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# Adapting to climate change

## Lessons from Lake Bogoria catchment, Kenya



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## **In brief**

Climate change is already threatening ecosystems, with severe consequences in Africa. Poor people who depend on these ecosystems need urgent help to enable them to adapt to this change. Thus adaptation to climate change is essential, especially for the vulnerable millions. This paper reviews a case study in the upper Lake Bogoria catchment—in Kenya’s Rift Valley—where WWF has been actively engaged on a project on water resources management. It discusses how the local communities are adapting to climatic variability, indicating the interventions undertaken and providing recommendations and the way forward.

## **Introduction and background**

Science has provided clear evidence that climate change is real and is happening. Within Africa there is growing acknowledgement that the impacts of climate change are inevitable. The livelihoods of poor people are more threatened than ever by these changes and thus their ability to adapt to the new scenario is necessary. In eastern Africa, people heavily rely on land for agriculture, rivers and other natural resources for their survival. However, these resources are climate-sensitive and are easily affected by any changes in climate. Most parts of the region are already water-scarce and hence even more vulnerable. Therefore, the adaptive capacity of the local communities dependent on these resources is very critical (Smit and Wandel, 2006; and Huq, 2007).

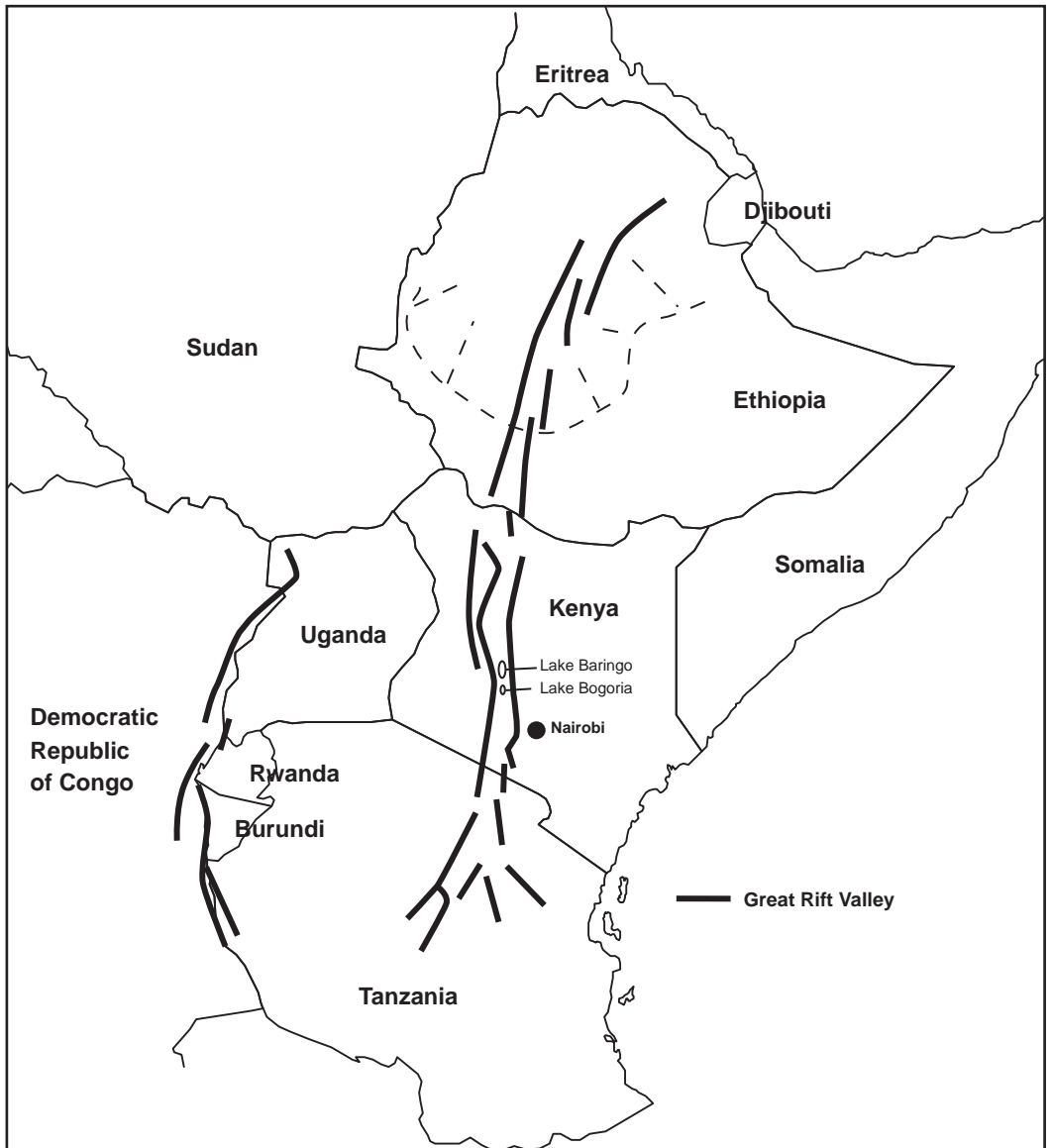
The Lake Bogoria case study aims to show how local farming communities are adapting to climate change following highly variable rainfall patterns and reduced water volume in the Wasages River. WWF has recognized the importance of adaptive strategies used by local communities and why partnership with various stakeholders is environmentally sustainable, especially for water resources which are climate sensitive.

