which was used as share capital to become a registered cooperative. In 1989, the group planted 5.2 hectares of cotton, 8 hectares of cassava, 3.2 hectares of pepper and cowpeas, and another 4,000 tree seedlings. At the time of the study, the full profits of these crops had not been realized, but some early returns had been used to construct a shelter for the equipment needed to process *gari*, a local staple made from shredded and fermented cassava.

In its first four years, the group turned more than 55 hectares of wasteland into productive farmland. For their efforts, the government awarded the mobisquad a Certificate of Achievement in 1989 for being the most visibly successful group in the Volta Region. A year later, Goviefe-Agodome was the site of the UNEP World Environment Day celebration in Ghana, at which time the mobisquad was presented with *gari*-processing equipment worth over U.S. \$5,000 by the Ghanaian government.

In 1990, the mobisquad had 71 members, with at least one individual from every household/extended family. The group had grown primarily because the people recognized the significant personal and household benefits of membership. Equally important in attracting new members was the fact that some profits were realized after the first agricultural season. Although the level of contributions to community efforts have increased over the years, a significant percentage of the annual profits continue to be shared equally among the mobisquad members. Individual members' profits remain high, and without question they are a primary incentive for joining the mobisquad, though other benefits, such as access to low-interest loans, are also important. (Significant profits also await the group when the teak matures.) In addition, as the group grows, the workload and other costs per member decline.

### **Case Study 4—Sierra Leone: Cash Crops and Forest Management in Mofindor**

The village of Mofindor is located in Sierra Leone's Kailahun District, within 20 kilometers of both the Liberian and Guinean borders. The village lies within the Moa Basin (500–1,000 meters above sea level), which is drained by the Moa River and its tributaries. Alluvial depositions make its soils very fertile. Rainfall is moderate—2,560–2,800 mm per year—with one long wet season, and the mean monthly temperature is 27.5 degrees Centigrade. In December, the *harmattan* winds blow from the Sahara, raising evapotranspiration rates dramatically. Secondary forest and some thicket bush dominate the region.

The population density in the area is relatively high—100 to 150 people per square kilometer. Small-scale agriculture forms the backbone of the local economy. The staple food crop, rice, is cultivated primarily in the floodplains. Most households also grow various tree crops, including coffee and cocoa, which are the region's principal cash crops. At the time of the study, most farmers were expanding cash cropping due to favorable growing conditions, guaranteed prices from the

government, and good market opportunities in nearby Guinea and Liberia.

In the late 1800s, the government began promoting coffee and cocoa production by conducting research on various local and introduced species, establishing village nurseries in areas considered most suitable for their growth (including Kailahun), and providing training on production and marketing techniques. These efforts markedly increased coffee and cocoa production and export earnings, especially in the 1930s. With the onset of World War II, however, international markets closed, prices dropped, and export production went into steep decline.

In 1947, the Sierra Leone Produce Marketing Board was commissioned to oversee the purchase, marketing, and export of produce, including coffee and cocoa. The Board introduced and established new varieties, conducted research on improved methods, negotiated guaranteed prices with the United Kingdom, and appointed buying agents throughout the country. Following the return rise in prices in the 1950s, production increased. Beginning in the 1970s, government began providing extension services, credit facilities, and other inputs to further improve coffee and cocoa production. The focus was on hybrid varieties, chemical inputs, and the planting of exotic cover crops and shade trees. But limited resources made it impossible to implement these projects effectively, so many farmers did not manage their farms according to government recommendations.

Much research has been undertaken on improved coffee and cocoa production especially on the use of shade trees to shelter these understory crops and on species density. But most of the findings are unknown to local farmers. Yet, in Mofindor and elsewhere, where farmers have local experience, understanding of how to improve coffee and cocoa production is good. Farmers recognize, for example, that the forest canopy establishes a suitable microclimate by regulating light intensity, protecting the trees and fruit from direct exposure to the sun, increasing humidity and temperature, blocking the wind, and buffering the

trees from climatic changes. But rather than plant the government-recommended species of shade trees, the farmers leave standing or plant a mix of indigenous trees of local value as fuelwood, timber, or a source of food or medicine. Farmers also know the soil and water needs of these crops (e.g., coffee prefers gravel; cocoa, loam).

In Mofindor, most coffee and cocoa plantations are situated on farmland near water sources, which has been lying fallow for 6 to 10 years. Rarely are primary or advanced secondary forests cut to establish new plantations. Instead, paths are cleared through the bush and high densities of seedlings six months to two years old are transplanted. Some farmers apply mulch—usually grass cuttings—to the young trees and cut some non-valuable trees in the fallow. In addition, some economically important tree species, such as bananas, kola, mangoes, and oranges, are planted. As the plantation and canopy become established, the underbrush is gradually cleared or clears naturally because of the shade. The plantation is also thinned to a more appropriate density, and the remaining coffee and cocoa trees are trimmed. As the economically valuable trees that make up the canopy or provide the shade are cut, they are replaced by others (established plantations generally require less shade).

Mofindor farmers are encouraged to manage their land and resources because the economic returns from coffee and cocoa production and the canopy trees are high. Farmer-devised canopies continue to dominate the coffee/cocoa plantations in part because government can't effectively implement its policies and programs. The general absence of alternative economic activities also encourages farmers to manage their plantations effectively. When world prices decline, however, coffee and cocoa plantations are abandoned, allowed to degenerate, or, in land-scarce regions, cut down and replaced by more lucrative land uses. In Mofindor, the price of rice is increasing, partly because rising coffee and cocoa prices prompt many farmers to establish new plantations on former rice fields. In turn, however, some farmers are cutting down older, less productive plantations to grow rice and get immediate payback.

Tree crops have important soil- and water-management advantages over annual crops. For instance, the tree canopy needed to grow coffee and cocoa brings added ecological benefits. And the farmers' indigenous canopy-management practices best those recommended by government since they rely on diverse, native species that together grow into a canopy composed more like that in the natural forest. For this reason, the farmers' canopy is home to a large variety of birds, reptiles, and mammals, and thus serves a number of food, biodiversity, and other purposes.

### **Case Study 5—Ghana: Religious Beliefs and Forest Management in Malshegu**

The community of Malshegu (2,000 people) is located six kilometers north of Tamale, the capital of Ghana's Northern Region. The area is not densely populated. The land, classified as Guinea Savannah, is dominated by grasses and interspersed with fire-resistant trees. The highly erodible soils have low agricultural potential. The mean annual temperature is 27.9 degrees Centigrade. The average annual rainfall of 1,070 mm falls in one wet season. No surface streams flow in this drought-prone area.

The people of Malshegu—the Dagbani—originally lived in separate compounds on scattered farms. The settlement was formed in the early 18th century, when several families moved nearer to each other to defend themselves and their property from slave and livestock raids by Arabs from the north.

Today, mixed agriculture and animal husbandry are the dominant economic activities. Villagers cultivate both compound and "outpost" farms. The compound farms are continuously cultivated with guinea corn (a staple food) and a variety of vegetables while on the outpost farms, bush-fallow farming systems are used to cultivate cash crops, principally groundnuts, maize, and upland rice. Virtually every household has some cattle (four to five), goats, chicken, and guinea fowl.

