

Alliance for Water Stewardship
Kenya Case Study

Exploring the value of Water Stewardship Standards in Africa

Technical Report

February 2011

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Sponsored by Marks and Spencer and GIZ on behalf of the BMZ

Correct citation
Hepworth N, Agol D, Von-Lehr S and O'Grady K, 2011. AWS Kenya Case study technical report: Exploring the value of water stewardship standards in Africa. Alliance for Water Stewardship/Marks and Spencer/ GIZ/BMZ.

Photo credits front cover: Reuters, O'Grady/WSA, Hepworth/WWI

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Acknowledgements
The case study team and AWS are indebted to the case study site operators Flamingo Holdings and Vegpro Kenya Ltd, and in particular their site managers at Flamingo and Longonot farms who's generous contribution of time and knowledge added much to this study. In addition recognition and thanks are due for the significant contribution made by the members of the Project Reference Group and the logistical support provided by GIZ, Marks and Spencer and WWF Kenya.

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List of Acronyms

AWS	Alliance for Water Stewardship
BMP	Best Management Practice
CAAC	Catchment Area Advisory Committee (in Kenya)
CBO	Community Based Organisation
CEO	Chief Executive Officer
CMS	Catchment Management Strategy
EC	Electrical Conductivity
EDCP	Effluent Discharge Control Plan
EIA	Environmental Impact Assessment
ESARPO	Eastern and Southern Africa Regional Programme Office (of WWF)
EMCA	Environmental Management Coordination Act 1999
EWP	European Water Partnership
GIS	Geographic Information System
GIZ/GTZ	German Technical Cooperation
GRI	Global Reporting Initiative
ISDC	International Standard Development Committee
IWRM	Integrated Water Resource Management
IWSS	International Water Stewardship Standard
KSh	Kenyan Shillings
LaNAWRUA	Lake Naivasha Water Resource Users Association
LNB	Lake Naivasha Basin
LNGG	Lake Naivasha Growers Group
LNRA	Lake Naivasha Riparian Association
LNBSF	Lake Naivasha Basin Stakeholder Forum
MoU	Memorandum of Understanding
MWI	Ministry of Water and Irrigation
NEMA	National Environment Management Authority
NGO	Non Governmental Organisation
PES	Payment for Ecosystem Services
PRG	Project Reference Group
SCMP	Sub Catchment Management Plan
SME	Small to Medium Enterprise
SWM	Sustainable Water Management
WAP	Water Allocation Plan
WRUA	Water Resource User Association
WRMA	Water Resource Management Authority
WRT	Water Roundtable
WSA	Water Stewardship Australia
WSB	Water Services Board
WSP	Water Service Provider
WSTF	Water Services Trust Fund
WWF	World Wildlife Fund
WwTW	Wastewater Treatment Works

Executive Summary

Improving the management of water to support sustainable economic development whilst securing social equity and biodiversity conservation is one of our most urgent global challenges. In order to help meet that challenge, the Alliance for Water Stewardship[1] (AWS) is developing a new, robust, market-based standard which will guide, incentivise and differentiate responsible water stewards. Regulatory effort and existing market standards already attempt to manage the impacts of water use but both currently fall short in delivering the proactive and progressive water stewardship which is urgently needed. The AWS standard will support and supplement these efforts and will meet the growing demands of consumers, purchasers and investors who need to ensure that their actions do not contribute to water problems, but instead help to solve the world's water challenges.

Established in 2009, the Alliance for Water Stewardship brings together a growing number of organisations into a united, coherent effort to develop an International Water Stewardship Standard (IWSS) with the objective of minimizing the negative impacts of water use on ecosystems, human health, social and cultural wellbeing and economic activity.

To be legitimate and effective, the standard needs to be developed and owned by those expected to adopt it and those affected by it. The AWS is therefore shepherding a multi-stakeholder development process or global 'Water Roundtable' over the next three years and this will be supported by pilot testing in various biophysical and cultural contexts.

The AWS case study in Kenya and the Lake Naivasha Basin

The standard aims to deliver significant benefits in developing countries where water governance is currently weak but where the imperatives for equitable and sustainable water use are great. This Kenya case study is the first ever exploration of how a water stewardship standard could work in a developing country. With support from Marks and Spencer and German Technical Cooperation (GIZ), draft water stewardship standards developed in Europe and Australia were tested at flower and vegetable farms and a coffee processing enterprise. The work investigated whether these existing standards, developed by the European Water Partnership (EWP) and Water Stewardship Australia (WSA) were fit for purpose and viable in delivering better water management in the challenging context of an African river basin. Working closely with farm managers, Kenyan institutions and a Project Reference Group (PRG) of local experts the research team assessed what works well, what needs strengthening and what needs further development for a robust international water stewardship standard. To validate and add depth to the findings, they were deliberated by a group of national and local stakeholders to generate consensus on key recommendations.

Shared water risks and opportunities facing the Lake Naivasha Basin

The complex challenges facing water users in the Lake Naivasha Basin are a microcosm of the problems which a global water stewardship system must address.

[1] AWS partners are the WWF; Water Witness International; Water Stewardship Australia; The Nature Conservancy; the Pacific Institute; Water and Environment Federation; European Water Partnership; International Water Management Institute; CEO Water Mandate and the Carbon Disclosure Project. See www.allianceforwaterstewardship.org

Lake Naivasha is a globally important wetland ecosystem and is designated as a Ramsar site yet it also provides irrigation water to an intensive flower and vegetable farming industry which generates over 10% of Kenya's export revenue, contributes 2.1% of the national GDP and provides direct and indirect employment for 75 000 people. A rapidly growing population and economy also depend on the basin's water resources for water supply and wastewater disposal, and the needs of small-scale agriculture, tourism and wildlife conservation, cattle ranching and grazing, fisheries and power generation must also be met. These challenges exist against a difficult physical, socio-economic and institutional backdrop. Climate is naturally highly variable and climate change is exerting new challenges. Poverty, poor health, inadequate water supply and sanitation, and inequity blight many parts of the catchment and whilst positive steps have been taken towards improving water governance institutions, difficult challenges mean these may not be fully functional for some time. Regulation of water abstraction and wastewater discharge is extremely weak, with a recent survey showing that over 80% of water withdrawals do not have a valid permit and that over half of the water used in the basin is technically illegal. The Water Resource Management Authority (WRMA) is responsible for enforcement but has historically lacked both the funding and political support needed to deliver its mandate.

Water related impacts and risks in Naivasha include depletion of basin flows, groundwater and lake levels due to over-abstraction and drought; water quality deterioration through high nutrient and sediment run-off and pollution from agricultural chemicals and untreated human waste; habitat degradation and riparian encroachment; access conflicts; invasive species and reduction in biodiversity and fishery production. Perhaps the greatest threat is the decline in lake levels which cause widespread ecological degradation and conflict. During dry spells such as that seen in 2009, water use becomes unsustainable when more water is extracted than flows into the lake. Increasing demands for extraction and increasing likelihood of dry and hot periods under climate change mean that Naivasha faces a severe and immediate water management challenge. Ultimately, a failure to address this challenge threatens hydrological and ecological crisis, and social and economic impacts that will be felt nationally. The risks are shared by government, communities, business and environmental concerns and therefore present a shared opportunity for collaborative action. In a recent assessment by local stakeholders supported by WWF, those opportunities were defined as improving institutions, innovative partnerships and the development of a stewardship standard to guide, incentivise and differentiate responsible water use in the basin. Thus the AWS effort responds to local demand in Kenya as well as the international demands of sensitised consumers and retailers.

An overview of pilot site performance

The main pilot tests were carried out at Flamingo Farm which produces cut-flowers for the UK and European markets, and Longonot Farm which grows high value vegetables for Vegpro Holdings Ltd, the largest supplier of Kenyan grown vegetables to the UK supermarkets. The sites employ about 2000 people and both withdraw water from Lake Naivasha and groundwater boreholes. Some waste water is treated onsite and returned to the lake, and some is disposed of via the municipal Wastewater Treatment Works (WwTW) in Naivasha town. Applying the draft regional standards at the sites generated the following headline findings regarding site performance.

- Both sites exhibited numerous features of best practice in terms of their existing water use and stewardship. For example, the storage and handling of agricultural chemicals and oil, and innovative practices such as precision calculation of crop water and nutrient requirements, integrated pest management and water recirculation meet or exceed best practice and regulatory specifications in Europe.
- The ongoing pressure on water resources in Naivasha, and in particular the drought of 2009, has forced the sites to explore and implement progressive strategies for efficient water use. Over the past ten years Flamingo has managed to reduce its water consumption by 40%.
- Recognizing that better water management across the Lake Naivasha Basin is critical for their reputation and their future operations both farms have made long term investments and management commitments to improving basin governance. For example through initiation, support and leadership for Water Resource User Associations (WRUAs), research, and partnership projects such as Payment for Ecosystem Services. These impressive contributions have made a significant contribution to improved planning and governance and in some respects exceed the requirements of the draft stewardship standards.
- The piloting work also identifies areas of potential improvement. For example, the robust analysis demanded in the standards helped clarify the pollution risks of waste disposal to the municipal WwTW which is known to be dysfunctional. Management of the lake shore zone was also flagged as an issue requiring attention because deep abstraction channels have potential to impact on the movement of wildlife.
- Potential savings were also identified, for example through taking a risk-based rather than blanket approach to environmental monitoring and development of a farm-wide nutrient management plan.
- Perhaps the most problematic aspect of site performance is that not all the water abstracted by the sites is covered by a valid water use permit. Both sites have been applying for legal permission for some relatively minor water withdrawals for several years, but the under resourced WRMA is faced with a huge backlog and has been unable to process these applications. The sites could therefore not currently be awarded with the standard, a controversy because of the conditionality this places on the performance of a third party.
- The work also found that whilst existing social and environmental standards addressed some aspects of water use, they fell short of driving the progressive engagement needed to tackle the difficult water challenges faced in places like Naivasha.

Road testing the results

These results were road-tested at sites outside of Naivasha, at Gikanda Farmers Cooperative Society and Mana horticultural and dairy farm in the Tana river basin. The 2600 members of the Gikanda cooperative grow and mill coffee for export, whilst Mana farm is an small-to-medium sized enterprise (SME) of ten staff producing vegetables for export and milk for local markets. These supplementary pilots generated rich insights including that:

- Multiple and significant incoming and outgoing water related risks for the smallholder cooperative and the SME exist which are not actively managed by statutory processes or extant standards. These could be addressed through adoption of a water stewardship standard to deliver collective benefit and water security.

- Both sites have been driven to adopt market standards such as Fairtrade from which they derive multiple benefits. The IWSS must therefore consider and be applicable to the contexts, needs and capabilities of smallholder cooperatives and SMEs. Neither the EWP or WSA draft standards could easily be adopted by these sites in their current formats.
- These pilots also underscored the difficulties of applying the standard in 'governance challenged' basins with scarce data. For example, although one site had a legal permit to withdraw water, there were no numerical limits on abstraction and so the requirement for compliance with local statutory requirements become meaningless in terms of sustainable water use. The standard must therefore provide some form of check that local statutory processes are judicious and working toward the public good, and drive supplementary action where this is lacking

Implications and outcomes of water stewardship standards

The Kenya case study validates the business case for water stewardship standards. Both draft standards provide a workable and effective framework for ensuring regulatory compliance, for driving efficiencies in water and related resource use, and a proactive, efficient and risk-based approach to action on key water issues. They also promote effective action towards water stewardship throughout the 'chain of influence' of site operations. Stakeholders in Naivasha concluded that the water stewardship standards have the following benefits for site operators:

- *reduced costs and efficiency gains;*
- *reduced operational water risks;*
- *reduced regulatory and reputational risks;*
- *generation of intellectual and political capital;*
- *securing certain markets and accessing new ones.*

They also concluded that implementation of water stewardship standards would drive positive outcomes for:

- *downstream water users and the environment;*
- *social equity and poverty reduction;*
- *biodiversity conservation;*
- *sustainable economic growth;*
- *efficient and good government;*
- *conflict prevention.*

Potentially they could drive the more effective basin governance needed in Naivasha but both market benefits and the contribution to basin governance are conditional on the generation of demand and an internationally recognized brand as part of the AWS effort.

In summary, for operations in data rich and well regulated environments such as those found in Europe, the EWP standard with certain modifications is a straightforward and logical approach to identifying and driving a progressive water stewardship approach which handles on-site issues and those in the supply chain. In order to better unlock improved governance at the basin level and to be relevant in developing countries however, the EWP standard needs to be further refined.

In contrast, the WSA standard responds to the challenge of devising a responsive water stewardship strategy in basins which lack data and government led planning by setting out a framework for self assessment by site operators. The general approach and intent are highly appropriate but the process and tools for analysis need further development in order to be adequately user friendly.

Notwithstanding these observations, both draft standards represent a significant first attempt to define, guide and measure water stewardship and create a firm platform for future development of an international water stewardship standard.

The piloting work succeeded in flushing out some of the issues for further deliberation within the Water Roundtable and for further development of a international water stewardship standard. Initial insights drawn from the Kenya Case study to feed into this process are listed below.

Conclusions and recommendations

I. **The standard should require full compliance with water related law.** One of the main problems in the Naivasha basin is lack of legal compliance and it would therefore be difficult to envisage a credible standard which did not require this as a minimum.
II. **Embed a risk-based approach.** Risk-based approaches are rational and cost effective in targeting investment and management effort to priority issues and should be a central feature of an international water stewardship standard.

Standard elements which need strengthening or more explicit attention

III. **A robust response to climate change, flooding and other emergencies.** Although both standards consider extreme weather events, the requirements and guidance in this respect could be usefully strengthened because floods and droughts and climate change are primary triggers for water conflict and impacts in developing countries.
IV. **Promoting a duty of care**. A duty of care requirement should be explicitly set out which levels an obligation on the site operator to ensure that the chain of handling and disposal of solid and liquid wastes produced by operations do not have negative impacts.
V. **Quality assurance in water monitoring.** For example, the standard should require sampling and monitoring to be carried out in accordance with ISO 5667-5 and any laboratories used to be accredited against ISO 17025.
VI. **Prioritising health and water linkages**. Proactive preventative management regarding linkages between water and diseases like bilharzia and malaria must be incorporated.
VII. **Improving water supply and sanitation service delivery**. To be genuinely progressive the standard must require action by site operators within their sphere of influence to improve water supply and sanitation facilities for unserved communities.
VIII. **Promoting recreational water use**. A requirement to proactively promote water based recreation should be contained in a future standard
IX. **Action on alien and invasive species**. Contributions to prevention and management of alien species need to be emphasised given the gravity of impacts associated with water hyacinth and introduced fish and invertebrate species in places like Naivasha.

X. **Making stewardship user friendly.** To ensure maximum uptake and impact the international standard needs to be clearly set out and easy to follow. Issues of common language, clear definitions and specificity need to be addressed.
XI. **Prioritising the needs of the poor.** An international standard should more explicitly explore the livelihood needs of local communities, in particular in relation to riparian access and water allocation requirements.

Standard elements which need further exploration and development

XII. **Setting boundaries for stewardship.** A clearer indication of the boundaries of analysis is required for both assessment and design of the stewardship response.
XIII. **Reviewing the role of water footprint assessment**. The role of the site level water footprint assessment was questioned by site operators, the project reference group and evaluators because of the significant management effort it requires and unclear benefits for operational water stewardship.
XIV. **Supporting small and medium sized enterprises, small-holder and out growers**. Whilst improved water stewardship among smallholders and out growers is a priority, it is unlikely that they could meeting the standard requirements in their current format. Access to and uptake of the standard by smallholders needs to be thoroughly explored and scaled requirements developed which are proportional to the risks posed so that smaller producers are not unduly prejudiced.
XV. **Compensating water stewards**. The potential for charging a premium for goods and services produced or provided based on water stewardship principles, or for sharing the burden of additional investment with retailers or consumers should be explored.
XVI. **Rethinking basin assessment.** The difficulties implicit in benchmarking sustainable water resource use mean that devising an optimal and cost effective approach requires further work anticipated by the Water Roundtable and AWS development effort. The insights generated by the case study point to a potential third way of assessing catchment and site management priorities in order to design an expedient and effective stewardship response. It is recommended that the standard prioritises support for and application of local pre-existing or emerging planning and assessment frameworks rather than imposing new ones. In particular local participatory frameworks should be supported to identify maximum abstraction volumes and rates, set environmental flow needs and to quantify sustainable yield. This introduces a difficult dilemma when statutory planning and assessments are non-existent, failing or dysfunctional, as is the case in many countries. A progressive response in this eventuality would be to initiate a process of basin dialogue to appraise the issues, needs and risks according to basin stakeholders and to contribute to a consensus based development process for defining basin priorities and stewardship responses.
XVII. **Driving proactive engagement with water governance.** The kind of interpretive approach to governance described here is likely to be necessary if the standard is to effectively respond to the disparate challenges facing the world's river basins. Put simply, the standard should drive an iterative approach to the governance principle of stewardship which asks, 'what are the main problems facing sustainable water management locally; how best can we make a proactive contribution to their equitable resolution; and what targets can we set, work towards and monitor to that end?'. Such an approach overcomes the shortcomings of the EWP standard and would embody the intent of the WSA standard.

Whilst such a flexible approach may overcome the challenge of real world complexity it could also invite misplaced action. Corporate engagement in water policy has potential for positive outcomes but can also invite unforeseen negative outcomes, for example through regulatory capture. Principles for responsible business engagement with water policy have therefore been developed recently by the CEO Water Mandate with the aim of setting out broad do's and don'ts in this area. In developing the IWSS the value of these principles should be tested as a way of bounding an interpretive and adaptive response to improving water governance. The PRG in Naivasha thought the following wording for this element of the standard could be useful:

'The site operator must demonstrate an effective, proactive leadership role in improving basin governance and public water policy implementation within their area of influence. This should be interpretive and adaptive adhering to the 'Principles for Responsible Engagement with Water Policy':

Principle 1: Advance sustainable water management
Principle 2: Respect public and private roles
Principle 3: Strive for inclusiveness and partnerships
Principle 4: Be pragmatic and consider integrated engagement
Principle 5: Be accountable and transparent'

Developing consensus among Kenyan stakeholders

Senior representatives of national and local stakeholder groups were invited to deliberate on these findings and recommendations and to generate ideas for how some of the difficult questions facing the development of an IWSS could be handled. A majority of stakeholders supported each of the recommendations made by the project team though important differences of opinion were highlighted and the level of support for each was recorded to indicate the strength of feeling and relative level of priority within a group of African stakeholders.

Contentious issues were explored including how the standard should handle the following challenges:

1. Where attaining the standard relies on performance of a third party. eg. full statutory compliance, and the duty of care requirement for solid and liquid waste handling and disposal.
2. Engaging with out-growers, smallholders and SMEs.
3. How to define stewardship in data scarce or 'governance challenged' catchments?

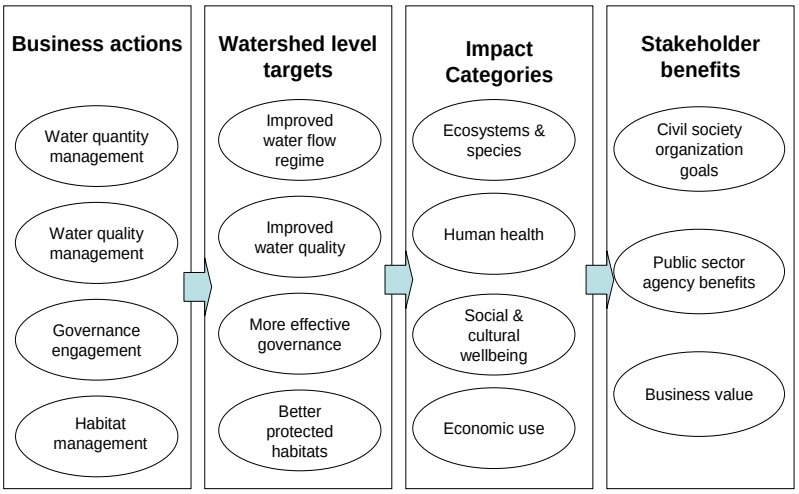
The results of these deliberations are recorded in this report and provide valuable and progressive ideas for further development within the global standard setting process.

1. Introduction

This report documents the findings of the Alliance for Water Stewardship's Kenya case study which took place between September 2010 and February 2011 with support from Marks and Spencer and GIZ[2]. The work explores whether draft water stewardship standards developed in Australia and Europe are fit for purpose in an African river basin context. It generates learning for the development of an international water stewardship standard within the global multi-stakeholder Water Roundtable (WRT) of the AWS[3].

The Alliance for Water Stewardship (AWS) was established in 2009 to develop an international water stewardship standard with the objective of minimizing the negative impacts of water use on ecosystems, human health, social and cultural wellbeing and economic activity[4]. The standard(s) will achieve this by setting out actions required by water users which will contribute to catchment level sustainability targets and deliver stakeholder benefits in terms of improved water flow regimes and water quality, protection of high conservation values and effective governance, as illustrated in Figure 1. Additional specifications for the standard are set out in Box 1 below.

Figure 1. The AWS Theory of Change from business actions to stakeholder benefits.



Over the next three years the AWS will support the development of the standard by stakeholders through a global process of discussion, deliberation and consensus building known as the water roundtable (WRT), and pilot testing in various environmental, socio-economic and cultural contexts. Alongside this standard development work, the AWS will develop a globally recognisable brand and robust verification system. Ultimately this effort will guide, differentiate

[2] German Technical Cooperation, formerly known as GTZ
[3] AWS 2011. Water Roundtable Process document,
[4] Impacts: the undesirable consequences of human induced effects on water. See "*Where to Focus? Water-Related Impact and Risk in the Context of Standard Setting*" (AWS, June 2010).

and reward those water users doing all they can to ensure that water is managed sustainably[5] at their sites, by their suppliers and throughout the catchments within which they operate.

Box 1. Key specifications of the AWS Water Stewardship Standard

[1]The AWS standard(s) will:

- Be global in their geographic scope;
- Take account of and aim to address the impacts of direct as well as indirect water use;
- Be applicable to all businesses with significant potential to influence the sustainability of water use at the catchment level;
- Be sufficient for the implementation of the AWS global water stewardship program without the need for the development of further standards;
- Support and complement effective regulatory policy;
- Specify the combination of process and/or performance requirements that is considered optimal to achieve the specified objectives;
- Be designed to align, coordinate and as far as possible avoid duplication with complementary standards or approaches such as sector-specific 'best management practice' standards, water footprinting standards, environmental reporting standards, management system standards, etc.;
- Be designed so that their implementation shall not disadvantage small and medium-sized enterprises in comparison to larger enterprises nor disadvantage businesses in developing countries in comparison to those elsewhere.

The AWS theory of change is based on generating preferential treatment in the market place for those operators adopting the standard from customers, retailers and investors eager to ensure that their choices and actions 'do no harm' in terms of water impacts. By providing incentives for widespread uptake of a carefully designed standard the AWS effort will drive positive change in water and river basin management in new and exciting ways across the globe.

To have value and be viable in developing country contexts, water stewardship standards must be developed to respond to the challenges facing water users and the environment in countries like Kenya. It is also critical that water stakeholders in Kenya and other developing countries have ownership in the development of a standard which is likely to affect them in the future.

Responding to these imperatives, the AWS Kenya Case Study explored how two existing draft water stewardship standards developed in Australia by Water Stewardship Australia (WSA-00) and in Europe, by the European Water Partnership (EWP v2.0) would perform in an African context. This work is the first exploration of the costs, benefits and business case for water stewardship standards in a developing country. By piloting existing draft standards against water use by horticulture, floriculture and smallholder coffee processing operations in the challenging contexts of Kenya this work elaborates how standards can be improved to better deliver the AWS objectives. It identifies omissions, assumptions and aspects which are challenging, controversial or contested by stakeholders and which therefore warrant thorough deliberation in Kenya and beyond.

This work is also demand driven by local stakeholders in Naivasha. A key recommendation of the recent Lake Naivasha Shared Water Risks and Opportunities Study[6] was exploration of the

[5] For an operational definition of sustainable water resource management see Hepworth 2009 and CEO Water Mandate 2010

value and subsequent development of water stewardship standards which would differentiate responsible water users across the basin.

The Kenya case study began with preparatory desk study, a written consultation exercise and the formation of a local Project Reference Group to guide and quality assure the work[7]. Two pilot sites representing different types of water use activity were recruited: Flamingo Farm, operated by Flamingo Holdings Ltd., growing primarily flowers, and Longonot Farm, operated by Longonot Horticulture Ltd part of Vegpro (Kenya) Ltd, growing primarily vegetables. This was followed by intensive field testing at these pilot sites, with inspections, interviews and review of site records and documentation by the AWS Project Team. To ensure a high level of understanding and information exchange this team was lead by the developers of the draft regional standards from the European Water Partnership and Water Stewardship Australia with support from the Kenyan AWS Project Manager and Water Witness International Initial insights were discussed with site operators and a 23 member Project Reference Group to derive provisional conclusions and recommendations which were further tested at two sites outside the Naivasha basin. These supplementary sites were the Gikanda coffee cooperative and Mana Horticultural farm in Nyeri District of Central Kenya.

This technical report is the main output of the study and is accompanied by an accessible summary of the key findings for non technical audiences and Pilot Site Feedback Reports. Its purpose is to provide detailed assessment and results for input into the WRT process of international standard development. It serves as a basis for further discussion on how to shape a future international standard to deliver maximum positive impact and benefit, and as a proposed model methodology and format for future feedback reports to the WRT.

- **Chapter 1** introduces the aims, objectives and methodology of the study;
- **Chapter 2** describes the baseline conditions in the Lake Naivasha Basin;
- **Chapter 3** summarises information about each standard under review;
- **Chapter 4** reviews the extant standards in place in Naivasha and their handling of water stewardship
- **Chapter 5** summarises characteristics of each case study site and evaluates the performance of the pilot sites against the draft Standards and sets out what the site would need to do in order to comply;
- **Chapter 6** reflects on the requirements of the draft standards and considers their implications and whether they are achievable, reasonable and effective in driving desirable outcomes;
- **Chapter 7** reviews the findings and insights derived from supplementary pilot sites
- **Chapter 8** concludes by reflecting on whether the draft standards are fit for purpose and considers how they might be amended and improved to generate recommendations for the development of an international standard.

[6]WWF 2010. Shared risk and opportunity in water resources: Seeking a sustainable future for Lake Naivasha. Pegasys, RSA.

[7] The full methodology, approach and research questions are documented in AWS 2011, Draft Pilot Study Methodology

1.1 Aims and objectives

In order to contribute to the goal of a global water stewardship system which is sufficiently robust to contribute to the objectives of the AWS, the aims of this AWS Kenya Case study were:

1) *to test the two preliminary regional draft water stewardship standards:*
    a. *European Water Stewardship standard version 2.0 (EWP v2.0) and;*
    b. *Water Stewardship Australia zero draft (WSA-00);*

   for their applicability in Africa using the Lake Naivasha catchment as an initial test area, and;

2) *to ensure that the findings from this field testing are fully taken into account in the drafting of the Alliance for Water Stewardship's first draft international water stewardship standard.*

In order to deliver these aims, the following objectives were addressed:

Objective A. *To systematically explore and where possible quantify the costs and benefits at site level, and the long term public-good values at basin level of the draft water stewardship standard(s) under study.*

Objective B. *To identify challenges and opportunities for delivering the AWS objectives through the standards being tested, within the environmental, institutional, social and economic contexts of the study sites.*

Objective C. *Based on these findings and the insights of stakeholders, to recommend amendments to the standards, and/or identify aspects which require further development in order to successfully deliver the AWS objectives.*

Objective D. *Generate interest, understanding, support and ownership of the AWS objectives and the future standard(s) among stakeholders in Naivasha, Kenya and internationally.*

In order to address these objectives a set of research questions were developed which guide the workplan and field tests and these are set out in Section 1.2.

The outputs of the study include this full technical report; a shorter, popularised summary; site feedback reports and a draft AWS pilot methodology document.

1.2 Methodology

This work in Kenya builds on experience in Australia and Europe to develop an efficient and robust methodology and operational guide for future AWS piloting work. The draft AWS piloting methodology which is summarised here sets out this transferable methodology to promote the generation of comparable and reliable results[8]. The detailed methodology contains research questions and design, site selection rationale, a pilot case study protocol, research and analytical techniques, a road map, task descriptions, deliverables and work plan. A section on research conduct covers Health and Safety, confidentiality and ethical considerations.

[8] AWS 2011, Draft Pilot Study Methodology

1.2.1 Research questions

In order to address the research objectives and to guide the workplan and methodology the following research questions (RQ) were generated and grouped according to their purpose:

RQ1. Understanding the basin context
What are the environmental, social and economic, and institutional contexts of the AWS case study basin?
Purpose: To establish the priorities and guiding principles for water stewardship in the basin

a. The environmental context:
Key hydrological and hydro-geological features; trends and key risks in terms of water quality, water quantity, and ecological quality in the basin; trends and key risks in terms of drought and flood occurrence and climate change in the basin; priorities for water related biodiversity conservation.

b. The social and economic contexts:
Social and economic trends and risks; uses, values and functions of water; role of water in the economy, livelihoods and health sustenance and the priority risks to these values; level of coverage of improved drinking water supply and adequate sanitation.

c. The institutional context:
National and local policies, laws, regulations and statutory standards; generic national standards in place (NB. Site level regulatory specifications handled in RQ3); institutional frameworks and organizational responsibilities for implementation; review of performance and key constraints and opportunities; review of local and basin level water management efforts and initiatives, their genesis and outcomes.

d. In summary, what are the priority water resource management and water stewardship issues facing the basin?

RQ2. Understanding the standard(s) under review
Purpose: To provide detailed understanding of what the standards being tested require in terms of information, actions, procedures and experience of their application/testing to date

a. How and where were these standards developed and by whom?

b. What do the standards contain and what are the requirements for 'compliance'?
Relating to water quality, quantity, biodiversity and governance.

c. What have been the outcomes of earlier piloting and testing of these standards?
Aspects which have worked well, or not; particularly problematic issues needing further attention; methodologies used; perspectives and experiences of stakeholders.

RQ3. Understanding the case study site(s)
What are the operational realities of current water use and stewardship at the site under study?
Purpose: To ensure that the current status of water stewardship and management at the site - the baseline - is well understood.

a. What are the baseline characteristics of the site?
Operations and operators; scale and significance of the site - economically, socially, turnover, employees, throughput, water use; where is the site in relation to water and biodiversity features and what is the site layout; which key individuals/ teams have responsibility for water management and stewardship; history and future plans.

b. What are the characteristics of the site water use? (Direct and indirect)
Water quantity - use and abstraction of water, quantity, timing and monitoring; diversions, rainwater harvesting, storage or otherwise modified flow; proportion of the natural flow abstracted; impact of floods and droughts; water use efficiency.
Water quality - generation, handling, storage, treatment and disposal of wastewater flows; contaminated run-off (including diffuse runoff or groundwater flow); solid and liquid waste; bulk liquids and potentially hazardous chemicals storage and handling; waste and waste water production trends.
Biodiversity and riparian management - adjacent watercourse or water features and ecological and geomorphologic status; status of access to these water features for other water users**.**

c. What are the legal specifications for water use and stewardship at the site and how does the site perform against these?
Legal permissions in place for abstractions, discharges, impoundments and diversions and the determination procedures for these; specific or generic planning controls (EIA's, planning permissions/agreements); statutory provisions for waste; compliance monitoring and inspection record and site performance against legal specifications; enforcement action, 'incidents' or conflicts.

d. What do market or production standards require in terms of water use and stewardship at the site?
Standards in place, requirements with relevance to water stewardship and performance against these; costs and benefits and the experiences of the operators regarding their value.

e. Contribution to improved water management and governance in the local community, environment, within the basin or nationally?
Motivations and outcomes of these efforts.

f. Key water impacts, risks and concerns at the site?
Based on key features of the sites water use, regulatory obligations and performance, the priority impacts, risks and problems posed by site operations; options available to the site to improve its own water stewardship performance and water management in the basin.

RQ4. Site performance against the draft standards under review
Purpose: To understand the costs and viability of compliance with the standard.

a. What will be needed to comply with the draft standard(s)?

Data, information and analysis; human resource - time, skills and management effort; investment in infrastructure and technology; training and guidance and external support - changes to operational procedures, policies and budgets.

RQ5. Outcomes driven by the draft standards under review
Purpose: To understand the outcomes which the standard would drive including benefits.

a. Internally: cost and efficiency (water and finance) savings; reputational enhancement / protection; market benefit; others (water risk reduction)
b. Externally: for downstream users and the environment; social equity, protection and poverty reduction; biodiversity conservation; economic potential / growth; basin governance; institutional development and sustenance; conflict prevention; other.

RQ6. Recommendations for enhancing the standard
Purpose: Given the issues in the basin, opportunities identified at the site, and results of RQ4 and 5 what aspects of the draft standards need to be amended to enhance the viability and positive impacts of the standard(s)

a. What aspects work well to deliver AWS objectives?
b. What aspects are problematic, difficult or need more work?
c. Were any aspects found to be redundant?
d. What new elements need to be introduced?

1.2.2 Research design

Piloting of standards concerns 'what?', 'how?' and 'why?' questions about complex contemporary social and environmental phenomena. Such questions are best suited to investigation through a multiple pilot-case study approach[9]. Pilot-case study research does not aim to derive statistical representation using samples, but instead, cases are treated as individual 'experiments', which can provide analytical rather than statistical generalisations. Key considerations for effective pilot-case study research are consistency in research questions and pilot-study protocol which sets out quality assurance and site selection criteria, analysis and interpretation techniques.

Pilot study protocol

As with other types of empirical research, tests of validity and reliability must be applied to assure the quality of pilot-case study work and these are set out in the detailed methodology. To this end, as well as triangulation between sources of data, the research should be quality assured and validated by a group of local stakeholders who have an expert understanding of the issues. To this end a Project Reference Group (PRG) was established and this group of 23 individuals made a major contribution to the planning and review of the research, not only by generating a state-of-the-art understanding of basin priorities and insights and deliberation based on the findings, but through logistical support to the research team. A list of PRG members is provided in Appendix A.

[9] See Yin 2003

Pilot-case study site selection

The multiple pilot-case study element of this research is exploratory and interested specifically in the identification of patterns to test the viability, constraints and opportunities of draft AWS standards. The selection of individual pilot-studies should therefore follow a replication logic which reflects the AWS objectives. Because the water stewardship standards aim to be applicable to a wide range of water users across a wide range of hydrological, institutional and 'developmental' settings, replication logic dictates that as many of these water user types within each setting should be considered as individual pilot-case sites as possible. However, to keep the research manageable, representative locations have been identified which combine the strategic rationale set out by the AWS with the necessarily opportunistic approach which harnesses the support and resources of parties interested in piloting.

The Kenyan AWS case study is representative of an East African water stewardship setting and horticultural and floricultural sites have volunteered to undergo piloting work in the Naivasha basin. These sites also draw water from different types of sources: surface and groundwater. Outside of the basin, two other pilot sites were identified to represent small-holders within a coffee cooperative and a horticulture enterprise to test the standards and findings across these contexts. In particular our aim was to explore whether the standards are viable for and supportive of smallholders given that this is a specification for the AWS international standard.

