

The eastern Africa flamingo Lakes: Building partnerships for sustainable resource management

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Abstract

The saline alkaline lakes of the Eastern Africa Rift Valley "Flamingo Lakes" support diverse biological resources that are of global, regional, national and local importance. These lakes form the center piece of some of the world renowned national parks and conservation areas and are major feeding, staging and displaying ground for the region's Lesser flamingo (*Phoeniconaias minor*), Greater flamingo (*Phoenicopterus ruber*) and for over 70 species of water birds. Unsustainable land use practices within the basins of these lakes during the last four decades have adversely affected the environment in many ways. Notable among the effects are the diminishing forested areas, rampant soil erosion, waste disposal problems and deterioration in catchment water quality. In view of these threats, the main challenges confronting conservation are; to reduce extreme poverty, maintain the vitality and integrity of the watersheds, restore ground cover to the extent possible under existing land use regimes, mitigate impacts of climatic variability, flooding, landslides and droughts, restore the water balance and water quality, reduce human-wildlife conflict, monitor trends in biodiversity and promote broad based environmental conservation.

Programmes designed to ensure the long-term protection of these lakes and their basins through adoption of conservation-based land use and development have been initiated and much progress has been recorded towards addressing these challenges. More terraces have been built, more trees planted, more water conserved, more people made aware of the environmental challenges and opportunities confronting us, more research and monitoring of water quality, water quantity and biodiversity has been undertaken, more time has been invested in integrating environmental considerations into the planning process and more partnerships that consist of governments, intergovernmental agencies, corporations, professional organizations, donors, individuals or any group of society have been built. Village Environmental Committees have been formed to act as fora for discussing issues related to the management of village lands and to take the lead in organising and co-ordinating community conservation work. The information presented in this paper was gathered from project records, seminars, workshops, training and convention reports, survey findings and records maintained by collaborators.

Key words: Flamingo lakes, Partnerships, Biodiversity

Introduction

Flamingo lakes are part of a chain of lakes found on the floor of the eastern arm of the Great Rift Valley of Africa. In Kenya the major flamingo lakes are Bogoria, Nakuru, Elementeita and Magadi. Other minor lakes are Solai, Sonachi, Oloidien, Amboseli, Shompole and Simbi. In Tanzania the main

Flamingo lakes are Manyara, Natron and Eyasi. The minor flamingo lakes in Tanzania include the Momela lakes in Arusha National Parks, Lake Burungi, Lake Embakai, Ngorongoro crater, Lake Magadi in Ngorongoro Conservation Area, Lakes Lagarja, Basuto, Balangida and Lelu (Katondo and Mwasaga, 1997). In Ethiopia the main Flamingo lakes are Abijatta, Shalla, Metehara, Chitu, and Aranguade.

The chain of lakes and wetlands in the eastern Rift Valley supports globally important biodiversity at all levels: species, communities and ecosystems (Gichuki *et al.*, 1997). Birds constitute the most important and conspicuous component of biodiversity in the lakes and wetlands. According to Bennun and Njoroge (1999), all seven of Kenya's major lakes are designated as important bird areas (IBAS). These are sites of global significance for conservation of birds. Each of the seven major lakes supports 300-500 bird species of which about a third are waterbirds. The eastern Rift Valley is a major flyway of migratory birds that breed in Europe and northern Asia but winter in Africa. For instance, 50,000 European white storks stop over to feed or roost in the grasslands and large-scale grain farms in Kenya's central Rift Valley. The lakes provide special feeding sites for thousands of palearctic ducks, shorebirds and some fish-eating birds. The system of lakes and wetlands is also crucial to the survival of 47 species of Afro-tropical migrant birds. The most conspicuous of these birds are Lesser flamingos, Pink-backed pelicans and African spoonbills.

The lakes support endemic species of plants, animals and microbes that have become adapted to local environmental conditions. Large numbers of Greater flamingos and Lesser flamingos are some of the animal species that depend wholly on the Rift Valley lakes for their survival. At times, almost the entire population of Lesser flamingos is resident in the eastern Rift Valley lakes. Lesser flamingos have unpredictable spontaneous movements between the alkaline lakes, whose ecological triggers and forcing functions are not well known. Vareschi (1978) attributed them to a variety of factors ranging from changes in food quality and quantity, alkalinity changes, breeding migrations, fresh water requirements and predation pressure. High algal densities do not necessarily imply Lesser flamingo residence and movements from lakes with high phytoplankton standing crops can still occur (Brown,

1973; Tuite, 1979). Other attributes of the Eastern Rift Valley include the prehistoric and archaeological sites e.g. Kobi-fora site in Lake Turkana, freshwater resources, geological resources e.g. minerals (soda ash mining in Lake Abijata and Magadi) geothermal energy at Naivasha and extraction of gum arabica. Moderately saline lakes also produce some fisheries.

