FROM THE GROUND UP
CASE STUDY NO. 1

Traditional Village Institutions In Environmental Management: Erosion Control In Katheka, Kenya

Barbara Thomas-Slayter
International Development and Social Change Program
Clark University
Worcester, Massachusetts 01610 USA

Charity Kabutha
(formerly with)
National Environment Secretariat
Ministry of Environment and Natural Resources
Nairobi, Kenya

Richard Ford
International Development and Social Change Program
Clark University
Worcester, Massachusetts 01610 USA

February 1991

Edited by
Center for International Development and Environment
World Resources Institute, USA

A

Published in Kenya by
World Resources Institute (WRI)
Center for International Development and Environment
1709 New York Avenue, NW, Washington, DC 20006 USA
Tel.: (1-202) 638-6300; Fax: (1-202) 638-0036
Tlx.: 64414 WRI WASH

and

Acts Press
African Centre for Technology Studies (ACTS)
P.O. Box 45917, Nairobi, Kenya
Tel.: (254-2) 340650, 336603
Fax: (254-2) 336793; Tlx.: 22448 ACTS KE

Printed by English Press Ltd.
P.O. Box 30127, Nairobi, Kenya

Cataloguing-in-Publication Data

Traditional village institutions in environmental management: erosion control in Katheka, Kenya/Barbara Thomas-Slayter, Charity Kabutha and Richard Ford. – Washington, DC, USA : World Resources Institute and Nairobi, Kenya : Acts Press, African Centre for Technology Studies, 1991.

(World Resources Institute (WRI) and African Centre for Technology Studies (ACTS) From the Ground Up Case Study Series; 1)

Bibliography: p.

ISBN 9966-41-019-8

B

Series Introduction

In 1987, the Center for International Development and Environment of the World Resources Institute, in collaboration with African development institutions and Clark University's Program for International Development and Social Change, initiated an ambitious program in Africa known as **FROM THE GROUND UP**. The program seeks to increase local, national, and international development assistance institutions' capacity to strengthen community management of natural resources in Africa. The guiding belief of **FROM THE GROUND UP** is that important insights can be gained by analyzing effective community-level efforts in natural resource management. In practical terms, this principle means identifying communities already pursuing ecologically sound self-development and analyzing the reasons behind their success—local leadership, viable institutions, suitable technologies, etc.

FROM THE GROUND UP shares the results of its case studies and their policy implications with other communities, national policy makers, and the international development community. Publications, conferences, workshops, training programs, radio, and video are used to reach these audiences. Over the long term, these findings will promote decentralized, small-scale natural resource management policies, influence the allocation of development resources to the grass roots, and foster self-reliance and sustainability within the communities.

WRI's **FROM THE GROUND UP** case study series is designed for professionals in the development community—governmental and nongovernmental development and environmental planners and field workers, international and national development assistance officers, and concerned academics. The series is intended to inform policy-making, stimulate discussion on environment and development, and assist in training programs for development officers.

The African Centre for Technology Studies (ACTS), based in Nairobi, and WRI are collaborating to publish the **FROM THE GROUND UP** series for distribution in Africa and elsewhere. ACTS is a nonpartisan, nonprofit institution established to conduct policy and practical research in technological innovation and natural resource management. ACTS promotes the view that technological change, natural resource management, and institutional innovation are crucial to sustainable development and should be at the core of all development efforts.

Contents

Figures

Acknowledgements

Preparing this case study on Katheka Sublocation was possible only through the assistance and support of many people and organizations.

The Kenya Government's Ministries of Environment and Natural Resources, Water Development, Agriculture, and Planning all provided personnel and organizational support. The director of the National Environment Secretariat (NES) from 1985 to 1989, A.K. Kiriro, and other NES members of the field research team, including Florence Kariuki, Catherine Kimani, Wycliffe Mutero, and Julius Muinde, also supported the work. From the NES, Eliud Ngunga, Elizabeth Oduor-Noah, and Isabella Asamba helped to revise and clarify the village analyses.

Many Katheka residents helped, especially Assistant Chief William Mutua and Grace Ngii, chair of the Katheka Women's Group, along with dozens of officers and assistants in Katheka's *mwethya* (or voluntary self-help) groups. In Kangundo Division, District Officer John Ole Mosiany, Water Engineer Nicholas Mageto, and Forestry Officer N. Kinyua as well as many other local technical officers offered their assistance.

Funds for field research and data collection came from the Ford Foundation, the United States Agency for International Development, and the World Resources Institute. Assistance for project activity in Katheka was made possible by a grant from the John N. Taylor, Jr. Foundation. At the Center for International Development and Environment of the World Resources Institute, Peter Veit, David Richards, and Kara Page provided editorial assistance.

Most important, the authors wish to thank the *wananchi* (citizens) of Katheka who are so effectively demonstrating the difference between theory and practice.

Twice in the history of Katheka Sublocation, Machakos District, its residents have been involved in the construction of bench terraces to control erosion and stabilize agricultural productivity. The first effort was coerced, resisted, and not sustained. The second effort began in the early 1970s and continues today. Fifteen traditional volunteer *mwethya* groups have been revitalized and have constructed over 20 kilometers of bench terraces and almost 100 check dams.

Three hypotheses are proposed for Katheka's success in managing its soil resources:

- The effort was a local initiative born out of the necessity to meet basic needs and the realization of little prospect for external assistance in the foreseeable future;
- Bench terracing is a known technique, its effectiveness in reducing soil erosion is well recognized, and it is primarily dependent on local resources; and
- The effort is housed within revitalized traditional village-based institutions and functions within acceptable social contexts.

The findings from Katheka have implications for other communities in Kenya and elsewhere in Africa concerned with managing their local resource base. Specific policy and programming recommendations for the government of Kenya and the development assistance community emerge from this study and are presented in the final pages of this document.

I. Introduction

Natural resource management is critical to a country dependent on agricultural production. In Kenya, agriculture is the dominant economic sector, accounting for nearly 70 percent of national employment, 41 percent of export earnings (mainly tea, coffee, and horticultural crops), and 31 percent of gross domestic product (WRI 1990). Although the sector grew at an average annual rate of 3.5 percent in the last decade, it is short of the annual rate of population growth estimated to be as high as 4.1 percent (WRI 1990).

Kenyan agriculture is dominated by the 17 million people (over two-thirds of all 23.5 million Kenyans) who live and work on farms of 20 or fewer hectares. These smallholders average 2 hectares of land, but 75 percent own less than 2 hectares and over 50 percent own less than 1 hectare (World Bank 1983). They account for nearly 75 percent of the total agricultural output, over 60 percent of the land, and 85 percent of the total agricultural employment (Juma 1989).

Kenya depends on a small portion of its land for most of its agricultural production. Less than 18 percent of Kenya is of high or medium agricultural potential; the great majority is arid or semiarid land. The higher potential zones support 75 – 80 percent of the human population, almost one-half of the livestock population, nearly all major cash crops, and most of the remaining closed-canopy forests. Because they are a scarce resource, good farming areas are a target for speculation, and large chunks are purposely left out of production as capital assets (Juma 1989). Little of the higher potential land is available to family farmers.

The amount of land owned by small holders in Kenya has increased rapidly since independence because of various land reform, redistribution, and resettlement programs. Much of the increase is due to the establishment of small holdings in semiarid lands. The lack of access to high potential land has forced rural people to seek a living elsewhere and to resettle in marginal areas, increasing the population at the rate of more than 5 percent per year (Ford et al. 1989; Wisner 1988; Wamalwa 1989). As Kenya's population continues to increase — it is expected to double within the next 20 years — more pressure will be put on the natural resource base and more migrant farmers will move into marginal areas. Despite this expansion, recent increases in food production have been achieved mainly through agricultural intensification.

Soil loss is a major environmental problem in Kenya (Ford 1987; GOK 1984, 1989). Studies indicate that the country is losing a large share of topsoil in the high- to medium-potential areas and much more in semiarid areas. Gully and wind erosion are common in many parts of the country. Alarming rates of soil loss (up to 32 tons per hectare per year — over three orders of magnitude greater than the rate of soil formation) have been recorded (Juma 1989).

