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A woman in a white dress with black polka dots and a red shawl is standing in a field of green leafy plants. She is holding a bunch of the plants. The background shows a hazy landscape with hills under a cloudy sky.

SHARED RISK AND OPPORTUNITY IN WATER RESOURCES

Seeking a sustainable future for Lake Naivasha

Prepared by Pegasys - Strategy and Development

Cover photo: © WWF-Canon / Simon Rawles.
Zaineb Malicha picks cabbage on her farm near
Lake Naivasha, Kenya. She is a member of WWF's Chemi
Chemi Dry Land Women's Farming Project.

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WWF is one of the world's largest and most experienced
independent conservation organizations, with over
5 million supporters and a global network active in
more than 100 countries.

WWF's mission is to stop the degradation of the planet's
natural environment and to build a future in which humans
live in harmony with nature, by conserving the world's
biological diversity, ensuring that the use of renewable
natural resources is sustainable, and promoting the reduction
of pollution and wasteful consumption.

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This worker is one of 25,000 people directly employed by the horticulture industry in the basin.

EXECUTIVE SUMMARY

Lake Naivasha is a freshwater lake in the Kenyan Rift Valley. It is unique in that it is home to both an internationally renowned environmental treasure as well as a blossoming agriculture industry that exports high value fresh vegetables and cut-flowers to European and English markets. For years, the lake has been under intense scrutiny over concerns about how its environmental integrity can be maintained while still supporting a valuable and growing economy and society.

The two most valuable crops in the Naivasha basin are cut flowers and vegetables. The vegetables grown in Lake Naivasha contribute approximately KSh6.65 billion (\$95 million) to the Kenyan economy. Kenya is also one of the world's largest exporters of cut-flowers and Lake Naivasha is at the heart of the nation's floriculture industry, accounting for more 70 per cent (KSh28 billion) of the country's cut flower exports.

The Naivasha basin involves a broad group of stakeholders including large horticulture companies and their employees, smallholder farmers, local government and basin inhabitants, and those dependent on the broader Kenyan economy and trade.

For an agriculture-based economy that is completely dependent on its water resources for economic production, the social, economic, financial (investment), regulatory and reputational risks associated with a deteriorating bio-physical environment are significant. Given its links to the national economy and the international export markets, these risks are not localized within the basin, but extend through to the rest of Kenya.

The central aim of this paper is to articulate the risks for each of these groups and to highlight the commonalities between them, or in other words, the shared risks between corporate, government and civil society stakeholders. In so doing, these stakeholders can recognize the incentive for a common path to achieving improved water resource management in the basin and the future economic and environmental sustainability of Lake Naivasha.

It is important to recognize that the shared risk framework is not linear and does not fall within a conventional quantifiable cost-benefit metric. A reduction in abstraction for commercial farmers affects employment, export earnings, livelihoods and social tensions. The manifestation of these risks is highly uncertain, but the implications are potentially significant.

It is unlikely that the current water resources situation would cause such severe and sustained physical deterioration that major irrevocable economic impacts will be experienced in the local economy or that individual companies will fail financially, in the short term. However, it is highly likely that some level of local economic and corporate financial impacts will occur during crisis periods of drought, water quality deterioration and/or wetland degradation.

In the future, increasing urban-agricultural abstraction and increasing temperature-climate variability is highly likely to impact on the recurrence and severity of crisis periods. Similarly, the already significant developmental pressures on this area will increase over time, due to population pressure and economic growth in the country as a whole. Lake Naivasha provides an important opportunity to support social and economic development in Kenya in an ecologically sustainable

The Naivasha basin accounts for 70 per cent of Kenya's cut flower exports and generates approximately 9 per cent of Kenya's total foreign exchange revenue.



© WWF-Cannon / Simon Rawles

manner, but these opportunities may be squandered without adequate engagement of the risks outlined in this paper.

Three areas of focus may be identified in responding to these risks and opportunities:

- Risk mitigation requires improved institutional arrangements to support a clear definition and management of the availability of water and the rules for its use in the different parts of the catchment.
- Innovative partnerships between government, private sector and/or civil society organizations should be fostered to address problems in and around the lake.
- Progressive horticulture companies should develop Naivasha-specific water stewardship standards and gain both competitive distinction and reputational “immunization” by gaining accreditation by a recognized body.

This paper is an abbreviated version of a 2010 report, which gives more detail and background on the issues covered here.

1 INTRODUCTION

LAKE NAIVASHA IS AT THE CONFLUENCE OF POLITICAL AND ECONOMIC PRESSURES THAT INFLUENCE AND ARE INFLUENCED BY DECISIONS MADE OUTSIDE THE BOUNDARIES OF THE LAKE ITSELF.

Lake Naivasha is an internationally renowned Ramsar site located in the Rift Valley in Kenya. But unlike most other designated wetlands of international importance, the water in Lake Naivasha also anchors a flourishing horticultural industry. A simple Google news search on “Kenya’s Lake Naivasha” finds a collection of headlines that mostly place the blame for the lake’s perennial “imminent ecological collapse” on the shoulders of the seemingly all-powerful cut-flower industry surrounding the lake.

Yet this is a far more layered story than the headlines imply. It extends well beyond that of a single focus on the impact that the export horticulture industry has on the lake’s ecology. Lake Naivasha is at the confluence of political and economic pressures that influence and are influenced by decisions made outside the boundaries of the lake itself. It is only through extending the focus on the lake to its linkages with the local, national and international political economy that common ground can be found on what can be done to ensure the lake’s long-term social, economic and ecological sustainability.

Its economic impact stretches from the job markets of migrant labour seeking work on the shores of the lake and the household incomes of smallholder farmers in the upper catchment, through the economic base of the local economy and the tax and foreign exchange revenues generated for the Kenyan government, to the purchasing decisions of the major English and European supermarkets and the dividends sent to internationally owned commercial agri-business.

In turn, there is a feedback loop from the international economy back into the economy of the lake. The supermarkets respond to the purchasing decisions of their customers, which are informed by their perceptions of a range of issues from the environmental sustainability of the lake, to labour rights and food miles. The profile of Lake Naivasha as a premier tourism destination strengthens these perceptions of European travelers.