## **The Lake Bogoria Project – history and objectives**

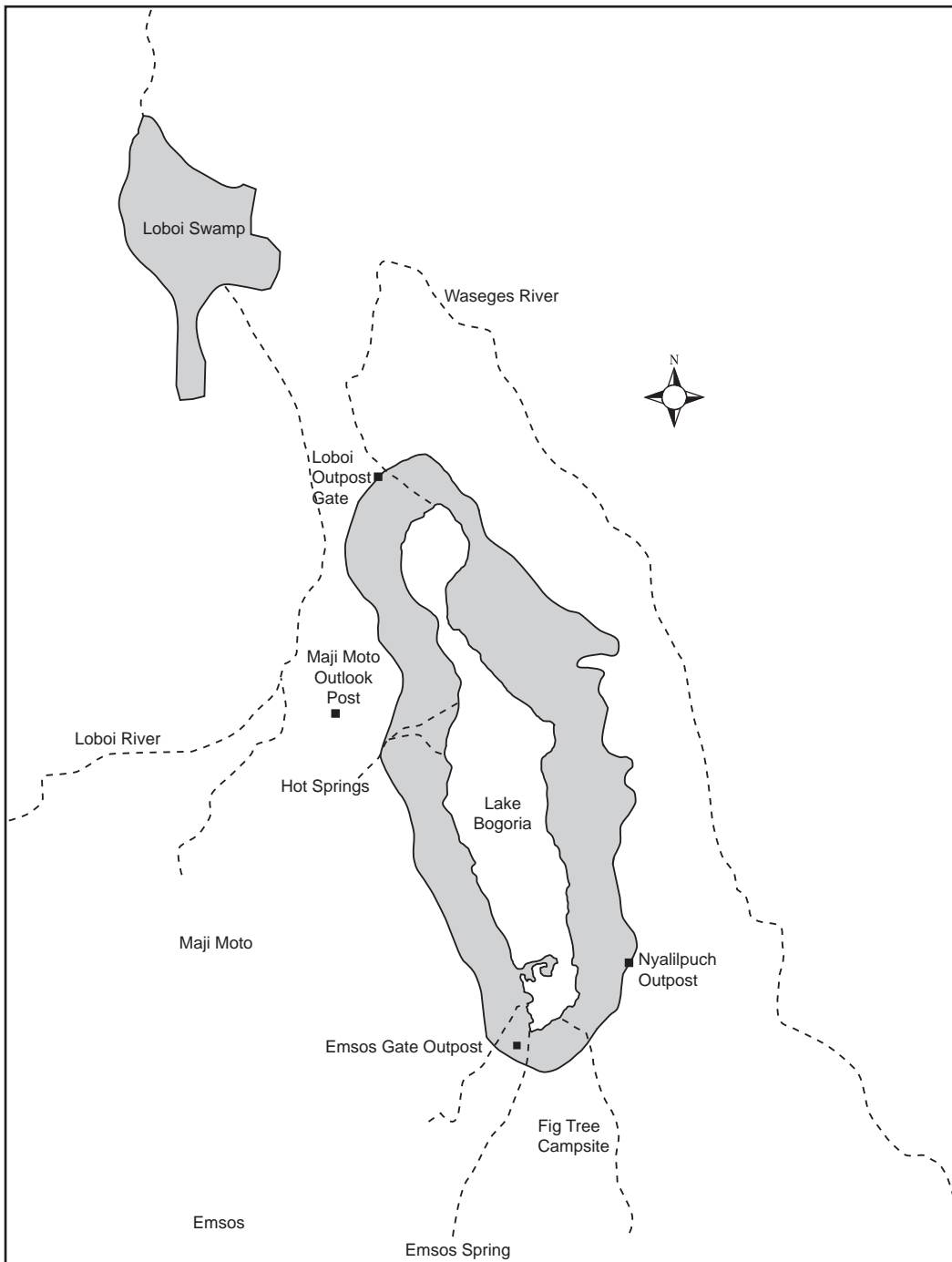
Lake Bogoria is one of several saline lakes located within the East African Rift Valley (Figure 1). The lake and its wider catchment are rich in natural resources that include the lake itself, forests, rivers, wildlife, and land for agriculture and pasture. The upper catchment comprises forests that are the source of the Wasages River—the main freshwater inflow into the lake (Figure 2). This part of the catchment has multiple land-use practices dominated by small-scale farm holdings where irrigation agriculture is the main-stay. The middle and lower catchments on the other hand lie within a semi-arid to arid region, where the main land-use practices are livestock production and irrigated agriculture.