Religious beliefs have always profoundly influenced the lives of the Dagbani people. When the community was established, the families were led by a fetish priest (*Kpalna*). They believed that a fetish god, *Kpalevorgu* in the form of a boulder under a large baobab tree helped protect them from evil spirits, Arab invaders, and other enemies. At that time, 0.8 hectares of open-canopy forest overlooking the village and surrounding the boulder was demarcated by the *Kpalna* as *Kpalevorgu's* sanctuary and dwelling place. In the 1950s, concern about development and deforestation in the area caused his successor to demarcate an additional 0.2 hectares of land around the sacred grove as fetish buffer lands.

The sacred grove and fetish god are part of a complex traditional hierarchy of gods. A supreme god is believed to be the creator of all things while the land, considered female, is the second most powerful god. The *Kpalevorgu* is Malshegu's community god and is thought to ensure local prosperity—adequate rainfall and harvests, fertility, lineage stability, and so on. Local tradition also holds that numerous spirits and supernatural powers, both good and evil, dwell in the community.

The *tindana*, a female custodian of the land, is the community's most powerful religious leader. The *Kpalna*, the second most powerful religious leader, can supersede the *tindana's* authority only in the sacred grove and on matters regarding its protection. The *Kpalna* leads the community in honoring the *Kpalevorgu* god and advises the villagers on compound, family, and individual spiritual matters. Since many physical and mental ailments are attributed the machinations of evil spirits, the priest is also the community's primary traditional healer. Many of the traditional medicines he provides come from the sacred grove.

Unwritten regulations were put in place by the *Kpalna* to control land use in and around the grove. Today, all forms of farming and grazing in the grove and buffer lands are prohibited. Entrance is permitted only during biannual rituals or on other special occasions and with the advance consent of the priest. During these occasions, some use of forest resources is allowed.

Only the *Kpalna* and his aides, however, have regular access to the grove, which they visit to pray and to collect medicinal plants. On the one-quarter kilometer wide band of buffer lands around the grove only grazing is permitted.

Twice each year, the *Kpalna* organizes a festival and leads the community in prayer and various rituals in honor of the *Kpalevorgu*. These thanksgiving festivals mark the beginning and end of the agricultural season. During these festivals, supervised hunting of various rodents and birds is allowed, and the branches of certain hardwood trees are cut for hoe and axe handles. At the conclusion of the ceremonies marking the end of the farming season, the young men of the village clear a three-meter wide firebelt around the sacred grove and buffer lands.

The Malshegu people believe that failure to comply with the rules protecting the grove or to participate in the festivals will offend and dishonor the god and may bring misfortune to the offender, his or her family, and perhaps even the whole community. As a result, community vigilance is well entrenched and effective. In the past, offenders were lynched; today, they are fined several cows or goats that are sacrificed by the *Kpalna* to appease the fetish god. The support of the village leaders ensures that the priest has the power to enforce the restrictive rules on access.

Today, the sacred grove consists of tall trees that form a more or less complete canopy with dense undergrowth in the gaps. This closed-canopy forest developed from the original open-canopy forest—typical in the savannah zone—which has been protected from human and natural disturbances for almost 300 years. As a result, the grove constitutes a critical habitat for the area's fauna and flora, which provides important forest products and renders critical ecological functions to the people of Malshegu.

Ghana's government has encouraged and facilitated Malshegu's efforts by providing important political and other support. It has made progress in understanding the importance of traditional religion in natural resource manage-

ment, in developing policy and legislation, and in facilitating local efforts. The forestry policy recognizes the cultural importance of sacred groves; local people continue to practice their traditional religion while the government provides additional protection. And at the time of this study, a draft bill under discussion recognized the environmental, cultural, and scientific role of groves and other sacred sites. If approved, it will empower traditional authorities to proclaim areas sacred and set the conditions for their protection.

### **Case Study 6—Liberia: Local Regulations in Fish Management in Panta/Kpaai District**

The villages of Gwainyea, Bellemu, and Foequelleh are located in Panta/Kpaai District, northern Liberia, near the Guinean border. The major drainage feature is the Foe River—a tributary of the St. John, which eventually empties into the Atlantic Ocean. The basin through which the river meanders is a relatively broad floodplain comprised mainly of secondary forest, though the banks of the Foe and its tributaries remain primary evergreen rainforest. Annual rainfall averages 1,910 mm, and flooding is common during the wet season (May–October). Mean temperatures range between 18.3 and 31.7 Centigrade.

Founded at the beginning of the century, Gwainyea at the time of this research had a population of about 500 people (1989). Located two kilometers northwest of Gwainyea, Bellemu was founded about 50 years earlier and had an estimated population of 2,000 while Foequelleh—the administrative headquarters of the Panta Chiefdom to which all three belong—is located about 1.5 kilometers south of Gwainyea and had an estimated population of 3,000. In all three villages, agricultural and fishing are important economic activities. Fishing is undertaken principally for subsistence while cocoa, coffee, and sugar cane are the major sources of income. Catfish is the principal fish caught in the Foe River, tilapia in the Saya Creek, and tilapia and eel in the Viakpa Creek.

Fish management was initiated by the village founders, who consider fish and certain bodies of water sacred. To protect fish populations in these sacred sites, clearing vegetation from banks was prohibited and strictly enforced rules were enacted to limit fishing. Traditional prayers and sacrifices are made to invoke the spirits for good fortune and protection, and fishing is still banned in the Gbeleya.

Regulated and monitored fishing is permitted in the Viakpa and Say Creeks (in Gwainyea and Bellemu) and in the Foe River (in Bellemu and Foequelleh). Fishing is prohibited during the rainy season, when the water temperature is ideal for spawning, so fish fry have enough time to spawn, hatch, and mature. The clearing of forest vegetation along the edges of the waterways is also prohibited.

Practices vary among the three communities, but in general, dry-season fishing is restricted to clearly demarcated spots on the river—usually in the large pools and deep channels of meanders or where the water is otherwise impounded. These shelter holes for the fish also provide ideal habitat and rich biota to stimulate the growth and natural productivity of plants and fish.

The fish management is headed by the town chief and assisted by the quarter chiefs and village youth organizations. The chiefs police the water bodies during fishing bans, and encroachment upon the river banks is rare. Violators are immediately punished according to the village laws. The town chief adjudicates and imposes fines of rice, palm, oil, salt, cane juice, and in some cases, a goat.

The youth organizations are responsible for organizing the fishing. Before the fishing season commences, special sacrifices are offered to the ancestors to invoke their protection. For example, in Bellemu, white chicken are sacrificed in the Foe River. Afterward, a swimmer dives into the fishing pools to perform additional sacrifices. In so doing, he disturbs the fish and drives them to the surface for easy cropping. Although many people participate, fishing is a major responsibility of

women, who use hook and line, basket traps, and nets. Each woman is expected to contribute a portion of her catch to the village elder, who then distributes it according to need.

These rules and procedures have helped safeguard the fish population and, as a result, the communities have enjoyed an abundant supply of fish for more than a century.

