

## Part 4

### Potential Impacts of Changes in Smallholder Irrigation

# Commercialization of Smallholder Irrigation: Economic and Social Implications in Semiarid Areas of Eastern Kenya

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## Introduction

The observed increase in smallholder commercial irrigation and adoption of new irrigation technologies in Kenya provide new opportunities for increasing agricultural productivity and incomes especially in semiarid areas. Irrigation can lead to a reduction in crop-production risk and, therefore, provides greater incentives to increase input use, increase crop yields, intensify crop production and diversify into higher-valued crops. The resulting increase in marketable surplus and commercial activities has the potential to generate increased incomes for farmers. Yet as smallholder commercial irrigation expands, issues relating to access to water among competing user groups, enterprise profitability and access to markets take on added importance because they directly impact on the size and distribution of benefits accruing to various stakeholders.

Data were collected from secondary sources and key informants in the Makueni and Central Meru districts of eastern Kenya. Rapid market surveys using a checklist were conducted to fill in gaps in data. The results from the study are used to draw implications for likely economic and social impacts from the growth of smallholder commercial irrigation.

## Biophysical and Socioeconomic Profile of the Study Area

Makueni and Central Meru districts have a total area of 10,4520 square kilometers and an estimated population of 1.3 million (table 1). Both of these districts are characterized as arid and semiarid agro-ecological zones but with varying potential for agricultural production. These districts have a bimodal rainfall pattern with the first season known as the long rains falling between March and May and the second season known as the short rains falling between October and December. The average annual rainfall in both seasons varies from 500 mm to 2,600 mm in Meru Central and slightly over 1,000 mm in Makueni.

Agriculture, including livestock, is a major economic activity in the study areas with a predominance of smallholder farms. In the Makueni district, crop production contributes only 9 percent of the total agricultural income of Ksh1.3 billion. On the other hand, income from crop production accounts for 76 percent of an estimated total agricultural income of Ksh1.8 billion in the Meru Central district.

A similar proportion of land is classified as cultivable land in Makueni and Meru Central. However, the irrigated area of 1,866 hectares in Makueni represented 0.3 percent of the cultivable area while in Meru Central the irrigated area of 4,078 hectares represented 2 percent

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Table 1. Area and population in the study area.

District	Total Area (km <sup>2</sup> )	Cultivable Area (ha)	Proportion of Cultivable Land in Total Area (%)	Total Population (‘000)	Population Density (Persons/km <sup>2</sup> )
Makueni	7,440	554,000	74	767	103
Meru Central	3,012	216,500	72	500	166

Sources: Ministry of Agriculture, Central Bureau of Statistics.

of the total cultivable area. This relatively low proportion of irrigated areas in both districts implies that rain-fed agriculture is predominant in these areas.

The production of horticultural crops is an important economic activity in the Makueni and Meru Central districts. Although accurate estimates were not available at the time of our survey, anecdotal evidence suggested that smallholder farmers produced most of these crops. The area under horticultural crops in the Makueni district was estimated at 277 hectares in 1998. The total production was estimated at 5,572 metric tons of which vegetables accounted for 5,268 metric tons and fruits for 304 metric tons. Production of vegetables declined by 25 percent and fruit production by 86 percent between 1996 and 1998. In Meru Central an estimated 2,009 hectares were under horticultural crops in 1998. This represented a 69-percent increase over the acreage under horticultural crops in 1991. Production data show that 21,592 metric tons of horticultural crops were produced in 1998, a 174-percent increase over the total production in 1991 (table 2). Thus smallholder production of horticultural crops appears to be declining in the Makueni district and increasing in Meru Central.

Table 2a. Trend in production of horticultural crops in Makueni, 1996–1998 (output in metric tons).

	1996	1997	1998
<i>Vegetables</i>			
Brinjal	3,200	4,050	1,800
Chili	-	225	120
Okra	1,485	900	560
Karella	315	1,000	396
Tomato	1,800	2,000	1,400
Kale	144	720	800
Onion	90	240	192
<i>Fruits</i>			
Mango	120	-	42
Pawpaw	1,200	300	210
Custard apple	60	12	12
Citrus	850	120	40

Sources: MoA 1999a.

Table 2b. Trend in area planted to horticultural crops in Meru Central, 1991–1998.

Crop	Area (ha)							
	1991	1992	1993	1994	1995	1996	1997	1998
Cabbage	325	250	271	519	400	360	420	440
Tomato	204	212	112	284	300	380	400	430
Kale	158	138	112	139	123	75	70	85
Onion	45	35	159	254	200	240	260	280
Karella	-	-	50	78	87	50	62	70
Brinjal	-	-	70	54	37	33	40	52
Snowpea	-	-	100	150	180	280	-	-
Fr. bean	390	400	705	600	400	350	390	410
Okra	-	-	60	60	43	50	44	50
Dudhi	-	-	11	15	18	15	29	32
Valore	-	-	178	15	12	20	-	-
Carrot	74	70	92	86	109	90	130	160

Source: MoA 1999a.

Table 2c. Trend in production of horticultural crops in Meru Central, 1991–1998 (output in metric tons).

	1991	1992	1993	1994	1995	1996	1997	1998
Cabbage	3,365	2,445	1,626	5,190	4,000	3,600	6,300	6,600
Tomato	1,164	1,300	1,680	1,988	2,400	3,420	4,000	5,160
Kale	854	754	224	278	264	300	210	340
Onion	334	245	636	1,270	1,600	3,600	3,900	4,200
Karella	-	-	198	287	609	400	558	700
Brinjal	-	-	214	366	296	264	360	468
Snowpea	-	-	30	56	360	980	-	-
Fr. bean	1,720	1,420	2,999	3,160	800	1,050	1,170	1,640
Okra	-	-	240	516	365	450	396	500
Dudhi	-	-	45	54	162	150	319	384
Valore	-	-	714	76	48	100	-	-
Carrot	444	440	368	344	545	720	1,300	1,600

Source: MoA 1999b.

The nutritional status of children and the percentage of the population with access to safe drinking water are important indicators of the welfare or general well-being of the population.

Table 3 shows that large proportions of the population in the Makueni and Meru Central districts can be classified as living in poverty. This implies that interventions, which promoted improved economic opportunities in these areas, could offer significant prospects for raising the poor out of poverty.

Table 3. Selected welfare indicators.

Province/District	Children	Population
	Chronically Undernourished	with Access to Safe Water
Eastern Province	39	35
Makueni	50	17
Meru Central	38	63

Source: Central Bureau of Statistics 1994.

## Trends in Demand for Smallholder Irrigation

Irrigation in the Kibwezi division started in the 1950s with 100 acres (40 hectares) under the Kwa Kyai irrigation scheme. Small pockets of farmers in the division also used bucket kits to irrigate kitchen gardens outside the scheme. Since then smallholder irrigation has evolved involving irrigation groups and individual owners cultivating food crops, horticultural crops and other high-valued vegetables and fruits for domestic and export markets. The Kwa Kyai irrigation scheme was extended under the Makueni Smallholder Irrigation Program to 200 acres (80 hectares) in 1993. Data available indicate that the record of the number of smallholder farmers involved in smallholder irrigation has not been updated since 1993 at which time it was estimated that there were 13 irrigation groups and 133 individual irrigators in the Kibwezi division of the Makueni district. Our rapid survey estimated 4 smallholder irrigation schemes and 22 irrigation groups. We could not accurately estimate the number of individual irrigators but anecdotal evidence from farmers suggested that their numbers have increased since 1993.

Irrigation in Meru Central started in the 1930s during the colonial period. It took an upward trend in the 1980s with the implementation of the Mitunguu irrigation scheme in 1986. Smallholder farmers involved in this scheme produce mainly high-valued horticultural crops for export. Since the start of this scheme several individual- and group-based irrigation schemes have been developed. The most recent data available for Meru Central suggest that the number of irrigation projects increased from 131 in 1990 to the current estimate of 190 in 2000, a 45-percent increase in 10 years. These values however underestimated the growth of smallholder irrigation because many new projects were not recorded (personal communication, District Irrigation Engineer).

## Production Systems

### *Sources of Irrigation Water*

In the Kibwezi division of the Makueni district, irrigation activities are concentrated along Kibwezi, Athi and Thange rivers. In Meru Central irrigation activities are concentrated along the main rivers originating from Mount Kenya, Kathita, Kithino, Thigithu and Mutunga rivers, and their tributaries.

### ***Crops Grown under Irrigation***

Smallholder farmers irrigate a wide range of high-valued horticultural crops, mainly vegetables and fruits year-round, for sale in domestic and export markets. Farmers rarely irrigate food crops but a few irrigate maize and napier grass for livestock feed. A wide range of high-valued horticultural crops are grown including Asian vegetables (brinjal, ravaya, chili, okra, karella, guar, dudhi, turia, curry leaves, patra and saragua); vegetables for the domestic and export market (tomato, kale, onion, spinach, baby corn); and fruits (mango, pawpaw, custard apple and citrus).

### ***Organization of Irrigated Production***

There are variations in the organization of irrigated agriculture in the two sites. In the Makueni district, individual farmers generally use their own motorized pumps on their plots. These farmers make their own decisions on when to irrigate and are not affected by water rationing and management problems that those in the group-based schemes face. However, they are constrained by a lack of investment capital, high maintenance costs and low bargaining power in marketing. Though required by the Water Act (Chap. 372 of Laws of Kenya) few individual irrigators obtain water permits as a result of weak enforcement by authorities and bureaucracy involved in getting permits.