This case study examines soil conservation practices in Katheka Sublocation in Machakos District (*see also Clark University and NES 1988*). It analyzes past, present, and future needs of effective resource management in the sublocation's three villages. It presents recommendations on village-level environmental management, emphasizing lessons on building both local and external institutional capacity for resource management. The study makes suggestions for future policies and projects. This report is intended for decision makers concerned with developing policy that both recognizes the importance and takes advantage of the millions of rural resource users, people who are often capable and interested in seeking ways to achieve socioeconomic development without jeopardizing the resource base upon which their futures depend.

The research for this study was conducted by a multidisciplinary team of five professionals from Kenya's National Environment Secretariat and two from Clark University, Massachusetts, U.S.A. Four high school-level students from Katheka were hired as research assistants. Fieldwork was conducted from July 1 to August 2, 1987, with an additional 12 months for follow-up and analysis. A questionnaire focusing on household demographic and socioeconomic data and resource use was analyzed for 57 out of Katheka's 360 households (16 percent). The team conducted about 30 interviews with leaders of Katheka's 12 women's groups and held extended discussions with another 25 village leaders from schools, churches, businesses, and government.

II. Katheka's Self-help Erosion Control

Mwethya groups have built kilometers of bench terraces to slow erosion. The ecological and historical context of their work is described here.

Location and Ecology

Katheka Sublocation lies 75 kilometers east of Nairobi in Machakos District (Eastern Province). Katheka Center is 13 kilometers from Tala, the nearest market town. (*See Figure 1.*) The sublocation is about 11 square kilometers and includes three villages of over 1,000 residents each. Elevation varies from 1,240 to 1,500 meters. The Kanzalu Hills forming the southern border of the sublocation rise to 1,700 meters; less than 10 kilometers to the northwest, Ol Donyo Sabuk mountain reaches 2,145 meters.

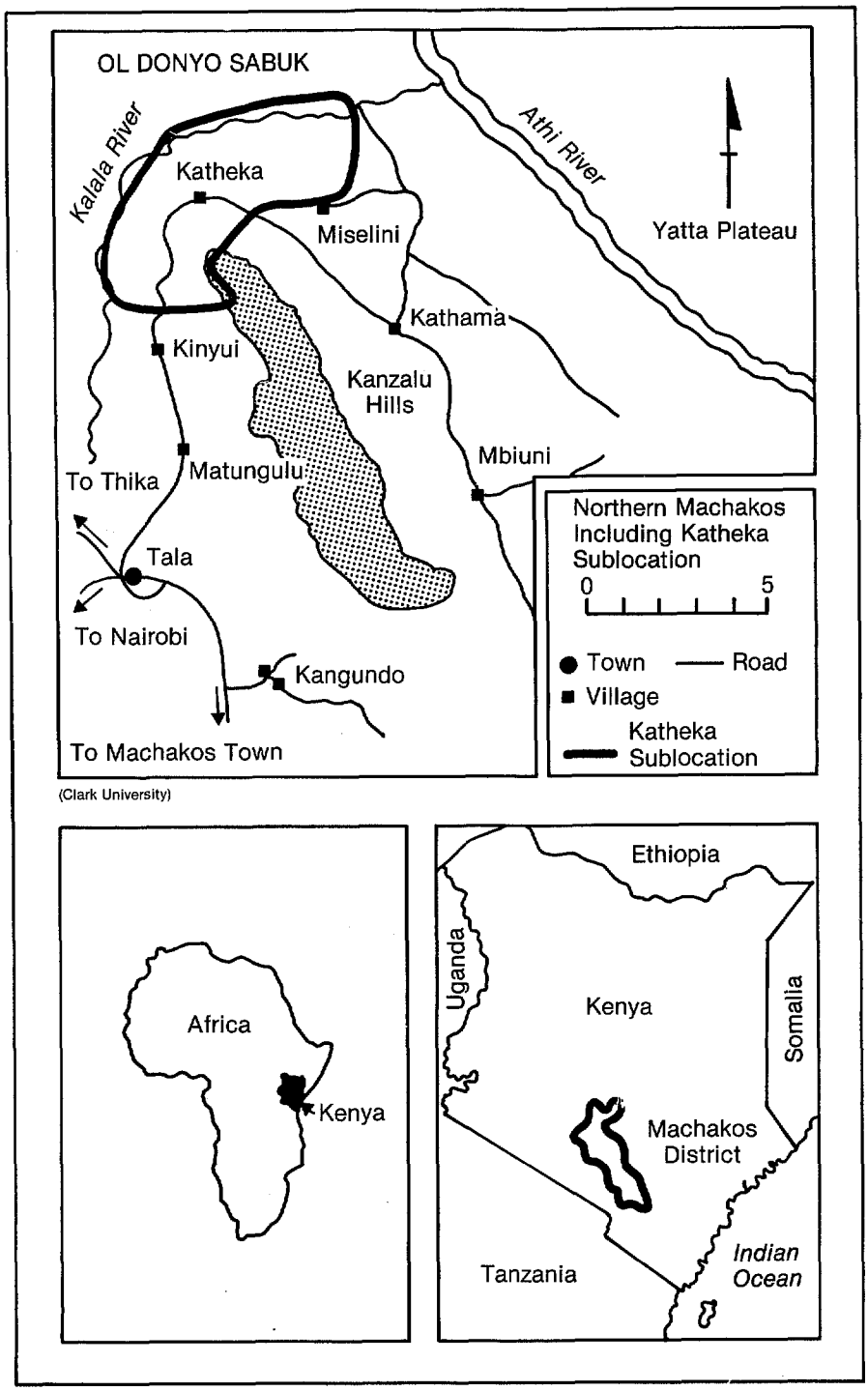
The area is classified as marginally productive semiarid, receiving an annual average rainfall of 600 – 800 millimeters. Although rainfall occasionally exceeds 1,000 millimeters, the area has long been subjected to periodic dry spells and droughts, most recently in 1984 – 85. The long rainy season extends from March to May and the short, more reliable rains last from September to October.

The Kalala River and several springs located in the surrounding hills are the major water sources for the villagers. In recent years, however, the Kalala has been running dry for several months of the year. Currently, no above-ground rivers or streams in the area flow year-round. Katheka's rugged terrain and rocky soils are spotted with scrub vegetation — acacias, cacti, and coarse grasses — typical of Africa's semiarid ecosystems. The sparse vegetation and porous soil offer little protection when torrential rains cause intensive water runoff and massive soil losses.

Land Use Changes

One hundred years ago, what is now Katheka Sublocation was sparsely settled by the agropastoral Bantu-speaking Akamba people who migrated in the 17th century from their original home near Mt. Kilimanjaro. In the 1890s, a two-year drought and a disastrous rinderpest epidemic crippled the Akamba's herds. Many Akamba began to supplement their herding with subsistence farming. The British colonial government, seeing opportunity, encouraged white settlers to establish farms. Although the dry climate discouraged settlers from staking out land

Figure 1.
Location of Katheka.



in Katheka itself, colonial farmers developed at least two large coffee and sisal estates along the Kalala and Athi Rivers some 10 kilometers away. Throughout the country, growing restrictions on access to prime agricultural lands forced Africans to migrate and farm marginal lands.

The new estates near Katheka drew influxes of migrant workers who established farms in the area. Local grazing lands were reduced 20 – 30 percent. The long-term impact was yet more severe. In the early 1900s, larger waves of migrants began to arrive in Katheka from nearby Kangundo and other villages in Machakos. Many workers lived on the estates, adding their large families and sizable herds to those already in the Katheka area. As settlements and livestock numbers grew, so did pressures on the land. By the 1920s, overgrazing and expanding household agriculture were creating serious land use problems in Katheka. Vegetation declined and gullies appeared on the steep hillslopes, eroding the soil and seriously disrupting the water supply. By the late 1930s, these problems affected the entire sublocation.

The Akamba's traditional land use and grazing management systems were unable to deal with these new pressures, in part because the colonial government, in control since the turn of the century, had taken authority from local councils of elders to regulate these systems. Local leaders were overruled by district commissioners, administrative authorities, and sectoral extension officers who knew neither the local customs or needs.

