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AN ASSESSMENT OF THE ROLE OF LAND TENURE AND OWNERSHIP IN THE MANAGEMENT OF WETLANDS: THE CASE OF OKANA WETLAND ECOSYSTEM IN THE LOWER NYANDO RIVER BASIN, KENYA

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ABSTRACT

Wetland ecosystems, like any other natural resource, have been exploited by the adjacent communities so as to sustain their livelihoods. The ecosystems have supported millions of livelihoods of the riparian communities and even beyond since time immemorial through their socio-cultural and economic values as well as ecological functions. The ecosystems should therefore be well planned and managed through wise use for sustained livelihoods hence sustainable development. However, the planning and management of the ecosystems is impeded by land tenure and ownership which is not clear in most wetland areas. The phenomenon has impacted negatively on the planning and management initiatives of the wetland ecosystems thereby compromising their quality and quantity hence sustainability. The situation has been exacerbated by the climate change phenomenon. The paper sought to assess the impacts of land tenure and ownership in the planning and management of wetlands with specific reference to Okana in the lower Nyando River Basin, Kenya. The study used techniques such as photography, surveys and Participatory Rural Appraisal (PRA) tool in collecting data. Field data was analyzed using SPSS. The survey revealed that community participation in the planning and management initiatives is quite minimal due to unclear land tenure and ownership of the wetlands. The results therefore form basis in addressing land tenure and ownership issues, which enhance degradation of the wetland ecosystems thereby putting the livelihoods of the riparian communities who depend on the wetland resources at stake. The paper recommends enhanced sensitization and awareness of land tenure and ownership of wetlands taking cognizance of the National Environmental Management Authority (NEMA) regulations on buffer zones.

Keywords: Wetland, Degradation, Planning and Management, Land Tenure and Ownership, and Sustainability

1. Introduction

Wetland ecosystems are diverse habitats, which are permanently or temporarily waterlogged by either saline, brackish or freshwater. They include mangroves, marshes, swamps, lake and riverine edge swamps, ponds, dams, coral reefs, flood plains, swamp forests, peat land, sea grasses, sandy beaches, deltas and estuaries. These wetlands have been classified differently under different classification systems. Mistch and Gosselink (2007) outline two systems of wetland classification namely the US Fish and Wildlife Services Systems (USFWS) and the Cowardin Wetland and Deepwater Systems (CWDS). Under these classifications there are coastal, inland, marine, estuarine, riverine, lacustrine and palustrine wetlands. In East Africa, wetlands have been classified on the basis of whether freshwater or saline. Harper & Mavuti (1996) and Ruwa (1996) have identified several categories of freshwater and intertidal wetlands such as swamps, estuaries, deltas, mangroves, floodplains and riverine wetlands.

Wetlands have been broadly defined by the Ramsar Convention on Wetlands of International Importance in 1971 as areas of marsh, fen, peat land or water whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water, depth of which at low tide does not exceed six metres (Kasoma, 2003; Mwanuzi, 2003; Mitsch & Gosselink, 2007). A simplified definition of wetlands has been given by Awange & Ong'ang'a (2006) as areas where the land is saturated with

water long enough to support and that do support poorly drained soils, plants and animals, which have been adapted to such environment, and biological processes suited to wet areas. In the East African context, wetlands are defined as areas of land that are permanently or occasionally waterlogged with fresh, saline, brackish or marine waters at a depth not exceeding six metres, including both natural and man-made areas that support characteristic biota (McClanahan & Young, 1996; GOK, 2005; GOK, 2007).

Kenya's wetlands are diverse in type and distribution. They cover a total surface area of about 2,737,790 ha, which is approximately 3-4% (14,000 km 2) of the country's surface area, which is about 583,000 km 2 (Raburu et al. 2012). The wetlands often increase upto 6% during rainy seasons (Raburu et al. 2012). Some of the larger wetlands of Kenya include shallow lakes such as Nakuru, Naivasha, Magadi, Kanyaboli, Jipe, Chala, Elementaita, Baringo, Ol Bolossat, Amboseli and Kamnarok; the edges of Lake Victoria; Lorian, Saiwa, Yala, Ondiri, Shompole Swamps; Lotikipi (Lotagipi) and Kano plains; Kisii valley bottoms and Tana delta and Coastal wetlands including the mangrove swamps, sandy beaches, sea grass beds and coral reefs.

Wetlands are one of the most productive ecosystems in the world supporting high biological diversity and economic importance

(Mitsch & Gosselink, 2000; Okurut & Weggoro, 2011). They support high biodiversity of fish, birds, macro-invertebrates and micro-organisms, which maintain and support life systems on the planet earth. Wetlands have provided great socio-cultural and economic values to the riparian communities

living around these ecosystems since time immemorial. Both rural and urban populace obtain food, water, handicrafts, fuel wood, medicinal products and building materials from the wetland habitats.