The group-based irrigators pool their resources by collective ownership of motorized pump sets and communal production. The groups are allocated water at different schedules. They tend to benefit from pooling their resources, but frequently face problems of management and limited water availability for group members at the lower end of the canal. Some farmers in irrigation schemes, mostly along the Kibwezi river, grow crops independently on their own plots but are members of groups that control the water supply. A water-management committee allocates water according to a water-allocation timetable. Most farmers in group-based schemes obtain water permits because many donors stipulate obtaining of permits as a requirement.

In the Meru Central district, group-based irrigation was dominant but few individuals own irrigation equipment. These group-based schemes are mostly donor-driven as some donors require the formation of groups as a prerequisite for funding. Many of these schemes operate on a cost-sharing basis with donor funds provided for the initial investment to establish water intake pipes and storage tanks. The farmers generally manage these groups by appointing a committee to manage the project while the farmers themselves enforce bylaws. Few individual farmers, mostly large-scale producers, use their own motorized pumps on their plots.

### ***Irrigation Technology***

There were also differences in the types of irrigation technology used in the two districts. In the Makueni district, motorized pump-fed furrow irrigation was dominant but a few farmers along the Kibwezi river used gravity-fed furrow irrigation. The Super MoneyMaker manual treadle pump was introduced recently but it has not been widely adopted. A few large-scale farmers and institutional operators such as the University of Nairobi and Tana and Athi River Development Authority use drip and sprinkler irrigation systems.

In the Meru Central district, sprinklers were dominant, due mostly to the nature of the topography. Furrow irrigation where water flows by gravity was another common irrigation technique. A few farmers used the bucket kit while some large-scale farmers used motorized pumps.

## Profitability of Horticultural Crop Production

The enterprise budget data in table 4 suggest that smallholder production of horticultural crops is a highly profitable enterprise when compared to alternative investment options that farmers can undertake in other crops. For example, gross margin for the most profitable enterprise is about 400 percent higher than that for the competing maize crop. This raises the question as to why every farmer in the area is not jumping on this bandwagon. Several reasons explain why the industry has not seen a massive entry into the sector as the profitability estimates would suggest. One important factor is that the enterprise budget values do not explicitly include transaction costs that are not explicitly measured. These costs arise mainly from the specific institutional arrangements that determine the production, market access and trade in horticultural crops. Because such costs are not included as monetary costs in the enterprise budget it is likely that these budgets erroneously overestimate the actual profitability of horticultural crop enterprises by underestimating the cost of inputs and overestimating the price of farm outputs. Consequently, the enterprise budget makes horticultural crop enterprises more profitable than they actually are, especially in the study areas where poor rural infrastructure, risk and other market imperfections lead to high transaction costs. These considerations need to be explicitly considered when designing technology interventions for farmers in these areas.

*Table 4. Gross margins of selected crop enterprises in the Makueni and Meru Central districts.*

Activity	Meru Central				Makueni	
	French bean	Tomato	Potato	Karella	Ravaya long	Brinjal
Land preparation	3,705	3,705	3,705	7,200	7,200	7,200
Seeds	29,640	741	29,640	0	0	0
Planting	2,470	7,410	2,964	2,012	1,817	1,817
Weeding	5,928	5,928	4,940	5,415	10,381	10,381
Manure	0	17,290	17,290	0	0	0
Fertilizer	8,892	11,115	13,338	3,735	3,960	3,960
Irrigation	0	0	0	32,230	25,300	25,300
Chemical	16,796	55,328	21,489	29,208	21,872	21,872
Nursery management	0	4,940	0	0	0	0
Pruning	0	1,976	0	0	0	0
Ridging	0	0	3,705	0	0	0
Fertilizer application	1,482	0	988	0	0	0
Spraying	2,470	2,470	7,410	0	0	0
Harvesting	39,520	6,175	14,820	5,425	12,472	12,472
Others	0	0	0	13,469	0	0
Miscellaneous costs 10%	0	0	0	9,869	14,048	14,048
Total variable cost (Ksh/ha)	110,903	117,078	120,289	108,563	97,050	97,050
Mean output (kg/ha)	9,880	24,700	19,760	12,500	20,000	20,000
Average price/kg	30	10	10	25	15	13
Total revenue	296,400	247,000	197,600	312,500	300,000	266,600
Gross margin (Ksh/ha)	185,497	129,922	77,311	203,937	202,950	169,550

*Sources:* MoA. 1999b; Kimenye 2000.

## **Gender Issues**

Both male and female farmers were involved in production and marketing of horticultural crops. Women farmers however appeared to allocate more time to planting, weeding, harvesting, grading, sorting and retail trade. Men, on the other hand, allocated more time to land preparation and maintenance of irrigation systems. In some cases, there was joint decision making while in others men had full control over all production and marketing decisions.

## **Organization of Marketing**

Marketing arrangements were similar across both sites but marketing channels were different in domestic as opposed to export markets.

### ***Domestic Markets***

The main crops sold in domestic markets were cabbage, onion, kale, tomato and “export crops,” such as French bean, that were rejected by exporters because they did not meet export standards. Most farmers sold their crops at the farm gate to rural traders within the village or to traders who came from other districts to save time and to avoid transport costs from the farm to the market. Rural assemblers sold the produce to larger traders in local markets who, in turn, sold it to other traders in regional markets or large urban markets, such as Nairobi and Mombasa. Some traders entered into informal contracts with farmers before the crop was harvested. Rural traders collected and assembled small quantities of produce from many farmers scattered all over the rural areas. However, a few farmers, especially those who were located close to market centers, sold crops directly in local markets because they could get better prices. Crops were mostly packed in bags, except for tomato, that were packed in cartons and all transactions in local markets were in cash.

### ***Export***

The major crops sold in export markets were French bean, baby corn and Asian vegetables. There were several companies involved in marketing of export crops. In Meru Central it was estimated that the number of companies involved in marketing rose from 13 in 1997 to 20 in 1999, an increase of 54 percent in 2 years. Some of the exporting companies were seasonal, involved in crop marketing only during the peak season while others were engaged in marketing year-round.

There were several marketing arrangements for export crops:

- Exporting companies organized marketing directly with individual farmers or farmers’ cooperatives with written contracts specifying volumes, dates of collection and prices. This was a common practice with large-scale producers but few smallholder farmers had formal contracts with exporting companies or their agents.

- Company agents or brokers entered into verbal and informal contracts with groups of farmers. Penalties were agreed on in case of a breach of contract but without a written document it was difficult to enforce these penalties. Farmers were not restricted to sell to one agent but they invariably sold to agents who provided farm inputs such as seeds and chemicals.
- Company agents or brokers entered into verbal and informal contracts with individual farmers.
- Individual farmers sold their produce to company agents or brokers without a formal or informal contract. Transactions with informal contracts were usually on credit and it could take up to one month between collection of produce and payment.

Interlinked transactions are very common with company agents providing farmers with seeds, chemicals, advice on planting, application of chemicals, grading, sorting and packing. In some cases, technicians hired by the exporting company supervise farm activities from production to marketing and schedule planting through control over quantities of seed provided to avoid gluts in the market.

Farmers themselves usually harvest the crop. The produce is taken to collection centers where it is sorted and graded under the supervision of committee members. The produce is then packed in cartons provided by exporting companies, weighed and loaded into company vehicles. Members in the farmers' committee are also involved in weighing and recording of deliveries. Payment is by cash or check to the farmers' committee that then pays farmers after one or two weeks depending on the contractual agreements.

Farmers constructed the collection sheds. In some cases, collection sheds are rented. These sheds have rudimentary infrastructure and provide limited facilities. Further grading of the crop is done in company warehouses in Nairobi before export.

About 90 percent of the total horticultural export from Kenya is destined for European markets. In these markets, the European Union sets the grades and standards for exports including maximum pesticide residue levels, size, shape and weight of packaging materials.

## **Marketing Constraints at Smallholder Level**

Farmers face several marketing constraints. These include

- *Infrastructure:* Lack of physical infrastructure reflected in inaccessible roads, lack of market facilities, power and electricity.
- *Inputs:* Unavailability of quality seeds and other inputs including production and trading capital.
- *Post-harvest losses:* High levels of post-harvest losses.
- *Assembly cost:* Lack of economies of scale leading to high cost of assembly.

- *Quality of produce:* High levels of crops rejected at both farm level and at company warehouses because products did not meet market standards. In some cases, farmers were not compensated for rejected products.
- *Risk:* High levels of price and market uncertainty.
- *Market information:* Unreliable information on market trends or scheduling of production decisions to meet market needs. Farmers and other market intermediaries were not aware of important information on prices and marketing, grades and standard information further up the marketing chain.

## **Implications Arising from Commercialization of Smallholder Irrigation**

### ***Water Scarcity***

As smallholder irrigation expands in a regime of lack of enforcement of water regulation, lack of water pricing and uncontrolled water use, water scarcity is likely to be an overarching concern that could lead to social conflicts. What are the likely impacts of policy reforms given growing water-scarcity problems? What types of institutional innovations for allocating water are likely to have the greatest impact on the poor? What are the likely equity and efficiency considerations?

### ***Gender***

In what specific ways does commercialization of smallholder agriculture impact on gender relations? How do women farmers get access to resources and information? How do questions of access and control over resources impact on the participation and investment decisions of women farmers in profitable commercial activities?

### ***Technology***

What explains the differential use of alternative technologies? What technologies are cost-effective and under what conditions?

### ***Farm Profits***

What are the implications of inefficient use of pesticides on farm profits and consumer health?

### ***Health***

What are the health implications of diverting products, which do not meet export standards, to domestic markets?

### ***Markets***

The accepted wisdom is that unscrupulous middlemen exploit farmers. But is this a useful paradigm for designing market interventions? The case study suggested the following:

- Market intermediaries rarely knew or provided important information such as price trends, seasonal requirements, market product specifications or quality standards.

