

CHAPTER 10

CATCHMENT PROPERTY RIGHTS AND THE CASE OF KENYA'S NYANDO BASIN

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ACRONYMS

CAPRI	Collective Action and Property Rights programme
ICRAF	World Agroforestry Centre
NEC	National Environment Council
NEMA	National Environment Management Authority
NSWCP	National Soil and Water Conservation Programme
RWSTF	Rural Water Services Trust Fund
Sida	Swedish International Development Cooperation Agency
WRMA	Water Resource Management Authority
WSRB	Water Services Regulatory Board

Attention to watershed management is increasing across the developing world. In India, for example, more than US\$500 million is invested in watershed projects every year. There are compelling reasons to believe that this interest will continue to grow. Water resources are becoming increasingly scarce. Tunisia, Kenya, Rwanda, Burundi, Algeria, Somalia and Malawi were already considered water scarce in 1990; by 2025 they will be joined by the Libyan Arab Jamahiriya, Morocco, Egypt, Comoros, South Africa and Ethiopia (as measured by the availability of 1 000 m³ of renewable water per person per year) (www.cnie.org/pop/pai/water-14.html). Concerns about water scarcity in South Africa have led to the Working for Water programme to remove fast-growing invasive trees from critical catchment areas and areas of valuable biodiversity (www.dwaf.pwv.gov.za/wfw). Across the developing world, ever-greater numbers of people are exposed to flood risks. Soil erosion continues to degrade agricultural potential, while dams, reservoirs and irrigation infrastructure continue to be clogged with sediment.

Integrated water management and ecosystem approaches are now generally recognized as vital to durable solutions to these challenges. In India, for example, the most successful watershed and catchment management programmes involve multiple stakeholders – community groups, NGOs, government agencies – a mix of new techniques and social organization, and give balanced attention to improving resource management and farmers' livelihoods (Kerr, Pangare and Pangare, 2002).

A particular area where more integrated approaches are required is in property rights reform. Insecure property rights to cropland are often cited as the major cause of soil erosion, sedimentation and low crop production (see review in Gebremedhin and Scott, 2003). An obvious policy prescription for dealing with catchment degradation, therefore, is to enhance tenure security on cropland. While more secure tenure may well reduce plot-level erosion, it is possible that less erosion at the plot level will not translate into significant changes in sediment loss at the catchment scale. Catchments are comprised of different types of land, put to different uses and held under different types of property rights. Crop agriculture may or may not be a large contributor to erosion within a catchment. In most catchments, there are other land uses, especially roads and footpaths, which occupy small areas of land but account for large percentages of total erosion (Ziegler, Sutherland and Giambelluca, 2001). In addition, catchments invariably comprise micro and macro sinks where eroded soils accumulate, as well as filters that reduce lateral flows of water, pollutants and sediment (Van Noordwijk *et al.*, 1998; Swallow, Garrity and Van Noordwijk, 2002). It is important, therefore, to take a wider perspective on property rights.

The objective of this paper is therefore to present a catchment perspective of property rights. Following Tiffen and Gichuki (2000) and DENR (1998), we define a *catchment* as “the area of land from which rainwater can drain, as surface runoff, via a specific stream or river system to a common outlet point which may be a dam, irrigation system or municipal/urban water supply offtake point, or where the stream/river discharges into a larger river, lake or the sea” (DENR, 1998: p. 29). On the other hand, a *watershed* is a “whaleback land unit” that forms the upper area of one or more catchments, with hydrologic linkages to lower parts of those catchments (Tiffen and Gichuki, 2000). We use the term *property rights* to refer to claims to use or control resources that are recognized as legitimate by an entity or entities larger than the individual, and the social and/or legal mechanisms that define and protect those claims. The key elements of *catchment property rights* therefore are the claims to use or control the resource stocks, flows and filters that comprise catchments, the individuals and groups that exert those claims, the statutory and non-statutory entities that support those claims, and the institutions that define and protect those claims and enforce duties on others.

The remainder of the paper consists of three components. The second section presents an analytical framework for watershed property rights that builds on a simple model of watershed function and the concepts and approach of legal pluralism. The third section applies that framework to the case of the Nyando river basin in western Kenya. The final section presents conclusions.