The lake also cannot be viewed in isolation from the political economic context of the basin in which it resides. The water that flows into Lake Naivasha passes a growing population and emergent smallholding farmer group that have an influential local and national political voice. The proximity of the lake to Nairobi means that it is also the location of the second homes and absentee farms for some of Kenya’s political and economic elites.

Water is a shared resource and many stakeholders may lay claim to it. The water used by smallholders to flood their crops in the catchment north of the lake may be perceived as a direct opportunity cost to the commercial farmers on its shores that demand that water for their roses, and vice versa. The discharge of municipal waste water and irrigation return flow poses threats to the water quality in the lake. The direct use of lake riparian wetland areas for the cultivation of horticulture, cattle ranching and game during drought periods may be perceived as having detrimental consequences for the lake’s ecological functioning as an important Ramsar wetland. The lake environment and water resources can therefore not be separated from the local and national political economy, nor should the importance of water governance and institutional arrangements be ignored.

There are significant medium-term economic and social risks to Kenya, the flower industry and local residents. These arise from the primary risk of deterioration of the lake's water quality, quantity and ecosystems, leading to secondary risks such as reputational loss, withdrawal of existing investments and loss of future investment potential. This has potential consequences that include loss of jobs, loss of foreign exchange earnings and (maybe as important) withdrawal of those investors in the basin that are considered forerunners with state-of-the-art environmental and social practices. It is therefore of utmost importance that the government, business and civil society stakeholders have an appropriate and constructive response to the threats at hand, based on a vision that provides for long-term attractive economic, social and environmental perspectives.

This shared risk lens brings into simultaneous focus many of the tensions between politics, economics, institutional capacity, local governance, development priorities and investment decisions. In particular it highlights the way in which they all come together to inform the decisions that determine water use and protection, which will ultimately determine the sustainability of the lake.

The purpose of this study is to bridge the understanding of environmental concerns with the economic, social and political ramifications of the lake's current and future water use. This report does not seek to revisit discussions regarding the causes of fluctuating water levels or the hydrology of the lake or the scientific underpinnings of the lake's ecosystem health. Rather, it introduces the economic contribution that the lake and its surrounding basin makes to the local and national GDP, as well as identifies its links to important and lucrative export markets abroad. It also adapts the water footprint framework to show how water use in the basin can be viewed in terms of economic value and job creation. The information presented here was collected via a desktop study of academic and other research materials, as well as through interviews with multiple stakeholders during a site visit to Nairobi and Naivasha in August of 2010.

2 ECONOMIC ACTIVITY AND LAND USE IN THE NAIVASHA BASIN

Land users in the Naivasha basin include traditional pastoralists to subsistence and smallholder farmers, dairy and beef farmers, and high-tech international commercial vegetable and cut flower farming operations.

The lake itself is internationally renowned because of its biodiversity and natural beauty, which attracts thousands of local and international tourists. In the south of the lake, close to Hell's Gate National Park, geothermal steam is harnessed to drive electrical turbines, which contributes electricity to the national grid.

The upper catchment of the basin which has historically consisted of indigenous forest and open woodland has also experienced significant changes in land use over the past 50 years as the forest has been converted into rainfed smallholdings. This has had a direct impact on the water resources of the lake.

This deforestation has had a marked effect on the hydrology of the basin as flows have become more extreme with intense flooding in the wet season and low volumes in the dry season. This rapid runoff has led to higher rates of siltation, while water quality concerns have been further compounded by poor farming methods in the upper catchment. The use of fertilizers to improve crop production and the farming and overgrazing of riparian areas has increased siltation and nutrient loads.

2.1 POPULATION DISTRIBUTION

THE ECONOMY OF THE BASIN IS ANCHORED IN THE AGRICULTURAL SECTOR. THE COMMERCIAL HORTICULTURAL SECTOR IN THE NAIVASHA BASIN EMPLOYS APPROXIMATELY 25,000 PEOPLE DIRECTLY AND AN ADDITIONAL 25,000 INDIRECTLY WITHIN THE AREA.

According to the 2009 census, the total population of the basin was estimated to be 650,000 people, of which approximately 160,000 lived around the lake itself. In the decade between 1989 and 1999 (during the boom years of the horticulture industry), the population of the basin grew by 64 per cent.

The economy of the basin is anchored in the agricultural sector. The commercial horticultural sector in the Naivasha basin employs approximately 25,000 people directly and an additional 25,000 indirectly within the area. Most of the commercial farms pay more than the minimum wage and provide auxiliary services and facilities such as clinics, houses, schools and sports facilities, making this even more attractive for migrants who have a high dependency ratio on their remittances.

A simple calculation that multiplies the minimum wage by the number of employed residents indicates that horticulture contributes at least KSh3 billion in wages to the local economy.

2.2 EXPORT VEGETABLE FARMING

Annual vegetable exports from Kenya have increased from approximately KSh2.5 billion in 1996 to approximately KSh16 billion (\$230 million) in 2008. The Naivasha basin accounts for 20 per cent (KSh3.2 billion or 16 500 tons) of Kenya's vegetable exports.

The overseas markets that the commercial farmers supply are highly dynamic and respond quickly to changing consumer patterns. Supermarkets overseas will supply farmers with their orders via email or phone each morning and most expect the product to be delivered within the next 24-48 hours.

In Kenya, vegetables grown for export are produced by both smallholders and commercial farmers. Although commercial farms and the major exporters have had an increasing share of Kenya's total vegetable export market, they have started establishing "outgrower" schemes over the past decade that enable smallholder farmers to gain access to more profitable, export-orientated supply chains. It is estimated that there are approximately 5,000 smallholder farms associated with the commercial farming/export vegetable industry in the Naivasha basin.

By joining cooperatives and getting technical support from commercial farming operations (and NGOs in some instances), the smallholders are able to shift from a subsistence livelihood to one with more stability and higher earnings.

2.3 VEGETABLE FARMING FOR DOMESTIC CONSUMPTION

Despite the advantages of the export market, the vast majority of fresh produce production (as much as 90 per cent) is grown for local consumption in a national market worth approximately KShh 50 billion (\$700 million) a year. In 2003, Kenya grew 4.35 million tons of horticultural products, of which 6 per cent to 7 per cent was processed and only 4 per cent was exported.

Muendo and Tschirley (2004) explored the value chain of Kenya's vegetable production between 1997 and 2001 and found that vegetables sold on the domestic market accounted for 52 per cent of farm production, followed by on-farm consumption (36 per cent) and vegetables sold on the export market (12 per cent).