## **Case Study 7—Kenya: Security in Land and Small-Scale Irrigation in NGK**

The communities of Njoguini, Gitero, and Kabati (NGK) are located in Nyeri District, at an altitude ranging from 2,060 to 2,240 meters. The annual precipitation of 800 to 1,600 millimeters is divided between two rainy seasons. Numerous rivers and streams, fed by sources in the nearby Mt. Kenya Forest Reserve, flow through the region. The mean annual temperature is about 15 degrees Centigrade. The soils are deep, well-weathered, moderately high in organic matter, relatively well-drained, and generally fertile.

The NGK communities were established in the mid-1960s by landless peasant farmers, most of whom were ethnic Kikuyu. Migrating into the area because of land fragmentation and population pressure in neighboring areas, these people settled on land that had recently been large colonial estates or Government Trust Lands. Some people first settled within the boundaries of the forest reserve, but were forced by the government to relocate.

After Kenya became independent, these high-land areas fell under the aegis of the Million Acre Resettlement scheme launched to redistribute British colonials' land to local farmers. When public and donor funds dried up, private land-buying companies were formed; savings were pooled to purchase large farms that were then subdivided among the new owners. The three NGK communities organized a cooperative in the mid- to late-1970s to purchase their land. By the mid-1980s, registration was completed in all three villages: 250 families had obtained title deeds and

settled on about 800 hectares. The land was divided into 350 plots of one-third to one hectare and distributed. By 1989, virtually every plot was owned by a separate household; the average landholding was two hectares.

Before irrigated agriculture was established, the NGK farmers eked out a living through a mixture of rainfed agriculture (maize, beans, arrowroot, sweet potatoes, potatoes) and livestock production. Crop yields were highly variable and often insufficient. Cash crops were few and most households depended on urban wage labor to supplement incomes.

To improve the communities' livelihood, local leaders in Njoguini conceived a gravity-fed water supply project in 1981. (Some had experience with water projects in other regions and saw the irrigation potential of their land.) Several efforts were made in all three NGK communities to establish irrigation projects, but not until the debilitating drought of 1984–85 ended did each village devise a village-level irrigation plan, formally register its water users' association with the government, and seek technical assistance from the district water officer.

After examining the irrigation plans of the three communities, the district water officers concluded that the development of three separate water systems was technically and financially prohibitive, but that a single integrated scheme could work. NGK leaders approved the joint effort and established a nine-member Executive Committee to oversee project design, development, and management, though the three local water users' associations remained active. Village leaders, farmers, and the water officer then together designed a system that would satisfy their collective needs. A proposal was prepared with help from a U.S. Peace Corps water technician and submitted to the African Development Foundation (a U.S. government development agency). An initial grant of U.S.\$149,030 was awarded in 1985.

The NGK Executive Committee procured materials and equipment, coordinated *harambee* (vol-

untary labor), and managed project funds. Most labor and building materials and some funds (about \$30 per household) were provided by the local people. The Ministry of Water Development seconded two district water officers to help with masonry and pipe fitting and to secure the necessary permits—complicated since the intake was to be located within the Mt. Kenya Forest Reserve, and a storage tank and the main trunkline would encroach upon several private farms. Later, the NGK Executive Committee hired the U.S. Peace Corps water technician and a local counterpart as project managers for one year.

The system currently irrigates approximately 80 hectares; each household owns about one half hectare of irrigated land and a hectare of non-irrigated land. In addition, a standpost is now situated in almost every compound, improving water quality, increasing water availability, and saving women and children the trouble of walking long distances to collect water. NGK farmers now cultivate a much larger variety of food and cash crops on their plots, while in and around the compound, kitchen gardens, zero-grazing practices, tree plantations, and even fish ponds have been established. Diet and hygiene have improved significantly, food shortages are now rare, household incomes have increased, and more children now attend school.

At the time of the construction of the joint irrigation scheme, most families held title deeds to their land and had access to a reliable and adequate water supply. This control over productive resources, as well as the water management decision-making process, were identified by the NGK farmers as critical to their long-term investments in the irrigation scheme.

### **Case Study 8—Tanzania: Land Tenure and Resource Management in Lyamungo**

Lyamungo Parish is located in Kilimanjaro Region on the southern slopes of Mt. Kilimanjaro at an altitude of 1,220 to 1,370 meters. The parish comprises three villages, the government

Lyamungo Agricultural Research Institute, the Lyamungo Secondary School, and several coffee estates. It is bordered by the Weruweru River to the west, the Sere River to the east, Narumu Parish to the south, and the Mt. Kilimanjaro Forest Reserve to the north. The volcanic soils are generally fertile, and the average annual rainfall of 1,600 mm falls in two seasons—ideal for coffee production.

The Chagga people have lived on Mt. Kilimanjaro's lower slopes since the early 17th century. As their population increased, they moved further up the mountain. Lyamungo was first occupied in the early 1900s. By the 1920s and 1930s, population increases and the establishment of large coffee estates resulted in land scarcities. In addition to their mountain farms, the Chagga began to cultivate land in the plains. Today, Lyamungo's three villages include 6,574 people and cover 9.85 square kilometers. The average household landholding of about 1.2 hectares is often divided into three or four plots—two-thirds of a hectare on the mountain and the same amount in the plains. While every Lyamungo farmer owns land on the mountain, about one quarter of them own no land in the plain (though some of these people borrow or lease land).

Coffee and several varieties of bananas are the dominant crops on the mountain plots, though maize, beans, peas, yams, taro and other vegetables and fruits are also grown. Because coffee prices are falling, coffee is gradually being replaced by vegetables that can be sold at local markets. Maize, intercropped with beans, is cultivated on the lowland farms.

Since there is no more land in Lyamungo to bring under cultivation, farmers have adopted various resource-management techniques that allow them to continuously cultivate the mountain farms—a network of furrows for irrigation and domestic water, terracing on steep slopes, agroforestry and other intercropping practices, and zero grazing. Several local laws now enforce certain aspects of resource management. For example, one prohibits people from cultivating steep slopes in the Weruweru River valley.

The Lyamungo mountain farm or "home garden," is a complex land-use system that makes effective use of the natural resource base. These gardens generally have four vegetative layers. The top story consists of tall, mostly indigenous, and economically important (fuel, fodder, timber, and medicines) trees that form a protective canopy against the sun, rain, and wind, and thus keep moisture and temperature regimes for the crops relatively constant. The next layer usually consists of a banana canopy with some fruit and fodder trees. Bananas are the local staple, and surplus fruit is sold for cash. Below this layer is a bush-level growth of cash crops, such as coffee, maize, and a few young valuable trees and shrubs. The lowest layer consists of ground-covering and climbing species, along with in-ground roots and tubers such as beans, taro, herbs, and fodder grasses. Intercropping helps ensure the effective use of soil nutrients, moisture, and sunlight.

Most crops in home gardens are watered directly via the furrows of the gravity-fed irrigation systems. In some cases, intakes are several miles from the farms; in others, a nearby dam stores water for the dry season. Clans manage the furrows and irrigation systems and regulate water use. Irrigation allows for year-round production and multiple harvests of some vegetables and fodder species. Soil fertility is maintained by applying cow manure. In addition, many crops are leguminous, and tree leaves add nutrients to the soil.