The cost of acquiring such information was high, precluding many smallholder farmers from using such information to make production and investment decisions.

- Rural assemblers faced high opportunity costs in collecting small volumes of product from large numbers of producers scattered all over the rural areas.
- Many producers continued to sell to particular market intermediaries even when they were dissatisfied with the service because they could not find an alternative market outlet or because the cost of finding and/or negotiating with an alternative buyer was too high.
- Market intermediaries could misinform farmers about overall market conditions, wrongly claiming that the quality of produce deteriorated in transit, or delaying payments because of imperfections in information collection and dissemination systems.
- Most farmers and market intermediaries relied on their own funds to finance production and trading activities. There was a lack of credit available for lending despite the need for production and trading credit. Formal credit was not available for traders because lenders either found it difficult, or encountered high costs, to assess the creditworthiness of potential borrowers. This high cost of acquiring information on potential borrowers is reflected in widespread failures of credit markets in rural areas.
- Farmers lost cash income because of the high cost of enforcing contracts.
- Both production and trading were characterized by high levels of uncertainty about the availability of markets, the quality of the product and the conditions of trading.

Given the complex production and trading environment in which smallholder farmers operate, is it likely that they will survive in the highly competitive and “exacting world” of horticultural exports where high transaction costs in the smallholder sector typically favor large producers? Our research suggests that marketing interventions in the horticultural sector must focus on improving the competitive advantage of smallholder farmers through improvements in the efficiency of markets and lowering of transaction costs that arise from high cost of information, contract enforcement and negotiation in marketing transactions. The focus of research and development efforts should be to increase the returns to farmers through the promotion of transparent marketing activities and combination of marketing functions that exploit economies of scale and improve information flows between market participants and farmers. Promising initiatives in this area include contracting options that reduce rather than impose additional costs on smallholder farmers, interlocking markets that combine input provision and produce marketing, effective group marketing schemes that reduce unit marketing cost and improvements in collection points to better serve farmers’ needs. A closer examination of the design of innovative marketing interventions that focus on the realities of cost of production, marketing and trade in rural areas can translate potential for income generation in real and sustainable income-earning opportunities for large numbers of smallholder farmers.

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# Water Policy and Law in a Water-Scarce Country: Implications for Smallholder Irrigation in Kenya

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## **Introduction**

Today, Kenya is categorized as a *water-scarce* country, with an annual internal water availability of just 636 m<sup>3</sup> per capita.<sup>2</sup> Availability of surface water in Kenya is subject to great temporal and spatial variation. This variability is not adequately managed by the existing water-storage infrastructure, which is often poorly maintained. The increasing numbers of water users have led to a reduction in the dry-season flows of surface water and this reduction is exacerbated by climatic factors and degradation of watersheds. The exact nature of the groundwater resource is not fully documented, and the water table is falling in certain areas due to overabstraction from aquifers.

The scarce water resources are being utilized for an increasing number of domestic, industrial and agricultural uses, with irrigation being the major consumer of water. The Government of Kenya is committed to promoting and supporting the expansion of smallholder irrigation to provide improved incomes and livelihood security to farmers. For the smallholder irrigation sector to expand, the available water resources must be adequately protected from degradation, and allocated between a range of competing uses. Because of the limited funds available to the relevant state institutions, monitoring and regulation of these water uses are a difficult task.

The recently formulated Water Policy and the Draft Water Bill represent major changes to the national water-management regime, while the draft Irrigation Policy has major implications for the smallholder irrigation sector. Although it is beyond the scope of this paper to evaluate all the implications of these three documents, it refers to them to describe the water allocation system in Kenya and to provide an overview of the key issues affecting water availability at the national level for smallholder irrigation. These issues include:

- decentralization of water management responsibilities
- contrasting strategies of supply-oriented water development and demand management
- institutional coordination and institutional adaptation

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<sup>1</sup>African Centre for Technology Studies.

<sup>2</sup>Compared to a value of 3,759 m<sup>3</sup> for neighboring Uganda.

The paper also examines whether the legal framework is reflected by actual practice. A case study of water issues affecting smallholder irrigation schemes in the Taveta division, Taita-Taveta district, provides an insight into the ways in which the laws and policies are enforced, and the ways in which they are perceived by the farmers.

The paper concludes by outlining the key challenges to be faced in the future, and options and opportunities for effective water management in a situation of national water scarcity.

## **Water Management Regimes in Kenya**

### ***Customary Water Management***

Water management did not originate with the legal systems established by the colonial government. In precolonial times, management of water was an integral part of the overall customary laws and behavioral norms of each tribal society. Some of these customs are still in practice while others have been discarded or modified.

Water regulations varied considerably between different cultures, particularly between those living in areas of high and low water availability. However, at the risk of generalizing, it is possible to say that ownership of water sources was usually vested in the political institutions of the local community rather than in the household. Sometimes, the community unit was the clan rather than the village, which is the case amongst the Borana pastoralists of northern Kenya. Water was rarely “owned” exclusively by a single clan or village. Access by others was often allowed, subject to permission being sought and, sometimes, reciprocal arrangements being made. This may have been facilitated by clan links, as in the case of the “agricultural Pokot” and the Marakwet of Kenya’s Rift valley, who have a system of mutual assistance (access to land or water) for households of the same clan.

Often, a distinction was made between different water uses. According to the customs of many tribes, any water source, even on private land, was traditionally free for *domestic* use by anyone. However, as regards water for cattle, permission had to be sought and it was possible to charge people for use of a private water hole (Ramazzotti 1995). Agreements over water use are particularly important amongst societies that are highly mobile, as reliable access to water is vital for pastoral migration routes. It is partly for this reason that pastoral societies have developed wide-ranging kinship networks that allow negotiated access to water and grazing rights among the territories of their clan, tribe and, sometimes, amongst other tribal groups. This is an example of political structures being shaped by the challenges and opportunities posed by the need to gain access to water.

Customary systems of water management were by no means static. Regulations and technologies altered over time, and innovations were introduced as a result of cultural exchange and experimentation. Water technologies have been altered and refined, and have spread geographically. In some places, irrigation was introduced by immigrants and was not readily adopted by the “original” inhabitants. The increasing trend of irrigation in dryland environments in Kenya is, to a large extent, the result of population pressure in areas of high

agricultural potential, as people migrate due to land fragmentation. However, it may also be the result of innovation amongst existing dryland communities (See Scoones 1992; and Kunzi et al. 1998). The Maasai of Rombo in the Kajiado district, Kenya, for example, did not readily adopt irrigation as a means of livelihood when Chagga, Gikuyu and others brought the technology to their area. Instead, the Maasai benefited from their role as landlords for many years, and it is only recently that some of them have started to cultivate or have taken an active role in water management.

To summarize, most indigenous systems of water management in Kenya are based on the concept that access to water was guaranteed for each individual by virtue of affiliation with a specific community (e.g., tribe or clan). Water use was regulated and controlled by the political leaders of each community (e.g., chiefs, elders, clan leaders). Water sources that were readily accessible (e.g., bodies of surface water) were generally regulated by the leaders of the community for the benefit and use of the community as a whole. The amount of control exercised over a water source by an individual or a household increases in proportion to the degree of labor invested in the water source.

This is the background on which modern governance structures were superimposed.

### ***Colonial Governance and Water Management***

During the colonial era, white settlers had a legally protected priority right to water sources, and large-scale water development was largely associated with urban administrative areas and white-owned farms and ranches. Many water points in the semiarid districts, particularly in the Maasai areas, were expropriated by the state for use by settlers. Large-scale irrigation schemes were constructed from the 1930s onwards, using the labor of political detainees during the 1950s.

Colonial administrative structures were based on the principle of “indirect rule,” which attempted to utilize adapted forms of “traditional” institutions to effect the colonial policy. Rural governance revolved around the chief who was responsible for a location. Few cultures in Kenya had a position of customary chief, and this was generally imposed upon local power structures. The chief was appointed and some of the local elders were more-or-less “coopted” onto the side of colonial rule, to advise him and support his decisions. The chief was given significant powers to enforce local bylaws and ensure that “voluntary” community activities took place. Generally, governance at local levels was based more upon enforcement than on incentives. However, every chief would have a unique relationship with the community, depending on local politics. Some could be very effective in mobilizing the community for water development or catchment protection. However, in the eyes of many local people, the identity of the chief has been, and remains, that of a *Kanu* (party-political man) rather than of a civil servant with a role in development.<sup>3</sup>

Since 1999, the power of the chief has been considerably reduced and more responsibility for developmental issues has been entrusted to District Committees. Some chiefs are respected and can be more effective than the District Committees in mobilizing the community for

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<sup>3</sup>Interview with D.N. Mauro, Taita-Taveta District Development Officer, October 2000.

development purposes. These chiefs now find themselves frustrated at their reduced powers to enforce bylaws. Local administrative structures are further discussed below.

### ***Post-Independence Water Management***

From the 1950s until approximately the mid-1980s, the concept of community responsibility for water management was replaced by the perception that the state was the legitimate provider and manager of water services. The government implemented thousands of water supply schemes, constructed irrigation infrastructure and largely carried the responsibility of O&M of these schemes. Those communities that were supplied with water from government schemes ceased to see themselves as the principal guardians of their water resources.

