WRMA Performance Report 4

A report to the public from the
Water Resources Management Authority

Accounting for every drop

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Water Resources Management Authority
P.O. Box 45250 – 00100 Nairobi, Kenya
T. +254 20 273 2291/272 9048
F. +254 20 272 9950
E. wrma@wrma.or.ke
W. www.wrma.or.ke

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A report to the public from the
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for the periods 2012/13 and 2013/14

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Protecting our water sources: Hundreds of water resources users associations (WRUAs) at the grassroots level have been set up and trained by WRMA to monitor and safeguard riparian zones in water catchment areas.

Contents

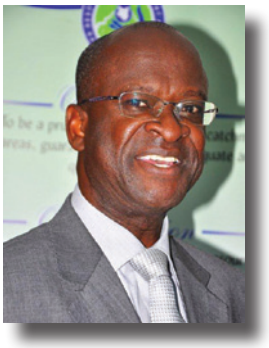
List of figures

List of tables

List of abbreviations

CAAC	Catchment Area Advisory Committee
CETRAD	Centre for Training and Integrated Research in ASAL Development
CMS	Catchment Management Strategies
CoK	Constitution of Kenya
CSOs	Civil society organisations
DPs	Development partners
EDCP	Effluent Discharge Control Plan
ENN	Ewaso Ngiro North catchment area
FM	Flood Management
FMU	Flood Management Unit
FY	Financial year
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GW	Ground water
KMD	Kenya Meteorological Department
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
LVEMP	Lake Victoria Environmental Management Programme
LVN	Lake Victoria North catchment area
LVS	Lake Victoria South catchment area
LWF	Laikipia Wildlife Forum
M^3/day	Cubic metres per day
M^3/s	Cubic metres per second
NBI	Nile Basin Initiative
NGOs	Non-governmental organisation
PDB	Permit Database
RV	Rift Valley catchment area
SCMPs	Sub-catchment management plans
SDGs	Sustainable development goals
SW	Surface water
TSS	Total suspended solids
WDC	WRUA Development Cycle
WKCDD & FM	West Kenya Community-Driven Drought and Flood Management
WAPs	Water allocation plans
WRM	Water resources management
WRMA	Water Resources Management Authority
WRUAs	Water resources users associations
WSTF	Water Services Trust Fund

Foreword



The Water Resources Management Authority (WRMA) has been presenting its performance reports to the public since 2009. This report is the fourth in the series. It covers the two previous financial years (FYs) from July 2012 to June 2013, and July 2013 to June 2014. It presents an analysis of WRMA performance based on 31 indicators derived from 23 management objectives which were developed from nine water resources management functions as adopted from IWRM (Integrated Water Resources Management). The thematic areas upon which these are based are water use permitting and compliance, sustainable water use, water allocation system, water quality, pollution and control system, catchment conservation and rehabilitation, basin planning, and water resources information management. In addition, performance on flood and drought risk management, and climate change adaptation, have also been covered. Of these thematic areas, performance in water allocation and permitting has been extensively covered as it is a core function of WRMA. Overall the analysis has been presented in terms of performance based on the six catchment areas of Lake Victoria North, Lake Victoria South, Rift Valley, Athi, Tana and Ewaso Ngiro North. The report shows the overall performance of the organisation on water allocation to be steadily improving.

The performance of WRMA as provided in this report has also shown that the fundamental principles of water resources management which have been adopted nationally are being followed in the management of water resources. For example WRMA has opened up the space for stakeholder involvement, which has resulted in participatory resolution of complaints. This has helped water users appreciate each other despite the challenges, and share water equitably even as they recognise that fresh water is scarce. As users understand the need to share water, concerted effort is required to protect this resource and also improve its availability.

A number of stakeholders from the public and private sectors, civil society organisations and development partners have done a commendable job in this area and WRMA highly appreciates their efforts. Through water resources users associations (WRUAs), WRMA has managed to reach and provide service to many water users and even ensure gender parity in water resources management as contained in this report. In this context no water user is disadvantaged in water sharing since the WRUAs participate directly in issuance of permits and ensure fair play. Whenever water gets scarce, especially during droughts, domestic and environmental water uses are given priority and this is enforced participatorily with involvement of WRUAs and law enforcement agencies. This shows that WRMA prioritises the human right to water as

opposed to its economic use, which gains in importance when water availability improves. It is noteworthy that water users have responded positively and are increasingly recognising the economic value of water through payment of water use charges.

Despite this positive response, challenges still exist which require all stakeholders to work together, not only to improve compliance to water use charges but also to reduce pollution of water resources among other areas, so as to ensure adequate availability of good quality water for socio-economic development.

Eng. John P. Olum
Chief Executive Officer, WRMA

A rehabilitated and protected spring.

Executive Summary

This report presents an analysis on how WRMA performed in the financial years 2012/2013 and 2013/2014 as well as the overall progress since 2005 based on indicators derived from water resources management functions. One such function is water allocation which was analysed based on information contained in the permit database (PDB). Four permit categories exist, the first being category A where one does not pay water use fees and the water is meant for social use. The other three categories are B, C and D where one pays water use fees depending on the amount of water used and the impact the use has on the water body. Similarly the amount of water permitted was also analysed for both ground and surface water and the proportion of legal abstractions determined in every region and for the organisation. The findings revealed that in FY 2012/2013, WRMA permitted 70% of the abstracted surface water and 33% of abstracted ground water. In 2013/2014 the respective performance was 60% and 31%, which was a decline. The drop came from Athi and Tana, probably due to the high number of conflicts/ complaints in these catchment areas that slowed down the rate of processing of permits. The other area regulated by WRMA through permitting is the issuance of permits for storage development, mainly for small dams. In 2012/13 and 2013/14 WRMA issued permits for storage development of 4 million m^3 and 28 million m^3 respectively, which is an increase of 700% in one year. Related to permitting is restriction of abstractions in order to maintain reserve water, and WRMA determined and maintained eight such points in Lake Victoria North and South catchment areas.

Performance in pollution control was assessed through issuance of effluent discharge permits and compliance to conditions attached to those permits. In FY 2012/13, 36 out 131 identified effluent dischargers obtained permits while in 2013/2014 only eight out of 128 identified effluent dischargers received them.

Enforcement capacity within WRMA has been addressed through training and gazettement of officers to prosecute offences committed in contravention of the Water Act 2002. To date 19 such officers have been gazetted and have begun taking offenders to court.

Catchment conservation and rehabilitation has been accomplished through collaboration with WRUAs. WRMA supports the WRUAs in developing and implementing sub-catchment management plans (SCMPs). Major activities in the SCMPs dealing with catchment rehabilitation include sediment control and monitoring. The number of WRUAs carrying out such activities increased from 32 in 2012/13 to 80 in 2013/14. The number of constructed sediment control structures increased from 13 to 19 while sediment monitoring stations with TSS (total suspended solids) below 50 tonnes/year increased from four to 29 in the respective financial years.

Performance in the implementation of the catchment management strategies (CMS) was gauged through activities such as installation and rehabilitation of the water resources monitoring network. In FY 2013/14, 87% ground water (GW) and 63% surface water (SW) monitoring stations were active, an improvement from 67% and 57% respectively in the previous year. Other indicators used in assessing the extent of CMS implementation are volume of water abstracted under valid permits and permits for water use, which were 97% and 59% respectively. Similarly the number of WRUAs established and SCMPs developed also increased to 571 and 320 against an ultimate potential of 1868. On stakeholder participation, WRMA has increasingly involved stakeholders from the public and private sectors, civil society organisations (CSOs) and development partners (DPs), totalling 139 in 2014 compared to 97 in 2013. In conservation and protection of vulnerable catchments such as springs, wetlands and riparian zones, there has been a general improvement with the number of springs protected increasing from 73 in 2013 to 129 in 2014, an improvement of nearly 80%.

In water resources assessment and monitoring, analysis showed that the average turnaround of permit processing is about 150 days in practice, against the 180 days standard set by the organisation. On compliance to pollution control, the findings revealed that 43 out of 138 major effluent dischargers have permits. Regarding water resource availability, it was found that 165 out of 329 stations have discharge data while 47 out of 97 boreholes have water rest level records. Based on the data, surface and ground water availability can be easily determined as required by the users and for planning water allocation. On water resource quality, WRMA has continued to improve its performance by having increased surface water quality monitoring from 55% to 61% while monitoring of ground water quality increased from 42% to 60%.

Concerning economic and financial management, improved water use efficiency was adopted as an indicator for evaluating performance and it was measured through compliance to water use charges. A performance level of 101% based on the 2014 target was realised and this is likely because of improved enforcement of regulations. Regarding investments, the actual revenue collected was used as an indicator of performance and this increased from KSh 302 million in 2013 to KSh 318 million in 2014, an increase of KSh 16 million over a period of one year. Information management was assessed through frequency of data collection for surface water, ground water and water quality. The findings showed

that the monitoring stations with monthly data were 85%, 67% and 63% respectively. The functionality of the PDB was also evaluated as the main system for information management and it was found that on average it was operational in FY 2012/13 and 2013/14 at an average rate of 37% and 38% of the time. Effectiveness in participation of stakeholders was assessed using the WRUAs, the catchment area advisory committees (CAACs) and other institutions, and it was found that the number of stakeholders participating in water resources management increased from 602 to 716. Gender analysis of participating stakeholders showed that women representation was 40% in WRUAs, 15% in CAACs and 31% in WRMA staff deployment. On resolution of complaints as a major role for stakeholders, especially the WRUAs, 54% of the 98 cases reported were resolved in 2014. These cases were more common during droughts, implying that they were related to water scarcity against high demand. The stakeholders, particularly the WRUAs, played a key role in resolving them which ensured that water was shared equitably. On flood management, WRMA mapped flood-prone areas and initiated both structural and non-structural measures for flood control and adaptation.

Trend analysis on how WRMA performed since its operationalisation in 2005 has also been presented in this report as a way of showing progress in overall management of water resources. Performance in water allocation has been analysed using permits, with the number increasing from about 200 permits in 2006 to about 8000 in 2014. The analysis further revealed that currently about 90% of permits are valid, compared to 20% valid permits in 2009. This implies that water users are increasingly complying with the requirements for water allocation, which enables WRMA to allocate water resources to more applicants. On effluent discharge control, the compliance level increased from eight dischargers in 2009 to 38 in 2014. Concerning surface and ground water quality, monitoring performance generally declined from 73% and 71% in 2009 to 68% and 58% in 2014 respectively. On SCMPs and WRUAs the numbers increased from two and 13 to 34 and 47 in 2009 and 2014 respectively. Performance in surface water monitoring in 2009 was about 65% while in 2014 it was about 62%. In the same respective years 65% and 63% of ground water stations were monitored. There was inconsistency in monitoring surface and ground water with the best performance level for surface water being 70% in 2011 while that for ground water was 71% in 2013. Compliance to water use charges was analysed using revenue collected and this increased from KSh 50 million in 2006 to KSh 320 million in 2014. The general increasing trend in the indicators shows that there is overall improvement in management of water resources.

1 Introduction

1.1 Content of the report

This report focuses on WRMA performance over a two year period in the financial years 2012/2013 and 2013/2014. A trend analysis has also been presented on major areas of the WRMA mandate showing how the organisation has performed since operationalisation in 2005 and in as far as data is available. The performance in the last two years of reporting has been analysed based on four major areas of water resources management — these are regulation of water resources, conservation and protection of water resources, water-related risk reduction, and adaptation to climate change. In each of these areas indicators have been used to objectively assess performance against targets or standards as appropriate. About 31 indicators have been used in assessing performance with emphasis given to regulation of water resources where more efforts were put by WRMA and this is rightly so since it focuses on the main function of the organisation. Since water is a cross-cutting issue as well as a basic human right it attracts several stakeholders whose involvement enhances the performance of the organisation. In this context the report has attempted to structure the areas of performance so as to enable the various stakeholders to find entry points to be involved in the management of water resources.