Research techniques and conduct

Methodological reliability was ensured by adhering to a pilot-case study protocol which ensures that the same research approach is adopted at each pilot-case study site. A flexible toolbox of research techniques were used to address these questions and included:

- ⇒ ***Document analysis and literature review***
- ⇒ ***Key informant interviews***
- ⇒ ***Questionnaire surveys and written consultations***
- ⇒ ***Field observation, transect walks and site inspection***
- ⇒ ***Hydrometric survey & water quality sampling and analysis (potential)***
- ⇒ ***Stakeholder meetings, participatory exercises and focus groups***

Each technique and relevant guidance is described in the draft AWS piloting methodology. Guidance was also developed to ensure the highest standards of health and safety and ethical conduct within the work and the approach to potential confidentiality issues were agreed with the pilot sites at the outset.

Case study analysis

The challenge of pilot-case study analysis is to distill large amounts of potentially relevant information in a way which is clear, consistent, unbiased and which avoids equivocal conclusions. The method suggested follows the following steps:

- Initial overview, aggregation and comparison of relevant data;
- Synthesis of evidence to build a grounded response to each research question based on triangulation and cross-referencing of data sources;

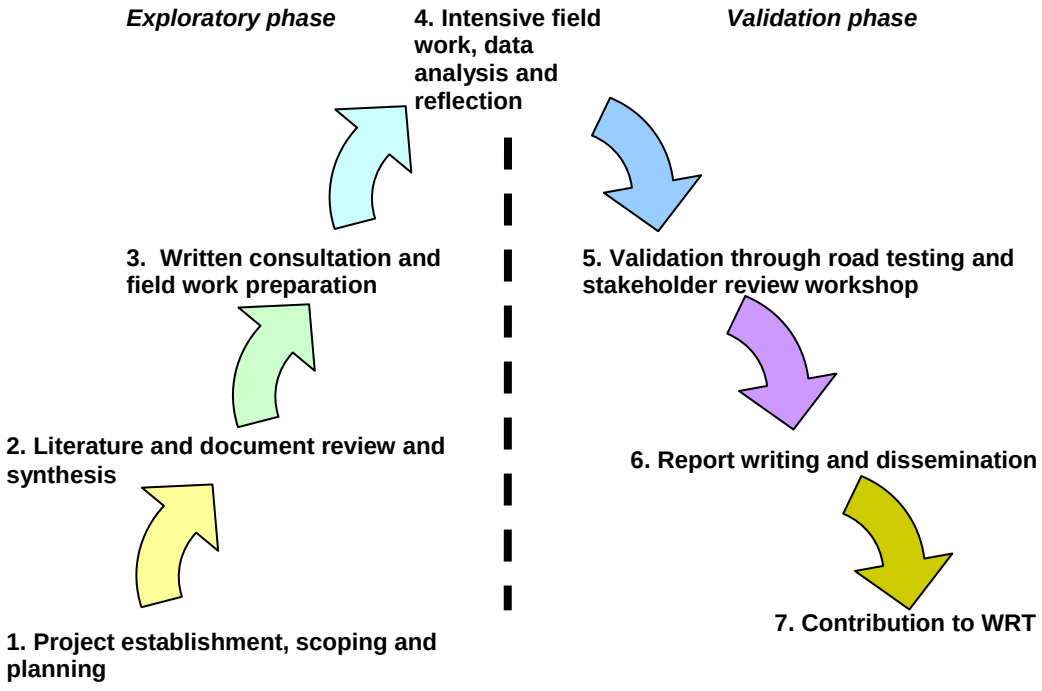
- Presentation of summary findings to the Project Reference Group to support interpretation and validation, referencing multiple data sources used in the analysis and providing plates, figures and maps to illustrate key findings;
- Further review and deliberation of key findings and recommendations by stakeholders (guidance on how to facilitate this process is included in the methodology).

A pilot-case study summary should be provided as a separate report following the same layout and schema for analysis. These pilot-case study summaries will be pivotal to getting most value from the AWS piloting results, and the findings within them provide for the logical development and amendment of the standards through stakeholder deliberation. To support the legitimacy, relevance and value of the data generated comprehension of the logic and rigor of the pilot-case study method and analysis among stakeholders is important. An annotated pro-forma pilot-case study report is provided here for illustrative purposes and details a citation protocol which relates statements and findings to multiple supporting data to aid traceability of the chain of evidence from discussions to source data.

Pilot-case testing roadmap and tasks

Relating the research objectives, questions and pilot-case study protocol to the methodology provides a stepwise progression or 'roadmap' for the work presented in Figure 2.

Figure 2. Research phasing and road map for AWS pilot-case study research



2. The Lake Naivasha Basin and water resource management in Kenya - Understanding the case study context

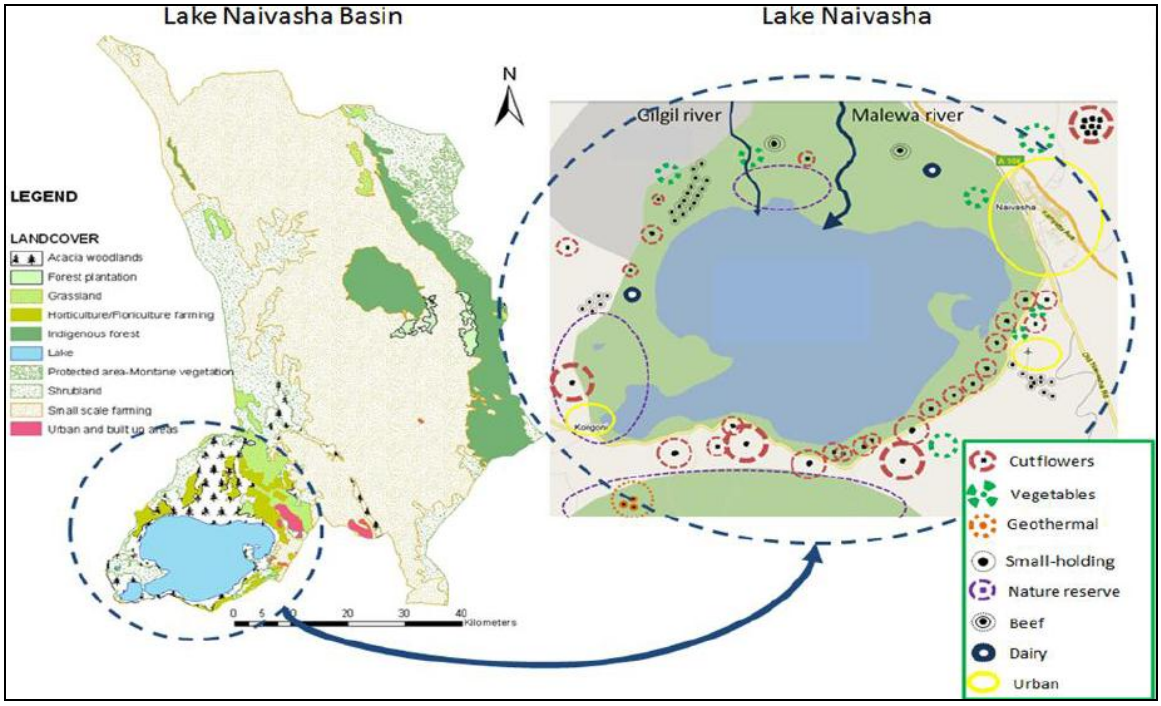
The complex interactions between disparate water users, the local environment and communities, local and basin level governance institutions in Naivasha and with the wider national and international political economy are a microcosm for the difficult challenges which a global water stewardship system must address. These multiple functions and values of water resources in the Lake Naivasha Basin (LNB) make it an ideal setting within which to explore the value and content of a water stewardship standard. Like many developing countries, Kenya is in the process of reforming its water management institutions towards the model provided by Integrated Water Resource Management (IWRM) and the insights around how stewardship standards interface with statutory water governance will therefore have wide relevance.

Lake Naivasha Basin sees internationally recognised wetland ecosystems coexisting with industrial scale intensive farming of cut-flowers and high value vegetables which in turn bring significant benefit, generating over 10% of Kenya's export revenue and employing over 50 000 people. A rapidly growing population and economy also depend on the basin's water resources for their water supply and wastewater disposal, with significant other water uses including small scale agriculture, tourism and wildlife sectors, cattle ranching and grazing, fisheries, power generation and municipal water use, including a bulk transfer out of the basin to Nakuru. Figure 3 illustrates the primary land use types in the basin. The challenges of meeting the needs and managing the impacts of these multiple uses occur against a difficult physical, socio-economic and institutional backdrop. The climate is naturally highly variable and climate change will exert new challenges. Poverty, poor health and inequity of wellbeing and opportunity still blight many parts of the catchment and drive development and livelihood imperatives which aren't easily compatible with long term sustainable resource use. Further, whilst positive steps have been taken towards improving environmental and water resource management, and governance more widely, very difficult challenges persist for effective implementation and policy coherence.

Resulting water related impacts, risks and concerns include depletion of basin flows, groundwater and lake levels due to over-abstraction and drought; water quality deterioration through high nutrient and sediment run-off and pollution from agricultural chemicals and untreated waste; habitat degradation and riparian encroachment, access conflicts, invasive species and reduction in biodiversity and fishery production.

As well as direct hardship for basin stakeholders, if left unchecked these problems threaten the ecological integrity of the basin and with it, reputational and financial impacts for export growers and tourism enterprises. These shared water risks extend to government and the national economy of Kenya with potential loss of significant export revenues, employment and GDP.

Figure 3. Land use in the Lake Naivasha Basin[10]



Improving water resource management across the basin is therefore an important priority, and an opportunity, for Kenya and basin stakeholders to demonstrate sustainable coexistence. A recent analysis by WWF underlines this[11] and through a process of consensus building with basin stakeholders three response areas were identified to mitigate shared water risks. They included improved institutional arrangements and development and implementation of rules regarding resource use; the fostering of innovative partnerships between the government, private sector and civil society; and the development of water stewardship standards to distinguish and incentivise progressive and responsible private sector water users in the basin. Thus, this case study responds to local demand as well as contributing to the international AWS effort.

To enable the objective exploration of the value of and modifications required within the two draft standards under review, the water stewardship priorities in the LNB must be thoroughly understood. This chapter therefore draws on existing literature and data to elaborate the physical, social, economic and institutional contexts of the LNB. It concludes with a summary of water stewardship priorities, tested and validated through an independent participatory assessment by the Project Reference Group of basin stakeholders.

2.1 Physical context

Lake Naivasha is a shallow freshwater lake lying 80 km north west of Nairobi in Kenya's Eastern Rift Valley. The Lake, Kenya's second largest freshwater body, is fed by two perennial rivers, the Malewa and the Gilgil, which discharge 80% and 20% of the total inflow respectively from a total

[10] WWF 2010 ibid.
[11] WWF 2010 ibid.

catchment area of 3400 km^2 (see Figure 4). The lake has no surface outlet and its levels fluctuate naturally, by up to 12 metres over the last 100 years. The basin hydrogeology is complex and imperfectly understood, however a net groundwater flow out of the basin is thought to account for the fresh water in the lake, which without significant seepage would become saline.

Mean temperature varies with altitude across the basin from 16°C in the Aberdare mountains which bound its north and north eastern borders to 25°C on the lake shore (1890m asl). Mean monthly rainfall for the Lake Naivasha Basin is presented in Figure 5. Rainfall varies across the basin from an annual average of 1350 millimetres in the Aberdares to 600 millimetres at the lake and is bimodal with long rains from April to May and short rains in October and November. The upper catchment is therefore suitable for rainfed agriculture and is classed as semi-humid whilst the lake area is semi-arid.

The lake supports a rich diversity of plants, animals, resident and migrant birds, with over 350 species of waterbird recorded, and is internationally recognised through designations including Ramsar[12], a UNESCO Hydrology Environment Life and Policy site (HELP, 2004) and a Ecohydrology Demonstration Site[13].

Stakeholders voice concerns about the status of the lake and the basin. In particular falling water levels and water quality deterioration are perceived to be caused by over-abstraction by horticultural growers; unregulated use in the upper basin; deforestation; basin transfer to Nakuru; natural variation and climate change; increased use of agrochemicals; contaminated return flows and human waste discharges; loss of papyrus and riparian encroachment[14]. It is likely that negative impacts arise from a complex combination and interaction of such causes and the current understanding of the lakes physical status and trends are explored here.

Hydrology and water balance

The long term average lake level is 1887 m asl with a water volume of 680 Mm^3 and surface area of 140 km^2 though there have been fluctuations in level of around 9 metres over the past 100 years and there is evidence of the lake drying completely several times over the past 1000 years. Analysis of the basin water balance emphasises this high natural dynamism with potential variation in rainfall explaining inflows ranging from 60 Mm^3 in dry years to almost 8 times that in wet years at 460 Mm^3.

As a shallow lake with a high surface area, evaporation losses are high accounting for 60% of water balance output, whilst abstraction accounts for between 10-20%. Groundwater seepage to the north and south, thought to feed a deep regional aquifer is estimated at 12%.

Deforestation in the upper catchment is thought to contribute to a 'flashier' response to rainfall characterised by runoff peaks and troughs so that there are higher evaporative losses after flood events and lower dry season flows. An abstraction survey by WRMA in 2009 suggested that abstractions were much higher than previously thought.

[12] Site number 724, designated 10th April 1995
[13] Harper & Mavuti 2004
[14] WWF 2010. ibid.

Figure 4. Lake Naivasha and its drainage basin (WWF 2010)

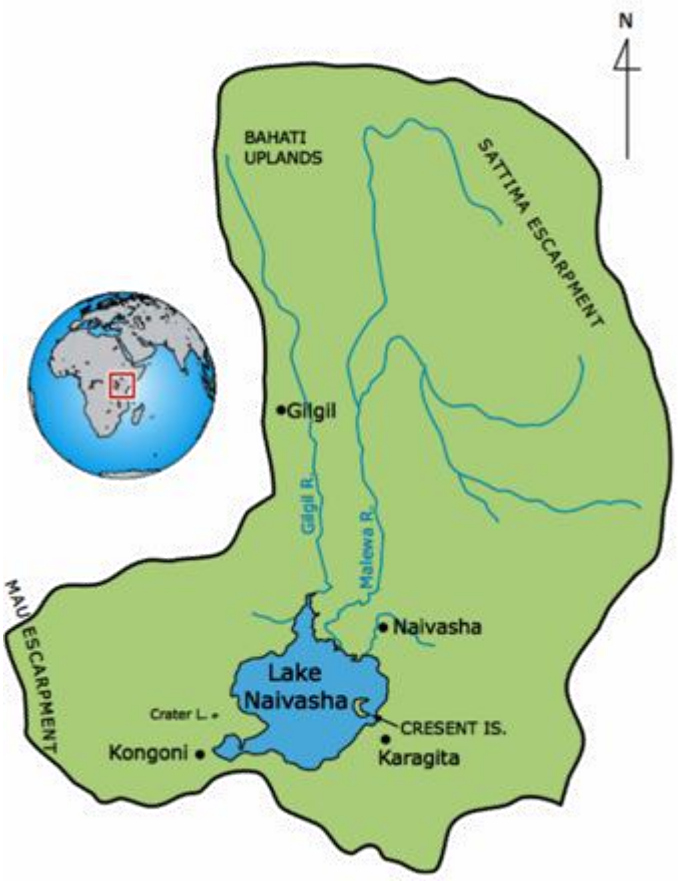
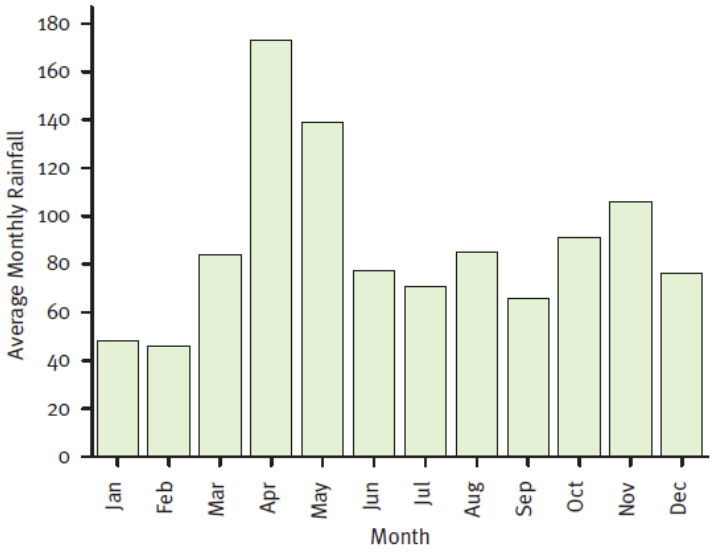


Figure 5. Mean monthly rainfall for Lake Naivasha Region[15]

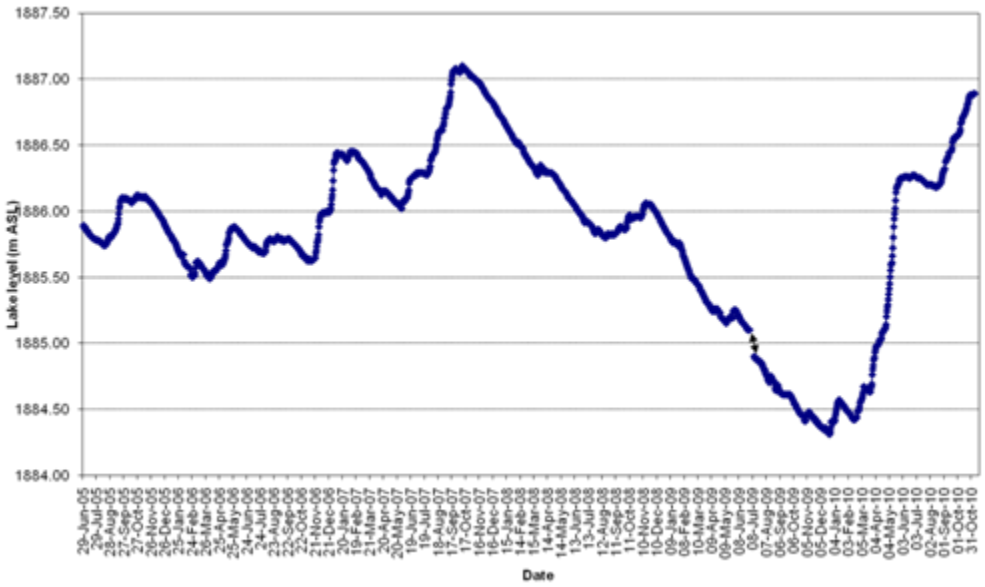


[15] from Brecht et al. 2006

Water levels in the lake declined steadily during most of the 20th century. The water balance under average conditions is positive, and under wet conditions the positive balance is as much as 416 Mm^3. Under dry conditions losses are typically 117 Mm^3/year. Consequently current rates of abstraction during dry years, or a maximum abstraction of 5 Mm^3 can be considered unsustainable, although the acceptable extent of lake level variation, and the sustainable and variable level of abstraction related to this, needs to be characterised and agreed among stakeholders and multiple user interests.[16]

With such a highly dynamic climate, droughts and flood events are regular occurrences in Naivasha and droughts in particular precipitate crises and conflict among water users. Drought culminating in 2009 caused significant decline in Lake levels (see figure 6) and has been associated with economic loss and widespread hardship and heavy rainfall events associated with fish kills in the lake.

Figure 6. Lake Naivasha levels June 2005 – November 2010 (metres above see level)[17]



Water quality

Pollution caused by increasing nutrient loads, organic matter, sediment and pathogenic material are the most significant water quality impacts in the basin and Lake Naivasha. There is also evidence of increasing heavy metal and pesticide levels[18].

As well as risks posed by silt and phosphorus and nitrogen run-off from agriculture in the upper catchment and around the lake, inadequately treated human waste is a significant problem. Sources include contaminated surface drainage, poorly functioning municipal sewerage and sewage treatment facilities, in particular that serving Naivasha town, and seepage and emptying

[16] WWF 2010 ibid.
[17] Finlays sustainability strategy (presentation) 2010
[18] Otianga-Owiti and Oswe 2006

of pit latrines. Many of the settlements established to house workers in agribusiness around the lake remain unserved by sanitation and waste collection services and are likely to be a major source of pollution.

Decline in papyrus beds around the lake and riparian encroachment remove the filtering potential of these littoral wetlands. It is estimated that the Malewa and Gilgil rivers discharge approximately 7 million tonnes of sediment to the lake each year, 20% of which is organic matter. Increased sediment loads are associated with both gully and sheet erosion linked to deforestation and land clearance for agriculture, and smallholder farming practices which sometimes see cultivation of steep slopes, riparian land and river banks. Other major sources include road construction and inadequately designed and maintained surface water drains throughout the catchment. Sedimentation results in shallowing of the lake, degradation of invertebrate, fish and other habitats. High levels of erosion also contribute significantly to nutrient inputs and potential for eutrophication.

Although not extensive, records of lake water quality do not indicate major trends though there are issues of concern. These include the area around the Melewa delta which is subject to increasing nutrient loads from agricultural and human settlement run-off in the basin and quality issues at Olioden/Crescent Lake lagoon that are related to agricultural and livestock production on the lake shore[19].

In 2010 there was a major fish kill in the lake which upon investigation appears to have been due to highly fluctuating dissolved oxygen levels following a downpour after a prolonged dry period. It is likely that organic matter, sewage and nutrients from upstream in the basin, from surface waters and foul drainage around the lake shore and Naivasha town were flushed into the lake, where subsequent bacteriological breakdown deoxygenated lake water to below levels required for fish respiration. This may have been followed by a series of diurnal algal blooms and die back which would have further exacerbated fish stress and mortalities. Media interest at the time implicated flower and vegetable producers in the pollution, suggesting that chemical spillage had caused the fish kill, but given the bulk quantity of chemicals which would have been required to affect water quality across such a wide expanse of water this is considered improbable.

A major concern for the lake is the increased primary productivity of phytoplankton and related algal blooms (mainly *Cyanobacterium microcystis)*. These are said to have first appeared in the last ten years and are closely linked to the eutrophic state of the lake particularly since the 1990s[20]. Past studies show that the eutrophic state of the lake is explained by the influx of nutrients from the catchment with run-off of agro-chemicals considered the largest contributory factor[21].

Climate change

The annual average temperature across Kenya has risen by 1°C since 1960, at a rate of 0.21 °C per decade and the frequency of 'hot' days has increased dramatically, by 57 days per year

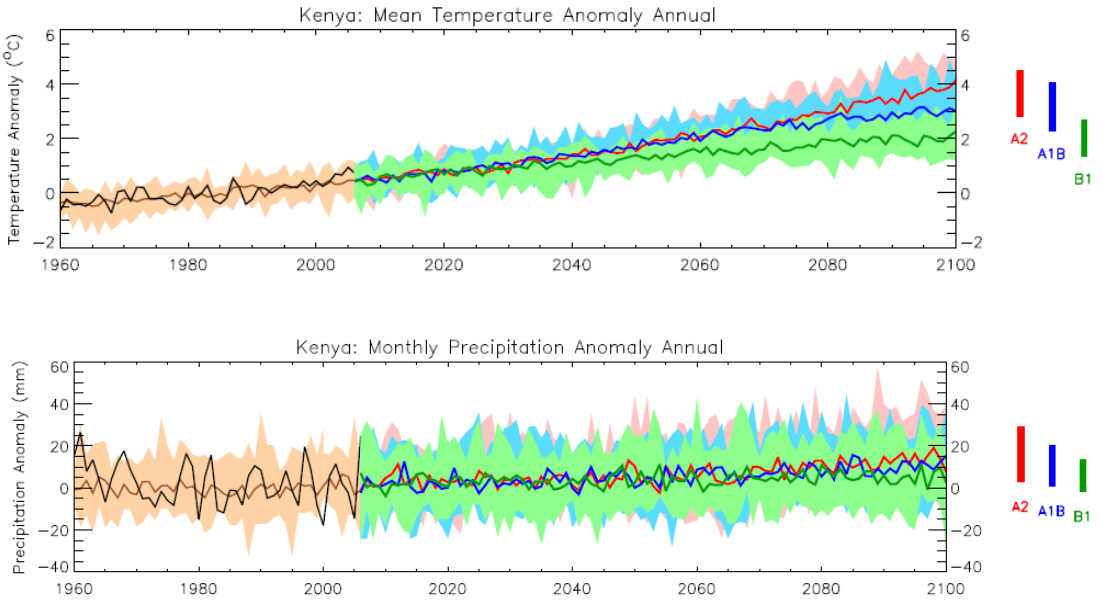
[19] Lake Naivasha Water Resource Management Programme (2001) Water Status Report pp15.
[20] Kitaka et al. 2002
[21] Ballot et al. 2009

whilst cold nights have declined by 42 days per year. Patterns of rainfall in Kenya are highly variable within and between years and are heavily influenced by El Nino events, becoming wetter in October to December in ENSO events and drier than average in La Nina. However the long term record shows no statistically significant trends, although the number of heavy rainfall events seems to be on the rise.

Figure 7 shows the range of climate model outputs for future temperature and rainfall in Kenya. In the future, climate models agree that Kenya will get warmer still, by up to 2.8 °C by the 2060s and by between 1.3 to 4.5 °C by the 2090s . Frequency of hot days will also increase and there is a risk that days and nights considered cold will not occur at all by the 2090s.

Mean annual rainfall is likely to increase by as much as 45% by 2090 with large changes in seasonality. For example rainfall in January and February could increase by 89%. Heavy rainfall events are likely to increase in frequency, however because climate models aren't good at interpreting how El Nino will change, there is a great deal of uncertainty about how future rainfall will behave.

Figure 7. Synthesis of General Circulation Model outputs for Kenya under most likely emission scenarios for mean monthly temperature and rainfall anomalies[22]



In summary, these changes in Kenya's climate are likely to exert significant challenges for water users and management in the Lake Naivasha basin. Higher temperatures will mean greater evaporative losses to the system, may disturb the lake ecosystem as the lake water warms and risks change in the distribution and prevalence of human, livestock and crop diseases. Changes in rainfall may make up for these evaporative losses but if rainfall is more intense, as predicted, then this will lead to more erosion and sediment run-off, crop damage and flooding.

[22] Sweeney, New and Lizcano, 2009. Kenya: UNDP climate change country profiles.

Naivasha's water problems are felt most acutely during and following extreme weather events such as droughts and floods. Although there is much uncertainty, climate change is likely to increase the frequency and intensity of these events. A key adaptation priority for all stakeholders in the basin is therefore to build resilience into their water use through planning and action for drought and flood prevention and management.

2.2 Social and economic context

The lake supports a range of communities, business and livelihood activities, with horticulture and floriculture activities in particular making an important contribution to the Kenyan national economy. Numerous community groups including pastoralists, fisherfolk, small-scale agriculturalists and tourism enterprises also draw their livelihoods from the natural resources of the basin. Growing socio economic activity in the LNB has brought a range of impacts. For example, water abstraction is reported to have caused deviation in lake levels by approximately one third from its normal height[23] increasing the proportion of shallow water. Other problems include excessive soil erosion and sedimentation, pollution and eutrophication, over fishing and poaching, invasive and alien species and loss of riparian vegetation including papyrus which originally fringed the entire lake[24]. Here the key features of the social and economic water use in the LNB are summarised and the main sectoral water users reviewed.

Population, economy and development priorities

Historically inhabited by Maasai communities, colonial era treaties and agreements saw widespread transference of land ownership to white, immigrant farmers and for around 80 years Naivasha was primarily an area of crop and cattle farming. Production of flowers began in the 1980s and over the last 30 years the Lake Naivasha Basin has become a major source of flower and horticultural exports to European markets. A combination of factors has contributed to this rapid growth including an ideal climate and altitude for flower and vegetable growing, reliable high quality fresh water, low rainfall, high soil fertility, easy access to international airfreight and a ready supply of labour. Indeed, with many thousands of migrant workers relocating to Naivasha from across Kenya to work in horticulture, the basin population has risen dramatically, from 237 902 in 1979 to an estimated 650 000 in the 2009[25]. During the 1990's, the boom years of horticultural industry growth, the population grew by 64% though this has since slowed to around 13%. According to the 2009 census only 160 000 people live around the lake, and the increased population pressure on infrastructure and natural resources is distributed across the basin with 28 urban centres with populations of between 5000 to 50 000.

25 000 people are employed directly in commercial horticulture with a further 25 000 employed indirectly with 10 - 20% of these engaged in vegetable growing and the remainder in flowers. The minimum wage in the horticultural sector is KSh 65 000 per year which equates to US$ 800, above the national average reported as US$680 (2008). Many of the farms pay more than this and provide additional support to staff through assistance with housing and transport and health, schools and recreation facilities. Based on the minimum wage and the number of people

[23] Becht and Harper 2002
[24] Everard & Harper 2002; Harper & Mavuti 2004
[25] WWF 2010 ibid.

employed it is estimated that commercial agriculture inputs KSh 3 billion (US$ 37 Million) into the local economy through salaries each year[26].

Small-scale agriculture in the wider Lake Basin has also proliferated so that the economy across the basin is primarily supported by agriculture, either via wages from the large farms or small-holder earnings, or through secondary support industries, shops and small businesses.

Although standards of living and incomes in Naivasha are likely to be above the national average in the Naivasha basin, figures on key development indicators were unavailable at basin level. However, Table 1 presents indicative figures for the whole of Kenya to contextualise the country's shared water related health challenges. They show that the population with access to improved drinking water supplies and sanitation remain unacceptably low, are static or in decline, with the exception of water supply in rural areas. Resultant water borne disease partially accounts for mean life expectancy at birth of only 51. Nationally, diarrhoeal disease is the largest child killer, accounting for 21% of deaths of children under 5. Inequity is a major and growing concern in Kenya, where 10% of the population controls 42% of the wealth. Per capita income for the poorest 90% of the country is KSh 35 300 (US$ 435).

Table 1. Indicators of water related health issues in Kenya and Naivasha

	Kenya	***Naivasha***	***Comments***
Life expectancy[a]	51	no data	79 in the UK
Population with access to improved water supply[a]	57%	no data	
Population with improved access to sanitation[a]	42%	no data	
Percentage of under-5 child deaths caused by diarrhoea[a]	21%	no data	Largest cause of child mortality nationally
Urban coverage of improved drinking water supplies[b]	83% of population 44% of households	no data	in decline due to rapid increase in urban pop.
Rural coverage of improved drinking water supplies[b]	52% of population 12% of households	no data	Coverage increased from 32% in 1990
Urban improved sanitation coverage[c]	27% 2% open defecation	no data	24% in 1990
Rural improved sanitation coverage[c]	32% 18% open defecation	no data	27% in 1990

[a] WHO 2008. Global Health Observatory, Kenya health profile
[b] WHO/UNICEF 2010. Joint Monitoring Programme, Estimates for use of improved drinking water supplies: Kenya. 2008 figures
[c] WHO/UNICEF 2010. Joint Monitoring Programme, Estimates for use of improved sanitation facilities: Kenya. 2008 figures

2.2.1 Key sectors and water users

Municipal and domestic water supply and sanitation

Naivasha Water and Sewerage Company are responsible for water and sanitation provision. Figures in Table 2 are drawn from the Water Service Regulatory Board annual report and show that there are only 2028 water connections in Naivasha serving only 13 % of the population.

[26] WWF 2010 ibid.

Water is provided for typically 14 hours per day and unaccounted for losses are 30%. The level of metering is very low compared to the national average and possibly related to this revenue collection and cost recovery are problematic. Figures on sanitation provision and water quality are not provided suggesting these are not measured or actively managed.

Table 2. Indicators of water service provision performance in Kenya and Naivasha

Performance of Naivasha Water and Sewerage Company against national average[d]			
	Kenya	***Naivasha***	***Comments***
Total water connections	n/a	2028	
Population served with water	37%	13%	
Population served by sanitation	49%	no data	
Unaccounted for water	47%	30%	
Drinking water quality	78% testing 88% compliance	no data no data	
Hours of supply/24hrs	14.3	14	< 16 hrs Deemed 'unacceptable'
Metering ratio	82%	7%	
Revenue collection efficiency	86%	84%	
O&M cost recovery at 85% collection efficiency	110%	69%	

[d] WASREB 2009. Impact: performance report of Kenya Water Services sub-sector no. 2. Water Services Regulatory Board. KPI data for 2006/7.

There is a transfer of water from the Naivasha basin to supply domestic water for Nakuru which accounts for 15% of the basins blue water, and there is pressure for this abstraction to be increased due to growing urban demand in Nakuru[27]. Domestic water in the basin accounts for a further 25% of the blue water footprint, though this figure seems quite high given the extent of agricultural water use. Naivasha Water and Sewerage Company draw water from selected surface and groundwater sources and operate a municipal waste water treatment plant which serves Naivasha and receives liquid waste from horticulture and flower producers. The poor condition and operational performance of this treatment facility was mentioned by several stakeholders and inadequate waste treatment has been implicated in the fish kill of 2010. Those not served by the company rely on private, community or shared water supplies including groundwater and gravity fed schemes, with untreated lake water and surface water commonly used as a source for washing and bathing. For those not served with sewerage, pit latrines are the norm though there is no information on how these are managed and emptied. Outside of urban areas in the basin domestic water is likely to be obtained from untreated surface or shallow groundwater sources with pit latrines used for on-site sanitation.

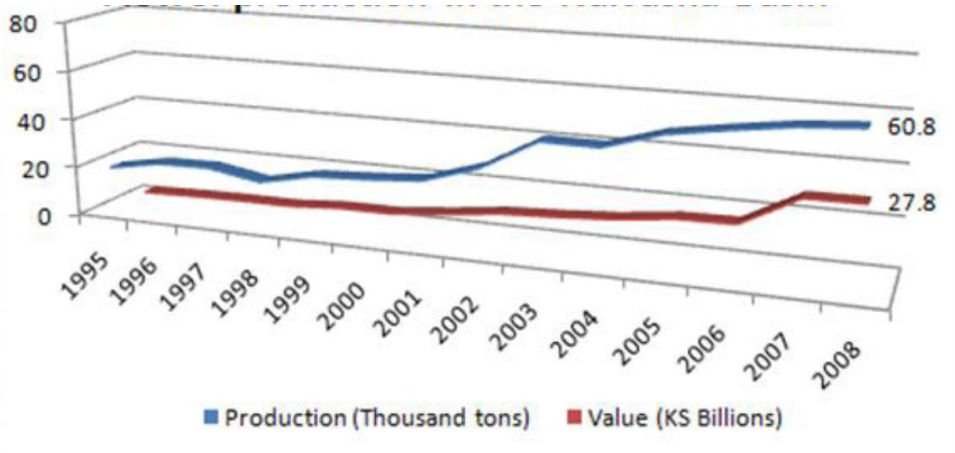
Export floriculture and horticulture

Kenya sends more than 450 000 tons of fruit, vegetables and cut flowers to the European Union and United Kingdom each year and the sector has recently surpassed tea and tourism as Kenya's biggest foreign exchange earner and was predicted to bring in more than USD 1.3 billion in 2009.

[27] Becht et al. 2006.

Cut flowers account for almost 70% of Kenya's horticultural exports and Lake Naivasha is the heart of the flower industry growing 70% of exports and home to at least 44 horticulture producers that hire up to 60 000 workers during peak season. Since the early 1980s the industry has grown tenfold and is now the largest exporter of flowers to the European Union, the world's largest flower market (see Figure 8).