Since approximately the mid-1980s, there has been a realization that the government does not have the financial capacity to be the sole provider of water services in Kenya. In particular, the high costs of O&M of water supply and irrigation schemes are beyond the means of the state. The government has been attempting to hand over responsibility for the management of water infrastructure to communities themselves. In addition, the dated “top-down” approach to development has been shown to lead to unsustainable projects, due to a lack of feeling of “ownership” of water points by local beneficiaries, and to projects that are inappropriate for local needs. Especially in the smallholder irrigation sector, donors and the relevant agencies are now insisting that communities mobilize themselves to seek assistance. Communities are required to fulfill a number of tasks before implementation of projects, in order to demonstrate group cohesiveness and management capacity

Therefore, there has been a reevaluation of the role of community institutions, which include customary management regimes as well as the more modern “committee” structures.

The survival of these customary systems and their relevance today vary widely across the country. The extent to which they survive and retain their ability to encourage sustainable use of water resources is a matter of contention. Many scholars argue that the ability to regulate use has been eroded by changes in community institutions, the expansion of populations, and the use of new technology that can involve abstraction or pollution of great volumes of water. Migration can also result in the undermining of sustainable use regimes. Amongst some groups inhabiting high-potential areas, control of water was vested, to a greater extent, in the individual household. Amongst the Gikuyu of Kenya for example, water availability on inherited land is traditionally seen as “God-given.” Thus, a household with riparian access to water could often abstract large amounts for private use even at the risk of resource depletion or at the expense of the community in general. Such households would be tolerated by society unless “the actual survival of members of the community is seriously threatened” (Kunzi et al. 1998). While this system has worked well in the well-watered homelands of the Gikuyu, it may not be sustainable in the drier areas where many Gikuyu now live (ibid.).

It is clear that customary water management regimes *may* often represent useful mechanisms for sustainable water management, due to the credibility of customary institutions in certain rural communities. However, this is not necessarily the case. Researchers in the field of water law should investigate a key research question: to what extent can national water legislation and policy support existing sustainable practices, while regulating unsustainable outcomes of customary practices? The decentralization of water resources management to the “lowest appropriate level,” as advocated in the Dublin Principles, is one component of an

“enabling environment” for customary practices. Water User Associations (WUAs) can include customary groups such as clan-based organizations, as are found for example in irrigation systems in the Elgeyo-Marakwet district. “Modern” committee structures can be supported by the authority of customary institutions. Customary water-management regimes can adapt themselves to changes in new technology and changing institutional contexts such as increased cooperation with donors and ministries. However, customary norms may contradict donor and government requirements, such as those encouraging gender equity. It is for this reason that a truly community-based approach must be followed to create an atmosphere of negotiation and mutual understanding between interest groups.

### ***The Roots of the Current Water Law***

The legal regime for water management in Kenya has evolved from English “common” law. In line with the Roman roots of the English legal system, water was classified as a public good. Therefore, there was no legal possession of water in an absolute sense, only rights of use. Rights of use, according to English law, were dependent upon physical access to water, which essentially meant ownership of riparian (riverbank) land or ownership of land, which allows access to groundwater beneath it. It was also dependent, in the case of surface water, upon the rights of other riparian users who had a share of the water upstream or downstream. Their rights to reasonable use could not be prejudiced by upstream abstractions. However, those who did not have riparian rights had no other rights over the resource. This meant that citizens, in their capacity as members of the public, had no legal right to complain over misuse or overexploitation of water resources.

User rights were also dependent on the water use being of a “reasonable” nature, the characteristics of reasonable use being decided in the courts as necessary. However, in the case of groundwater, use was unrestricted, meaning that aquifers could be tapped to an unlimited degree by landowners. There was also no obligation to ensure that an amount was abstracted that did not reduce the aquifer underneath the land of a fellow citizen. It can, therefore, be seen that although water was characterized as a “public good,” considerable private rights were conferred upon individuals, essentially based on landownership criteria. These contrasting poles of “public” and “private” rights are useful yardsticks for the analysis of water policy and law.

This legal framework evolved in a water-abundant country, and did not place stringent controls on water use or encourage the use of water for “the greater good,” or for the most economically efficient use. It is clearly not appropriate in a water-scarce country such as Kenya.

### ***Modern Water Legislation***

The Kenyan Water Law has been considerably altered from this original English model. However, the concept of water as a public good remains, with the state taking the role of the trustee of the public interest in water management. Essentially, all water in Kenya belongs to the state, with specific rights being parceled out under certain conditions. The permit system

has been used to regulate the allocation of private rights to water.<sup>4</sup> There are some uses of water that do not require a permit. These include abstraction of water for domestic use that does not involve “the employment of works” (MENR 2000). such as canals or pumps, and the use of a hand-dug well that is situated a minimum of 100 yards from a body of surface water. It is an offence to abstract water *by any other means* without the appropriate permit.

The role of holder of the public trust demands very high levels of accountability, and the state must be perceived by the public as valuing the public good above other, more political, concerns. The Ministry-in-charge of water affairs has had mixed results in this regard.<sup>5</sup> Projects such as the Turkwel dam have been the subject of contention, with doubts being raised over their utility for the greater good. At the local level, plenty of instances can be found of socially or politically “connected” individuals and institutions being able to avoid the legal requirements of the Water Act. The increased importance of the regulatory and coordination roles of the Ministry currently in charge of water affairs, the Ministry of Environment and Natural Resources (MENR), requires that it is able to avoid political interference. In order to be accountable, it should also separate its functions of project implementation from those of regulation, water allocation and monitoring.

In the past, the Ministry in charge of water management generally focused on water development, especially for domestic use. This has been prompted by the fact that access to water, even for domestic use, is still limited in Kenya. In 1972, only 9 percent of the total rural population were supplied by “safe” water schemes. This had risen to approximately 20 percent by 1989, and the current ratio is around 42 percent. (Thuo 2000). There is obviously a need to improve the water supply infrastructure. However, MENR is now attempting to move away from an emphasis on domestic supply towards a view of water as a catalyst for socioeconomic development and poverty alleviation. It is also attempting to move away from a purely supply-oriented approach to incorporate demand-management strategies. Demand management is practiced due to the recognition of the fact that water is a finite resource, and that any use of water has opportunity costs, possibly including lost environmental benefits. As water is an economic as well as a social good, it makes sense to use financial and other instruments to ensure that it is available for the uses which best balance “basic needs” (e.g., for domestic use), economic efficiency and environmental benefits.

Demand-management approaches can involve a) innovative ways of accessing water (including rainwater harvesting, for instance), b) public education campaigns to encourage water conservation and reuse, c) subsidy of more efficient water technology, d) financial incentives for voluntary water rationing, and e) transfer of water rights to the most efficient end use. There is also a need for the Ministry to move away from a technical bias, reflected in the dominant position of the Department of Water Development, and develop improved expertise in legal, policy and socioeconomic fields. Improved capacity in these areas will enable the Ministry to take on its new role as an arbitrator of water-use conflicts and as a regulator of water allocation and abstraction.

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<sup>4</sup>This is similar to the water regulation regimes of the vast majority of countries across the world.

<sup>5</sup>The term “Ministry-in-charge of water affairs” is used because the title of the relevant Ministry has been altered many times.

## Policy Formulation in the Water and Irrigation Sectors

### *National Policy on Water Resources Management and Development*

Approximately twenty-five pieces of legislation, in addition to the National Irrigation Board Act and the Water Act, have implications for water management (including, e.g., laws relating to forestry, agriculture and industry). Despite this, prior to 1999, no comprehensive policy statement existed for the water sector. This complex situation led to many ambiguities, “gray areas,” institutional conflicts and a lack of overall focus on the water sector.

Major donor-funded attempts to formulate an official water policy date from at least 1993/1994, when the Swedish International Development Agency (SIDA) funded a number of policy-formulation workshops. A draft document was eventually produced, but it was never publicly released. In the absence of a water-policy document, the Ministry’s water management strategies could be formulated on a fairly ad hoc basis, rather than according to clear long-term objectives. Without a clear policy statement on the prioritization of water projects according to specific criteria, it is more likely that political considerations and donor preferences will influence the selection and funding of projects.

The first Kenyan water policy was approved by the parliament in April 1999. Sessional Paper Number 1 of 1999 on National Policy on Water Resources Management and Development (hereafter termed “the water policy”) has been well received by most stakeholders in the water sector. However, as acknowledged by the Minister for Water Development, “it was apparent during the parliamentary debate... that the document was not adequately publicized to create the necessary ownership and understanding amongst the stakeholders to enhance its acceptability.”<sup>6</sup> This lack of ownership amongst the stakeholders is evidence of a formulation process that has not involved all the relevant stakeholders. This fact is in contrast to the calls in the policy for integrated approaches to water resources management, which should include the input of the private sector as well as all relevant government bodies.

The policy begins with a discussion of challenges in the water sector in Kenya. It acknowledges the uneven temporal and spatial distribution of water, and the negative impacts of human activities in water catchment areas that have affected the availability and quality of water. It also notes the lack of adequate interlinkages between the Ministry-in-charge of water (which, in the past, has been primarily concerned with domestic supply) and other water-related sectors. Other problems identified in the policy include “an overcentralized decision-making process, inappropriate and rundown monitoring network, inadequate database, discontinuous assessment programs, uncoordinated source development, nonoperative water rights, absence of special courts to arbitrate on water use conflicts and a generally weak institutional setup.” Some of these points will be elaborated on in this paper.

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<sup>6</sup>Speech delivered by the Minister for Water Development, Hon. Kipng’eno Arap Ng’eny, at the Workshop on Water Legislation and Policy, as Relates to Poverty Alleviation, Kenya College of Communications Technology, 2–4 February 2000.

The policy acknowledges the inadequacies in the Water Act, noting particularly that the act has no provision for the management of conflicts between different stakeholders. Key areas of conflict relate to different end uses of water, different institutions dealing with water issues and different districts within Kenya, and to relations between Kenya and neighboring countries.

