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In recent decades, the Mount Kenya highland–lowland system, which includes the Ewaso Ngiro North Basin, has experienced complex ecological and socioeconomic dynamics. These are reflected in changing land use systems and practices as well as in a rapidly growing human population, especially in the footzones and adjacent lowlands. These changes have exerted unremitting pressure on water resources, especially because the demand for water by different user groups has continued to grow, against the backdrop of expensive alternative sources (rainwater and groundwater harvesting) and increasingly dwindling river water resources. As each of the user groups moves to make substantial claims to available river water, competition for the resource becomes even sharper, thus setting the stage for conflicts related to scarcity that intensify during the dry season, at times resulting in fatal physical conflicts among different user groups in the basin, especially between upstream and downstream users. Different approaches have been used to address these scarcity-related conflicts. The present article discusses Water Users' Associations as one of the most effective initiatives launched to address the problem of water use conflicts in the basin in the recent past.

A diversified ecological system

The Ewaso Ngiro North Basin is included in the Mount Kenya highland–lowland system. This system is located to the north and west of Mount Kenya, and drops from an imposing height of 5200 m to an average height of 1000 m, dominated by the Laikipia Plateau and the Samburu Lowlands (Figure 1). The basin covers an area of about 220,000 km^2 (approximately 37% of the total land area of Kenya). The upper basin—the major reference point for the present article—is about 15,200 km^2 in size. Geopolitically, the area under consideration belongs to 7 administrative districts and 3 provinces, and had a population of close to 800,000 in 1999 (National Population Census).

The basin is characterized by highly diversified ecological systems and zonal differentiation. It includes the nival mountaintop, the moorlands above the timberline, a belt of tropical rainforest, the semihumid footzone of the tertiary volcano, the semiarid high Laikipia Plateau, the escarpment, and the semiarid to arid Samburu Plains. The ecological

FIGURE 1 The Mount Kenya highland–lowland system. (Photo by Urs Wiesmann)

gradient is quite steep, with precipitation levels dropping from over 1000 mm annually in the tropical rainforest belt to below 500 mm, over a range of less than 30 km.

Demand for water in a multi-stakeholder society generates user conflicts

The upper and middle reaches of the Ewaso Ngiro North Basin have experienced rapid population growth and dramatic land use transformation in the past decades. With the arrival of colonists at the beginning of the 20th century, predominantly pastoral grazing land was gradually converted to large-scale ranching and farming. After independence, in the early 1960s, and throughout the 1970s and 1980s, most of the white-owned ranches and farms were transformed into small-scale agropastoral settlements. Subsequently, new farming systems and land management practices were introduced by immigrants who came from neighboring overpopulated areas with high agricultural potential. In the last decade, most of the large-scale farms in the footzones of Mount Kenya have been transformed into large-scale horticultural irrigation schemes oriented toward the international market (Figure 2). More land has even been opened up for irrigated agriculture in the very marginal areas further north (Figure 3).

These changes in land use and land ownership have brought about a dramatic transformation in social composition, from a simple pastoral society to a complex multistakeholder society, ranging from the footzones down to the Laikipia Plateau and the Samburu Plains. This society consists of an urban population in the regional towns and trading centers, large-scale horticultural irrigators, small-scale horticultural outgrowers (ie, small-scale farmers contracted by large-scale farmers to produce exclusively for them), agropastoral smallholders, large-scale ranchers, pastoralists, and international tourists. For all practical purposes, wildlife and flora also are considered stakeholders in this system.

In view of this complex social structure and the rapidly growing population, with ensuing social, cultural, racial, economic, and political disparities, a key challenge is to achieve equitable universal allocation and distribution of river water resources. Further complications of the issue are (1) that people perceive water as a God-given resource—with the implica-

FIGURE 2 Horticultural production: the conversion of former livestock–wheat field systems into large-scale irrigated horticulture in the footzones of Mount Kenya has introduced a new dimension of water demand in the area. (Photo by B. Kiteme)

FIGURE 3 Crop production in the marginal pastoral area: the demand for water continues to grow as more marginal areas further north are used for irrigation agriculture. (Photo by B. Kiteme)

tion that unlimited individual rights of use and ownership are an unalienable divine gift—and (2) that institutions have failed to address the problem of equitable allocation of water.