Figure 8. Growth in cut flower production in Naivasha 1995-2008[28]



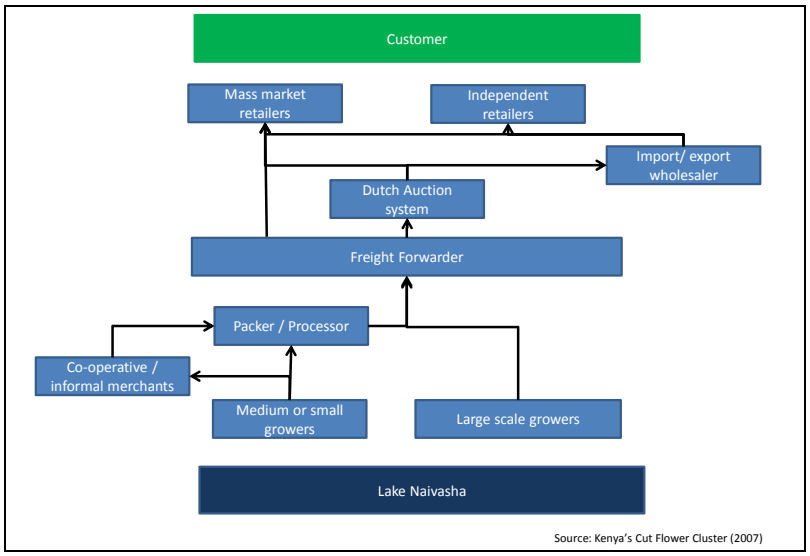
Flowers, with roses by far the largest crop, are grown on 19 000 hectares, mainly around the lake, of which 1200 hectares are under greenhouses. Current flower production in Naivasha is estimated at about 61 tons and national production has trebled in 15 years. Although once highly profitable, increased production and stable demand for flowers has reduced profit margins considerably. Still, flowers grown in Naivasha are estimated to generate about 9% or KSh 27.8 billion or US$400 million of Kenya's foreign exchange revenue. The financial benefits of the flower industry are felt throughout the value chain, presented in Figure 9.

The industry is highly capital and technology intensive with start up costs for greenhouses, shade cloths, drip irrigation, hydroponics, cold storage, packing and refrigerated transport estimated at $500 000 per hectare. With such high startup costs new entry into the industry is expensive and 40 farms control 75% of the exports. However smallholders also benefit from the flower trade with up to 5000 out growers contributing up to 10 % of the export volume, though there are fears that stricter Health and Safety and environmental purchasing standards may drive smaller producers out of business.

The flower industry is labour intensive as each stem has to be picked by hand. Once harvested the flowers are cooled, packed and sent to a central freight forwarding point in Nairobi where they are flown to the European markets. Three of the four specialized airfreight service companies serving the trade have links to or are owned by the major flower farms.

[28] WWF 2010 ibid.

Figure 9. Kenya's cut flower value chain



The Dutch flower auctions remain the dominant purchaser of Kenyan flowers, however some of the larger producers are able to negotiate higher margins by selling directly to the major supermarkets. Smaller producers combine into collectives in order to establish better bargaining power with the international buyers. In 2008 Holland accounted for 51% of Kenya's flower exports followed by the UK (25%) and Germany (9%). 2008 figures suggest that a rose stem sold in a UK supermarket for KSh300 (US$3.70) would have been sold for KSh21 (US$0.26) at Aalsmeer auctions in Holland and would have generated 8Ksh (US$0.10) in export earnings for Kenya[29] .

The value of annual vegetable exports from Kenya increased six fold between 1996 and 2008 to be worth KSh16 billion (US$ 230 million) with the majority going to the UK (55%), then Holland (19%) and France (15%). Naivasha accounts for 20% or 16 500 tons of these exports in a trade which is highly demand driven by the large supermarket retailers in the UK. Orders are often made and delivered over a 24 or 48 hour cycle depending on patterns of supermarket purchasing and consumer behaviour. With the six largest UK retailers accounting for 76% of national fruit and vegetable sales the large supermarkets dominate the market[30].

Vegetable production is labour intensive and there is further demand for prepacked vegetables (currently 29% of Kenyan exports by value). Packing accounts for around 50% of jobs in the vegetable production and Naivasha's production is thought to contribute about 5000 packing jobs in Nairobi.

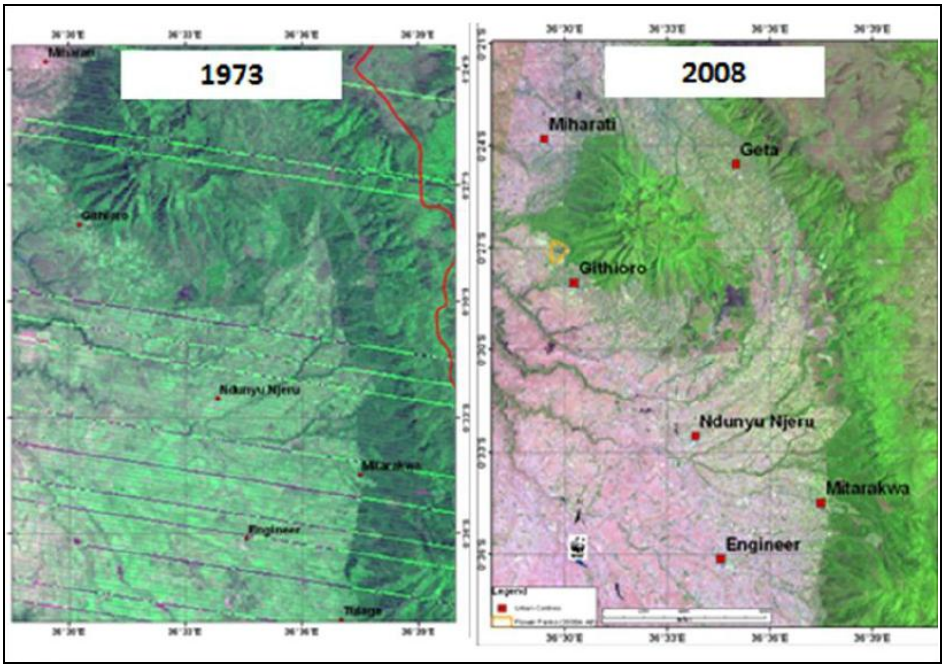
Smallholder agriculture

Smallholder farming for home consumption, domestic and foreign markets has expanded dramatically across the basin over the past thirty years and has contributed to clearance of bush

[29] WWF 2010 ibid.
[30] Humphrey et al. 2004. The impact of European market changes on employment in the Kenyan horticulture sector, Journal of International Development, vil 16 pp 64

and forest for agricultural land for planting of staples - primarily maize, fodder and vegetables. It is estimated that around 10 000 small farms occupy an area of 40 000 hectares within the basin. Land use change in the upper catchment, driven by the expansion of smallholder farming and deforestation for timber and charcoal is illustrated by the satellite images in Figure 10.

Figure 10. Land use change in the upper Naivasha basin (WWF 2010)



Smallholders contribute vegetables to the export market and whilst commercial farmers dominate the trade, outgrower schemes allow smallholders to access the higher value export market. According to the Kenya Horticulture Development Programme a smallholder was expected to earn an average of KSh 80 000 (US$ 990) growing for the export market[31]. It is estimated that 5000 smallholder farms operate in this way in the Naivasha Basin with a total of 10 000 hectares under cultivation.

Estimates of the contribution and value of vegetables grown by smallholders for the export market vary from 20% to 40%, with the larger figure implying a total income of KSh 480 million (US$ 7 million) for smallholder vegetable growers in the Naivasha basin.

Studies suggest that smallholder production for export markets is growing rapidly[32]. Although rates of return are higher for export, the majority of vegetable production by smallholders in the Naivasha basin is destined for the domestic market and contributes Ksh 2.75 billion (US$30 million) to local GDP and KSh 6.65 billion (US$ 80 million) to the national GDP.

[31] WWF 2010 ibid.
[32] WWF 2010 ibid.

Geothermal power generation

Geothermal power generation wells with capacity of 128 MW are based in Hell's Gate National park about 7 km south of the Lake. Beginning in 1982, three geothermal projects now account for 19% of Kenya's power supply. The installations require water supply of 1Mm3 per year which is obtained from the lake. The share of Kenya's energy mix provided by geothermal production is resilient to climate change relative to hydro-power and will increase in importance under a future increasingly variable climate.

Tourism and recreation

Easy access from Nairobi and onwards to National Parks means that Naivasha is a popular destination for national and international tourists as well as for second residences for wealthy Kenyans. There are three gated golfing communities around the lake shores and several private game sanctuaries.

There are approximately 4000 accommodation beds in the basin catering for a disparate range of visitors with an estimated 5% of Kenya's international tourists passing through the area. Naivasha also benefits as a destination for domestic and international conferences and meetings. Water supplies for tourism and recreation are drawn from the lake or private groundwater supplies and although data on sewage treatment is unavailable it is likely that this is via onsite septic tanks with discharge to the Lake or via a soak away. As well as employment opportunities, local communities benefit directly through trade with tourists and provision of tour guides and boat trips on the lake.

Fisheries

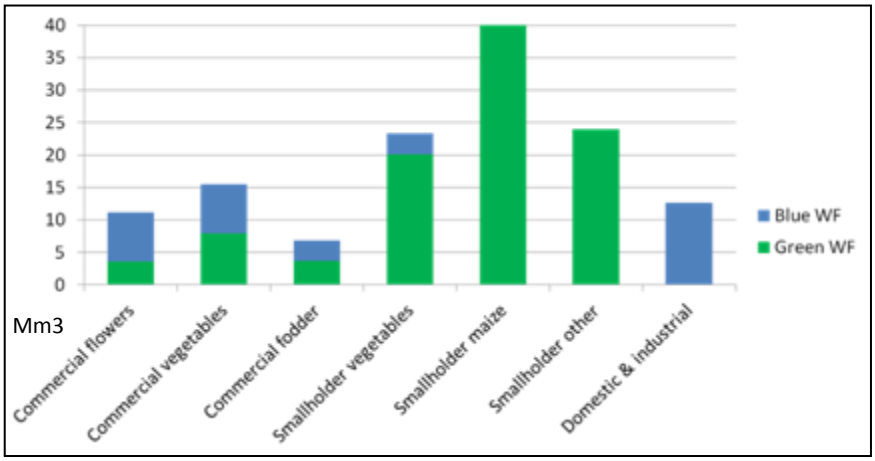
Commercial fisheries were established in the 1960s based on introduced black bass and tilapia[33]. The common carp was introduced in the 1990s. The performance of the fishery has fluctuated due to overfishing and water level fluctuations though the introduction of exotic species has also disrupted the lake ecosystem[34]. For example the introduction of Louisiana crayfish in the 1970s for the international market devastated the aquatic vegetation until predation brought some better balance in the 1980s. Also in the 1980s water hyacinth reached the lake forming characteristic dense littoral and floating mats and has since been the focus of control efforts using the hyacinth weevil.

Economic contribution and water footprint analysis

Analysis of the economic contribution and water footprint of water users in the Naivasha basin was carried out for the WWF 2010 study. In summary, the basin accounts for 70% of Kenya's cut flower and 20% of vegetable exports and generates at least 10.7% of Kenya's export earnings. Naivasha's contribution to the national economy is significant around 2.1% of national GDP with the agriculture sector contributing the majority of this and 75 000 jobs nationally.

[33] Muchiri et al., 1995
[34] Harper et al. 2008

Figure 11. Water footprint analysis of primary water use sectors in Naivasha Basin[35]



The relative water footprint of the key economic water users is illustrated in Figure 11 with blue water (that abstracted) differentiated from green water (water evapotranspired from soil moisture). The total green water footprint was calculated as 148Mm^3 and blue water footprint at 40Mm^3, this latter figure compares well to earlier estimates but is much lower than the estimate provided in the recent water use survey of 100Mm3/year. The analysis found that flowers generate the greatest income and jobs per volume of water than other activities, though interestingly vegetables grown for domestic markets in the upper catchment brought higher incomes per water used than those for export markets. Relative figures for job creation per water used were not available for vegetable production in the upper catchment though it is likely that significant livelihood benefits and resilience accrue from smallholder farming. Whilst the footprinting assessment is useful in highlighting the total economic value of water use in Naivasha, using such analysis to plan or guide water allocation in practice is fraught with difficulties because of the complexity of local water values and functions which it masks.

2.3 Institutional context

A thorough understanding of the institutional context, the formal rules and principles governing resource use, at the pilot sites is essential. Firstly, in order to test whether the standards meet the AWS specification of 'supporting and complimenting effective regulatory policy', there is a need to be cogniscent of the relevant policy, laws and statutory provisions related to water stewardship. Secondly an understanding of how these institutions are functioning nationally and at basin level and of the key challenges and opportunities they face will help to elaborate if, where and how a standard can contribute to better water stewardship and basin governance.

In this section the national and basin level institutional frameworks most relevant to water stewardship in Naivasha are considered. Bespoke regulatory requirements relating specifically to the pilot sites are considered in section 4.

[35] Pegram 2010.

2.3.1 National level institutions

The laws and policies relevant to water resource management in Kenya and Lake Naivasha are summarised in Table 3. A detailed review of key pieces of legislation is provided in Appendix B together with a table which traces the historical evolution of water related law in Kenya as Appendix C. The most salient features of the Water Act 2002 are summarised in more detail here.

Table 3. Legislation and policies related to water resources in Kenya relevant to water stewardship

Act/policy	Features
National Water Policy 1999 The Water Act 2002	Policy and subsequent act of parliament provides for the current institutional framework for the management, conservation and control of water resources through regulation of rights to abstract water and discharge waste water; provides for the regulation and management of water supply and sewerage services.
National Water Resource Management Strategy 2006	Articulates goals and objectives for water resource management in Kenya: including: 1) equitable access to water, water services and the benefits of water use; 2) sustainable use of water by striking a balance between availability and requirements and measures to protect water resources; 3) efficient and effective water use for optimum social and economic benefit.
Water Resource Management Rules 2007	Supplements the Water Act 2002 and outlines the relationships between Water Resource Management Authorities (WRMA) and Water Resource User Associations (WRUA)
Environment Management and Coordination Act (EMCA) 1999	Provides the overarching framework for environmental management in Kenya. Gives powers to the National Environment Management Authority (NEMA) to coordinate action and regulation via local authorities and line ministries. Creates environmental offences and sets levels of punishment as KSh 350 000 and / or 18 months in prison.
Environmental Impact Assessment and Audit Regulations 2003	Requires any project which has potential to harm the environment including agricultural development, use of pesticides, fertilizers and irrigation schemes, and large scale water use to undertake EIAs studies and obtain an environmental impact license and to monitor compliance against conditions set by the relevant authorities (e.g NEMA and WRMA) Requires compliance with water quality standards.
Water Quality Regulations, 2006 (Legal notice No. 121)	Provides for protection of lakes, rivers, streams, springs, wells, human health and the environment through a requirement to obtain an effleunt discharge licence. Creates the offence of causing pollution, discharging effluent without a permit and requires an EIA for activities with potential water quality impacts. Prohibits cultivation or development within 30 metres of a highest ever flood level of a water course or lake.Provides water quality standards for discharges to the environment and public sewer, and for water for use in irrigation and recreational waters. Sets monitoring requirments which include receiving water body as well as the discharge and quarterly returns for agricultural activities. Requirements for monitoring flows from intensive agriculture include pH, colour, faecal coliforms, phosphate, nitrogen, ammonia, flow and surfactantsSets a requirement for a buffer strip of 50 metres between an irrigation scheme and the natural water body abstracted from or discharged to. Obligates the WRMA to carry out an invetory of water quality by 2009.
Waste Management Regulations 2006	Regulates the handling, transportation and disposal of waste in order to protect human health and the environment. Requires licences for waste management, transportation and disposal, obligates producers to dispose of waste using adequate facilities. Requires auditing of waste disposal activities and disposal of waste in a manner approved by the authority. Establishes hazardous types of waste which include oil, toxic and ecotoxic materials and

	requires EIA for sites producing these. Requires pesticides to be disposed of at a designated site approved by the authority and completion of consignment notes for waste transport and handling.
Controlled Substances Regulations 2007	Defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements.
Wetlands, river banks and lakeshore management Regulations 2009	Provides for the conservation and protection of wetlands and shorelines through a requirement for EIA for any activity likely to adversely impact a wetland or shore area. Applies the precautionary principle. Provides powers to gazette particular areas, carry out strategic environmental assessment and an inventory of such areas by 2012. Standards and Enforcement committee to advise on wise use. Defines lake shore and river bank as land rising from the high water mark with no specific distances. Gives powers to the District Environment Committee, creates restoration orders and a legal duty for riparian managers to protect such environments.
The Agriculture Act (CAP 318)	Promotes agricultural development and conservation and manages agricultural land.
The Lakes and Rivers Act (CAP 409)	Provides for protection of biodiversity in lakes and rivers
National Land Policy Land Control Act CAP 406	Provides for control of land allocation – Government Land, Trust Land, and Private lands
Irrigation Act (CAP 347)	Irrigation and drainage development and management
The Fisheries Act 1959 (CAP 378)	Provides for management and conservation of fisheries. Creates the offence of causing damage to fisheries through pollution punishable by 2 years imprisonment. Declares fisheries as pollution prevention zones.
The Wildlife (Conservation and Management) Act 1976	Protects, conserves and manages wildlife resources.
Malaria Prevention Act 1929	Requires permission form local health authorities for any action which could promote expansion of mosquito breeding sites through alteration of water flow.

The Water Act of 2002

The Water Act of 2002 came into effect in 2003 and brought significant reforms to Kenya's water sector. Water resource management responsibility was separated from that of water supply provision, and policy making roles from responsibility for operational regulation. Management functions were decentralised and the involvement of non-state actors provided for.

The Act vested ownership of water resources in the state and established the Water Resource Management Authority (WRMA), with local or basin offices accorded powers to control water resource allocation, wastewater discharge and drainage via a system of permitted activities; carry out monitoring and enforcement; determination of applications; develop catchment management plans and to raise charges. Each Basin WRMA is advised on key decisions by a Catchment Area Advisory Committees (CAAC) made up of basin stakeholder representatives.

Key features of the law are the requirement that a permit be obtained for water abstraction, drainage or discharge, that information be submitted to WRMA and a fee paid for these permits. The Act sets priorities for water allocation with domestic needs the first priority. Permits are also required for temporary abstraction for construction; diversion of water from a water course; abstraction from surface or groundwater, either by a borehole or a shallow well; groundwater recharge augmentation; water storage in dams and pans; effluent discharge;

swamp drainage; obstruction of water; mixing of waters; hydropower; sand and gravel harvesting; and any other use determined from time to time by the Authority.

The Act specifies a requirement for public consultation and an Environmental Impact Assessment for abstraction applications 'if needed' under EMCA 1999 and establishes breach of permit conditions, abstraction without a permit, causing pollution and non payment as offences punishable by a fine and/or imprisonment. When determining a permit application, the WRMA must take into account factors including other valid uses and prior use; public interest; catchment management strategy; resource quality objectives; strategic priorities; reserve or environmental flow requirements; probable duration of the activity or undertaking for which authorisation is sought. Section 29(7) places a duty on the WRMA to determine an application for a water permit as soon as is practicable after application. If not processed within 6 months then the application fee must be returned. Other pertinent requirements of the Water Act 2002 include:

Water resource planning, decision making and finance:

- Establishment of a water resource classification system in order to determine resource quality objectives for each class and requirements for achieving the objectives. The Resource Quality Objectives (RQOs) represent the desired condition of the resource with respect to quantity and quality and the act sets up a framework for assessment and setting of time bound targets for improvements. See Appendix B for description of classification system.
- A reserve - or environmental flow - must be determined for each catchment to ensure that adequate allowance is made for this reserve in allocation decisions. The reserve is the quantity and quality of water resources required to a) satisfy basic human needs for all people who are or may be supplied from the water resource; and b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the water resource.
- Establish of Catchment Area Advisory Committees (CAACs) of not more than 15 members for each catchment. The role of the committee is to advice the WRMA's regional offices on water resource conservation, use and apportionment, grant adjustment, cancellation or variation of any permit; and any other matters pertinent to the proper management of water resources.
- Establish a Water Trust Fund to assist in financing the provision of water services to areas of Kenya which are without adequate water services.
- Establishment of a catchment management strategy (CMS) for the management, use, development conservation, protection and control of water resources.
- Catchment management strategy shall be subject to Public Consultation and will contain:
    - A description of the institutional framework for water resource management detailing institutional roles and responsibilities;
    - A strategy for the conservation of the catchment and riparian areas;
    - A water resource development strategy capturing the need for improved water resource reliability and availability to meet current and future demands and to address poverty alleviation targets;
    - A stakeholder participation strategy that will include mechanisms for encouraging and strengthening WRUAs.

  - A communication strategy that will capture the communication needs and mechanisms for the catchment;
  - A water resource monitoring strategy that will capture the resource monitoring network and flow prediction targets;
  - A compliance strategy that will detail the timeframe, approaches and requirements to bring water users into compliance with water management rules;
  - A water demand management strategy that will capture approaches and targets for improving water allocation and use efficiencies.
- Water allocation plans will be established as part of the development of a catchment management strategy, for the better allocation and apportionment of the water resources. A Water Allocation Plan shall include:
  - A description of the class of resources and their resource quality objectives
  - An analysis of current and future water demands
  - Allocation of the resource to the Reserve and to different types of uses
  - Measures to be taken to ensure that water use approvals remain true to the allocations;
  - Measures to be taken when resource availability is limited;
  - A compliance plan;
  - An enforcement plan;
  - Mechanisms for reviewing the allocation plan from time to time as the need arises;

Water abstraction and diversion:

- Under the act it is the responsibility of the permit holder to make a fair assessment of the quantity of water abstracted and or used and or effluent discharged through self-assessment. An additional 25% will be added to the water charges as a penalty over and above the water charges for any water abstracted or effluent discharged in excess of 25% above the amount allocated on the permit.
- A permit holder may apply for a maximum of a 10% discount on his water use charges if he is able to demonstrate that he has made adequate arrangements to harvest rainwater or runoff into localized storage structures provided that 10 m^3 of storage is provided for each 500m^2 of rainfall catchment area, that proper channels are constructed to direct water to the storage structures and the water so collected is put to beneficial use.
- A permit holder storing or arresting the flow of water by means of a dam or weir located on a body of water or watercourse shall in each particular case, provide an outlet, controlled by a valve, sluice gate or other device, which shall be capable of being operated at all stages of the flow of such body of water or watercourse.
- In most water abstraction permits there is a blanket requirement for the provision of storage facilities at each site to provide storage for 90 days of water needs.

Groundwater use:

- Groundwater use will not be approved until the Authority has received a completion report for the boreholes which details results of pumping tests. The permit holder will provide the authority with information on abstraction, water levels, water quality or any other specified information within a reasonable time or on a regular basis. The Authority shall maintain a groundwater database, which shall be a public document that

may be accessible at normal office hours by any person on the payment of the prescribed fees.

Wastewater discharge and pollution:

- Criteria guiding the WRMA in determining the water quality requirements for each application for an effluent discharge permit include: the capacity of the receiving water resource to dilute the effluent without violating the water resource quality objectives for that water resource; the toxicity and persistence of the pollutant(s).
- Any person discharging effluent is required to maintain records of effluent discharge in terms of quantity and quality in accordance with the approved effluent control plan. The effluent discharge records shall be submitted to the Authority on a quarterly basis.
- In an event of accidental spillage, the persons responsible shall inform the WRMA and shall immediate and adequate measures to prevent adverse effects on water resources. The WRMA on receiving the information shall inform the public appropriately and the cost incurred by the Authority shall be covered by the persons responsible for the spillage.

Riparian management:

- The Authority may demarcate the riparian boundary on any riparian land. A riparian land owner may request at his cost for the Authority to demarcate the riparian boundary on his land. In demarcating the riparian boundary, permanent recognizable beacons shall be placed at sufficient interval to adequately represent the line of the riparian boundary. Unless authorized by the Authority, no person shall undertake the following activities on riparian land:
    - till or cultivate;
    - clear trees or natural vegetation;
    - build structures;
    - dispose of any form of waste within the riparian land;
    - excavate soil or develop quarries;
- For the purposes of conserving the catchments and riparian areas, the Authority may by Order or stated as a condition on an Authorisation or Permit require a person to prepare and conform to a Soil and Water Conservation (SWC) Plan. Criteria for Requiring a SWC Plan. In requiring a SWC Plan, the Authority will be guided by the following criteria:
    - Existing condition of the riparian area and the risk of river bank erosion, sources of direct runoff into the water course and sediment sources within the riparian and catchment areas;
    - Slope of the land in excess of 15%;
    - Land use and land management practices and the risk of soil erosion and destruction from excessive direct runoff;
    - Presence or otherwise of soil and water conservation structures;
    - Potential water resource pollution arising from the land use;

2.3.2 Basin level institutional arrangements

Institutional arrangements for managing Lake Naivasha Basin (LNB) date back to 1929 when the Lake Naivasha Riparian Owners Association (LNROA) was formed to resolve conflicts between land owners over the use of land around the lake and its resources[36]. In the 1990s the LNROA

[36] Enniskillen 2002

commissioned a study to establish the status of the Lake[37] and members subsequently successfully lobbied for the designation of the lake as a Ramsar site in recognition of its status as an important wetland in 1995. Since then LNROA has evolved into the Lake Naivasha Riparian Association (LNRA) composed of 160 land owners and is open to non-riparian landowners including fishermen, pastoralists and businessmen. This change in LNRA reflects its status as a community-based organization aimed at providing a platform for inclusive decision making for sustainable management[38] As a custodian of Kenyan Ramsar sites, the Kenya Wildlife Service (KWS) became an important and influential stakeholder and partner of the LNRA. Through working with stakeholders including horticultural farmers, fisheries, and tourism businesses the LNRA developed an integrated management plan (IMP) for the lake, which was gazetted under the 1999 Environment Act and led to the formation of the Lake Naivasha Management Committee (LNMC) in 2004. The committee consists of representatives of a range of stakeholders from governmental, non-governmental and community-based organizations (Lake Naivasha Riparian Association; Kenya Wildlife Service; The Ministry of Environmental Conservation; Kenya Power Company (KenGen); Fisheries Department; Ministry of Lands & Settlement; Ministry of Water Resources – Water Development Department; District Commissioner – Nakuru District;; Naivasha Municipal Council; IUCN; Lake Naivasha Fisherman's Co-operative Society

Despite these efforts towards community-based management in Lake Naivasha, through the LNRA and LNMC, problems arose with regard to the participation of 'legitimate' stakeholders and community members and an alleged tendency for certain groups of stakeholders and the most powerful to dominate dialogues[39]. The gazettment of the IMP was opposed by local community members and natural resource users under the banner of the Lake Naivasha Basin Stakeholder Forum (LNBSF). Some individual members of the LNBSF lodged a court injunction against the gazettment process preventing the carrying out of any IMP related activities on the grounds that the process was not legitimate because the LNRA did not fairly represented all stakeholders. Consequently the IMP has been suspended since then.

At present the principal institutional arrangements for managing the LNB and its resources is defined by the Water Act (2002) and mirrors the structure and relationships shown in Figure 12. The roles and responsibilities of these organizations are spread across national, catchment and sub-catchment levels and are outlined in Table 4. In accordance with the National Water Resource Management Strategy there exist six catchment areas in Kenya (Figure 13) with WRMA responsible for their management. One of the key functions of the WRMA is to formulate a comprehensive Catchment Management Strategy (CMS), as an instrument for the management, use, development, conservation, protection and control of water resources within each river basin.

[37] Goldson 1993; Khroda, 1994
[38] Enniskillen 1999
[39] Billgren & Holmen, 2008

Figure 12. Institutional arrangements of the water resources management in Kenya (MWI 2006)

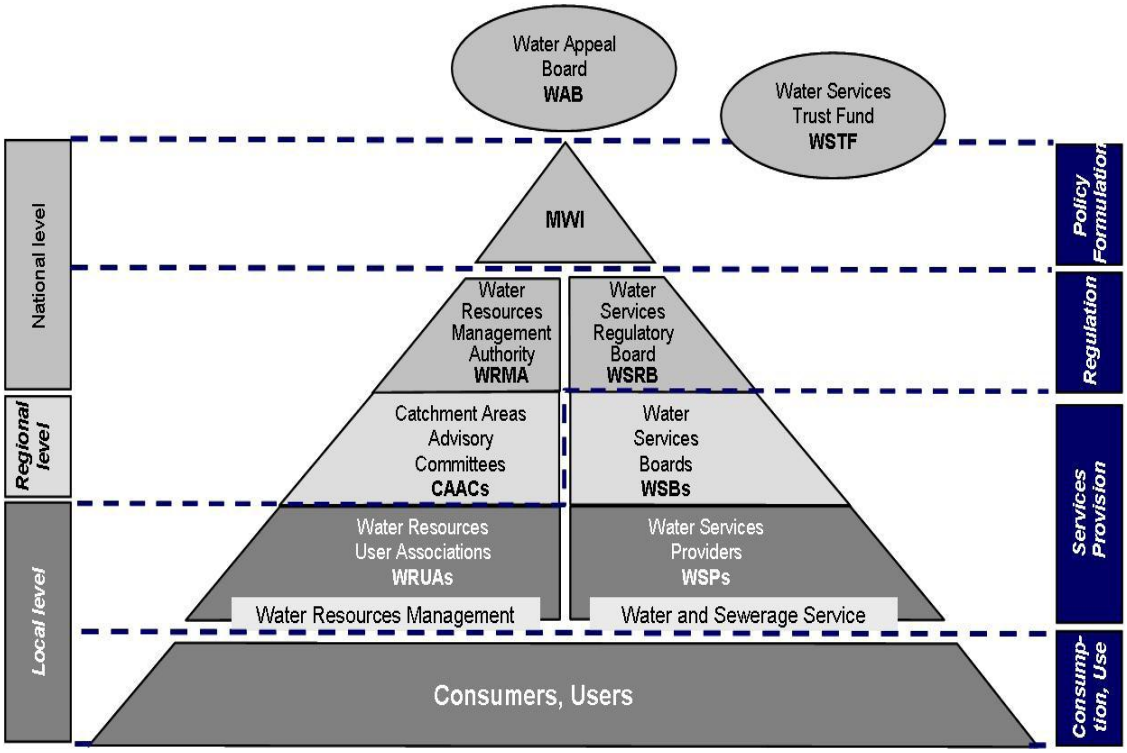
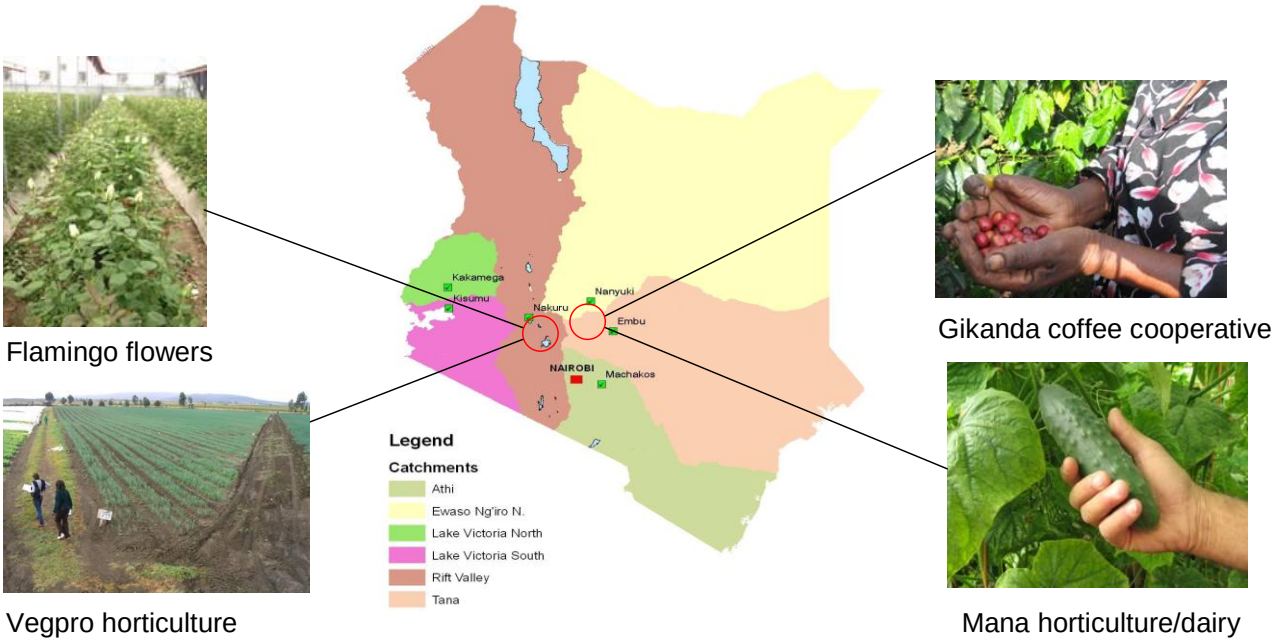


Table 4. Roles and responsibilities of institutions in the water sector in Kenya

Institution	Roles and responsibilities
Ministry of Water and Irrigation (MWI)	Development of legislation, policy formulation, sector coordination and guidance, and monitoring and evaluation
Water Resources Management Authority (WRMA)	Planning, management, protection and conservation of water resources. Allocation, apportionment, assessment and monitoring of water resources
Catchment Area Advisory Committees (CAACs)	Advising WRMA on water resources issues at the catchment level.
Water Resources Users Associations (WRUAs)	Collaboration in water allocation and catchment management Conflict resolution and cooperative management of water resources
Water Service Regulatory Board (WSRB)	Regulation and monitoring of Water Service Boards Developing guidelines for water tariffs
Water Service Boards (WSB)	Developing water facilities Applying regulations on water services and tariffs Contracting water service providers
Water Service Providers (WSPs)	Provision of water and sanitation Services
Water Services Trust Fund (WSTF)	Financing provision of water and sanitation to the disadvantage groups.
The Water Appeals Board (WAB)	Arbitration of water related disputes and conflicts
National Water Conservation & Pipeline Corporation (NWCPC)	Construction of dams and drilling of boreholes
Kenya Water Institute (KEWI)	Training and Research

Figure 13 The division of water resource management responsibility via 6 primary basins in Kenya showing locations of pilot study sites



Water Resource User Associations (WRUAs) and the work of LaNaWRUA

Lake Naivasha Basin falls within the Rift Valley catchment area and is further subdivided into 11 Water Resource User Associations based on the boundaries presented in Figure 14. Registered in 2007, the Lake Naivasha WRUA (LaNaWRUA) is the longest established and best resourced WRUA. The majority of the other WRUAs, are not yet fully active, although with support of LaNaWRUA an umbrella group called the Naivasha Basin WRUA has been formed to facilitate communication and to coordinate activities. The structure of Lake Naivasha WRUAs is illustrated in Figure 15. The LaNaWRUA has entered into a Memorandum of Understanding with WRMA to promote sustainable management of the LNB. In 2009, the group drove the production of the Naivasha Water Allocation Plan (WAP) as well as a Sub-Catchment Management Plan (S-CMP) which were informed by a hydrological study and abstraction survey. Other recent activities of the LaNaWRUA include:

- Working with WRMA and other stakeholders to gazette the Naivasha Basin as a protected area and groundwater conservation area
- Coordinating the activities of research institutions, Universities of Leicester, (supported by COOPERNIC), Bonn, Twente (ITC) and Western Ontario
- Payment for Environmental Services project with CARE and WWF
- Working with WWF on an Assessment of Shared Risk in Lake Naivasha
- Working with ITC on a groundwater study of the northern Naivasha aquifer
- Working with the International Sustainability Unit on the Lake Naivasha Catchment Restoration Programme

Six categories of water users have been formed under the auspices of LaNaWRUA and these are individuals, irrigators (ground and surface water abstractors), tourist operators, water service providers (WSP) and commercial users (e.g. fish farming, power generation) and pastoralists. It has an Executive Committee (EC) which consists of 12 people (two representatives from each user category) who are elected by members of each category. Like the LNRA, LaNaWRUA, has an observer group, consisting of people who belong to none of these user categories and who have no voting rights. This composition reflects LaNaWRUA's intention as a multi-stakeholder platform for community participation in managing LNB and its resources. Many previously excluded stakeholders such as small-scale farmers, pastoralists, local businesses, villagers and those situated on the upper catchment have been included. Some progress has been made in engaging pastoralists as key stakeholders through two community-based organizations in the LNB.