The policy emphasizes the importance of the river-basin approach to water resources management, and the need for groundwater conservation zones to avoid depletion of aquifers. Other recommended actions include:

- The establishment of Community-Based Water Committees, with clearly defined roles, at the district level.
- The establishment of hydrologic, hydro-geologic, water quality, water permit and socioeconomic databases at all levels of the water-resources management.
- Mandatory Environmental Impact Assessment for all major water development activities.
- Storage of surface water, supported by the government, for irrigation.
- The definition of roles, and the establishment of performance-monitoring systems, for all actors in the water sector (role definition and monitoring criteria to be established by the Ministry-in-charge of water)
- The establishment of a tariff structure for water abstraction, commensurate with the amount of water abstracted, in order to fund water-management activities.
- The establishment of a National Standing Committee to deal with crosscutting water-related issues.
- The development of a National Policy on Land, Water and Forests.
- The establishment of a National Water Conservation Program, which will fund construction of water storage facilities and protect water catchments.

Many of the key principles of the policy reflect the influence of the Dublin Principles and policy guidelines of the World Bank for water resources management. (World Bank 1993). These, as well as other recommendations, are included in an Action Plan, complete with a time frame. Perhaps most significantly, the Action Plan advocates a phased approach to the decentralization of decision-making processes in water-resources management. As a first step, government institutions for water management will be established or strengthened in the following hierarchical order: the national level, the basin level, and the subbasin/catchment level. Following this process, *decision-making processes* will be decentralized to the basin level, and then to the subbasin/catchment level. Finally, all vital water catchments will be gazetted.

The policy has resulted in the formulation of a draft Water Bill. An early version of the new Bill was presented at a workshop involving a fairly wide range of stakeholders, in early 2000.<sup>7</sup> At that time, the feeling of many stakeholders was that the new Bill was not representative of the Policy, as the proposed changes to the existing Act were not sufficiently thorough (personal observation). Sources in the Ministry report that a final workshop was convened in mid-2000, which resulted in the current draft, which is considerably different from the first version. The Bill has now been submitted to the Cabinet and is soon to be tabled.<sup>8</sup>

### *Policy in the Irrigation Sector*

At the time of writing, no official policy exists to guide the irrigation sector. The Irrigation Act is the principal legal document in the sector. It was formulated in 1966, specifically to provide guidelines for tenant-based national-irrigation schemes, under the National Irrigation Board (NIB). It is of little relevance to the smallholder irrigation sector, and it is unlikely that additional tenant-based schemes will be undertaken (see paper by Kabutha and Mutero).

Two government bodies have principal responsibility for the development and management of irrigation in Kenya. The NIB was established in 1966, by the Irrigation Act, as a statutory body under the Ministry of Agriculture (MoA). The NIB has responsibility for national irrigation schemes in Kenya, such as Mwea and Perkerra. It has not been active in the smallholder irrigation sector.

The Irrigation and Drainage Branch (IDB) of the MoA was developed from the Small-Scale Irrigation Unit, established in 1977. The main duties of the IDB are “to establish an institutional framework for the planning and implementation of smallholder irrigation,” and to “formulate appropriate irrigation policy for the whole country” (MoA/KARI 1987).

The draft irrigation policy was prepared by the IDB in October 1998, and is largely a product of a national workshop held in 1992.<sup>9</sup> It is a response to the inadequacies of the Irrigation Act, and the lack of any comprehensive national planning for the irrigation sector in Kenya. The draft policy mentions the lack of a national irrigation and drainage policy and master plan as a constraint to development that has resulted in “duplication of effort, wastage of scarce irrigation resources and haphazard interventions” (MoA 1998).

The draft policy acknowledges that the Irrigation Act “be amended to give clear provisions for the management and coordination of irrigation activities and provide for community participation in planning and implementation of irrigation projects in Kenya” (ibid.).

The draft policy notes the high capital costs of constructing irrigation schemes and thus states that “the government will encourage the development of low-cost gravity systems and use of local manpower and other resources for cost reduction.” This emphasis on gravity schemes has implications for the water-delivery technologies that may then be employed and, therefore, on the water-use efficiencies of the schemes; for example, high-pressure

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<sup>7</sup>Workshop on Water Legislation and Policy, as Relates to Poverty Alleviation, Kenya College of Communications Technology, 2–4 February 2000.

<sup>8</sup>At the time of writing (April 2001).

<sup>9</sup>By far the majority of the participants at the workshop were from the relevant Ministries, while other stakeholders included university staff and representatives of NGOs. See Kimani and Otieno 1992.

sprinklers (which are more efficient than furrow water-distribution methods) cannot be operated using gravity systems. While the draft policy notes that water scarcity is a problem that the irrigation subsector has to face, it arguably does not sufficiently address these issues. However, it does say that “appropriate and efficient technologies,” as well as storage and regulation facilities, will be promoted by the government.

The document also recommends the formulation of a National Irrigation Master Plan. The document gives priority in future irrigation and drainage activities to “commercially oriented smallholder group-based irrigation schemes,” rather than to extensive government investment in “food security” schemes producing subsistence crops in dryland areas. It may be felt that NGOs will support these schemes, while the government will concentrate on investment in areas where it can share costs of irrigation development with the farmers. However, there is perhaps some internal inconsistency in the policy, which states that priority will be given to “areas that are already settled and have basic social infrastructure,” but it also recommends the promotion of large commercial estates in sparsely populated ASAL areas. Presumably, it is envisaged that the commercial nature of such schemes will require only minimum government investment. However, the water demand of these large schemes will have to be carefully evaluated and seasonal aspects, in particular, will be significant.

### *Decentralization of Responsibilities in Water Management*

As has been mentioned above, the water sector in Kenya has been dominated in the past by the Ministry-in-charge-of water affairs, with the vital role of other stakeholders only recently being adequately acknowledged. The Ministry itself has been a highly centralized institution. However, the Draft Water Bill aims to assist in a process of decentralization within the Ministry, in order for it to become more responsive to local demands. The approach to decentralization of some of these responsibilities is outlined below.

Currently, the principal body for the apportionment of water rights is the Water Apportionment Board (WAB). To fulfill this role, it requires data on water use from the IDB, the River Basin Development Authorities (RBDAs), and other institutions. The exchange of these data has been very limited. In particular, the reticence of the River Basin Authorities has been commented upon in official studies (MoWD/JICA 1992).

In addition to the WAB, there are currently 6 Catchment Boards and about 65 District Water Boards. The Catchment Boards lack resources to operate very effectively. They also, in many cases, lack the political support as well as legal power to have their decisions implemented. The District Boards currently follow the administrative district boundaries, and this has led to a conflict between them and the Catchment Boards, which naturally have a weaker affiliation with district or provincial apparatuses.

The six RBDAs in Kenya were formed with the prime objective of planning and coordinating development activities.<sup>10</sup> However, the mandate given to them has resulted in unclear delineation of responsibilities between them and other government institutions. Their

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<sup>10</sup>The six are: Kerio Valley Development Authority, Lake Basin Development Authority, Coast Development Authority, Tana and Athi River Development Authority, Ewaso Nyiro North Development Authority and Ewaso Nyiro South Development Authority.

“advisory role” is unsupported by mechanisms to encourage or ensure cooperation from other institutions, particularly the District Development Committees (DDCs), which generally see the RBDAs as threats to their authority. There is also an “overt conflict” between the RBDAs and the Water Bailiff.<sup>11</sup> The RBDAs do not have powers to allocate water; however, their planning role implies that they should regulate the apportionment of water in their area. This puts them into direct conflict with the Catchment Boards. The institutional framework proposed in the Draft Water Bill, as outlined above, would give the RBDAs representation on the River Basin Authorities, effectively subsuming them into MENR structures for water allocation and water-development planning.

According to the terms of the Draft Water Bill, the WAB would be abolished. In its place, a National Water Board would be established. This would be the central body for the allocation of water rights, the coordination of River Basin Boards and District Water Boards (see below), the management of data banks, monitoring of water resources, and all other key functions of the MENR. Of the total membership of 11 of the National Water Board 5 persons are “chosen by the Minister from among the private-sector, user and environmental interests” (MENR 2000). The multi-stakeholder nature of the National Water Board may be favorably contrasted with the existing WAB, which is composed solely of Ministry employees and other government officials.

In practice, many of the functions of the National Water Board will be delegated to River Basin Boards. They will approve the applications for water permits from within their catchments, and will also formulate recommendations on water use and conservation, and monitor and enforce water use in the catchment area. The formulation of the river basin conservation plans should, according to the participatory principles of the Draft Water Bill, be essentially a bottom-up process. Policy formulation should, therefore, be informed by the District Development Committees and District Environmental Committees, as well as the opinions of local stakeholder groups. Arguably, the principles of stakeholder participation in such processes, and the dissemination of decisions made by institutions such as the River Basin Boards (in a form that is easily understood by the “average” water user) should be outlined in the Water Policy and/or the Draft Water Bill. Dissemination should take place *before* the plans are finalized, and could involve locally appropriate measures such as poster campaigns.

According to the Draft Water Bill, the current system of District Water Boards, which mirrors administrative boundaries, will be replaced by a new set of District Water Boards, which would follow hydrological catchment boundaries, termed “subbasins” within the river-basin areas. Two or more *administrative* districts would often be represented by just one District Water Board. The representation of administrative districts by the Boards would probably become a highly charged political issue, and the delineation of the boundaries of the District Water Boards may also be contested. This is because the communities within them represent political constituencies. In Kenya, the ability of an MP or a member of the administration to attract development projects to an area is seen as one of the keys to political success. The MENR will have to ensure that it is able to isolate itself from political interference. However,

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<sup>11</sup>Mr. Nyarao, Water Rights Specialist, MENR, speaking during the National Workshop on Water Legislation and Policy as Relates to Poverty Alleviation.

it must arguably also avoid using purely hydrological factors to set District Water Board Boundaries, as the geographical and political realities of the communities on the borders between them will be significant in development and conservation activities.