AN ANALYTICAL FRAMEWORK FOR ANALYSIS OF CATCHMENT PROPERTY RIGHTS

A watershed model of sources, sinks, flows and filters

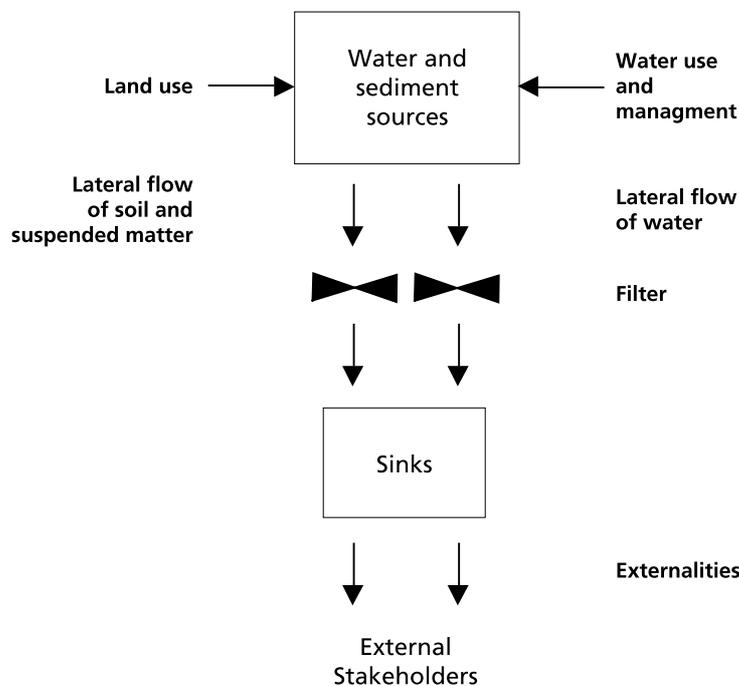
Van Noordwijk *et al.* (1998) and Swallow, Garrity and Van Noordwijk (2002) propose that watersheds be conceptualized as containing four main components: sources, sinks, flows and filters. *Sources* are units of land that yield more soil or water to downstream land units than they accumulate from upstream sources, while *sinks* are units of land that accumulate more soil or water from upstream sources than they yield to downstream sources. Both sources and sinks exist at multiple scales. At a landscape scale, natural forests tend to be net sinks of

sediment and water. At a smaller scale, natural forests usually have undulating land surfaces that contain small areas of source and sink.

Flows refer to lateral flows of organisms, soil, water, air and specific substances carried in such flows. Lateral flows of water are a defining characteristic of hydrologic catchments.

Closely related to the concept of lateral flow is the concept of *filter*. A filter is an element of a landscape that intercepts or modifies a lateral flow. Filters can decouple flows of dissolved particles from a flow of water, or act on flows of air or organisms. Filters have profound effects on the way that people cope with externalities and the scaling up and scaling down of catchment management. There are filters in the landscape at all scales, from field edges, to rice paddies, river vegetative strips and wetlands.

FIGURE 1
Simplified graphical model of sources, sinks, flows and filters in a hydrologic catchment



Source: Modified from Swallow, Garrity and Van Noordwijk, 2001.

Figure 1 presents a graphical model of a catchment that is comprised of sources, sinks, lateral flows and filters. Overall catchment management depends crucially on the particular portions of the catchment that can be identified according to source, sink, filter and flow. Landscape portions that are particularly important include the following:

1. *Water sources:* Catchments usually have discrete water sources, such as springs, that may be subject to multiple use by multiple users. Such sources may be the cause of severe gully erosion if poorly managed.

2. *Soil erosion sources*: Land areas that are particularly prone to high rates of erosion generally include footpaths and roadsides, which are often public property. Croplands and grazing lands, which may be private or common property, are more variable as sources of sediment.
3. *Pollution hotspots*: Particular commercial farms, such as horticulture farms or agro-industries, may be associated with particularly high discharge of pesticides, fertilizers or industrial residues.
4. *Wetlands*: Wetlands tend to be very important sinks and filters of sediment and nutrients. They also tend to be subject to multiple use, multiple users and conflicting property rights. Wetlands often have important values for preserving biological diversity.
5. *Waterways and constructed canals*: Waterways and canals serve as channels for carrying flows of water and suspended pollutants. Natural waterways are often viewed as public or common property, while canals may be private or group property.
6. *Riparian areas*: Riparian areas along watersheds or water reservoirs are important as potential or actual filters of soil and water (Tabacchi *et al.*, 1998). Riparian areas tend to be declared public areas, and are often used by large numbers of people with divergent interests (Swallow, Garrity and Van Noordwijk, 2002).
7. *Field and farm boundaries*: Field and farm boundaries can be important filters of water and sediments. Depending on the land tenure system, such boundaries may be subject to intense private investment in trees, vegetative fences or stone structures, or intense competition and multiple use.