Despite the socio-cultural, economic and ecological importance, wetlands have been and/or are being modified mainly because their resources are overexploited and their lands converted to other uses as well as implementation of upstream developments,
which alter the quality and flow of water. This is attributed to the fact that the economic values of wetland goods and services are poorly understood (Breen et al. 1997; Emerton et al. 1999). Both freshwater and marine wetlands, their resources and hydrological functions have been modified, degraded and interfered with because they are considered less valuable compared to other 'developments', which yield immediate and obvious profits (Emerton et al. 1999).

Wetland loss and/or degradation, which may emanate from anthropogenic activities such as infrastructure development, channelization, canalization and draining for agriculture and mosquito control, pollution (Mitsch & Gosselink, 2000; Okurut & Weggoro, 2011; Rongoei et al. 2013), and natural factors such as invasion by both alien and native species (Howard & Matindi, undated), may result into adverse environmental impacts. Besides, the livelihoods of the riparian communities that directly rely on the wetland resources for sustenance will be in jeopardy. In the long run, the benefits so derived may decline drastically or become exhausted altogether.

Wetlands are very valuable multifunctional environmental resources. Despite this fact, they have been disappearing at an alarming rate all over the globe. Globally, wetland ecosystems are estimated to cover about 1,280 million hectares (MEA, 2005). However, most of the wetlands are under threat from a variety of local or regional human activities which have resulted in rapid degradation and/or loss. Examples of wetland degradation and/loss are many. In the Dakotas and Minnesota, USA, about 56,000 ha of wetland is drained annually. The US Army Corps of Engineers estimates that about 90 square kilometers of Louisiana's wetlands are lost annually due to both natural change and human activity (Lutgens & Tarbuck, 2000). Mexico City, in fact, is the site of a wetland or lake that disappeared during the past 400 years as a result of human influence (Mitsch & Gosselink, 2000). Besides, major cities in the world such as Chicago and Washington DC in the United States and Christchurch, New Zealand and parts of Paris, France, as well as many of the large airports such as Boston, New Orleans, and J.F. Kennedy in New York among others are situated on former wetlands (Mitsch & Gosselink, 2007). In fact, even Nairobi City was once a wetland! In Finland, about

90% of the peat land, which covered 11 million ha is drained and planted much for forestry; while in the Netherlands, drainage of peat lands has affected about 180,000 ha of land, leaving only about 3,600 ha undisturbed (Briggs & Courtney, 1989). In Japan, 35% of its mudflats have been reclaimed since 1945; while in Summatra, as little as 7% of the estimated original peat swamp forest remained intact by the late 1980s (Anonymous, 1997). In the Ganges-Brahmaputra flood

plain in Bangladesh, an estimated 2.1 million ha (26.3%) of wetlands have been lost to flood control, drainage and irrigation (Khan et al. 1994). In Uganda, about 5% of the wetlands had been lost during the period between 1950/60 and 1993 due to human activity (Kasoma, 2003). In Nakivubo wetlands in Kampala, 2.39 km 2 (45% of the original 5.29 km 2) had been modified or reclaimed by 1998 (Emerton et al. 1999). In Rwanda, nearly 9,400 km 2 of the seasonally flooded wetlands (16,800 km 2) have been officially reclaimed for agricultural use (Okurut & Weggoro, 2011). Kenya's wetlands have not been spared. For instance, sections of the Yala and Nyando wetlands are being reclaimed for agricultural use. Wetlands in the Nyando River Basin have been lost due to the establishment of sugarcane factories in the middle catchment of the basin as well as the horticultural farming to meet the growing demand for food in the Lake Victoria Basin (Masese et al. 2012). The sugar factories include Kibos, Chemelil, Muhoroni and Miwani. About 230 km 2 of the Yala wetland have been reclaimed by Dominion Farm mainly for rice cultivation (Okurut & Weggoro, 2011). Ombeyi wetland has also been degraded due to human activities such as deforestation, overgrazing as well
as unsustainable harvesting of wetland products (LVEMP, 2014).

Wetlands have also suffered from other factors apart from conversion into other uses. Climate change has impacted negatively on the ecosystems. For instance, rainfall variability due to climate change on one hand, has led to the drying up of seasonal streams, ponds and wetlands in the Lake Victoria Basin (LVB), study area included (EASWN, 2013). On the other hand, climate change phenomenon may also cause excessive rainfall, which in turn can lead to flooding and subsequent inundation of low elevation wetland areas. For instance, in the Ganges-

Brahmaputra and Zambezi deltas, multiple risks of storm surges and inland river flooding severely affect the cities and settlements within the deltas (Reckien et al. 2017).