The membership of the District Water Boards would include a representative of WUAs from the subbasin. In many cases, the most powerful WUAs represent the interests of major landowners and large-scale commercial irrigators, rather than the local communities. While the most organized WUAs are most able to debate with government representatives, it is also important that the interests of the “typical” water users in the area are represented. It might be prudent for the Bill to specify that at least one WUA from each of the main water sectors should be represented, including the smallholder irrigation sector.

### *Local Administrative Structures*

Following the District Focus for Rural Development strategy, implemented in 1983, a hierarchical structure of District, Divisional, Locational and Sub-Locational Development Committees forms the basis for decentralized development planning and implementation.

Development plans, including those for smallholder irrigation, are eligible for government support and funding only if they are forwarded up the institutional hierarchy, and are discussed at each stage. However, projects can be implemented in the district without having been proposed by the DDC. One study found that of 82 projects implemented in the Kajiado district during a specific period, only 38 had been proposed by the DDC (Southgate and Hulme 1996). The District Commissioner (DC), who chairs the DDC, is also the Chair of the District Executive Committee (DEC). A number of studies have concluded that the DFRD policy, despite its avowed aim of decentralization, has in fact led to increased control of central government at the local level. The DC, a political appointee, is responsible to the Office of the President, rather than to a local electorate. The DEC, comprising the DC, District Development Officer, and departmental heads of all Ministries in the district, is the real source of authority in terms of allocation of funding for development projects. Some analysts have commented that “decisions are not primarily taken with respect to projects but with respect to the machinery of sectoral ministries” (Sottas et al. 1998). In addition, political interests have a heavy influence in the selection process.

The divisional, locational and sub-locational meetings, in many instances, are not convened regularly (Sanyu Consultants Ltd. 1999; Southgate and Hulme 1996). If this is the case, local interests might best be served by a more flexible framework that gives institutional authority to a variety of local organizations. Associations, subcommittees and their equivalents should be able to federate themselves at any level to pool resources and coordinate activities. “Mobilization of the community needs to be based on a wide definition, the ultimate objective being to make the community self-reliant. A plurality of different organizational forms should be allowed with no predetermined organizational structure being “imposed” on the community” (Anonymous 1999).

## Challenges for Sustainable Management of Kenya's Water Resources

The sustainable use of water resources demands that the quantity and quality characteristics of the resources are well understood by those allocating water rights. There is also a need for protection of water-catchment areas, and the effective allocation and enforcement of water-abstraction permits.

Planning for sustainable water-resources development demands an accurate database of hydrological information, including data on baseline river flows in different seasons, abstraction rates, groundwater levels and water quality. Currently, the database in Kenya is patchy and poorly consolidated, being scattered among different institutions and reports. Of the 928 hydrological monitoring stations existing in 1990, only 505 were operating. Since that time, many more have been damaged by the El Niño floods and there is little money available to repair them or to pay staff to collect the data.

In terms of groundwater, most of the surveys conducted have consisted of basic reconnaissance work: "quantitative aspects of groundwater flows were rarely taken into account, recharge zones were not delimited, and the effect of pumping on artesian aquifers was not specified" (UN 1989). The Registrar of Water Rights has commented that knowledge of groundwater potential is still limited.

Although government policy is to avoid interbasin water transfers whenever possible, for reasons of environmental sustainability, the government is considering transferring water supplies from high-rainfall areas to the drier areas.<sup>12</sup> This process would require a more comprehensive database on water resources than is currently available.

Official documents recognize that the preparation of a complete inventory of present river conditions "will take many years" (MoWD/JICA 1992). The lack of such an inventory has contributed to the current problems of overabstraction, as indicated elsewhere in this report. Currently, calculations of base-flow and flood-flow rates are based on measurements made by the District Water Bailiff at the point of abstraction. Frequently, irrigators time their applications so that these measurements are made during a time of high flow; because the farmers pay for the fuel used by the Bailiff, they can influence the timing of the operation (Sottas et al. 1998). There is a need for long-term data on streamflow (measured over a series of years) to be made available to Water Bailiffs across the country. This would demand investment in information-management systems as well as monitoring capacity in the national water quantity.

There is also a fundamental misunderstanding amongst some stakeholders regarding the 30 percent minimum flow level of surface waters, which is to be reserved for domestic uses and maintenance of ecological systems. Some abstractors have assumed that they must leave a minimum of 30 percent of whatever flow remains in the river at the point at which they do the extracting. However, the 30 percent ratio refers to the aggregate base flow of the river, and is meant to ensure that 30 percent of the "natural base flow" continues to flow into the sea, or the usual termination point of the river. The calculation of this 30 percent ratio then depends upon a comprehensive understanding of the characteristics of the river along its entire length, under different seasonal conditions.

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<sup>12</sup>This was noted, for example, by participants during the National Workshop on Water Legislation and Policy as Relates to Poverty Alleviation. Several interbasin transfer schemes are listed in the MoWD/JICA 1992.

Therefore, two interlinked factors, the lack of data on river flow and poor coordination of water-apportionment bodies, have hindered the sustainability of surface-water abstractions. Cases exist of a number of permits being issued for a single source of surface water so that the quantities of water corresponding to these permits add up to more than the average flow of the river. It has even been noted that “in some basins in high-potential areas... the abstraction volume permitted by WAB appears to have already exceeded the available natural flow” (MoWD/JICA 1992).

The Draft Water Bill includes a number of conditions to be attached to permits for irrigation. For example, permits for irrigation demand that the irrigated land will be efficiently drained, and that used or unused water flowing from the land will be delivered “to a watercourse or a body of water or drainage or other works” (MENR 2000, 35).

A number of conditions *may* be attached to a permit. These include data on water quality, the quantity of water to be abstracted, the quantity of water to be returned to a specific water body or drainage area, area of land on which the water may be used, and the WUA involved as well as others. However, it remains to be seen whether or not the MENR staff will stipulate that these conditions are met, or will analyze the information received. The greater the amount of information demanded the more the time and money that have to be invested in processing that information.

For sustainable water management in a country with extreme seasonal variation in water availability, perhaps the most significant factor is the water-storage requirement for irrigators. The granting of an irrigation permit is intended to be contingent upon the provision of a 90-day storage facility. This is in order that irrigation water can be taken from the *flood-flow* rather than from the *base-flow* of a river. However, in practice, this requirement is very seldom met. The costs of such a facility, as well as the large parcel of land it would require are prohibitive for the average household, and the MENR does not enforce the rule. It is very difficult to propose a solution to this problem, other than a compromise based on storage facilities to be shared by a number of users. This shared system would however be prone to conflicts between users over access to the stored water.

The Minister-in-charge of water affairs has been given the power to gazette catchment areas that are threatened by environmental degradation. However, at present, very few have, in fact, been gazetted. There is no inventory of gazetted catchments.<sup>13</sup> The new Draft Water Bill gives the Minister-in-charge of water affairs sweeping powers to control activities, which have adverse impacts on water resources. These include the power to declare any activity to be a controlled activity, as long as the Minister is satisfied “that the activity in question is likely to have an adverse impact on a water resource” (MENR 2000, 16). It would be an offence to undertake a controlled activity without the authorization of the National Water Board. This section of the Bill gives the Minister so much power that it might be questioned on the basis of personal liberties as enshrined elsewhere in the Kenyan Law.

It has been recommended that the viability of proposed irrigation schemes be assessed, in addition to the usual criteria, on the condition of the watersheds that regulate the relevant water source. If the relevant watersheds are being poorly managed, the water supply scheme

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<sup>13</sup>Various Ministry officials, commenting during group discussions, Workshop on Water Legislation and Policy, as Relates to Poverty Alleviation, Kenya College of Communications Technology, 2–4 February 2000.

might be compromised as a result. In this case, the community or the appropriate institutions in the district (the District Environment Committee, for example) should put in place measures to protect the watershed. This issue has not been tackled in the Draft Irrigation Policy, probably because the IDB and the NIB see watershed protection as extraneous to their mandate. It would be possible, however, for the policy to stipulate the need for NGOs as well as the IDB or the NIB, to liaise with the MENR and other relevant institutions over the management of the relevant watersheds before any proposed irrigation scheme is judged to be viable.

### *Case Study: Taveta Division*

The Taita Taveta district is part of the Coast province in southeastern Kenya. The district borders the Kajiado and Makueni districts to the north and west, and the Kwale district to the south. The Tanzanian border runs along the southwestern border of the district. Of a total area of 1,695,900 hectares, only about 249,400 hectares are arable. Private ranches, large commercial agricultural estates, and national parks occupy a significant percentage of the district area. In 1994, the population was estimated at 300,000. Most of the district is semiarid, categorized as agro-ecological zones V or VI, and is thus unsuitable for rain-fed agriculture.

The area has a range of water sources, including the Chala and Jipe lakes, and the Mzima springs that rise in the Tsavo West National Park, and are piped to the Mombasa municipality. Four major rivers run through the district: the Voi river, the Mbololo river and the Bura river (with their sources in the Taita hills), and the Lumi river which originates in the Kilimanjaro slopes. However, the distribution of surface water varies greatly across the district. Surface water sources arising from springs are not generally prone to extreme seasonal variation. Most of the surface water flows are fed by melting snow on Mt. Kilimanjaro so that water flow variation involves *increased* flows during the dry season and low flows during the wet season.<sup>14</sup> Groundwater is generally found close to the surface, and pumping from shallow wells does not require very powerful pumps (IDB 1994).