The nature and extent of conflict

These circumstances make it clear that water use conflicts in the basin, associated with water scarcity, are exacerbated by deep-seated latent conflicts attributed to perceived inequitable access to water and land resources, economic and political support for commercial interests unrelated to the local community, and long-standing ethnic, cultural, racial, political, and economic differences. Conflicts occur primarily between different types of stakeholders, whether they occur at the local (project) level, between upstream and downstream users, users and the authorities, humans and wildlife, or users and advocates of conservation.

The most commonly experienced conflicts occur between downstream and upstream users and attract wide coverage by local daily newspapers, as exemplified by the following quotation from an article in *Nation*, a leading Kenyan newspaper:

> On 21st February 2000, residents of Kariminu village led by the Nyeri County Council chairman barricaded the Nyeri–Nyahururu highway from 8:30 AM to 1:00 PM when the police arrived. They were protesting against the diversion of Kariminu River by a group of individuals for irrigation and failure of the local District Officer and District Water Office to take any action to stop the illegal abstractors from draining the river. They claimed that their sub-location had gone without water for several months due to over-abstraction by upstream irrigators, resulting in increases in typhoid cases and near closure of a local boarding high school. They demanded an audience with the area District Commissioner. As the riot police were restoring law and order, a riot erupted, several vehicles were damaged, and old men and women who could not flee were injured.

Another example is that of a fish farmer who lost fish because of reduced water levels as a result of abstraction upstream (Figure 4):

> On March 13th, 2000, a *Nation* correspondent reported that a Nanyuki fish farmer had lost 30,000 trout following the diversion of the Likii River for irrigation upstream. The loss was estimated as KSh 4 million (US$53,000). The fish farmer threatened to resort to "other measures" if the authorities did not intervene and punish the responsible persons.

Conflicts have also been reported between humans and wildlife, as illustrated by this report:

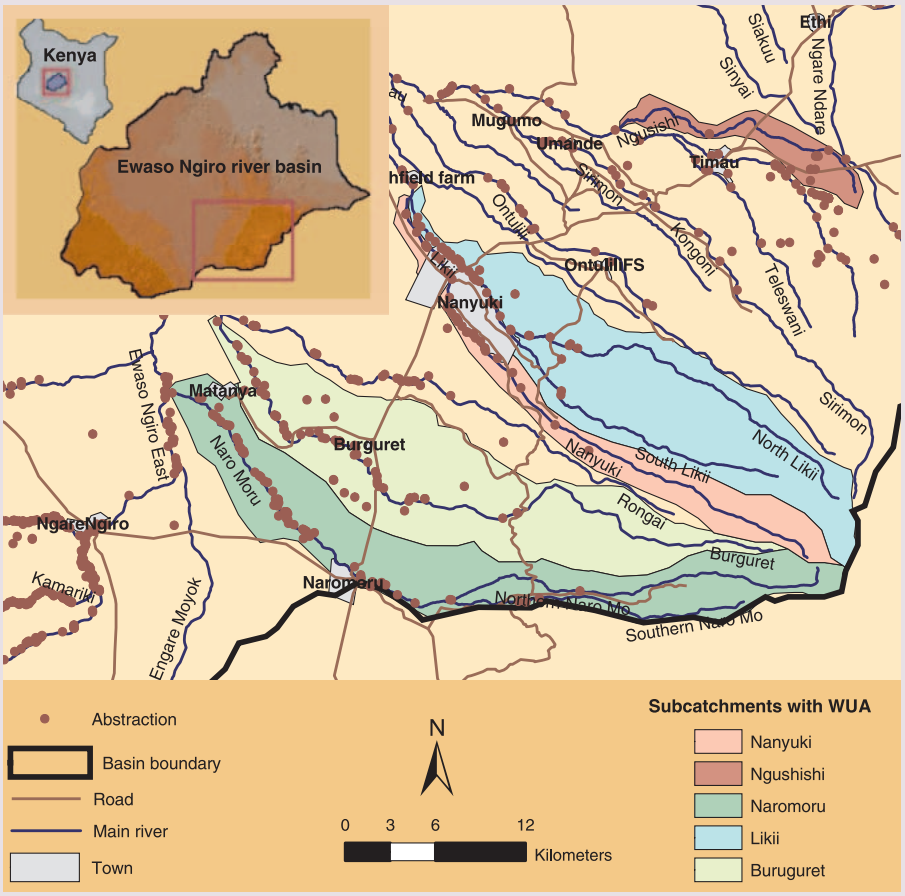
> On 21 March 2000, a *Nation* correspondent reported that ten villagers of Takaba Trading Centre, Mandera District, were hurt and eight monkeys killed in a two-hour duel between man and beast over water. The trouble started when villagers were attacked by monkeys while drawing water from three relief water delivery tankers. The clawing and biting monkeys sent villagers fleeing and took to quenching their thirst. The villagers regrouped and counterattacked and killed eight monkeys. The villagers reported that water shortages in the area due to dried river systems had forced dangerous wildlife out of the bush to roam through the villages. They feared for their lives.