In regulation of water resources, performance was assessed by considering effectiveness in water allocation through permit processing and accountability of water resources using legally allocated water. This was based on the information contained in the Permit Database (PDB), which is an information system used to manage water abstractors. The other area of regulation is in control of pollution, especially that caused by effluent from inefficient treatment systems. WRMA does this participatorily with the client and uses an Effluent Discharge Control Plan (EDCP) to monitor progress until the required standard is attained, after which a discharge permit is issued. Monitoring of water resources quality and quantity was another area of regulation. Surface and ground water were assessed using the proportion of functional targeted monitoring sites and the data acquired used to determine the quantity and quality of available water resources.

Performance in the protection and conservation of water resources was assessed through protection of springs, wetlands, ground water recharge zones and riparian zones. Performance in flood and drought management was assessed in terms of the strategies put in place by WRMA in the selected pilot areas. The emphasis was more on flood management. Regarding economic and financial management, compliance to water use charges through revenue collection against annual targets was used in assessing performance. The other area of performance also considered was information management, which was assessed through data availability and participatory data acquisition.

In addition to this, stakeholder participation was also assessed as an area which is essential for WRMA to execute its functions effectively. The assessment was done by considering the establishment of WRUAs and CAACs and the participation of other stakeholders such as the public and private sectors, NGOs and

development partners. Gender participation in WRUAs, CAACs and WRMA was also assessed. Last but not least was the assessment on participatory resolution of complaints, which is essential in reducing conflicts arising from water sharing.

1.2 Highlight of major achievements

Since the operationalisation of WRMA in 2005 under the Water Act 2002 as an institution responsible for the management of water resources, a number of achievements have been realised. The major ones that have made water resources management appreciated as essential in fulfilling socio-economic needs are:

i. the streamlining water allocation through a permitting system in a way that gives preference to social water for basic human needs, and equitably sharing of water for economic use

ii. encouraging recognition of the economic value of water by water users through payment for water use based on the "user pay" principle

iii. reduction of conflicts in sharing of water resources through participatory conflict resolution mechanisms that involve water users

iv. structuring management of water resources based on river systems, thereby bringing users in the same system together, which enhances cooperation in addressing water resources issues and challenges while at the same time sharing the benefits

v. establishing institutions at the ground level through WRUAs that enable users, as those directly affected, to be involved in the management of water resources. The inclusiveness boosts resolve in management of water resources

vi. recognising the preservation of reserve water for biodiversity conservation and other environmental water needs

vii. development of participatory methods for control of pollution caused by the discharge of effluent that does not meet acceptable standards

2 About management of water resources

2.1 Introduction

Management of water resources as outlined in the Water Act 2002 involves the issuance and enforcement of permits, regulation and protection of water resource quality, management and protection of catchments, determining water use charges, and monitoring of water resources.

Based on these functions, the management of water resources can be regarded as seeking to fulfil basic human needs and environmental water requirements on the one hand and economic water use on the other. The need to fulfil these uses is also emphasized in the Constitution of Kenya (CoK) 2010 and more so water for basic needs and the environment. Article 43 of CoK 2010 emphasizes the right to clean and safe water in adequate quantities, and WRMA is committed to protect and conserve water resources so as to enhance availability of good quality water. This includes protection of water resources against the adverse effects of low quality effluent discharged from inefficient treatment plants. The government's Vision 2030 emphasizes that the realisation of its economic and social pillars will require more high-quality water in an environment where water resources are scarce, making conservation of water resources essential for all citizens. The demand for water will therefore continue to increase, making it more costly to access. This trend implies that the economic value of water will also continue to increase and users need to comply with payment for water use, which WRMA is committed to promote in line with the principles of water resources management agreed upon globally and adopted nationally. The user pay principle is therefore a requirement for all commercial water users and guidelines are in place to ensure that this is done equitably without compromising social water needs. To execute its functions effectively, taking into account the provisions of CoK 2010, WRMA seeks to manage water resources in three main aspects as outlined in the following sections.

2.2 Regulation of water resources

Regulation of the use of water resources is intended to ensure that all water users and uses are recognised and equitably allocated water according to their needs, taking into consideration the availability of water resources and the environmental changes that impact on it either positively or negatively. Derived from the Water Act 2002, the regulatory functions in water resources management cover the following areas:

i. Water resources monitoring to provide information on availability of water resources for planning of water sharing

ii. Water quality monitoring to provide information on the status of a water resource for planning interventions to reduce pollution and other adverse effects

iii. Permitting water resources use for accountability and equitable water sharing

iv. Enforcement of conditions for abstraction to ensure that all users have their rights to water

v. Variation of water allocation in response to demand and environmental impacts

The execution of these regulatory functions requires guidelines to ensure fairness and maintenance of standards. To accomplish this, WRMA has identified and developed a number of tools as provided for by the Water Act 2002 to guide management of water resources. These include the following:

i. Water Resources Management Rules 2007 as an overall framework for regulation of water resources

ii. Thresholds for water allocation to help in determining categories of water applications

iii. Thresholds for effluent discharge, used in determining categories of permits with respect to effluent discharge

iv. Thresholds for development of storage structures

v. Code for ground water practice

vi. Guideline for storage development

vii. Effluent discharge control guidelines

viii. Guidelines for enhancement of compliance

2.3 Conservation and protection of water resources

Conservation and protection of water resources mainly involves investments to improve water availability and reduce adverse effects on the water body. Functions in this area include:

i. riparian zone conservation to protect water resources quality

ii. control of soil erosion to reduce siltation of water resources

iii. construction of sand dams and earth dams to enhance water resources availability

iv. protection of wetlands to improve ground water recharge and purify surface water resources

v. construction of boreholes and shallow wells for accessing ground water reserves

vi. protection of springs to improve water quality and quantity

vii. water harvesting to improve storage

These functions are intended to contribute towards fulfilling water resources requirements for basic needs and environmental demands. These are articulated nationally in the CoK 2010 and internationally in the Sustainable Development Goals (SDGs). The nature of these activities demands investments

from stakeholders from the public and private sectors, civil society organisations and development partners. WRMA has developed a framework for participation of these institutions through the WRUA Development Cycle (WDC). This is a tool developed on the basis of catchment management strategies and implemented through the sub-catchment management plans (SCMPs). The WRUAs are the custodians of the SCMPs while WRMA ensures that the activities are executed according to the WDC guide and that good governance principles are upheld. Following operationalisation of the Water Act 2002, in 2005 WRMA managed to attract stakeholders to address this function. However, due to emerging challenges, more participation and investment are still needed in order to meet the increasing demand for water.

2.4 Water-related disaster risk management and adaptation to climate change

Water-related disaster risk management is a necessity, due to floods and droughts caused by weather variability that, over a long period of time, may be considered as the effects of climate change. Floods and droughts can cause damage to infrastructure and property resulting in economic losses and socio-cultural disruption. On the other hand, flood water can also be harvested for storage and subsequent use during droughts. WRMA is therefore engaged in flood and drought management in order to reduce the risks resulting from these two extremes and also to ensure that flood water is made use of effectively as a water resource.

Control of flooding is part of disaster risk management.

3 Water Resources Management objectives and indicators

3.1 Introduction

The indicators used in this report to assess WRMA performance have been derived based on eight functions in water resources management and 21 management objectives. A total of 31 comprehensive indicators were subsequently derived and considered in assessing how WRMA has performed in the following areas:

i. Water allocation with consideration of social water and environmental water use

ii. Pollution control and catchment conservation to reduce adverse effects on water resources

iii. Catchment management plan and strategy development for systematic and participatory management of water resources

iv. Water resources assessment and monitoring for data acquisition and information generation, for effective management of water resources

v. Information management and dissemination for transparent decision-making and governance of water resources

vi. Stakeholder participation for effective coordination and consensus building for ownership

vii. Flood and drought management to reduce the impacts on vulnerable groups and damage to property

viii. Effect of climate change and adaptation measures

The indicators outlined below were used to evaluate the performance of WRMA in the eight thematic areas.

3.2 Equitable and efficient water allocation

Water allocation is done taking into consideration both economic and social water use as well as environmental water demands. To ensure equitable and efficient water allocation WRMA developed a permitting system which gives first priority to social water use and environment needs. The permitting system is categorised into the four classes A, B, C and D. Water allocated under class A is for social and environment needs while classes B, C and D belong to the level of economic water use where the user pay principle is applied and one pays for water depending on the amount used. To effectively assess performance in this area, the following were considered:

i. Rate of permit processing for major water users for both surface and ground water

ii. Authorisations to construct works for use of water resources

iii. Abstractions with measuring devices for use of water resources

iv. Abstractors regularly submitting assessment forms on water use

v. Volume of water used in relation to category of permits

Apart from the permitting system WRMA also has a system for enhancing efficiency, economic benefits and realisation of social goals where use of water resources is concerned. Performance in these areas is monitored using the following tools:

i. Use of water allocation plans based on abstraction surveys. The latter provide information on real time users of water resources while the former is a plan developed participatorily to ensure equitable sharing and allocation, taking into account all users

ii. Volume of water allocated per category of use. The uses are public, domestic, livestock, irrigation, industrial, power generation, and others

iii. Status of water storage in dams and pans to enhance water availability to meet the demand

iv. Stations for water resources monitoring where reserve water has been determined and maintained to meet environmental flows and basic human needs

3.3 Control of pollution of water resources

Control of pollution is intended to prevent adverse effects on water resources as a result of effluent discharge from point sources, as well as sources of pollution that are mainly non-point in nature. To make control cost effective, WRMA developed guidelines for monitoring discharges of effluent into water bodies and onto land. These are shown in Table 3.1.

The monitoring and control of effluent flowing into water bodies is one of WRMA's core functions.

Table 3.1: Guidelines for effluent discharge into surface water bodies and onto land

Guidelines for effluent discharge into surface water bodies	
Parameter	Max allowable (limits)
Arsenic as As (mg/l)	0.1
Biochemical Oxygen Demand (BOD 5 days at 20°C) (mg/l)	30
Cadmium as Cd (mg/l)	1.0
Chemical Oxygen Demand (COD (mg/l)	100
Chromium as Cr (mg/l)	Less than 0.01
Lead as Pb (mg/l)	Less than 0.01
Oil and grease	Absent
pH (Hydrogen ion activity)	5.0-9.0
Phenols total (mg/l)	0.05
Sulphide as S (mg/l)	2.0
Total Suspended Solids (mg/l)	30
Temperature (in degrees Celsius) based on ambient temperature	±5
Cyanides as CN (mg/l)	Less than 0.2
Nickel as Ni (mg/l)	Less than 2.0
Detergents (ABS) (mg/l)	Less than 5.0
Mercury as Hg (mg/l)	Less than 0.01
Total Phosphorus as P (mg/l)	2
Total Nitrogen as N (mg/l)	10
Total pesticide residues	Absent

Guidelines for discharge of effluent onto land	
Parameter	Max allowable (limits)
pH	5.5 - 9.0
Boron (mg/l)	2.0
BOD (mg/l)	500
Chloride (mg/l)	600
Total Dissolved Solids (mg/l)	2100
Oils and grease (mg/l)	30
Sulphates (mg/l)	1000
Sodium (as percentage of total concentration)	60

(Source: WRM Rules 2007)

The table shows the maximum allowable parameters in effluent discharges depending on whether discharge is onto water body or land. From the 19 parameters identified for regulating quality of effluent discharged, seven are most commonly used: Electrical Conductivity, pH, Turbidity, Total Suspended Solids, Temperature, Phosphates, Nitrates, and Fluoride. The indicator used in measuring performance in pollution control was based on inventory of effluent discharge and progress in management of pollution. Progress was measured through pollution survey reports; compliance to effluent discharge control plans (EDCPs), effluent discharge permits and compliance inspection reports.