Irrigation in the district has a long history, especially in places such as Wundanyi, in the Taita hills, but indigenous systems are not very significant today. "Organized irrigated agriculture" dates back to colonial times when the schemes were implemented in the early 1940s (ibid.). The great majority of irrigation activities (approximately 90%) of the district are found in the Taveta division, one of the five divisions in the district. The district supplies a very large percentage of the fresh produce found in Mombasa's markets. However, the industry is hampered by the very poor state of the network of roads.

The irrigation potential in the district was estimated at 3,712 hectares in 1994, although this value has not been adjusted according to issues of fluctuating/declining water availability. Of this, 3,141 hectares are located in the Taveta division. The division can be usefully divided into two sections, the southern and the northern. The southern section has a high water table and some of this area is swampy. This area is fed by many small springs, and poor drainage is a limitation to agricultural production. However, the northern section is drier.

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<sup>14</sup>Interview with Eng. Kinyanjui, DIE, October 2000.

Of the 30 potential projects in the district that have been proposed for development, 3 new group irrigation projects, covering a total of 120 hectares, have been implemented since the District Profile was prepared in 1994. According to the District Irrigation Engineer (DIE), there was an overall decline in the total irrigated area from 2,526 hectares recorded in the District Profile, to the current 1,511 hectares.<sup>15</sup> However, this value does not take into account the physical expansion of several schemes. Since the District Profile was compiled, the resources available to the District Irrigation Unit (DIU) have not permitted systematic and comprehensive assessment of the current acreage. In addition, this value may also exclude a significant number of individual farmers who are irrigating private plots using pumped water from shallow wells.<sup>16</sup> Staff bases at the DIU in the Taveta town estimate the total current irrigation acreage at 3,500 hectares. The discrepancy between this value and that provided by the DIE in Wundanyi demonstrates the limited institutional capacity to gather and collate information on irrigation activities. Of course, increased acreage implies that more water is being abstracted currently than in the past.

As noted above, there are a significant number of individual farmers who are irrigating private plots using pumped water from shallow wells. Many of these individuals use piped systems, but are reportedly switching to open furrow systems rather than replacing worn-out parts of the piped systems.<sup>17</sup> The vast majority of group schemes utilize gravity-fed canal systems, most of which are unlined, and therefore lead to water wastage.<sup>18</sup>

The last Water Availability Assessment Study for Taita Taveta was undertaken in 1993. At that time, there were 31 schemes, which were either proposed or actually present on the ground. The assessment concluded that of these 31 schemes only 5 could experience no water shortage, 16 would experience water shortages, even in a year experiencing average amounts of rainfall and 10 would experience shortage once in every 20 years.

In terms of the 16 schemes that were operating when the District Irrigation Profile was being prepared, the DIU estimated that only 2 schemes could definitely expect to operate without suffering from water shortages while 6 schemes would suffer serious water shortages, on average, every 5 years. More research would be needed to assess the water-security situation for the other 8 schemes.

It is clear that water availability in parts of the division is a key limitation to expansion of irrigation. Indeed, existing schemes may need to be monitored to assess their effects on scheme flows. However, due to the *apparent* abundance of water sources, especially in certain areas, the local administration has commented that “the district is well endowed with plenty of water, which flows to the Indian Ocean untapped.”<sup>19</sup> While there is an abundance of water in some areas, there are also episodes of localized water scarcity, and irrigation development in the district requires careful planning, based on hydrological data.

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<sup>15</sup>Mr. K.B. Chiyonzo, Taita-Taveta District Irrigation Officer in IDB 1994.

<sup>16</sup>Interview with Mr. Chengo, District Irrigation Officer, October 2000.

<sup>17</sup>The extent to which water is “wasted” depends on the hydrology of the area, as well as subjective interpretations of the “value” of water for different uses.

<sup>18</sup>Mr. Calistous Akello, Taita-Taveta DC, paraphrased in the National Steering Committee, World Day to Combat Desertification 2000. These comments were echoed by other local officials during field-work.

<sup>19</sup>Interview with Eng. Kinyanjui, DIE, October 2000.

### *Water Management Issues at the Divisional Level*

All of the irrigation schemes in the division have water permits, and the usual period of time taken to process them is 3–6 months. It is clear that many of the farmers have expanded their plots beyond the area stipulated in the permits. This means that abstraction rates have almost certainly also exceeded the stipulated limits. However, it is impossible to accurately estimate water use, as none of the water-monitoring stations in the division are currently operational.<sup>20</sup>

Some of the schemes are affected by land disputes, as official demarcation of plots has not been conducted. This leads to minimal investment in the canal infrastructure and, sometimes, to increased water wastage as a result.<sup>21</sup>

Drainage of swampland is also a management issue in the division, as it has not been very well coordinated. In some cases, the water that is drained from one plot simply accumulates in the neighboring farm. Extension work in this area, combined with meetings involving all the affected farmers, could reduce this problem. One large drainage canal has been under the responsibility of the MENR, which lacks funds to maintain it. Farmers have yet to develop the organizational capacity to maintain it collectively.

The DDC meetings are held far from the Taveta division. There are no transport facilities, so the relevant stakeholders must fund transport from their respective budgets. The DIU, located far from the District Headquarters, is therefore not able to attend the DDC meetings, and prioritization of irrigation schemes (for recommendation to donors, for example) takes place in their absence. This may work against the best interests of the district.

The District Water Board is apparently not functional, although the District Water Officer is very active. The Assistant Water Officer, located in the Taveta division, undertakes visual checks of the actual or proposed water-abstraction regimes of water users seeking permits. He is not able to do rigorous quantification of data, largely because of lack of equipment. He then forwards the application to the District Water Bailiff. It is interesting to note that, in the last 3 years, the DIU had no direct contact with the District Water Bailiff.

In the past, the DIU had links with the Coast Development Authority, which is the relevant River Basin Development Authority for the area. However, there has been no communication from this authority for the past 3 years, and it appears to be “dormant” in terms of water-management activities.<sup>22</sup>

The best-known water issue in the district relates to the Njoro Kubwa canal, which dates from 1947. The canal runs through a large sisal estate owned by a local politician, before reaching a number of smallholder irrigation schemes. An agreement between the estate and the colonial government, dating from 1948, granted rights to 70 percent of the canal flow to the estate, while the local community was granted rights to 30 percent of the flow. Details of how the 30 percent was to be shared were not specified in the agreement. Frequently, the

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<sup>20</sup>Interview with Eng. Kinyanjui, DIE, October 2000.

<sup>21</sup>Interview with Eng. Kinyanjui, DIE, October 2000.

<sup>22</sup>Interview with local government official, October 2000.

estate has been using all of the canal flow during daylight hours, and releasing the water at night. This was of great inconvenience to the irrigating communities, especially to the women farmers who may not be able to safely irrigate at night.

The situation has become worse after the maintenance of the canal deteriorated. Because of the poor condition of the section of the canal within the sisal estate, the water that was released for downstream use is unable to flow and simply drains into the estate's land. One of the irrigation schemes, Kitobo, has not received water for about 5 years, while another, Kamleza, has lacked water for the past 2 years. The issue of water flow, which concerns the legal rights of each stakeholder to the water, is bound with the maintenance of the canal. Because the water flow to the smallholder irrigation schemes was limited by the activities of the estate, the motivation for the scheme communities to maintain "their" portions of the canal also diminished. Community efforts are notoriously difficult to organize, and this difficulty is enhanced when the rewards of community labor are uncertain.

Responsibility for maintenance of sections of the canal outside of private lands also lies with the MENR, which currently lacks funds thus exacerbating the problem. However, it is planned that funding by the World Bank will be used for this purpose.

It is ironic that, as more responsibility is being transferred from government institutions to community organizations, the division actually receives less support from the District Development Officer than in the past, because of budgetary constraints.

The issue has been frequently debated at the DDCs at the district divisional and locational levels. A number of public meetings have also been held, particularly following threats of violence over the dispute. The MP who owns the estate has participated in some of these meetings (particularly around election time) and has, on occasion, promised to maintain the canal, but these agreements have not been honored. Some of the local people formed a "Divisional Water Board" to represent their interests in their attempts to gain access to the water for irrigation. This Board was composed of local elders, but was not able to exert very much influence, and the membership was not permanent. It was disbanded some time ago. The members of the staff at the District Irrigation Office report that the main factor limiting the government's power to enable the smallholders to have access to the water is the water permit belonging to the estate. However, it should be clear that the permit allows for the estate to use a maximum of 70 percent of the total canal flow at any time. The estate is, therefore, *not permitted* to abstract all of the flow at any time.

Other means of resolving the conflict are found in the Draft Water Bill, which requires that the holder of an irrigation permit must deliver unused water to the downstream users (MENR 2000, 35). Indeed, one of the fundamental principles of water management outlined in the Draft Water Bill is that "it shall be the duty of every person using water to exercise due care and diligence in order to avoid unnecessary waste and pollution (ibid)." The Draft Water Bill also provides for a range of means by which the water permit held by the estate could be varied or cancelled, with due compensation being paid.

The main factor preventing the MENR or other government institutions from resolving this dispute is the fact that the estate owner is a politician. It is not easy for a government employee to try to interfere in the business of a government politician. Possibly, the issue may best be tackled as part of a nationwide reassessment of water rights that predate a certain year. A reassessment of all rights granted prior to independence, for example, might allow for similar situations across the country to be tackled simultaneously, thus making it less of an “individual” issue.