The average Chagga household owns two cows, three goats, and two sheep. Cattle—mostly high-yielding dairy cattle—are kept primarily to meet domestic milk needs, while goats and sheep are raised for meat and, occasionally, for sale. All cattle are kept in livestock stables on the mountain farms, where they are permanently stall-fed with banana pseudo-stems and leaves, grass grown on farm boundaries or on the farm itself, crop residues, and fodder from trees and shrubs. Farmers grow grasses for fodder around the homestead, along paths, and along furrow channels.

Village land in Lyamungo is held, according to customary tenure, by individuals or households. This arrangement in Lyamungo traces back as far

as anyone can remember. Indeed, probably nowhere else in Tanzania is land so strongly held as individual property. A basic tenet of the local customary regime is that a man who develops bush land by planting trees—initially bananas, but later coffee and other trees as well—thereby establishes a permanent interest in it.

Traditionally, fathers passed their land on to their oldest and youngest sons. Today, land is given to the youngest son only. (The local population growth rate is low since most maturing children migrate.) All farmers who own land on the mountain inherited it from their fathers, though a few obtained additional land by purchasing some and a very few by clearing new land many years ago. In contrast, only half of the farmers obtained their plain farmland through inheritance, while 12 percent purchased it.

Because the Kilimanjaro region has long been of great agricultural importance to Tanzania, producing significant food and export crops, especially coffee (the region grows about 30 percent of the nation's mild arabica coffee), the government does not interfere in local land issues. As a result, the Kilimanjaro region continues to adhere to customary land ownership even though the government introduced legislation that made all land state-owned. Even the "villagization" or collectivization policy of 1967–75 did not disrupt land-use and settlement patterns. Except when the German colonial administration appropriated some land for settlers at the turn of the century (and even then the alienated land was not being cultivated), the Chagga have no experience with losing the rights to their land. This security in their land provides them with the incentive needed to invest in long-term and expensive resource-management activities.

### **Case Study 9—Kenya: Traditional Village Institutions and Soil Erosion Control in Katheka**

Katheka Sublocation in the Machakos District lies 75 kilometers east of Nairobi in a semiarid and marginally productive area. Originally, the

area was sparsely populated by the pastoral Akamba people. Over the past 35 years, however, land use has become predominantly agricultural. Maize is the principal crop and staple food. Farming is risky, however, because the soils are generally infertile and rainfall is both low (600–800 mm per year) and unpredictable (drought every three to four years). Despite its proximity to Nairobi, Katheka is isolated and receives little government support. Most residents are poor and have few material possessions.

By the early 1970s, Katheka faced a severe crisis. The population was rising; resource degradation, particularly soil erosion, water shortages, and tree cutting, was rampant; and agricultural production per capita was falling. No active self-help institutions existed, and no projects were under way to improve the community's well-being. In 1973, the new assistant chief joined forces with village leaders to strengthen community institutions, recruit local voluntary labor, and develop projects—using mainly local resources. First, a cattle dip was constructed; later, three schools and four churches were built.

The most active of the local institutions were indigenous, voluntary, self-help groups organized along clan or family lines known as *mwethya* groups (traditionally including men and women). For many generations, the Akamba people had used *mwethya* groups for emergency assistance and to meet special needs, such as building houses or clearing new fields. But *mwethya* groups were replaced during the colonial era with a more formal system of conscripted labor units.

Contemporary *mwethya* groups are still based on traditional lines of authority, but they are no longer strictly organized along clan lines. Groups have 25 to 35 members, mostly women, from a certain farm neighborhood or household cluster. In most cases, members share a common interest or need as well as group responsibilities, particularly cooperative labor. A few groups require a small entrance fee.

While resource management practices were common during the colonial era, to improve their



efforts, Katheka leaders in the mid-1970s nominated four *mwethya* group leaders to attend a short soil-conservation workshop sponsored by the church in a nearby town. The women learned how to lay out terraces and set levels, reinforce new terraces with grass plantings, and plan for drainage.

The initial success of the first *mwethya* group's terraces and cutoff drains encouraged local women to establish other groups and try similar approaches. By the late 1970s, five groups were operational; in 1987, 12 groups were working. A decade later, 15 *mwethya* groups had been revitalized. Among other activities, these groups had constructed over 20 kilometers of bench terraces and almost 100 check dams and cut-off drains. In addition, Katheka also has a council of *mwethya* groups, known as the Katheka Women's Group, that coordinates community-development work.

Each *mwethya* group is headed by an elected leader and has a secretary and treasurer. It sets specific rotation schedules and enforces individual members' participation. The groups work two mornings a week throughout the year. A member who misses two or three work sessions may be fined, or the group may skip her farm during the rotation. Each member has the benefit of the group labor force three to four times a year. The groups work primarily on the household farms of members, performing routine activities such as hoeing, sowing, weeding, and harvesting, but they also build check dams in gullies that run between member farms. For the most part, the woman of the household picks the tasks to be performed.

Their success has emboldened Katheka's *mwethya* groups to tackle other problems, including putting a hand pump in a well that now provides year-round water for about 100 households. They help members find ways to earn income, including marketing handmade baskets and selling kerosene, and they often join in on such public works as repairing roads, developing water systems, and building schools and churches.

*Mwethya* groups are the mainstay of Katheka's resource-management activities; their revitaliza-

tion has been one of the community's greatest accomplishments. Practices are undertaken through local initiative, housed in traditional institutions, and function in acceptable social contexts. Bench terracing work fits well in the seasonal calendar of activities, does not disrupt social continuity, and leads to a relatively even distribution of benefits. It has also slowed soil erosion, increased water retention, and stabilized agricultural production.

### **Case Study 10—Sudan: Traditional Leadership and Range Management in Butana Region**

The communities of El Sadda and Um Sarha are located in the Central Butana region of eastern Sudan, an area of flat grazing land with a few small hills. The soils are of light to heavy clay with poor water permeability. Central Butana experiences annual rainfall of 200 to 300 mm a year with 25 to 35 percent variability. No permanent surface water exists, and the area contains little groundwater. Only about 25 percent of the land has plant cover. Various grasses are the dominant natural vegetation; acacia trees and bushes are confined to seasonal water courses. Water comes from seasonal wetlands (depressions), man-made ponds called *hafirs* (which hold water up to eight months a year), and wells dug in the few spots where groundwater is high.

The spatial distribution of groundwater has resulted in dispersed settlements and pasture use. Um Sarha is on the northern boundary of central Butana. The people migrated to the site recently and settled around the community *hafir*. El Sadda, on the eastern side of Central Butana, was a nomadic camp; a village emerged after a *hafir* was established and several shallow wells hand dug.

The Shukriya tribe inhabits the two communities. In 1992, there were more than 2,000 permanent residents and some part-time residents who continued to live semi-nomadic lives. Traditionally, Shukriya clans occupy specific territories

and live in one camp when they migrate. Rangeland and large watering places are communally owned and managed while agricultural land and hand-dug wells tend to be privately owned by extended families.

All economic activities revolve around livestock husbandry; agriculture (quick-maturing sorghum varieties and some vegetables) is the second main activity. In the past, the nomads concentrated on a single species of animal, either camels, cattle, sheep, or goats. Today, resource scarcity makes extensive mobility and such specialization impossible. In 1992, there were an estimated 3,500 sheep, 2,300 goats, 1,800 cattle, and 1,600 camels in the two villages.