There is however an ongoing debate regarding the role of the WRUAs which needs to be resolved before the full benefits of their formation can be felt. In terms of legal recognition the only reference to WRUAs in the Water Act (Section 15(5)) states that "… the catchment management strategy shall encourage and facilitate the establishment and operation of water resources users associations as fora for conflict resolution and co-operative management of water resources in catchment areas". References to WRUAs in the Rules are more detailed, particularly regarding formation and also registration with WRMA, but despite this, the WRUA-WRMA relationship remains very ill-defined[40].

A particular area of concern for the WRUAs is the dearth of resources available for them to fulfil the challenging roles expected of them and as of yet an apparent unwillingness or inability for the MWI to support the WRUAs financially. It seems the challenge remains of how the WRUAs, which offer the potential of a legitimate additional resource for water management with excellent reach to local level water users, can be funded via predictable revenue streams whilst maintaining independence and accountability.

[40] Watson 2007, Water Resource User Associations, Establishment, operation, and potential for conflict prevention, Dispute Resolution Centre, Kenya

Figure 14. The Water Resource Users Associations' boundaries of lakes Naivasha (LaNaWRUA, 2009).

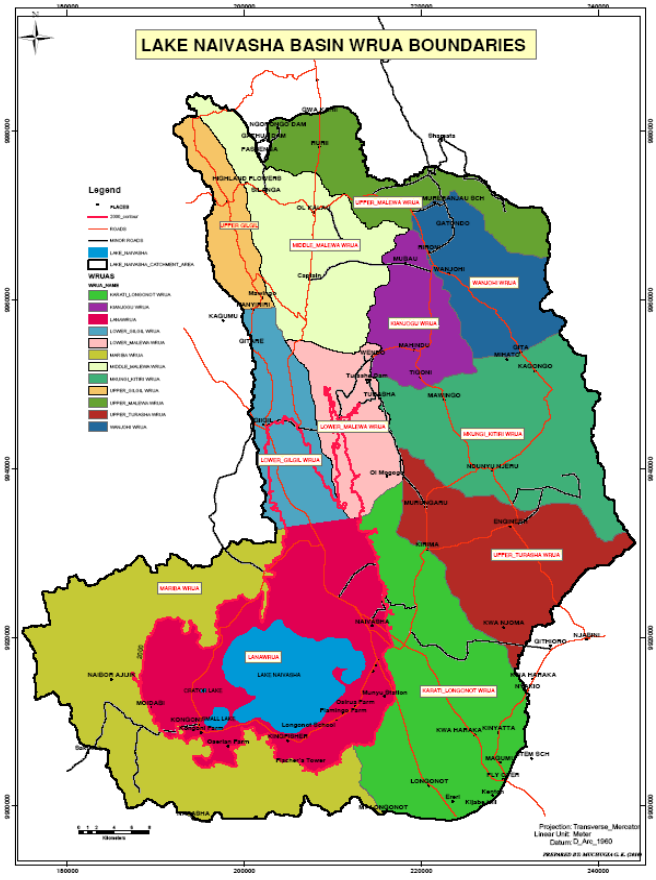
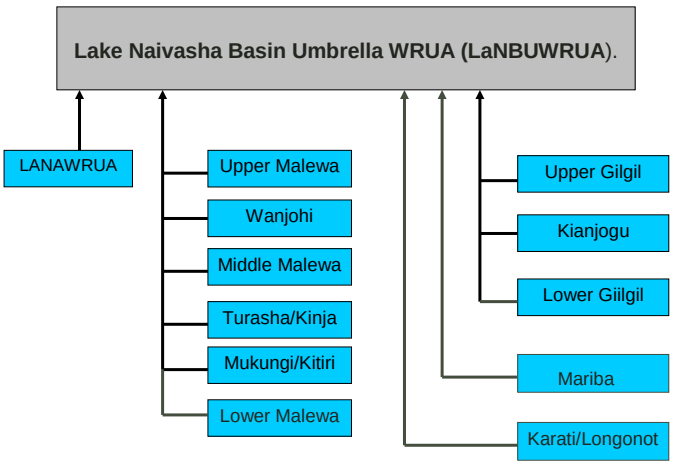


Figure 15. Lake Naivasha Basin WRUAs (Finlays 2010)

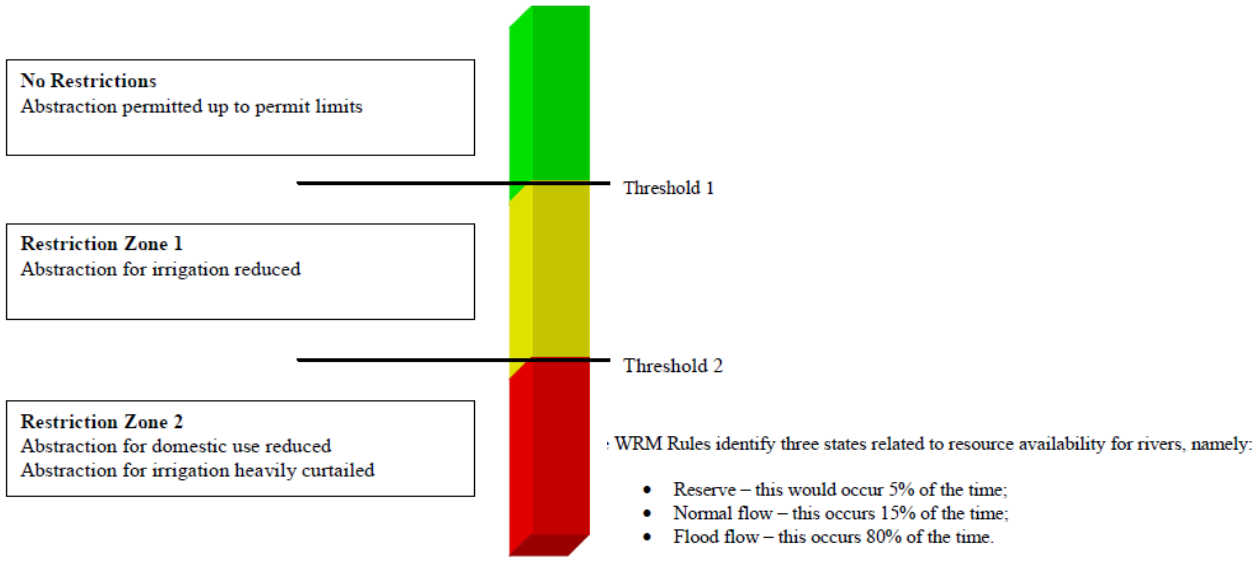


Water Allocation Plan – Naivasha Basin

The Water Allocation Plan (WAP) for Naivasha Basin represents a significant step towards sustainable and equitable utilisation of the basin's water resources. With support from the Lake Naivasha Growers Group in 2005 the planning process has drawn on research and studies and participation of basin stakeholders. The WAP provides a set of rules which aim to establish rational water use and allocation through bringing abstraction into legal compliance and reducing the total allocation by 10% by 2015. The plan sets out how new applications for water will be handled, specifying that no new boreholes will be permitted for irrigation in certain areas, that only flood flow from rivers will be available for large scale irrigation and that no additional lake abstractions will be permitted for irrigation expansion.

It also establishes the scaled reduction of abstractions by sector in the event of reduced flows and drought, prioritising domestic and livelihood uses over commercial and irrigation use in a traffic light system. For example, when the lake, groundwater and river levels reach certain thresholds, commercial water abstractions must be sequentially scaled back. The basis for these thresholds is the frequency of return flows rather than quantification of actual downstream flow needs. For example the reserve or 'hands off' flow or level, below which commercial abstractions are heavily curtailed (reduced by 50% of the permitted amount) is estimated at that which is exceeded 95% of the time based on the natural flow record (1940-80). Flood flows, when abstractions are allowed up to permitted limits, are estimated as those exceeded 80% of the time. Figure 16 illustrates this principle and the rules are appended as Appendix E.

Figure 16. Abstraction restriction zones set within the WAP (WRMA 2009)



The WAP also sets out a enforcement and compliance strategy for non compliance with these rules and illegal water use, setting out that offenders will receive a formal warning before prosecution action is taken. It also places a 90 day storage requirement on permit holders with the aim of embedding resilience and preventing disruption of water use during periods of low flow although this is contested by some as unpractical. This concern is probably justified where 90 day storage could mean construction of very considerable storage lagoons.

Notwithstanding this, the WAP sets a rational framework for water management in Naivasha and although it is yet to be made legally binding through gazettment, its development and potential to drive sustainable use is impressive. Whilst the process for establishing the reserve is not as sophisticated as some contemporary methods for quantifying environmental flow needs, the system is simple, transparent and similar approaches have served water management well historically in other parts of the world. Further the WAP is intended to be a first attempt at establishing abstraction rules and sets a 5 year timescale for review and amendment by stakeholders, and therefore judiciously builds in an adaptive interpretive approach.

Once gazetted it will be vital that the WAP has the legitimacy and credibility which will only come from sufficient resources for monitoring and enforcement, and transparent, accountable implementation

Payment for Ecosystem Services Project

CARE and WWF have led the establishment of the 'Payment for Ecosystem Services in Melewa catchment' project which aims to generate payments from downstream beneficiaries or 'buyers' to reward and incentivise water resource conservation and protection practices by poor farming communities in the upper catchment. This project targets control of erosion and the reduction of sediment load linked to eutrophication in the Lake. It supports farmers to adopt sustainable and improved land-use practices, notably grass buffer strips and agroforestry, riparian land protection, good agricultural practices training and farming inputs. As in Tanzania where a similar programme exists the hypothesis is that improved land use will improve water quality and improve livelihoods within communities in the target catchment area.

The projects was evaluated at its Mid-term in 2010[41] and visited by the AWS team and this provides the following insights. The project has promoted the benefits of conservation agriculture rather than payments themselves and has made a major contribution to mobilizing WRUAs in the upper catchment. However the impact of the scheme has been limited by low demand and investment from the buyer side – the downstream users. This may be linked to a lack of monitoring or evidence base which would demonstrate any benefits in terms of reduced erosion and eutrophication. Although the feasibility study has not been reviewed here the project may also suffer from a problem of scale and attribution whereby the scale of area requiring interventions to have any noticeable affect on downstream quality is very large and the contribution of sediment relative to other sources such as road building may mask benefits of investment. That said the PES project represents a potential way of sharing benefits and water management responsibility across the basin and for linking upstream and downstream management actions. With improved monitoring it may be possible to establish a viable

[41] Harrison et al 2010.

freestanding scheme in the future though the testimony of a beneficiary farmer suggested that rather than vouchers for fertilizer, what his community really needed to manage their environmental impacts were decent education services.

2.4 Summary of key water risks and water stewardship priorities

This section combines the available literature with testimony of the Project Reference Group to review the key water risks and stewardship priorities in the LNB. They have been grouped into issues of water quantity, water quality, biodiversity, governance and other issues. Although by no means an unequivocal assessment, the priority issues according to the Naivasha Project Reference Group are illustrated in Figure 17 and provide a useful overview of stewardship challenges according to local stakeholders and experts.

2.4.1. Water quantity

As reflected in the concerns of the PRG the primary risk in terms of water quantity and flow is the potential for unsustainable levels of abstraction in the basin, from groundwater and from the lake itself and the potential for this to lead to excessive decline in lake levels which has widespread negative biophysical, reputational, economic and social impacts.

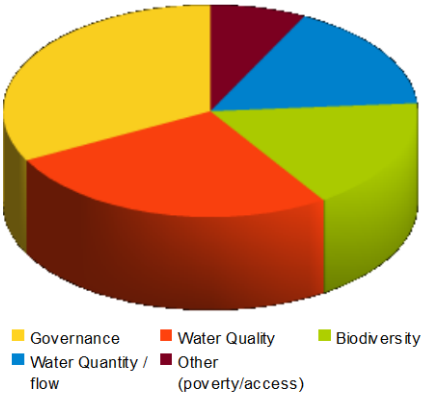
The relative contribution of abstractions by different sectors to the basin water balance has recently been elaborated by a water abstraction survey and the WWF water footprinting work. Earlier Brecht[42] calculated that the impact of additional abstractions from the basin since 1982 had caused lake levels to decline by 2.5 metres. Other studies suggest that the level of abstraction only becomes unsustainable in dry conditions, and that the acceptable level of lake level fluctuation and the corresponding controls on water abstractions must be agreed and deliberated among the stakeholder. The WAP is potentially a significant step towards this though it is not yet gazetted and doubts remain as to the likely levels of compliance.

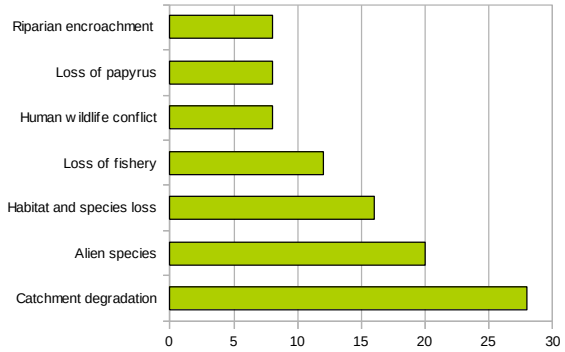
At the root cause of concerns about over-abstraction is the poor record of regulatory performance in controlling abstractions in the basin. The 2010 abstraction survey conducted by WRMA and LaNaWRUA with support from WWF shows that a significant amount of water by both volume and by number of abstractions are not regulated or covered by a valid permit. Figure 18 shows that over 80% abstractions from the Lake and more than 95% of abstractions in the upper catchment are illegal. According to the survey the total abstraction above the permitted, allocated amount is 15,189 m^3/day. Similarly, for groundwater, 44 boreholes were abstracting 43,034 m^3/day although only 10,120 m^3/day had been legally allocated. Overall, over 50% of water abstraction in Lake Naivasha Basin is illegal and/or unauthorized[43].

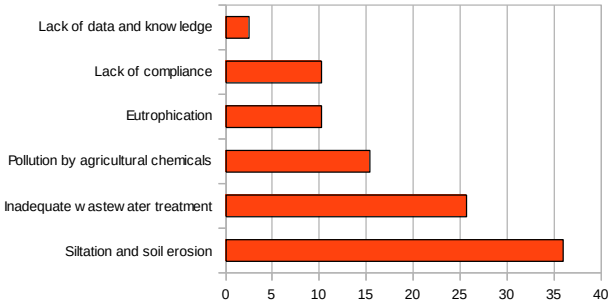
Such a significant level of unauthorized water use makes it extremely difficult to proactively manage and plan the use of water resources and denies the WRMA significant revenue. The risks it brings will be felt through lake level fluctuation and disturbances to river flow and groundwater levels which have implications for ecosystem deterioration, wetlands and water quality.

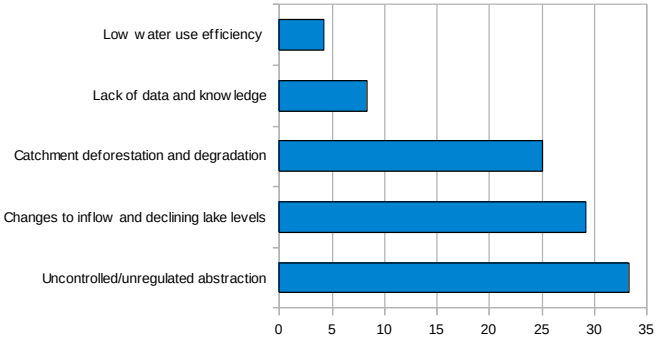
[42] Becht 2006
[43] WRMA 2010

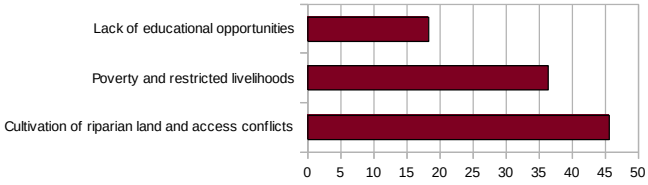
Figure 17. Priority water related challenges in LNB according to the Project Reference Group by percentage of responses per issue





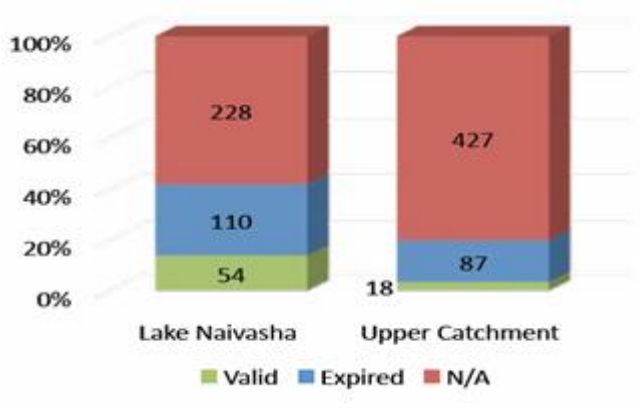






Although uncoordinated abstraction could lead to conflict between users along the rivers feeding the lake and between groundwater users the greatest risks are for those around the lake: commercial horticulture industry, the tourism industry; small-holders / outgrowers; ranchers and commercial farmers; conservation areas / ecosystem; communities and towns and geothermal plants. Impacts and risks are particularly severe during dry periods and are likely to be exacerbated by climate change.

Figure 18. Proportion of water abstractions with valid, expired permits or which have never applied in the Lake Naivasha and upper catchment[44]



Related stewardship priorities:

- Demand management and efficiencies in water use;
- Effective abstraction management strategy (WAP) agreed and implemented which includes:
    - Quantification and protection of the reserve which accounts for ecological and human livelihood needs;
    - robust drought prevention and management;
    - rationale planning control across the basin which links development to water availability in advancement of a consensual public good;
- Adequate regulation and control of water abstraction;
- Enhanced understanding of the contribution of deforestation and treeplanting on the flow regime
- Improved understanding and regulation of groundwater.

2.4.2. Water quality

As already introduced the primary water quality risks are pollution from agrochemicals, fertilizer and pesticides, sedimentation and inadequately treated human waste. These have contributed to fish mortalities and ecosystem degradation in the past and risk widespread eutrophication in the lake.

[44] Finlays 2010 ibid.

Sources and pathways of this pollution should be better understood, for example, while the consensus seems to be that small-holder farmers in the upper catchment contribute to soil erosion through 'poor farming methods' there is anecdotal evidence that other sources such as road construction cause high and acute inputs of sediment load.

Related stewardship priorities:

- Erosion control and sediment management plans including a monitoring regime to construct a sediment budget for the basin and better understand the process leading to soil loss and effective intervention;
- Improved treatment and regulation of waste water discharges and effluent treatment including municipal sewage treatment;
- Pollution prevention and control measures implemented and incentivised including control of diffuse pollution from small and large farm holdings (for example support for PES);
- Support for small farmers in best practice techniques for land and water stewardship and advocacy or delivery for effective farm/rural extension work.

2.4.3. Biodiversity

Although interlinked with water quality deterioration and flow degradation through issues such as eutrophication and lowering of lake levels, there are several distinct and complex water related biodiversity challenges facing the LNB. They include:

- Catchment degradation and deforestation and its role in modifying the basin hydrology, greater sediment run-off and droughts and floods;
- Alien and invasive species, in particular the proliferation of water hyacinth and introduced fish and crayfish;
- Encroachment and disturbance within the riparian zone, including practices of burning papyrus and construction of fences and trenches which can lead to loss of habitat, disturbance to ecosystem functioning and migratory or feeding movement and human wildlife conflict.

Related stewardship priorities:

In addition to measures to control indirect impacts on biodiversity through mitigation of quality and quantity issues:

- Understanding of drivers for catchment degradation and adaptive management responses;
- Effective alien species control plan;
- Integrated riparian planning and management with enforcement and compliance assistance measures in place, including control of activities within a commonly defined riparian zone.

2.4.4. Governance

By far the greatest challenge facing the basin is effective governance. Problems cited include lack of regulatory implementation and enforcement; low accountability and confused mandates; political interference and capture of regulatory process; low levels of awareness and a lack of infrastructure, investment, resources and capacity. It is very clear that on paper the regulatory provisions in place to protect water resources in Kenya are formidable. For example, the adequate functioning of the municipal sewage works, the robust control of water abstraction control of activities in the riparian zone, and the protection of water quality are provided for in numerous pieces of legislation. Notwithstanding the best efforts of local stakeholders, the key to unlocking sustainable resource use across Naivasha is functioning government institutions with capability to implement these progressive laws. In relation to many of the problems facing Naivasha only government has the legal mandate and authority to take action. The issues constraining the performance of NEMA, WRMA, Water Services Board and the District Authority are complex and potentially challenging to overcome, but there are constructive stewardship responses available to facilitate that process.

Related stewardship priorities:

Many stakeholders are already engaged directly in governance through the numerous groups and associations existing in Naivasha. To be effective these bodies must have legitimacy which is derived from being genuinely multi-stakeholder, being considered 'fair' and being able to deliver benefits. These groups should continue to work towards improved basin governance, exploring opportunities at both a practical and policy level. For example, they could consider developing a sophisticated understanding of the 'drivers of change' in the basin and using this to inform an advocacy strategy which targets the specific barriers to regulatory functioning. In the absence of this detailed understanding, some obvious examples of governance challenges worthy of advocacy include:

- The persistence of overlapping mandates and contradictory statues which undermine accountability and efficacy. For example conflict between NEMA and WRMA is still unresolved relating to who is responsible for permitting of waste water discharges. Separate legislation assigns the powers and associated revenue streams to both which makes the enforcement of either regime judicially unviable. Similarly several different pieces of legislation specify conflicting statutory set back distances between water bodies and cultivation or development. For example the Wetland, lake shore and river bank regulations 2009 do not contain a ready legal definition for where the statutes they contain relate to, whilst the water quality regulations specify that no development will take place within 30 metres of the highest flood level ever recorded, whilst the Land Act specifies a different figure. Such issues of regulatory dysfunction and confusion need to be resolved as a priority.
- It is apparent that a lack of financial resources restricts action by NEMA, WRMA and the Water Service Provider and the WRUAs. For example, Water Resource Management Authority officers responsible for the LNB even lack a dedicated vehicle. Targeted research and advocacy which uses budget tracking and performance indicators assessed through participatory accountability monitoring have been shown to be effective in

improving commitment, allocation and flow of funds for key government services in East Africa. Such an approach could be valuable in Naivasha.

- The PRG also recommended that new ways of driving compliance be explored, for example through ensuring compliance as a precondition for membership of groups like the LNGG; support for the regulators such as peer to peer learning schemes and independent verification of compliance through market standards.

2.4.5. Other issues facing the basin

Issues which are not easily categorized in the above schema include conflict relating to riparian access for livelihood activities; poverty and restricted livelihood opportunities and educational opportunities for the basin population.

Access disputes centre on ability of the Maasai to graze and water cattle along the edge of the lake, particularly during dry periods. The proliferation of lakeside farms, tourist development, nature reserves and residential properties means that access for pastoralist communities is severely restricted to only a few public points around the lake which must be shared with other public activities. Some pastoralists trespass with their cattle to access the rich grazing land and water whilst landowners argue that this grazing and trespassing exacerbates lake shore degradation. The issues are complex, contested, continue to fuel conflict and do not appear to have been adequately addressed in basin planning.

Despite the economic benefits brought by horticultural and floricultural exports, poverty, restricted livelihood opportunities and restricted access to quality education, improved water supply and sanitation services and healthcare are significant problems throughout much of the basin. Sustainable natural resource use is intimately entwined with social wellbeing and equitable development and there are a number of direct links between water stewardship and wider social development including: equitable and sufficient resource access; climate resilience; adequacy of water supply and sanitation; environmental health issues such as malaria and bilharzia.

Related stewardship priorities:

- Development and implementation of an integrated riparian management plan which includes provision for pastoralist and other legitimate community needs.
- Exploring and pursuing opportunities for proactive contribution to improved healthcare, education and livelihoods for poor communities in the basin, particularly where these are linked to water use, management and stewardship.

3. Understanding the draft water stewardship standards

In this section the draft water stewardship standards being tested are reviewed to provide a detailed understanding of their main features, their development and results of earlier testing.

3.1 European Water Stewardship draft standard (EWP v2.0)

The European Water Partnership (EWP) was established in 2006 as a not-for-profit partnership between governments, business and NGOs to promote the 'European water vision'[45]. The organization is membership based and funded by subscriptions from its members with a secretariat of seven staff based at a Brussels headquarters.

The organization focuses on awareness raising and communications; innovation; climate change adaptation and dialogue processes. The EWP Water Stewardship Programme was established in 2008 with stakeholders in business, agriculture, civil society and public authorities and responds to their demand for active guidance towards sustainable water management with the following goal and aims:

> ***Goal****:* to provide a tool to change behavior and practices towards Sustainable Water Management (SWM) for all water users which will support existing legal processes and provide positive incentives.
>
> ***Aim:*** Over 3 years to develop a voluntary scheme containing:
> - A transparent, open, dynamic and representative definition of SWM
> - An objective scheme to assess the implementation of SWM by sector
> - Communications support for the implementation and achievements on SWM

Through outreach, formation of sector working groups and piloting work in Europe the EWP have generated a Draft Standard (v2.0) and a range of supporting tools and documentation including a pilot testing policy, guidelines, checklists, evaluation scheme and glossary of terms. It aims to be pragmatic and implementable by a broad range of water users whilst responding to the complexity of impacts linked to water use. Partners in the EWP effort include BASF, Women for Water Partnership, the Ferry Group, CocaCola, the Confederation of European Paper Industries, Diputació de Castelló and SAP. In 2009 the EWP became a coordinating board member of the international Alliance for Water Stewardship.

The draft standard EWP v2.0 is a working document which is undergoing stakeholder and expert review which will be further evaluated in pilot studies to determine its applicability in real conditions.

[45] European water vision: "We have achieved sustainable water resource management and universal access to modern and safe water supply and sanitation because we value water in all its dimensions – in its economic, social, environmental and cultural importance."

Key features of EWP v2.0

EWPv2.0 defines principles and criteria (Part I) of Sustainable Water Management and provides a table of indicators used to evaluate and certify the degree of compliance against these criteria (Part II)[46]. Principles include:

Principle 1: Environmental flow regime and water abstraction

- Achieve and maintain sustainable water abstraction in terms of water quantity.

Principle 2: Water quality

- Ensure the achievement and maintenance of good status in terms of chemical quality and biological elements.

Principle 3: Protection of high conservation value wetland, lake or riparian areas

- Restore and preserve water-cycle related high conservation value ecosystems.

Principle 4: Equitable governance

- Achieve equitable and transparent water governance

Each principle is explained (see Appendix E), and is then sub-divided into between one and nine additional criteria which specify what a water manager would be expected to do to demonstrate that a participating organization is implementing the principle. Each criterion is further divided into a number of verifiable indicators by which performance against the criteria could be evaluated.

Indicators have been developed on a 'modular' basis: requirements may only be applicable to a particular sector, or may only be applicable in certain situations. The expectation is that compliance with some indicators will be recommended rather than required following the model of the Global GAP standards. Indicators are therefore rated as 'MAJOR', obligatory for good stewardship; 'MINOR' a requirement that has to be achieved in 2 years time and; 'RECOMMENDATIONS' are optional requirements for good water stewards.

The standard also aims to take particular account of the needs of the small and medium-scale businesses (SMEs) which make up the majority of water users in the European context.

It takes account of and relies on the existing legal framework provided by the European Framework Directive. For example, where a user has been issued with a water permit under the requirements of the Framework Directive it is accepted that such use is sustainable in the context of the river basin (at least on an annual basis), and that further assessment of this aspect would add cost to the system without adding value.

A table which sets out the detail of the principles, criteria and indicators within EWP v2.0 along with examples of the checklist contents for agriculture is provided as Appendix F, and an extract is provided in Table 5 for illustrative purposes.

[46] Definitions are drawn from the ISEAL code, draft 5.3. ***Principle:*** fundamental statement about a desired outcome; ***Criteria:*** conditions that need to be met in order to achieve a Principle: they add meaning and operationality to a principle without themselves being direct measures of performance; ***Indicators:*** measurable states which allow the assessment of whether or not associated criteria are being met. Note: Indicators convey a single, meaningful message or piece of information; ***Means of verification:*** the type of information or observations that are used to demonstrate that the required indicator state is being realized.

Table 5. Illustrative example of principles, criteria, indicators and checklist contents for EWP v2.0

Principle 1: Achieve and maintain sustainable water abstraction in terms of water quantity from all sources and maintain and restore environmental flow regime in all catchments where it has significant influence. Abstraction of water from all sources will be evaluated.		
Criteria	***Indicators***	***Example checklist content***
1.1 The total and the net water abstraction shall be quantified and monitored by source. **This includes** **- The abstraction from self-supply sources** **- The use of alternative water resources** **- The water supply by a public water system.**	**1.1.1. Classification of sources** Number and description of all sources used and outlining those that are: a) Sensitive in terms of water stress b) Significantly affected by water abstraction	MAJOR. Report source type (groundwater, surface water, rainwater, municipal etc) Refer to Source list annex. Are all sources documented, updated and accurate? MINOR. Classification of sensitivity based on: 'Water stress' Professional recognition due to relative size; Average >5% annual average volume abstracted (GRI?) National or international designation (WSA also mentioned) *List of sensitivity by source should be available*
	1.1.2. Accounting water abstraction - Total water volume abstracted by source - Water consumption by source	MAJOR. Quantify, monitor and report volume abstracted from each source. Tabulate abstractions per source, annually, seasonally and monthly Calculate water consumption per source: abstraction minus discharge *A regularly updated water accounting procedure should be available*
	1.1.3. Resource permits for abstraction Number and date of issuance / renewal of resource permits linked to water abstraction - Water withdrawn from non-permitted sources to total water withdrawn	MAJOR. List legal requirements relating to water use ensuring permits are in place and valid for abstraction and discharge. *Are permits available for each source and is data in line with abstraction volume on site?*

Evaluation of compliance against indicators is supported by sector specific checklists (currently available for agriculture, industry and golf courses), annexes and guidelines, an evaluation table and end report template. The intention is for a process of prior internal audit by the water user followed by external audit and reporting by a certifying body using EWP guidance regarding scoring.

Results of piloting work to date

Three pilot studies have been conducted to date including:

BASF SE, Ludwigshafen/Rhine, Germany
Chemical production site (250 production units)
Highly self-maintained water management facilities
Supply mainly from Rhine with majority of the water used for cooling processes
Rhine is not considered a water scarce basin

Coca-Cola Erfrischungsgetränke AG (CCE AG), Genshagen, Germany
Bottling factory (processing and bottling of soft drinks)
High level water management monitoring
Majority of the water consumed is included in the end product
Elbe is not considered as water scarce basin

HOLMEN Paper Madrid S.L., Madrid, Spain
Paper Mill (100% newsprint recovered paper)
Served by public supply and waste water utilities
Major losses of water used in the cooling process
Tagus is considered a water scarce basin

Findings of this work included:

- the draft standard and checklists are comprehensible and in general complete but a data-base tool including the checklist, annexes and information is required.
- The standard is compatible with existing environmental monitoring systems but the terms used could be better aligned with the terms used in for example ISO 14001.
- Additional Good Management Practices (GMPs) should be provided within the checklists as core guidance.
- Additional social aspects should be added to the indicators in terms of future conflicts around water use with other stakeholders (NB Elaboration required).
- There are tensions between the requirements for transparency versus confidentiality.
- A challenge is to link the operational water management strategy to all other management strategies relating to natural and chemical resources (e.g. energy, the use of chemicals etc.)
- There are challenges for reporting on potential pollutants.

In summary the pilot studies suggest that the standard will directly improve the water management performance of the pilot organization. Even under the highly regulated conditions found in Europe and in well managed organizations, the water stewardship scheme adds value through its comprehensive and far-reaching view on the sustainability of water management inside the operation and at the level of the water shed. Pilot organizations received an analysis of their water management performance and improvement points were suggested to enhance their water stewardship strategies. Note: SVL to provide examples.

3.2. Water Stewardship Australia standard (WSA-00)

The idea for an independent water stewardship standard emerged in Australia following discussions between primary producers, industrial water users, retailers, financial service providers and experts involved with forest stewardship in 2006. This led to the establishment of the Water Stewardship Initiative (renamed Water Stewardship Australia in 2010) and the group became founder members of the Alliance for Water Stewardship. Initial concepts emerging from a first stakeholder forum in 2007 were refined through a second workshop in 2008 which advanced thinking on the structure, scope and the use of a principles, criteria and indicators framework. A 2009 collaboration with the Cotton Cooperative Research centre (CRC) moved the work from a theoretical to applied level and delivered:

- A zero draft Water Stewardship Standard (WSA-00) with specific focus on agricultural users in general and cotton growers in particular;
- Stakeholder Consultation on the draft;
- Review by a certification and audit firm and development of audit approach and protocols;
- Evaluation of the standard and audit protocols with a view to implementation by cotton growers. This included mapping to existing Cotton industry Best Management Plans (BMPs).
- Documentation and business case for future pilot testing.

Other sectors in Australia were interested in how a future standard would affect them and two additional pilots explored the standard against off-channel irrigation for horticulture (Timbercorp) and chicken production and processing (Inghams).

Key features of WSA-00

The draft standard was based on the objective of improving water stewardship at the catchment level rather than on improving responsible use or efficiency on-site alone. Catchment sustainability is interpreted as meaning that the health and survival of freshwater species, human livelihoods and well-being are assured in the long term. The standard is designed to facilitate organisations to contribute to better performance at the catchment level, and to reward organisations that perform well in relation to the impacts of their direct and indirect water use. The standard aims to achieve these objectives by:

- identifying when water is coming from unsustainable catchments;
- creating incentives for organisations within those catchments to improve catchment sustainability by the most effective and cost effective means available, including actions in relation to water use, quality *and* governance;
- identifying organisations within unsustainably managed catchments whose own direct use is not contributing to the problem, so that these organisations can be rewarded and encouraged.

There are three main Principles, plus a fourth Principle initially considered to be provisional[47]:

Principle 1: Environmental flow regime

- The organization is committed to maintaining or restoring an environmental flow regime in all the catchments in which it has a significant influence.

Principle 2: Water quality

- The organization is committed to ensuring that the physical and chemical quality of water in all the catchments in which it has a significant influence meets agreed quality standards.

Principle 3: Equitable governance

- The organization is committed to ensuring that there is an equitable system for agreeing and implementing the allocation of water between different uses and users in all the catchments in which it has a significant influence

Principle 4: Protection of high conservation value wetland, lake or riparian areas (provisional).

- The organization is committed to identifying and protecting high conservation value wetland, lake or riparian areas in all the catchments in which it has a significant influence.

[47] This fourth principle, relating to high conservation value ecosystems, is quoted in this document. It was put forward for consideration in the WSA-00 standard, but was not developed in its main text.

These four principles are embedded within an environmental quality management system, following a widely recognized 'Plan, Do, Check, Act' structure. The Principles are not explicitly broken down into Criteria, but the standard contains a number of paragraphs in which lists of indicators are provided.