Colonial officials became justifiably concerned about resource degradation. But instead of addressing the root causes — land inequities between African subsistence farmers and commercial farming colonists, the British confronted the symptoms — overstocking of cattle and soil erosion. From the 1930s until independence in 1963, colonial officers tried to force villagers to reduce their livestock herds and construct bench terraces on their farms. Officers laid contours on farms, often without notifying the farm owners, and when farmers found the stakes and ropes on their farms, they knew the officers would force them to construct the terraces. The Akamba and Kenyans elsewhere recognized the colonial hypocrisy and tried to resist. This resistance to conservation programs in the 1930s fueled a national anticolonial offensive in the 1950s (for more information *see* Munro 1975).

World War II put a temporary stop to the colonial government's coercive tactics and the terracing stopped. This in turn led to an increase in soil loss and overgrazing. These problems were exacerbated by a severe drought in 1943. When the war ended, both the colonial conservation campaign and the villagers' resistance resumed. In Machakos, tensions reached a high point in 1951, when colonial extension officers established a livestock quota for each farm. The losses were sometimes overwhelming; several holdings declined from over 500 to 15 head. In Katheka, the massive destocking marked an irreversible change in land use from that of agropastoralism to agriculture.

For the past 35 years, land use in Katheka has been essentially agricultural. Among the 57 household heads interviewed, the median farm size was 1.3 – 2.0 ha. There are no landless households in Katheka; all farmland is in private hands. The remaining communal lands are either

not arable or are maintained for pasture, waterways, or access roads. Property among the Akamba is handed down from generation to generation through the men — divided equally and passed to sons; daughters move to their husbands' land or village. Although men hold government rights (actual title deeds are being issued) to most land, women are involved in the decision-making process on subsistence crop production, they perform much of the fieldwork, and they manage the harvests. For the most part, men decide what cash crops and livestock to maintain, and they manage the profits.

Most of the 3,500 people in Katheka's 360 households are farmers. Maize is the dominant food source, and it is grown on all the farms surveyed. Beans, pigeon peas, bananas, coffee, cassava, and cabbage are also raised on most farms. Pigeon peas, introduced by the government, are a particularly reliable dryland crop, but they require pest management, primarily chemical pesticides. Coffee, the most important cash crop, does not produce as well (3 – 5 kilos per stem) in Katheka's dry climate, as in neighboring areas (5 – 15 kilos). Papaya, mangoes, vegetables, oranges, and cotton appear with less regularity. Millets and sorghums are seldom grown, though they do well in the area.

Farming is risky in Katheka even in the best of years. Families plant, knowing that drought may destroy their crops every third or fourth year. In such times, many families buy most of their food; during the 1984 – 85 drought, 90 percent could not grow enough to feed themselves. In good rainfall years, 85 percent of the 57 households interviewed are self-sufficient in food

Most households also keep a few cattle and goats, primarily as a capital investment. The 1984 – 85 drought had major impacts on local livestock populations, but of the 57 households surveyed, 70 percent own at least 1 cow (5 households own 7 or more) and 85 percent at least 1 goat (12 own 10 or more). Differences in distribution of livestock are more equitable now than before the drought. For instance, whereas 15 households had owned 20 or more goats before 1985, only 2 now have 20 or more.

Present land use practices in Katheka press on the limits of the natural resource capacity; yet the local population continues to grow. A family planning clinic, in Katheka since 1984, has made little progress in reducing the considerable growth rate, which resulted in a 30 percent population increase in the six years from 1973 to 1979. Moreover, Katheka lacks an adequate system of primary and secondary education. The median educational level of the 57 household heads interviewed was 5 to 8 years of formal schooling; only 7 had completed secondary school or its equivalent. Although the community has roughly 1,500 members under 16 years of age, the eight-grade primary school has only 500 pupils, a new four-grade primary school serves another 100 pupils, and a recently founded secondary school accommodates 60 pupils in three grades.

Few of Katheka's residents have the money to invest in land, a home, or other possessions. No resident has electricity, piped water, an automobile, or even a motorbike. Of the 57 sample households, only 33 owned radios, 15 had wheelbarrows, 14 owned bicycles, and 8 possessed ox carts. Only 30 houses (53 percent) had corrugated

iron roofs (up from 2 in 1973), a local indicator of wealth. Recently, 3 of Katheka's 12 shops closed because of insufficient cash flow to support the trade.

Katheka's farmers have attempted several income-generating activities, mostly based on agriculture. Cash cropping of coffee, melons, vegetables, and cotton is limited and until 10 years ago, there was also a modest market for oil seeds. Yet many of these crops are vulnerable to drought, are difficult to market and are subject to considerable price fluctuations, and they incur significant opportunity costs by taking land out of subsistence crop production.

Few alternatives to farming exist for Katheka's residents. Some women are increasingly turning to handicrafts as a source of cash income. They weave *chiondos* — sisal baskets that sell in Nairobi and abroad. The baskets are attractive and skillfully woven, but they bring only Ksh 25 (US $1.25 in 1988) to the women that make them — with leather handles, they bring Ksh 500 – 600 or US $25 – 30 abroad.

For men, some migrant labor opportunities exist. Katheka experiences significant male out-migration. Most men work on nearby coffee estates for seasonal employment, although a few go to Machakos and Nairobi for long-term manual wage labor. Forty of the 57 households interviewed are headed by females, primarily because of this periodic migration. But although the majority of households receive money from family members working outside the community, the funds are small.

Given these current hardships, it is difficult to imagine that the local socioeconomic circumstances were even more precarious 20 years ago. Following independence in 1963, the hostility toward coerced colonial-era conservation continued. In Katheka, as virtually everywhere in Kenya, soil conservation stopped and erosion increased at least a decade into the postindependence period.

By the early 1970s, Katheka faced a severe crisis. The population exceeded 1,800 and was rising, food production per capita was declining, and land use patterns had not changed appreciably from before independence. The nearby coffee estates were under local ownership, but they continued to attract migrant labor and increase pressure on the land. Resource degradation, particularly soil loss, water shortages, and tree cutting, was out of control. No active self-help institutions existed and no projects were under way to improve the socioeconomic well-being of the community or to curb resource degradation.

Effective Resource Management

In 1973, the government appointed a new assistant chief for Katheka. Along with some elders and informal village leaders, the villagers adopted three interventions: strengthening local institutions, recruiting local voluntary labor, and beginning projects for which they could provide the great bulk of material from local resources. The first tangible and encouraging outcome of the assistant chief's efforts was construction of a cattle dip. Later, Katheka established three schools and four new churches.

The assistant chief's and Katheka's greatest success, however, is building local institutions. The most visible are traditional voluntary self-help groups, known as *mwethya* groups. For many generations, the Akamba people had used *mwethya* groups in time of need. Normally, groups consisted of men and women organized along clan or family lines. They provided emergency assistance or met special needs such as building houses and clearing new fields. The custom of *mwethya* groups slipped into disuse during the colonial era, when they were replaced with a more formal system of work groups and conscripted labor units.

Modern *mwethya* groups are still based on traditional lines of authority, but they are no longer strictly organized along clan lines. Groups have 25 – 35 members, mostly women, from a certain farm neighborhood or household cluster. In most cases, membership requirements are a common interest or need and a willingness to share equally in group responsibilities, particularly cooperative labor. A few groups require a small entrance fee. Membership remains stable throughout the year, often for many years.

Encouraged by the early successes of *mwethya* groups in other villages in Machakos District, the assistant chief supported the interests of the women in Katheka to organize local *mwethya* groups. By the late 1970s, five were operational.

Postindependence *mwethya* groups primarily help their members with agricultural work, but they also build and repair bench terraces and dig cutoff drains on private farms. (*See Figure 2a.*) For the most part, the woman of the household determines the specific tasks to be performed by the *mwethya* group on her family's land. The groups also build check dams in gullies that run between member farms and that may border on as many as 20 – 30 separate land holdings. (*See Figure 2b.*) Often they join (sometimes with other groups and individuals) for public works such as repairing roads, developing water systems, and building schools and churches.

One task these women turned to first was environmental protection. Group members learned soil conservation techniques in different ways. Bench terracing was known from the colonial period, but the technique of laying out and leveling contours across the slope of hills had not been transferred to the people. In the early years, the assistant chief and the women's groups failed to convince agricultural extension officers to come to Katheka to train them. Rather than wait any longer, some groups took it upon themselves to experiment. In the mid-1970s, Katheka leaders nominated four *mwethya* group leaders to attend a short soil conservation workshop in Machakos Town, sponsored by the local Catholic diocese. The women learned how to lay out terraces and set levels (using simple string-and-level systems), reinforce new terraces with grass plantings, plan for drainage, and differentiate among soil types and their agricultural potential. In addition, some elders (including a former supervisor) who had worked on coffee plantations and sisal estates and were familiar with water catchment and gully management occasionally offered advice.