Major threats to biodiversity

Most of these lakes have witnessed dramatic changes in land use in their basins over the last four decades and resulted in the destruction of critical watersheds, themselves the last remaining bastions of biodiversity. The most important threats to Kenya's Rift Valley lakes and their biodiversity are human economic activities. Some of the environmental impacts arising from development and landscape modification in the respective lake basins include:

- alterations in the hydrological regime of the catchment resulting in increased seasonality of stream flow, declining yields from wells and bore holes, and frequent, prolonged dry-outs of the lakes as have recently occurred in 1993, 1994, 1995 and 1996.
- Climate change, drought and desertification especially in Ethiopia.
- Degradation of water catchments, over population, urbanization and industrialization within the lake ecosystem's increasing e.g. Awasa and Nakuru towns has caused loss of biological diversity and the capacity for disturbance regulation.
- Accelerated soil erosion, resulting in loss of farm productivity and income, which in turn leads to over exploitation of the natural resource base e.g. soil loss from farms in the Lake Nakuru catchment is estimated to range from 18 to 50 t/ha/annum (China, 1994).
- Contamination of the lakes and rivers with pesticide residues, heavy metals and possibly PCBs, dioxins and furans. Nutrient enrichment of the lakes, resulting in reduced productivity of the lake's natural primary producer (*A. fusiformis*), and the frequent occurrence of blooms of toxic blue-green algae (*Anabaena spp.*, *Microcystis spp.*) has led to the desertion of the lakes by flagship species.
- Encroachment on wetlands and flamingo breeding areas, flamingo and fish mortality due to diseases, parasites, predation and toxic pollution. Disappearance of aquatic species such as the Clawless otter (*Aonyx capensis*) last reported in Lake Nakuru National Park in the 1970s.
- Introduction of alien invasive species e.g. in Lakes Naivasha in Kenya and L. Kitangili in Tanzania. Collapse of fisheries in Lakes Baringo and Naivasha. Over fishing and destructive fishing in Lake Awasa (Ethiopia), Lake Baringo

and Naivasha (Kenya) and Lake Kitangili in Tanzania.

- Progressive alienation of neighbours to Protected Areas (PAs) from the interests and attractions of the PAs, gender disparities and cultural issues, wood fuel shortages, lack of good quality water and the loss of produce in farms bordering the PAs as a result of wildlife depredations.

These threats are inter-linked and many have similar causative factors throughout the region. The main challenges confronting conservation are to:

- maintain the vitality and integrity of the watersheds
- restore ground cover in the catchment basins to the extent possible under existing land use regimes
- restore the water balance and water quality of the catchment basins through better land use practices and sustainable water management
- entrench the conservation ethic among catchment residents and promote sustained conservation effort by building capacity and linking conservation with the achievement of development aspirations
- Monitor trends in biodiversity and environmental conservation to evaluate progress and identify new threats.

The resource management objectives are as follows:

- Raise environmental awareness among catchment residents through training and production of teaching manuals; slide packages, information leaflets and publicity materials. This is to help people become aware of and appreciate the value of natural resources and the ecological processes that support them
- Help people to understand the threats to their environment, how it should be managed and how they can contribute to its improved management.
- Provide training in essential conservation skills to residents of the catchment basins.
- Create an enabling environment for those in possession of these skills to apply them and transfer them to other members of the community
- Institute strategies to promote and guide sustainable landuse in the catchment basins.
- Establish programmes to monitor water quality, water quantity and biodiversity in both lotic and lentic environments of the catchment basins
- Develop plans for sustainable agricultural and industrial development in the basins that would not exhaust or degrade the natural resources of the catchments.
- Develop strategies that would perpetuate environmentally sound land use and natural resource management within the basins.

Materials and methods

There are seven national mechanisms of managing biodiversity in Kenya. These are national parks, national reserves, wildlife sanctuaries, forest reserves, Ramsar sites, World Heritage sites and Man and Biosphere Reserves. Six major lakes in Kenya's Rift Valley are protected by law under one or two of the seven management regimes.

Results

A number interventions relating to the management of natural resources and environmental conservation have been initiated at some of the Rift Valley Lakes by the government of Kenya in collaboration with local communities, NGOs, religious organizations and development partners.

Table 1: Past and current management interventions that have been funded by various donors and are relevant to the Rift Valley lakes in Kenya.