Originally dominated by nomadic groups, most of the livestock-keepers are now sedentary. Over the years, both the upper and middle catchments have experienced an increase in population and changes in land-use. Rainfall variability has compounded the problem even further. However, like many agricultural zones of Kenya, the

problems are further exacerbated by uncontrolled and illegal over-abstraction (Mogaka, *et al.*, 2006) of water from the Wasages River. These factors clearly have increased pressure with adverse effects on the environment, particularly water resources.



**Fig. 1: Location of the Lake Bogoria within the East African Rift Valley.**



**Fig. 2: Lake Bogoria National Reserve and its drainage system.**

## Approach and intervention – community adaptation strategies to climate change

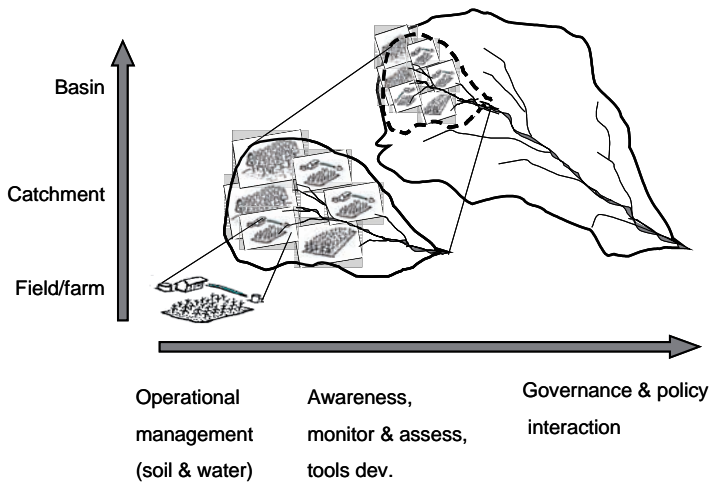
The Waseges River flows through the middle catchment in Subukia, a semi-arid area with no more than 700mm per annum. Communities here predominantly rely on irrigated agriculture for food and cash crops. The Lari Wendani Irrigation Scheme was initiated by the Department of Irrigation in 1984 to enhance food security and production. Currently, it supports 94 families covering 25ha. Over the years, deforestation and over-abstraction in the upper catchment has resulted in less water available for the irrigation scheme, and downstream there was sometimes no flow of water in the river for over 5 months.

Working with various partners and stakeholders—such as the Department of Irrigation, local community-based organizations (CBOs), the Water Resources Users Associations (WRUA)—WWF engaged with the local communities within the middle catchment to find a solution for better water resources management. The WRUA (Figure 3) was particularly a good entry point as this represented different user-groups within the community. The WRUA consists of members of various common interest groups and the community whose main interest is to discuss water-related issues. This forum presents itself as an effective medium for participatory management of conflicts that arise during water resource use.



Fig. 3. Discussions held with Water Resources User Association. (WWF-EARPO/Scott DAVIS)

In effect the process described above required the use of a nested approach (Figure 4) where participation was from a micro-scale (farm level) to the macro-scale (basin level). For the purpose of this case study, focus was more at the catchment level where several farmers were engaged. There was general recognition that climate change also had a role to play in the reduced availability of water resources, Integrated Water Resources Management (IWRM) was deemed as an environmentally sustainable approach with the different stakeholders.



**Fig. 4: Nested approach for water governance at river basin scale.**

Over-abstraction of water from the Waseges River—mostly illegal—coupled with variable rainfall, resulted in reduced to no flows within the river for downstream communities. Due to this, conflicts between the downstream and upstream communities ensued. WWF working with other stakeholders in the area organized a meeting to initiate dialogue between members of the downstream and upstream WRUAs to so as to resolve conflict. Though mandated through the water act (2002) to have dialogue, WRUAs were not in a position to initiate this. There was also recognition that climate change had altered the availability of water resources within the area and some coping strategies were needed at farm and community level.