In 1981 – 82 and again in 1983 – 84, an agricultural extension officer was stationed in the sublocation and worked with the *mwethya* groups to lay out terraces, but from 1984 – 87, no others came to help.

Figure 2a. Women work together to build contoured bench terraces. (B. Thomas-Slayter)

Figure 2b. Cutoff drains and check dams often run between farms. (B. Thomas-Slayter)

Again, the women had to rely on local people with experience. Despite this slow start, the number of groups increased as the achievements of the early *mwethya* groups became apparent to other villagers. When this survey began, in July 1987, 12 *mwethya* groups comprised almost 400 members; all but 40 were women.

In 1987, as a result of this case study research, agricultural extension officers returned to Katheka to assist in the terracing activities and introduce improved terracing methods, such as cutoff drains and terrace stabilization. With their input, many new bench terraces were constructed, and because of the improved techniques, less work had to be put into repairing old terraces. The improved techniques encouraged the formation of new work groups. During the 12 months of this study, the number of groups increased to 15. One of the new groups is comprised of about 15 young men in their late teens to early twenties, and two include both women and men. Currently, almost three-fourths of the women in Katheka belong to one or more *mwethya* groups.

Each *mwethya* group is headed by an elected leader and has a secretary and treasurer responsible for keeping attendance and financial records, setting rotation schedules, maintaining logs of work accomplished, and related activities. In addition, Katheka now has a council of *mwethya* groups known as the Katheka Women's Group, with a chair, secretary, and treasurer dedicated to coordinating work in community development. The council recently opened a bank account in nearby Tala to improve its financial management and save money for development and income-generating efforts that require capital input.

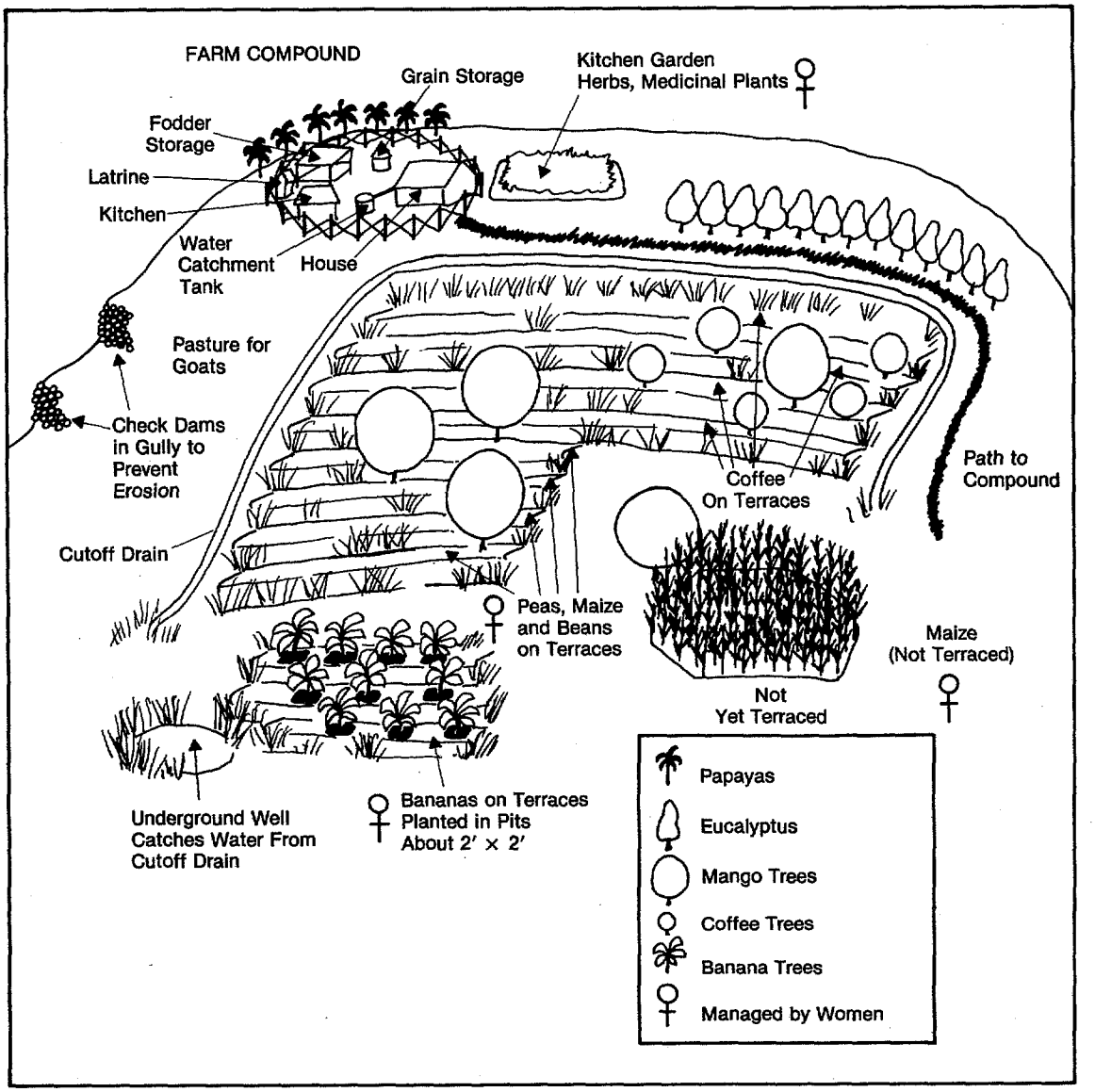
Customarily, the groups work two mornings a week throughout the year. For 10 months (from October to July during the growing season), they emphasize agriculture-related activities such as hoeing, sowing, weeding, and harvesting on privately owned farms; land clearing is men's work. The peak labor need is from March to June. Each member has the benefit of the group labor force three or four times a year.

In August and September, when the demand for agricultural labor is low, groups work on community and resource management projects. Just before the short rains, the land is dry, allowing for terrace construction. Much of the conservation work is done on private land, but the groups also work on communal land 6 – 12 days per year, usually on Saturdays, when they build check dams between farms and repair roads. (*See Figure 3.*)

Each group sets specific rotation schedules and enforces individual members' participation. A member who misses two or three work sessions may be fined, or the group may skip her farm during the rotation. Both are serious losses, so attendance is high. Exceptions are made, for example, when a woman is sick, but even then she usually sends someone in her place.

The *mwethya* tradition has been so effectively reestablished and updated in Katheka that today's groups are the most visible and active of the local institutions and the backbone of the village's resource management activities. Data from the

Figure 3.
Hypothetical Farm in Katheka.



village survey suggest that the results of the *mwethya* groups' efforts have been significant. Although the figures are approximate and the group record-keeping uneven, it is clear that each group digs a minimum of 1,500 meters of bench terraces each year and in some cases twice that amount (each member is responsible for digging 2 meters per work session). Given Katheka's current 15 groups, annual construction of terraces reaches 20 kilometers. Accomplishments in check dams and cutoff drains are equally impressive.

The initial success of the first *mwethya* groups' terraces and cutoff drains encouraged other women in Katheka to try similar approaches. It also emboldened the community to tackle other problems. In the early 1980s, with advice of the division water engineer, work began on several water projects including a small dam that measured about 6 meters by 3 meters. Village groups have subsequently constructed several check dams in gullies, built a few subsurface dams, and installed a hand pump in a well that now provides year-round water for about 100 households.

In addition, Katheka's *mwethya* groups help members find ways to generate income. *Mwethya* groups are beginning to work together to find markets for their handmade baskets and, with the church and other local institutions, are raising funds for larger development projects and new enterprises such as selling paraffin (kerosene) in Katheka. This new use of the *mwethya* institution constitutes an avenue whereby Katheka, on the periphery of the cash economy, can begin to mobilize not only labor but also cash for development.