In order to reverse the scenario through sustainable utilization of wetlands, an integrated planning and management is a prerequisite since wetland habitats are diverse, ubiquitous and complex ecosystems. Integrated planning and management focuses on different actors and sectors working together under a commonly designed agenda to produce a commonly defined or desired objective (Auriacombe & Ackron, 2015). Besides, the approach, when properly developed and implemented, is quite effective and efficient in enhancing and sustaining rural livelihoods through sustainable use of natural resources such as wetlands (Pycroft, 2010). The undertaking however has to be carried out in an environment where land tenure and ownership is clearly defined since the latter has a major impact on the planning and management strategies. This study therefore aimed at investigating the role of land tenure and ownership in the management of Okana wetland ecosystem in the lower Nyando River basin. An understanding of the phenomenon will help in designing a framework for planning and management of wetland resources in the basin as well as in other regions.

2. LITERATURE REVIEW

Wetlands, like any other wild habitats, need to be well planned and managed. According to Helliwell (1985), planning and management of ecosystems would counter any losses and/or degradation that would be difficult, and often impossible to recover. Such losses and/or degradation would be not only detrimental for us but also to all subsequent generations. Therefore, it is prudent to conserve as much wildlife as nature may offer. Other reasons for conserving wildlife habitats such as wetlands include actual production, potential production and for recreation purposes (Helliwell, 1985). Actual production involves the provision of meat, fish, fruits or pharmaceutical materials while potential production is where wetlands are used as reserve of material for breeding new varieties of edible plants or producing new breeds as a means of controlling pests, and pollinating food crops and facilitates for research work and the training of scientists. The wetlands therefore act as gene bank. Recreation purposes include generation of education to broaden one's mind and increase one's understanding of the world, hobbies such as amateur photography or natural history studies and contribution to the character of the visually perceived landscape (Helliwell, 1985). All these functions of wetlands justify their conservation and management through proper planning.

Wetlands are potentially vulnerable to changes in climatic parameters such as air, temperature, precipitation and other meteorological components (DMCN, 2002). Variations in these parameters cause changes in evaporation, water balance, hydro-chemical and hydro-biological regimes hence entire wetland ecosystem. The variations in climatic parameters are bound to exist in the Lake Victoria Basin due to the anthropogenic activities such as deforestation, overstocking, overgrazing among others. All these impacts directly or indirectly on the wetlands, and hence the physical
environment.

Many communities of the Lake Victoria Basin, the study area included, derive their livelihoods from exploitation of wetland resources. They draw traditional food, herbal medicine, building and construction materials, water and handicrafts from the wetlands. Besides, the ecosystems provide green grazing fields especially during dry seasons. They also form important sites for ceremonies such as circumcision, ash drive and baptism. These ecosystems should therefore be protected for sustained livelihoods. However, an assessment report by LVEMP (2002) confirms that there is very little effort to manage wetland resources in the Lake Victoria Basin.

Studies have shown that wetland ecosystems face myriad of challenges which affect their planning and management. In the East African region, for instance, the ecosystems face challenges such as too many sectoral laws, policies and institutional frameworks, inadequate funding for wetlands survey and research leading to inadequate scientific information on the wetlands, inadequate education and dissemination of information to riparian communities on wetland values, functions and how to manage them, land tenure and ownership of the wetlands as well as access and use rights of the same (MEA, 2005; Kibwage et al. 2008).

By law, wetlands are public lands (GOK, 2010). However, research has indicated that many wetlands in the Lake Victoria Basin are communally owned (LVEMP, 1998; LVEMP, 2000; LVEMP, 2001). At the community level, wetlands are thus common property areas for fishing, grazing and harvesting of natural products such as papyruses, reeds and grasses.

Community regulations for wetland use stipulate free access and user rights for all community members. Exclusive user rights are only exerted during wetland cultivation where real parcel owners have to grant permission. This implies that basically, community level management alone does not offer effective management regime to protect wetlands and their

associated resources especially in the absence of policy framework regulating wetland utilization. An assessment of the existing land tenure and ownership of wetlands is quite crucial for planning and management of the ecosystems.

Wetlands, both in rural and urban areas, have had considerable pressure from socio-economic development over time and space. In urban areas, wetlands have been converted into industrial sites and residential settlements. In Kampala for instance, wetlands were the last “free” or cheap areas for infrastructure development, and despite the designation of most wetlands as “green corridors” in the Kampala Structural Plan of 1994, wetlands were still turned into industrial sites or were slowly filled in with semi-slumps in the 1990s (Iyango & Ndayabarema, 1995; Bakema & Iyango, 2000). In fact, Munyonyo beach in Uganda was built at the expense of wetlands for the purpose of eco-tourism. This is despite the fact that Uganda’s wetlands are protected ecosystems. In total, 75% of the wetland area in Uganda has been significantly affected by human
activity and about 13% severely degraded (Awange & Ong’ang’a, 2006).