### *Water Management Issues within Irrigation Schemes*

Water use in the irrigation schemes is controlled by a rotational system and farmers generally pay a fee of KSh 20 for a single irrigation “gift” (allotted irrigation slot, usually of a few hours’ duration). However, many of the group irrigation schemes within the division are affected by problems of water theft. Farmers with neighboring plots frequently breach the canal walls of the schemes to water their crops but do not pay any fee for this. In some cases, committee members themselves have also broken water distribution procedures. Therefore, it becomes very difficult to take action on this issue. In a typical scheme, bylaws specify a fine of KSh 1,000 for out-of-turn abstractions but these bylaws are not enforced. In one scheme, the same people had been on the Irrigation Committee for the last 10 years, having been reelected every 2 years. Normally, it is recommended that posts are changed frequently to avoid vested interests becoming entrenched in the management systems. While government policy is to promote the concept of gender balance, in most of the schemes, the female membership in committees is less than 20 percent.

All the irrigation schemes in the division have bylaws, regulating membership, water-distribution regimes, financial aspects and other management issues. Copies of bylaws of schemes are sent to the District Officer, the courts and the police. However, all of the irrigators interviewed during fieldwork complained of the difficulty of enforcing these bylaws.

The local chief complains that even if he takes those accused of water theft to court, they can be fined a maximum of about KSh 200, which is not a sufficient deterrent.<sup>23</sup> Members of the local administration also complained that the recent amendments to the Chiefs Act, which greatly reduced the powers of the chiefs, had impacted negatively on the capacity of the authorities to tackle water theft. Some of the respondents reported that the chiefs themselves frequently abstracted water illegally, thereby losing their credibility as enforcers of the bylaws. One irrigator lamented that “there is no support from the administration.”

The DIU is not in a position to enforce bylaws but it can offer management advice. However, this unit had not had a budget for fuel in the 6 months previous to the period of fieldwork. The last batch of fuel it received was just 20 liters.<sup>24</sup> This makes extension work, including monitoring of water-abstraction rates, very difficult. While farmers are willing to provide money for fuel for extension work it is unlikely that they would be willing to provide

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<sup>23</sup>Interview with W. Lesilale, Chief, Kitobo Location, October 2000.

<sup>24</sup>Interview with Eng. Kinyanjui, DIE, October 2000.

fuel for activities such as monitoring of flows, etc., which would not directly benefit them. Irrigation schemes collect money for basic administrative and infrastructural expenses but they do not have separate funds to pay for extension services, which have been free in the past until the recent cost-recovery policies came into operation. For these to be made available for extension work, the district staff would have to demonstrate that their “investment” in extension work would be profitable. One way of benefiting the average irrigator would be to improve water-management procedures in the schemes, but this would often mean confronting the committee members who break the rules, and getting the support of other administrative staff who may also have direct or indirect interests in water theft.

## Conclusions

The case study has illustrated a number of important challenges to water management in Kenya.

- The uncertainty of government institutions over the acreage of irrigated land and the amount of water being abstracted is a result of the limited institutional capacity to gather and collate information on irrigation activities, largely due to financial constraints. Collection of basic data is a fundamental part of any water-management process in the district. There is a need for investment in monitoring systems, including funding for the transport necessary to gather information.
- This is just one instance of a general lack of state capacity to provide basic services in rural areas. Full or partial cost-recovery, using contributions from beneficiary communities, is now government policy. However, practical mechanisms for this are difficult to develop and enforce. Members of the local-level staff receive little support from district levels in implementing the policy.
- The MENR has become less capable of implementing or maintaining projects but the necessary support (e.g., training and encouragement) has not been given to the communities to take over these roles.
- Localized variation in water availability should be acknowledged in water-management plans, and current or potential future scarcity should be made apparent to all stakeholders. This is especially important in the case of members of the DDC who do not have a technical background in water management.
- The difficulties in enforcing bylaws of the irrigation scheme are exacerbated by frequent episodes of water theft by members of the committees and even by local administrative personnel, leading to a general breakdown in the enforcement of water-management regulations. Greater participation of a cross section of irrigators in development organs, such as the Locational Development Committees, may help empower the group members to change their committee members when necessary. When NGOs or government projects involve a capacity-building element, the training of a representative sample of the irrigators, rather than just committee members, may also help encourage scheme-level equality.

- The case of the sisal estate in Taveta may be affected by the proposed system of District Water Boards that represent more than one administrative district. This may help avoid political favoritism, as decisions would be taken by a group including government staff from the neighboring district. However, the power of political figures is such that they could influence these Boards by influencing higher political levels to pressure the decision makers. A massive change in the “culture” of governance would be necessary to avoid such situations, and this is a national, multi-sectoral issue.
- Finally, it is interesting to note that the DIU had not been involved in the formulation of the Draft Sessional Paper on Irrigation and Drainage, did not have a copy of it and had not been informed of its contents.

### **Next Steps in the Refinement and Implementation of the Water Policy and Water Law**

In the past, the Ministry-in-charge of water affairs has been highly centralized, resulting in a physical and psychological distance between Ministry staff and those they serve. This distance has discouraged long-term programs for community capacity-building and other initiatives from entrusting communities with responsibility for monitoring and management of water quality and quantity. For example, it does not have very effective links with community groups, especially when compared to the Ministry of Health. If it is to effectively implement the policies of participation and decentralization of responsibility, it should reassess and enhance its approaches to empowering communities. However, it should be recognized by the government and the NGOs alike that increased meaningful stakeholder participation often involves increased costs in terms of money and time. Participation also involves increased risk for the overseers of the management process because true participation leads to increased options and thus less certainty about the outcome. Unless meaningful support and power are given to community institutions, the current changes in the water sector will lead to a “vacuum” that will be filled by the most powerful actors to the detriment of the common Kenyan.

The twenty-five pieces of legislation that, in addition to the National Irrigation Board Act and the Water Act, have implications for water management, will have to be revised to harmonize with the statutes and the principles of the Water Act and the new irrigation policy. This could be done by involving a cross section of stakeholders in a focused workshop; it would also require sufficient political will to set a timetable for revision.

It is important that MENR establish means for conflict resolution between stakeholders. This is particularly important in the case of interbasin water transfers, seen by many in the MENR as vital for the economic growth of the drier areas of the country, because the River Basin Boards will have difficulty in agreeing with terms of transfer. Existing transfer projects have been characterized by lack of public accountability, debate and environmental-impact assessment.

Increasing involvement of stakeholders in policy formulation at all levels, from the division to the national level, will enable the government to benefit from enhanced legitimacy. It will then be in a better position to mediate in situations of conflicts in water use. However, specific training needs in the area of conflict resolution should be identified for key government

departments. Clearly, a “level playing field” does not currently exist, and processes should be developed to enable adequate representation of weaker stakeholders who have less bargaining power.

It is also necessary that government institutions improve the availability of information, so that people understand not only their rights but also the responsibilities they are asked to shoulder. Regulations need to be put in place for the dissemination of decisions made by the Water Boards and other important information. This process would be enhanced by improving links (both formal and informal) with stakeholders, at all levels.

At the local level, capacity building should be aimed at representatives of the beneficiary community, not merely the committee members. This is to ensure that the group understands the roles and responsibilities of each actor, those of the group members as well as those of the committee members. Participants of training courses should be selected by the community as a whole, and not merely by the committee or by the local elite.

The intention of the MENR to conduct nationwide workshops to foster “awareness creation and common understanding and interpretation of the policy at the grassroots level” (Wambua 2000) should be vigorously pursued. Workshops should be conducted in a participatory manner, and local-level staff should formulate the structure of the workshops, to ensure that they are motivated about the process. These workshops could be linked by common questions and gray areas to be resolved, and should involve a two-way debate, rather than a one-way process of “orientation” of stakeholders, controlled by the MENR.

It is planned that a summary of the Water Act be produced, in Kiswahili and possibly in some local languages as well as in English, for the benefit of the general population. Such a summary, or guide, will be an extremely useful tool for raising awareness and enhancing the capacities of local communities to monitor and manage local water uses. The guide to the Environmental Management and Co-ordination Act may provide a useful model for a comprehensive guide, which would focus on sustainable water use and ways for all stakeholders to gain equitable rights to water.

There is an inherent conflict between supply-oriented strategies of water development and exploitation, and approaches that are influenced by the concept of demand management and environmental conservation. The conflict between these two broad approaches is likely to be played out within the MENR, and will be implicit in different models for the restructuring of the Ministry. The supply-oriented approach prioritizes development of new water supply infrastructure and may involve interbasin transfers and other highly technical and capital-intensive projects. By its very nature, this approach requires the technical expertise that has been the core of the key institution within the MENR, the Department of Water Development. Therefore, the existing personnel have a vested interest in maintaining a supply-oriented approach, in order to protect their status within the MENR. For the same reason, it is in the interests of many MENR staff to resist decentralization of the various responsibilities of the Ministry. In many cases, the “lowest appropriate (institutional) level” for water management is the WUA. If the Ministry builds capacity amongst such decentralized management units, and hands over to them the responsibility for management, it is facilitating its own “downsizing.” Efforts must be made to restructure the Ministry in such a way that community links are prioritized and training for employees in relevant skills can assist them to find jobs in the NGOs and private sectors.

The demand-management approach emphasizes increased efficiency in water storage and distribution, application of charges for water abstraction, conservation of watersheds and the use of other environmentally sound practices such as on-farm soil-and-water conservation

and rainwater harvesting. It also requires difficult trade-offs to be made between different water uses, trade-offs that have political implications. These strategies require an improved degree of stakeholder participation, awareness-raising campaigns, and unprecedented levels of coordination with other institutions. The equitable and sustainable allocation of water resources also requires considerable political will.

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