Limitations and Adaptations

Although Katheka has effectively confronted some of the technical and institutional challenges of ecological sustainability on a local level, villagers have been less successful with externally controlled forces. For example, villagers and the *mwethya* groups are struggling with Nairobi businessmen to gain control of the area's abundant river sand deposits, vital to conserving dry-season water.

Deep sand deposits in the Kalala River and feeder streams retain water and provide a much needed dry-season water source for Katheka's residents. Women use these nearby traditional water beds to collect water for animal and household use. To accumulate more sand and increase water retention capacity, the *mwethya* groups build small rock dams across the river beds and in gullies.

Since 1974, Nairobi construction-business owners have removed sand from Machakos District. They send lorries to Katheka and other sublocations to collect sand, denuding river beds, river banks, and the dams/gabions of their water-retaining sand. Removing the sand sharply decreases the long-term water retention capacity of the river beds, weakens the dams, and increases the likelihood of water shortages, especially during periods of drought. At one point in the early 1980s, up to 200 lorry loads were taken from Katheka per day. The water level has dropped in one elder's well from a constant 10 feet to 20 (3 to 6 meters), and one woman noted that in the 1984 drought she walked five hours each day to obtain water for her family.

Sand removal in Katheka pits poor farmers, mostly women, against wealthy business and powerful political elites and illustrates how weak rural people are in participating in Kenya's public arena. Rural residents have no recourse because sandscooping is entirely legal. Nairobi businessmen purchase sandscooping permits from the Machakos County Council (the permits do not specify locations) and hire a few local teenage boys to help load the sand. The council depends on permit fees for its public works programs, and the construction industry in Nairobi depends on inexpensive raw materials to make a profit. Yet the long-term impact of these actions is that Katheka's already desperate need for water grows more severe.

Women are responsible for providing water for their families and livestock; yet the erosion-control dams and gabions they build are systematically being made inoperable by sandscooping. Desperate to protect sand deposits, women dug deep trenches across some roads; this action did discourage sandscoopers from coming to Katheka for a period in the mid-1980s. In 1989 – 90, however, sandscoopers returned to Katheka in force as other communities increased their resistance to them. Sandscoopers filled in the trenches, threatened and intimidated the assistant chief, and resumed their sand loading, usually at night. The assistant chief and villagers have little capacity to stop their work, and there is no possibility that the police will patrol the riverbeds at night. Thus while the *mwethya* groups continue to work on private lands, sandscooping has diminished their dam-building efforts on public land (for more information *see Thomas-Slayter and Ford 1989*).

III. Core Elements In Effective Resource Management

The experience of Katheka leads to several hypotheses about effective resource management at the village level.

Community Initiative in Difficult Conditions

Katheka's activities in resource management were born out of basic needs and little hope of external assistance in the foreseeable future. Local environmental conditions presented a significant challenge, and in the early 1970s, the effects of a decade of neglect were glaring. Many of the elders who grew up in Katheka remember the first signs of significant soil loss in the 1920s. They watched gullies enlarge and saw the consequent disruptions to the water table and local water availability. In the survey, more than 75 percent of the households interviewed indicated that soil erosion had increased during the first 10 years after independence.

All household respondents made the connections between soil and water conservation and food production. They recognized the fact that bench terracing reduced soil losses and construction of small dams increased water retention. All agreed that without the resource management efforts of the *mwethya* groups, agricultural yields would have suffered precipitously.

In addition to the harsh natural environment, Katheka's residents are distant from market and government centers. Machakos District includes over 1 million people, and the district headquarters is more than 40 kilometers from Katheka Center. Katheka has no phones (the poles are just now being installed), roads are poor, and public transport is relatively expensive.

Kangundo, headquarters of the agriculture, water, forestry, and other technical extension officers, is 18 kilometers from Katheka — 45 minutes by *matatu* (mini-bus) or a 3 to 4 hour walk. When the survey began in 1987, no agricultural officer had been stationed in the sublocation since 1984 (from 1984 to 1987, they visited Katheka only 3 to 4 times a year), the water engineer had been unable to visit for 3 years, the forestry officers had not been there in anyone's memory, and the Machakos County Council road maintenance group had not visited since 1979. Partly as a result of this case study research, extension officers now visit Katheka more often, but staff remain in short supply, and transportation is a

problem because government vehicles and fuel are scarce.

Village residents recognize that Katheka is an isolated sublocation in the larger Machakos District context. They perceive the district level of decision-making as being unconnected and unable to offer much tangible help in their day-to-day development efforts. They realize that if they are to prosper, they must learn to define their own problems, set priorities for action, and find ways to mobilize local and external resources. This realization has helped unite the residents and has given Katheka the confidence to take initiatives on its own.

Known and Manageable Technology

The women of Katheka understand that their ability to produce food in a semiarid region depends on their own care of the natural resource base. Their soil management techniques are responses to recognized problems of soil erosion and water runoff. At the time of the survey, all households interviewed practiced some soil conservation — 91 percent built bench terraces, 66 percent planted grass on the terrace edges, 81 percent used contour plowing, 97 percent planted in rows, 76 percent used crop spacing, and nearly all intercropped their fields and used mounding, composting, cover crops, household waste, or animal manure to maintain and improve soil fertility and protect soil structure.

Bench terracing is not as widely practiced elsewhere in Kenya as is cutoff drain and check dam building. Why did the women of Katheka undertake such a laborious task? Bench terracing was a known technique and its effectiveness in reducing soil erosion was recognized. Many of Katheka's elders had lived through 30 years of coerced terracing and, though they resisted, they knew its value. In the midst of the fervor of impending self-government in the early 1960s, coercive measures stopped and most terracing was halted. In 1973, when the villagers organized around the problem of declining agricultural productivity, it had been more than 10 years since anyone in Katheka had constructed a bench terrace. But the knowledge of terracing had not been forgotten.

Katheka's initial terracing activities were limited by a lack of local technical ability. But as this knowledge was shared internally, progress steadily increased and each new success built on the visible achievements of previous efforts. And although causing some delays, the incremental approach has enabled the villagers to learn and develop proficiency in the techniques of management, organization, and leadership to deal with the increased activity.

In a poverty-stricken region such as Katheka, it is important that development initiatives rely largely on local labor and available resources rather than on external capital or resource inputs that cannot be sustained. When this case study was prepared, Katheka had no motor-driven pumps or mechanized plowing; hand tools and animal traction were virtually state of the art. In contrast, the few externally derived innovations that had been adopted were not widely used, including the use of hybrid seeds (occasionally used by 50 percent of the interviewed households),

chemical fertilizers (41 percent), and chemical pest control (38 percent). Further, the villagers had no debt burdens because few farmers and *mwethya* group leaders were willing to gamble land for unfamiliar inputs.

The introduction of more complex technologies or donor-supported wage labor may bring new opportunities, but it may also disrupt the local economy and undermine self-reliance (Blaikie 1985; Bromley 1985). For example, in 1981 – 82, a donor organization provided an agricultural assistant and funds for 18 months of local wages for soil conservation work in Katheka. Women were paid to construct bench terraces. Disputes quickly developed between women and managers about the wage level, hours worked, and work quality. When the program ended, no provision was made for wages from alternative sources. Work languished for several months after funds ran out, but as resource problems began to increase, the women gradually returned to their voluntary work status. Today, villagers view the payment of wages for conservation work as unnecessary.

Viable Local Institutions

Historically, Katheka's farmers constructed bench terraces during the colonial period when the work was forced on them and more recently through their local initiative. The first effort was never popular and collapsed at independence; the second appears more stable and consistent. What institutional factors are responsible for the seeming sustainability of the second effort?

Today's villagers are certainly more motivated to act, in part because the local resource base has significantly eroded since independence. More important, the efforts were resumed through local initiative, they are housed in traditional institutions, and they function in acceptable social contexts. Terracing activities do not disrupt social continuity, they fit well in the seasonal calendar of activities, and they lead to a relatively even distribution of benefits.

Realizing that single households alone do not have the expertise or resources to stop natural resource degradation in the sublocation, the residents of Katheka pooled their knowledge and energies to meet common environmental challenges. Rebuilding traditional *mwethya* self-help groups and mobilizing them in natural resource management practices are Katheka's greatest institutional accomplishment.