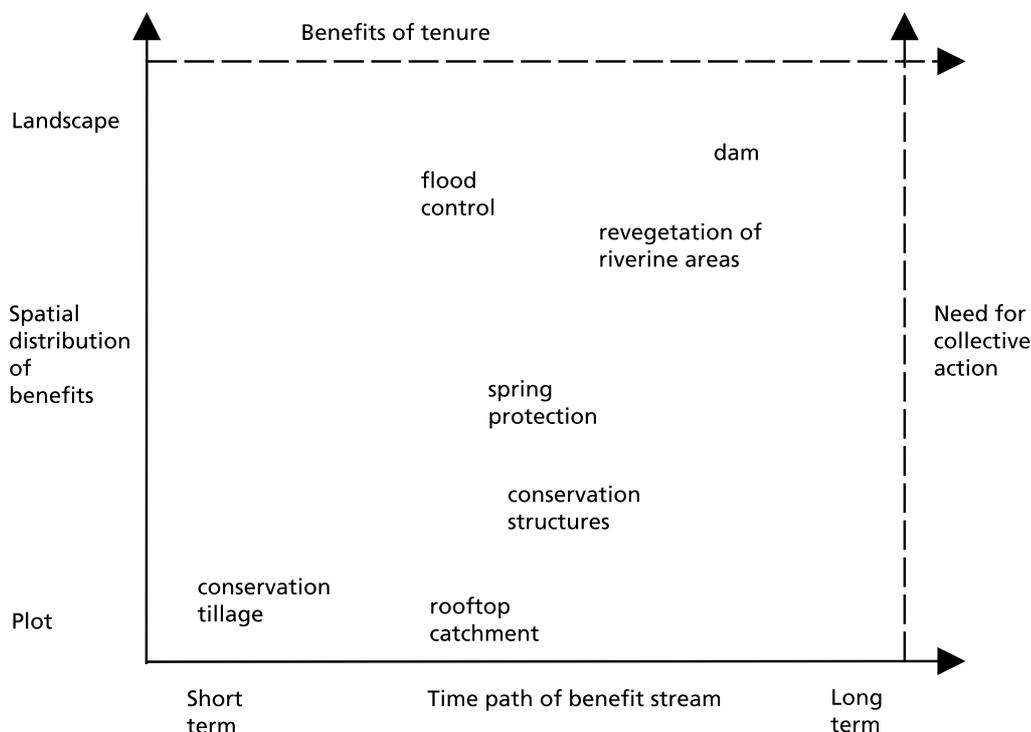
Importance of property rights and collective action over catchment components

The Collective Action and Property Rights programme (CAPRI) offers a simple conceptual framework to depict the importance of property rights and collective action for the adoption and management of different types of agricultural technologies and natural resource investments (Knox, Meinzen-Dick and Hazell, 1998). The key components of the framework are: 1) time duration of investment, which implies the value of long-term security of land tenure; and 2) spatial distribution of effects of investment, which implies the benefits to be obtained from collective action for resource management. Knox, Meinzen-Dick and Hazell (1998) indicate watershed/catchment management as a resource investment that requires both secure property rights and strong collective action. In Figure 2 we use the CAPRI framework to offer some hypotheses about the importance of secure property rights and effective collective action for the watershed components.

A legal pluralism approach to watershed property rights

Conventional treatments of property rights start from the presumption that there is a single legal source of authority that defines and enforces a single set of rules and laws about how people may access, use and manage resources and the benefits that derive from those resources. In contrast, the legal pluralism approach recognizes that there tend to be multiple sources of authority and institutions affecting people's access and use of resources and does not judge the legitimacy or superiority of any particular authority or institution (Meinzen-Dick and Pradhan, 2002).

FIGURE 2
The spatial distribution and time duration of investment in key catchment components



Source: Modified from Knox, Meinzen-Dick and Hazell, 1998.

Analysis of property rights through the perspective of legal pluralism begins with an understanding of how individuals obtain access to and control over resources. The “law” that governs access to and control of resources is not confined to rules and regulations enacted by State organs, but also includes norms and rules of behaviour that are generated by various forms of social organization, including villages, ethnic groups, associations or the State. Various types of law may be important in influencing property rights, including statutory law, religious law, customary law, project law, organization law and a range of local norms. Different types of laws are likely to be supported or sanctioned by different social authorities, which will tend to have different types of strengths and weaknesses. People with claims or complaints regarding watershed resources are likely to appeal to different types of law and social authorities to support those claims (Meinzen-Dick and Pradhan, 2002).