In addition to the participatory process of pollution control, WRMA also enhances pollution control through enforcement of compliance. In this regard performance in enforcement was assessed based on the:

i. number of orders issued by WRMA to those not complying with the guidelines
ii. number of effluent dischargers complying to the orders issued to them
iii. number of legal cases instituted against those issued with orders and not instituting measures to improve the quality of their effluent
iv. status of prosecuted cases of non-compliance

3.4 Catchment conservation and rehabilitation measures

The status of the catchment directly affects the quality of water resources through surface water flows that carry sediments and pollutants and deposit them in water bodies, thereby causing pollution. WRMA monitors catchment conservation and rehabilitation measures through TSS measurements at specific points, especially along water courses. Since sediments are generated from both on-farm and off-farm areas, catchment conservation and rehabilitation requires involvement of all stakeholders with interests in the catchment. This includes the forestry, agriculture, wildlife, livestock and mineral sectors together with private and civil society organisations. Thus the values of TSS recorded are essentially a combined effort of these stakeholders. It is essential that this concerted effort is sustained for better catchment protection.

3.5 Integrated basin planning

Integrated basin planning is guided by the Catchment Management Strategy (CMS) which was first developed in 2009 for the six regions and is currently being revised for the coming five years. The strategy provides outlines actions which are implemented through involvement of stakeholders. The outcomes of the strategies implemented over the last five years have been assessed in terms of:

i. achievements and impacts in strategic areas such as number of permits issued, % volume of water under permits, number of WRUAs established, % water use compliance, major effluent dischargers with EDCPs and % operational stations for ground water and surface water monitoring. These achievements are considered for the five-year period of implementation of the plan.

ii. rhe level of stakeholder involvement in basin planning and subsequent implementation of the strategic actions. The achievement was looked at in terms of the numbers of stakeholders from the public and private sectors, civil society organisations and development partners who have participated either by providing support or implementing specific activities directly.

3.6 Protection of vulnerable water resources

Vulnerable water resources are more often than not subject to abuse because they are mainly used for provision of social water for domestic, livestock, livelihoods and environmental needs. Regular monitoring to minimise encroachment is only possible through involvement of riparian communities who, in the majority of cases, also exploit the resources to meet their livelihood demands. Institutionalisation of the communities through WRUAs has been done as a step towards sustaining the protection measures. The critical catchments identified for assessment of performance in protection measures are springs, wetlands, ground water zones and riparian zones.

3.7 Monitoring compliance to water abstraction and effluent discharge

Performance in compliance to abstractions was assessed through the number of pending applications before issuances of permits and the average time for processing permits. The economic categories of permits, namely B, C and D, were considered in this analysis. The duration of pending applications used in the assessment were less than 30 days, 30-90 days, 90-120 days, 120-180 days and over 180 days. Regarding effluent discharge, % compliance was used as a measure of performance, which was derived from effluent discharge permits and EDCPs developed by effluent dischargers in each of the six regions.

3.8 Monitoring water quantity and quality

Knowledge of water quantity is basic information for water resources management. The information comes via data obtained from gauging sites for monitoring surface and ground water resources. The number of such stations operational in each of the six regions was used to assess performance. In the case of surface water monitoring, the number of stations with rating curves for converting measured water levels into discharges was also used in the assessment. With regard to ground water monitoring, operational boreholes were used as a measure of performance along with data on water rest levels. Performance in water quality monitoring for both surface and ground water was assessed through comparison of stations with updated data against the number of monitoring stations overall.

3.9 Improving water use efficiency and economic value for water

Water use efficiency is increasingly being emphasized given the scarcity of water resources and the increasing demand. Water use for permit categories B, C and D attract user fees based on the user pay principle. Therefore enforcement of abstraction regulations to ensure that water use fees are paid is a measure of water use efficiency that reduces wastage. This is because users will minimise the amount of water wasted as they know they have to pay for it. Therefore compliance to water use charges was used as an indicator to assess performance in improving water use efficiency. Payment for water use is also a measure of the economic value for water and it is measured by the amount of revenue collected against potential revenue.

3.10 Information systems for water resources management

These systems are used in processing hydrological and water resources data and permit data, and packaging them for dissemination and decision making. So far it is the permit database that is operating effectively. Performance in this area was assessed through analysis of the functioning of the PDB. The assessment included an inventory of all water users, water users in the database, compliant water users in the database and the time the database is operational. In addition to these, the level of involvement of stakeholders in data acquisition and information sharing was also discussed to determine to what extent they are involved in this activity.

3.11 Stakeholder participation and networking

Involvement of stakeholders in water resources management is inevitable since water is a basic human right and essential for all sectors of the economy. It however continues to get scarce due to environmental impacts and increasing demand. Stakeholders are drawn from the public and private sectors, development partners and target groups beneficiaries. The latter form the largest group; as such their participation has been institutionalised through WRUAs as provided by the Water Act 2002. The number of WRUAs established has been used as an indicator of sustainability of stakeholder participation in water resources management. WRUA composition has been formulated such that gender participation is observed, to ensure that disadvantaged groups are also involved in the management of water resources. The WRUAs and other stakeholders are key in resolution of complaints, which minimises conflicts over water sharing. The number of complaints resolved through this process has also been presented in this report as an indicator of participation. Regarding stakeholders from the public sector, the organisation networks with them and creates synergy for a win-win situation. Civil society, development partners and the private sector have close working arrangements with the organisation because of the enabling environment created.

3.12 Flood and drought management

In managing floods and droughts, WRMA focuses on reducing the impacts as well as adaptation measures. Measures initiated for flood management have been done with JICA (Japan International Cooperation Agency) as the main partner. Major activities carried out were the mapping of flood-prone areas, development of integrated flood management plans and putting in place both non-structural and structural measures for mitigation and adaptation to flood events. With regard to drought management, the focus has been on enforcement of permit conditions to ensure maintenance of reserve flow through resolution of conflicts over water sharing.

4 WRMA performance

4.1 Water allocation

4.1.1 Management of water use through the permitting system

WRMA manages water use through a permitting system that involves applications, approvals, authorisations, and issuance of permits. Records of these activities are maintained in an operational permitting database (PDB) which contains all the data from the above mentioned processes. These data were used in assessing how WRMA performed in permitting as a major component of water allocation. A summary of the data up to June 2013 contained in the PDB is given in Table 4.1.

During the year ended June 2013, more permit applications were received for ground water resources than for surface water resources. Consequently, more permits were issued for the former. Athi, Tana, and Rift Valley (RV) catchments had the highest applications, authorisations, and permits processed in both ground water and surface water. Most applications for ground water permits in Athi and Tana were in category B while in Rift Valley they were in category D (Table 4.1). Lake Victoria South (LVS) had the highest approvals which implies that they processed more of category A (social water use) than all other regions by June 2013. Rift Valley had the lowest approvals during the same period.

Graphical presentation of the status of permitting for different regions is given in Figure 4.1. It shows that ground water authorisations and permits were more than those for surface water, perhaps due to the higher numbers of permit applications for the former. In addition, permits were higher than authorisations in surface water but lower than authorisations in ground water in all regions. This implies that the rate of conversion of surface water authorisations to permits was higher than in ground water. It is important to note that the conversion of authorisations into permits depends on, among other factors, the participation of stakeholders such as water users and the public: when surface water authorisations are converted into permits faster than ground water, then it can be said that stakeholder participation was higher in surface water permitting. In Tana and Ewaso Ngiro North (ENN) regions, the permit conversion rate in surface water permitting was more pronounced because the majority of water uses depend on surface water. In ground water, the conversion of authorisations into permits was slowest in Rift Valley and highest in Lake Victoria South. The slow conversion rate in Rift Valley could be attributed to the high number of category D permits, which take longer to process.

Table 4.1: Cumulative permitting status up to June 2013

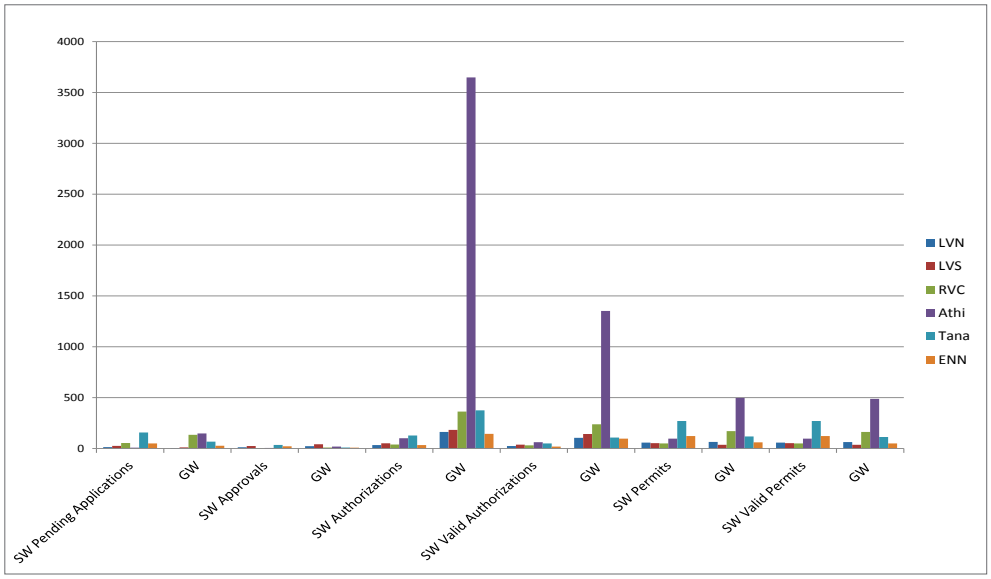
Region	Applications pending processing		Number of approvals		Number of authorisations		Number of valid authorisations		Number of permits		Number of valid permits	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	14	5	13	23	34	163	25	105	61	65	58	64
LVS	26	11	25	42	52	183	38	143	66	37	53	37
RVC	55	135	3	10	39	364	32	239	58	171	50	163
Athi	9	149	6	20	101	3,647	62	1,352	100	498	97	488
Tana	158	68	36	10	128	376	51	108	290	119	271	113
ENN	51	27	22	9	34	145	19	98	137	61	123	51
Total	**313**	**395**	**105**	**114**	**388**	**4,878**	**227**	**2,045**	**712**	**951**	**652**	**916**

	All permits						Valid permits					
	Category B		Category C		Category D		Category B		Category C		Category D	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	34	59	19	4	8	2	31	56	19	4	8	2
LVS	23	37	26		17		22	37	18		13	
RVC	18	63	17	29	23	78	13	62	16	28	21	72
Athi	38	433	54	61	8	4	37	426	52	58	8	4
Tana	241	107	32	4	17	8	226	106	28	1	17	5
ENN	73	37	54	17	10	7	66	31	47	16	10	4
Total	**427**	**736**	**202**	**115**	**83**	**99**	**395**	**718**	**180**	**107**	**77**	**87**