The focus on *mwethya* groups is based largely on recognizing their historical contributions to the community and the concurrent successes of similar revival efforts in neighboring areas. Just as bench terracing was selected in part because of its familiarity, so *mwethya* groups were chosen as the social force to implement the terracing because of their traditional role in Akamba society. Postindependence *mwethya* groups' goals are no different from those of traditional groups, but they have adapted to current needs and opportunities.

Why are Katheka's *mwethya* groups flourishing? First, the broad political environment is supportive. In the early 1970s, active government interest in rural development revived. The government's Special Rural Development Program, which shifted focus to district and village levels, was set in motion with broad donor support.

Interest in the roles of women in development was growing and spurred by the international women's movement. Both Denmark and Sweden began supporting such programs. Concurrently, the government promoted soil and water conservation through self-help initiatives. For example, in 1974, the government, with Swedish support, launched a nationwide soil and water conservation program. These national-level efforts did not reach Katheka, but they did provide much-needed national visibility and legitimized the work of Katheka's *mwethya* groups in resource management.

A second institutional element is the recognized differentiation of gender roles. In Africa, women are integral to agricultural development because they traditionally assume responsibility for most farm work and thus also for resource management (Dankelman and Davidson 1988). In Katheka, they also head many households. Participation in the *mwethya* groups is overwhelmingly female — 14 of the 15 groups elected women as leaders; all three elected officers of the Katheka Women's Group are women; and women control the group's bank account. In so organizing themselves for soil conservation work, the women are acting in accordance with the traditional gender divisions of labor.

But men have recently begun to make significant contributions. Two of the 15 *mwethya* groups are mixed gender, and one is all male. From an institutional perspective, their involvement is not surprising because traditionally the groups were mixed. Yet their participation in subsistence agricultural activities and resource management may signal a gradual transformation of traditional gender labor divisions, which would significantly speed sustainable resource recovery (Dankelman and Davidson 1988).

Third, the *mwethya* groups have flourished because of committed leadership of both the 15 groups and the Katheka Women's Group. These leaders, generally elected by group members, have the respect and support of their constituency and enjoy considerable prestige and status in their communities. Few group leaders have any formal education in leadership or community development, but they effectively organize meetings, keep financial records, assign tasks to individuals and groups, set work quotas for individuals, establish rotation systems among members, mediate conflicts regarding resource use and activities, and introduce new conservation and marketing techniques.

The combination of sound leadership and committed members brings access to labor, the single greatest asset available in most rural communities. When well-organized and coordinated, this energy, with its collective expertise and resources, can tackle problems and meet opportunities beyond the capacity of individuals acting alone.

Fourth, the *mwethya* groups have benefited from the support and encouragement of traditional, governmental, and nongovernmental village leaders, in particular, the assistant chief. Shortly after his appointment in 1973, an official mandate from the government through the district commissioners and local chiefs called for the encouragement of organized activities by women's groups. For the assistant chief, this mandate, coupled with the resurgence of active governmental interest in rural

development, self-help, and soil conservation, coincided with his desire to build Katheka.

Recognizing Katheka's poverty and isolation, the new assistant chief looked internally for ways to resolve local problems. He directed area residents toward self-help activities and facilitated early meetings to revitalize *mwethya* groups. He still organizes public discussion of community priorities, praises the work of *mwethya* groups, informs the community of project progress, facilitates communication between the villagers and external institutions, and occasionally works on farms with *mwethya* groups. His involvement has helped legitimize *mwethya* groups within the community.

IV. Implications and Recommendations

The three hypotheses explaining Katheka's effective natural resources management — community initiatives, known technologies, and local institutions — have policy and programming implications for government and development assistance groups. Opportunities for action exist to channel development resources directly to the local level, where village-based institutions can take the lead in managing their own growth and development.

Overview of Kenya's Decentralization and Resource Management

Kenya is among Africa's leading proponents of decentralized planning and implementation in rural development in general and natural resources management in particular. As early as 1965, in its *African Socialism and its Application in Planning in Kenya: Sessional Paper No. 10*, the government called for "renewed growth" in the quality of life through promoting rural self-reliance and reducing reliance on external assistance (GOK 1965).

Kenya recently expressed continued commitment to decentralized planning and environmental management in its 1989 - 93 development plan. It refers explicitly to its 1965 paper, reiterating goals established then, and calls for preparation of a sessional paper on the environment to lead to national legislation on environmental management and protection. The plan also reinforces the district-level development focus and other themes, notes that an "integrated approach" will be used to implement the district focus, and places priority on popular participation as the underlying theme for the entire five-year plan (GOK 1989).

Legislation on local-level natural resource management often supports these policies. Among the more important laws are the Water Act, Agriculture Act, Forests Act, Local Government Act, and the Chief's Act. All recognize the importance of local needs, opportunities, and capacities.

The government began establishing agencies to support these policies in the early 1970s. It created the National Environment Secretariat (now housed in the Ministry of Environment and Natural Resources) to increase public awareness of environmental issues and regulate use of the nation's productive resources. In the early 1980s, Kenya strengthened its environmental mandate by establishing the Permanent Presidential Commission on Soil

Conservation and Afforestation (housed in the Office of the President).

In the last few years, Kenya's government registered several nongovernmental agencies with natural resource management activities, such as Kenya Energy and Environment Organizations (KENGO), African Centre for Technology Studies (ACTS), Kenya Water for Health Organization (KWAHO), and Manor House. In 1989, the government created the Ministry of Reclamation and Development of Arid and Semi-Arid Areas and Wastelands, which is charged in part with improving the productivity of Kenya's natural resources and rehabilitating degraded areas classified as arid or semiarid (over 80 percent of the country) (KENGO 1989).

Kenya also has a well-developed infrastructure to sponsor training in natural resource management and research on locally applicable technologies and implementation strategies. The government of Kenya recently established the School for Environmental Studies at Moi University, which offers postgraduate training in natural resource management.

Several national research institutes add to the available options for development technology. The Kenya Agriculture Research Institute coordinates research on agriculture and related topics for food and cash crops, agroforestry efforts, and livestock products, and is taking the lead in linking research of all food-related agencies, including local and on-farm products and systems. The Kenya Forestry Research Institute studies traditional forestry and agroforestry issues; its goal is to reduce pesticide use, economize on fertilizer, and increase productivity and sustainability. The Kenya Industrial Research and Development Institute is responsible for intermediate and long-term sustainable technologies, and the Kenya Industrial Property Office, established in 1990 under the 1989 Industrial Property Act, also promotes technological innovation.

Expanding decentralization parallels efforts in resources management. Government circulars and planning documents in the 1960s and 1970s prepared the way for the much discussed 1983 paper, *District Focus for Rural Development* (GOK 1983). This document placed responsibility for planning and implementing rural development directly on district officials. Particulars include creating a district development committee in each district to be "responsible for rural development planning and coordination, project implementation, management of development resources, and overseeing local procurement of goods and services" (GOK 1984, p. 91).

A major objective of the district focus is increasing discussion among local communities and government officers working in the districts. "Full participation of the local community . . . is a key element of the Strategy" (GOK 1987, p. 22). Divisional, locational, and sublocational development committees represent the grass roots level and are encouraged to provide guidance from community members on development opportunities and problems in their areas, the types of projects needed in their communities, and ways to maintain and increase access to and use of completed development infrastructure.

Through its *District Focus for Rural Development* (GOK 1983, 1987), the government outlined structures, procedures, and funds for rural development, including resource management. It subsequently gave field presence to these resource management priorities by posting district environmental officers in each of the nation's districts in 1988.

Since the early 1980s, each district has prepared a district plan, with input from constituent villages, ministries, district development committees, and other government agencies. A plan details district needs and suggests goals. Kenya's district plans are an important milestone — not only for Kenya but for Africa — in suggesting that decentralization can extend to Africa's rural areas and to institutions that directly represent the people. Thus Kenya provides a policy platform backed by legislation and an institutional infrastructure to take action on decentralized environmental management.

Community Institutions and Participation

Trends toward decentralization spurred initiatives in Katheka. National leaders encouraged village authorities to work with their people on local problems. So in 1973, the new assistant chief opened a long process of discussion on community development among local leaders and residents. In the early 1980s, a small leadership core emerged that helped the community agree on the severity of local problems and the feasibility of local solutions. An initial activity was to strengthen local self-help institutions, in particular the *mwethya* groups, to promote participatory problem-solving for specific needs. The *mwethya* groups worked with village leaders to identify soil management as one of their greatest needs, and bench terracing as among their best solutions. Once the community agreed, the *mwethya* groups implemented the plans.