FIGURE 4 Loss of fish due to over-abstraction of water upstream. (Photo by J. Gikonyo)

Conflict prevention and resolution through Water Users' Associations

Water Users' Associations (WUAs) started up in the late 1990s as a strategy employed by the larger Water Awareness Creation Campaign initiative, which had been operating for a few years with the support of the Laikipia Research Programme and the Ministry of Water Development. The WUA approach is a relatively new strategy in the

FIGURE 5 Subcatchments with WUAs. (Source: NRM[3] Database, 2002. Map by Kurt Gerber)



management of water resources in the region. Associations operating in the upper catchment include those focusing on the Ngare Nything River (1997), the Ngushishi River (1998), the Upper Naru Moru River (1998), the Likii River (1999), the Burguret River (1999), and the Nanyuki River (2000) (Figure 5). The Ontulili River association is in its formative stage.

Formation and function of the WUAs

WUAs are formed through the efforts of the major water users within a given river subcatchment, who, aside from mobilizing the local community, also provide the necessary financial and logistical support. Existing Water Projects in the respective river subcatchment provide a basis for formation and recruitment of members. Once a WUA is formed, an Executive Committee is elected. The Executive Committee is composed of the chairpersons of the active Water Projects and representatives of major water users in the subcatchment. The local administration and water office are also represented on the Executive Committee. Special Task Committees are also formed to deal with specific water-related matters—pollution, abstractions, water permits, etc. The river is then divided into sections along the profile to facilitate monitoring of all water use activities. Next, a Water Situation Monitor is appointed on a voluntary basis to monitor and report to the Executive Committee all water use activities (river water level [fluctuation], new users, wasteful uses, pollution threats, etc) in his respective section. The WUA is then registered with the Ministry of Culture and Social Services as a Self-Help Group.

The formation and institutionalization of the WUA is followed by documentation of the main water uses in the subcatchment, as well as sharing of information and experiences to create general awareness of the water situation among the various water users. This is a very important step in the effective functioning of the WUAs with respect to conflict prevention and resolution, as it helps to create common understanding among the user groups. It is at this point that people's perceptions and attitudes change, and they begin to appreciate the need for concerted efforts and action to ensure that water is available to all deserving users downstream.

Membership in the WUAs: It is difficult to describe actual membership in the WUAs operating in the upper Ewaso Ngiro North Basin. This is because membership is determined not in terms of individual members but by existing Water Projects in each subcatchment. A look at the membership in each of the Water Projects will give an impression of the membership per WUA (Table 1).

Frequency of meetings: All WUAs meet 4 times a year (every 3 months); the District Office and the local administration are invited to the meetings. However, the Executive Committees may meet more frequently, if there are issues that require immediate attention.

TABLE 1 Water Project membership in 5 WUAs, with number of members per project. In the case of Likii River WUA, actual membership is difficult to compute because of the nature of the function each user category has within the WUA. The Nanyuki Municipal Council supplies water to over 50,000 inhabitants, whereas Mount Kenya Safari Club is an international tourism facility that attracts a huge clientele. The other 3 user categories are large-scale irrigation farms. (Source: NRM[3] Database)

Nanyuki River WUA	Barguret River WUA	Ngushishi River WUA	Ngare Nything River WUA	Likii River WUA
Project 1 (120)	Project 1 (300)	Project 1 (142)	Project 1 (600)	Nanyuki Municipal Council
Project 2 (300)	Project 2 (500)	Project 2 (70)		Mount Kenya Safari Club
Project 3 (100)	Project 3 (500)			Mount Kenya Growers
Project 4 (200)	Project 4 (113)			Kangaita Farm
Project 5 (365)	Project 5 (200)			Likii Farm
	Project 6 (500)			Project 1 (1200)
Total: 1085	**Total: 2113**	**Total: 212**	**Total: 600**	**See caption**

Time schedule for water abstraction: During the months of August, September, and January, only 1 sprinkler per user is allowed and secondary supply pipes are operational on alternate days. During the months of February and March, no irrigation is allowed during the day; water is reserved for domestic use and livestock only.