Shukriya herders are required to take livestock to remote areas during the rainy season. This preserves grazing areas around the two settlements for dry-season pasture as well as year-round pasture for small ruminants and lactating animals, which are always kept in the village. Because almost all water during the dry season comes from wells, most livestock are kept near the settlement then. The principal concern is protecting the land from other herders during the rainy season.

Historically, the rangeland-management system was well managed by tribal leaders who organized grazing areas and the use of wells and dams, established nomad routes and grazing times, enforced tribal customs and codes of behavior, protected *hafirs*, and ran native courts to settle disputes and decide on penalties for violations.

The Native Administration law passed by the colonial powers legitimized traditional tribal leadership and authority. But in the early 1970s, the new national government repealed the Native Administration and created local councils. Local *Sheikhs* (clan elders) and *Khalifas* (religious leaders) lost their authority and the rangeland management systems were undermined. The local councils have the power but neither the information nor the means to exercise their authority. Most of Butana became an open grazing area for local and foreign herders, resulting in pasture degradation. With the establishment of more

permanent water sources, more animals could be kept around the settlement for longer periods, so rangeland was degraded.

In response, the tribal leaders worked with the local councils to revive rangeland-management practices. Today, the traditional leaders manage the rangelands with the support of the local councils, which have the legal authority to enforce local laws and regulations. This support is critical in influencing foreign herders, who consider all land as government land with rights of use extended to everyone and often break the traditional tribal rules.

In Um Sarha, the *Sheikh* is also the chairman of the local council. The rangeland-management practices are well organized and the village grazing zone is well defined. In El Sadda, the people are led by the *Khalifa*. As the most influential person in the village, he organizes the community to protect local rangelands and manage pasture. In El Sadda, there is no clear boundary for the village grazing zone yet, but the *Khalifa* is working with the community to demarcate one. In both communities, the local council supports the tribal leaders by reporting offenses to the police.

## Case Study 11—Tanzania: Indigenous Knowledge and Water Management in Msanzi

Msanzi village is located in Rukwa Region, southwest Tanzania. The village land is divided into two distinct land systems—the Kira-Longo Hills, which range between 1,600 and 2,150 meters, and the Sintali Plain. Both the Msanzi and Sukwa Rivers originate in the forested hills, joining in the settlement to form the Nsingewi River. The soils in the river valleys are deep, moist, rich in organic matter, and fertile—in contrast to the loamy sands and gravel on the Sintali Plain, which are generally infertile. The region receives 800 to 1,000 mm of rainfall annually in one wet season.

Until the 1970s, small-scale agriculture provided farmers in Msanzi with enough subsistence

food (primarily maize) and with small surpluses that were exchanged for essential goods. Most of the food was produced on farms and in dry-season gardens in the Kira-Longo Hills and river valleys. In 1933, heavy rains caused the Msanzi River to flood the main farms. One farmer, Chumia Mulela, organized a traditional labor force to dig a single irrigation canal from the Sukwa River to the outlying Sintali Plain. The delivered water was used to establish a small coffee plantation. For over 30 years, his was the only irrigated land in Msanzi.

In 1966, a severe drought brought crop failure and widespread hunger. Mulela's son, Sebastian Chumia, then a district counsellor, recognized the potential of his father's canal for improving agricultural productivity and reducing farming risks. Together with his father and local leaders, he designed an irrigation system that tapped water from the Sukwa River and irrigated land in both the river valleys and on the Sintali Plain.

Chumia eventually induced the skeptical farmers to invest their time and labor in constructing the irrigation system. The canal they dug was an unlined trench with a stick-and-stone weir. In the valleys, lateral furrows ran from the main canal to fields that were further subdivided by ditches. In the Sintali Plain, the canal branched into multiple furrows that terminated in individual farms. Only local resources and labor were utilized. When completed, each household was allocated  $\frac{1}{10}$  to  $\frac{1}{5}$  hectare of irrigated valley land and another  $\frac{1}{4}$  to  $\frac{1}{2}$  hectare in the Sintali Plain—for a total of 30 hectares of irrigated land (10 hectares in the valleys).

In the valleys, agricultural productivity increased dramatically, providing many farmers with significant surplus crops and increased incomes. In their effort to develop ever more effective irrigation practices and to adapt them continually to changing political, socioeconomic, and environmental conditions, most farmers routinely experimented with promising new techniques, many based on local ideas and knowledge.

In the 1970s, three events significantly changed the nature of village life. In 1973, the small hamlet

of 500 to 600 people became the nucleus of a government "villagization" program. Its population increased to over 2,000 within a few months. In 1975, Rukwa became Tanzania's twentieth administrative region, ending its historic isolation. And in 1978, the government designated Rukwa as one of four major maize-producing areas and offered the farmers powerful economic incentives.

The dramatic increases in population, new infrastructure, and commercialization of maize led to significant changes in land use and farming practices. New farms were established, pastures were converted to farmland, and cultivated fields were expanded and intensified. By the early 1980s, about 110 hectares of land were being irrigated in Msanzi. Irrigated farms were double-cropped, and all fields emphasized maize production, sometimes at the expense of subsistence crops.

With no local irrigation or water-users' group, however, the system was not managed effectively. The expansion increased soil erosion, reduced fertility and productivity, and increased the threat of flooding. The use of chemical fertilizers increased, posing health and other risks. Finally, in 1983/84, severe soil erosion caused the main canal to collapse and sink just before it reached the Sintali Plain, bringing virtually all plain irrigation to a standstill. Incapable of repairing the canal themselves, and with few alternatives, the farmers further expanded valley irrigation. In 1987, severe flooding destroyed most valley crops.

In 1988, Msanzi, with support from Rukwa Region officials and the Norwegian bilateral foreign assistance program (NORAD), rehabilitated its irrigation system. The villagers established a local water users' association, helped redesign the scheme to use elements of the traditional irrigation system, and provided all labor and most supplies and resources. The local government and the Norwegian program conducted feasibility studies, shared building techniques, provided management training, and constructed the intake dams and culverts. The training and experience not only helped the villagers build and manage the rehabilitated system, but also enabled them

to construct a new system that will establish irrigation elsewhere on their land.

## **Case Study 12—Uganda: Transferable Technologies for Fish Farming in Mbale**

Mbale District is located on the western slopes of Mt. Elgon on the Kenyan border. The northern three-quarters of the district, primarily highland, is located at an altitude of more than 2,000 meters above sea level. The district is endowed with fertile soils and good rainfall. The forested Mt. Elgon National Park is the source of numerous rivers, streams, and springs. Wetlands and marshes dot the river valleys.

With 223 persons per square kilometer, mostly of the Bagisu group, Mbale District has the highest population density in Uganda. A significant shortage of land has resulted in land fragmentation, encroachment into the national park, deforestation, the draining of wetlands, and soil erosion. The agricultural economy is dominated by the cultivation of coffee, bananas, maize, cassava, passion fruit, cabbage, and potatoes. Almost all of Uganda's arabica coffee is grown in Mbale, which is also the main banana-growing area for the Eastern Region. Most families also have one or two milk cows and a few pigs, all of which are zero grazed.