The Katheka example suggests that *local labor and resources, combined with modest external assistance, and managed by viable village or grassroots institutions with committed leadership, can foster sustainable development.* It supports the findings of other studies that a community-based focus for local development can lead to more effective resources management than distant, centralized management (Bagadion and Korten 1985; Chambers 1983; Chamber et al. 1989; Cohen and Hook 1987; Korten 1980; Korten and Klauss 1984; Uphoff 1986). Despite opportunities, community institutions remain an under-utilized resource for planning, implementing, and managing activities in Africa (Agarwal and Narain 1989; Harrison 1987; Korten 1990; Paul 1987; Pradervand 1989; World Bank 1989).

For communities like Katheka, which have the institutional and leadership skills to prepare and implement local development plans based on popular participation, government and development assistance agencies have the opportunity to achieve a lasting impact in resource management and to multiply the effects of their support. *Continued study and evaluation of local initiatives in sustainable development can lead to a better understanding of the potential roles and involvement of local institutions such as the* mwethya *groups. Policy considerations to encourage and support community*

initiatives will assist and reinforce local leaders in their efforts to help organize self-help initiatives. Programs and field projects with explicit goals to strengthen ongoing community-wide activities of rural institutions can provide both the incentive and the leverage for them to resolve other community problems.

For Katheka, the process of identifying problems, gaining consensus on solutions, and implementing these locally derived plans took over 10 years, despite previous experience with bench terracing and *mwethya* institutions. Few communities have such continuity of committed leadership and little means to develop community consensus on problems and options. How can government and development assistance agencies help communities and their leaders systematize participation and gain consensus on local problems, and go on to create their own development strategies over shorter periods?

Increased sustainable agricultural production, local resource management, and income generation will require significantly expanded training to *strengthen the organizational capability of government (district, location, sublocation) and village-based institutions in decentralized planning and implementation.* Various tools and methodologies are known that can help local groups and leaders organize themselves to plan, finance, and take action on their own development efforts, and that enable government and nongovernmental extension staff to facilitate this process. (*See* NES et al. 1990) Training institutions can be mobilized to share these methodologies or to develop and field-test new techniques in collaboration with field officers charged with working at the community, village-cluster, or sublocation levels.

Local institutions would also benefit from *learning skills to acquire materials and funds to purchase inputs not available locally.* The construction of terraces, check dams, cutoff drains, and subsurface dams requires building materials and tools. In Katheka, individual members of *mwethya* groups do not have enough tools or money to finance these activities on their own. Acquiring even basic tools and other external inputs is a problem. Initially, the women used their own tools; for cement and other materials not available in the village, the assistant chief organized fundraising programs, including large village meetings, appeals to water users, and direct cash payments for resource use. But in poor areas such as Katheka, locally financed development limits the potential of a well-organized community.

Through the establishment of small development funds potentially accessible to village groups, government and development assistance agencies can accomplish much with modest investments. These funds could *supplement existing village activities that are part of a carefully determined plan of action.* For example, in 1988, Katheka obtained external inputs with the help of the research team, including about US $4,000 (Ksh 80,000), a hand pump, well rings, and technical advice for a dilapidated well. This modest assistance enabled Katheka to develop a new water supply and hand pump, hand tools for 400 village women's group members, a roof top catchment tank, a new roof for a small school, and eventually capital for a paraffin (kerosene) distribution center owned and operated by the Katheka

Women's Group. The Katheka study indicates that cost sharing with village communities not only works, but it increases village organizations' involvement and ownership.

The Nature of Technologies

The tools and techniques used by Katheka's residents in their resource management activities are locally known and managed. Bench terracing was practiced in Katheka for 30 years during the colonial period and was remembered for its positive impacts on erosion control and water retention. Simple string levels are used to lay out contours, and with local labor, shovels, *jembes* (hoes), mattocks, and ox-drawn plows, bench terraces and cutoff drains are built.

For gully control, the people shifted from using expensive wire-caged gabions to natural control measures, especially planting sisal and other plants in gully channels. Sandscooping controls consist of digging deep trenches across the tracks and rutting roads that lead to sand beds. Although the trenches are not foolproof, they did deter many would-be scoopers from entering the sublocation. The implication of these findings is that locally-based development technologies are more likely to be sustained if they are known to villagers or can be quickly taught, understood, and adopted by rural residents.

The Katheka survey also revealed that women were receptive to improvements on bench terracing, such as digging cutoff drains to reduce the pressure on the terraces and planting grass on the terrace edges to strengthen them. Although such bench terraces require more initial input, they are more effective and need less maintenance; these facts encouraged the women to adopt the new techniques.

Similar successful interventions involving improvements of existing technology can be cited from Kenya, including a popular fuel-efficient cookstove based on the traditional *jiko* stove. Developed through a Kenyan research initiative, the productivity of fuel (wood or charcoal) is dramatically improved with the addition of a simple ceramic liner in the local *jiko* stove (Kinyanjui 1984). Such experiences suggest that with increased involvement in sound indigenous techniques, farmers are more likely to accept improvements on existing technologies that are adaptations of familiar "parent" methods than complete new and foreign practices. *Government and international research institutions should consider expanding their work in the development of more effective and efficient locally-known techniques.*

It is well known that farmers experiment with different methods and alternative techniques to improve their agricultural output (Bunch 1982; Chambers et al. 1989). Government and international research institutions have also developed and field-tested new techniques, many based on traditional practices, that have improved the well-being of some villagers. Many such developments are not well-known or have not been made available to the rural people who could benefit from them. In Katheka, for example, initial bench terracing work was stalled because the technique of laying out terraces was not widely known and local leaders could not attract outside technical assistance. Extension officers were not aware of the local institutions and

development potential because of Katheka's isolation and problems with transport and fuel shortages.

Early training of *mwethya* group leaders and members — village specialists — in bench terrace, check dam, and small dam/water storage tank construction would have improved the quality and output of the Katheka groups. Governments and assistance agencies *previously relied on training experts external to local communities and placed too little attention on training local groups and agencies* in terracing, reforestation, water development, land management, and other technical tasks. Local leaders want villagers to receive on-the-ground training, and believe it will have a high return in implementing sustainable natural resource management. Thus a priority is to *train village-based and other local specialists in low-input and manageable technologies such as soil control, reforestation, wind breaks, sustainable agriculture, and small dam / well construction, and to assist village leaders to acquire materials and raise funds for low-input technology installation.*

Linkages with Local Community Institutions and External Political, Technical, and Economic Entities

Katheka's experience indicates that its development is limited, in part, because only the immediate local resources and institutional support are used. The community has tried integrating into the regional context by soliciting support from government extension officers, marketing their products, and regulating sandscooping. Yet Katheka has been largely unsuccessful in establishing the necessary links with external agencies to help the community address their concerns.

Why has no force or spirit of collaboration emerged among neighboring sublocations to address common problems and opportunities? Why have both public and private elements on the outside obstructed or been indifferent to Katheka's needs? First, the region is poor and when money has a significant influence, Katheka and other cash-scarce sublocations usually lose out. Second, the poor rural infrastructure means communication between and among sublocations is difficult, thus discouraging village-village collaboration. And third, rural communities have little access to

governmental or nongovernmental development agencies.

Linkages with external political, technical, and economic entities are fundamental for the long term development of local institutions and the implementation of local initiatives in sustainable development. Yet Katheka's lack of access to external agencies is common to many rural communities throughout the developing world. It results, in part, from an overly centralist perspective in designing, managing, and paying for rural development (Chambers 1983; Leonard and Marshall 1982; Uphoff 1986; World Bank and Instituto Italo-Africano 1989). Even in a country such as Kenya, which has made progress toward regional planning through its district focus, political distance between villagers in Katheka and district headquarters in Machakos Town (about 50 kilometers away), for example, is still considerable (Silberfein 1984).