CATCHMENT PROPERTY RIGHTS IN THE NYANDO RIVER BASIN OF WESTERN KENYA

The Nyando River basin covers an area of 3 500 km² of western Kenya, and has within it some of the most severe problems of agricultural stagnation, environmental degradation and deepening poverty found anywhere in Kenya. The Nyando River drains into the Winam Gulf of Lake Victoria and is a major contributor of sediment, nitrogen and phosphorus to Lake

Victoria.¹ About 750 000 people reside within the Nyando basin, most of whom live in Nyando District in Nyanza Province and Nandi and Kericho districts in Rift Valley Province. The incidence of consumption poverty is high, ranging from an average of 58 percent in Kericho District, to 63 percent in Nandi District and 66 percent in Nyando District. At the administrative location level, the locations of Nyando District include both those with the lowest poverty rate in the sugar belt of Muhoroni Division (36 percent) and those with the highest poverty rate in Upper Nyakach Division (80 percent) for the entire basin (Central Bureau of Statistics, 2003). HIV/AIDS prevalence varies among 28 percent in Nyando District, 7 percent in Nandi District, and 12 percent in Kericho District.

Land-use and property rights vary across the basin. The upper part of the basin is comprised of gazetted forests, commercial tea production and small-scale agriculture on steep hillsides that were degazetted as forests during the last 40 years. Mid-altitude areas are a mixture of smallholder farms (with maize, beans and some coffee, bananas, sweet potatoes and dairy) and large-scale commercial farms (mostly sugar cane). The flood-prone lakeshore area is mostly used for subsistence production of maize, beans and sorghum, combined with commercial production of sugar cane and irrigated rice. There are clear differences in land use between long-settled areas and resettlement areas. The irrigated areas are owned by smallholder farmers and the moribund National Irrigation Board.

Sources, sinks, filters and flows in the Nyando basin

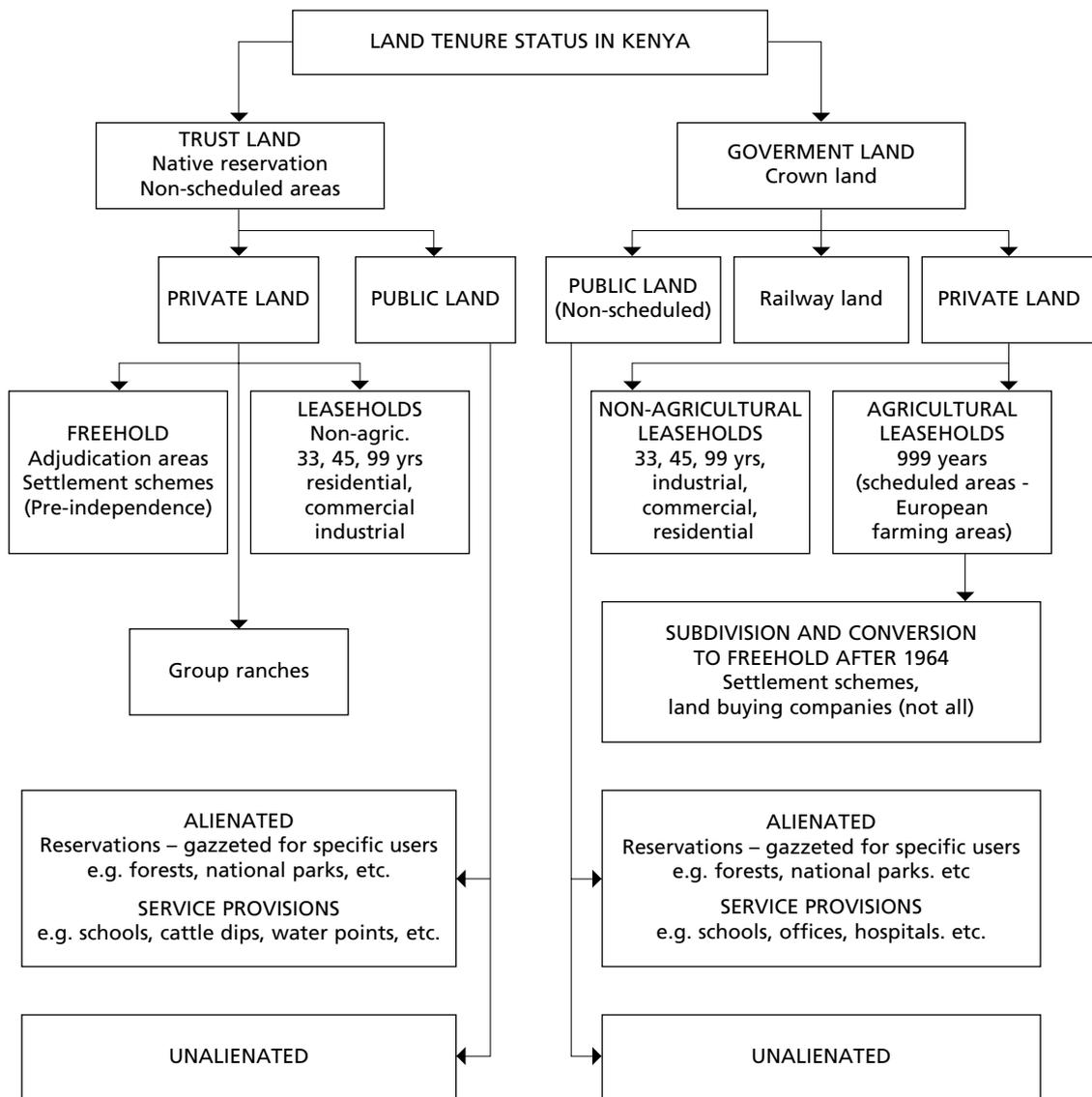
Scientists from the Lake Victoria Environment Management Programme, Water Quality Component and ICRAF have conducted several studies of water quality, land use and soil degradation across the Nyando basin during the last few years. Many of these results are summarized in a proceedings volume edited by Mungai *et al.* (2004). An analysis of sediment cores from the outlet of Nyando River into Lake Victoria shows a historical trend towards higher levels of sedimentation, with strong peaks in sediment deposition during high rainfall events associated with El Niño. Increased nutrient and sediment loads in the Nyando are linked to both point and non-point sources of pollution. Key point sources are sugar processing and agrochemical factories, while non-point sources are the thousands of small farm families who operate throughout the basin. ICRAF scientists estimate that about 61 percent of the land in the basin is sediment “source” area, with average net erosion rates of 43 tonnes/ha per year, while 39 percent of the land in the basin is sediment sink area that accumulates about 45 tonnes/ha per year. Sediment source areas are further distinguished into areas with relatively high erosion rates (fast erosion) and relatively slow erosion rates (slow erosion). Fast erosion is concentrated in hill slopes in the flood-prone Kano plains and some of the steep hillsides in the upper and mid-altitude parts of the basin. The remaining upland forests and wetlands and some of the sugar cane and smallholder farming areas in the mid-altitude zone appear to be net sediment sinks (Walsh, Shepherd and Verchot, 2004). Most of the riparian areas that could be important filters have been systematically deforested over the last 40 years.