Vegetable farming in the Naivasha basin is estimated to contribute about KSh2.75 billion (\$50 million) to the local GDP. Of this value, on-farm consumption accounts for about 35 per cent and vegetables grown for the domestic market account for 37 per cent.

In terms of final market prices, vegetable production in the Naivasha basin contributes just over KSh6.65 billion to the Kenyan GDP.

2.4 CUT FLOWER FARMING



Large-scale flower farms can export more than a million stems a day, while small-scale operations might ship 700,000 stems a year.

The flower farms surrounding the lake grow 1,900 hectares of cut flowers, of which 1,200 are grown in greenhouses. Roses make up about 75 per cent of Kenya's annual agricultural production, followed by mixed flowers (8 per cent), hypericums (3 per cent) and carnations (2 per cent).

The Naivasha basin accounts for 70 per cent of Kenya's cut flower exports and generates approximately 9 per cent or KSh27.8 billion (approximately US\$400 million) of Kenya's total foreign exchange revenue. It is estimated that 45 per cent of the revenue generated by a typical cut flower farm is spent on production costs at the farm. This would imply that the contribution of the floriculture industry to Lake Naivasha's local economy is approximately KSh12.6 billion (US\$180 million).

The Kenya Flower Council indicates that the floriculture industry represents 500,000 indirect jobs to Kenya through a variety of formal and informal industries such as transport, packaging, business suppliers, fertilizers, irrigation engineers, chemicals, consultants and auditors.

Farmer Margaret Wanjiru Mundia lives in the upper catchment. She has implemented conservation measures on her land as part of a payment for environmental services scheme.



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2.5 GEOTHERMAL ELECTRICITY GENERATION

The first geothermal plant in Lake Naivasha became operational in 1982. The generation wells are located in the Hell's Gate National Park about 7 km south of the lake shore, but obtain their water supply of about 1 million m³ per year from the lake. There are currently three geothermal projects that have 128 MW of capacity and generated approximately 1039 GWh in 2008. This electricity accounts for 18.9 per cent of the country's national power supply and was worth about KSh2.8 billion (US\$40 million) in 2008.

Given that so much of Kenya's electricity is generated from hydropower, which loses capacity in time of low rainfall, geothermal's share of national electricity generation can be as high as 30 per cent. If current rainfall trends continue, it is likely that geothermal energy will continue to take up a greater share of national electricity generation.

2.6 CONSTRUCTION AND MANUFACTURING ACTIVITY

Growth in the national economy and its proximity to Nairobi has led to an increasing amount of property development in Naivasha. High value residential property around the lake range from approximately US\$4000 to US\$60,000 an acre. There are also three gated golf communities on the outskirts of the lake. Based on similar local agriculture-based economies, this typically translates to construction and residential economic activity of about 5 per cent of GDP.

2.7 TOURISM AND RESIDENTIAL ESTATES

Lake Naivasha accounts for a very small proportion of the total tourism industry in Kenya. There are approximately 4,000 accommodation beds in Lake Naivasha that cater across a range of markets from international political and business delegations to truck drivers carrying freight to Uganda. The total value of the tourism sector in Naivasha was estimated to be approximately KSh600 million a year in 2010, which is relatively small (less than 5 per cent) compared with the horticulture industry.

2.8 ECONOMIC ACTIVITY IN RELATION TO KENYA'S ECONOMY

**THE NAIVASHA BASIN
ACCOUNTS FOR 1.6%
OF KENYA'S TOTAL
POPULATION AND
CONTRIBUTES AT LEAST
2.1% OF ITS GDP.**

The Kenyan government collates its economic data centrally so there is no available economic activity at a district level; the data for Naivasha were collected from various industry and government sources.

The Naivasha basin accounts for 70 per cent and 20 per cent of Kenya total cut-flower and vegetables exports and at least 10.7 per cent of Kenya total export earnings. Naivasha's local GDP is estimated to be in the order of KSh40 billion (\$570 million) and its contribution to the Kenyan economy can be estimated to be at least KSh59 billion (\$830 million). GDP per capita was estimated to be KSh62,500 a year compared to the national average of KSh54,895.

The contribution of the agriculture sector directly accounts for about 40 per cent of Naivasha's local economy. The majority of trades and services in the basin will be directly or indirectly linked to the agriculture sector; be it in terms of providing goods and services to the farms themselves or to supporting those that work on the land. Following this, the contribution of the agriculture sector to Naivasha's local economy is likely to be about 75 per cent.

The Naivasha basin accounts for 1.6 per cent of Kenya's total population and contributes at least 2.1 per cent of its GDP. Naivasha is also clearly attractive from a jobs perspective. The formal employment to population ratio is about 8.3 per cent as compared to the national average of 5.1 per cent, and this does not include the self-employed on small holdings.



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Forty per cent of Naivasha's local economy comes from agriculture, with around 90 per cent sold on the local market.


3 HYDROLOGY, WATER USE AND ECOSYSTEM FUNCTIONING

The following are explanations by various stakeholders for the falling lake levels and decreases in the water quality:

- Abstraction from the lake by commercial flower growers and vegetable farms
- Increases in unregulated water abstraction in the upper catchment
- Increasing use of agro-chemical in the upper catchment as soil productivity declines
- Return flow of contaminants to the lake from horticulture
- Water transfer out of the basin via the Nakuru pipeline
- Deforestation in the upper catchment leading to erosion and siltation
- Excessive abstraction (both surface and groundwater) by commercial flower farms
- Natural fluctuations in water levels
- Climate change and reductions in rainfall
- Destruction of papyrus
- Invasion of the riparian zone by pastoralists, small-holders and commercial farmers
- Human waste discharge from growing human settlements

These are perceptions and opinions, rather than established facts, but all have some basis in reality. It is important to understand how people perceive the water problems in the basin if a consensus is to be reached on how to solve these problems. The debate surrounding what is a sustainable equilibrium level for the lake is as much a socio-political question as a hydrological one.

The lake faces a range of water quality issues stemming from increasing nutrient loads such as nitrogen and phosphorous, increasing siltation and a growth in a level of pathogens and viruses from the inadequate treatment of sewerage (either from the municipal sewerage facility, surface runoff or through seepage from pit latrines). There is also increasing evidence of heavy metal (iron, cadmium and lead) and pesticide contamination.