	All permitted volumes (x1000 m^3/d)						Valid volumes (x1000 m^3/d)					
	Category B		Category C		Category D		Category B		Category C		Category D	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	4.34	1.12	5.71	0.23	152.9	0.24	4.1	1.1	5.7	0.2	152.9	0.2
LVS	1.30	0.89	20.27	0.00	946.97	0.00	1.2	0.0	11.6		951.4	
RVC	1.37	2.32	7.41	6.54	1537.3	100.62	1.1	2.9	7.4	5.3	1531	95.7
Athi	1.66	13.37	55.99	11.06	78.28	4.64	1.6	11.0	49.1	10.5	78.3	4.6
Tana	146.53	2.33	241.50	1.10	80565	8.30	147.1	2.3	214.0	0.1	80564	1.1
ENN	11.95	1.27	46.98	3.84	29.90	5.36	11.7	1.1	38.6	3.6	29.9	3.6
Total	**167.15**	**21.29**	**377.85**	**22.77**	**83310**	**119.16**	**166.92**	**18.39**	**326.35**	**19.69**	**83309**	**105**

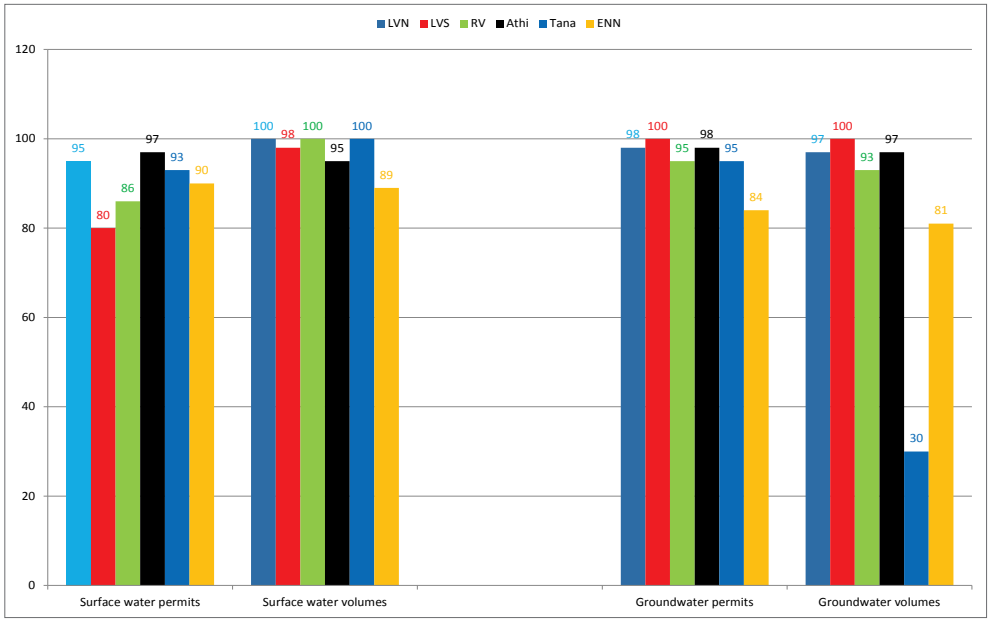
SW = Surface water GW = ground water

Figure 4.1: Comparative permitting status up to June 2013



In assessing efficiency of permit processing, the proportion of total permits versus valid permits was used. The analysis showed that all permit processing efficiencies were above 80% (Figure 4.2). In terms of ground water and surface water comparisons, the permit processing efficiency was higher in ground water everywhere except Ewaso Ngiro North. However, more valid volumes were allocated in surface water than in ground water. Especially in Tana, valid ground water permits represented only 30% of permitted volumes. This implies that water use in Tana is largely dependent on surface water. A similar observation was previously reported in permit performance analysis (WRMA, 2014[1]).

Figure 4.2: Cumulative proportion of valid permits and volumes up to June 2013



Apart from issuance of permits and authorisations, WRMA also uses database information on water meters (or measuring devices) to monitor compliance to water uses conditions in the permit. A summary

[1] *WRMA Performance Report No.3 (2014)*

of status of the measuring devices from the PDB is given in Table 4.2. The summary shows that the majority of permitted water abstractions (66%) did not have measuring devices as of June 2013. There were no abstractions in category A with measuring devices up to the same time period. Athi had the highest number of abstractions with measuring devices (mainly for ground water abstractions) while Lake Victoria South and North had the lowest. Overall, more measuring devices were used in ground water than surface water abstractions.

By June 2014, the number of approvals, authorisations and permits had increased (Table 4.3). Still, authorisations were higher than permits. Athi, Rift Valley and Tana continued to show a higher proportion of applications, authorisations and permits than Ewaso Ngiro and Lake Victoria South and North. Lake Victoria South showed highest approvals (social water) in ground water by June 2014. The overall increase in number of permitted water abstractions showed that WRMA was able to improve its campaign of registering water users by bringing in new water abstractors to comply with permitting conditions.

Table 4.2: Cumulative status of abstractions with measuring devices and permitted abstractions up to June 2014

Number of measuring devices up to June 2013									
Region	Category A		Category B		Category C		Category D		Total
	SW	GW	SW	GW	SW	GW	SW	GW	
LVN	0	0	1	1	1	0	0	0	3
LVS	0	0	0	1	0	0	0	0	1
RV	0	0	1	17	3	7	6	29	63
Athi	0	0	11	313	11	41	2	1	379
Tana	0	0	3	13	1	0	0	0	17
ENN	0	0	28	24	12	6	0	5	75
Total	0	0	44	369	28	54	8	35	538
Number of measuring devices up to June 2014									
Region	Category A		Category B		Category C		Category D		Total
	SW	GW	SW	GW	SW	GW	SW	GW	
LVN	0	0	1	2	1	0	0	0	4
LVS	0	0	0	2	0	0	0	0	2
RV	0	0	3	46	4	18	8	45	124
Athi	0	0	72	967	32	124	7	16	1218
Tana	0	0	18	45	6	0	0	3	72
ENN	0	0	42	63	19	15	1	8	148
Total	0	0	136	1125	62	157	16	72	1568

WRMA's comparative permitting performance by June 2014 showed that there was an increasing trend of conversion of authorisations into permits. Since the conversion of authorisations to permits also depends on stakeholders (such as water users), the growing trend observed from June 2013 to June 2014 implies that water users were increasingly becoming aware of WRMA's permitting conditions and improving their participation in permit processing.

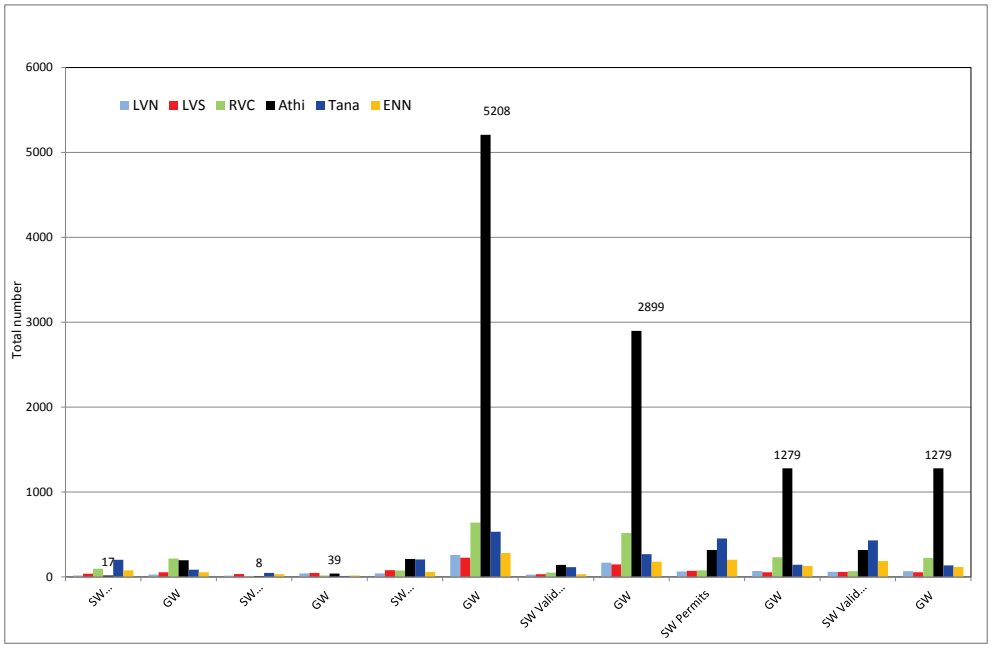
Other than improvement in volumes of authorisations and processed permits, WRMA's efficiency in processing permits also improved (Figure 4.3). About 2% improvement in efficiency of permit processing was observed between June 2013 and June 2014 (Figure 4.2 and Figure 4.3). All the regions had more than 81% of their permits valid, which corresponded to valid allocation of more than 80% of their water (except Tana). Although Tana had the lowest proportion of ground water allocation with valid permits (at 35%), it had a remarkable improvement of 5% in valid allocation of ground water volume, up from 30% as at June 2013 (Figure 4.2).

Table 4.3: Cumulative permitting status up to June 2014

Region	Applications pending processing		Number of approvals		Number of authorisations		Number of valid authorisations		Number of permits		Number of valid permits	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	18	29	16	41	41	258	26	168	64	70	61	69
LVS	37	54	35	48	79	226	32	147	72	54	59	54
RVC	97	218	12	17	75	639	51	517	77	232	69	224
Athi	17	196	8	39	211	5208	141	2899	317	1279	317	1279
Tana	203	85	47	12	206	532	115	268	453	144	430	136
ENN	77	55	33	17	59	281	32	179	203	128	187	117
Total	**449**	**637**	**151**	**174**	**671**	**7144**	**397**	**4178**	**1186**	**1907**	**1123**	**1879**
	All permits						Valid permits					
	Category B		Category C		Category D		Category B		Category C		Category D	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	36	64	20	4	2	8	33	61	20	4	8	2
LVS	27	52	28	2	0	17	26	52	20	2	13	0
RVC	26	96	23	39	28	96	21	94	95	136	26	90
Athi	199	1128	99	139	19	12	198	1119	95	136	19	12
Tana	394	127	39	4	20	12	94	126	38	1	90	8
ENN	122	84	70	36	11	8	114	78	62	34	11	5
Total	**804**	**1551**	**279**	**224**	**80**	**153**	**486**	**1530**	**330**	**313**	**167**	**117**
	All permitted volumes (x1000 m^3/d)						Valid volumes (x1000 m^3/d)					
	Category B		Category C		Category D		Category B		Category C		Category D	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	4.7	1.2	6.5	0.2	152.9	0.2	4.4	1.2	6.5	0.2	152.9	0.2
LVS	1.5	1.2	18.3	0.3	962.6	0.0	1.5	1.2	12.2	0.3	951.4	0.0
RVC	2.5	4.1	10.9	6.9	1577.5	150.8	2.2	3.1	10.1	6.9	1572	142.9
Athi	3.8	28.8	117.4	25.1	186.7	13.2	3.8	28.7	107.6	24.5	186.7	13.2
Tana	226.6	3.0	267.6	1.1	80557	9.1	218.5	2.9	260.3	0.1	80577	1.5
ENN	23.1	3.4	62.8	7.4	38.7	6.0	20.8	3.2	52.4	7.3	38.7	4.2
Total	**262.32**	**41.73**	**483.44**	**41.09**	**83475**	**179.24**	**251.20**	**40.31**	**449.1**	**39.36**	**83479**	**162.0**