Bilateral donor	Nature of the intervention
Netherlands Government	Support Wetland conservation and community capacity building through Kenya Wildlife Service in Lakes Nakuru and Naivasha.
GEF/UNDP/FAO/Birdlife International	Institutional support for protection of EA Biodiversity through Forest Department in Mau and Kikuyu catchments.
GEF/UNEP/UNOPs	Community based management of land and water in lake Baringo basin
GEF/UNDP/GOK	Conservation and sustainable use of Biodiversity in Eastern Rift Valley lakes. Setting priorities for biodiversity conservation and Lake Management, through National Museums of Kenya
Ramsar	Conservation Fund Support for Waterbird Census & Monitoring by National Museums of Kenya and KWS in Nakuru, Bogoria, Elementeita and Naivasha.
Department of International Development (DFID, UK)	Support for protection of Lake Nakuru catchment through WWF and Ministry of Agriculture and Rural Development.
Swedish International Devpt Agency (SIDA)	Support for catchment rehabilitation and water conservation in Nakuru (Molo), Baringo and Magadi
JICA/JBIC	Support for Lake Nakuru Ecosystem Management

Table 2: Past and current management interventions by Government institutions, some NGOs and CBOs in Kenya.

Organisation	Nature of the intervention
Kenya Wildlife Services (KWS)	Management of PAs, research, community and stakeholder mobilization, resource mobilization and administrative issues
National Universities	Capacity building and applied research
Provincial administration	Policy enforcement and creating an enabling environment for sustainable lake environment management
Government Ministries of Agriculture, Water Development, Environment & Nature, KARI	legislation and polices, linked to programmes like the National Action Plan on Desertification, Poverty Reduction, resource management. Research on forestry, agriculture etc.
World Wide Fund for Nature (WWF)	Support for ecosystem monitoring, Wetland conservation and catchments rehabilitation in Lakes Nakuru and Bogoria
Municipal Councils/ County Councils	In-charge of urban development, setting trade effluent standards and monitoring, waste collection, management of PAs
Kenya Forest Working Group, FOMAWA, SUMAWA, Forest Action Network (FAN), WETCON	Working for the protection and rehabilitation of gazetted forests, particularly in the Mau Escarpment. campaigned against recent forest excisions, advocacy and Networking. Enjoys grass root support.
Darwin Initiative & Earth Watch	Support for ecosystem monitoring, Wetland conservation

Below is a general overview of impacts of current activities being carried out by various organisations:

- The teaching of Environmental Education (EE) in schools has been revitalized. More time is being devoted to EE and both teachers and pupils are better informed on local environmental issues. This is evident in the content of material presented by schools at competitions and celebrations. A heightened awareness among educators of the possibilities for incorporating EE into subjects taught in primary schools and at adult education centers.
- Records show that study tours by local schools to the Flamingo lakes have increased significantly since 1993. Interest in environmental education has grown in local schools. This is evidenced by the frequent requests made by schools for lectures and film shows and by the increase in number of wildlife and nature clubs.

- A growing number of high school and university students are undertaking research projects on local environmental themes. Requests from these students for information and advice are frequently received.
- Over 50% of the primary schools have initiated conservation activities within the school. These include starting a seed bank for trees, establishing tree nurseries, planting trees in the school compound, excavating earth dams to detain runoff, establishing kitchen gardens and participating in activities aimed at keeping the school compound and neighboring premises free of litter.
- Courses are offered to farmers, members of Village Environmental Committee's (VEC's), women groups, local leaders and members of the clergy. These individuals have gone on to play a key role in disseminating information to the wider public.
- Public meetings and gatherings at national celebrations are used to disseminate information on the environment and solicit public support for conservation. Articles published in the local and international press is an indication of a fuller appreciation of the natural attributes of the lakes and their importance as cultural, scientific and economic assets.
- Environmental markets jointly organized with communities to promote the sale of environmentally- friendly products such as tree seedlings, tree seeds, beehives, energy saving devices, compost etc. During these markets farmers assume the role of extension workers in raising environmental awareness.
- Workshops, seminars, exhibitions, field days and park tours are organized for local residents as well as regional conservation agencies. Greater awareness among urban residents of the hazards of waste accumulating in the environment leading to active involvement of the public in waste management programmes.
- Greater awareness among farmers of the economic and ecological consequences of deforestation and soil erosion leading to widespread interest in conservation solutions. Examples of successful conservation practice can be seen and exert a positive influence on the practices of the farming community. Soil loss from conserved farms has been dramatically curtailed. This, by the farmers' admission has resulted in a stabilization of crop yields and improvement in soil quality.
- Heightened awareness among administrators and planners of the impact of development on the natural environment of the catchment. This is manifested, among other actions, by the government's decision legislate relevant conservation Acts, and to set up pollution control committees and task forces e.g. in Nakuru and the declaration by the Municipal Council of

Nakuru to develop Nakuru as the first "Eco-City" in Kenya.