THE DEBATE
SURROUNDING
WHAT IS A
SUSTAINABLE
EQUILIBRIUM
LEVEL FOR THE
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HYDROLOGICAL ONE.

4 WATER FOOTPRINT AND THE ECONOMIC USE OF WATER

The water footprint of a product estimates the volume of water that is indirectly or directly used to produce it, along its supply chain. The water footprint approach can also be used to estimate the indirect and direct water consumption of a catchment area, by summing up the individual water footprints of the products and the services that they consume.

This concept can then be applied to identify how water flows through the economy of a basin and a country. Its objective is not to just estimate the volume of water embedded in the products of a particular area, but to compare how different water uses contribute to economic activity and job creation.

For the purposes of this analysis, a water footprint captures both the blue and green components of water consumption. A blue water footprint refers to the volume of surface and groundwater that is used for irrigation in the supply chain of a product (net abstraction less return flow), while the green footprint refers to the consumption of rainwater that is evapotranspired from soil moisture.

The total water footprint for the Naivasha basin is estimated to be 224 Mm³. The green water footprint accounts for 65 per cent of the total water footprint. Unsurprisingly, the largest share of green water (70 per cent) was found in the rain-fed agriculture of the upper catchment.

The total blue water footprint is estimated at about 77 Mm³. The blue water footprint for agriculture in the basin was approximately 58 Mm³ of which 87 per cent could be found in the commercial farming around the lake.

5 INSTITUTIONAL ARRANGEMENTS

Through a combination of consumer and buyer pressures, the private sector has made some significant strides in self regulating water use in commercial farming operations. The Lake Naivasha Growers Group (LNGG) is a commercial farming body that has its own code of practice relating to water use and environmental impacts that its members have to follow.

Given the greater consumer awareness in the international markets, many of the supermarkets and buyers make it compulsory for the commercial farmers to follow the requirements of different certifications such as the EuroGAP, Fairtrade, GAP and the Tesco certification of compliance. The certifications have been successful in reducing water use and improving water management behaviour, such as requiring member farms to reduce water consumption by a set target every year.

These certifications are predominantly focused on what happens “within the farm gates” and, while successful at a micro level, are just not appropriate tools to enforce or encourage behaviour at a catchment level. Furthermore, it is clear that upstream smallholder farming has an impact on the hydrology of the basin, which is largely not addressed by these certification processes.

To look at water resource management at a catchment level, it is necessary to understand Kenya’s legislative and institutional water management environment.

5.1 LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK IN KENYA

Kenya’s water resource legislative framework is progressive. The Water Act (2002) places policy development under the Ministry of Water and Irrigation, which establishes and mandates the Water Resource Management Authority (WRMA) among other bodies to implement that policy in regard to water resource management.

The Water Act separates water resource management and water services and supply into two different institutions. The Water Act similarly delinked water services and supply to 117 water services providers that are managed by eight water services boards. These are managed by the Water Services Regulatory Board.

WRMA is tasked with the following responsibilities:

- Water apportionment and allocation
- Catchment protection
- Water resource assessments and conservation
- Delineation of catchment areas
- Gazetting water protected areas
- Protection of wetlands
- Gazetting water schemes to be state and community owned
- Establishing catchment management strategies
- Collecting water use and effluent discharge charges

WRMA is mandated to charge for water usage. Domestic and non-domestic water users are charged KSh0.5 and KSh0.75 per a cubic meter of water. This charge serves the dual purpose of funding WRMA and of incentivizing water users to become more efficient.

The Water Act recognizes that water management needs to be locally driven. Accordingly, each sub-catchment area is supposed to have a range of water resources user associations (WRUAs) that collaborate with WRMA in managing water resources in a harmonized and cooperative manner. The membership of the WRUAs is meant to be representative of all water users in an area and can include commercial and small-scale farmers, pastoralists, fishermen, industrial users, land owners and domestic users. A typical WRUA in Kenya manages the water resources of an area of 200km² (or about a 10-20 km stretch of river).

5.2 INSTITUTIONAL ARRANGEMENTS AND PARTNERSHIPS IN LAKE NAIVASHA

The Lake Naivasha Water Resources User Association (LANAWRUA) is probably one of the most developed WRUAs in Kenya. Local water resource management in Naivasha finds its roots in the Lake Naivasha Riparian Association (LNRA), which was originally established in 1929 to protect local landowners rights. With the advent of the floriculture industry in the early 1980s, the LNRA became more strident in trying to balance the impact of the expanding commercial interests surrounding the lake with protecting its environmental integrity. The Lake Naivasha Growers Group was established in the late 1990s by a group of progressive commercial farmers who recognized that their commercial interests were tied up in the sustainable use of the lake.

Although they have different incentives, both of these groups have established capacity and are well versed in the environmental issues of the lake. They have access to funding and have good communication networks. The other WRUAs in the lake do not have as much history, nor established stakeholder groups. As a result, many of them are still trying to establish the capacity to effectively manage the water resources in their area. WRMA has stated its intention to delegate some of its functions to the WRUAs, but the institutional restructuring needed to do this is still taking place.

The legislation recognizes that resources are needed to establish and build the capacity of WRUAs if they are going to be effective. A proportion of the water charge is allocated to the water service trust fund (WSTF), to which WRUAs can apply for funding for training. The commercial farmers and the WRUAs argue that in reality it is almost impossible to get the trust fund to release money for capacity building, despite multiple applications. The counter argument is that the WRUAs need to follow the correct legal processes in establishing themselves before WRMA can recognize them and allocate money from the WSTF.

This deadlock is rooted in the funding arrangements of WRMA. The institution is intended to be self sustaining and its funding from the central government decreases each year. As a newly established institution, WRMA faces the coinciding pressures of having to generate funding for its operational survival, but not necessarily having the financial and operating resources and institutional memory and capacity to effectively do so.