In Kenya, wetlands have not been spared. The wetlands have been converted intofarmlands, residential areas and/or enterpreneural premises. For example, Yala Swamp was converted into rice irrigation farming while Bura and Tana River Delta into sugar cane farming. However, the large-scale rice irrigation farming in Yala Swamp by the Dominion Groups of Companies has since stopped. Nyamasaria and Nyalenda wetlands (including Dunga) in Kisumu City have been reclaimed and converted into residential settlements, social amenities and premises for business enterprises (Odaro, 2010; NBI, 2018). Besides, Kimana wetland in Kajiado County has also been drained and converted into agricultural farmland and urban settlement (Njagi, 2016). The rationalization of these development projects is creation of job opportunities for the local communities. However, such rationale is still in doubt. For instance, in the case of Yala Swamp, the Kenya Land Alliance (KLA) holds that the operations would lead to ecological disaster. Thus:

> “……. KLA is constrained to conclude that the activities of Dominion Farms (K) Ltd in Yala swamp are environmentally degrading and destructive of Kenya’s largest, rich and fragile wetland ecosystem in the name of development…….” (KLA, 2005; KLA, 2008).

It is worth noting that Kenya has established the Wetlands Policy (The National Wetlands Conservation and Management Policy, 2015) as part of her obligation under Ramsar Convention as well as those of the East African Community. However, localized wetlands such as Okana, which are small in size and hardly inventoried, are easily abused. Formulation of localized management strategies based on the main policy to enhance wise use of the local wetlands is necessary.

Wetlands around Lake Victoria including the study area are increasingly threatened by agricultural activities such as crop farming, grazing on lush wetland pasture, excessive harvesting of wetland products and frequent fires. All these phenomena lead to loss and/or decline of biodiversity, which subsequently reduce the capacity of wetlands to filter and reduce the amounts of pollutants reaching the Lake (Awange & Ong’ang’a, 2006). Sustainable utilization of the wetland ecosystems is necessary in order to enhance ecological sustenance of the ecosystems and sustain the livelihoods of the riparian communities who depend on the wetland resources.

3. Study Area

The study is based on a research survey conducted in Okana wetlands in the lower Nyando River basin. It has an estimated area of about 40 km 2 (GOK, 2009). The Okana wetland system lies in West Kano in Nyando Sub-County, Kisumu County. The wetland system is in the western part of Kano Plains where the soils are gleysols type, commonly associated with swamps (LVEMP, 2000a&b). It is located at the confluence of rivers Ombeyi-Oroba, Luanda, Nyangeta, Lielango and Miriu (Fig 1).

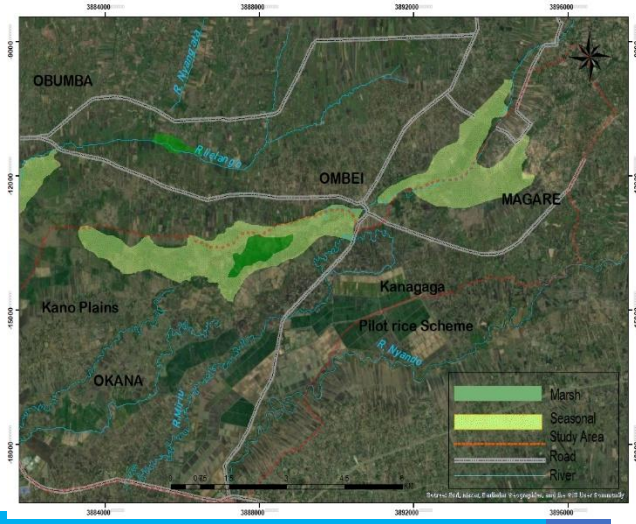


Fig: 1 Okana Wetlands. Source: Kisumu East Topographical Map 1: 50,000.

Okana area comprises several villages with a total population of about thirteen thousand, four hundred and sixty-seven (13,467) with a total number of households of nine hundred and thirty eight (938) (GOK, 2019). The major villages in the area include Kowuor, Kabina-Kodeyo, Kagaya, Kaluga, Kosimbo, Kawuor, Kodhiambo, Kokal, Kanyang'anyi, Kanyaoma, Kadeya and Kathina (Fig. 2). In terms of economic activities, the residents basically engage in subsistence agriculture, with rice being the staple crop.