1. The myriad problems of Lake Victoria – heavy loading of nutrients, loss of indigenous fish species, invasion by aquatic weeds, bans on fish exports to the European Union – have prompted a number of research, development and networking activities during the last decade.

Statutory land tenure in the Nyando basin

Land and water in the Nyando basin are held under a surprisingly wide variety of statutory property rights arrangements. Figure 3 presents the various types of land tenure as a classification tree, showing that there are at least six types of private tenure, including three types of private tenure on former crown land (large agricultural leaseholds [former white-owned farms], subdivided agricultural leaseholds and non-agricultural leaseholds) and four types of private tenure on trust land (freehold land in adjudication areas, freehold land in settlement schemes, non-agricultural leaseholds and group ranches). At the present time, these different tenure types are administered under a number of statutes, including the Government Lands Act, the Trust Lands Act, the Registration of Titles Act, the Land Adjudication Act and the Registered Land Act.

FIGURE 3
Land tenure characterization in Kenya



Source: Authors' analysis of the legal statutes and key informant interviews.

Land degradation problems appear to be most severe in subdivided agricultural leaseholds and in freehold land in adjudication areas. In the former, there are problems associated with poor land-use planning during the transition from large-scale to small-scale farms in the 1960s and early 1970s. The land buying companies that purchased land on behalf of groups of shareholders did not consider the productive capacity of the land, the terrain or the need for public utilities. Their main interest was to allocate some land to all of their members. Land buying companies have been formed along ethnic lines, thus creating clusters of different cultures living next to each other on the same landscape. This had the effect of weakening traditional systems. As a result, people in these areas find statutory laws more functional. A contrasting situation is found in the areas that were designated as native reservations in the colonial era. Natural growth in the populations in the native reserves has led to high population pressure in those areas and to overuse of all land resources.

Figure 3 also illustrates that there are at least five types of public land in the Nyando basin. In both government land and trust land areas, there is land that is not alienated to any specific user. This type of public land is very vulnerable and is often subject to abuse because of *de facto* open access. This is the land that is supposed to form the land bank from which the custodians of land draw when a development need arises. In the Nyando basin this bank is almost empty. There is also land that is alienated for specific public purposes such as forests, parks, government institutions, and public utilities such as schools and hospitals. The use for which it is alienated determines the custodian of such land. These are less vulnerable. Preliminary studies indicate that many very important areas for catchment management have been formally designated as private property and not left as public lands. These include spring heads, the catchment areas immediately around spring heads, riparian areas, some wetlands, and water harvesting structures. While private property generally offers the tenure security that is desirable to provide incentives to prevent degradation, inappropriate privatization can also cause problems, such as when the layout of plots results in many holdings cut across steep hillsides, or when key watershed points (e.g. spring heads) that have spatial benefits that go beyond the individual household are privatized and put under the control of one household.