One requirement for getting a water permit in Kenya is to have 90-day water storage on the farm. Communities in and around the scheme area—through their engagement with WWF and Department of Irrigation—were challenged to dig pan dams for water storage and use during the dry period so as to let the river flow. The Department of Irrigation—in partnership with WWF and Fisheries Department—provided training and sensitization for the communities within the Lari-Wendani to develop water pan dams on their individual farms. As an incentive to the farmer, the Fisheries Department integrated fish farming into the activity hence providing additional income to the farmers. Therefore, the pan dams were stocked with tilapia and cat fish (Figure 5). During the rainy season—April to September—the farmers would then harvest storm run-off and stock fish. At the end of the period, farmers harvest the fish and use the remaining nutrient-rich water for irrigation during the dry season—October to March—without interfering with the river.

This adaptive strategy has had positive results for the community and the environment. As a result of this intervention, the Waseges River flowed continuously in August 2007—the driest month—reaching the Lake Bogoria (Figure 6). This was the first time this has happened in the last 10 years. One key lesson is that community-based approach is effective in developing appropriate adaptive strategies especially for vulnerable

people. WWF is therefore working very closely with the local communities within the Lake Bogoria Catchment on issues related to irrigated agriculture. This is in line with the new National Water Resources Management Strategy (2007-2009) which clearly indicates the need for reserve water within river courses. This refers to the quantity and quality of water needed to meet both basic human and ecosystem needs. The strategy also emphasizes that the reserve needs to be met before water is allocated for other uses.



**Fig. 5: Releasing fish into a pan dam and (inset) a rain-filled pan dam. (WWF-EARPO/Musonda MUMBA)**

## **Why adaptation matters: recommendations and way forward**

This case study takes cognizance of the fact that adaptation is necessary, particularly within water scarce areas where communities are likely to be most vulnerable. Furthermore, it is clear that the local communities need the right and appropriate information about how they should adapt. WWF and the other stakeholders have served as change agents within this catchment, which is an essential element to adaptation. WWF's approach to environmental sustainability has been to advocate Integrated Water Resources Management (IWRM) mechanism within this catchment. Both the water and agricultural sectors are climate-sensitive and this case study illustrates the need to mainstream climate change adaptation policies into these sectors.

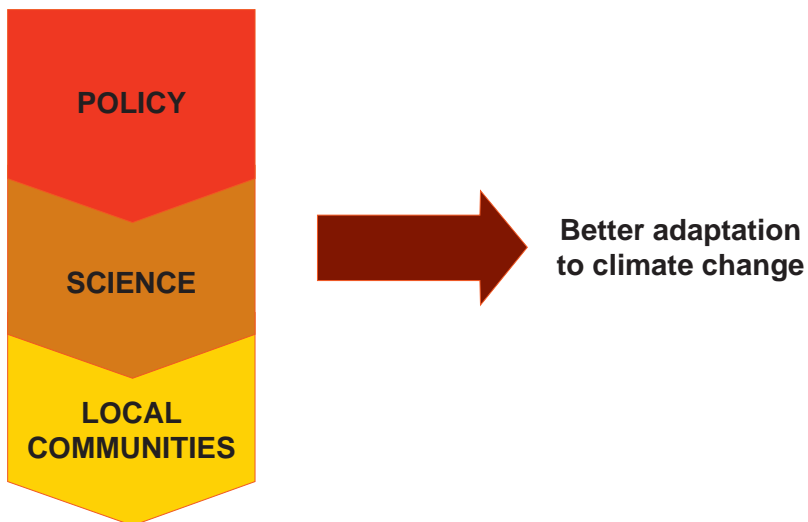
However, gaps still exist. Information about similar case studies within Kenya has not been forthcoming or known. It is particularly important for both environmental and development NGOs and civil society groups to share lessons about community-based adaptation. Once such lessons are shared and known, it would be easier to influence governments about the necessary policy changes as regards climate change adaptation.

Finally Figure 7 illustrates the importance of linkages between policy, science and local communities. National and international policy structures are important in supporting community adaptation to climate. These can be supported by the best available science and knowledge structures however local communities also need to be linked to such structures (Yamin, et al., 2005).





**Fig. 6: Waseges River flowing continuously after 10 years during the August 2007 dry season (inset) and sediment load from the river in Lake Bogoria. (WWF-EARPO/Musonda MUMBA)**



**Fig. 7: Making linkages between Policy, Science and Local community engagement in climate change adaptation.**

## References and further reading

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