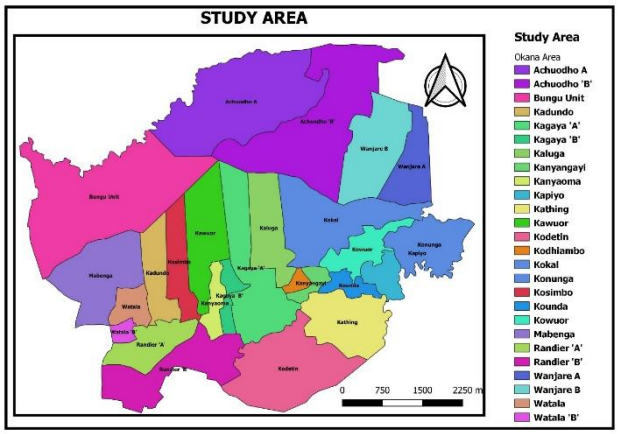


Fig: 2 Okana Area (Villages).

4. Methodology

A number of techniques were used in the assessment of the impact of land tenure and ownership on the management of Okana wetlands in the lower Nyando River basin. These include random

sampling, purposive sampling and PRA. Random sampling technique was used in the administration of three hundred and eight (308) questionnaires in the study area. Purposive sampling technique was used to obtain information from key informants. A total of forty (40) questionnaires were administered. PRA was used to validate responses obtained during field survey. A total of thirty-six (36) members participated in the exercise.

5. Results and Discussion

The study has revealed that the wetlands manifest two (2) types of land ownership namely, communal and government (public). The survey showed that 65% of the respondents indicate that the wetlands are owned by the local community while 35% are convinced that the ecosystems are government owned. The former category insists that the parcels have been allocated to them by the ministry of lands and some displayed the Land Title Deeds that they
were issued with. That the parcels were passed down to them by their ancestral fathers long before the land adjudication exercise. To the latter category, the wetlands are owned by the government and therefore anyone has access and use rights. The individuals who possess land title deeds claim ownership of the land including the areas which should be legally protected wetlands! The nature of ownership is therefore not clear and often results into social conflicts
regarding the access and use rights of the ecosystem. In the long run, degradation and/or loss of the wetlands occurs.

On the basis of the nature of land tenure and ownership, two (2) management strategies exist. These include rehabilitation of wetland ecosystem and economic diversification initiatives. The rehabilitation of the ecosystem is undertaken by individual members who own land in the wetland area. The alternative economic activities on the other hand are carried out by the members of the Okana Community Wetland Self Help Group. Planning interventions that have existed include the land adjudication, registration and subdivision. While these exist and evident by the presence of Land Title Deeds, the interventions have not been translated into pragmatic management strategies of the wetland resources. The effectiveness of the existing management strategies of the wetland resources is discussed in the sections below.

6. Rehabilitation of Wetland Ecosystem

Wetland vegetation has been cleared to give room for agricultural production, particularly rice growing. The activity has seen a vast proportion of the wetland macrophytes cleared through burning,

clear cut and uprooting. In fact, a visit or a ride to the site confirms this, and one hardly believes that the open rice fields (Plate 1) that stretches to Landi River towards Sidho, a neighbouring clan, was initially a dense thicket of wetland macrophytes and habitat of numerous fauna. The clearance has led to the decline of biodiversity either through emigration, extinction or both (Tables 1a & b).

a: A mature rice ready for harvesting.

b: Harvesting of rice
Plate: 1. : Rice fields in Okana.
(Source: Author, 2023)

Table 1a. Species of plants that have declined/disappeared in Okana Wetlands

Local Name	Botanical Name

Adugo	*Acacia drepanolobium*
Okaka lang'o	*Aloe secundiflora*
Keyo	*Combretum* spp.
Ochol	*Diospyros abbysinica*
Powo	*Grewia bicolor*
Pedo	*Caesalpinia sepiana*
Atego	*Keetia gueinzii*
Sangla	*Rhus natalensis*
Saa	*Oncoba spp.*
Achak	*Pittoasporum spp.*
Nyayado	*Cassia floribunda*

Table 1b. Species of animals that have declined/disappeared in Okana Wetlands

Local Name	Scientific Name	English/Common Name
Ondiek	*Crocuta crocuta*	Hyena
Bim	*Papio anubis*	Olive baboon
Ong'er	*Ceropithecus mitis*	Monkey
Dwe	*Tragelapus spekei*	Sitatunga
Nyang'	*Crocodilus niloticus*	Crocodile
Tula	*Asio abyssinicus graueri*	Owl
Ng'ielo	*Python sebae*	Python
Muok	*Orycteropus afer*	Antbear
Awendo	*Acryllium vulturinum*	Guinea fowl
Ndemu	*Mehelya spp.*	Brown mamba
Tel-tel	*Capethera spp.*	Wood pecker
Aywer	*Francolinus spp.*	Spurfowl
Chiewo	*Hystix galeata*	Porcupine
Aluru	*Coturnix delegorguei*	Harlequin quail
Magungu	*Anastomus lamelligerus*	Open billed stock

The phenomenon has resulted into the loss of the values of the ecosystems through provision of various goods and services to the riparian community thereby putting their livelihoods at stake. Consequently, they have initiated restoration programme of the wetlands. The rehabilitation programme started in the early 2000s by one resident and with time a few members have embraced the initiative. The activity is however confined to one's own land parcel since one is prohibited to undertake the activity in another person's parcel due to both access and use rights.