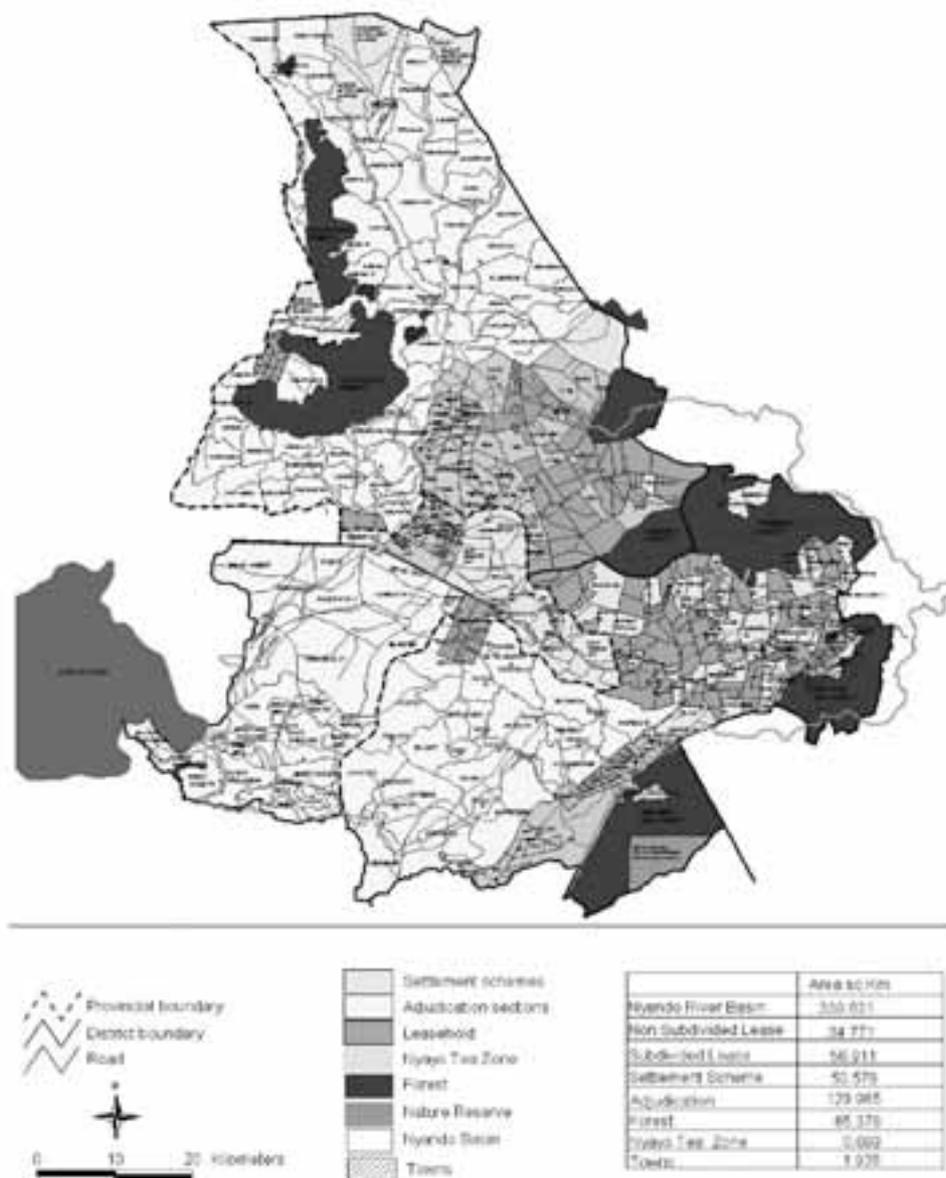
Figure 4 presents a map of land in the Nyando river basin that distinguishes the main types of private and public forms of land tenure. This map is based on data provided by the Ministry of Lands and the Forest Department offices in the relevant provincial and district offices.

Multiple statutory sources of authority for land, water and tree management in the Nyando basin

The *Ministry of Lands* is responsible for land adjudication, survey, registration, settlement, land administration and land-use planning under the statutory land tenure system of Kenya. Currently, there are more than 20 statutes that are used for land administration, which makes the process confusing and expensive. Formal land administration in Kenya is very centralized, with lands, survey, physical planning, settlement and adjudication handled by relatively independent departments of the Ministry. At the local level, the functions of the Ministry of Lands are handled by a number of boards and committees. Land Control Boards are responsible for approving or denying land transactions on freehold land. Liaison committees receive and resolve contentious issues on development applications that have not been approved by the local authorities. Plot allocation committees deal with issues of

FIGURE 4

Land tenure adjudication in the Nyando basin of western Kenya.