One successful example of a project that has been implemented without the support of government funding is the pilot project Equitable Payment for Watershed Services, which was jointly facilitated by CARE and WWF. The project linked the

**THE COMMERCIAL FARMS
SEE THEMSELVES AS BEING
THE LOW HANGING FRUIT
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ARE COMPLYING WITH
THE WATER RESOURCE
REGULATIONS AND PAYING
FOR THEIR WATER USE,
AND THAT PART OF
THIS MONEY SHOULD BE
USED FOR IMPROVING
THE WATER RESOURCE
MANAGEMENT IN THE
UPPER CATCHMENT.**

commercial water users around the lake with 565 smallholder farmers via the WRUAs. The LANAWRUA members paid the Wanjohi and Upper Turusha WRUAs to rehabilitate and maintain the riparian zones, plant trees and reduce fertilizer use. The upper catchment WRUAs identified 565 farmers to undertake these activities, who were then rewarded with KSh1200 (\$17) vouchers that could be cashed in to purchase agricultural inputs and basic household goods. Although still a pilot, the project is an effective example of the coordination of different water users to manage the water resources from the top of the catchment to the end user.

A major complaint about WRMA in Naivasha is that the institution focuses only on regulating (and charging) the major commercial water users, but does not have the capacity or institutional will to regulate water use in the upper catchment.

The commercial farms see themselves as being the low hanging fruit and argue that they are complying with the water resource regulations and paying for their water use, and that part of this money should be used for improving the water resource management in the upper catchment. They also argue that WRMA would be able to generate more funding if they could register and charge the currently unregistered water users in the upper catchment.

The evidence clearly supports this assertion. While Lake Naivasha water users abstract significantly more water than the upper catchment users, they also have a far higher level of water use payment.

With the support of WWF, WRMA and the Ministry of Water and Irrigation are drafting a new set of rules for the Lake Naivasha catchment that will empower WRUAs in the catchment with more autonomy. The WRUAs are tasked with assisting WRMA “in gathering information about water resources within its area of operation; monitoring the use of water; inspecting compliance to these rules; enforcing compliance with the conditions of water use permits; and collecting water use charges.”

In order to do this, the WRUAs are allowed to keep a portion of the water charges that they collect as an agency fee. This money can be used to pay for operational and administration costs. This will hopefully unlock the funding constraints of the WRUAs, which in turn will allow them to develop their institutional capacity so as to better manage and regulate the water use in their particular area.

5.3 INSTITUTIONAL OPPORTUNITIES AND CHALLENGES

It is clear that the challenges facing the lake take place against a backdrop of a concerned stakeholder group that includes both government and the private sector. This common interest presents an opportunity for consensus-driven water governance solutions that can tailor existing institutional capacity to the unique requirements and issues facing the lake.

**EACH OF THE MOST
PRESSING ISSUES
FACING THE LAKE IS
SYMPTOMATIC OF AN
INEFFICIENT REGULATORY
AND ENFORCEMENT
ENVIRONMENT.**

In its sub-catchment management plan, the LANAWRUA identified water regulation enforcement and non-compliance as greater concerns than declining water quantity and quality issues. Each of the most pressing issues facing the lake is symptomatic of an inefficient regulatory and enforcement environment. The high level of illegal or unpermitted abstractions both in the upper catchment and around the lake is indicative of this. However, the fact that the abstraction survey has been undertaken at all signifies a clear intention from WRMA to improve the water management of the basin.

It is also important to recognize that many of the challenges facing the lake, such as the expansion of human settlement in the upper catchment and the increase in human waste discharge from the growing urban centers, are not directly under the control of the water resource managers. The lake is home to a unique combination

Water's essential nature means that it cannot simply be optimized to meet economic needs. Meeting social needs must be the objective of any basin management plan.
Water kiosk, Naivasha.



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of social, economic and political pressures, and long-term sustainable solutions to its problems will require the cooperation and engagement of a broad array of stakeholders. In order to begin this engagement process, it is necessary to outline some of the shared risks that these stakeholders face.

6 UNDERSTANDING SHARED RISK FOR THE NAIVASHA BASIN

INVESTMENT AND
BUSINESS DECISIONS WORK
BEST IN A REGULATORY
AND ECONOMIC
ENVIRONMENT THAT IS
STABLE AND PREDICTABLE,
AND IN WHICH THE RULES
ARE COHERENTLY AND
CONSISTENTLY APPLIED TO
ALL PARTICIPANTS.

The hydrological and ecological functioning of Lake Naivasha is naturally variable and this has been compounded by the development of the basin and the use of its water resources. A nationally important agricultural economy has developed around the lake, with a strong political-economic relationship to Nairobi and Nakuru. At the same time, there are social and political tensions within the basin that surface during periods of drought, dropping lake level and water quality deterioration. The export market also faces perception and market challenges around water use and environmental concerns. Projections of water use into the future indicate increasing pressure on the lake, which will most likely exacerbate these various pressures and tensions.

There is a general recognition of the issues around the lake and its catchment, but coherent and proactive management of the water resources in the basin has been limited during the period of rapid development over the past two decades. There is also widespread acknowledgement that the water and land management of the basin must improve, which will require adequate institutional arrangements and resourcing. Investment and business decisions work best in a regulatory and economic environment that is stable and predictable, and in which the rules are coherently and consistently applied to all participants.

The issue of risk should not be perceived as only being a corporate issue. Risk response by companies has impacts on investment and profitability, which have social impacts through employment and income levels, and which in turn affects the local economy. This will inform the political and social equilibrium of the basin. On the other hand, impacts on agricultural production will have consequences in the domestic food and international trade arenas.

The central aim of this paper is to articulate these risks for each of these groups and to highlight the commonalities between them. By doing this, it is hoped that an opportunity for constructive engagement may be found between these groups to improve the management of the basin and thereby reduce the risk to all groups.

The following risk discussion has been developed against six inter-dependent dimensions of this shared risk, namely:

- Bio-physical risk related to the water resources and ecosystem of the basin
- Socio-political risk related to perceptions of inhabitants of the basin
- Regulatory risk associated with governance at a local and basin scale
- Reputational risk around requirements on products from the basin
- Investment risk linked to increasing requirements of financial institutions
- Economic-financial risk due to impact of these other risks

It is important to understand that it is unlikely that there will be a complete collapse in any one of these areas with irreversible consequences for Lake Naivasha and Kenyan society, economy or ecology. Rather these are issues that are likely to pose greater challenges and thereby to incur greater costs over time, with the consequent lost opportunity for development through possible growth forgone or in the worst

case a reduction in existing activity. This is an important facet of the shared risk paradigm in a developing country, where maximizing development opportunities is necessary to address the significant social and economic challenges.