The programme involves planting of wetland plants (papyruses) on the sites, which have been cleared and selective harvesting of the products, whereby only mature ones are cut. The initiative has been successful and since its launch, residents confess continuous availability of water at the site even during dry seasons. This is due to wetland ecological function of water recharge. Prior to the initiative, the local people were sensitized on the value of wetlands and trained on the propagation practices of the wetland macrophytes by VIRED International. Though a success, the programme may not last for long and hence complete rehabilitation or restoration of the ecosystem is still in a limbo. Two setbacks are likely to hinder the progress.

First, the programme has not been embraced by all wetland users in the study area. In fact, it is only one resident, who is a member of Okana Wetlands Management Self Help Group, has taken the pain to undertake the initiative. The other members are yet to take part or show commitment in the restoration programme despite the sensitization and training as well as the fruitful attempts by one of them. The phenomenon confirms the findings of Pomeroy (1995) in the analysis of community participation in resource management. He observes that many communities or people may not be willing to or capable of taking on the responsibility of management of a resource in question. This is due to a long history of dependence on the government to take charge. It therefore requires sometimes to be reversed. Besides, there is no guarantee that a community or resource users will organize themselves into an effective governing institution.

To this end, it can rightly be concluded that the rehabilitation initiative is still at an infant or experimental stage and cannot therefore be relied on to offer an effective wetland ecosystem management that would sustain livelihoods. A proper organizational structure that compels all users to participate in a management task is thus necessary. Such a structure should explicitly outline individual member's responsibilities in a larger integral unit.

The second setback concerns ownership of the wetland. Whereas wetlands are trust lands in Kenya, this perception or notion is seldom known by the riparian community. The locals claim ownership of the ecosystems on the basis that their land parcels stretch down to the habitat. Therefore, one owns a portion or section of the wetland that corresponds to one's parcel of land. In this context, it becomes extremely difficult for one member to undertake any rehabilitation activity on another person's parcel unless permitted to do so. The scenario therefore confines any rehabilitation of the ecosystem to one's own parcel. Moreover, this is only possible if one accepts to take up the task. It is worth noting that even the member who has embraced the initiative carries out the activity on his own parcel of land. Sensitization of the status of wetland tenure systems through seminars, workshops, media and chief's *baraza* is very crucial.

7. Economic Diversification Initiatives

Economic diversification refers to the adoption of alternative sources of livelihoods or incomevgenerating activities other than the main or dominant one. The purpose of this is to ease pressure on the resource(s). The practice will therefore help to shift focus on wanton destruction or overexploitation of the resource(s). The types of alternatives or activities that may be chosen
vary widely from one place to the other. Identification of the best alternatives requires collaboration between professionals, opinion leaders, entrepreneurs and community members. These experts or groups would help to establish market opportunities, ecological requirements and sustainability of the activities.

The study has revealed that craft making is the second most dominant economic activity after crop farming, accounting to about 80% of the livelihoods (Table 2). This implies a potential undue pressure on papyruses and reeds with a possible depletion. However, harvesting of the resources is checked by engagement in other income generating activities such as bee keeping, horticulture, cereal production, aquaculture and agro-forestry. These activities are undertaken by the members of the Okana Community Wetlands Self Help Group (OCWSHG) as ways of sustaining their livelihoods while not depending entirely on the wetland resources. As a Community Based Organization (CBO), members formed different sub-groups or committees in charge of each activity. The activities kicked off well and had good returns at the beginning. However, the group encountered several hiccups, which tampered with their common goal environmental protection while sustaining their livelihoods. Leadership problem emerged and mistrust within the management team cropped in where some sub- group or committee leaders personalized their projects and detached completely from the mainstream management team. Consequently, the latter ex-communicated

such leaders and only worked with loyal and like-minded team leaders. The hiccup can be addressed conveniently at the monitoring and evaluation stage, which is often continuous, in the proposed wetland management model (Fig. 3).