A key feature of the WSA-00 standard is that it proposes an explicit framework to evaluate the sustainability of the catchment within which the participating organization operates, and incorporates a system of 'scoring' participating organizations both on the basis of their own site level performance (using a 'Direct Use Scorecard') as well as on the basis of the catchments overall sustainability ('catchment sustainability index'). The standard also requires that an organization's indirect water impacts are taken into account.

A structure resembling the Forest Stewardship Council (FSC) Principles and Criteria was originally proposed but the final outcome of the development process was also influenced by ISO14001. The standard focuses strongly on the measurement of generic indicators relating to flow, quality and governance, and then provides a level of flexibility regarding the optimal site level response.

The detail of the WSA-00 standard is provided as Appendix G and an illustrative extract of its contents in Table 6.

4 Direct water use assessment

The organisation shall establish, implement and maintain a procedure(s) to measure and monitor its direct water use.

4.1 Points of assessment

The organisation shall identify the point(s) at which its water withdrawals, discharges may be measured and monitored in terms of the quantity and quality parameters specified below.

In addition to measurement and monitoring at individual points of water withdrawal and/or discharge the organisation shall identify its key point(s) of assessment, being the most downstream point at which the organisation either withdraws or discharges water in the catchment(s) in which it operates, or at which its activity is likely to have a significant effect resulting from non-point-source run-off from its site(s).

4.2 Run-off assessment

The organisation shall establish, implement and maintain a procedure(s) to measure and monitor its effects on the quality of water in the run-off from its site(s).

4.3 Indicators of the organisation's direct water use

The organisation shall establish, implement and maintain a procedure(s) to measure and record the following indicators of its direct water use on a monthly basis:

a its water withdrawals at each significant point of withdrawal in terms in cubic metres for:
- surface water, including water from wetlands, rivers, lakes and oceans
- ground water;
- rainwater collected directly and stored by the reporting organization;
- waste water from another organization; and
- municipal water supplies or other water utilities.

b for each point of water withdrawal the quality of the water shall be recorded in terms of the following parameters:

Compliance assessment is envisaged to be by audit by an independent and accredited certification body. Information requirements are laid out in the standard, they revolve around direct use, indirect use and in product use. Currently there is no other generic guidance material.

In severely degraded, closed or contested basins or aquifers, as is the case in the Murray Darling Basin where historic allocation is considered unsustainable, it is envisaged that the standard will reward those doing all they can to remedy the situation. Stakeholders felt that these situations were where incentives for change were most needed and thus, prescribing that the standard can only be awarded in already sustainably managed catchments could restrict its value.

The standard will specifically address products which have very high in-product water use characteristics.

Although many questions about the optimum design of WSA-00 standard are outstanding, it is envisaged that through a process of iterative testing and refinement it will be evolved by stakeholders into an effective and legitimate benchmark for best practice in water stewardship.

Results of piloting work to date

The WSA pilot studies used a bottom-up approach involving systematic steps including:

- water footprint analysis of site operations;
- critical path analysis of the water based processes;
- development of best practice for water use;
- a gap analysis of current systems compared to requirements of the draft standard.

It is intended that the standards would be applied and tested through audit and in the case of the off channel irrigation pilot a full third-party audit was carried out by SGS. In the cotton project SGS reviewed the standards document and confirmed that it could be audited against. For each of the pilot projects there was documentation of key issues and leaning points and these are summarised:

Cotton business case: An interpretive document and gap analysis were necessary to relate the draft standard to the cotton growing context. Cotton growers were intimidated by the standard and without an interpretive document could not easily see how the standard related to them. By working through the interpretive document it was clear that current industry BMPs supported compliance with portions of the standard but that they fell short of addressing more complex issues including basin level management. A key issue was the feasibility of this catchment level approach and the motivation of site operators to address issues beyond the fence line. The project identified the importance of industry BMPs as supporting documents for compliance with the draft standard and established incentives for the industry to engage with the WSA effort on an ongoing basis.

Horticultural – Off-channel irrigation pilot: Although the company was relatively efficient in its water use, negative perceptions that corporate agri-businesses were “sucking the Murray River dry” brought significant reputational risks. The company desired legitimacy within community, government, NGO and investor groups for their water use and were keen to demonstrate the

environmental and social sustainability of their operations. The company saw the standard as one approach.

Applying the draft standard required the company to set new targets for water efficiency and redefine sustainable best practice for irrigation. Consideration of social and environmental impacts of water use beyond the fenceline was an innovation and went beyond requirements of existing standards. The company demonstrated responsible water use through full disclosure of their use and this set a new benchmark regionally and gained the company plaudits domestically and internationally.

The draft standard was consistent with state and catchment authority strategies and legislation and drove the company to meet and exceed the much higher expectations of stakeholders and the community.

Chicken processing pilot: The company's motivation for undertaking the pilot was to ensure the security of resource use in the future and establish a position as industry leaders in Water Stewardship through supporting development of the standard.

The draft water stewardship standard was easily integrated into Quality and Environmental Management Systems already in place and was equally relevant across aspects of the company's organisation, ie. farming, milling, hatching and processing. Related to this was the realization that it was important to follow the process without preconceptions and 'see where it took you'. The process helped develop a business case for efficiencies and innovation in the use and treatment of water that were subsequently implemented.

Although the local water authority did not participate in the pilot it became clear that their role in managing the water catchment including water allocations and discharges would influence how easily the requirements of the standard could be met.

3.3. Summary comparison between the two standards

The clearest and strongest point of linkage between the two draft standards is at the level of Principles. From different starting points both standards have identified four key 'principles' of management that relate to sustainability of water use:

- Water Quantity (linked in both cases to environmental flow);
- Water Quality;
- High Conservation Value Ecosystems;
- and Equitable Governance.

There is also considerable convergence between the 'criteria' specified in the EWP v2.0 and the requirements of the WSA-00 standard, even though these are not characterized as 'criteria' in the latter. For example, both standards provide detailed specifications as to how an organization should evaluate the impact of its own water abstraction within the watershed, and the similarities extend to the level of 'indicators'.

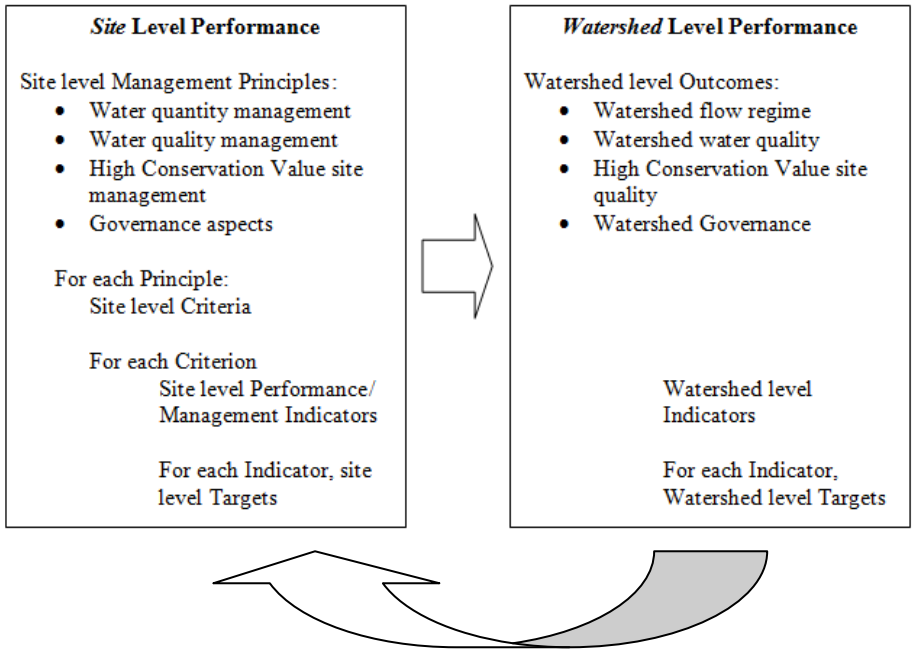
Both standards place considerable emphasis on the need for an organization to consider its impacts at the watershed level. They both go beyond the need simply to consider internal efficiency and legal compliance, irrespective of the broader context. The underlying model of the relationship between site level management and watershed level outcomes appears to be essentially the same, although the mechanisms for implementation differ somewhat, reflecting differences in legal and institutional contexts. The WSA-00 standard places the onus on the participating organization to have access to fairly detailed watershed level data and to establish watershed level targets, whereas the EWP 2.0 standard generally relies on the mechanisms of the EU Water Framework Directive to ensure that these are already in place, and only requires organizations to identify their own data to supplement the needs of the Framework Directive, or to fill gaps.

Similarly, whilst the WSA-00 standard establishes its own scoring system to evaluate and encourage management engagement in watershed level governance, the EWP 2.0 standard reflects the pre-existing requirements of the EU Framework Directive in this respect, although it goes beyond these requirements in some respects.

Both standards require participating organizations to consider their indirect as well as their direct water use. The WSA-00 standard puts forward an explicit mechanism for doing this, and requires such a mechanism to be established in the short term, albeit with longer term targets for full implementation. The EWP v2.0 standard is less explicit, indicating a continual improvement approach with longer term objectives.

The WSA-00 standard explicitly incorporates an environmental management system (EMS) design. The EWP v2.0 standard does not attempt to do this, reflecting its onus on the needs of small farmers for which formal EMS systems may be considered unnecessarily onerous. An organization with its own EMS could of course build compliance with EWP v2.0 requirements into its pre-existing system. Figure 19 shows the main features of the two standards graphically.

Figure 19. Key features of the EWP 2.0 and WSA-00 water stewardship standards



The left hand side of the diagram emphasizes the *site* level aspects of the standards, where the focus on principles makes the similarities very clear.

The right hand side of the diagram emphasizes the *watershed* level aspects of the standards. On this side the EWP v2.0 standard relies where possible on the underlying infrastructure provided by the European Framework Directive, whilst the WSA-00 standard proposes to incorporate a watershed assessment framework into the standard itself.

Neither standard requires the achievement of specific catchment sustainability thresholds. WSA-00's scoring system aims to reward progress towards (direct and indirect) catchment sustainability. EWP's system of criteria and indicators would evaluate and reward measures taken to manage water use within the context of the Framework Directives river basin targets.

Table 7 below summarizes the main points of this comparison

Table 7. Comparison between EWP and WSA standards

	EWP	WSA
Organization based on key principles?	Yes, four principles • Water Quantity (linked to environmental flow) • Water Quality • High Conservation Value Ecosystems • Governance	Yes, three or four principles • Water Quantity (linked to environmental flow) • Water Quality • [High Conservation Value Ecosystems] • Governance
Criteria and indicators?	Yes	Requirements not formatted as criteria, but cover similar aspects
Catchment/ River basin objectives?	Yes, based on European Water Framework Directive	Yes, based on system of 'catchment sustainability' indicators
Direct and Indirect water use considered?	Yes, in principle	Yes
Scoring system?	System of 'minor' and 'major' requirements under discussion	Scores assigned for 'catchment sustainability' and 'Direct Water Use'
Excludes participation by businesses in water-stressed catchments?	No	No
Quality management system (QMS) framework?	No, but could be built on to a QMS framework where these are in place	Yes
Business focus?	Emphasis on needs of small and medium-scale water users	Explicit focus on large water users

4. Review of extant standards and their handling of water stewardship

A range of voluntary standards already exist to promote environmental and socially responsible production in contexts such as those in Naivasha. These include international, sector specific standards and those developed by retailers. In order to objectively assess the value and optimal design of a water stewardship standard the performance of these existing standards in driving water stewardship in Naivasha is explored. Some of the main standards used by producers in Naivasha are introduced and their requirements in relation to water stewardship summarised in Table 8 (page 55). This supports subsequent observations relating to the value of these standards in driving water stewardship and the relative merits against the draft stewardship standards under review.

Global GAP- Good Agricultural Practice

GlobalGAP started as an association of European retailers and is known for establishing its fruit and vegetable certification programme. In order to obtain certification, producers must meet the general Control Points and Compliance Criteria, plus the specific criteria for the Crops Base category, as well as for the "sub-scope," 'Flowers and Ornamentals'. These farm-level standards address a range of objectives related to environmental management, reduced use of agro-chemicals and worker safety.

In Kenya, the equivalent of Global Gap is the Kenya GAP, a good agricultural practice standard which was developed by the Fresh Produce Exporters Association of Kenya (FPEAK) for fruit, vegetables and flowers to enable Kenyan exporters to access European Union (EU) markets. The KenyaGAP standard also takes into consideration small-scale farming systems in Kenya by incorporating them into the EUREPGAP.

The Kenya Flower Council (KFC)

Established in 1996, the Kenya Flower Council is a private voluntary organization of independent growers and exporter of flowers and ornamentals. Its aim is to foster responsible and safe production of cut flowers while taking into account environmental sustainability and social welfare of those involved in the industry. Currently, between 50-60% of flowers exported from Kenya originate from KFC members.

Fairtrade

Fairtrade Labeling Organizations (FLO) International exists to improve the position of poor and marginalized producers in the developing world by setting Fairtrade standards and by creating a framework that enables trade to take place at conditions respecting producers' interests. FLO gives credibility to national Fairtrade labels by providing an independent, transparent, and competent certification of social and economic development. Participants are required to address social development, economic development, environmental development, and labour conditions.

Fairtrade certification promotes workers' welfare on large-scale farms. It ensures that workers in those farms get fair wages and that they operate under good working conditions in line with

the International Labour Organization (ILO). Among the key issues that fair trade promotes include the right to join a trade union, freedom from discrimination, the right to negotiate collectively with the employer, no child labour and the promotion of a safe and healthy working environment. In Kenya there is increasing fair trade certification in the flower industry with 71% increase since 2006.

The Fairtrade standards require that farms protect the surrounding natural resources such as water. For example, they are required to avoid over abstraction of water and the use of excessive pesticides and insecticides, although it is not clear how these are defined.

Fair Flowers Fair Plants (FFP)

Fair Flowers Fair Plants (FFP) aims to stimulate sustainable production and trade of flowers. It promotes a healthy environment and better living conditions. The initiative was introduced with financial support of the European Community and the Horticultural Commodity Board to ensure that producers meet high standards, respect people and nature and protect the environment as well as guaranteeing good working conditions on the companies.

Environmental certification requires determination of the quantity and quality of crop protection agents, fertilizers, energy and water used for production processes throughout the company, and of the separation of waste water. The Fair Flowers Fair Plants imposes social requirements including freedom of association and the right of collective bargaining; no discrimination; right to minimum (living) wages; respect for working hours; a healthy and safe workplace; responsible and minimal use of pesticides; work guarantee; protection of the environment; no child labour; no forced labour.

Failing the certification requirements means failing the Fair Flowers Fair Plants targets and can lead to temporary or permanent suspension of the FFP membership.

MPS- (Milieu Programma Sierteelt or Floriculture Environment Project)

MPS is an international certification which promotes corporate social responsibility and sustainable production in the international horticulture sector. It was established by the Dutch floricultural sector with support from the flower auction houses and several flower trading companies. The certification provides quality assurance as well as promoting environmental and social welfare and health and safety. It has developed an environmental standard based on action on four elements: minimum use of chemical crop protection; nutrition; and energy and waste management. MPS targets include better and responsible water and energy use, chemical crop protection, biological pest/insect control, less or no artificial nutrition, and environmental friendly wrapping materials.

MPS offers certification services for several schemes: MPS A, B and C concerned with reducing the use of fertilizers, energy and waste; MPS -Social deals with issues such as safety, health and working conditions; MPS -GAP has been awarded “equivalent status” by GlobalGAP. A qualification at MPS-A level is claimed as representing the highest achievable level of environment conscious cultivation methods.

Tesco NURTURE

Tesco NURTURE is a standard required of producers supplying Tesco with fresh fruit, vegetable and salad products. It attempts to ensure that best agricultural practices are applied in production. Certification depends on growers demonstrating that their produce is grown and handled in a manner which meets regulatory requirements, protects the environment and is safe, plus meeting the high expectation of Tesco customers. The scheme belongs to Tesco plc and is limited exclusively to producers who supply products to Tesco UK.

According to Tesco. 'Our unique approach with 'Nurture' offers us the fantastic opportunity to pioneer standards around the use of pesticides, reducing energy usage and allows us to break new ground improving and enhancing the local environment'.

British Ornamental Plant Producers (BOPP)

The British Ornamental Plant Producers Scheme (BOPP) was developed in the mid-90's, initially for the pot and bedding plant industry, to provide a certification scheme that would give grower's customers reassurance that their suppliers were meeting certain criteria with respect to legal, environmental and quality requirements.

The BOPP Scheme is a 'one-stop-shop' that provides all the certification needs for growers and packers in the ornamental horticulture industry. The scheme has developed the grower and packhouse standards to meet the specific requirements of ornamental horticulture operations. Unlike other schemes membership provides a forum in which members have an input into the scheme. BOPP is the only ornamental horticulture certification scheme that is owned and controlled by growers and packers.

Table 8: A summary of existing standards and their requirements in relation to water stewardship

Name of Standard	**Requirements in relation to water stewardship**
Kenya Flower Council (e.g. KFC Silver Standard KFC Gold Standard)	Establish environmental policy incorporating waste, wildlife and water management and keep records. Comply with all local legislation; Safe use of pesticides; Fertilizer management plan Water management plan to cover: - valid water abstraction permits; - optimize use and reduce waste; - keep records to **show the sustainability of water sources**; - allow pass-forward flow from dams; - no sanitation facility within 500m of a water source; - adhere to Codes of Practice; - install water meters and record use; - be conversant in efficient irrigation, avoiding overhead sprinklers and favouring efficient ./drip irrigation and rainwater harvesting; - calculate crop water requirements and use tensionometers - train personnel on water efficiency and keep records; - undertake risk assessment on irrigation water and test once a year - ensure no pollution; - favour constructed wetlands and test every three months

	- No cultivation within 25m of a riverbank or lakeshore - undertake environmental audit at least once a year.
Fair Trade	All workers must have access to potable water & clean sanitary facilities. Compliance with environmental standards is required. Buffer zones are maintained as required to protect water bodies and watershed recharge areas. Water resources will be managed with the objective of conservation and non contamination - soil erosion avoided - handling of waste water will have no negative impacts and baseline levels will be set, monitored and documented - no pollution of drinking water sources permitted - ensure water management does not contribute to contamination, salinisation or desertification - pay attention to issues of water depletion - where desertification is a problem plan to conserve or adapt water use - use water efficiently, use efficient irrigation - avoid lowering the groundwater or negatively affecting the availability of drinking water and irrigation water for local communities.
MPS	Carry out auditing and implement corrective measures. Avoid chemical methods and provide training on chemical handling. Develop a waste disposal plan which establishes targets for disposing of waste in an environmentally responsible way; prove that pesticides are securely stored, handled and used and have been removed in a safe manner. Keep spray off records. Develop a fertilizer management plan – sewage sludge and reuse of waste water is prohibited Have a water management plan which covers: - efficient irrigation; - maintains records of water use: - '**sustainable sources must be used'** after consulting with water authorities - sampling of water which enters the site - pollution is to be avoided 'where ever possible' - Drinking water and sanitation facilities to be provided on site Policy and plans will be developed to 'go further' on waste, water, nature conservation. Complaints must be recorded and responded to.
Tesco NURTURE	Rational use of fertilsers, pesticides and organics matter, and pollution prevention. Sustainable use of water resources: - policy statement in place, endorsed and implemented - water risk assessment in place for incoming water - water only from authorized sources in permitted quantities (28 day correction timescale) - risk assessment of contamination all water sources once a year (incoming) - use of accredited monitoring and lab facilities - evaluation of total water use, crop water needs - no waste water reuse - wet weather storage and efficient use.
British Ornamental	Water quality analysis, risk assessment.

Plant Producers (BOPP) e.g. BOPP Growers Standard, BOPP Packhouse Standard Growing Media Producer Standard	Sustainable water abstraction. Water management plan drawn up. Water abstraction to be authorized.
Fair Flowers Fair Plants	To follow
Global GAP Examples include GLOBALGAP Flower and Ornamental standard	(see MPS)

In reviewing these existing standards against the requirements of the EWP and WSA draft water stewardship standards, three observations are made:

- To varying degrees they appear to address some of the issues relevant to water stewardship and of concern in the Lake Naivasha Basin. In particular the Kenya Flower Council standard provides a robust framework for identifying and minimising many potential water impacts. However, it is not clear how thorough and far reaching the requirements of these standards go in respect of key stewardship requirements. For example, they all state a requirement for full compliance with local legislation but it is not clear that this is adhered to at some certified sites. Similarly, some standards such as Tesco's NURTURE tend to focus on incoming risks to the site rather then the risks posed by the site to other users. There are therefore opportunities to learn from the experience of implementing these standards for the AWS, to strengthen aspects which genuinely drive positive change, to avoid duplication and embed complimentarity.
- Many of the standards refer to a requirement to ensure that water is drawn only from 'sustainable sources' but no clear definition is provided of what this means operationally or of how a sustainable level of water use should be established. This is a key omission that the AWS standard seeks to address through the creation of a system which defines locally specific sustainable water use and management responses.
- These standards universally focus on action 'within the fence line' to address water impacts. But river basins and water impacts, values and functions have a high degree of interconnectedness and are complex because sustainability can be determined by remote upstream actions and downstream needs, or by institutional performance. This is why the AWS standard seeks to drive engagement beyond the fence line within the governance principle.

This review shows that extant standards fall short of addressing the complexity of sustainable water management and reinforces the need for the AWS effort.

5. Case study results

The case studies generated a large amount of relevant information and in order to report efficiently and avoid repetitious use of data the following approach and format has been adopted. Although there were some important differences between the sites, many aspects of performance against the standards, and follow up actions were common for both Flamingo and Longonot farms. Each site operator has received site specific feedback, but for the sake of brevity in this document performance is reported generically for both sites as follows:

- Firstly, the case study sites are briefly introduced to provide an overview of their setting, operations and interactions with water and water governance.
- Secondly the performance of the sites against the WSA and EWP standards is assessed and described across the domains of water quantity and flow; water quality; high conservation values and governance.
- The overall performance of the sites is then summarized with areas of non-compliance clearly articulated together with corresponding corrective actions.

It is emphasized that the purpose of the exercise is not primarily to make judgments about site performance, rather it is to judge whether the draft regional standards would drive better water stewardship and basin governance in places like Naivasha and to explore how they can be improved.

5.1. Case study site overview – see boxes on subsequent 2 pages

Flamingo Farm

Location: Moi South Lake Road, Lake Naivasha
Owners: Flamingo Holdings Ltd.
Year established: 1987
Crops grown: Flowers, mainly roses
Area under cultivation: 35 - 40 hectares
Total farm size: 80 ha
Cultivation methods: 25 ha roses, 20 under hydroponics on inert volcanic substrate, replaced every 7 years.
Primary markets: 85% United Kingdom and Germany
Staff full time: 1000 / 1100 at peak (Valentines, Christmas)
Staff accommodation: Offsite in Naivasha town, staff receive housing allowance and transport support

Water use characteristics:
Primarily drip irrigation through recirculated system whereby run-off water not used by plants (30%) is passed through an ultrafiltration plant and reused. Flamingo has been working towards a complete closed loop hydroponic system and this was largely completed by 2009. On average irrigation water totaling 2,000 m^3/dayis made up of fertigant that has been collected and filtered, rainwater collection, water treated in the onsite wetlands with the balance drawn from boreholes and Lake Naivasha. Targets for water use efficiency are in place and a 40% reduction in water used for rose production has been achieved in 10 years..

Water quality interactions:
Filter backwash is discharged together with irrigation water system overflow through a a constructed wetland treatment facility which discharges to the lake . Settled sludge removed from septic tanks was originally tankered offsite and disposed of at the municipal sewage works, but more recently it is disposed of on the farm by spreading in controlled manner and allowing further breakdown by evaporation and drying. Agrochemicals and waste oils are stored and handled securely and pesticide washings applied to designated spray off area. Solid waste is composted on site or disposed of offsite. Pollution control training and emergency procedures are in place.

Biodiversity:
Site lies within Ramsar boundaries and abuts the lake shore. Wild animals use the shore area which is crossed by a deep abstraction canal and have been known to invade site especially during drought. Minor agricultural activity takes place in the riparian zone although staged withdrawal is underway to comply with local commitments.

Governance:
Permits are in place for the bulk of water abstraction but applications for additional extraction have not been processed by WRMA over the past 2 years and therefore not all water use is technically legal. Fees are paid for all water use and all abstractions are metered. Site operator is heavily and proactively involved in improving basin governance and water stewardship through leadership roles in LNGG and LaNaWRUA and formation of the umbrella WRUA; sponsoring and coordination of research and hydrological surveys; support for Payment for Ecosystem Services scheme; capacity and coordination among catchment WRUAs and WWF shared risk study; Water Abstraction Plan, sub-catchment management plan and gazettment; and lobbying.
Standards in place: KFC, GLOBAL GAP, MPS, FLO - Fairtrade, Tesco NURTURE, Field to Fork – M&S, FFP

Longonot Farm

Location: Moi South Lake Road, Lake Naivasha
Company: Vegpro Kenya Ltd. Largest vegetable grower in Kenya
Year established: 1980s
Crops grown: Vegetables: peas, baby corn, runner beans, fine beans, salad onions, pak choi, asparagus, carrots, broccoli, lemon grass, mint, coriander, chillis, roses
Area under cultivation: 100 ha total, 25 ha flowers
Cultivation methods: hydroponic using pumice, drip irrigation. Centre pivots, overhead, drip and micro-sprinkler on soil
Primary markets: 87% to UK (Marks and Spencer; Tesco; Sainsburys; Waitrose; Morrisons) and other European markets (France, Belgium, Holland)
Staff full time: 900
Staff seasonal: 200

Water use characteristics:
Water is drawn from the lake and supplemented by groundwater and rainwater harvesting in a central reservoir and pump house and distributed by 4 or 5 different lines and pivots.
Self monitoring is conducted daily by meter readings and sent to WRMA and LNGG monthly.
6000 m^3 / day is abstracted and is supplemented by rainwater harvesting.
WAP traffic light system for control of lake level abstraction is in place and adhered to.
Irrigation and crop water needs are guided by remote soil moisture probes.
Driver on efficiency is electricity costs rather than water. There are trade offs with efficiency: for example dusty crops require regular washing using overhead sprinklers to promote photosynthesis.

Water quality interactions:
The packhouse creates about 20 m3/day wastewater which is channeled to a pit for chemical deactivation and pumped out with sewage to municipal water treatment works and directed to soakaway.
Solid waste is composted with some disposed of off site by liceneced waste handlers.
Buffer strips and swales are used to control soil erosion losses.

Biodiversity: Not within riparian zone, though abstraction canal crosses riparian zone.

Governance characteristics:
Abstraction permit for surface water is in place with compliance measured against meter with external and internal audits conducted. Monitoring is carried out of water abstracted, recycled and runoff.
A completion record has been obtained for the borehole but no licence is in place despite one having been applied for over 12 months ago.
Site actively involved in basin governance through membership of LNGG and LaNaWRUA
Standards in place: LNGG, Tesco NURTURE, Faitrade, MPS, ABC, KFC, ETI, GAP

5.2. Naivasha case study site performance against EWP v2.0 and WSA-00

In this section, points of non-compliance across both sites are presented for the EWP and WSA standards in Tables 9 to 12. By implication those issues not mentioned are in compliance with the standards. It must be remembered that these requirements have been developed in European and Australian contexts respectively and that the actions they drive are not automatically appropriate in Naivasha.

Table 9. Water quantity and flow performance

EWP v2.0	WSA-00
NC1: Impact estimation of abstraction on availability of water in river basin (social, environmental) **(C 1.2):** There is no assessment in place identifying and describing risks of operational impacts. No list of preventive and corrective measures available. Corrective measures: • Risk-assessment required for abstraction activities and strategy to avoid or minimize impact • Preventive and corrective planning to react in extreme situations (e.g. droughts, floods, spillage) NB. EWP deals with governance of water quantity in governance section Improvement points: **IP1 Provide data that enable to estimate/calculate the maximum abstraction rate for the source** (C1.2) (self-responsibility of organization in case of non-availability of public data). Setting of maximum abstraction level required. • Contact authorities or research project to receive additional information on river basin recharge rates and available water volumes • Ground Water Source: estimation of recharge rate and data on GW level development combined with abstraction volumes (if possible based on data of Water Allocation Plan) • Lake water: Contact authorities or research project to receive additional information on river basin recharge rates and available water volumes • Generic: Calculation of WSI (complimentary to Water balance studies) **IP2 Accountancy on water abstraction** (C1.2) Rain water harvest is estimated but not metered • Meter rainwater harvest **IP3 Provide EIA for any new abstraction facility established in future** (C1.2) • responsibility of organization in case of non-availability of public data	3. A direct water use foot print will need to be carried out. Although indirect water use is likely to be less than 20% of total water use this needs to be established. 4.3 Rainwater harvesting contribution needs to be measured and monitored 4.5 An assessment of whether withdrawals significantly affect water sources is needed for all sources of abstraction including boreholes. NOTE: significantly affected is defined by the Global Reporting Initiative (GRI) as: Withdrawals that account for an average of 5 percent or more of the annual average volume of a given water body; from water bodies that are recognized by professionals to be particularly sensitive; or any withdrawal from a Ramsar-listed wetland or any other nationally or internationally proclaimed conservation area. NOTE: If the water is provided by a public or private water supplier, the original water body/source should be identified and reported. 5.4 A quantitative description of the water flow regime at the organisation's key point(s) of assessment in the catchment(s) 6.The organisation shall establish, implement and maintain a procedure(s) to assess its indirect water use. NOTE. Actions to address water quantity impacts driven by actions described in Governance section

Table 10. Water Quality performance

EWP v2.0	WSA-00
NC2 Monitoring of quality of effluent water (C2.1): The established monitoring system is not exhaustive enough to cover the potential pollutants Corrective measures: • Monitoring system needs to be revised and accomplished based on the identification of main pollutants and priority substances • Calculation of Eutrophication potential • Duty of care: Monitoring septic tank effluents regardless of whether disposed of via external WWTP **NC3 Impact estimation of pollution on water in river basin (social, environmental…) (C 2.2):** There is no impact assessment in place describing risks of impacts as well as preventive and corrective measures that can be taken by the organization Corrective measures: • The organization needs to provide a risk assessment and strategy to avoid or minimize risks • Provide an exhaustive water quality management plan including a strategy to achieve good water quality in river basin Improvement points: **IP4 Documentation of potentially water-hazardous inputs (C2.1):** Classification of inputs has to be amended according to their risk and potential impact. • The organization needs to document and classify priority potential pollutants based on a shared understanding of priority water quality sensitivities in the river basin. **IP 5 Identification of potentially affected destinations (C2.2):** The established list of critical contamination points needs to be revised based on definition of main pollutants and priority substances • List of areas and destinations potentially affected by pollution • Specification of pollution potential: diffuse pollution sources have to be described and monitored • Accurate and up to date maps of pollution sources and pathways are required • Destination of run-off from composting area needs to be established	4.2 Discharges from the site need to be monitored, in terms of flow, quality and the receiving environment A pollution prevention risk assessment of the site is required which includes a drainage plan contingency plans in the event of extreme weather events. For each point and non point discharge the quality of water shall be recorded in terms of the following parameters: Water temperature; pH; Suspended Solids; Biochemical oxygen demand (BOD)/ Dissolved oxygen (DO); Total dissolved solids (TDS); nutrients (phosphorus, ammonia, Nitrite/nitrate, Escherichia coli, Fecal coliform, metals: Cr, Cd, Cu, Pb, Ni, Zn, pesticides (DDE, DDT, other) 5.5 Baseline water quality characterisation required. A quantitative description of water quality at the organisation's key point(s) of assessment in the catchment(s)

Table 11. High conservation values performance

EWP v2.0	WSA-00
No non – compliance issues Improvement points **IP 6 Identification of high-conservation areas (C3.1):** High-conservation areas are not identified and documented on overview map Analysis of impact on riparian areas not available. Corrective measures: • Overview map which clearly identifies sites of high-conservation values • Description of protections goals (social, historical, ecological): focus riparian areas • Estimation of impact caused by activities of the organization on high-conservation areas and an identification of the referring corrective or preventive measures • Evaluation and communication of positive effect through wetlands created by the company	**4.7 Wetland management** The organisation shall identify and record any aspects of its management which have a direct effect on wetland habitats, such as drainage, construction of dams, modification of natural habitats, and shall estimate the effects such activities may have on the flow regime on a monthly basis. For example the impact of water abstraction canals and easements across riparian land needs to be considered under this requirement. **4.8 Beneficial effects** The organisation may establish, implement and maintain a procedure(s) to quantify and record the beneficial effects of its activities in terms of water flow or quality, assessed using the same indicators as specified in 4.3 above, on a monthly basis.

Table 12. Governance performance

EWP v2.0	WSA-00
NC4 Comply with legal requirements (C 4.1): • Borehole in use without permission documents • Full abstraction volume from lake is not covered by actual permit Corrective measures: • The organization needs to prove its efforts to obtain a permit • The organization needs to provide the revised permits for the increased abstraction volume in an agreed timeframe. **NC6 Water Resource Management Strategy (C 4.6):** There is no integrated water resource management strategy available Corrective measures: • The organization needs to set up and implement an operational Water Resource Management Strategy involving the agreed topics. **Improvement points** **IP 7 External waste water treatment (C4.2):** The treatment of waste by an external public WWTP and an external contractor (for solid wastes and septic tanks) has to be involved in the evaluation of quality of the effluent water • Get information and evidence of good practice in WWTP (Questionnaire) • Description of suitable or required organization´s activities based on inquiry **IP8 Water management by outgrowers (C4.2):** Water management by outgrowers is unknown/not considered • Ensure that within a defined timeframe that the outgrowers comply with the requirements of the AWS standard **IP 9 Identify links of water use and other resources (C4.3):** Water management has to involve cross cutting points with use of other resources Improvement area: • Involve the management of other resources (soil, energy, detergents) in your operational Water Resource Management Strategy **IP 7 Improve the GMP of pesticide handling (C4.5):** Implemented GMPs shall be amended by GMP to avoid point pollution with pesticides and fertilizers Improvement area: • Evaluate the implementation of GMP on this topic (e.g. Biobeds)	1. Develop a Water Stewardship Policy declaring the organisation's commitment to the 4 principles within the standard. 2. A water stewardship system needs to be developed. specifying the organisation's objectives, targets and programmes for the implementation of its Water Stewardship Policy. This shall include management of the organisation's direct, indirect and product use-phase water use . Note that out growers and other service providers would be within the scope of the system. 3. Baseline estimate of the organisation's water footprint 5.Catchment sustainability assessment. The organisation shall document and regularly update a direct use catchment sustainability assessment including a clear description and map of the basin and a description of the current status of governance including **Policy and legislation; management strategy; Institutional capacity** 5.3 Catchment assessment points need to be defined and identified based on flow and quality risks posed by the site **5.4 Baseline water flow and water quality scenarios** Quantitative description of the water flow regime at the organisation's key point(s) of assessment in the catchment(s) in three scenarios: a) *no change scenario*: climate change only b) *business as usual scenario*: climate and changes in domestic and commercial use c) *'environmental flow' scenario*: the target flow regime for the catchment taking account of projected climate change and the maintenance of environmental, social and economic services. This quantitative description shall include estimates of monthly base flow and the monthly mean flow for each month at the organisation's key point(s) of assessment in the catchment(s). 5.6 **Catchment sustainability indicators** The organisation shall allocate a quantitative score (0-100) to the current status of the catchment(s) in terms of p**olicy and legislative indicators; management strategy indicators (Institutional capacity indicators ; social indicators ; water flow indicators; high conservation value land use indicators ; water quality indicators.** 6. **Indirect water use assessment** The organisation shall establish, implement and

	maintain a procedure(s) to assess its indirect water use. 8.0 Organisational catchment sustainability index required. The organisation shall establish, implement and maintain a procedure(s) to calculate its organisational catchment sustainability index on at least an annual basis. Organisational catchment sustainability index defined as the average of its direct and indirect catchment sustainability values weighted by their relative value in final annual production, plus its product use-phase catchment sustainability values if applicable. 10. Identification and prioritisation of organisational water stewardship strategy. Based on these assessments the operator should assess the most cost effective options for maximum impact on priority basin and site issues. 11. All legal requirements related to water understood, documented and complied with 12. Set and plan towards 5 year catchment sustainability targets and objectives This element will identify issues including access, biodiversity, riparian management, sedimentation, basic local needs etc. Define develop and implement: 13. management functions 14. competencies and training 15. communication and reporting system 16. documentation system 17. operational controls 18. emergency procedures 19. contingency planning 20.monitoring and measurement systems 21. legal compliance 22. compliance with other commitments 23. corrective and preventative actions 24. Control of records 25. Internal audit in relation to water stewardship

5.3. Summary of performance and key improvement points

Both sites exhibited numerous features of best practice in terms of their existing water stewardship. For example, the storage and handling of agricultural chemicals and waste oil, and innovative practices such as water recirculation were conducted in ways which meet or exceed best practice and regulatory specifications in the UK. Further, the ongoing pressures on water resources in Naivasha, and in particular the drought of 2009 has forced the sites to explore and implement progressive strategies for more efficient water use. The contribution made by both sites to improved basin level governance is particularly impressive and, as will be discussed, in many ways exceeds the requirements of the draft standards. The site operators long term engagement and investment in the Lake Naivasha Basin management has made a significant contribution to improved basin governance. For example, through support for equitable stakeholder representation in the WRUAs; promoting research and understanding of basin functioning and challenges; and the mobilization of partnerships, and regulatory and political effort to address these shared challenges.