6.1 BIO-PHYSICAL RISK

The economy of the Lake Naivasha basin is anchored in its capacity to harness water resources primarily for agricultural production. The primary physical water risk is around the lake itself, because the flow generated in the headwaters exceeds the local upper catchment water requirements. This physical risk is cyclical, linked to hydrological variability, and typically manifests itself in crisis events linked to drought periods. This risk is shared by those that depend upon the lake or surrounding groundwater, namely the:

- horticulture (cut flower and vegetable) industry that abstracts from lake or groundwater;
- tourism industry focused on the lake;
- communities and towns around the lake that are dependent upon this industry for employment and secondary economic activity, as well as domestic supply;
- ranchers, farmers and pastoralists that use the riparian zone for grazing and stock watering;
- geothermal plants using lake water for power generation; and
- conservation areas and wetlands dependent upon the lake for ecosystem functioning.

The degree to which there is currently an ecological concern is hotly debated, as are the interactions between lake and groundwater resources. However, this is a Ramsar site, and the combination of water abstraction (leading to declining lake levels), water quality deterioration and riparian zone degradation pose a significant long-term risk to this internationally recognized wetland ecosystem.

Changing land use (deforestation) and increasing abstraction to meet agriculture and urban demands has reduced the amount of water reaching the lake and recharging its underlying aquifers. The stresses from reductions in water availability have been compounded by concerns about the water quality deterioration caused by increasing siltation, human waste discharge and agricultural runoff. These stresses are mutually reinforcing; as the levels of the lake fluctuate downwards, the riparian zone increases and this leads to further encroachment as agriculturalists, cattle ranchers, pastoralists and wildlife move into newly accessible areas to access water and pasture. The loss of the papyrus around the lake removes the natural filtering system contributing to a further deterioration in water quality.

THE MITIGATION OF THIS PHYSICAL RISK WILL DEPEND ON A COMPREHENSIVE AND MUTUALLY SUPPORTIVE ENGAGEMENT BETWEEN ALL WATER USERS IN THE BASIN, NOT JUST THOSE AROUND THE LAKE.

The hydrology and water quality of the lake therefore depends not only on the activities taking place around it but is also irrevocably linked to what happens in the upper catchment. This relationship sets up a critical upstream-downstream tension, with smallholder farmers, urban abstraction and deforestation with lower physical risk in the upper catchment being an important contributing factor to the physical risk for those around the lake. As a consequence, the mitigation of this physical risk will depend on a comprehensive and mutually supportive engagement between all water users in the basin, not just those around the lake.

The bio-physical risk underlies all of the other risks, because the conflicts and perceptions that underlie these other risks are primarily driven by insufficient

water, of inadequate quality for productive and domestic uses, and/or degradation of the wetland ecosystem. Even if the current situation is not unsustainable (with occasional periods of drought), population and development pressures on the lake and its rivers will continue and these will most likely culminate in more dramatic and regular bio-physical risk (crisis) events if not managed carefully.

6.2 SOCIO-POLITICAL RISK

The migration of Kenyans toward Lake Naivasha is likely to continue as long as there is a perception of livelihood opportunities in the area. As more and more people enter the area, competition over available resources will become more and more acute.

One need only look at the violence in Naivasha after the disputed 2008 elections, or the historical violent conflicts over water between pastoralists and smallholders in other parts of the country, to see the damage that social unrest can do to the economy, social fabric and by implication the horticultural industry.

These pressures have manifested themselves more directly in the political environment surrounding water management in the basin. During the drought of 2009, the political leadership of the municipality is said to have entertained the prospect of severely restricting cut-flower farms' withdrawal of water. Similarly, popular and political discourse around the 2010 fish-kill attributed the water quality deterioration to the horticulture industry, despite the significant impacts of the failing Naivasha town waste water treatment works discharging directly to the lake and runoff from upstream settlements and smallholder areas.

The real impact of social risk is reactive and ill-considered political decision-making that can ride on waves of popular discontent. While politically attractive in the short-term, these sorts of decisions have potentially disastrous long-term consequences, because the need for predictability and consistency are violated. The loss of employment and wages from the cut-flower industry in Lake Naivasha would have dire impacts on the local economy and investment.

Social tensions also increase the cost of doing business. Companies have to pay for increased security and have to consider lower worker productivity, while workers are inherently affected by conflict and social unrest in their neighbouring communities. The farms are already trying to mitigate this risk by investing in their workers. With their education and medical care provided, workers have a vested interest in ensuring that their companies continue to have the "social license to operate", even in an environment of significant instability.

Potential loss of productivity in the northern catchment smallholdings has the potential to fuel these social tensions. As plots become smaller and less profitable, landowners or their families may shift off the land and move to the towns to find work. The need to mitigate social risk in the basin must consider the likelihood that Lake Naivasha town will continue to be the destination of choice for smallholders moving off their land in the upper catchment, because it is perceived to have economic and employment opportunity.

In the same way that commercial farmers have an interest in engaging the upper catchment smallholders to improve their water use efficiencies, they similarly have an interest in ensuring that the upper catchment can provide livelihoods for as many small farmers as possible so as to minimize the flow of people into the lake area itself.

6.3 REGULATORY RISK

Even in the absence of social pressure, inadequate regulation poses a significant risk in stressed catchments, such as Naivasha. Predictable, stable, effective and consistent regulation may be thwarted by limited resources, inadequate institutional capacity or political interference by vested interests.

Regulatory failure obviously poses significant risk to the private sector, but also manifests itself in increased bio-physical and economic risks. Thus, seen from a broader risk perspective, all players have an interest in reducing the regulatory risk in the basin through improved water resources management and governance.

6.4 REPUTATIONAL RISK

Reputational risk relates to the perceptions of consumers who buy goods and services from Lake Naivasha. It is a risk with significant potential to damage the economy of Naivasha, and is the risk that policymakers and stakeholders have the least control over.

Naivasha has a famous local and international profile, not only because of its flowers but also because of the domestic and foreign tourists that visit its natural beauty and biodiversity. Its media profile extends from reports about the horticultural industry's impact on the lake's water resources, to labour practices and labour unrest, to crime, to the political decisions that have been negotiated at the hotels around the lake.