Table 2. Level of engagement in wetland resource utilization in Okana

Activity	Percentage (%)
Agriculture	95.8
Fishing	65
Fuel wood collection	97.5
Extraction of medicinal herbs	9.2
Water supply	100
Construction activities	30.8
Craft making	80

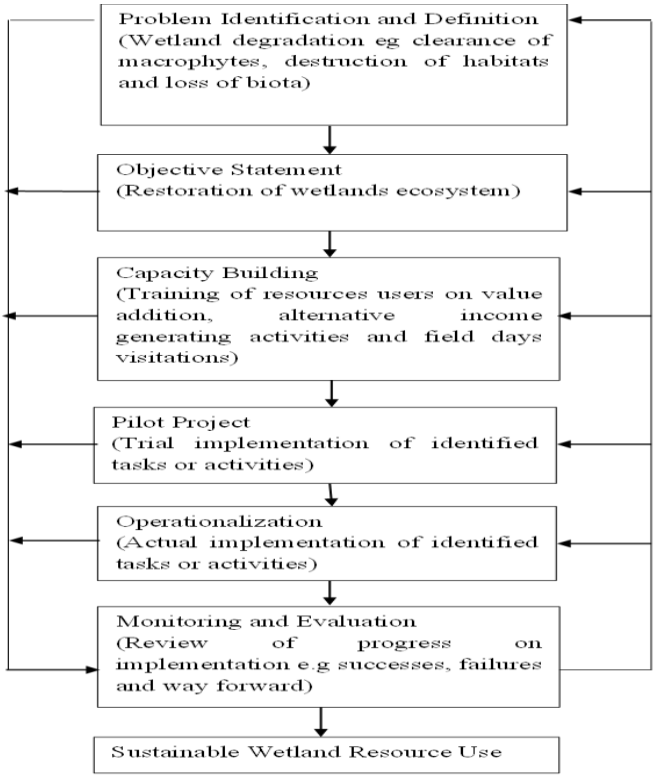


Figure: 3 Phases in the development of Okana Wetland Management Plan. (Source: Author, 2023)

Another hiccup is laxity and lack of commitment on the part of the members especially resource users. At the beginning of the activities or projects, members were enthusiastic and all groups picked up. However, the vigour soon waned away and members hardly participated on regular basis. The phenomenon led to

drastic decline in the production of wetland goods particularly the handicrafts. The most affected was the craft making strand. As a result, only the horticultural and cereal projects remained steady. A remedial measure for this would probably be regular visitation to centres where similar activities or projects are undertaken. Members or resource users would perhaps learn from their counterparts the virtues of commitment and hard work, and this would be awake up call for the resources users. In the proposed model, it is captured in the capacity building, which comprises seminars, workshops, field days, exhibitions and exchange programmes.

Prolonged dry spell also affected the performance of some of the projects namely fish farming, horticultural farming and agro-forestry. Contrary to the expectation, the Ombeyi-Oruba River which hardly dries up, dried at the time of research study. Since this was the only source of water for fish pond and horticultural farming, the activities had no option but to wind up. Surprisingly enough, water did not dry up completely at the site of wetland rehabilitation. Thanks to the water recharge function of wetlands. Two lessons are learnt here. The first one concerns appropriate siting of a fish pond based on potential drying up of the river during drought. The second is to do with increased or expanded programme of wetland rehabilitation. Resource users should take up the situation as an impetus and embrace rehabilitation so as to enhance water recharge function of the wetland ecosystem.

It can be derived from the foregoing discussion that the alternative income generating activities-economic diversification-initiated by the OCWSHG, were basically experimentation and cannot be considered as viable management strategy for the wetland resources. Their sustainability and hence effectiveness still hangs in the balance. Nevertheless, they have provided a basis of reference and further implementation of similar management plans.

They only provide vital lessons for the monitoring and evaluation in the implementation of a management plan for proper utilization of the wetland ecosystems for sustained livelihoods.

8. Constraints in Wetland Resource Management

According to the study findings, two management measures exist in Okana area namely, rehabilitation of the wetland ecosystem and economic diversification of livelihoods. These measures have their own weaknesses or shortcomings as have been discussed. The study further reveals a number of constraints, which impact negatively on the effective management of the ecosystems. To begin with is the transboundary nature of wetland resources. Wetland resources are diverse and are seldom confined to any particular boundary whether physiographical, ecological, political or administrative. For instance, a wetland system may extend across parts of two or more regions, communities, counties or countries.

In the context of the study area, the Okana wetlands cover several other villages, which border the sampled twelve (12) villages. All the villages therefore share the Ombeyi-Okana River basin. Besides, the migratory birds, wild game and fish which find habitat in the wetlands as well as mobilized pollutants from upstream catchments are capable of crossing territorial borders. Proper planning and management of these resources therefore requires involvement and cooperation between the community within the study area and other bordering regions especially those in the upstream catchment whose activities are likely to impact directly on the lower catchment in the study area. This is the essence of the proposed integrated planning and management of the wetland ecosystem. The two management initiatives have not incorporated the strategy.

The second constraint concerns land tenure system of the wetland ecosystem. Two land tenure systems exist at the study area. The wetlands are owned both communally and by the government (public). The individual ownership has been shown to enhance resource management. However, customary, communal or public tenure system is usually complex, controversial and poses serious challenges to management of resources. Under the tenure system, every household or member has both access and use rights.