SW = Surface water GW = ground water

Figure 4.3: Comparative permitting status up to June 2014

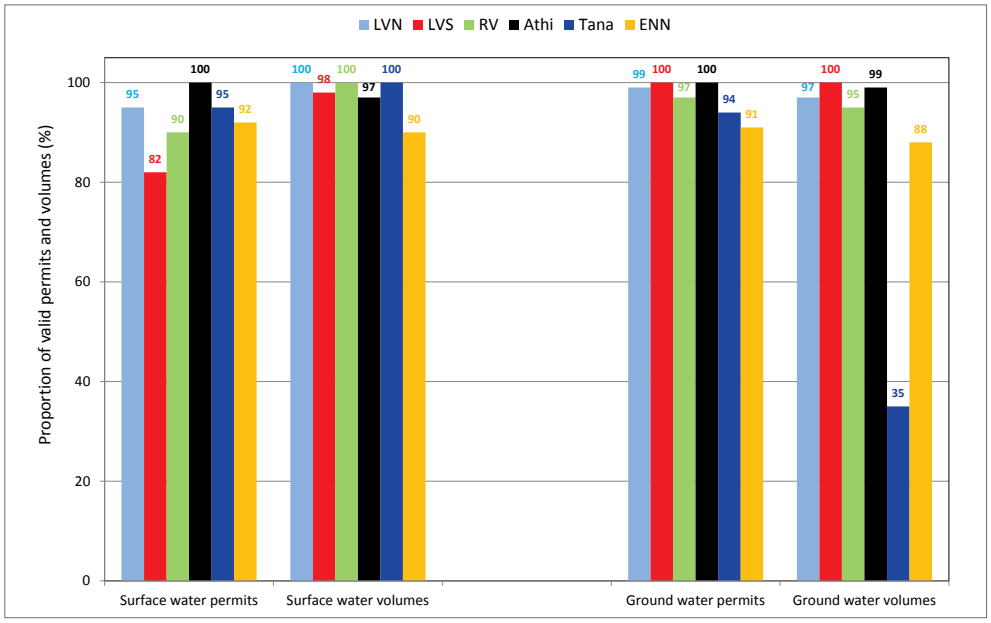


Overall, the water use permit processing efficiency increased to 95% (due to 2% increase in processing surface water and ground water) by June 2014. This implies that the proportion of expired permits shrank by about 2% by June 2014. There was no significant change/pattern observed on the number of expired authorisations.

In processing different ground water permit categories, WRMA's performance declined from category B to D, which implied that WRMA was more efficient in processing category B permits than category D permits. This was understandable because the permit conditions for category D require more time to process than category B.

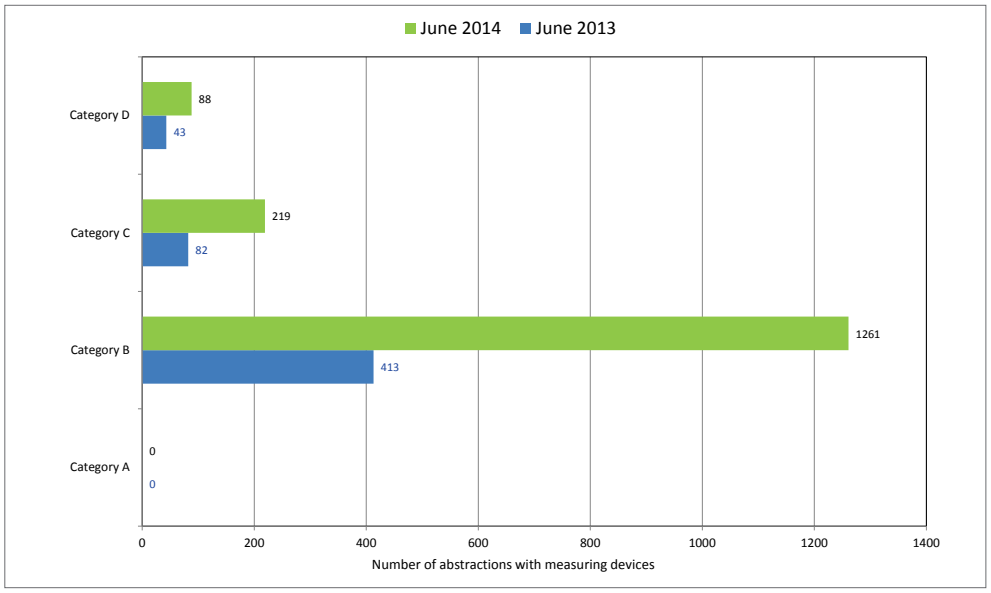
In terms of number of water meters, WRMA's performance rose to 52% in June 2014 from 34% in June 2013. This showed that the number of permitted water abstractions without water meters decreased from 66% to 48% by June 2014. Still, there were no abstractions in category A with water meters up to June 2014. Athi continued to post the highest number of abstractions with water meters (especially for ground water abstractions in category B). Lake Victoria South and North had the lowest number of abstractions with water meters.

Figure 4.4: Cumulative proportion of valid permits and volumes up to June 2014



Overall, there was more than 100% improvement in number of abstractions with water meters from categories B to D (Figure 4.5). Category B abstractions had 300% improvement from June 2013 to June 2014. This is tremendous improvement for WRMA in enforcing compliance to permitting conditions. At the same time, WRMA's data on the amount of abstracted water has improved. However, there is still a need to improve enforcement of permit conditions on water meters so as to improve accountability of allocated water resources.

Figure 4.5: Comparative number of abstractions with measuring devices up to June 2014



4.1.2 Water allocation criteria

WRMA's performance in water allocation was also assessed in terms of the tools it developed for water allocation and status of the water reserve. The tools for water allocation that WRMA uses are abstraction surveys and water allocation plans. Performance assessment was done by comparing the number of tools so far developed against the set target. Up to June 2013, only Ewaso Ngiro North region performed well, completing 80% of the set number of abstraction surveys (Table 4.4). Overall, 29% of the set target was met. By June 2014, WRMA had scaled down the target number of abstraction surveys by 87%. This reduction was based on the recognition of the high level of involvement and requirements necessary to carry out such surveys. With this reduction, all the regions except Lake Victoria South and North passed the set target. Ewaso Ngiro North still had the highest number, while the Lake Victoria regions had undertaken none.

Table 4.4: Status of abstraction surveys and water allocation plans by June 2014

Abstraction surveys						
Region	Number between June 2012 and June 2013			Number between June 2013 and June 2014		
	Target	Undertaken	Performance (%)	Target	Undertaken	Performance (%)
LVN	6	1	16.7	1	0	0
LVS	6	1	16.7	1	0	0
RV	10	2	20	1	2	200
Tana	10	2	20	1	1	100
Athi	10	1	10	1	1	100
ENN	10	8	80	1	3	200
Total	52	15	29	6	7	117
Water allocation plans						
Region	Number between June 2012 and June 2013			Number between June 2013 and June 2014		
	Target	Undertaken	Performance (%)	Target	Undertaken	Performance (%)
LVN	1	1	100	1	0	0
LVS	1	0	0	1	0	0
RV	1	1	100	1	0	0
Tana	1	0	0	1	0	0
Athi	1	0	0	1	0	0
ENN	1	0	0	1	2	200
Total	6	2	33	6	2	33

Similarly, in water allocation plans (WAPs), the targets which WRMA had set by June 2013 were largely not met. Unlike the abstraction surveys, the target number of WAPs was not revised in the year following. Only Ewaso Ngiro North developed water allocation plans (Table 4.4). Overall, WRMA did not perform well in developing water allocation tools by June 2014. There is need for WRMA to emphasize the development of these tools as they are essential in planning water allocation.

WRMA also maintains a database of volume of water used by category. Table 4.5 gives a summary of this database up to June 2014. This database is used to account for different amounts of water abstracted. In this performance analysis, it was used to evaluate amount of water allocated and amount of water WRMA is able to account for.

Table 4.5: Cumulative volumes of water allocated per category of use up to June 2013

Volume of water by category of water use up to June 2013 (x 1000 m^3/day)														
Region	Public		Domestic		Livestock		Irrigation		Industrial		Power		Other	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	268.8	0.4	17.8	5.3	1.5	0.1	528.5	0.2	106.4	0.1	1001.5	0.0	11.3	0.1
LVS	32.6	0.3	8.9	6.5	0.0	0.1	19.9	0.4	18.3	1.2	970.8	0.0	2.4	0.0
RV	11.7	39.3	17.8	9.6	4.8	1.9	89.5	135.7	24.1	2.4	1469.0	4.0	9.4	7.3
Athi	27.3	111.3	9.2	78.8	0.2	3.7	188.3	26.8	13.5	16.5	0.0	0.0	0.5	2.2
Tana	220.5	0.9	465.7	13.1	3.5	1.3	494.1	3.3	6.4	0.1	81928.5	0.0	1.2	0.8
ENN	21.2	3.8	27.0	8.0	5.5	1.3	74.3	14.5	1.4	0.5	0.2	0.0	4.0	0.3
Total	582.1	156.0	546.4	121.3	15.6	8.4	1394.7	181.0	170.1	20.8	85370.0	4.0	28.8	10.8

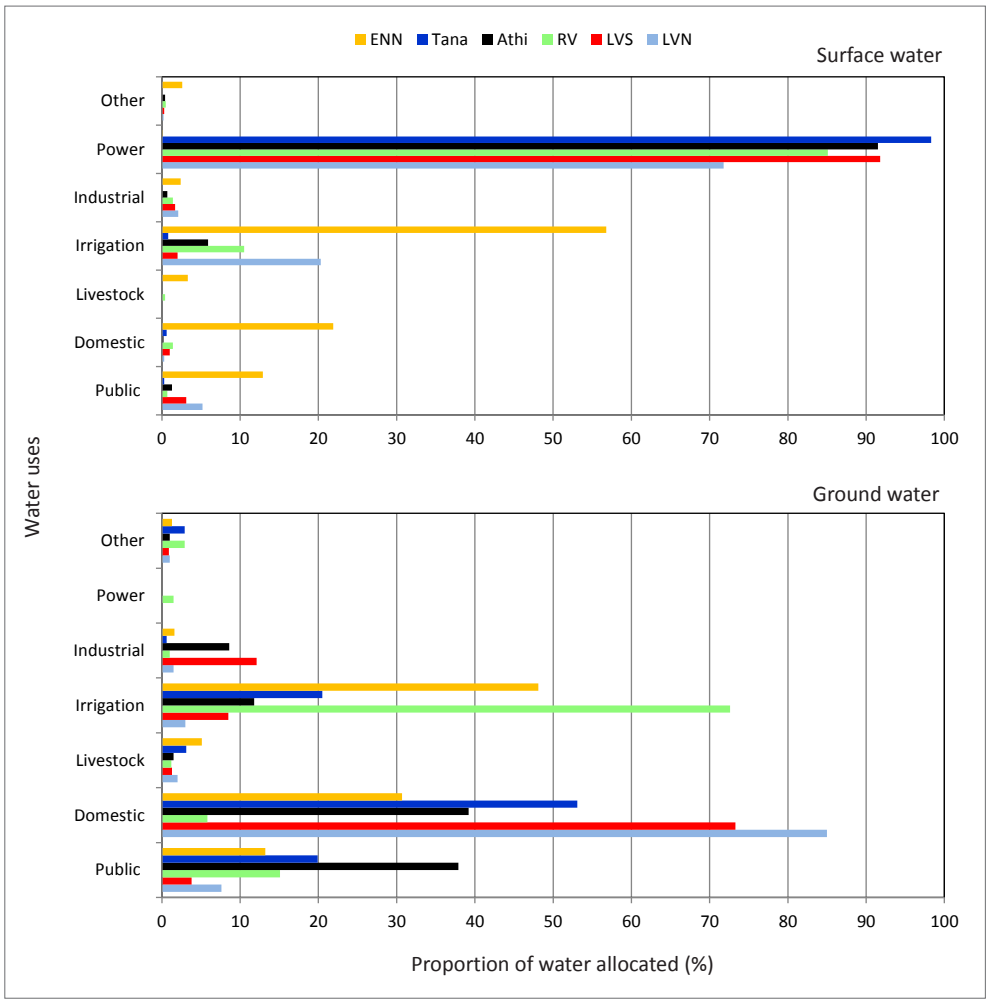
Volume of water by category of water use up to June 2014 (x 1000 m^3/day)														
Region	Public		Domestic		Livestock		Irrigation		Industrial		Power		Other	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
LVN	269.1	0.6	17.8	6.7	2.1	0.2	1046.9	0.2	106.4	0.1	3702.9	0.0	11.7	0.1
LVS	33.0	0.4	10.3	7.5	0.3	0.1	21.4	0.9	18.5	1.2	970.8	0.0	3.0	0.1
RV	11.7	39.3	24.2	15.2	6.1	3.1	180.6	189.6	24.8	2.6	1469.0	4.0	9.4	7.5
Athi	69.4	120.0	12.8	124.1	0.3	4.9	323.7	37.5	37.1	27.3	5000.1	0.0	19.4	3.1
Tana	259.5	11.8	490.4	31.6	4.7	1.9	675.0	12.2	8.3	0.3	83357	0.0	1.3	1.7
ENN	22.5	5.0	38.2	11.7	5.8	1.9	99.1	18.3	4.2	0.6	0.2	0.0	4.5	0.5
Total	665.2	177.2	593.6	196.8	19.2	12.0	2346.8	258.8	199.3	32.2	94500	4.0	49.3	13.0

SW = Surface water GW = Ground water

A high proportion (over 50%) of surface water in Lake Victoria North, Rift Valley, Tana and Lake Victoria South was allocated for electricity power generation (Figure 4.6). In Athi and Ewaso Ngiro North, surface water was mainly used for irrigation. Lake Victoria North also used about 25% of its surface water for irrigation.