CONSUMERS HAVE A GREATER AWARENESS ABOUT LAKE NAIVASHA THAN THEY DO ABOUT OTHER AREAS FROM WHICH THEY PURCHASE PRODUCTS.

As a result of this media attention, consumers have a greater awareness about Lake Naivasha than they do about other areas from which they purchase products. It is unlikely that they can differentiate between products that come from Lake Naivasha specifically and products that fall under the "Made in Kenya" brand.

Reports about Naivasha (be they from the media or from returning tourists talking to their families and friends) have the capacity to influence consumer decisions. Lake Naivasha's water stresses are well known if not fully understood. As the publicity (academic, NGO, media, blogs) surrounding the environmental degradation of Lake Naivasha grows, it is likely that the end consumer will demand that the flowers that they buy are produced in an environmentally sustainable manner and as a result choose not to buy flowers or vegetables sold under the "Made in Kenya" label.

In the case of Naivasha it is important to recognize that perceptions about water use and environmental impact on the lake may be different to what is actually happening on the ground. If consumers perceive that the vegetables and cut-flowers producers are contributing to the deterioration of the lake and as a result change their purchasing decisions, then the producers lose out (regardless of how environmentally sustainable their practices are in reality).

The probability of this eventuality is difficult to assess, but as was seen with the "food-miles" campaign this can escalate rapidly, even with poor base information. As with the other risks, it would most likely be linked to periods of crisis (physical risk) that gained international prominence. The consequence of this risk would be quite dramatic, as was seen during the prevention of flower exports to Europe associated with the Iceland volcano eruption. Whether this would have long-lasting consequences is also unclear, particularly once the lake condition improved, but reputational damage typically does have some long-term effects.

PERCEPTIONS AROUND WATER RISK IN NAIVASHA MAY HAVE PROFOUND CONSEQUENCES FOR CAPITAL ACCESS BY THE COMPANIES OPERATING THERE, AND MAY HAVE SPIN-OFF CONSEQUENCES FOR THE RISK PROFILE LINKED TO WATER IN KENYA AS A WHOLE.

6.5 INVESTMENT RISK

The increasing public awareness around water has contributed to investors considering water risk in their financing of equity and debt. The Water Risk Filter was launched this year, as banks and fund managers are beginning to make investment decisions around water considerations.

Perceptions around water risk in Naivasha may have profound consequences for capital access by the companies operating there, and may have spin-off consequences for the risk profile linked to water in Kenya as a whole. The possible implications for foreign direct investment and private sector funding of development should be seriously considered by government and private sector, as markets and investors take water issues more seriously.

The likelihood of this risk is quite high and is not directly linked to periods of crisis (as with the other risks), but is associated with investor perceptions around physical, social and institutional risks. Following the above analysis, Naivasha is likely to be viewed as high risk in an international context and therefore financial institutions may place a premium on debt and equity associated with companies operating in Naivasha. This could be counterbalanced by reduction in these other risks or in individual companies addressing their exposure through joint (or individual) accredited water stewardship interventions.

6.6 ECONOMIC-FINANCIAL RISK

The point has been made above that all of these other risk will eventually have economic consequences at a local economy, national economy or international trade economy level. Horticulture and small holder farming is the mainstay of the local economy, which is by far dominated by the cut flower industry. While Naivasha and the horticulture industry does have a national impact, this is relatively small (<3 per cent). However, it does have a significant (>10 per cent) impact on export earnings and thus the current account. Any negative consequences for these exports related to the above risk areas will have direct impacts on the country's foreign exchange, as well as possibly indirect investor perception issues. From this perspective, the management of risk in Lake Naivasha must be taken seriously at a national political, economic and planning level.

Similarly, any negative impacts on horticulture companies' operations associated with the abovementioned risks may have impacts on their financial position and profitability. While these companies have made investments in the region, increasing risk may cause them to relocate to other regions with lower risks. This may have significant impacts on the local and national economy.

An assessment of the economic risk is a synthesis of all the other risks, which in turn are largely dependent upon physical risk. It is unlikely that the current situation would cause such severe and sustained physical deterioration that major irrevocable economic impacts will be experienced in the local economy or that individual companies will fail financially. However, it is highly likely that some level of local economic and corporate financial impacts will occur during crisis periods, largely associated with reduced crop yields associated with reduced water abstraction and/or higher pumping costs from the farms that are directly dependent upon the lake and its surrounding groundwater.

On the other hand, a future with increasing urban-agricultural abstraction and increasing temperature-climate variability is highly likely to impact the recurrence and severity of crisis periods. Thus the likelihood of the physical and related risks

An additional 4,000-5,000 smallholders supply 5-10 per cent of the export flower market. WWF supports several cooperatives to meet the quality and environmental standards of foreign buyers.



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to the basin will definitely increase over time, possibly to a level at which sustained commercial activity is jeopardized.

Finally, the already significant developmental pressures on this area will increase over time, due to population pressure and economic growth in the country as a whole. Lake Naivasha provides an important opportunity to support social and economic development in Kenya in an ecologically sustainable manner, but these opportunities may be squandered without adequate engagement of the risks outlined here.

In conclusion, the shared risk of the private and public sectors around the water resources of Lake Naivasha should be reframed as a shared opportunity for future social and economic development of the basin in the interests of everyone in the region. It is through this lens that the responses should be viewed.



Environmental integrity is essential to the health of economies, people and nature. Lake Naivasha's natural beauty supports a tourism industry that brought in KSh600 million in 2010.

7 POSSIBILITIES FOR RESPONDING TO THESE RISKS

This paper has highlighted the nature and magnitude of shared risk and opportunity between various players around Lake Naivasha. Instead of coalescing around the popular perception that the lake is at risk of permanent collapse, stakeholders rather have an opportunity to act collectively to optimize the management of their water resources to safeguard against some of the varied risks that water stresses create.

This strategy to increase water efficiency is grounded on three interlocking platforms: improved governance, fostering partnerships and promoting more responsible individual water use. Governance, regulation and enforcement create a broad framework than can incentivize water users to be more responsible. Similarly, partnerships enable the sharing of resources, skills and institutional knowledge, which builds capacity and facilitates greater collaboration around shared risk. Finally, individual water users must take responsibility for their actions and pursue better practices that are attuned to local social and hydrological realities.