Fish farming was introduced in Uganda in the mid-1950s. The Kajansi Fry Centre in Mbale was one of four regional centers established to breed and supply fish fry. Before it collapsed in 1978, the Centre had succeeded in introducing aquaculture. Today 200 farmers, mostly in northern Mbale, practice aquaculture. Both the number of farmers and ponds is increasing—fish is the traditional food of the Bagisu, and aquaculture is more reliable than fishing in local streams. Equally important, fish management skills are straightforward, inexpensive, and relatively easy to learn from other farmers.

Although ponds are often constructed with hired labor, pond maintenance and fish manage-

ment are mainly a family affair. Commonly, a gravity-fed channel is dug from a permanent river or spring to a pond or a set of ponds in series. Often, wire mesh is placed across the water inlet to protect the pond from intruder fish that compete with the farmed fish for space and food. In some low-lying areas, ponds are fed with ground water and rainfall.

Animal manures—cow dung, duck and rabbit droppings—are commonly used to fertilize the ponds. The manure provides essential nutrients for the growth of phytoplankton, the base of the food chain. Food supplements are sometimes added to obtain higher yields, including yellow bananas or their peels, cooked cassava, maize meal, and leaves of certain herbs. Weeds are extracted from the ponds to give preferred plants an edge, to eliminate the habitat of fish predators (e.g., snakes), and to reduce shade in the ponds, which restricts photosynthesis and oxygen production.

Farmers produce fish to eat themselves and to sell, primarily to immediate neighbors. In some years, farmers produce enough to supply more distant markets. Because fish are in short supply, the farmers have no problem selling their fish at a good price, and fish stealing has become a real problem for Mbale's fish farmers.

The principal fish species farmed in Mbale are the common carp and Nile tilapia, both introduced, as well as the local catfish. The omnivorous and disease-resistant carp, which thrives in cooler climates, predominates because it can grow at the rate of 2 kilograms per year and a fertilized pond of carp can yield 0.5 to 2 tons per hectare. Also, the carp is not a prolific breeder, so its numbers—and growth—can be controlled. At the time of this study, however, only farmers in the Bulago area in Mbale had devised methods of breeding carp, and they supplied fry to other farmers.

Tilapia, the second most common species, is sometimes cultured together with carp in the highlands. It is the dominant species in the warmer lowland areas. Tilapia feeds mostly on higher plants, but also consumes a range of foods. Yields of up to 1.7 tons per hectare are not un-

usual. But tilapia are prolific breeders, and large population densities result in small, stunted fish that are not marketable.

Catfish are naturally found in the local waterways. They commonly invade fish ponds and, once there, are cared for by the farmers.

### **Case Study 13—Uganda: Public Policy, Local Laws, and Soil Conservation in Nyarurembo**

The one and a third square kilometer Nyarurembo Subparish of Kisoro District is located in the mountainous corner of southwestern Uganda at an altitude of 2,000 meters. Nyarurembo is dominated by three hills. The volcanic soils are generally fertile, but shallow and highly erodible; in the lowlands, they are mature, deep, well-drained, and very fertile. The average annual rainfall of more than 1,000 mm falls in two wet seasons. Despite its proximity to the Mgahinga National Park (rainforest), no permanent streams or springs flow through the area.

More than 200 years ago, the economy was largely pastoral. In the last 150 years, waves of immigrants from neighboring Rwanda heightened pressure on the land. Animal husbandry gave way to farming, and farmers were increasingly forced to cultivate the hillsides. By the mid-1920s, soil erosion was reducing agricultural performance. The British colonialists established district farm institutes, and in 1935 they organized training courses for extension officers and some chiefs. An agricultural officer from Kisoro who was among the first to receive the training later schooled a cadre of local officers.

In 1939, another large wave of immigrants arrived in Kisoro when famine struck Rwanda. The same year, the local district authorities passed a soil-conservation law detailing how farmers should protect their lands. The law stipulated that farmers construct bunds—soil mounds no less than one meter wide—across cultivated slopes at intervals of less than five meters. Agricultural officers and local chiefs enforced the laws

well. By 1945, virtually all the communities in the district were complying, and by 1949, the area had reached a soil-conservation standard perhaps unsurpassed elsewhere in Africa. During political turmoil and civil unrest between 1971 and 1986, farmers in the district continued to practice bunding, but in ways that violated the strict terms of the 1939 mandates.

The average household landholding in Nyarurembo is 1-1.5 hectares, usually fragmented into five to ten parcels, including both valley and hillside plots. Sorghum, beans, and potatoes are the common crops grown in the valleys while sweet potatoes and cowpeas are the principal crops on the hills. Many families also own goats, sheep, and chicken. Farmers get most of their income from the sale of surplus crops.

For 50 years, Nyarurembo farmers have practiced effective soil and water management. Most visible are the terraces on the three hills, which have earned them fame and numerous government awards. At least three forms of terracing are practiced. *Bench terraces* consist of permanent level steps cut into the hills along contours, the size depending on the available labor, slope, and soil depth. The land is continuously double-cropped. *Band terraces* are contoured bands of land—in this case, eight meters wide—that encircle the hill and are alternately cropped and left fallow (six or twelve month rotation cycles). *Strip terraces* are contoured bands eight meters wide that are continuously double-cropped. Between the bands, the farmers plant napier grass to trap eroding soil. The terraces are knocked down every eight to nine years, when the accumulated soil threatens to ruin the terrace and the area immediately below the grass strip becomes devoid of soil. With the help of the agricultural extension officer, the soil is redistributed and the grass strips replanted four meters above and below their previous locations.

The district soil-conservation laws have been a driving force behind effective terracing in Nyarurembo. Although the laws have been updated, the specific conservation provisions are virtually unchanged. From the villagers' perspective, the

laws have legitimized soil conservation and empowered local authorities to implement and enforce conservation practices (even though they don't know the specifics of the law). The practices enforced, however, are not those stipulated by the law, but rather those that the villagers and agricultural extension officer have agreed are best-suited to local circumstances. Fortunately, the agricultural extension officer is genuinely interested in the people's welfare and has excellent relationships with them. The result, however, is that the (inappropriately specific) district laws have not been strictly implemented or enforced. Technically, the extension officer, chiefs, and other officials could be reprimanded for not performing their duties and the farmers subject to the various fines and penalties stipulated.

### **Case Study 14—Zimbabwe: Local Political Support for Wetland Cultivation in Zvishavane**

The 518 square kilometers of Mazvihwa and Vungowa Communal Lands are situated in Zvishavane District in southern Zimbabwe. The hilly region has limited resources and low productivity. The soil, derived from granite, is generally sandy, low in fertility, and susceptible to erosion and waterlogging. The area gets only 450 to 650 mm of rainfall per year and suffers periodic drought. The dominant natural vegetation is savannah grasses and miombo woodland. Small, shallow wetlands, (or *dambos*), dot the landscape, especially at the base of hills.

The average household landholding is 5.8 hectares. The cultivation of drought-resistant crops—bulrush, millet, sorghum, cotton, sunflowers, maize—predominates. Most households have access to one or more *dambos* at the base of hills. About half of the households own draft cattle (average 2 head). Stocking rates are high—4.6 hectare/livestock stocking unit, compared to the ideal of 10. *Dambos* in the plains are reserved for grazing.