The findings from Katheka shed new light on district-level planning. Local leaders and residents have not participated in previous regional planning; nor have they benefitted directly from the Machakos Integrated Development Plan. They perceive the district focus as distant and the district plans one step removed from village priorities. Policymakers interested in promoting sustainability will benefit from *considering and supporting the expressed priorities of communities such as Katheka, which in turn are the foundation stones for building regional plans and supporting regional actions. Mechanisms are needed to involve local communities more effectively in the planning process and to integrate community plans into the regional context.* In this way, the regional officers with responsibilities to serve rural communities would be more accountable to those whom they serve.

Communities exist in a social, economic, and political arena in which they are both influenced by and dependent on external support, protection, communication, training, and technologies. Although some community-based development functions effectively within the bounds of Katheka and other sites, integrated development and long-term sustainability require more than community-by-community action. Katheka's experience suggests that *a community-based strategy needs mechanisms to facilitate links to external agencies in ways that benefit both parties. Research on alternative models of regional planning, in which member communities both contribute and benefit, would yield a better understanding of the relationships between communities and external institutions. Such information would be helpful in developing a regional policy to facilitate such linkages and relationships.*

The lack of regional linkages and direct accountability of political and technical officers to Katheka's people means that cooperation beyond the community is minimal. Sandscooping in Katheka by Nairobi-based companies is an example of how a community seeking to sustain its own resources may be subjected to destructive forces beyond its control, here, for individual financial gain. A reexamination of the regional political context and legal framework in which sandscooping operates and a redistribution of the environmental and labor costs of water management in Katheka is necessary.

Through better marketing and cooperation among regional producers, Katheka's *mwethya* groups and other local institutions could negotiate stronger positions with external buyers/sellers. These regional linkages would enable villagers to earn substantially more from the sale of local products — such as baskets — to an outside market, and of external products — such as kerosene — within the community. Marketing and cooperative efforts may also encourage the development of other cottage industries in wood products, cooking oil, fabrics, and clothing.

V. Conclusions

Despite its accomplishments, Katheka is still poor. Many problems remain. Katheka's successes, however, suggest that the collective decision and action power of the community regarding resource use and abuse are key to attaining sustainable development. Cooperation rather than competition is the hallmark of development planning, especially in resource-poor communities. Because approaches to development in many such areas are unsustainable and based on externally-imposed plans, degradation of the resource base continues, for future as well as present generations.

For Katheka, the community-based approach seems to have generated a social energy that has gained much more for the community than could individual or coercive efforts. Community-based development is not the only approach required to reverse Africa's degradation. Nonetheless, it is a major element that has eluded the development community over the years, it has worked in Katheka and many other communities described in this World Resources Institute series of case studies, and it has helped the residents of Katheka become more productive on their own farms and understand how they can achieve substantial benefits through coordinated action. That Katheka's problems are beginning to be resolved is an indication that the fundamental assumptions of community-based development are valid. That issues remain to be addressed suggests that Katheka needs more time, continued energy, and resolve, as well as some external support and improved regional linkages, to continue its efforts.

References

Agarwal, A., and S. Narain. 1989. *Towards Green Villages: A Strategy for Environmentally-Sound and Participatory Rural Development.* New Delhi: Centre for Science and Environment.

Bagadion, B., and F. Korten. 1985. "Developing Irrigators' Organizations: A Learning Process Approach." In *Putting People First: Sociological Variables in Rural Development,* edited by M. Cernea. Baltimore: Johns Hopkins University Press.

Blaikie, P. 1985. *The Political Economy of Soil Erosion in Developing Countries.* London: Longman.

Bromley, D. 1985. "Resources and Economic Development: An Institutionalist Perspective." *Journal of Economic Issues* 19 (3).

Bunch, R. 1982. *Two Ears of Corn.* Oklahoma City: World Neighbors.

Chambers, R. 1983. *Rural Development: Putting the Last First.* London: Longman.

Chambers, R., A. Pacey, and L.A. Thrupp, eds. 1989. *Farmer First: Farmer Innovation and Agricultural Research.* London: Intermediate Technology Publications.

Clark University and Kenya National Environment Secretariat (NES). 1988. *Resources Management, Population, and Local Institutions in Katheka: A Case Study of Effective Natural Resources Management in Machakos, Kenya.* Worcester, Massachusetts: Clark University.

Cohen, J., and R. Hook. 1987. "Decentralized Planning in Kenya." *Public Administration and Development* 7:77–93.

Dankelman, I., and J. Davidson. 1988. *Women and Environment in the Third World.* London: Earthscan.

Ford, R. 1987. *U.S. Stake in Global Resources: The Case of Kenya.* World Resources Institute (WRI) Working Paper. Washington, D.C.: WRI.

Ford, R., W. McConnell, and U. Arens. 1989. *Analysis of Natural Resources Management Activity in Kenya.* Program for International Development, Clark University, paper unpublished.

Government of Kenya (GOK). 1965. *African Socialism and its Application in Planning in Kenya: Sessional Paper No. 10.* Nairobi: Government Printer.

1983 (rev. 1987). *District Focus for Rural Development.* Nairobi: Government Printer.

1984. *National Development Plan for the Period 1984–1988.* Nairobi: Government Printer.

1989. *National Development Plan for the Period 1989–1993.* Nairobi: Government Printer.

Harrison, P. 1987. *The Greening of Africa: Breaking through in the Battle for Land and Food.* London: International Institute for Environment and Development.

Juma, C. 1989. "Environment and Economic Policy in Kenya." In *Gaining Ground: Institutional Innovations in Land-use Management in Kenya,* edited by A. Kiriro, and C. Juma. Nairobi: African Centre for Technology Studies Press.

Kenya Energy and Environment Organizations (KENGO). 1989. "Arid Lands: What Hope?" *Resources* 1(2).

Kinyanjui, M. 1984. *The Kenya Ceramic Jiko: A Summary of Field Test Results.* Nairobi: Energy/Development International.

Korten, D.C. 1980. "Community Organization and Rural Development: A Learning Process Approach." *Public Administration Review* 40(5):480–511. 1990. *Getting to the 21st Century: Voluntary Actions and the Global Agenda.* West Hartford, Connecticut: Kumarian Press.

Korten, D.C., and R. Klauss, eds. 1984. *People-centered Development: Contributions toward Theory and Planning Framework.* West Hartford, Connecticut: Kumarian Press.

Leonard, D., and D. Marshall, eds. 1982. *Institutions of Rural Development for the Poor: Decentralization and Organizational*

Linkages. Berkeley: Institute of International Studies.

Munro, J.F. 1975. *Colonial Rule and the Kamba*. Oxford: Clarendon Press.

National Environment Secretariat (NES), Clark University, Egerton University, and World Resources Institute's (WRI) Center for International Development and Environment. 1990. *Participatory Rural Appraisal Handbook*. Washington, D.C.: WRI.

Paul, S. 1987. *Community Participation in Development Projects: The World Bank Experience*. World Bank Discussion Papers, No. 6. Washington, D.C.: World Bank.

Pradervand, P. 1989. *Listening to Africa: Developing Africa from the Grassroots*. New York: Praeger.

Silberfein, M. 1984. "Differential Development in Machakos District, Kenya." In E. Scott, ed. *Life before the Drought*. Boston: Allen and Unwin.

Thomas-Slayter, B., and R. Ford. 1989. "Water, Soils, Food, and Rural Development: Examining Institutional Frameworks in Katheka Sublocation." *Canadian Journal of African Studies* 23(2): 250–271.

Uphoff, N. 1986. *Local Institutional Development: An Analytical Sourcebook with Cases*. West Hartford, Connecticut: Kumarian Press.

Wamalwa, B.N. 1989. "Indigenous Knowledge and Natural Resources." In A. Kiriro, and C. Juma, eds. *Gaining Ground: Institutional Innovations in Land-use Management in Kenya*. Nairobi: African Centre for Technology Studies Press.

Wisner, B. 1988. *Power and Need in Africa: Basic Human Needs and Development Policies*. London: Earthscan Publications Ltd.

World Bank. 1983. *Kenya: Growth and Structural Change*, Vol.I. Washington, D.C.: International Bank for Reconstruction and Development (IBRD).

1989. *Sub-Saharan Africa: From Crisis to Sustainable Growth*. Washington, D.C.: IBRD.

World Bank and Instituto Italo-Africano. 1989. *Strengthening Local Governments in Sub-Saharan Africa*. Washington, D.C.: IBRD.

World Resources Institute. 1990. *World Resources Report 1990–91*. New York: Oxford University Press.