At the same time the piloting work identified some areas of potential improvement where the sites could act to further reduce their on and off-site water risks and reduce water use and costs. For example, the robust analysis demanded in the standards identifies the risks of waste disposal via tankers to the municipal WwTW, and of contamination of ground or surface water at several points onsite. Cost savings were identified, for example in taking a risk-based rather than 'wholesale', or blanket approach to monitoring. Further, management of the riparian zone was flagged as an issue, where the presence of abstraction canals and easements across the lake shore requires assessment to ensure no impact is exerted on ecosystem functions and wildlife. The concern here is that modifying the lake shore morphology by constructing deep abstraction channels perpendicular to the lake shore has potential to impact animal movement. Figure 20. showing a giraffe crossing the irrigation channel at Flamingo farm illustrates the potential for this problem, although anecdotal evidence suggest that animals are able to pass freely across the shallow sided channels.

Figure 20. A giraffe crossing the intake channel at Flamingo farm

Perhaps the most problematic aspect of performance is the fact that not all the water abstracted by the sites is legally mandated under a valid water use permit, which comprises an offence under the Water Act. Both standards require full compliance with water related law as a minimum. This requirement warrants further discussion because at both sites this lack of legal compliance is linked to the actions, or rather inaction of a third party, the Water Resource Management Authority. Both sites have been applying for legal permission for their unpermitted abstractions for over 2 years, and have paid application fees, yet the WRMA in breach of standards of service set out in the Water Rules have not responded. The airing of such controversies and multi-stakeholder discussion of the best way to handle them in the standard is exactly the purpose of this work.

To aid this review and discussion of the implications and outcomes of the draft standards, the requirements they impose on the sites are summarized here using basic language rather than the often meticulous prose necessitated within a standard. An evaluation scheme has not yet been developed for the WSA-00 but the EWP v2.0 specifies some major requirements (coloured red in the text below) indicating that award of the standard would be conditional on their fulfillment.

5.3.1. Water quantity and flow

Although the Naivasha sites have existing systems in place for measuring and assessing their water use, both standards required extra effort to provide a more thorough assessment on which to base actions to manage water impacts and risks, and to drive water use efficiency. In summary these include:

i. An impact assessment of all ongoing (and planned) water withdrawals which appraises the risks posed to other water users, social and environmental values and sets out measures to minimize these risks including response to droughts and floods. Both standards requires evaluation of whether water sources are 'significantly affected' or 'sensitive' using definitions set by the Global Reporting Initiative (GRI EN9)[48].
ii. A water footprint assessment which characterizes blue, green, grey, direct, indirect and in product water use.
iii. Assessment and description of the water flow regime for sources of abstraction, evaluation of the maximum sustainable abstraction rate and monitoring of use against that. The EWP standard allows default to 'public data' from authorities or researchers and where this is not available suggests use of the Water Stress Index[49] to determine whether the water body is sustainably exploited.
iv. The contribution to water needs and potential impacts of rain water harvesting need to be better understood through metering and monitoring.

5.3.2. Water quality

Again, whilst both sites already manage water quality through pollution control procedures, structures, training, monitoring waste water treatment and storage facilities, both standards

[48] GRI, Global Reporting Initiative Indicator Protocols on water, v3.0 see Appendix G.
[49] Pfister et al 2009

require these to be strengthened in order to more systematically minimize and prevent water quality impacts.

i. An impact assessment which appraises all potential water quality risks arising through site operations, based on an understanding and mapping of potential pollution sources, pathways and receptors is required. This must be used to develop and implement a strategy and operational management response which prevents negative impacts, minimizes risk and contributes to achieving water quality objectives set for the basin.
ii. Water quality and effluent monitoring needs to be strengthened using a risk based approach which targets the priorities identified in i). This should include the monitoring of flow in order to calculate pollutant loads and regular assessment of the receiving environment. 'Eutrophication potential' needs to be calculated. Further, there is a requirement to monitor the impacts of wastes transported off site, in particular the effluents disposed of via the municipal WwTW.
iii. The WSA standard specifies a list of water quality determinants which should be monitored.
iv. The pollution risks associated with waste composting run-off, spray off areas, underground tanks and soakways need to be assessed and acted upon.

5.3.3. High conservation values

There were no incidences of non compliance against major requirements of either standard in respect of high conservation values. However the following improvement point was flagged:

i. Areas of high conservation value in terms of ecology, biodiversity and habitats; social and historical values should be mapped and an assessment of the impacts of site operations on these made. This analysis should inform a response plan of corrective and preventative measures including reporting and monitoring on a monthly basis. The beneficial effects of site activities will also be reported.

5.3.4. Governance

Within the standards themselves greater clarity is needed regarding how internal and external governance requirements are distinguished. Requirements for internal water stewardship management or 'governance' within site operations and contributions to wider basin governance need to be handled separately. Notwithstanding this insight, the following requirements were specified:

i. Both standards demand that regulatory and legal specifications are fully complied with, yet at the pilot sites some boreholes and a proportion of abstraction from the lake (accounting for a relatively minor part of total water use) were not covered by a valid permit. The sites were aware of this problem and had applied to WRMA over a period of two years to obtain permits and received nothing from the authority. The organization needs to demonstrate these efforts and obtain the necessary permits in an agreed timeframe or cease to abstract water in excess of the permitted amount.
ii. A water resource management strategy/water stewardship policy and plan needs to be developed and implemented by the site operators. This should address direct, indirect and in product water use and be based on a water accounting and risk assessment exercise at the site and for the basin.

iii. Where the EWP standard is heavily dependant on a catchment assessment carried out by statutory authorities under the Water Framework Directive, the WSA standard anticipates that this will not always be available. Instead it therefore requires the site operator to undertake a catchment sustainability assessment and to then quantify catchment and operator sustainability indices. This involves the assessment and scoring of policy and legislation; management; institutional capacity; social issues; water flow; conservation values and water quality. It also requires the development of three future basin scenarios over 30 year time scales of climate change, domestic and commercial demand trajectories and idealized sustainable conditions. The intention is that this assessment will be used to shape a bespoke water stewardship and management response which guides the operator towards the most pressing issues. The resulting water stewardship strategy requires the site to develop and implement appropriate management functions; competencies, training and systems for communication and reporting; documentation; operational controls; emergency procedures; contingency planning; monitoring and measurement systems; legal compliance; corrective and preventative actions; control of records and internal audit.

iv. The sites are required to assess and evaluate the chain of water use which includes an impact assessment of solid and liquid waste disposal off site. In particular there is a requirement to assess the impacts of directing waste to the municipal WwTW which is known to be dysfunctional.

v. The sites must ensure in a defined timeframe that their outgrowers comply with the requirements of the water stewardship standard and where indirect water use is greater than 20% of the total that this is assessed on the same basis as direct water use.

vi. Because of the innate linkages between water use and use of other resources, the sites must integrate their water resource/stewardship strategy with planning for the management of soil, energy and raw materials.

vii. Best management practices for pesticide handling should be reviewed and implemented, for example in the use of biobeds for deactivation.

6. The implications and outcomes of the draft standards

This section reflects on the requirements of the draft standards set out above and considers their implications: whether they are achievable, reasonable and effective in driving desirable outcomes. This process was supported through discussions with site operators and a workshop with the Project Reference Group. Firstly the implications for the site operators are considered followed by an evaluation of the external outcomes which the standards - in their current format - would drive.

6.1.Internal implications

6.1.1. Internal benefits

The Naivasha case study sites already exhibit many elements of good practice in terms of their water stewardship and through extant standards an array of quality management systems are in place. Apart from the important caveats set out in 5.1.2, the implementation of the draft water stewardship standards would be relatively straight forward from a management perspective.

Following the field work exercise, site operators envisaged that implementing the standard would have the following benefits for their internal operations and business.

1) Reducing costs and promoting efficiency

- Although the sites operate a sophisticated regime of real time monitoring which informs precision use of fertilizers, the requirement to calculate the eutrophication potential and the implication that this will be used within a nutrient management plan could bring savings in fertilizer use and related costs.
- The standards provide a clear framework for measuring, identifying, implementing and reviewing water efficiencies and cost savings.
- The standards provide a framework for establishing a risk-based environmental and water monitoring regime. Rather than carrying out monitoring and analysis across a wide range of parameters at specified intervals, a risk based approach means that only specific parameters are monitored at a frequency relative to the scale of the risk. This has two obvious benefits for the sites. First it means that their monitoring regime will be more likely to identify issues before they cause significant harm and second, site monitoring regimes will be more cost effective and efficient in the use of staff time and monitoring and testing costs.

2) Reducing operational water risks

- The emphasis on proactive and preventative planning in the standards will facilitate contingencies to avoid water problems in the future, in particular in relation to drought and flood events, climate change, emergencies and spillages.
- The process of adopting the standards provides an iterative and ongoing tailored response strategy to embed water security into business operations and future growth.

3) Reducing regulatory and reputational risks

- By establishing a system which proactively identifies and manages all water risks, the standards also actively reduce associated regulatory and reputational risks. For example, the standard drives the proactive prevention of pollution and identifies pollution risks which had been overlooked historically.
- The standards support the site to maintain compliance with regulatory regimes and to demonstrate compliance (or attempts to comply) and therefore will reduce the likelihood of regulatory breaches and insulate the site from malicious or vexatious complaints.

4) Generating market benefits

- The sites felt that the standard had the potential to help them maintain access to certain markets and gain access to new markets in the future. There was agreement that market benefits would be contingent on widespread adoption of the standard, and related to this, the building and promotion of a credible and valued international brand.

5) Building political and intellectual capital

- Compliance with the standards was seen as a way of enhancing and securing the legitimacy of the site operators in wider policy discussions about water.
- The process of adopting the standards and engagement with the AWS effort would enhance the intellectual capital of the site operators by exposing their staff to state-of-the-art thinking on water stewardship.

- The opportunities for peer-to-peer learning and sharing of best practice among an international community of water stewards were flagged.
- Relatedly, adoption of the standard provides the site operators with the opportunity to demonstrate their leadership in the sector and brings positive reputational legacy.

6.1.2. Internal costs and viability

Further detail will be added based on additional feedback to this report, however based on site discussions, most of the standard requirements seemed reasonable to the site operators in terms of costs and achievability. However, the complexity of some issues raised concerns and these include:

1) ***Requirement for full compliance***
   The requirement for full compliance with water related legislation means that attainment of the standard is contingent on the performance of a third party. For example, the sites had used their best efforts to obtain abstraction permits for all water withdrawals but the inability of WRMA to process these applications jeopardizes the status of the sites as good water stewards. This condition could reduce interest in and uptake of the standard in basins where statutory water governance is dysfunctional. Worse still it could de-incentivise private sector engagement with public water policy in these contexts, which is where it is needed most.

2) ***Duty of Care requirement***
   Similarly the duty of care requirement which obliges the sites to check solid and liquid waste disposal off site by licensed municipal or private operators was questioned. It was felt by some that this put an unreasonable conditionality on the performance of local government and others to manage waste adequately which, it was argued, was beyond influence or control.

3) ***Issues of riparian access***
   The implicit obligation on the sites to address conflicts over riparian access was questioned on the basis that the issues were complex, highly contested and required a collective response which went beyond water stewardship and into issues of contested land allocation and access against a rapidly changing social milieu.

4) ***Catchment Sustainability Assessment, threshold setting and interface with basin level effort***
   Site operators were intimidated by the level of effort required to develop a catchment sustainability assessment and index, and bring together the data and skills to chart future development scenarios for the basin. Further, the requirement for establishing a 'maximum sustainable level of abstraction' is seen as problematic because 'acceptability' of water use effects, such as lake level fluctuations, are largely socially mediated and can not legitimately be decided by a single water user in isolation. The relevance of such an assessment for a common pool resource with multiple users is questionable and could be a major financial and resource intensive commitment. It can be argued that the basin Water Allocation Plan, sub-catchment management strategy, the shared risk shared opportunity study and other collaborative research, all supported by the site operators, already cover much of the

ground required by the standards in this respect. It can also be argued that because these existing assessments have the legitimacy of being collaborative multi-stakeholder efforts in line with national and basin water policy, the development of a further catchment assessment for the standard could initiate damaging parallel processes and be an inefficient use of management resource.

5) Water footprint analysis

There was concern that the requirement to calculate and consider indirect water use and water embedded in products used on site (eg. Fertilizer) could be an expensive, difficult and sometimes impossible task with questionable benefits and outcomes. It was suggested that pressure for adoption of the AWS principles through the operations chain of influence would be a simpler and more effective way of driving better water use in the supply chain with lower transaction costs for the operators. There were also questions from the PRG and site operators over the wider value of conducting a site level water footprint assessment, and instead a simplified site water accounting process was favoured.

6) Requirement for outgrower compliance

The implications for the out-grower community were flagged as an area of concern. Although there was agreement in principle that out growers should be encouraged to improve water stewardship, in their current forms there was doubt as to whether the standards were relevant and implementable for this level of water user.

7) Streamlining, guidance and relevance

It was noted that in some areas procedural aspects of the standards could be made more efficient and user friendly, and that guidance was lacking for some key aspects. For example, the EWP v2.0 dealt with strategic and operational governance of water quality and quantity under the heading of the 'governance' principle which caused some repetition. There is also a lack of guidance on some elements of the standard for example calculating Eutrophication potential, using the WSI, the procedure to be adopted in risk assessments and appraising 'significance' and calculating the catchment sustainability index. The relevance of some aspects of the standards to water stewardship need to be reconsidered and where relevant, the linkages should be more clearly explained. For example the rational for elaborating the detailed link between energy and water use and the need for a full water footprint assessment was not immediately clear.

In bringing these issues to the fore the AWS Kenya Case study has partially succeeded in its objectives. Whilst generating unequivocal answers to the questions they raise is beyond the scope of this work the next section and final chapter relate insights and perspectives from Naivasha stakeholders as an initial contribution to their resolution.

6.2.External outcomes – what outcomes would the standard drive?

During the feedback meeting to the Project Reference Group a two stage analysis was carried out with support from basin stakeholders. Firstly the most contentious or challenging requirements of the standards were identified and the group reflected on whether these were reasonable, achievable and the outcomes which would be driven by site compliance. The results of this assessment are summarised in Table 13 below. Secondly, the group reflected on

the specific impacts that compliance with the draft standards would have for a range of interests, stakeholder groups and perspectives. The results of this exercise are summarized in Table 14.

Table 13. Requirements of the draft standards: Reasonable, achievable and to what end?

Requirement	Reasonable?	Achievable?	What outcomes could compliance drive?
1) Full compliance with local and national statutory requirements	Yes Unanimous agreement	Yes, but conditional on level of resources and cooperation within WRMA and other regulators.	Positive: • Pressure for improved regulatory performance and adequate resources to deliver services. • Drive streamlining of permit determination process • Implementation of water law and plans, freeing up illegally used water and support control of water resource use. • Deemed 'helpful' by WRMA Potential negative outcomes: • Disincentive to uptake of the standard • Pressure on regulators to issue permits that have not been adequately assessed. • Preferential rapid processing of applications by large commercial water users
2) Duty of Care	Yes for the majority. One business representative less certain based on position that legal compliance was enough, and companies shouldn't have to check up on government.	Yes. Time bound rather than immediate. Responsibility for the growing population and pressure on infrastructure brings a shared duty of care.	Positive: • Prevent pollution of the lake and drive adequate WwT, protection of WwTw functioning and an operational trade discharge system. • Pressure, incentives and greater accountability for adequate WwT and sanitation coverage and municipal planning. Potential negative outcomes: • Could require significant investment . • Could penalize operators for government underperformance and prejudice poorer countries/ districts. • Pressure from companies could skew limited water supply and sanitation investment budget towards industrial waste water treatment, rather than potentially more immediate needs of domestic provision.
3) Action on riparian management	Yes. Unanimous	Yes. Benefits may be contingent on extent of collaboration and common action.	Positive: • Enhance ecological value of riparian land. • Ensure riparian integrity and sustenance of wildlife / species • Support monitoring of biodiversity status of the lake. • Would drive more equitable access and conflict prevention / resolution.

4) Basin level assessment and threshold setting	Yes, though should be collaborative and consistent with statutory / river basin authority process and policy	Yes, in Naivasha because of years of research and is included in WAP and SCMP. In other basins eg. Tana this would be a much greater challenge. A de minimis [50]level is required to prevent inappropriate levels of investment	Positive: • Investment in data generation and sharing of data • Consensus and collaborative effort on basin priorities • Sustainable and equitable basin governance Potential negative outcomes: • Raises difficult questions where the statutory efforts are dysfunctional or policy not in place. Who decides? • Risk of unbalanced representation in basin planning
5) Water footprint analysis and action on embedded water	Uncertain. The rationale is not clear. Value in WF for operational water management is debatable eg. Handling of waste water is problematic.	Uncertain. Unlilely that information will be available at reasonable cost and effort. For example, calculation of water embedded in fertilizer, employees food, tractor tyres?	Positive: • This could drive widespread investment in analysis of embedded water. • Positive outcomes for basin governance are not clear. Potential negative outcomes: • Barriers to trade and business, added costs where data is unavailable. • Could preclude marginal and smaller operators unable or unwilling to invest in WF from stewardship.
6) Out grower compliance	Yes. Unanimously desirable with a simplified standard with requirements proportional to risks.	Uncertain. Even with differention with the standard based on scale and risks, external support may be required.	Postive: • Potential to drive widespread responsible water use in new ways. • Sustainable river basin management by addressing the large cumulative impacts which smallholders often exert. • Will promote technology transfer and uptake to rural poor. Potential negative outcomes: • Could prejudice small farmers who lack resource and capacity to comply. • Costs of support and outreach service may increase investment required by large farms.

[50] so small or minimal that it does not matter or the law does not take it into consideration

Table 14. Summary of water stewardship standard compliance outcomes for basin stakeholder perspectives and interests (as evaluated by the Project Reference Group)

Stakeholder / perspective	**Net outcome**	**Qualifying remarks**
Downstream and lake water users	POSITIVE	Downstream and shared water needs, values and functions actively identified and protected
Social equity, health protection and poverty reduction	POSITIVE	Natural capital relied on for health maintenance, livelihood sustenance, development and resilience actively identified and protected. In particular the standard could drive much needed greater investment in the PES scheme.
Biodiversity conservation	POSITIVE	Biodiversity values and ecological integrity actively identified and protected
Economic growth	POSITIVE	Biophysical, regulatory and reputational risks actively identified and managed. Resource security embedded to support sustainable and equitable economic development. Economic cost and externalities on local or downstream communities prevented through avoided environmental degradation.
Government and regulators	POSITIVE	Incentivised compliance with regulatory and policy specifications. Reduced costs of regulation. Seeding of best practice through exemplary water stewardship sites. For WRMA the standard will drive institutional sustainability and will assist them in arguing for / justifying adequate operational budgets and resources.
Conflict prevention	POSITIVE	Significant potential benefit to avoid future conflict and incentives to address current complex issues
Basin governance	CONDITIONAL	The draft regional standards as they stand would not necessarily drive positive changes in basin governance or contributions to governance over and above those already made by the pilot sites because they already take a proactive leadership role. Standards revision needed. Benefits to basin governance would be conditional on widespread uptake of the standards across sectors (including tourism) which could be a challenge. This could be driven by adoption as a group standard by LNGG and would also need outreach, sensitization and generation of demand. There is a responsibility on the AWS to support this. Compliance comes with costs to the site operator so could uptake be incentivised by a water stewardship premium payable by supermarkets and consumers?

The insights generated from the analysis set out in Tables 13 and 14 are collated to inform a set of recommendations in Chapter 8.

7. Road testing the results: Insights from supplementary pilot sites

In order to validate and add depth to the initial findings from Naivasha described in Chapters 5 and 6, the standards where tested at two supplementary pilot sites outside of the Naivasha basin. In addition the results of the case study were presented and discussed amongst a group of senior representatives of national and regional level stakeholders. The results of these supplementary pilots and insights derived are presented here and results of group deliberation are summarized in Chapter 8 with reference to the recommendations discussed.

7.1 Gikanda Farmers Cooperative Society

An overview of the Gikanda site characteristics and water use is provided overleaf.

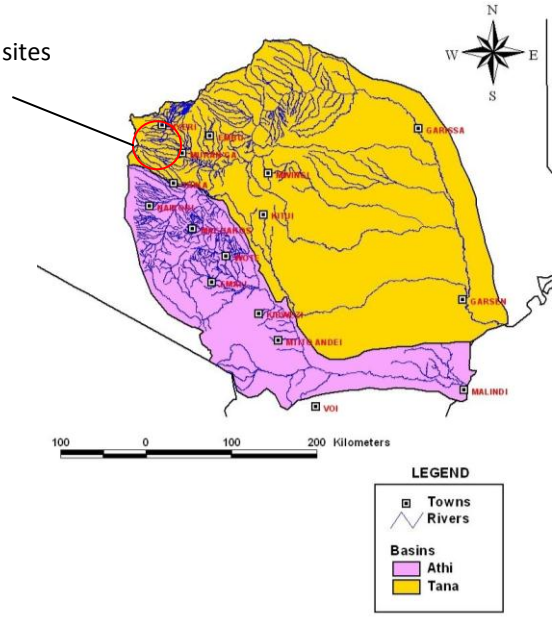
7.1.1. Site context and water use

Institutional context

The Gikanda site is governed by the same statutes and policies as described in Section 2.3. However, the coffee processing plants and farms fall within the Tana River Basin which is managed by the Tana Water Resource Management Authority (see Figure 21). Tana Basin Water Resources Management Authority (Tana-WRMA) is one of six catchment organizations responsible for management allocation and protection of water resources in Kenya. The Tana WRMA became operational in July 2006 and operates under the national Water Resources Management Authority, which became operational in 2005.

Figure 21. Tana and Athi River Basins showing location of supplementary pilot sites (UNDP 2008)

Gikanda and Mana sites



Gikanda Farmers Cooperative Society

Location: Karatina, Nyeri Central Kenya
Owners: approximately 2600 small-scale farmers
Year established: 1987
Crops grown: Coffee and vegteables
Total farm size: Coffee ranging from 200-500 trees per holding
Cultivation methods: Rainfed
Primary markets: Europe via Coffee Management Services

Water use characteristics:
The smallholder farmers use a limited amount of water for pesticide application though coffee crop is rainfed. The majority of water use takes place during the wet milling, or processing of the coffee crop at three mills owned by the cooperative located on the Ragati and Rwaithanga rivers. Coffee milling is a water intensive process producing significant amounts of liquid and solid waste. The main process involves removal of pulp, fermenting the beans, washing, soaking and drying before the beans are taken to the dry mills for roasting. Water is gravity fed, abstracted via impoundments and channelled through pipe work shared with several other users. There are no metering or measuring devices for these abstractions (although secondary data estimates that 4-6 m^3 of water are needed to process 1 tonne of coffee cherries[51]). Some water is recirculated but bulk disposal of wastewater is required at the end of each daily process.

Water quality interactions:
The fully washed processing of coffee as practiced at these sites generates large quantities of liquid and solid waste with a high pollution potential. Waste water includes runoff from pulping (fermentation) and washing and has particularly high Biochemical and Chemical Oxygen Demand (BOD/COD) – considerably higher than raw human sewage – associated with carbohydrates and proteins. Waste water also contains elevated nitrogen and phosphorus and variable pH. Wastewater is collected in unsealed lagoons where it soaks away whilst solid waste is collected and applied to land by farmers.

Biodiversity:
The sites do not lie within or close to protected or designated areas, although the activities of 2600 farmers are likely to have widespread interactions with biodiversity. Farming was observed to begin immediately adjacent to water courses.

Governance: An abstraction licence has been issued by WRMA for one site only and a monitoring record of waste water and river water quality has been issued. The sites are not members of any WRUAs.

Standards in place: The Society was given a Plan A Award by Marks and Spencers, UK in recognition of its efforts for sustainable production. The Cooperative is registered under Fairtrade certification

[51] Von Enden, J.C. and Calvert, K.C. 2002

Tana WRMA have issued the cooperative with a water use permit to be renewed every 5 years and have issued a certificate of water quality in 2008. The level of site performance with regard to regulatory measures is generally poor due to failure by the relevant authorities to enforce or inspect or assist compliance. However, the Cooperative has been recognized by Marks & Spencer for their efforts towards sustainable production and the cooperative is Fairtrade certified.

Environmental context

The site lies on a plateau below the southern side of Mount Kenya with water flowing from the Aberdares and Mount Kenya and joining the River Tana downstream. The Tana is the longest river in Kenya and the countries largest basin. It supports the livelihoods of very many rural communities and key ecosystems and the Kindaruma Hydro-Electricity Power Station downstream.

The social and economic context

Karatina town hosts a municipal council and is the headquarters of Mathira East district with a total population of 6,852. It is famous for agriculture mainly small-scale tea and coffee growing, dairy and horticultural farming.

The key water resource management issues facing the upper basin around Karatina are:

- Water scarcities during the dry season,
- High natural levels of fluoride,
- Deforestation around Mt. Kenya and loss of indigenous tree species,
- Soil erosion and sedimentation downstream,
- Climate change (extreme drought and flooding),
- Lack of land and land fragmentation which discourages efforts to set aside riparian land for conservation,
- Poverty, restricted livelihood and educational opportunities and low coverage of improved water supply and sanitation.

Pilot site overview

Gikanda Cooperative Society consists of a group of small-holder farmers who grow coffee for export and horticultural crops (e.g. French beans, tomatoes, snow peas, carrots, potatoes, bananas, etc.) for subsistence and to sell in local markets. The society owns three coffee factories (wet mills) which are used for pulping coffee berries and drying them before they are taken to the dry mills for roasting. The factories are:

1. Gichatha-ini pulping station (1,040 farmers) which uses River Ragati water
2. Kagocho pulping station (900 farmers) which uses River Ragati water
3. Ndaroine pulping station (700 farmers) which uses Ragati & Rwaithanga River waters

Gikanda comprises 2640 small-scale farmers who grow coffee ranging from 200 - 500 trees. The main function of the Cooperative is to help farmers process and market coffee with the amount of coffee processed by each factory ranging from between 2,000 to 70,000 kg/day. Based on secondary figures[52] this equates to water use of between 12 and 420 m^3/day. The coffee is mainly for export to European markets including the United Kingdom where the Coopertaive supplies Marks and Spencer. The money that members earn from the coffee is used for meeting

[52] Von Enden, J.C. and Calvert, K.C. 2002

their basic needs including paying for their childrens' education, food and shelter. The Cooperative also helps members to secure financial services for improving farming activities.

The three sites are situated in separate locations, but all use the water from Rivers Ragati and Rwaithanga. These Rivers originate from the Aberdare mountains and are tributaries of Sagana River which joins River Tana downstream. Gichatha-ini is about ½ km from River Ragati; Kagocho is approximately 1¼ km from River Ragati while Ndaroine is approximately 200 metres from River Rwaithanga River.

There are no recognized special areas for biodiversity conservation around the sites which are surrounded by farms and households. However, farmers are involved with various activities for biodiversity conservation including restoring the riparian zones through tree planting.

Key individuals responsible for water management and stewardship include:

- Members of the Cooperative, mainly farmers
- Management in the Cooperative
- Ragati River Water Users Association
- Kiagutu Domestic Water Association

Gikanda Cooperative Society was established in the 1990s. One future plan is to expand its production by recruiting more farmers. If funding is available, the Society would like to construct boreholes at the sites as alternative water sources.

The characteristics of water use at the sites

The three sites use water for milling coffee, specifically for grading (denser beans are of high quality and remain behind); pulping; washing; soaking/fermentation and transporting coffee within the processing system e.g. pumping coffee from one unit to the other (for example from pulping drum to the fermentation chambers)

The Process:

Water is abstracted from the River by gravity using 6 ½ inch pipes. It is directed to reservoirs (large tanks onsite) where it is stored before being pumped. When farmers bring their coffee beans to the mills, they are weighed. The water is used to grade the coffee beans according to their densities (heavy beans - high quality; light beans- low quality). Pulping is done to remove the outer shell or 'cherry'. The beans are transported by water to fermentation chambers where they are left for a minimum period of 24 hours. They are rinsed thoroughly and transported to soak tanks where they remain for another 12 hours, followed by more rinsing and finally transported to the drying tables where they are left to dry for several days before being delivered to the dry mills.

Water quantity

Water is mainly used during coffee picking season (High coffee season: November – December: Low season: Jan, April and May). There is no system for monitoring water within the sites. However, when pulping over 40,000kg of coffee berries, two large water tanks are used with a capacity of 105 566 litres each (this tallies well with secondary data – about $5m^3$ of water per tonne of coffee cherries).

Sources of water are as follows:

1. Gichatha-ini pulping station uses River Ragati water and groundwater for domestic purposes (i.e. For use by factory workers and office staff)
2. Kagocho pulping station uses River Ragati water
3. Ndaroine pulping station uses Ragati & Rwaithanga River waters

The natural flows of the rivers have been modified at points of abstraction via dams and transmission through pipes to the pulping stations. There are no records on the proportional or total volume of water abstracted from the rivers.

During dry seasons, water is reportedly scarce although this has not limited the ability of the factories to process coffee. At the Ndaroine pulping station, water from the Rwaithanga River is used mainly during the dry season to supplement the water from Ragati. During floods there have been accidental spills of waste water from the soak pits which has led to complaints from farmers downstream.

There is no evidence to show that the sites use water efficiently. Although all the sites recycle water at the pulping stage, none keeps a record of how much is recycled. It was observed that a lot of water is used, some of which goes directly to the soak pits and left to seep through the soil. At the drying tables, the water that drains from coffee beans is left to run freely without capturing it.

Water quality

The main source of solid waste is the pulp material which is removed at the initial stages. The pulp material is separated from the waste water and is eventually deposited as solid waste. Members of the Cooperative (Farmers) collect the pulp material to use as manure in their farms. Although this waste seems valuable to farmers and tends to be collected frequently, observations showed it was not always adequately stored. For example, at Ndaroine factory, waste water was seeping from a heap of pulp waste and observed to be running downstream through a small drainage channel.

Waste water is generated at all stages. The effluent is channeled to soak pits and left to percolate into the ground. Effluent from the factories can potentially contaminate surface water as well as the groundwater particularly during heavy rainfall events. Key pollutants are likely to include BOD/COD, total nitrogen and phosphorus.

The amount of waste and waste water produced by the three factories is unknown due to an absence of monitoring effort. However, it is presumed that more waste is produced during peak seasons when there are large amounts of coffee available to be processed. In total, there are 15 soak pits (dimensions: 6 x 10 feet) which tend to be full throughout the peak seasons(October-December). It is not easy to quantify solid waste (mainly pulp material) as it is informally collected by the farmers who are cooperative members.

Figures 22 to 30 clockwise from top left: River abstraction intake showing concrete structure and hand built stone dam; on site water storage; drying racks; effluent soakaway; downstream watercourse; effluent lagoon; solid waste storage area; process water transmission line; centre: drying racks.

Biodiversity and riparian management

There are no immediate borders between the sites and the rivers except that one site (Gichatha-ini) has a borehole onsite. Distances between the sites and rivers are short and the riparian lands are owned by farmers who are members of the Cooperative. Many of the small-scale farmers whose lands fall in the riparian zones can easily access the water from the rivers for domestic and irrigation purposes. Access is mainly through pipe systems connected to a central abstraction point.

Data is sparse concerning the ecological and geomorphological status of the rivers and groundwater around the sites. Data derived from interviews, focus group discussions and observations show that the physical structures of the rivers have been modified specifically in attempts to divert high water volumes at the abstraction points. There are no records of the diversity of plants and animals in the rivers.

Legal specifications for water use and stewardship and site performance against these

According to the sites, they have not yet been subjected to comply with specific legal measures concerning water use and stewardship. Only one (Ndaroine) out of the three sites pays for water abstraction via a voluntary community water project. With regard to discharge, the Water Management Authority tested water quality at the abstraction points although a limited number or parameters were used and the sampling dates may be outdated.

No specific or generic planning controls are in place at the sites and neither have EIAs or Environmental Audits been conducted nor any planning permissions or agreements drawn regarding the sites.

Although there are a number of statutory measures for waste management (e.g. Water Quality Regulations 2006 Legal Notice No. 121), the relevant authorities are not active enough to enforce them at the sites. The only evidence regarding statutory measures is the water quality testing done by the WRMA in 2008. Without systematic monitoring, it is unfeasible to determine whether the sites are complying against legal measures.

Requirements of existing market or production standards

The main market standard applied at the sites is the Fair Trade standard. It requires that all workers must have access to portable water, that no pollution is caused, that local legislation is complied with and that buffer zones be maintained and restored in order to protect water bodies. The sites have qualified with previous Fair Trade audits.

In terms of the benefits of these standards and the experiences of operators regarding their value, the Fair Trade standards have driven:

- Recycling of water to minimize use
- Recycling pulp material which farmers use as manure
- Construction of numerous soak pits to store waste water
- Treatment of liquid waste in the soak pits to reduce odours
- Construction of a borehole at one site to provide domestic water
- Facilitation on workers' and farmers' awareness on health and safety through training (e.g. on protective clothing during chemical spraying)

- Construction of secured chemical houses onsite

Associated benefits are:

- Recycling waste water and pulp waste saves water use and minimizes the use of fertilizers
- Increased awareness on good crop husbandry among farmers
- Increased awareness on health and safety at work with subsequent protection of workers and farmers
- Exposure to international markets via Coffee Management Services
- Increased income per kg of coffee (For example, farms get KSh 60/kg compared to the previous years when they got KSh 40/kg.