Sources: Map produced by the ICRAF GIS laboratory on the basis of data compiled by the authors from data supplied by the Kenya Ministry of Lands and Ministry of Forestry.

allocation of public land to public or private individuals and entities for development purposes. Local adjudication committees and arbitration boards facilitate the process of adjudication of land.

The Environment Management and Coordination Act Cap 8 of 1999 attempts to provide an appropriate legal and institutional framework for the management of the environment. It creates the National Environment Council (NEC), the National Environment Management Authority (NEMA), the Provincial and District Environment Committees and the Public Complaints Committee, the National Environment Action Plan Committee, the Technical

Advisory Committee on Environment, and the Establishment of Standards and Enforcement Review Committee. It also establishes the National Environment Trust Fund and the National Environment Restoration Fund and provides for Deposit Funds.

The *National Environment Management Authority* was established in July 2002 and made responsible for coordinating and supervising all matters related to the environment. NEMA is responsible for preparing environment action plans, and protecting and conserving the environment, including key water resources rivers, lakes, wetlands, hillsides, hilltops and the coastal zone. It establishes guidelines and procedures for environmental impact assessment of policies, programmes and projects likely to have significant environmental impact. It enforces quality control standards and can issue environment restoration orders, environmental easements and environmental conservation orders (Buigutt, 2004).

Department of Forestry: The Forest Act Cap 385 of 1962 (revised 1982 and 1992) is implemented by the Forest Department of the Ministry of Environment and Natural Resources. According to this act, "a forest area means an area of land declared under section 4 to be a forest area". The act addresses the preservation, protection, management, enforcement and utilization of forest resources on forest reserves, which must be reserved through a gazette notice as forestland. This limits forest development by the government to specific regions. Degazettement of forest lands is periodically undertaken to make way for new settlements. Concerns about the continual loss of forest lands and forest functions led to the drafting of a new Forestry Bill. This new bill attempts to expand the definition of forest to include all types of woody vegetation. It also attempts to address issues of gazettement and degazettement and provide for greater community involvement in forest management. The Forestry Bill was rejected by parliament in early 2004.

The Ministry of Agriculture is the leading agency in agriculture matters and the Agricultural Act Cap 318 of 1963 is the principle legislation. The act provides for the development of agricultural land use in accordance with accepted practice of good land management and husbandry. It provides for the conservation of soil and its fertility. It also empowers the Minister of Agriculture to make preservation rules to regulate, control and prohibit the clearing of land for cultivation, grazing or watering of livestock with a view to protecting land against floods, landslides, formation of gulleys and destruction from roads and other infrastructures. Soil and water conservation has been given some level of priority by the Ministry of Agriculture and the Office of the President. The National Soil and Water Conservation Programme (NSWCP) was supported by the Swedish International Development Agency (Sida) for the 25 years that ended in the year 2000. For the last 12 years, the NSWCP implemented a catchment approach to conservation, which was generally considered to be successful (Pretty and Shah, 1999). Until a realignment of the government structure in early 2003, the Ministry of Agriculture was responsible for supporting irrigation development.

The *Lake Basin Development Authority* was set up by an act of parliament (Lake Basin Development Authority Cap 442) to plan for the development of the Lake Victoria basin area of Kenya and to initiate project activities that would boost economic growth and human welfare in the region. A controversial component of the Lake Basin Development Authority was its largely unsuccessful support to the conversion of wetlands into irrigated agriculture.

The *Ministry of Water Resources Management and Development*: Until 2002, the focus of water management in Kenya was on the provision of water for domestic use, agriculture, livestock development and industrial utilization. A number of organizations were involved in the provision of water and sanitation services, including the Ministry or Department of Water, the National Water Conservation and Pipeline Corporation, local authorities, local communities, self-help groups, NGOs, projects in the private sector, regional development authorities and the Office of the President (for water development in the arid and semi-arid lands). There was very little focus on water resource management, and systems of water monitoring fell into relative disrepair. In the late 1990s, concerns about increasing water scarcity, low coverage of water services and declining water quality led to a new water policy, new legislation and a set of reforms of the water sector.