Direct intervention to address the major causes of water conflicts: One of the most significant contributions of the WUAs in the prevention and resolution of water conflicts is through direct intervention to deal with the major causes of conflict, such as over-abstraction of water, illegal water abstraction, wasteful means of conveyance and irrigation, and delayed issuance of water permits. Those guilty of such offenses are compelled by the respective Association to take the necessary corrective measures; otherwise, they are reported to the relevant authorities for appropriate legal action. The WUAs have acted as pressure groups to press for speedy issuance of water permits by the concerned authorities.

FIGURE 6 Negotiations among stakeholders at all levels are effective in resolving conflicts over resource use. (Photo by Boniface P. Kiteme)

Dialoging and arbitration of potential and existing water conflicts

Practices (and developments) within the subcatchment that have the potential to cause user conflicts are identified by the Water Situation Monitors and reported to the Executive Committee (members of the Association affected can also report directly to the Executive Committee), who move quickly to address the problem, either directly with the concerned party or parties or through the District Water Office. In other instances, the Executive Committee convenes a stakeholders' consultative meeting to deliberate over the problem and negotiate a win–win solution. Thus, most problems never get to the authorities because a workable resolution is negotiated and agreed upon at the user level.

New water users are required to consult the Association through the Executive Committee, who commissions an overview assessment of the water situation to determine the implications of proposed new users. If it is determined that new uses will cause undesirable effects that could lead to conflicts, a general meeting is convened to discuss the best ways of allocating water to new applicants, using existing water abstraction points without affecting the river flow downstream. Even where water permits from the Water Office exist,

actual abstractions are subject to discussions and negotiations among the other members of the Association in order to ensure that implementation of permit provisions does not lead to any shortages that could cause conflicts. Furthermore, some well-established WUAs have drawn up area-based Water Abstraction Schedules to guide water abstraction among different user groups. This has become a very effective and popular tool for regulating abstractions and ensuring flows of water downstream most of the time. The success of these negotiations underscores the need for multi-stakeholder meetings in the effort to resolve conflicts over resource use (Figure 6).

Beyond river water conflicts

Although the WUAs were formed primarily to address the concerns of river water conflicts, well-established WUAs have gone beyond this immediate concern and are now addressing other issues such as water pollution, riparian degradation, and separation of livestock watering points to reduce associated contamination. Indeed, some WUAs have gone even further to put management components on their agenda (developing alternative water sources, especially through rainwater harvesting), along with diversification of income-generating activities, as a way of reducing the demand for water needed to support commercial horticultural irrigation. Two WUAs in the subcatchments have initiated external fund raising to support these additional ventures. Others will certainly follow this good example.

The challenges ahead

Despite the gains achieved by WUAs in the upper Ewaso Ngiro Catchment, there are several challenges worth mentioning.

First, there is a real danger of deviating from the primary objective of conflict prevention and resolution as the Associations try to diversify into other aspects of water management. These dangers should be monitored effectively.

Second, as the WUAs grow in number, they must face the challenge of how to ensure horizontal linkages and coordination so that they can learn important lessons and share experiences with best practices as a basis for improving their operations.

Third, certain legal and institutional aspects remain unclear, especially regarding institutional positioning of the WUAs vis-à-vis the institutions responsible for water resources management, particularly at the district level. Furthermore, the existing legislative framework does not provide for or recognize the role of WUAs in water resources management.

Finally, some of the facilitating (major) water users appear to have a hidden agenda in relation to the WUAs: WUAs can be misused as convenient platforms for public relations by large-scale commercial horticulturalists eager to continue using river water without interference from other smallholder agropastoralists in the neighborhood.

There is thus a need to begin addressing these issues before they affect the continued functioning of the WUAs, whose benefits so far cannot be overemphasized.

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