How *dambos* are used and cultivated depends on their water-holding capacity and predominant

soil type. *Dambos* that hold water throughout the year are used mainly as a source of potable water. Crops, and in some cases, paddy production are often cultivated on the edges.

The most common and preferred *dambo* type holds water for up to eight months a year. Such *dambos* are cultivated at least three times a year (August, December, May). The August/September planting is possible because a moisture flush enables the farmers to grow an early season crop, often maize and groundnuts—much of which is harvested and sold in late December. In *dambos* with sandy loam or non-calcic soils, farmers grow such crops as bulrush millet, groundnuts, maize, and sunflower. On heavier clay and calcic soils, farmers grow rice and maize. Both soil types are well suited for vegetables.

Many rainfed *dambos* have shallow soils, retain water poorly and are prone to waterlogging. They are of little agricultural use, though vegetables are often cultivated on the edges early in the wet season before waterlogging sets in. Such *dambos*, however, are important seasonal water sources.

In many cases, rice, maize, groundnuts, sunflowers, and vegetables have been continuously cultivated in *dambos* for more than 100 years without any significant drop in productivity. Most of the produce from the *dambos* is sold locally, accounting in many cases for more than half of the family's income. *Dambo* yields fluctuate from season to season, depending principally on the amount of rainfall. More important, however, *dambos* almost always provide some produce, so they are the main source of food security in Zvishavane. On balance, the average *dambo* farmer is better off than the average non-*dambo* farmer.

Since they have high water tables, *dambos* are also the site of many hand-dug wells. Although most *dambo* grasses have low forage value at best, cattle are often grazed there during the dry season. *Dambo* grasses are an especially important source of forage during drought years. The grasses are also used for roof thatch and brooms and trees on the edges of *dambos* provide fruit and fuelwood.

Most *dambos* are well managed to keep the resource base productive. To reduce soil erosion and improve water retention, most *dambos* are contoured and terraced. Land preparation involves plowing between contours. Early planting helps ensure adequate crop cover before the main rains and guards against splash erosion. While most *dambos* are inherently fertile, many farmers apply cattle manure to further ensure fertility and maintain proper soil structure and texture. Some farmers also apply termitaria soils to sandy loam soils to increase their clay content. To protect soils and crops from cattle, most farmers have fenced their *dambos*.

*Dambo* farming in this part of Zimbabwe has not only survived the dislocation of people from their homelands to the communal areas during

the colonial period, but also various attempts by government to prohibit or restrict their use. The Natural Resources Act and the Water Act of the 1940s were passed because lawmakers believed that *dambos* were fragile ecosystems best left undisturbed. Fortunately, the hill *dambos* in the study area have survived the ban for several reasons. The area is generally inaccessible to the law-enforcement agencies, as local people know. More important, the government has long recognized that there is a general lack of alternative land in the area and that Zvishavane farmers cultivate *dambos* sustainably, so it does not strictly enforce the restrictive legislation in the District. Local farmers understand the government position on *dambos* cultivation, and they are free to practice sustainable *dambo* cultivation.

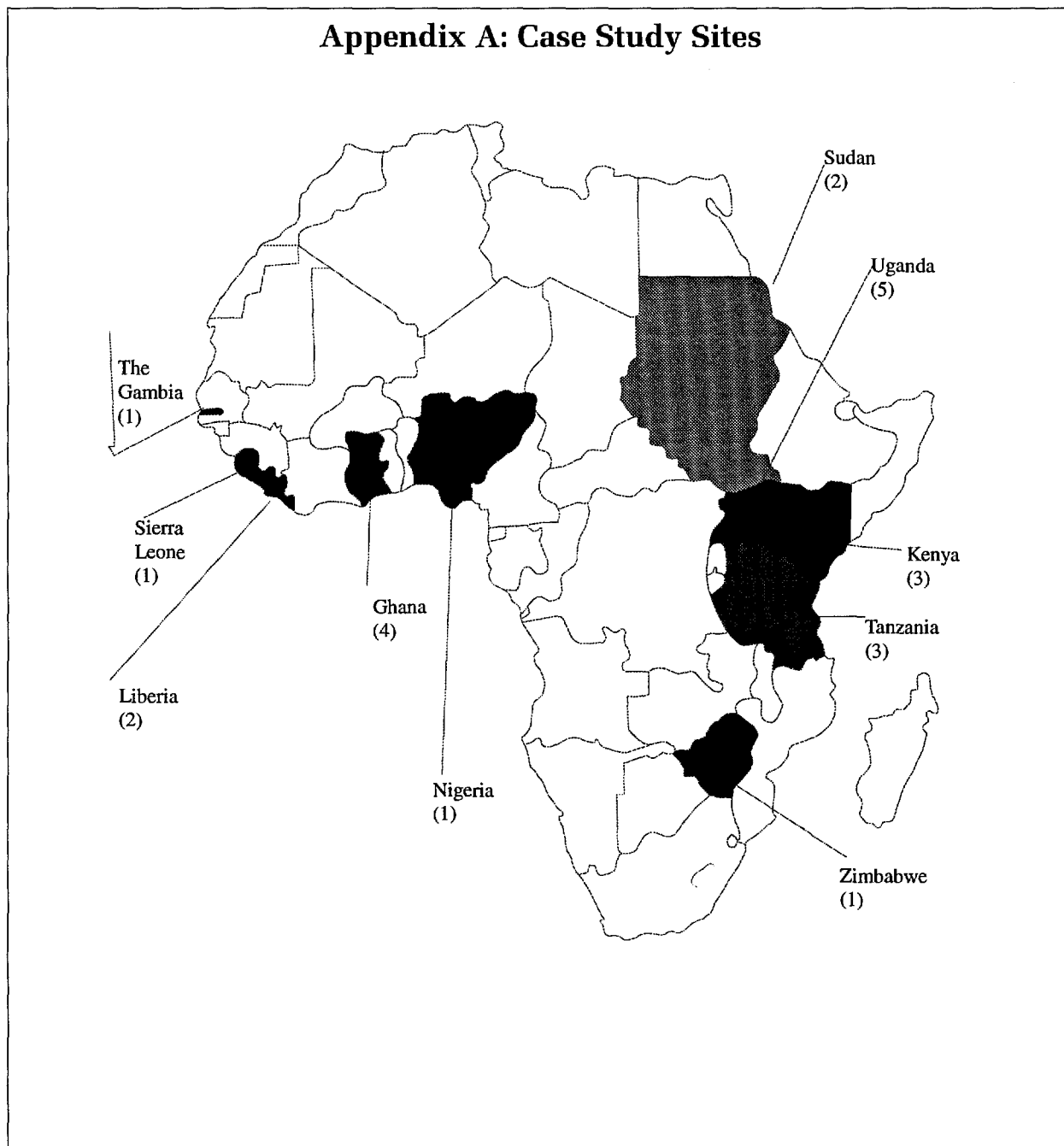
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# Appendixes





## Appendix B: Published Case Studies "From the Ground Up"

Thomas-Slayter, Barbara, Charity Kabutha, and Richard Ford. *Traditional Village Institutions in Environmental Management: Erosion Control in Katheka, Kenya*. FGU Case Study Series, No. 1. African Centre for Technology Studies (ACTS), Nairobi, 1991.