Although the sites recycle water at the pulping process which reduces its use, there are plans to recycle the water at all stages in order to increase the capture of water. There are also plans to increase capacities among the Cooperative members and sites' workers on good crop husbandry and environmental protection and conservation

The main motivation for these efforts is to be recognized at all levels (locally, nationally and internationally) as responsible producers and to subsequently secure markets at all these levels. For example, Marks & Spencer have granted them a Plan A award and Fairtrade earns them a highly valued premium.

Key water impacts, risks and concerns at the site

Water quantity

There is a risk of over-abstracting water from the rivers given that there are effectively no controls, monitoring or working agreements in terms of water allocation and abstraction. These risks conflict with downstream users in the catchment, in particular other small farmers, and environmental degradation through low flows, particularly during dry spells. Of particular concern is the observation that constructed abstraction points had been supplemented by hand built dams across the full channel to generate a consistently high head of water.

Water quality

Waste water generated by the site poses a significant pollution threat to surface and groundwater. In particular, wastes with very high BOD/COD and nutrient loads are currently disposed of in unsealed ponds and risk pollution to groundwater and surface water through overflows, particularly during flood events. However no evidence of pollution was seen during our visits. It is unlikely that this wastewater could cause significant human health risks although reduced oxygen levels and impacts on aquatic ecology and invertebrates could be significant.

Poor land husbandry and cultivation in the riparian zone risk erosion and high levels of sedimentation downstream.

Cooperative members also store and use agricultural chemicals which pose pollution risks though no evidence of their handling was gathered during our visit.

Biodiversity

There is a risk of habitat and biodiversity loss, for example following pollution events and via low flows. Further, the activities of 2600 farmers are likely to have significant implications for water related ecosystems in the area, in particular riparian habitats.

Governance

There is limited knowledge of policies, laws, regulatory measures and a lack of capacity within the responsible organizations to support compliance. Only one abstraction is licenced and the sites are not compliant with other legislation such as that for an annual environmental audit return to NEMA. Neither are participatory or devolved management structures such as WRUAs particularly active or effective, and the cooperative is not represented. Not only do these governance challenges significantly heighten the risks of environmental impacts but they erode institutional development. For example the none payment of revenues to NEMA and WRMA restrict their ability to address capacity shortfalls.

Options available to the site for improving water stewardship performance and water management in the basin

Key options include:

- Install a metering and monitoring system
- Ensuring pass forward flow needs are provided
- Explore options for reducing pollution risk
- Implement a water quality monitoring system and waste and water use minimization programmes
- Engage members with river basin conservation, riparian restoration and basin governance
- Work with members to improve land husbandry, minimize chemical inputs and promote WASH activities

7.1.2 Requirements of the draft standards and outcomes in terms of costs and benefits

Generate data, information and analysis

- Volumes of water abstracted from the rivers
- Assess risks to sensitive water sources
- Amount of water used for processing
- Amount of water recycled
- Amount and quality of waste water discharge
- Productivity of the borehole at Gichatha-ini site
- Water quality parameters for monitoring quality of water sources & discharge
- Environmental baseline information of the sites (e.g. plant and animal species)
- Maps showing priority areas for conservation e.g. High Conservation Value (HCV)
- Hydrological data (e.g. amount of rainfall in the area) obtained by sites (e.g. rain gauges) or through a third party
- Identification and analysis of risks associated with site operations
- A clear and coherent water resource management strategy

- A documentation of all the relevant laws and policies including what is expected from the sites, how they are complying, opportunities and costs.
- Names and contacts of relevant authorities responsible for enforcing the laws and policies
- Score cards
- Baseline information on suppliers (e.g. their position in the river catchment)
- Knowledge and awareness of potential conflicts and a clear strategy (s) of actions to be taken to resolve them.

Develop human resource - time, skills and management effort

- Monitoring and evaluation (e.g. impacts of operations on water quantity, quality & biodiversity)
- Risk analysis (e.g. procedures for pollution events)
- Waste and waste water treatment procedures
- Development of a Water Stewardship Policy

Invest in infrastructure and technology

- Installation of water meters at the factories
- Construction of drainage systems for collecting water used for soaking and rinsing coffee berries
- Constructed wetlands
- Simple and basic water monitoring apparatus
- Liquid waste water treatment
- Container for storing waste pulp material
- Cover water tanks to minimize evaporation

Training and guidance and external support

- Identify training and capacity building needs for site operators and suppliers on sustainable water management and stewardship
- Facilitate training and capacity building activities in accordance to needs
- Risk assessment procedures
- Training on monitoring and evaluation
- External guidance on the development of water stewardship policy
- Seek external assistance on regulatory procedures, policies and laws (e.g. requirements, changes etc.)
- Seek external consultancy services on environmental baselines through EIAs and EAs
- How to record complaints associated with sites' operations

Changes to operational procedures, policies and budgets

- Systematic monitoring and evaluation of water use and quality (being pro-active)
- Engage suppliers in sustainable water resource management
- Engage site operators and suppliers with river basin management activities
- Synthesis and document relevant policies and laws and indicate the level of compliance
- Identify persons (e.g. relevant authorities) responsible for enforcing laws and policies

- Identify and compile a list of other stakeholders and actors in the river basins
- Put in place a risk assessment procedure (e.g. preventive measures)
- Put in place a system for rewarding responsible water and resource users (site' suppliers)
- Put in place a system for recording and reporting complaints
- Fundraise and set up a budget for water management strategy and water stewardship

The outcomes of compliance with the draft standards

Benefits internally

Cost and efficiency (water and finance) savings

- Avoid cost of compensation for example through risk prevention and corrective measures
- Avoid or minimize legal and expert costs (e.g. hiring services of a lawyer or a consultant during risk events)
- Maximize production using less resources including water and energy

Reputational enhancement / protection

- Recognition for being responsible water users at local, national and international level
- Referral/recommendations to potential customers
- Could attract more members (farmers) to join the Cooperative and subsequently expand production
- May attract high quality human resources (skills, experience, expertise)

Market benefit

- Recognition at local, national and international markets
- Market may expand or diversify due to increased production and good reputations
- Potential to earn a premium

Others (water risk reduction?)

- Legal protection of sites' operations
- Enhanced capacities on risk reduction, monitoring and evaluation
- Better communication channels

External benefits

For downstream users and the environment

- Minimize impacts to downstream water bodies (e.g. River Sagana and Tana)
- Address risks of water scarcities especially during the dry seasons
- Protection of local environment including surrounding farms

Social equity, protection and poverty reduction

- Promoting equitable access to water among various users
- Raising the living standards of local populations through increased earnings

Biodiversity conservation

- Knowledge and conservation of priority areas (e.g. HCV)
- Riparian protection and restoration
- Minimize impacts to biodiversity

Economic potential / growth

- Improved local economy through enhanced living standards of local populations
- Improved national economy through protection of revenue generation and foreign exchange against water risk
- Coffee market expansion

Basin governance

- Promotion of integrated water resource planning and strong multi-stakeholder participation in river basin management
- Support and supplement existing regulatory measures
- Improved basin governance

Institutional development and sustenance

- Institutional capacity building
- Clear roles and responsibilities of various institutions in the basin
- Better communication and information exchange
- Formulation of institutional by-laws

Conflict prevention

- Better channels for resolving conflicts
- Identification and minimization of potential conflicts between catchment resource users.

7.1.3 Challenges and opportunities for standard implementation

Difficulties, challenges and shortcomings	**Opportunities and amendments**
Lack or limited data and information on the amount of water abstracted, recycled and the impacts of the sites' operations on the local environment including the surrounding rivers and their users.	It is possible to monitor amount of water abstracted by installing water meters. A different tank should be installed to store recycling water in order to determine the amount re-circulated in the system.
Lack of monitoring of the quantity and quality of waste and waste water The challenge would be to monitor water quality using all the parameters that the standards are asking for.	Simple procedures can be prosecuted to monitor water quality using the basic parameters such as temperature, turbidity, pH, etc. The parameters to be used for monitoring water quality should be site-specific as not all may be applicable within the sites.
A limited understanding about the direct and immediate benefits of the water stewardship standard to the livelihoods of members of the	The fact that Cooperative members are already benefitting from the Fair Trade Standard gives an opportunity to create awareness about the benefits

cooperatives and their associates.	of the Water Stewardship Standard such as earning a premium.
Limited knowledge about the risks associated with the sites' operations with regard to water quantity, quality, biodiversity and governance (as outlined above).	The Cooperative facilitates capacity building activities which would integrate risk assessment and corrective/preventive measures.
Limited knowledge about the national laws and policies that govern river basins including persons responsible for their enforcement.	The present institutional arrangement for water resources management outlines clear roles and responsibilities of various actors. There are opportunities to involve local water users through WRUAs.
The fact that there are numerous actors associated with the sites mainly small-holder farmers who do not have the capacity to comply. For example, setting riparian land free of cultivation within farms of less than one acre.	Members of the Cooperative would comply through collective action taken in groups. Auditing could be conducted through group activities
Absence of budget specifically for water stewardship standards.	A willingness to adopt the Water Stewardship standard would create opportunities to fundraise in order to take the necessary measures.

7.1.4. Key insights from the Gikanda site study

Road testing the pilot study results with the Gikanda smallholders provides very rich insights for the development of an international water stewardship standard. Above all it suggests **a need for the standard to be applicable and adoptable by smallholder producers** of this kind. This conclusion is based on the observation that the cumulative water impacts of large numbers of smallholders and the coffee milling operations pose significant risks for other water users in the basin. For example, the generation of large quantities of wastewater with very high pollution potentials across several sites, the damming of rivers across their full width at abstraction points and the activities of 2600 farmers has the potential to create conflict and exert negative impacts for other users and biodiversity. This is particularly the case in an environment which is effectively unregulated with low levels of communication and awareness of water impacts, risks and control measures, and which is highly naturally dynamic – such as that facing the Gikanda co-operative.

On a positive note, the pilot identified that whilst significant risks existed, no negative impacts were ongoing during the visit. For example, despite disposal of wastewater to unsealed pits, no pollution impact was observable in the small adjacent stream. Further, by **mobilizing the effort and initiative of such a large number of farmers, engaging with small holders in water stewardship has huge potential for proactive catchment protection and restoration**. Additional insights from the Gikanda pilot include:

- The primary challenge at the Gikanda sites is the generation and disposal of large quantities of highly polluting waste water. The Biochemical Oxygen Demand (BOD) - or pollution potential - of this effluent is likely to be several times as high as raw human sewage. The challenge facing the standard and the site operators is to guide and implement a treatment and disposal option which is both acceptable in terms of environmental impact and viable in terms of installation and operating costs. Although no

pollution was observed during the site inspection, the current disposal method poses significant risks of chronic groundwater pollution and acute surface water pollution in the event of flooding or lagoon collapse or overflow. **The standard needs to respond to this type of scenario and ensure that appropriate and effective technologies are applied which mitigate risk but which do not have a disproportionate financial cost for small producers**.

- Although no issues of conflict were reported between the cooperative and their upstream and downstream neighbours in terms of abstraction of river flow there is potential for this given that 1) the abstractions although permitted are effectively unregulated with no monitoring or compliance, 2) several other users share the abstractions, 3) the full cross section of the river is dammed to ensure a good head of water and 4) downstream water demand appears to be high with numerous small farmers using 2.5 inch diesel pumps to abstract irrigation water for high value vegetables**. The standard needs to be able to respond to this 'governance challenged' context with an approach which ensures downstream needs are assessed and provided for which can be easily applied by groups such as the Gikanda Cooperative.**

- Existing standards in place at the sites, in particular Fairtrade were popular with the cooperative members but do not appear to adequately address the water risks posed by site operations. **In particular the premium payments and group benefits of Fairtrade were a significant incentive for collaboration and joint effort and such a mechanism should be explored within the development process of the IWSS.**

- **Implementing water stewardship standards with smallholders offers numerous opportunities for driving progressive pro-poor development and embedding resilience.** For example, it could promote the adoption of weather indexed or smallholder insurance to protect from drought, floods and disease, or scaling up of integrated solutions such as Ecosan latrines.

- **Smallholder groups and SMEs are likely to need differentiated indicators and support given their restricted resources and capabilities.** Special attention should be given to training, advice and capacity building requirements in terms of water stewardship.

7.2 Mana horticultural and dairy farm

An overview of the Mana site characteristics and water use is provided overleaf.

7.2.1. Site context and water use

Institutional context

The Mana site is governed by the same statutes and policies as described in Section 2.3. though the site is within the Honi River sub-catchment within the Tana River Basin which is managed by the Tana Water Resource Management Authority (see Figure 21). The farm has a water use permit for it's abstraction from the Honi River from Tana WRMA and a permit for groundwater abstraction is in place though there are no numerical limits on the amount of water to be abstracted. Other regulatory requirements are not monitored by authorities though the site has been recognised by Homegrown Ltd. for efforts towards sustainable production

Environmental context

Key water related issues facing the sub-catchment include:

- Water scarcities during the dry season
- Deforestation in Mt. Kenya
- Soil erosion and sedimentation downstream
- Land fragmentation
- Loss of indigenous tree species
- High natural levels of fluoride
- Climate change (extreme events - droughts and floods)

The social and economic context

Nyeri is a densely populated district within the fertile Central Highlands, lying between the eastern base of the Aberdare Range which forms part of the eastern end of the Great Rift Valley and the western slopes of Mt Kenya. The town's population according to the 2009 Kenya Population and Housing Census is 119,273 with 36,412 households.

Farming is the primary economic activity where tea and coffee are the main cash crops grown by small-scale farmers who are organized into quasi-private state-supported and supervised co-operatives or companies for farm input distribution, basic processing and marketing purposes. Horticultural and dairy farming have also become common over the last decade. Horticultural crops include legumes (especially beans and peas), tubers (mainly potatoes), and vegetables (especially tomatoes, cabbage, spinach and kale). Livestock, mainly dairy cattle, goats, sheep, and chickens are also widely kept. Food crops and livestock farming are also done by smallholders, with marketing and distribution of surplus produce (after farmers' own consumption) being done privately.

Tourism is also significant, as there are many tourist destinations nearby, including the Aberdares and Mount Kenya National Parks.

Water provision and sewerage services are said to be improving in the town, though water scarcities are common during the dry season and use of unimproved pit latrines is widespread.

Mana horticulture and dairy farm

Location: Nyeri Central Kenya
Owners: Private owners supplying Homegrown Ltd.
Year established: 1997
Crops grown: French beans, baby corn, garden peas (for export). Others include onions, carrots, spinach, cabbage, tomatoes, capsicum, cucumber, celery and coriander leaves for local markets.
Dairy (40 cows) produce around 200 litres per day for Kenyan markets
Total farm size: 40 acres
Cultivation methods: Greenhouses take ¾ of land where tomatoes, capsicum, cucumber, celery, coriander leaves are grown.
Primary markets: International and domestic
Staff full time: 10

Water use characteristics:
The farm abstracts from the River Honi (also known as Amboni) which originates in the Aberdare mountains, at an abstraction point 4km from the farm. The river is fed by the Ikumare springs from which a furrow supplies other local farmers for domestic and farm purposes. A borehole is also used. The farm irrigates using overhead sprinklers in the open field and drip irrigation within the green houses.

Water quality interactions:
The main sources of waste and potential water quality issues are crop and animal waste (slurry), wash out from chemical tanks, run-off from irrigation and soil erosion. Organic wastes are reused on site as animal feed and for land conditioning with slurry stored in tanks prior to application. Agricultural chemicals including fertilizers, fungicides, pesticides and herbicides are stored and used in line with best practice. Wash water containing agricultural chemicals is disposed of to soak pits.

Biodiversity:
Site is located within 5km of Solio Ranch and 20km from the Aberdares National Park though there is no direct involvement with biodiversity management. The farm does not abut any watercourse and has no riparian land. Some agroforestry is underway on the site.

Governance:
Regulatory and governance interaction is limited to permits issued by WRMA for ground and surface water abstractions though numerical limits are not set within these.

Standards in place: GlobalGAP, Fairtrade, Homegrown internal standards

In summary, priority water resource management and water stewardship issues facing the basin are:

- Water scarcity during the dry season
- Climate change and changing frequency of drought and flood events

Pilot site overview

Mana Farm is a private agri-business which specializes in horticultural crops for both export and local markets on a 40 acre plot. The main crops for export to international markets are French beans, baby corn and occasionally garden peas while cabbages, tomatoes, capsicum, cucumber, celery, carrots, spinach and onions are grown for local markets. The farm is sub-divided into several pieces of land (one acre each) where each crop is grown. A variety of vegetables are grown in greenhouses which take ¾ of the land and these include tomatoes, capsicum, cucumber, celery, and coriander leaves. Dairy farming (40 cows and 5 goats) also takes place and the farm produces 200 litres/day of milk for local markets.

The total number of permanent employees is 10, while the numbers of temporary workers vary according to season. The farm uses water from the River Honi as well as groundwater from the borehole.

The farm is about 4km from the River Honi which originates from the Aberdare mountains. At the abstraction point, the River is joined by a saline stream called the IKumare which originates from springs. The farm does not use this stream, however there is a furrow through which local farmers abstract water to use for domestic and farm purposes.

Besides the Honi River and Ikumare stream, the surrounding areas are recognized as special areas for biodiversity conservation. Protected areas include the Solio Ranch and the Aberdares National Park which are approximately 5km and 30km away respectively. These sites are important for conserving wild animals and plants. Whilst the farm has no direct involvement with protected areas it is engaged in agro-forestry activities.

Key individuals responsible for water management and stewardship include:

- Farm owner; Farm manager and workers
- Ragati Honi Water Users Association
- WRMA
- NEMA
- Home grown

The Mana farm was established in 1997. It plans to expand its production including dairy farming.

The characteristics of water use at the sites

Water quantity

The main uses of water are:

- Irrigation (sprinkle and drip)
- Spraying chemicals
- Watering cattle
- Washing tanks

- Domestic (e.g. drinking and sanitation)

The water from the river is transmitted through a 4 inch pipe and stored in a reservoir tank which has a capacity of 489,000 gallons. Rain water is also harvested and stored in a tank which has a capacity of 54,000 litres. There is another special tank for transmitting water to the green houses via drip irrigation. The tank has a capacity of 10,000 litres of water. Within the reservoir, there is an automatic switching system so that when it is dry and there is less water coming from the river, it switches on to withdraw water from the borehole. Water is pumped from the borehole and transmitted via a 2½ inch pipe. The borehole on site has a capacity of 26 cubic meters (m^3) per hour.

There are no records showing how much water is abstracted and no systematic monitoring. However, rough estimates were given as follows:

- 24-hour sprinkle irrigation: 485 000 gallons used per day
- 12 hour drip irrigation in the greenhouses – 40 000 litres a day

Rainwater is harvested via the greenhouses but there are no records to show how much is harvested due to lack of monitoring. The capacity of the harvesting tank is 54,000 litres.

Observations showed that the natural flows of the rivers have been modified at points of abstraction where the river is dammed across its full width before it is pumped and conveyed to the farm.

During dry seasons, the river levels decline and the farm utilizes the groundwater to supplement it. The level of crop production decreases slightly. During floods the plots within the farm get water logged and some crop damage occurs.

There is no evidence of measures to drive water use efficiency at the farm. However, the water tanks are covered to reduce evaporation and small depressions are dug between the crops to retain water. No water is recycled.

Water quality

The main sources of waste are:

- Vegetation material from crops
- Animal waste (dung)
- Slurry
- Wash out from chemical tanks
- Run off from irrigation

Waste vegetation is used as animal feed while the dung and slurry are used as manure on the farm.

After washing the spray tanks, the waste water is drained into soak pits which are layered with stones at the core base, charcoal in the middle and stones at the top.

Fertilizers, fungicides, pesticides and herbicides sprayed onto the crops include:

Fungicides:
Copper-based: Mainly used to retard the growth of fungus and used in crops
Sulphur-based: As above
Spore-kil: kills the spores and prevents them from spreading

Pesticides:
Delta methin: used to kill caterpillars, thrips, aphids etc. These are sprayed reactively after scouting (i.e. Checking to see which plots are affected and require treatment)
Decis (product): Used as above
Cofidor (active ingredient Imidclopid)- used to kill white flies, aphids after scouting

Storage and handling of these chemicals appeared to be adequate to minimise pollution risks.

The amount of waste and waste water produced is unknown due to a lack of monitoring. Cattle slurry is stored in a large tank before being applied to the farm. Observations showed that the slurry tank was full and that it posed a pollution risk especially in the event of heavy rainfall. Wash out from the slurry handling area is directed to a soak pit.

Biodiversity and riparian management
The distance between the farm and the River Honi is 4km. Data is sparse concerning the ecological and geomorphological status of the river and there are no records of the diversity of plants and animals in the river stretch.

At the abstraction point there is a large pumping house comprising of five pumps owned by different water users. There is also a furrow system through which local farmers abstract the water from the Honi and the IKumare water to use for domestic and farm purposes.

Legal specifications for water use and stewardship and site performance against these
The farm is legally permitted to use water by the WRMA with a surface water permit issued in October 2006 and renewed in 2009, and a permit for groundwater issued in 2009. Both permits expire on November 2014. The permits do not set a numerical or qualitative limit on the water to be abstracted.

With regard to discharge, water quality is monitored via Homegrown and parameters tested include: sediment; Microbial bacteria- once or twice a year depending on the season (dry or wet); irrigation suitability – pH, electroconductivity; nutrients: sodium, potassium and heavy metals.

The farm obtained a planning permission/permit from the WRMA before constructing the borehole. It is not known whether EIA or Environmental Audits have taken place at the farm, though technically this is a legal requirement.

Although there are a number of statutory measures for waste management (e.g. Water Quality Regulations 2006 Legal Notice No. 121), the relevant authorities are not active in monitoring or enforcing these.

No 'incidents' or issues of water conflict have ever been reported.

Requirements of existing market or production standards

The site works to market standards which have relevance to water stewardship including Homegrown's internal standards, GlobalGAP and Fairtrade and audits against each have taken place to certify the farm to these standards. Full compliance with local statutes is a requirement of these standards.

Compliance with these standards has required or instigated the following investments:

- Installation of drip irrigation to minimize water use and improve soil moisture in the green houses
- Recycling waste and waste water
- Treatment of liquid waste in the soak pits
- Construction of the borehole to abstract groundwater
- Harvesting rainwater via greenhouses

Associated benefits seen through compliance and investment include:

- Efficiency in resource use, for example less water is used through drip irrigation while use of organic manure from animal waste minimizes costs of fertilizers
- The use of alternative water sources (rain and groundwater) reduces pressure on the rivers particularly during the dry season.
- Increased production due to investments on the alternative water sources
- Exposure to international markets via Homegrown

Future plans at the site include:

- Recycling water and using it more efficiently.
- Building more tanks for storing rainwater
- Constructing more greenhouses in order to reduce evaporation and water usage
- Apply drip irrigation more widely

The primary motivation for these developments is to increase production and profitability.

Figures 31-35 clockwise from top left. Mana farm abstraction point from Honi river; field crop; greenhouse crop; inside a pumphouse - unmetered water use; hand built dam downstream of abstraction point.

Key water impacts, risks and concerns at the site

Water quantity

There is a risk of over-abstracting water from the River Honi given that there are five other pumps at the abstraction point and the lack of numerical limits on the quantity of water abstracted. Numerous small-scale irrigators share the water resource in the catchment and although requirements are unknown conflicts may arise and intensify, particularly given that dry season water scarcity is already reported as a problem which has led to Mana farm drilling a borehole. A shortage of water in the Honi River could lead to ecosystem and livelihood impacts and poses incoming risks to Mana farm through interrupted production.

Water quality

Run-off from the farm has the potential to contain fertilizers, fungicides, pesticides and sediments though no formal risk assessment has been carried out. Of additional concern is the

vulnerability of the slurry storage facilities to heavy rainfall events and the unknown risks of groundwater contamination via wash water disposal to soakpits. Charcoal lining of pits will do little to ameliorate this risk unless it is replaced very regularly.

Biodiversity
Land conversion to farmland is lilely to bring changes to habitats and biodiversity though given the distance to the Honi River the direct influence of the site on aquatic habitats is likely to be limited. The primary concern relating to biodiversity is the potential impact of low flows exacerbated by site water use in the Honi, though the lack of any ecological data or knowledge of use values limits such an assessment.

Governance
Mana farm lies in a governance challenged catchment where relevant authorities lack the capabilities to implement policy and legislation (e.g. NEMA and WRMA). The lack of numerical limits on the abstraction is an excellent example of the challenges faced. There are also overlapping roles and responsibilities and limited knowledge of policies, laws and regulatory measures undermine compliance.

Options available to the site for improving water stewardship performance and water management in the basin

Key options are:

- Monitor water use and develop a regime for efficiency savings
- Implement a water quality and waste monitoring system and target waste minimisation
- Assess the risks posed to groundwater and act accordingly to minimize these
- Engage with research, conservation and riparian management activities
- Initiate and engage with governance through the local WRUA to promote coordinated water use and the avoidance of conflict.
- Lobby for improved delivery of regulatory services, for example the revision of permits against a mutually agreed catchment management plan.

7.2.2. Requirements of the draft standards and outcomes in terms of costs and benefits

To comply with the draft standard(s) the following steps will be required:

data, information and analysis

- A record of water quantities abstracted from the River Honi and from the borehole
- Information on all the sensitive water sources surrounding the farm including the protected areas
- A record on the water quantities used in other areas including washing the tanks, domestic use etc.
- Records of amount of water recycled
- Data on amount and quality of waste water discharged to the soak pits and run off from the plots
- A clear outline of relevant water quality parameters

- Environmental baseline information of the surrounding areas
- Maps showing priority areas for conservation e.g. High Conservation Value (HCV)
- Hydrological data (e.g. amount of rainfall in the area) obtained by the farm (e.g. rain gauges) or through a third party
- Identification and analysis of risks associated with farm operations
- A clear and coherent water resource management strategy for the farm
- A documentation of all the relevant laws and policies including what is expected from the farm, how they are complying, opportunities and costs
- Names and contacts of relevant authorities responsible for enforcing the relevant laws and policies
- Score cards as specified by the Australian Standard
- A data base on other water users in the river catchment and some knowledge about their activities and potential impacts to the water sources and the environment
- A record of past and potential conflicts and a clear strategy (s) of actions to be taken to resolve them.

human resource - time, skills and management effort

- Skills for monitoring and evaluation (e.g. impacts of operations on water quantity, quality & biodiversity)
- Ability to analyze risks and put in place preventive and corrective procedures, for example in case of flooding events which could cause leakages.
- Efficient methods for waste and waste water treatment
- Skills for developing a Water Stewardship Policy for example through multi-stakeholder consultation.

investment in infrastructure and technology

- Investments in drip irrigation
- Construction of drainage system for collecting run off water from the plots
- Constructed wetlands to treat waste and increase farm biodiversity
- Investment in water monitoring apparatus
- Construction of additional soak pits to treat waste water
- Installation of a secured container for storing animal waste and slurry
- Construction of additional tanks to store flood and rain water

training and guidance and external support

- Identification of training and capacity building needs for farm workers on sustainable water management and stewardship
- Training on risk assessment procedures
- Training on monitoring and evaluation
- Seek external guidance on the development of water stewardship policy
- Seek external assistance on regulatory procedures, policies and laws (e.g. requirements, changes etc.)
- Seek external consultancy services on EIAs and EAs
- Training on how to deal with complaints associated with farm operations efficiently.

changes to operational procedures, policies and budgets

- Systematic monitoring and evaluation of water use and quality (being pro-active)
- Engage the farm manager and workers with river basin management activities for example being a member of Honi Water Users Association
- Keep a database of synthesized records of relevant policies and laws and the level of compliance and persons (e.g. relevant authorities) responsible for enforcement
- Identify and compile a list of other stakeholders and actors in the river basins
- Put in place procedures (e.g. preventive measures) for potential risks
- Initiate a system for rewarding farm workers who are responsible for sustainable water use and environmental protection
- Put in place a system for recording and reporting complaints
- Fundraise and set up a budget for water management strategy and water stewardship.

The outcomes of compliance with the draft standards

Internal benefits

cost and efficiency (water and finance) savings

- Avoided cost of compensation, for example, in case of a major pollution events
- Avoid or minimize legal and expert costs (e.g. hiring services of a lawyer or a consultant during risk events which could have been prevented)
- Maximize production using less resources (e.g. water, energy, fertilizers)

reputational enhancement / protection

- A high recognition for being responsible water users at local, national and international level
- Third party referral/recommendations to potential customers
- May attract high quality human resources (e.g. skilled and experienced farm workers).

market benefit

- Recognition at local, national and international markets
- Market may expand or diversify due to increased production and good reputations
- Potential to attract a premium

others (water risk reduction?)

- Legal protection of farm's operations
- Enhanced capacities of farm workers and associates on risk reduction, monitoring and evaluation
- Improved communication channels internally (e.g. between farm workers)

Potential external benefits

for downstream users and the environment

- Minimize risks to downstream water sources
- Reduce the impact of water scarcity during dry seasons

social equity, protection and poverty reduction

- Promoting equitable access to water among various users in the river basin
- Raising the living standards of local populations through security of agricultural production

biodiversity conservation

- Knowledge base built
- Riparian protection and restoration
- Minimize impacts on biodiversity

economic potential / growth

- Improved local economy through secure livelihoods
- Improved national economy through revenue generation and foreign exchange
- Horticultural market expansion

basin governance

- Promotion of integrated water resource planning
- Promotion of strong multi-stakeholder participation in river basin management
- Support and supplement existing regulatory measures
- Improved basin governance for example by joining the WRUAs

institutional development and sustenance

- Institutional capacity building
- Clear roles and responsibilities of various institutions in the basin
- Better communication and information exchange
- Formulation of relevant and useful rules and regulations in support of the Water Stewardship.

conflict prevention

- Better channels for resolving conflicts
- Identification and minimization of potential conflicts between catchment resource users.

7.2.3 Challenges and opportunities for standard implementation

Difficulties and challenges	Opportunities and amendments
Lack or limited data and information on the amount of water abstracted, recycled and the impacts of the farm's operations on the local environment including the surrounding rivers and other users. Assessment and evaluation of off site impacts is challenging. EWP standard deems groundwater sensitive and requires full risk	A systematic monitoring should be possible through installation and use of water meters. Offsite risk assessment dialogue with water users could be a useful first step where data is not available from WRMA or others.

assessment	
Limited and unclear procedures for monitoring of the quantity and quality of waste and waste water The challenge is to monitor water quality using the parameters that both the Australian and European standards are asking for.	The parameters to be used for monitoring water quality should be site-specific as not all may be applicable within the sites. It is possible to seek services of water quality experts in order to identify parameters that can realistically be tested.
Limited knowledge about the direct and immediate benefits of the water stewardship standard to the farm.	There are opportunities to integrate the Water Stewardship Standard within the existing market standards through capacity building initiatives that are already in place (for example training of farm manager and workers).
Limited knowledge about the national laws and policies that govern river basins including persons responsible for their enforcement.	The present institutional arrangement for water resource management outlines clear roles and responsibilities of various actors. There are opportunities to involve local water users through WRUAs.
The fact that there are numerous market standards which ostensibly address sustainable water use (including Homegrown) and that it would be challenging to impose another one.	Since these standards are already in place there is an opportunity to supplement and strengthen the way they handle water by integrating the water stewardship standard.
Absence of budget specifically for a water management and stewardship	Adopting the Water Stewardship Standard would help identify cost savings and justify budget allocation and increased management effort

7.2.4. Key insights from Mana pilot study

The supplementary pilot study carried out at Mana horticultural farm provides further valuable insights for the development of an international water stewardship standard and adds depth to the findings in Naivasha. In particular it reveals both the value and challenges of scaling an IWSS to address the water stewardship of an SME in a governance challenged basin:

- Existing scarcity within a sub-basin with competing commercial and livelihood water uses which are neither coordinated nor controlled by statutory authorities poses multiple risks for all users and the environment. **Individual or collective action through a water stewardship standard could drive progress and reduce risks in this context**.
- It appears that **adoption of a water stewardship standard would reduce internal operational risks, generate efficiency and cost savings and would reduce the risks posed by the site** to other users and the environment.

- Mana farm is a small enterprise with limited capacity to roll out standards, but it has already been driven to implement GlobalGAP and Fairtrade which **implies that a IWSS must be viable and applicable at this scale.** It is unclear whether an operator the size and with the capabilities of Mana could comply with either of the draft standards in their current formats.
- **Although a site may comply with local statutory requirements on environment and water, this is no indication that water use is sustainable or of responsible stewardship**. An IWSS will need to factor in and respond judiciously to this type of scenario. For example, the farms abstractions are permitted but the permits do not specify any conditions or numerical limits on water use. The farm could be withdrawing the full flow of the river and causing problems for water users downstream yet it's use would be legal.
- **Flooding and drought conditions are the crux times for water impacts** at the site and the standard should pay special attention to preventative efforts and minimising vulnerability to such events.

8. Recommendations for building a robust international water stewardship standard

To explore how draft regional water stewardship standards perform in Kenya, this report provides a contextual understanding of the challenges facing Lake Naivasha Basin, introduces the contents of the draft standards, reviews site performance against them and the outcomes which compliance would drive for the site and the basin. This process has generated key insights and questions for further deliberation.

The Project Reference Group were unanimous in agreement that the standards would drive positive change in the basin. To develop a more systematic assessment of whether the draft standards are fit for purpose their strengths and weakness are reviewed based on whether they address the challenges and water stewardship priorities facing LNB identified in Chapter 2 . The combined insights of this analysis and that in Chapter 5 and 6 produce a set of recommendations for the development of an International Water Stewardship Standard (IWSS).

8.1 Reflections on EWP and WSA standards

Table 15 indicates whether each regional standard in its current form addresses the key issues facing the basin and drives the priority stewardship responses identified in Chapter 2. This informs a summary reflection in the strengths and weaknesses of each.

Table 15. Assessment of whether draft regional standards address priority issues and stewardship response s identified in Chapter 2.

Priority challenges facing LNB and related stewardship responses	EWP v2.0	WSA-00
Water flow/levels		
Uncontrolled / unregulated abstraction	✓	✓
Changes to inflow and declining lake levels	✓	✓
Catchment degradation and deforestation	?	✓
Lack of data and knowledge	✓	✓
Low water use efficiency	✓	✓
Related stewardship priorities		
Demand management and efficiencies in water use	✓	✓
Effective abstraction management strategy (WAP) implemented	✓	✓
Adequate regulation and control of water abstraction	✓	✓
Enhanced understanding of the contribution of deforestation	?	✓
Improved understanding and regulation of groundwater	✓	✓
Water quality		
Siltation and soil erosion	✓	✓
Inadequate waste water treatment	✓	✓
Pollution by agricultural chemicals	✓	✓
Eutrophication	✓	✓
Lack of compliance	✓	✓
Lack of data and knowledge	✓	✓
Related stewardship priorities		
Erosion control and sediment management plans including a monitoring regime to construct a sediment budget for the basin	×	?
Improved treatment and regulation of waste water discharges and effluent treatment including municipal sewage treatment	✓	✓
Pollution prevention including control of diffuse pollution from small and large farm holdings (for example support for PES)	?	?
Support for small farmers in best practice techniques	?	?