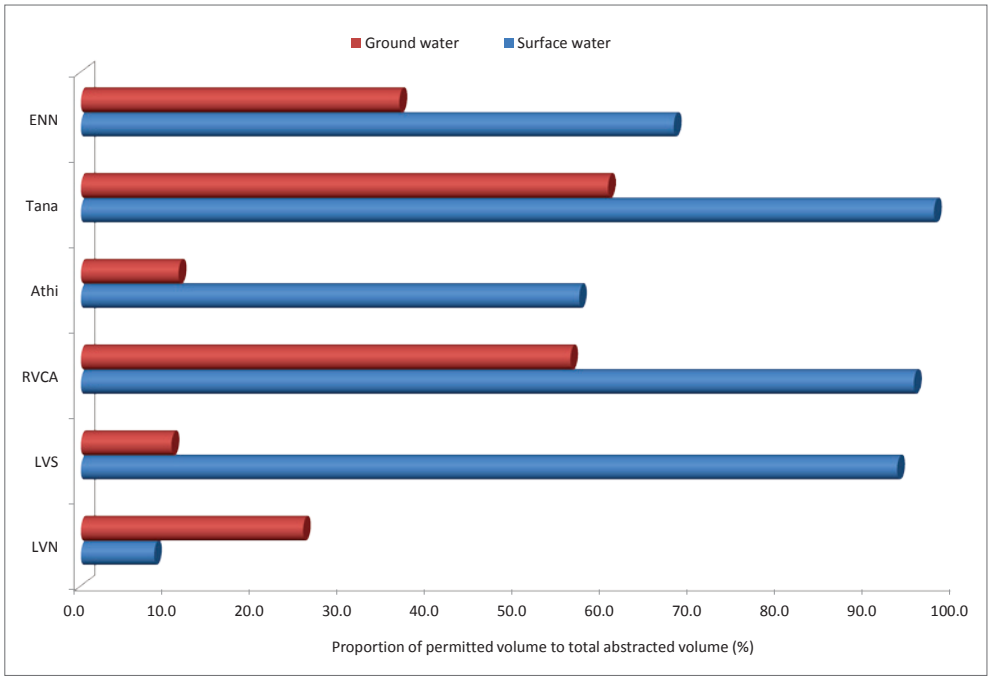
Domestic use took up most of the ground water allocations, except in Rift Valley and Ewaso Ngiro North where it was used for irrigation (Figure 4.6). In terms of social water (domestic, public, and livestock water uses), it seems WRMA did most of its allocations from ground water resources.

Figure 4.6: Proportion of water uses by category of use by June 2013



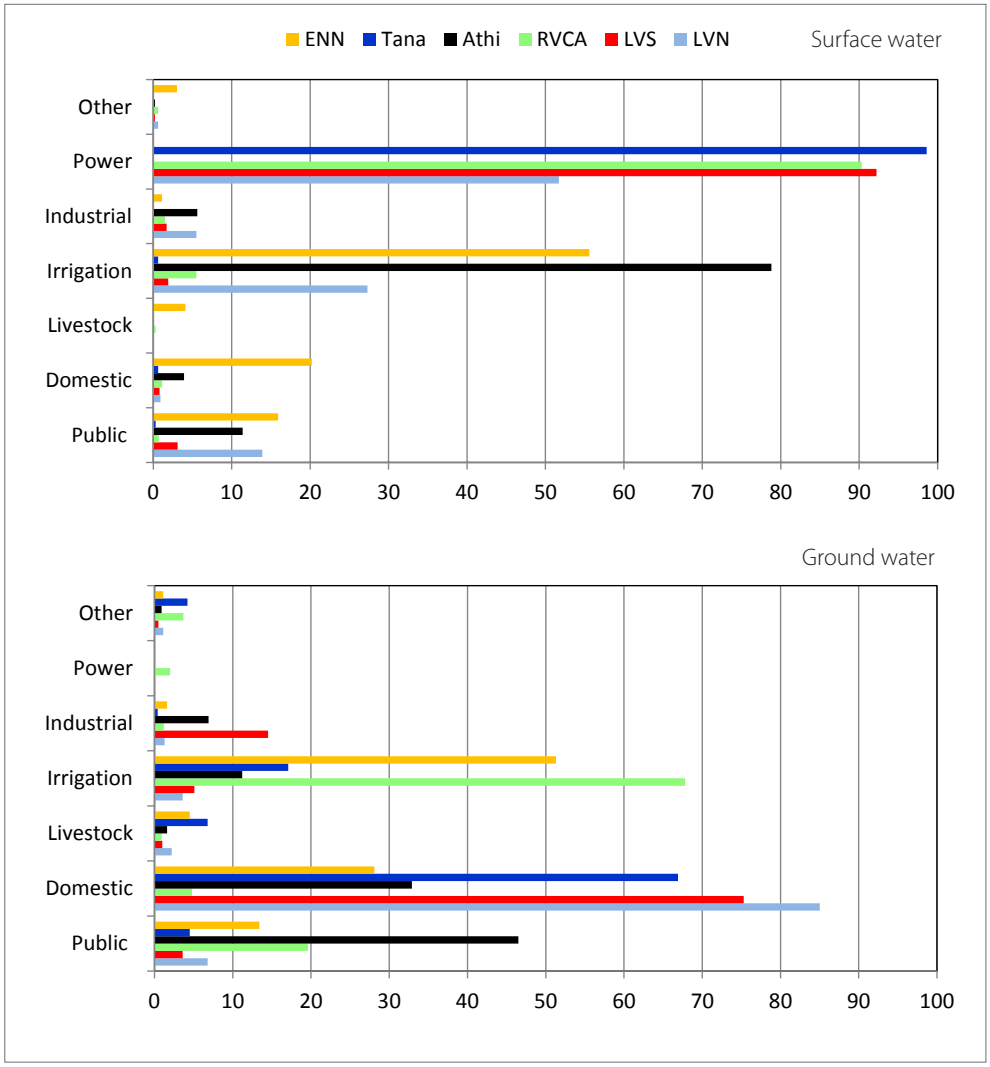
By comparing the total amount of water used and the total amount of water permitted, it was found that WRMA was able to permit 70% of abstracted surface water and 33% of abstracted ground water up to June 2013. Over 55% of abstracted surface water was permitted in all the regions except Lake Victoria North (8.4%). In ground water, over 20% of abstractions were permitted in all the regions except Lake Victoria South (10.4%) and Athi (11.2%). Overall, by June 2013, WRMA allocated more surface water to electricity power generation and irrigation, and ground water to domestic water users.

Figure 4.7: Proportion of permitted to abstracted volumes up to June 2013



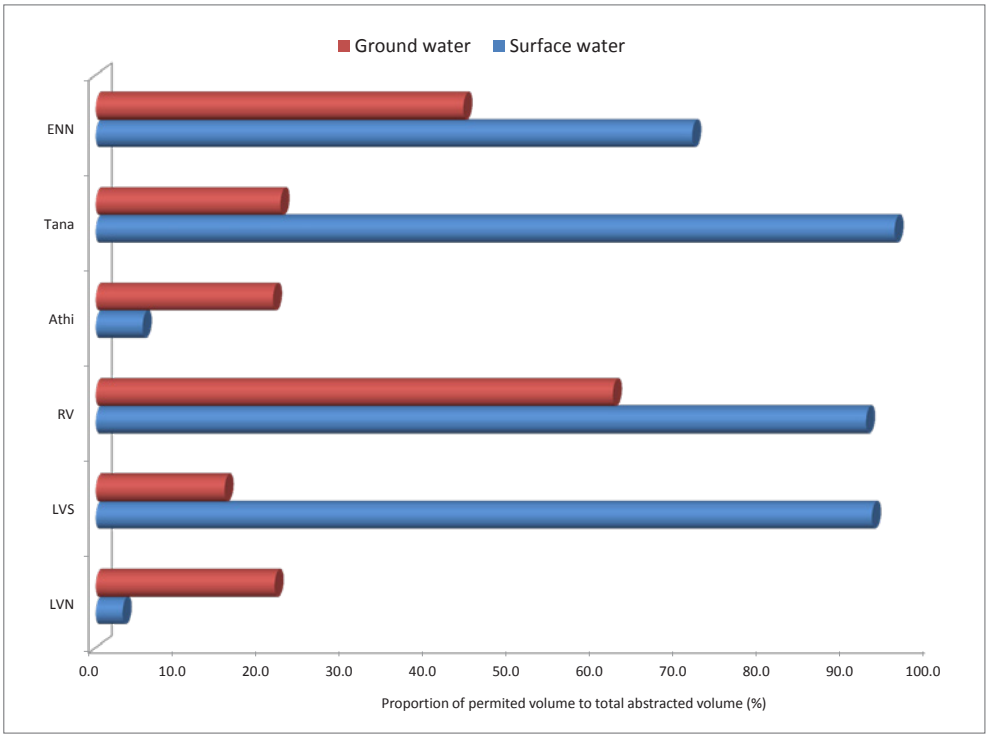
Analysis for water abstractions by June 2014 also showed a similar pattern in the proportion of surface and ground water used by different water use categories (Figure 4.8). However, Athi now increased its surface water allocation for electricity generation and reduced its allocation for irrigation. Similarly, Ewaso Ngiro North also reduced its ground water allocation for irrigation and increased the domestic water usage.

Figure 4.8: Proportion of water uses by category of use by June 2014



In Ewaso Ngiro North, most of water allocations were for irrigation. In other regions, electricity power generation and domestic water abstractions took precedence. In terms of proportion of permitted to abstracted water, there was a decrease in permitted water abstractions between June 2013 and June 2014. The proportion of permitted surface water to abstracted water reduced to 60% while that of ground water reduced to 31%. The main contributing factors for the reduction in water permitting were Athi surface water (which declined from 57% in June 2013 to 7% in June 2014) and Tana ground water (which reduced from 60% to 22%).