- The involvement of trained farmers in training others has laid the foundations for village-based extension services. Extension workers share a common appreciation of the conservation issues and solutions and hence there is no contradiction in the extension messages conveyed to the public.
- Sediment loads in streams have begun to decrease and sewage is better treated. For example the planting of over 200,000 trees each year, ground cover in the Lake Nakuru basin, is steadily improving and is expected to alleviate the fuel wood crisis and have a positive effect on the water balance of the catchment.

Discussion

One of the key lessons learnt in biodiversity conservation during the past decade is the important and central role that local communities are playing in the conservation and sustainable use of natural resources. While national legislation, international treaties and their implementing mechanisms are indispensable frameworks for global biodiversity conservation, the level of awareness by local communities of natural resource issues and motivation and know-how of indigenous people to use resources sustainably have the biggest impact on the long-term future of these resources. As a result, it has become standard practice not only to involve, but to build substantially on the participation of national and regional non-governmental organizations (NGOs) and of local community-based organizations (CBOs). These organizations are essential collaborators today in the implementation of almost any conservation and development programmes. They are also important potential players in the "bottom-up" development and advocacy of natural resource- use policies. The training and capacity building of such indigenous NGOs and CBOs have become important programme objectives of many resource management organizations. By helping and strengthening such local organizations, governments and international NGOs are ultimately making their own work more effective (WWF, 2004).

Two broad approaches to training were adopted: training groups and individuals in the field through field days, onsite training and home visits, and training small groups of farmers, youth, leaders, teachers, extension workers and women at a course in sustainable agriculture, held at Baraka Agricultural College (BAC) in Molo. The residential course lasts a week, is strongly oriented to practical training and covers the most fundamental skills and concepts related to conservation farming. Trainees have emerged as leaders in adoption and diffusion of skills as well as in the organization of communities for conservation work. As a result of the EE activities, environmental issues have been demystified. The cause-effect relationships between

landuse and environmental degradation have been clearly articulated and the catchment approach widely understood. With better understanding of the underlying issues, residents in target areas are better positioned to find solutions, improvise techniques and appreciate the benefits that will accrue to them as a result of their conservation effort.

Our collective experience in extension has taught us that training people in conservation skills does not necessarily lead to application of skills. Intrinsic factors such as population densities, farm sizes, access to capital and tools, returns on investment and security and tenure rights together with intrinsic factors such as policy form a complex which influence a farmer's options, choices and actions. It is beyond any project to address all these factors and therefore a strategy that entails building partnerships with farmers and other stakeholders was adopted. In the flamingo lakes region, partnerships consist of governments, intergovernmental agencies, individuals, corporations, professional organizations, donors or any group of society.

In practice the assistance rendered to the communities include: Convening meetings to discuss problems and work out viable solutions; preparation of resource management plans; providing opportunities to acquire practical skills where necessary; provision of inputs such as poly bags for tree nursery establishment; and initiating focused conservation activities such as soil and water conservation campaigns and tree planting drives. This participatory approach to problem diagnosis and resolution has been instrumental in achieving the conservation successes recorded by target communities. The formation of VECs is being actively encouraged. The VEC members are organised action oriented groups ideal for galvanising immediate conservation action. They are trained and equipped with appropriate conservation skills and insights needed to carry out broad-based conservation. VECs consist of between 15-20 members elected by community. Many members are BAC trained farmers and several have undergone leadership training.

In the formation of VECs, selection of target areas is based on the location of the village, relative to other villages, terrain and proximity to biodiversity

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hotspots such as wetlands, lakes, rivers and forested areas. Participants choose villages that are ideal conservation focal points and which can be catalysts and models for replicating sustainable natural resource management to other villages. Expert facilitation helps to guide villagers to democratically elect popular VEC leaders taking into consideration of age and gender. The process of developing Local Environmental Action Plans by VECs involves a series of 11 sessions culminating in the implementation of the plan.

Most farmers in high potential areas own small pieces of land of between 1-6 acres. The average family size is about 7 persons. In order to reach this large constituency where formal extension services are scant (about 1 extension worker to 2,000 farms); communities are invited to nominate a few members for intensive training in sustainable agriculture. These trained farmers are then expected to train other members of their community who would in turn disseminate the skills further. This training curriculum for the initial trainees is based on local needs and carried out at Baraka Agricultural College, located in Nakuru District, Kenya. Training components include soil erosion control, non-chemical methods for soil fertility enhancement, water harvesting, improvement of soil moisture content, tree seedling production and planting, skills related to the exploitation of draught power for tillage and transport and alternative income generating activities. Trainees also receive training in the art of information dissemination as well as in basic leadership skills.

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