Biodiversity		
Catchment degradation	×	✓
Alien/invasive species	×	✓
Loss of habitat and species	✓	✓
Loss of fishery	×	✓
Human wildlife conflict	✓	✓
Papyrus loss	×	✓
Riparian encroachment	✓	✓
Related stewardship priorities		
Understanding of drivers for catchment degradation and adaptive management responses	×	✓
Effective alien species control plan	×	×
Integrated riparian planning and management enforced and compliance assistance measures in place, including control of activities within a commonly defined riparian zone.	✓	✓
Governance		
Poor regulatory performance and implementation	✓	✓
Political interference	×	✓
Low awareness and poor communication	×	✓
Lack of infrastructure and investment	×	✓
Lack of regulatory capacity and resources	×	✓
Lack of integrated management	×	✓
Riparian access issues unresolved	×	✓
No common standards or plan	×	✓
Lack of monitoring	×	✓
Related stewardship priorities	×	✓
Legitmate and active stakeholder organisations	×	✓
Advocacy to resolve regulatory dysfunction	×	✓
Participatory accountability monitoring	×	✓
Other basin challenges		
Cultivation of riparian land and access conflicts	✓	✓
Poverty, poor health and restricted livelihoods	×	×
Lack of educational opportunities	×	×
Low coverage of water and sanitation services / water related health issues	×	×
Related stewardship priorities		
Development and implementation of integrated riparian management plan	✓	✓
Exploring and pursuing opportunities for proactive contribution to improved healthcare, education and livelihoods	×	×

8.1.1. EWP v2.0

The EWP standard has benefited from several iterations informed by testing in a number of settings and through deliberation by sector working groups of operational water users in Europe. This intensive development is reflected in the 'usability' of the standard and its supporting documents which are largely comprehensible and readily applicable on site. The Naivasha case study generated the additional following insights regarding the EWP standard:

Strengths

i. The general approach embodied in the EWP standard is logical, sequential and responsive to the nuances of sites and contexts under review. In particular the standard adopts an elegantly simple and flexible approach based on identifying topics

for exploration, and then requiring site specific risk assessment to generate management actions the efficacy of which must be then monitored and demonstrated.

ii. By promoting a risk-based approach, EWP 2.0 cuts down on unnecessary bureaucracy, management effort and expense and embeds a cost effective approach to stewardship. For example in establishing a monitoring regime, the EWP standards requires only those aspects which could realistically cause an impact to be monitored at a frequency proportional to the severity of the risks posed. This is in keeping with contemporary best practice 'smart', risk-based regulation which aims to bring efficiencies for the regulator and regulated alongside greater levels of environmental protection.

Weaknesses

i. The EWP standard has evolved in the relatively well regulated river basins of Europe and its data, resource, research and capacity rich water management contexts. For example the Water Framework Directive has ensured that every river basin in Europe is classified on the basis of current and future targets for flow, water quality and ecological status. There are several assumptions embedded in the draft standard which therefore do not have immediate relevance in an African basin context. These include that;
   - priority water quality and flow objectives have been set for the river basin and river stretches;
   - high conservation value features have been identified and designated;
   - a river basin committee representing stakeholders is in place and functioning in collaboration with a river basin authority;
   - data are readily available to drive environmental assessment and management.

   Unfortunately these assumptions do not hold true in many developing country river basins. The EWP standard does recommend certain steps where this 'public' data are not available. For example, it recommends deferral to:

   - the Water Stress Index to establish the status of local water bodies and ;
   - classification of water sources using the GRI EN9 indicators.

   However, assessment of the WSI tool reveals it to be inappropriate and potentially misleading for application within water stewardship because it lacks the granularity of scale and specificity necessary to target site and basin level stewardship responses.

   Similarly, an assessment of the GRI indicator protocols reveals that they have limited utility for guiding a stewardship response. For example, the GRI EN9 indicator characterizes sources which are 'significantly affected' as those 'where withdrawals account for an average of 5% or more of the annual average volume of a given water body', which are recognized by professionals as 'sensitive' or which are drawn from a Ramsar listed wetland. The first criteria based on abstraction as a proportion of total average volume is hydrologically meaningless and is not a credible indicator of hydrological status since the impacts of water withdrawal are temporally and spatially mediated and influenced by uses, values and functions. The second criteria assumes that data are available to make a judgment on and a professional at hand to pass reliable judgment. The EWP standard also specifies that all groundwater sources should

automatically be classed as sensitive sources requiring additional exploration and risk assessment and in the same section deems rainwater harvesting as having little potential for negative impact. However, a more cost effective and rational approach would be to base such assessments on scale rather than blanket classification. Therefore an alternative and more credible approach is required upon which to base these assessments which inform stewardship programme design.

→ SEE RECOMMENDATION XVIII. Rethinking basin assessment

ii. Within EWP 2.0, indicator 2.1 requires an assessment of 'eutrophication potential'. However no guidance is available on how this should be carried out. This requirement also appears to be insufficiently action focused and the development of a nutrient management plan would be a more productive requirement. Nutrient Management Plans (NMPs) take a whole farm approach to assessing nutrient demands, sources, diffuse and point source pollution pathways. They take into account seasonal nutrient demands and groundwater vulnerability and have been shown to be a farmer friendly approach to reducing nutrient pollution and fertilizer costs.

→ SEE RECOMMENDATION X. Assessing and acting on vulnerability

iii. The EWP standard restricts discussion of engagement in wider basin governance to two requirements in Criteria 4.7 which only oblige the site operator to be 'actively involved or represented in river basin activities or river basin committees' and to 'report on campaigns related to water '. Given the clear need for improved basin governance in Naivasha this requirement falls short of driving the proactive stewardship responses required to deliver the AWS objectives. The activities of site operators at Flamingo and Longonot in respect of wider basin governance already far exceed these requirements and a more progressive, ambitious requirement is needed within a future international standard.

→ SEE RECOMMENDATION XIX. Driving proactive engagement with water governance

iv. In its handling of High Conservation Values, the EWP standard does not currently give sufficient priority to the needs of local communities in terms of livelihoods, access and control of alien species and instead the focus is primarily on biodiversity and ecosystem assessment. Similarly, the boundaries and scale of engagement on high conservation areas need to be better defined.

→ SEE RECOMMENDATION XII. Prioritising the needs of the poor

8.1.2 WSA-00

The WSA-00 standard responds to the fact that for many catchments reliable assessments of impacts, thresholds and stewardship priorities are not available. It recognizes that devising an optimal water stewardship strategy needs to be based on and respond to a sophisticated understanding of the complex and interrelated determinants of sustainable catchment management which includes governance and policy issues as well as biophysical characteristics. The standard therefore provides a framework for weighing and assigning indices to these criteria and for shaping of a bespoke stewardship strategy which responds specifically to basin priorities. Whilst the intent is well thought out, in its current form the WSA-00 standard is difficult for site operators to implement. The strengths and weakness of the WSA-00 standard are summarized here.

Strengths

i. The WSA standard provides a framework for designing a locally relevant and adaptive stewardship response based on local priorities.
ii. The WSA standard includes in its assessment of high conservation values an assessment of local livelihood and access requirements.

Weaknesses

i. The requirement for a site based water footprint assessment and assessments of indirect, embedded and in product water use were felt by sites and evaluators and stakeholder alike to be onerous and of questionable viability and utility.

ii. →SEE RECOMMENDATION XV. Reviewing the role of water footprint assessment

iii. The current requirement for a catchment sustainability assessment, scenario planning and calculation of basin and site indices by the site operators, was considered to be unwieldy and intimidating, placing significant demands on time, resources and data. There were also questions as to whether the outcomes of this work would be representative of basin priorities because complex issues like governance capacity do not lend themselves to quantification. Also, the proposed assessment may lead to outputs of questionable value and legitimacy given that parallel processes of priority setting our ongoing in the public domain through collaborative and government mandated processes (namely the Water Allocation Plan and Sub Catchment Management Plan).

iv. The WSA standard also defers to GRI indicators for significantly affected water sources, though this schema is inappropriate for water stewardship for the reasons pointed out in 8.1.1.

v. → SEE RECOMMENDATION XVIII. Rethinking basin assessment

vi. The WSA-00 standard prescribes a set of parameters which should be measured by the site operators. However, although these are commonly measured determinants of water quality they may not relate to or fully reflect the actual parameters of interest at the site. This specification could lead to an inefficient mismatch between monitoring regimes and the actual substances which pose a risk to the water environment.

→ SEE RECOMMENDATION III. Embedding a risk based approach

In summary, for operations in a data rich and well regulated environment, the EWP 2.0 standard with several modifications comprises a straightforward and logical approach to identifying and tackling some of the key issues and could drive a progressive water stewardship approach which handles on-site issues and those in the supply chain. However, in order to unlock progressive engagement in governance the EWP 2.0 standard needs to be further developed and refined.

In contrast, the WSA-00 attempts to respond to the challenges and complexities of water stewardship and governance engagement at the basin level, but the process it currently adopts is not easy to use and should be revisited.

Notwithstanding these observations, both draft standards represent a significant first attempt to define, guide and measure water stewardship and are successful in many respects. To build on these achievements a series of conclusions and recommendations are set out based on those elements which work, those which need strengthening and those which need further exploration to support a progressive stewardship response in challenging developing country river basins.

8.2. Conclusions and recommendations for the development of an international water stewardship standard

The AWS Kenya case study clearly demonstrates the potential for water stewardship standards to make a positive contribution by driving improved and more equitable river basin governance in developing countries in new and exciting ways. It also clearly flags the challenges implicit in developing a standard which responds to the complexities of sustainable river basin management and flushes out some of the contentious issues for further deliberation. Resolving these challenges will require considered judgment by water stakeholders themselves and this underlines the crucial role of the International Standards Development Committee (ISDC) and the WRT as fora for this process. This case study work and discussions with stakeholders in Naivasha generate insights to support that process. Recommendations for consideration in the shaping of an international water stewardship standard are set out here.

Standard elements which are effective

I. **The Kenya case study validates the business case for water stewardship standards.** Both draft standards, provide a workable and effective framework for ensuring regulatory compliance, for driving efficiencies in water and related resource use, and a proactive, efficient and risk-based approach to analysis and action on key water issues. They also promote effective action towards water stewardship throughout the 'chain of influence' of site operators. Stakeholders in Naivasha concluded that the water stewardship standards have the following benefits for site operators:
    - reduced costs and efficiency gains;
    - reduced operational water risks;
    - reduced regulatory and reputational risks;
    - generation of intellectual and political capital;
    - securing certain markets and accessing new ones.

    They also concluded that implementation of water stewardship standards could drive positive outcomes for:
    - downstream water users and the environment;
    - social equity and poverty reduction;
    - biodiversity conservation;
    - sustainable economic growth;
    - efficient and good government;
    - conflict prevention;

    and potentially, could support more effective basin governance. Importantly, the market benefits and contribution to basin governance were seen as conditional on the

performance of the AWS in developing the standard and generating demand through an internationally recognized brand.

II. **The standard should require full compliance with water related law.** The requirement for full compliance with water related law should be retained. The PRG considered that this requirement would ultimately have positive outcomes for better regulation by driving demand and incentives for improved regulatory performance. Alternative perspectives argue that this requirements means attainment of the standard is conditional on the actions of a third party. However, one of the main problems in LNB is lack of legal compliance and it would therefore be difficult to envisage a credible standard which did not require compliance as a bare minimum. Proportional conditions and time bound requirements should be considered to prevent the standard from prejudicing operators in places where regulatory functioning is a problem.

III. **Embedding a risk-based approach.** The risk based approach is a rational and cost effective response to targeting investment and management effort to priority issues and should be a central feature of an international water stewardship standard.

Standard elements which need strengthening or more explicit attention

IV. **A robust response to climate change, flooding and other emergencies.** Both standards require consideration of and planning for emergencies and extreme weather events. However, floods and droughts are primary triggers for water conflict and impacts in Naivasha, Kenya and in many developing countries. Their prevalence in tropical and sub-tropical zones and the likely increase in intensity and frequency signaled by many climate change modeling scenarios demands their more explicit handling. For example, the standard could set out the return periods of droughts and flood events which should be planned for and provide more robust guidance on requirements for climate change adaptation and resilience. Problems of flooding, flood prevention, mitigation, planning and control in particular did not explicitly feature in either standard, and yet internationally flooding is responsible for the most severe impacts related to water. Flood risk management should feature explicitly in an international water stewardship standard.

V. **Promoting a duty of care**. A duty of care requirement should be explicitly set out which levels an obligation on the site operator to ensure that the chain of handling and disposal of solid and liquid waste generated at their sites does not have negative impacts. This needs to go beyond checking the legal status of waste handlers to a review of environmental risks and impacts.

VI. **Assuring quality in water monitoring.** Both standards are silent on the requirement for water quality and hydrometric measurement instrumentation and facilities to be quality assured. Use of accredited laboratories and properly installed regularly calibrated equipment by qualified staff should be a basic requirement of any future standard to ensure that data are reliable. For example, the standard should require sampling and monitoring to be carried out in accordance with ISO 5667-5 and laboratories used to be accredited against ISO 17025. Further, the standard should require operations dependent on water use to take an active role in collecting hydrometric data which can be used collectively. For example, given that a lack of reliable rainfall and flow data are often

a major barrier to resource planning and management, the standard should require installation of a rain and flow gauges and accurate recording and reporting.

VII. **Prioritising health and water linkages**. Neither standard currently features an explicit requirement to consider some of the health related impacts of water management. For example, changes in water storage, flow and movement through the landscape are major factors in the distribution and prevalence of diseases like malaria and bilharzia in tropical and subtropical regions. Consideration and proactive management of these environmental health linkages must be incorporated in a future standard.

VIII. **Improving water supply and sanitation service delivery**. Similarly, neither of the existing standards refer specifically to the water supply and sanitation requirements of site staff or local communities. To be genuinely progressive the standard must require action by site operators to ensure that local communities within the sphere of influence are provided with adequate water supply and sanitation facilities. This obligation, not necessarily to provide these services but to advocate for their provision by others arises particularly where operations have brought changes in local demographics and increased demand. Site operators considered this to be a reasonable requirement.

IX. **Promoting recreational water use**. Neither standard currently contains an explicit reference to or requirement to proactively promote recreational use of water resources, yet this is a key goal of sustainable water resource management, linked to the health and wellbeing of local communities and water based tourism. A requirement to proactively promote water based recreation should be contained in a future IWSS.

X. **Assessing and acting on vulnerability**. The standards should be more direct and provide more helpful guidance on pollution prevention planning, groundwater vulnerability assessment and mapping and specify a requirement to implement a Nutrient Management Plan.

XI. **Action on alien and invasive species**. Site contributions to the prevention and management of alien species needs to be emphasised given the gravity of associated impacts in places like Naivasha.

XII. **Making stewardship user friendly.** There are areas of repetition in both draft regional standards. To ensure maximum uptake and effective use the international standard needs to be clearly set out and easy to follow. The evaluators and site operators found the format of the EWP standard more logical in its layout and approach, however its handling of internal governance issues under the Governance banner is potentially confusing. Issues of common language, clear definitions and specificity also need to be addressed.

XIII. **Prioritising the needs of the poor.** An IWSS should explicitly explore the livelihood needs of local communities, in particular in relation to riparian access and water allocation requirements.

Standard elements which need further exploration and development

XIV. **Setting boundaries for stewardship.** A clearer indication of the boundaries of analysis is required. Neither draft standard handles this boundary issue very clearly. For example

useful guidance could be developed on risk based approaches to delineating the zone of potential biophysical influence of an operations water use. Requirements to assess basin priorities are fine in relatively small basins like Naivasha but in basins such as the Zambezi or Nile such a requirement would be unrealistic. This is not to imply that the standard should set boundaries on any stewardship response. On the contrary an interpretative governance response may need to be directed at a basin, national or even regional level.

XV. **Reviewing the role of water footprint assessment**. The role of the site level water footprint analysis was repeatedly questioned because of the effort this would require and unclear benefits for operational water stewardship. The value and cost implications of water footpinting in water stewardship standards should be objectively reviewed.

XVI. **Supporting small and medium sized enterprises, small-holder and out growers**. The evidence from this case study is that whilst improved water stewardship among smallholders and outgrowers is a priority, the standard requirements in their current format are likely to be unobtainable by this group of water users. Viability and impacts of the standards for smallholders need to be thoroughly explored and administrative requirements scaled to risks of operations so that smaller producers have a proportional and cost realistic management burden.

XVII. **Compensating water stewards**. Stakeholders felt that opportunities should be explored for how water stewards could be compensated for their investment in attaining the standard. The potential for charging a premium for products and services, based on water stewardship principles, or for sharing the burden of investment with retailers or consumers should be explored.

XVIII. **Rethinking basin assessment.** The difficulties implicit in benchmarking sustainable water resource use mean that further work is needed to develop an optimum approach. Both standards provide good starting points, but as discussed, the EWP standard rests on regulatory assessments carried out by well resourced statutory basin managers, whilst the WSA standard proposes an ingenious but difficult to use system of self assessment by the site operator.

The insights generated by the case study point to a potential third way of assessing catchment and site management priorities in order to design an expedient and effective stewardship response. Sustainable water use and stewardship priorities are defined by the changing and locally specific biophysical, social values accorded to water uses and functions. They therefore need to be evaluated in a collaborative and locally specific process which is shaped and owned by the stakeholders they affect. Imposing a process or a set of priorities developed by any one individual stakeholder is unlikely to be productive or legitimate. That is why most countries have reformed or are in the process of reforming their water management policies towards IWRM which sees participatory basin planning supported by a mandated authority. Although such processes may be imperfect or incomplete, they represent a route to legitimate and shared basin planning with the benefit of being backed up by legal authority. It is therefore recommended that the standard prioritises support for and application of these local pre-existing or emerging planning and assessment frameworks rather than impose new ones. In particular local

frameworks should be supported to identify maximum abstraction volumes and rates, set environmental flow needs and to quantify sustainable yield.

Of course this introduces a difficult dilemma when statutory planning and assessments are non existent, failing or dysfunctional. A progressive response within the standard in this eventuality would be to initiate a process of basin dialogue. This would aim to appraise the issues, needs and risks according to basin stakeholders and contribute to a consensus based understanding of basin priorities which could then be used to shape an appropriate stewardship response.

XIX. **Driving proactive engagement with water governance.** The kind of interpretive approach to governance described above is likely to be necessary if the standard is to effectively respond to the disparate challenges facing the world's river basins. Put simply, the standard should drive an iterative approach to the governance principle of stewardship which asks, 'what are the main problems facing sustainable water management locally, how best can we make a proactive contribution to their equitable resolution and what targets can we set, work towards and monitor to that end?'. Such an approach overcomes the shortcomings of the EWP standard and would embody the intent of the WSA-00 standard without imposing its labour intensive and epistemologically questionable methodology.

For example in Naivasha this expedient approach might drive a would-be water steward to interpret how well efforts towards better basin management were progressing and to adapt their response to where they could make greatest positive impact based on their resources and capabilities. For example, they may assess that basin dialogue and research has already taken place and that what was needed now was participatory monitoring of WAP implementation, or advocacy to higher government on issues of regulatory functioning, or an injection of funds into the PES scheme.

Whilst such a flexible approach may overcome the challenge of real world complexity it could also invite misplaced action, especially since site operators primary objective and area of expertise are generally not river basin management. Corporate engagement in water policy of the nature the standard will drive has potential for positive outcomes but it could also invite unforeseen negative outcomes, for example through regulatory capture. Principles for responsible business engagement with water policy have therefore been developed recently by the CEO Water Mandate with the aim of setting out broad do's and don'ts in this area[53]. In developing an international water stewardship standard the value of these principles should be explored as a way of bounding the interpretive and adaptive response to improving water governance. The PRG in Naivasha went as far as suggesting some wording for this element of the standard which is meant to support rather than gainsay discussions in the ISDC. In response to the question of how a more proactive contribution to basin governance could be embedded in the standard they considered the following requirement to be useful:

'The site operator must demonstrate an effective, proactive leadership role in improving basin governance and public water policy implementation within their area of influence.

[53] CEO Water Mandate 2010

*This should be interpretive and adaptive adhering to the '**Principles for Responsible Engagement with Water Policy':***

Principle 1: Advance sustainable water management
Principle 2: Respect public and private roles
Principle 3: Strive for inclusiveness and partnerships
Principle 4: Be pragmatic and consider integrated engagement
Principle 5: Be accountable and transparent'

This approach gained universal support within the PRG and it is recommended that its value be tested in future pilots.

8.3 National stakeholder reflection on the case study results

To build on the insights generated by the work and explore the relevance of the team's recommendations (in 7.2) a high level discussion group of senior representatives of local, national and regional stakeholders was convened. Additional objectives of this meeting were to engage the assistance of stakeholders in thinking about how some of the difficult issues aired by the case study should be handled, and to raise awareness of the AWS effort more generally. Attendees who included senior managers of relevant government authorities at the local and national level, senior managers of pilot sites and trade organisations, international, national and local level CBOs and NGOs, academics, donor organisations and multilateral Sectoral support agencies are listed in Appendix H and pictured in Figure 36 below.

Figure 36. Delegates of the high-level discussion meeting photographed on Lake Naivasha shore.

8.3.1 Group reflection on 'thorny issues'

Following welcome remarks by GIZ and an introduction to the basin based on the WWF Shared Risk study, the delegates were provided with an overview of the AWS effort and its rationale,

and the methodology of the case study. A review of the preliminary findings was provided and this was followed by group work which saw three groups reflect on some of the more challenging aspects – or 'thorny issues' of IWSS development. These issues were suggested by the case study team though the group was given the opportunity to reject them or add additional subjects. The topics and questions discussed are presented in the left hand column of table 16 with responses generated by group deliberation presented in the right hand column.

Table 16 'Thorny' issues and summary result of group deliberation

Issues and questions discussed	Summary response
1. Where meeting the standard relies on performance of a third party eg. full compliance, duty of care for solid and liquid waste?	**Overall, full compliance with local legislation and imposition of a duty of care for liquid and solid waste are seen as key requirements of the standard, though constructive approaches must be adopted where this is problematic.**
- What outcomes (good and bad) will full compliance with local statutory requirements drive?	The beneficial outcomes will be the promotion of a clean environment and sustainable resource use; rational and proper planning of resource use for the public good; local standards will improve; ensuring implementation and much needed revenue and compliance incentives for relevant authorities It was suggested that the requirement for compliance with the AWS standard could be a precondition of being granted an export licence. Negative outcomes may include the financial constraints on the regulator and regulated which may act as a barrier; potential political outcry attached to enforecment; the potential to limit innovation by only requiring basic compliance i.e. we need the standard to drive beyond this.
- How could compliance and duty of care be handled most constructively?	It *must* be constructive so approaches such as categorising the urgency of compliance on a risk basis; public private partnerships to drive compliance; compliance over a gradual timescale or percentile compliance should be considered. The group also considered that the requirement could be useful in ensuring that local courts adopted the precautionary principle.
2. Engaging with outgrowers, smallholders and SMEs.	**The standard must be relevant and obtainable by smallholders and SMEs and several approaches to this were suggested. The point was emphasized that the standard must not prejudice smaller operators.**
- Is there a need?	Yes, the group considered this essential
- What are the benefits and the risks of certifying smallholders?	Benefits: - control and prevent resource conflict - ensure production is sustainable - promote market access for less powerful groups - provision of capacity building Risks - Difficult and expensive to monitor and certify - Resistance within smallholder groups if no tangible benefit is seen immediately - For an already weak association such an issue could dissolve the group - Entry into the scheme could be very difficult for some
- How should big and small operators	Options include:

be defined?	- a simple classification system based on volume of water use as is adopted in Kenyan water resource regulations for abstraction classification - a separate classification for cooperatives - base it on risk as 'size' is not relaibale. For example, the cumulative effects of smallholders and pastoralists and the potential of, for example artisinal mining operations to use small quantities of water but pose significant risks through mercury pollution.
- Could requirements be scaled and how?	Same standard should be used but with different indicators for 'applicants' according to their size, capabilities or risks Maybe boil down requirements for small operators into a simple checklist eg. Legal compliance, rainwater harvesting, measurement in place.
- What support would be needed and how could it be provided?	It will be vital to integrate development of training resources alongside the standard. Ideally a uniform training system should be available for anyone to pick up and use. Micro-finance could be used to support smallholders or some form of premium payment on labelled products which is then redirected to support smallholders.
3. How to define stewardship in data scarce or 'governance challenged' catchments?	The group felt that it was important that the standard deal with this common scenario constructively. An expedient approach to assessment and target setting should be taken, led by government and supportive of emerging statutory effort where possible.
- How should basin level assessment be approached?	For larger users they should be required to conduct a baseline survey; in other circumstances secondary/historical data may be available or it may be possible to use a standard catchment model, or proxies of similar basins. Where no data is available dialogue based approaches may be useful.
- How could site and basin targets be set and by whom?	Target setting must be consultative and ideally led by government if possible. If government is unable or unwilling, all stakeholders must be involved in agreeing basin level targets.
- How should this interact with statutory efforts?	It is essential that any approach to assessment and target setting must compliment and build on local systems and approaches rather than setting up competing parrallel processes. However, some kind of check should be built in to ensure that the statutory local effort, permits and standards are rational and effective.
- What does water stewardship look like in regulatory challenged basins?	A system of self-, co-regulation or informal peer-to-peer regulation would be necessary. Capacity building, guidance and some consistant benchmarks would be neccesary for this. Innovative tools and approaches could be used to support implementation such as tax breaks or reduced charges for water stewards. Advocacy for better government performance, devolved power, and peer pressure, or peer-to-peer learning and exchange between business could also be major features.
4. Others (suggested by the delegates)	**Two additional difficult issues were proposed but there was insufficient time to reflect at length on these**
- Should stewardship attract a premium?	Water stewardship is likely to involve additional investment and could benefit from financial; incentives, or a funding facility for

	'good works' similar to the Fairtrade model. The suggestion was therefore made that the opportunities to generate a premium or cash reward for water stewards be explored. Some delegates felt that this was not useful despite the success of the Fairtrade model because consumers and purchasers were not ready to pay more.
- How boundaries should be set both geographically and in terms of root causes of water problems.	This question concerned where the theoretical boundaries for action were. For example, if water impacts have their root cause in land allocation, population pressure or inequity how should the standard respond to this?

8.3.2 Group reflection on study recommendations

Following the session described above the tentative recommendations developed by the study team based on analysis of the case study results were presented and the rationale and evidence base for each explained. The intention was for the delegates to bring their perspectives, experience and draw on the preceding sessions to critically appraise and add to these recommendations.

In terms of methodology, recommendations were listed on flipcharts and delegates invited to use post it notes to indicate if they agreed or disagreed with each recommendation and why, or to add additional recommendations.

The results, presented in Figure 37 below are not meant to provide unequivocal demands to the ISDC but rather, it is intended to support their deliberations by revealing which issues the Kenyan delegates felt most strongly about and which require further exploration and deliberation**.** A full breakdown of all comments received is provided in Appendix I.

8.3.3. Selected testimony on the AWS from Kenyan stakeholders

'Now we understand what the AWS standard is about, it is clear it will help us implement IWRM and our national water policy. It has our full support'

CEO, Water Resource Management Authority

'*This work is very important. It will change the way water is managed in Naivasha'*

Vice-chair, Naivasha Basin Water Resource Users Association Umbrella Group

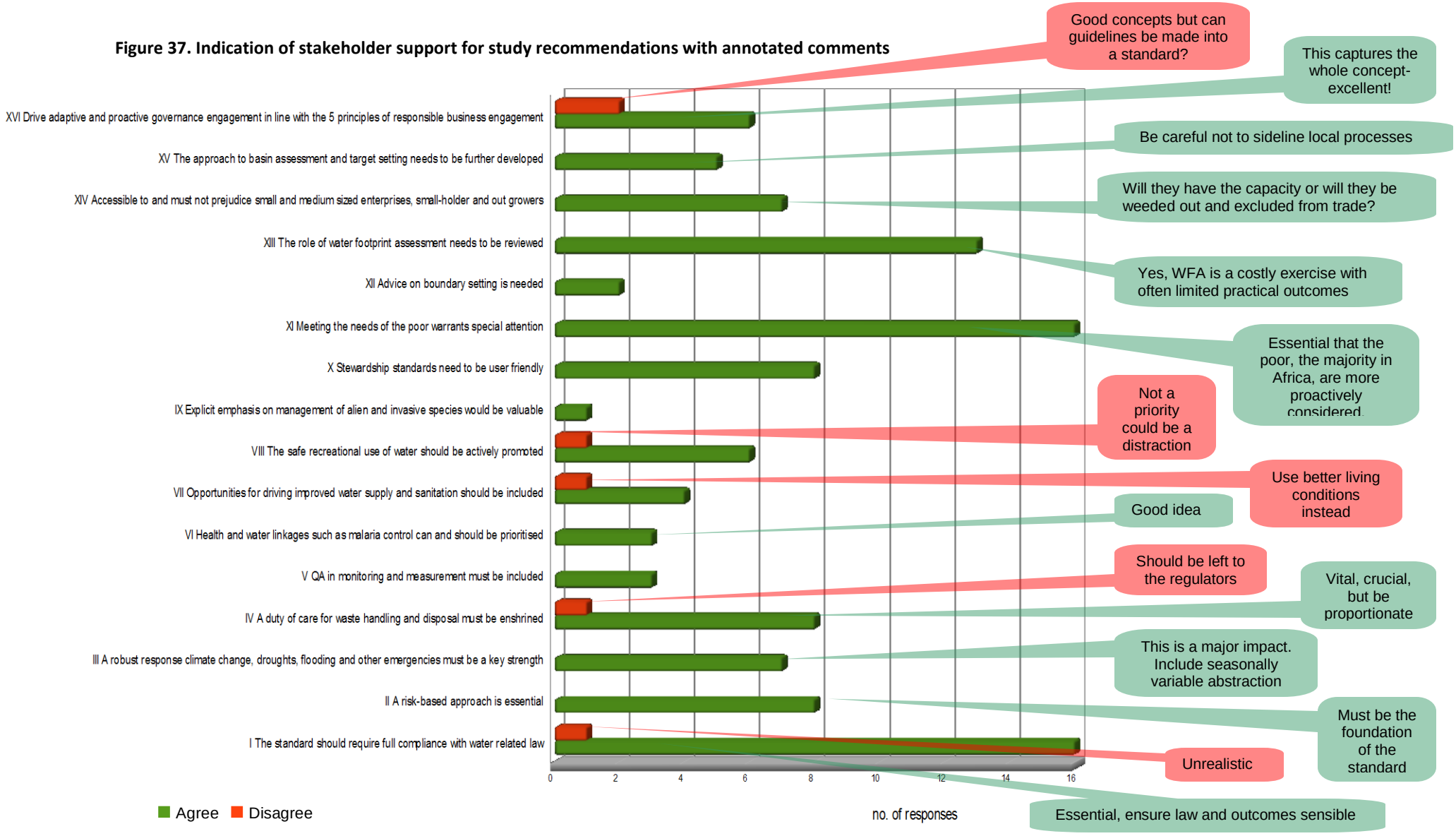
'Standards bring many benefits but some audits aren't thorough and there isn't much attention to water. This focus on water will bring targeted action'

Quality and Compliance Manager, Naivasha Agri-business

'Of course our resources are stretched, so anything that promotes compliance and business cooperation is a welcome initiative'

Director of Enforcement and Compliance, National Environment Management Authority

Figure 37. Indication of stakeholder support for study recommendations with annotated comments



Additional suggestions (one response each): ***Constant improvement and review of the standard itself; Compensate water stewards; Also prioritize land and water links – land planning ; Include rainwater harvesting as part of standard as way of supplementing abstraction***

References

AWS 2011. Water Roundtable Process document, http://www.allianceforwaterstewardship.org/water_roundtable.html

AWS 2010. Where to Focus? Water-Related Impact and Risk in the Context of Standard Setting

AWS 2011, Draft Pilot Study Methodology, Kenya Case Study

Ballot,A. K. Kotut, E. Novelo and L. Krienitz, 2009. Changes of phytoplankton communities in Lakes Naivasha and Oloidien, examples of degradation and salinization of lakes in the Kenyan Rift Valley Hydrobiologia. Volume 632, Number 1

Becht and Harper (2002) Towards an understanding of human impact on the Hydrology of Lake Naivasha, Kenya in Hydrobiologia (488)" pp3

Becht R, Odada, E O, and Higgins S, 2006. Lake Naivasha, Experience and lessons learned brief, World Bank

CEO Water Mandate 2010. Guide to Responsible Business Engagement with Water Policy, Morrison J, Orr S, Hepworth N, and Pegram G, UN Global Compact, Oakland.

Enniskillen, 2002. The Lake Naivasha Management Plan – consensus-building to conserve an international gem. Hydrobiologia 488 (Developments in Hydrobiology 168): ix-xii.

Everard, M. and Harper DM, 2002. Towards the sustainability of the Lake Naivasha Ramsar site and its catchment. Hydrobiologia Volume 488, Numbers 1-3

Finlays 2010. Sustainability strategy (presentation) R. Fox, Naivasha, December 2010

Goldson, J. 1993. A Three Phase Environmental Impact Study of Recent Developments around Lake Naivasha. Lake Naivasha Riparian Owners' Association, Naivasha, December 1993: 109

Harper DM and Mavuti KM, 2004. Lake Naivasha, Kenya: ecohydrology to guide the management of a tropical protected area. Ecohydrology and Hydrobiology 4, 287-305

Harrison, P. 2010, Mid Term Evaluation of Malewa PES Scheme, CARE/WWF.

Hepworth N. 2009. A progressive critique of IWRM in sub-Saharan Africa. University of East Anglia PhD Thesis, UK.

Humphrey et al. 2004. The impact of European market changes on employment in the Kenyan horticulture sector, Journal of International Development, vil 16 pp 64

Kitaka, N. D. M. Harper N. Pacini & K. M. Mavuti, 2002 Chemical characteristics, with particular reference to phosphorus of the rivers draining into Lake Naivasha, Kenya. Hydrobiologia 488 (Developments in Hydrobiology 168): 57-71.

Khrodha, G. 1994. A Three Phase Environmental Impact Study of Recent Developments around Lake Naivasha II. Lake Naivasha Riparian Owners' Association, Naivasha, P.O. Box 1011 Naivasha, Kenya.

Lake Naivasha Water Resource Management Programme (2001) Water Status Report pp15.

Otiang a Owiti and Oswe, 2006. Human impact on lake ecosystems: the case of Lake Naivasha,Kenya" in African Journal of Aquatic Science pp 83

Pfister et al 2009. Assessing the Environmental Impacts of Freshwater Consumption in LCA Environ. Sci. Technol. 2009, 43, 4098–4104

Sweeney, New and Lizcano, 2009. Kenya: UNDP climate change country profiles.

Von Enden, J.C. and Calvert, K.C. 2002. *Limit Environmental Damage By Basic Knowledge of Coffee Waste Waters.* GTZ-PPP Project "Improvement of coffee quality and sustainability of coffee production in Vietnam.

WASREB 2009. Impact: performance report of Kenya Water Services sub-sector no. 2. Water Services Regulatory Board. KPI data for 2006/7.

Watson 2007, Water Resource User Associations, Establishment, operation, and potential for conflict prevention, Dispute Resolution Centre, Kenya

WHO 2008. Global Health Observatory, Kenya health profile
WHO/UNICEF 2010. Joint Monitoring Programme, Estimates for use of improved sanitation facilities: Kenya.
WHO/UNICEF 2010. Joint Monitoring Programme, Estimates for use of improved drinking water supplies: Kenya.
WWF 2010. Shared risk and opportunity in water resources: Seeking a sustainable future for Lake Naivasha. Pegram, G. Pegasys RSA.
Yin, R.K., 2003. Case Study Research: Design and Methods, 3rd Ed., Sage Publications, USA