A member has the right to cultivate as much land as one can manage, graze livestock anywhere except on land actually under crops, take timber for building and firewood, use water resources for various purposes, use clay, sand and stones from the communal land resources and to choose a site to build a house

(Breen et al. 1997; Turner et al. 1994).

In the study area, the wetland resources are accessible to every member of the community for grazing of livestock, harvesting of wetland products such as papyruses, reeds, grasses and other macrophytes, extraction of medicinal herbs, excavation of clay and abstraction of water. The only check and balance that regulates the use is pegged on membership. That so long as one is a member of the community either by virtue of birth or marriage, he/she qualifies for the access and use rights of the resources. Immigrants who have settled permanently in the community from other places also share these rights. This type of ownership is likely to result into conflicts between individual and communal interests. In the long run, the concept of Tragedy of the Commons advanced by Garrett Hardin in 1968 and further revised in 1998 is likely to emerge, where the common resources – wetland ecosystems in this case – are subject to degradation and loss. This is because every member has an incentive to maximize gains and a disincentive to conserve and manage.

The third constraint in wetland resources management in the study area is conflict of interest on the utilization of the resources. For instance, while some harvest wetland products for craft making, some consider the ecosystem important grazing fields especially during dry seasons. Another group may use it as rice fields. The latter two groups particularly have had long history of conflicts over conservation and wise use of the wetlands. Mitigation measure for such resource use conflicts lies in a properly designed land use plan such as the proposed one (Fig 4) where each group is catered for.

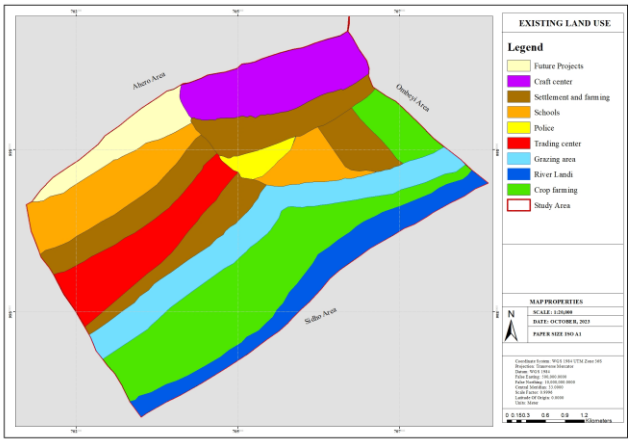
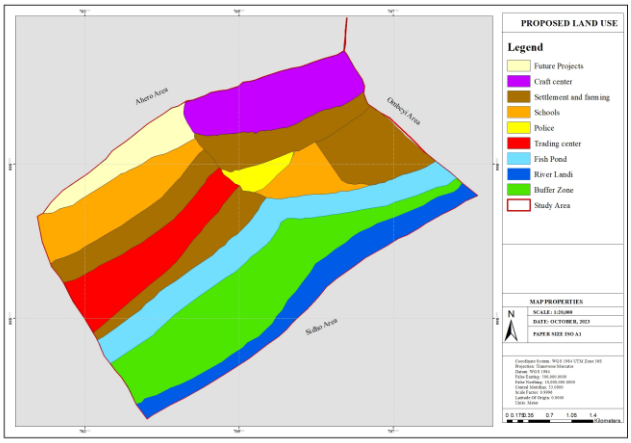


Figure: 4a. Current Land Use in Okana.
(Source: Author, 2023)



The buffer zone covers about 100 m from the Landi River. The coverage is as per the National Environment Management Authority (NEMA) regulations regarding riparian ecosystems.

Figure: 4b Proposed Land Use Plan for Okana.
(Source: Author, 2023)

The foregoing discussion on the management regimes of Okana wetlands clearly shows that there is no proper management of the wetlands in place basically because of unclear land tenure and ownership of wetlands in the study area. In fact, the existing management strategies cannot suffice in the long run given the many weaknesses and constraints outlined. It can therefore be concluded that the strategies are not effective in managing the wetland resources for sustainable livelihoods.

Conclusion

Okana wetlands manifest mostly communal, private and public property regimes. Each of these regimes has its own implications in terms of planning and management based on the incentives and disincentives associated with them. Planning and management initiatives therefore become compromised in the long run. Besides, the study has revealed that there is no specific or comprehensive wetland management regime that can be singled out in the study area. The study has shown a *laizzesfare* type of management where there is no follow up on who does what, how and why.

Recommendations

For proper planning and management of the wetland ecosystem, the study recommends the following:

1. An integrated wetland management plan for Okana wetland to be implemented by the County Government.
2. Buffering of the wetland by the community to avoid further encroachment.
3. Rehabilitation of the wetland ecosystem by the community for continued livelihood and ecological sustenance.

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