Thompson, John. *Combining Local Knowledge and Expert Assistance in Natural Resource Management: Small-Scale Irrigation in Kenya*. FGU Case Study Series, No. 2. African Centre for Technology Studies (ACTS), Nairobi, 1991.

Dorm-Adzobu, Clement, Okyeame Ampadu-Agyei, and Peter G. Veit. *Community Institutions in Resource Management: Agro-forestry by Mobisquads in Ghana*. FGU Case Study Series, No. 3. African Centre for Technology Studies (ACTS), Nairobi, 1991.

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- . *Increasing Productivity on a Rangeland Ecosystem: The Case of Kashaka Parish*. WRI, Washington, D.C. 1991.

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# Notes

1. Sub-Saharan Africa—23.6 million square kilometers—encompasses all of Africa including Madagascar and the oceanic island nations, except the North African countries of Algeria, Egypt, Libya, Morocco, Tunisia, and Western Sahara.
2. Three of the world's nine major ocean upwellings are off the coast of Sub-Saharan Africa—Ghana to Nigeria, South Africa, and Somalia.
3. The population growth rate appears to be declining in a few African nations—most notably Kenya, Botswana, and Zimbabwe—suggesting a long-term demographic transition.
4. The relationship between population and environmental management is complex. High population density often increases pressure on the resource base. In some cases, this resulted in overexploitation and resource degradation (Cleaver and Schreiber, 1994). In other cases, it encourages effective management, especially when resource-dependent production and livelihoods are threatened (Tiffen et al., 1994).
5. In this report, the term “community-based” includes the individual, household, community and, in some cases, the village cluster. It can also refer to any institution or organization—public or private, formal or informal—within these social groupings. It is recognized that community-based organizations are neither homogenous or undifferentiated, but that they include multiple actors and institutions often with different roles, responsibilities, resources, and relationships (Murphree, 1994; 1993; Uphoff, 1986).
6. Recent declines in the level of foreign assistance further underscore the need for communities and local governments to take greater responsibility for their own development.
7. For the purposes of this report, sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). It includes social, economic, and environmental sustainability.
8. On the other hand, limited livelihood options can force people to overexploit resources to meet basic subsistence needs.
9. That increased production and economic growth improves social well-being and welfare is a primary motivation and incentive for local resource management. In reality, however, that relationship is not always straightforward. For example, involvement in the cash economy may actually diminish the quality of life by lengthening work hours and disrupting family life, both of which may result in reduced nutrition and health.

10. *Guardians of the Forest: The Nkebotok of Southern Turkana* by Geoffrey Clarfield and David Lowe is one of the 23 "From the Ground Up" case studies, although a more detailed box is not included in Chapter VI.
11. Food from *dambos* is especially precious during the "hungry season," just before harvest, when household food supplies are exhausted, local food stores are low, and disease incidence is high.
12. The origin and evolution of cultural practices and the relationship between culture and behavior, including resource management, are complex. While some researchers argue that environmentally friendly cultural attributes evolve to ensure sustainable socioeconomic well-being, others believe that culture evolves more independently of any practical function, including resource management (Wilson, 1985; Rappaport, 1979; 1968; Harris, 1974; Ashley Montagu, 1968). Either way, it is clear that culture shapes the way people perceive many phenomena and subsequently behave.
13. Institutionalized conflict-management mechanisms have often evolved from underlying social and cultural norms.
14. The extent of land appropriation varied by colonial power and African country. For example, the British took control of much of the most productive land in Kenya, but relatively little of it in Sierra Leone.
15. The few exceptions are noteworthy. Kenya is the only African nation that systematically individualizes tenure; its government conducted a comprehensive demarcation and survey of all holdings several years ago, and these are still being converted to individual ownership and registered today. In Botswana and Senegal, the governments have created local land administration institutions that administer land under indigenous tenure rules subject to statutory provisions.
16. Because of their influence and power, local leaders with interests and agendas that contradict effective environmental conservation can also significantly disrupt on-going or inhibit proposed natural resource management activities in their community.
17. That the cultivated land per capita in Africa is low by world standards—only 0.3 hectares in 1987—is a reflection of generally low levels of agricultural technology, most of which are various forms of labor-intensive shifting cultivation. Equally important, the rate of return of agricultural production, declining for many of Africa's major crops, suggests the need for technological and other investments.
18. Peak work loads often coincide with the "hungry season"—when nutrition is poor and the prevalence of disease high—further jeopardizing available labor.
19. In Tanzania, for example, 26 percent of all land is protected either in the form of national parks, game sanctuaries, or forest reserves (Shivji, 1994; Hoben et al., 1992). In Kasese District, Uganda, more than half of the land has been set aside by the central government for national purposes—national parks, forest reserves, state farms, and other operations, such as prisons, airports, and fuel depots—for national purposes (Veit, 1994).
20. In many African nations, actions that are not specifically authorized in legislation are deemed illegal.
21. In a few nations, including Liberia, Sudan, Somalia, Rwanda, and Angola, reform has failed or halted amid internal strife and the breakdown of order. In others such as Sierra Leone, the Gambia, Cameroon, Togo, Zaire, and Nigeria, political and economic reforms have not even been initiated. While Africa has never been homogenous, its variety has never been more striking than it is today.
22. Principally because of political turmoil and civil strife, NEAP preparation has not started

or has stalled in a handful of countries, including Chad, Equatorial Guinea, Liberia, Somalia, Sudan, and Zaire.

23. Bylaws are local legislation to implement parent (often national) legislation. Local laws address issues that are not regulated or are inadequately regulated at the national level. Local laws must be constitutional and not in conflict with any other existing legislation (Rukuba-Ngaiza and Hitchcock, 1995).
24. Some policy reforms under way are more compatible with aims for sound environmental management. For example, evidence suggests that fiscal reform and economic development promoted in the private sector also encourage pluralism, which often leads to increasing attention to social, environmental, and other public interest issues (van de Walle, 1994; World Bank, 1989).
25. Environmental regulations are critical to effective natural resource management. Market incentives should complement and support them to encourage sound resource management.
26. Creating resource-dependent economic opportunities does not mean that governments should stop promoting other economic activities independent of local natural resource capital. Indeed, such activities should complement resource-dependent economic activities and will become increasingly important as populations continue to grow and economic expansion improves local purchasing power.
27. The tenurial security required for effective community-based management does not necessarily require state-sanctioned and documented statutory rights. More important is governments' fulfillment of their responsibility to help communities defend and benefit from sustainably managed natural resources, whether public or private.
28. Alternatively, common property is customarily "owned" by the entire community, including women. When such land is formally titled, however, the deed more often includes only the village's men.
29. To minimize costs and speed the titling process, governments should consider surveying land initially at the village level and subsequently for individuals and households. Titling schemes should seek to minimize the amount of open-access land. For example, communal land and common property regimes should be included in village boundaries and such land should be placed under the jurisdiction of an appropriate user group (Hoben et al., 1992; World Bank, 1992b).
30. For example, the United Nations Development Programme's Africa 2000 Network, the Global Environment Facility's Small Grants program, and the United States Agency for International Development (USAID)'s PVO-NGO/Natural Resource Management Support program, as well as in-country USAID grants management units.

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