Figure 4.9: Proportion of permitted to abstracted volumes up to June 2014



When Athi surface water uses changed between June 2013 and June 2014, the proportion of electricity generation rose from 0% to over 90% and irrigation water abstraction declined from 78% to 5%. Public water abstraction also declined from 12% to 2%. These changes caused the drop in proportion of permitted water to abstracted water. Consequently, WRMA's performance in permitting abstracted surface water declined. Similarly, in ground water, Tana reduced its domestic water abstractions from 68% in June 2013 to 52% in June 2014 and increased its public water abstractions from 5% to 20%. WRMA's performance in permitting ground water abstractions also declined when these changes occurred. Altogether, WRMA's performance in permitting water uses declined between June 2013 and June 2014.

In Table 4.5, the overall total amount of abstracted water increased from 88,609,773.75 m^3/day in June 2013 to 99,067,725.34 m^3/day in June 2014, which corresponded to 11.8% increase in volume of abstracted water. For the permitted volume, the increase was 0.5%. The increase in volume of abstracted water was comparable to WRMA's target of 12% for the financial year ended June 2014. In this regard, WRMA barely attained its performance target.

In surface water storage, WRMA's contribution towards storage enhancement is in the form of regulating/ permitting storage development. WRMA's performance was assessed using the number of applications processed and permits issued for different classes of surface water storage facilities. A summary of the permitting status of storage facilities is given in Table 4.6.

Table 4.6: Status of surface water storage

	June 2013			
	Class A dams	**Class B dams**	**Class C dams**	**Total**
No. of applications	3	71	2	76
No. of valid authorisations	13	18	3	34
No. of expired authorisations	7	54	6	67
No. of valid permits	11	30	4	45
No. of expired permits	0	0	0	0
Total permitted capacity (m^3)	551,651.22	2,684,282.0	1,537,806.4	4,773,739.62
	June 2014			
	Class A dams	**Class B dams**	**Class C dams**	**Total**
No. of applications	6	7	2	15
No. of valid authorisations	13	5	1	19
No. of expired authorisations	12	70	7	89
No. of valid permits	16	136	0	152
No. of expired permits	0	1	7	8
Total permitted volume (m^3)	2,027,183.72	24,898,236.42	1,716,074.568	28,641,494.71

Most of the applications for permitting storage development were received for Class B dams. Although WRMA permitted over 4 million m^3 of storage by June 2013 and over 28 million m^3 by June 2014, the amount of available water in these storage facilities depends on the status of the structures and availability of rainfall.

In the maintenance of reserve, WRMA had set 16 reference points where the reserve flows were to be determined and maintained. These stations are on the following major rivers: Athi, Ewaso Ngiro North, Tana, Yala, Gucha-Migori, Mara, Nzoia, and Turkwel. Achievements in meeting this target were used to evaluate WRMA's performance in maintaining the reserve. A summary of these achievements by June 2014 is given in Table 4.7.

Table 4.7: Stations with reserve flow determined and maintained by June 2014

River	Point of determination	Reserve flow (m^3/s)	ID of monitoring point	No. of days reserve was violated as per the crest model
Nzoia River	Lower reaches of Nzoia River (Nzoia Market)	34.1	1EE01	0
Nzoia River	Lower reaches of Nzoia River (Rwambwa)	41.753	1EF01	0
Nzoia River	Moi's Bridge town	2.5	1BB01	0
Nzoia River	Webuye town	15.9	1DA02	0
Tana River	Downstream of Garissa town	53.5	4G01	0
Yala River	Yala town	6.7	1FG01	0
Yala River	Bondo Water Supply intake	5.04	1FG02	0
Gucha-Migori River	Wath Ong'er	2.4	1KB05	0

Overall, WRMA determined and maintained the reserve in 50% of the set target number of stations. In addition, there were no days in which the reserve was violated. WRMA maintained the reserve through an intensive enforcement programme at the river basin level that included disconnection of non-compliant abstractors to ensure that no abstraction activities were carried out above the authorised values during low flow periods.

4.2 Pollution control and catchment conservation

4.2.1 Management of major effluent dischargers

In order to control effluent discharge, WRMA has established and is enforcing minimum water quality guidelines for effluent discharging into water resources. WRMA identifies effluent dischargers, sensitises them, and requires compliance to guidelines before issuing an Effluent Discharge (ED) permit. These guidelines are contained in the Effluent Discharge Control Plan (EDCP). According to the EDCP, one is required to progressively improve the quality of effluent so that eventually it meets the required standards before it is discharged into a water body. Through pollution surveys WRMA identifies non-compliant effluent dischargers and enforces compliance through the EDCP process. Simultaneously, compliance inspections are carried out to affirm the validity of the ED permits already issued. In assessing WRMA's performance in pollution control the following indices were used: the number of pollution surveys conducted, the proportion of effluent dischargers complying with EDCP, and the proportion of effluent dischargers with ED permits. A summary of these indices is given in Table 4.8.

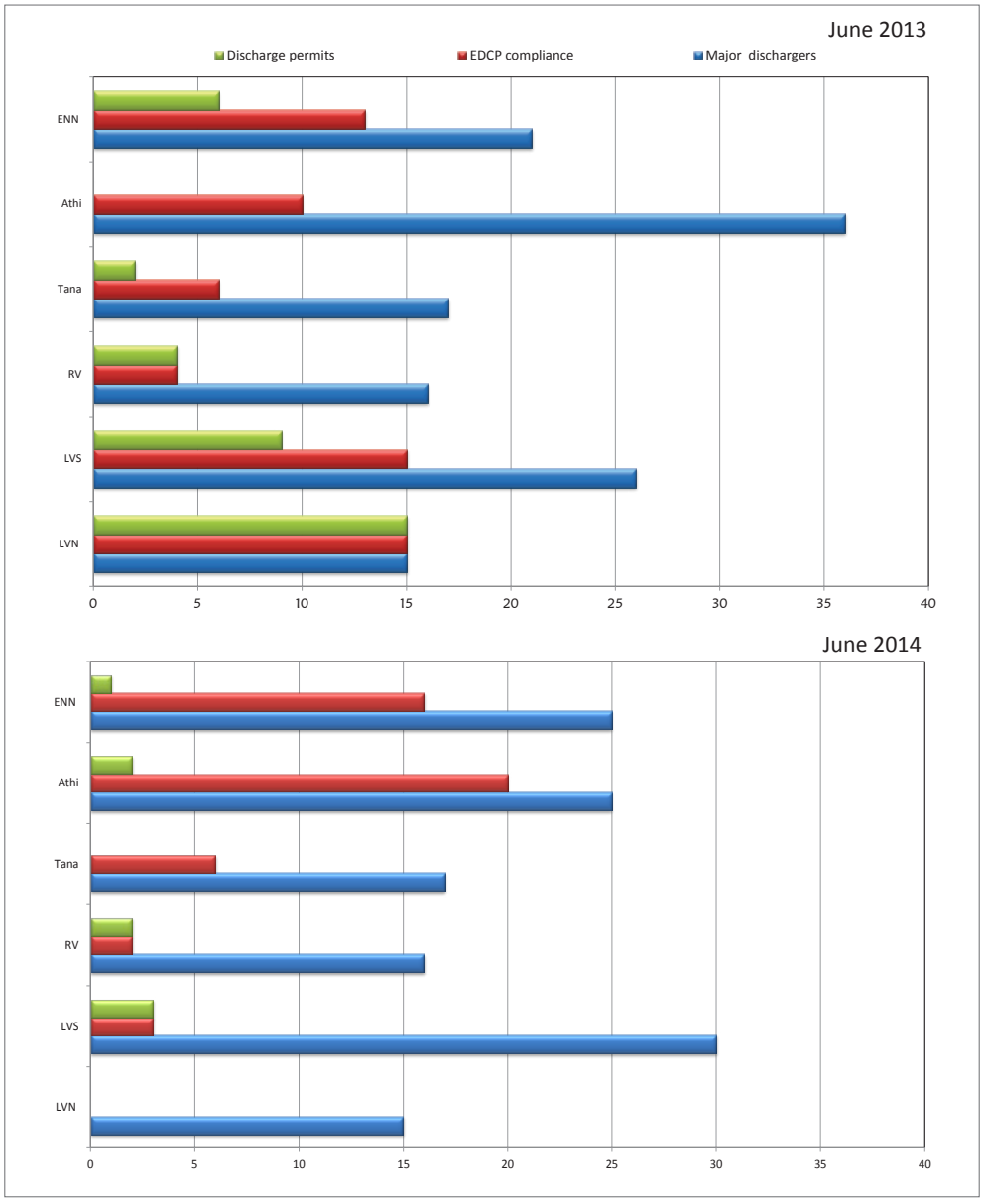
Table 4.8: Inventory of effluent discharge and control

Region	Number of major effluent dischargers		Number of dischargers complying with EDCP		Number of dischargers issued with ED permits	
	Up to June 2013	Up to June 2014	Up to June 2013	Up to June 2014	Up to June 2013	Up to June 2014
LVN	15	15	15	0	15	0
LVS	26	30	15	3	9	3
RV	16	16	4	2	4	2
Tana	17	17	6	6	2	0
Athi	36	25	10	20	0	2
ENN	21	22	13	16	6	1
Total	**131**	**128**	**48**	**47**	**36**	**8**

Up to June 2013, Athi had the highest number of registered major effluent dischargers with no effluent discharge permit issued, while Lake Victoria North had the lowest number of registered major effluent dischargers and the highest number of ED permits. By June 2014, Lake Victoria South improved tremendously and registered the highest number of major effluent discharges and number of ED permits issued. Athi and Ewaso Ngiro North registered the highest improvement in number of dischargers complying with EDCP between June 2013 and June 2014 (Figure 4.10).

Tana and the Lake Victoria regions (South and North) had a significant decline in the number of effluent dischargers either complying with EDCP or having ED permits. In Lake Victoria North, 15 major effluent dischargers complying with EDCP guidelines had their ED permits cancelled by June 2014. In Lake Victoria South, the 26 major effluent dischargers by June 2013 increased to 30 but those coping with EDCP and those holding ED permits declined. This implies that pollution from major effluent dischargers rose because compliance declined. In Tana and Rift Valley, the number of major effluent dischargers remained the same but those complying with discharge guidelines declined. This implies that the pollution control levels also declined. Overall, the number of effluent dischargers and those complying with EDCP guidelines declined by 2% while the number of dischargers with ED permits declined by 78%. The declining trend in the number of major effluent dischargers shows that either the dischargers stopped discharging effluent or WRMA did not update the records in time. The declining trend of compliance with EDCP and the number of ED permits implies that the quality of effluent discharged is declining, hence increased pollution. WRMA should therefore strengthen enforcement in order to reverse this trend.

Figure 4.10: Distribution of effluent dischargers and compliance to discharge guidelines by June 2014



4.2.2 Pollution survey

Eight pollution surveys were carried out against a target of 12, giving WRMA an overall performance of 67% for the financial year ended June 2013 (Table 4.9). When this target was lowered to six in the following financial year ended June 2014, WRMA's performance improved to 100%. Rift Valley and Ewaso Ngiro North regions surpassed their targets while Lake Victoria North and Tana did not carry out any surveys. While Rift Valley surpassed its target, the number of major effluent dischargers did not change although the number of dischargers complying with EDCP and those holding ED permits declined. Lake Victoria South, which did not carry out any surveys between June 2013 and June 2014, registered an increase in the number of major effluent dischargers and declines in compliance with EDCP and number of ED permits issued (Figure 4.10). Tana, which did not carry out new surveys between June 2013 and June 2014, had a constant number of effluent dischargers and level of EDCP compliance but seemed to have cancelled the two ED permits it issued before June 2013.