The Water Act 2002 vests all water resource in the State, and provides for the formulation of a National Water Resource Management Strategy and the establishment of the Water Resource Management Authority (WRMA), the Water Services Regulatory Board (WSRB) and the Rural Water Services Trust Fund (RWSTF). The Water Act provides an elaborate structure for water resource management based on catchment areas that are defined by the WRMA in accordance with the NWRMS. The WRMA formulates a Catchment Management Strategy and appoints a Catchment Advisory Committee for each catchment. Water Users' Associations are recognized as the primary authority for water management in rural areas. The Water Act 2002 also creates the Water Services Regulatory Board (WSRB), which concentrates more on the utilization (services providers) of water than the conservation of water. The WRSB is represented in the catchment by Water Service Boards that oversee water service providers. Once all of these new authorities are functional, the Ministry of Water will focus on the provision of information and the implementation of policy.

Multiple social authorities for land, water and tree management in the Nyando basin

The Nyando river basin is comprised of two major language groups – Luo and Kalenjin – with small minorities of other ethnic groups. Luo-speaking people reside primarily in the low and mid-altitude parts of the basin, while Kipsigis Kalenjin and Nandi Kalenjin reside primarily in the upper parts of the basin. The Ogiek is a small ethnic group whose customary habitat is the forests in the upper parts of the basin. Resettlement of the large farms in the “white highlands” has led to the co-existence of distinct clusters of Kipsigis Kalenjin with people of other ethnic groups, including Kikuyu, Kisii and Luhya. One spatial settlement pattern was one of the factors that contributed to politically motivated “tribal clashes” in 1992, 1994 and 1997.

The Luo ethnic group is well known in Kenya for the strength of its customary authorities and the large number of prohibitions and restrictions on individual land use. Polygamy is common, and polygamous households have a complex system of duties and obligations. Clans and subclans are very important sources of social authority; village committees are unlikely to succeed if they do not deliberately include representatives of all clans or subclans.

Women have very little independent access to land under Luo customary law, with the exception of the small home garden (*Orundu*) that even junior wives are entitled to (Onyango, 2002). Lack of control over land also severely constrains women's access to water sources, as

almost all water sources are established in private lands. Women thus have full responsibility for the provision of water for the domestic needs of their households, with almost no authority to manage their water sources.

Land management at the village and farm scales is also affected by the activities of a number of important projects and programmes. Perhaps most important of these are the focal area development committees and common interest groups that have been established, with support from the Ministry of Agriculture, under the National Soil and Water Conservation Programme, the National Agriculture and Livestock Extension Programme, the Lake Victoria Environment Management Programme, and ICRAF. Focal area development committees are elected by local communities to coordinate local contributions to extension and development plans developed by the communities and extension agents. Common interest groups form within these communities to address issues of common interest – often including spring protection, water pan construction, soil fertility enhancement, fuel energy conservation and income diversification. Hundreds of such community groups have been established over the last 15 years. In one part of the Nyando basin, ICRAF and the Ministry of Agriculture have been supporting coordination among neighbouring focal area development committees (Swallow *et al.*, 2003).

At the village level, rights and access to water are also affected by both customary authorities and area-based projects. In this area of rural Kenya, water service projects have been supported by the Ministry of Health, the Ministry of Water and the Ministry of Agriculture, as well as a number of NGOs.

CONCLUSIONS

This review illustrates the surprisingly large arrays of formal land tenure types and sources of statutory and customary authority over land and water management in the Nyando basin. While it appears that this complex land tenure system creates many problems for watershed management, insecure private rights to cropland is not one of the most compelling problems. High rates of erosion in the lower part of the basin are associated with private uncultivated areas that are overused for grazing and wood collection. High rates of erosion in the upper part of the basin appear to be associated more with the private allocation and farming of steep hillsides. Gully formation and low-quality water in the mid-altitude areas are associated with springs that are used commonly, but located on private land. Deforestation and cultivation of riparian areas are associated with privatization of riverine areas, together with ineffective enforcement of rules on the use of those areas. Lack of public infrastructure for water management is partially associated with the lack of public or collective land on which to locate water storage structures.

The Government of Kenya is currently undertaking a review of its land tenure and land policy. Whatever emerges from that review, however, it is unlikely that there will be a large reallocation of land from private individuals to the government. What is more feasible is that public and collective interests in key components of the watershed are exerted through new instruments such as environmental easements. However, that approach will require engagement with key statutory and social authorities. Catchment authorities or environment committees will be most effective if they are able to operate with the support of social authorities such as clan elders, water and land management projects and local authorities.

The Nyando case is complex, perhaps more so than most other watersheds in Africa. Nonetheless, it illustrates the importance of linking science with policy and institutional design: better scientific understanding of the catchment hydrology can lead to a policy and programme focus on small discrete parts of the catchment. The Nyando case also shows the need to understand the complex linkages between property rights and watershed management problems. And, finally, it illustrates the need to involve multiple social and statutory authorities in watershed management, including the various government institutions whose responsibilities and mandates often overlap and conflict.

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