7.1 GOVERNANCE

There is strong need for the institutional arrangements between WRMA and the WRUAs to be strengthened and clarified. This may involve the delegation of functions to the most appropriate level. The importance of this area within the Kenyan economy should be an important driver for the national government to support this process through political will and resources.

Governance in the catchment is clearly hamstrung by the lack of accurate and available data on the state of the basin's water resources.

The first critical knowledge gap relates to water use in the basin. Although the water abstraction survey has gained some valuable yards in closing this gap, there is still a great deal of uncertainty surrounding the total water use in the basin, the identity of the water users and whether they are licensed, how much water each user abstracts and the purpose for which that water is used. Without this knowledge it becomes very difficult to implement a fair and effective water licensing system, which is the integral component of a governance and regulatory framework.

The second unknown relates to the interaction of water flows between the lake and groundwater reserves. Clearly, it is impossible to implement effective water resource governance measures without knowing how much water is currently being abstracted by stakeholders and similarly knowing how much water is available.

Improving this understanding of the hydrology and water use in the basin is the first step of five in improving regulation and compliance. It allows authorities to begin addressing backlogs, promoting meter usage, processing water charges and developing a system to monitor abstraction and enforce compliance.

The second step is showing action. Authorities must continue verifying and validating water users, but also need to be seen responding to complaints, initiating spot checks on users and swiftly penalizing transgressions. This needs to be supported by improved reporting from water users and an analysis of where regulations are being effective and where they are failing.

The third step to improving regulation and enforcement is in the consolidation of available information. Once the verification and validation of licenses has been completed and the supporting hydrological studies have been finished, the authorities will be in a position to reassess the state of the basin's water resources. From here they can begin corrective action either through the licensing system (such as the compulsory licensing used in stressed catchments in South Africa) or by changing the water use payment charge.

Once this regulatory framework has been finalized, the authorities can undertake a full compliance audit of the entire catchment area. This can be used to amend the water allocation plan and to inform any future catchment management strategies.

An unresolved issue is identifying where this "authority" rests. It will largely be determined by the degree to which WRMA is able or willing to delegate powers to the WRUAs.

7.2 PARTNERSHIPS

The second platform is developed by fostering partnerships between different stakeholders. This requires dialogue and the building of consensus between the players about the situation, challenges and opportunities for managing water resources in the lake and its catchment, linked to a process of strategic environmental assessment and strategic environmental planning around a comprehensive options analysis.

There is a need for a central mechanism that can collect, synthesize and distribute information, as well as build partnerships between water users in the upper catchment and those around the lake. This mechanism is a necessity if there is to be a common understanding of the main issues facing the Naivasha catchment. Partnerships create transparency and aid the flow of information between water users. With this knowledge, local users can be made aware of best practices and be better empowered to monitor and report non-compliant behavior. This can only assist the governance process.

The Payment for Environmental Services (PES) programme provides a useful precedent of such a partnership. Water users around the lake were able to influence the land use practices of smallholder farmers in the upper catchment by sharing knowledge and promoting more sustainable agriculture practices that have led to tangible welfare increases.

It is important recognize that these partnerships need to apply to all stakeholders, not only the water users in the catchment. Given the economic value of the Naivasha catchment to Kenya's economy, there is strong reason for the government (and particularly those ministries that are not directly related to agriculture and water management, such as Finance and Trade) to start building up partnerships with stakeholders in the basin. Similarly, those companies that rely on the international supply chain of Naivasha's horticulture industry have an equal interest in ensuring that strong partnerships can be used as a mechanism for improving governance and promoting better collaboration and water efficiency. Partnerships with institutions of this level of authority and financial clout will put additional important pressure on the regulators to do their job.

7.3 RESPONSIBLE ACTION AND WATER STEWARDSHIP

The final step to ensuring better water productivity and efficiency in the Naivasha basin is creating the incentives and disincentives for more responsible individual action. A better, more efficient regulatory net will go a long way in achieving this.

Another mechanism that can be used is the application of a water use (stewardship) standard that promotes self regulation. At the moment, the water use standards certification process (AWS) is driven by international and national institutions, none of which are focused specifically on the water issues of Lake Naivasha.

There is a growing demand for these various certification processes to be synthesized into one single standard. Importantly, such a standard needs to enforce compliance with the local Lake Naivasha water resource regulations and the needs articulated by local stakeholders. This will shift incentives for compliant behavior to move from “within the farm gates” to behavior that considers the needs of the entire catchment. By shifting the focus to become more inclusive, large water users will be able to demonstrate to other stakeholders that they are not the cause of water stress or water pollution problems.

Each of these three platforms reinforces the others. A strong regulatory net incentivizes individual water users to adapt their behavior. Strong and transparent partnerships between different stakeholders can be used to apply pressure on government to ensure that the regulations are fairly and effectively applied. In turn, as individual users become embedded in their role as stewards of water, they too will begin forging partnerships and putting pressure on government to ensure that Naivasha’s iconic natural water resources can be conserved for a sustainable future.

The health of the lake has direct bearing on food security, as local fish are an important source of protein for many families.



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8 POSTSCRIPT

WWF is a conservation organization whose mission is to create a future in which people live in harmony with nature. For more than five decades, we have advocated for the protection of the natural resources on which all life depends. As conservation science evolves, so does our understanding of who has the power to protect ecosystems, and what motivates them to do so.

As the Lake Naivasha example so clearly demonstrates, the power to protect is jointly held by many. In this particular basin, it is held by government ministers, research and development specialists at state-of-the-art flower farms, and subsistence farmers in the upper catchment, to name a few. It is also held by investors, consumers and development funders in places like the Netherlands and the UK.

This diversity is matched by the range of arguments and information that motivate them to act. Since its publication in 2010, this report has shown that revealing how water flows through economies provides powerful incentive for cooperative action. It helps the various stakeholders understand their shared risk, but also the shared opportunity in better water management.

Specifically, the government has established the Lake Naivasha Imarisha Board to coordinate all actions and actors in the basin; there has been a survey of groundwater abstraction permits and a freeze on new abstraction licenses; and the WRUAs have been empowered to manage water resources and collect appropriate fees.

The progress and achievements in Lake Naivasha are infinitely replicable, as long as people are willing to see how their futures are linked to their neighbors' and to nature's.

Naivasha shows that conservation science is only part of the equation; success depends on creating strong partnerships built on a shared vision.



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