Table 4.9: Inventory of pollution surveys and inspections carried out between June 2013 and June 2014

Region	Pollution surveys by June 2013			Pollution surveys by June 2014			Inspection reports	
	Target	Undertaken	Performance (%)	Target	Undertaken	Performance (%)	June 2013	June 2014
LVN	2	1	50	1	1	100	1	1
LVS	2	1	50	1	0	0	2	4
RV	2	1	50	1	2	200	1	2
Tana	2	0	0	1	0	0	2	4
Athi	2	4	200	1	1	100	1	1
ENN	2	1	50	1	2	200	1	1
Total	12	8	67	6	6	100	8	13

4.2.3 Catchment conservation and rehabilitation

WRMA carries out conservation and rehabilitation activities in order to control degradation and improve catchment conditions. Catchment degradation is the source of siltation that contributes to non-point pollution of water resources. By conserving and rehabilitating degraded areas WRMA strives to control non-point pollution and improve water quality and yield. The activities involved in catchment conservation and rehabilitation include development of sediment trap/control structures and WRUA implementation of sub-catchment management plan (SCMP) activities that control sedimentation. WRMA monitors the effectiveness of these activities by monitoring sediment load in the rivers. During this performance assessment, the following indices were used to assess WRMA's performance in catchment conservation and rehabilitation: the number of WRUAs implementing SCMPs with sediment control activities, number of sediment control structures developed, and number of sediment monitoring stations. A summary of these indices is given in Table 4.10.

Although Table 4.10 had data gaps, it shows that there were efforts to control and monitor non-point pollution from water catchment areas. Only Athi and Tana had installed sediment control structures by June 2013. In terms of WRUA activities for catchment conservation and rehabilitation, Athi and Rift Valley had the highest number of participating WRUAs by June 2013. Athi also had the highest number of sediment monitoring stations with reduced sediment load (below 50 tonnes/year). Overall, only Athi and Lake Victoria North seem to have had activities for catchment conservation and monitoring of non-point pollution from the catchment areas by the end of June 2013.

In the year ended June 2014, Athi and Lake Victoria North showed improvements in catchment conservation and rehabilitation. They increased the number of WRUAs implementing sediment control activities (by 25% in Athi and 236% in Lake Victoria North). Athi also increased the number of sediment control structures by 73% (Table 4.10). In general, WRMA showed efforts in the initial steps to conserve water catchment areas and to monitor non-point pollution especially in Athi and Lake Victoria North. More efforts will be pursued in the other regions in the coming year.

Table 4.10: Achievements in catchment conservation and rehabilitation measures

Region	Station monitoring sediment load	Stations with TSS above 50 tonnes/year)		Stations with TSS below 50 tonnes/year)		Number of sediment control structures		WRUAs implementing SCMPs with sediment control activities	
		June 2013	June 2014	June 2013	June 2014	June 2013	June 2014	June 2013	June 2014
LVN	25	21	20	4	5	0	0	11	37
LVS	30	-	-	-	-	-	-	-	9
RV	9	0	9	0	0	0	0	7	3
Tana	-	-	-	-	-	2	0	-	18
Athi	22	-	-	-	22	11	19	8	10
ENN	0	0	-	-	-	0	0	6	3
Total	86	21	29	4	29	13	19	32	80

Entries with dash (-) = no data TSS = Total suspended solids

4.3 Catchment management strategy (CMS)

4.3.1 Basin planning tools

WRMA has developed basin planning tools to guide catchment management. These tools include CMSs and SCMPs. The extent of implementation and review of the CMS and the number of SCMPs developed were used as the criteria for assessing WRMA's performance in this regard. Table 4.11 gives a summary of WRMA's major achievements in CMS implementation.

Athi region had the highest number of permits issued to water abstractors, highest proportion of abstracted volume of water with valid permits, highest number of established WRUAs and highest number of effluent dischargers complying with EDCP. However, it had low achievement of the target number of water resource monitoring stations (Table 4.11). Nonetheless, it appeared as the highest performing region in terms of CMS implementation by June 2013. Lake Victoria North had the lowest proportion of permitted water use, lowest number of effluent dischargers complying with EDCP, and a low proportion of operational water resource monitoring stations. As a result, it appeared not to have performed well in CMS implementation by June 2013.

Table 4.11: Progress towards implementation of CMS up to June 2014

	CMS Implementation achievements up to June 2013						
	No of permits issued*	% volume of water with valid permit	No of established WRUAs	% of permitted water use	Major Effluent dischargers with EDCP	% achievement of target stations	
						GW	SW
LVN	145	99.79	76	08.48	15	12	23.6
LVS	122	98.24	81	92.56	15	92	96.6
RV	297	99.12	56	90.82	4	60.42	54.5
Athi	1598	95.23	113	34.03	6	36	59.6
Tana	566	99.97	113	97.37	10	100	70.0
ENN	310	87.79	60	62.20	13	100	30.8
Total	**3038**	**96.70**	**499**	**55.07**	**63**	**66.74**	**56.6**
	CMS Implementation achievements up to June 2014						
LVN	130	99.79	99	3.21	0	85	31.9
LVS	116	98.24	98	92.18	3	100	96.6
RV	295	99.16	68	88.20	2	83	66.7
Athi	1596	97.16	121	6.49	20	94	59.6
Tana	568	99.97	121	95.56	6	61.5	70.0
ENN	305	89.60	73	66.49	16	100	57.7
Total	**3010**	**97.32**	**571**	**58.69**	**47**	**87.25**	**62.6**

** Number of water and effluent discharge permits*

By June 2014, there was improvement in implementation of CMS activities. During this period the proportion of permitted volumes of abstracted water increased as well as the number of WRUAs and number of operational water resource monitoring stations. However, there was a decline in number of permits issued and number of effluent dischargers complying with EDCP. Notable contributions towards improvement in CMS implementation were Lake Victoria North and Ewaso Ngiro North regions. They both increased their number of WRUAs and number of major effluent dischargers complying with EDCP, and also made progress towards attaining the target number of water resource monitoring stations. In addition to these achievements, WRMA also initiated a process to review the CMSs in order to improve catchment management.

Table 4.12: Progress in formation of WRUAs and SCMP implementation up to June 2014

Region	WRUAs Up to June 2013			SCMPs up to June 2013		
	Potential	Achieved	Proportion (%)	Potential	Achieved	Proportion (%)
LVN	106	76	72	106	57	54
LVS	137	81	59	137	41	30
RV	175	56	32	175	28	16
Tana	240	113	47	240	75	31
Athi	309	113	37	309	99	32
ENN	901	60	7	901	32	4
Total	**1868**	**499**	**27**	**1868**	**278**	**15**

Region	WRUAs Up to June 2014			SCMPs up to June 2014		
	Potential	Achieved	Proportion (%)	Potential	Achieved	Proportion (%)
LVN	106	99	93	106	92	87
LVS	137	98	72	137	85	62
RV	175	68	39	175	52	30
Tana	240	121	50	240	147	61
Athi	309	121	39	309	159	51
ENN	901	73	8	901	63	7
Total	**1868**	**571**	**31**	**1868**	**320**	**17**

In SCMP implementation, the Lake Victoria region (North and South) had the highest proportion of developed SCMPs compared to the set target potential (Table 4.12). This arose from the high increase in number of WRUAs in these regions between June 2013 and June 2014. Tana had the highest improvement in number of SCMPs developed while Athi had the lowest rate of increment during this period. Overall, there was a 2% increase in number of SCMPs developed. This corresponded to a 4% increase in number of WRUAs established.

4.3.2 Stakeholder engagement

Implementation of catchment management plans taking into account IWRM principles requires stakeholder participation for ownership and sustainability of the activities carried out. Stakeholders can jointly implement the plans or contribute towards facilitation of the implementation. WRMA has pursued this effort by engaging a number of stakeholders in implementation of the catchment management plans. During this performance assessment, the number of stakeholders involved in implementation of catchment management plans was used to assess WRMA's performance in stakeholder engagement. A summary of stakeholder inventory for this assessment is given in Table 4.13.

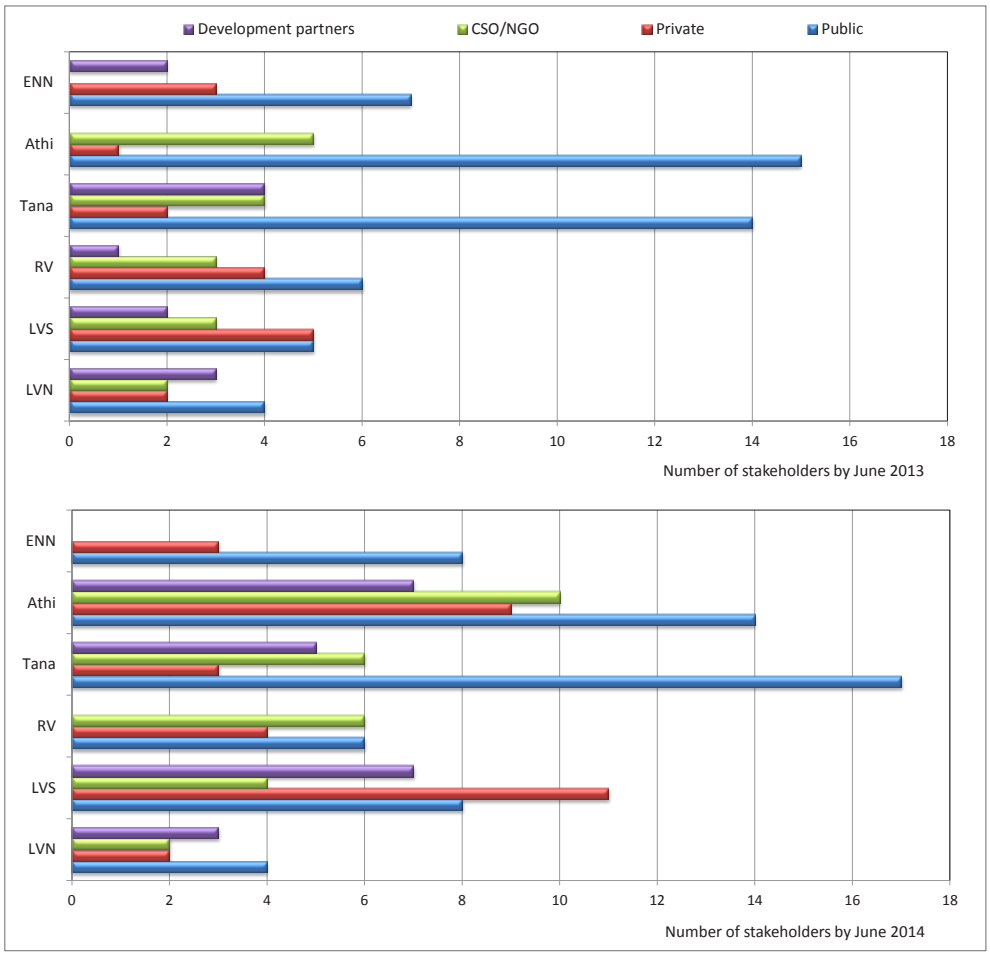
Table 4.13: Stakeholder inventory, participation and support

Region	Up to June 2013					Up to June 2014				
	Public	Private	CSO/NGO	DPs	Total	Public	Private	CSO/NGO	DPs	Total
LVN	4	2	2	3	11	4	2	2	3	11
LVS	5	5	3	2	15	8	11	4	7	30
RV	6	4	3	1	14	6	4	6	-	16
Tana	14	2	4	4	24	17	3	6	5	31
Athi	15	1	5	-	21	14	9	10	7	40
ENN	7	3	-	2	12	8	3	-	-	11
Total	51	17	17	12	97	57	32	28	22	139

DPs = Development partners CSO = Civil society organisations NGO = Non-governmental organisations

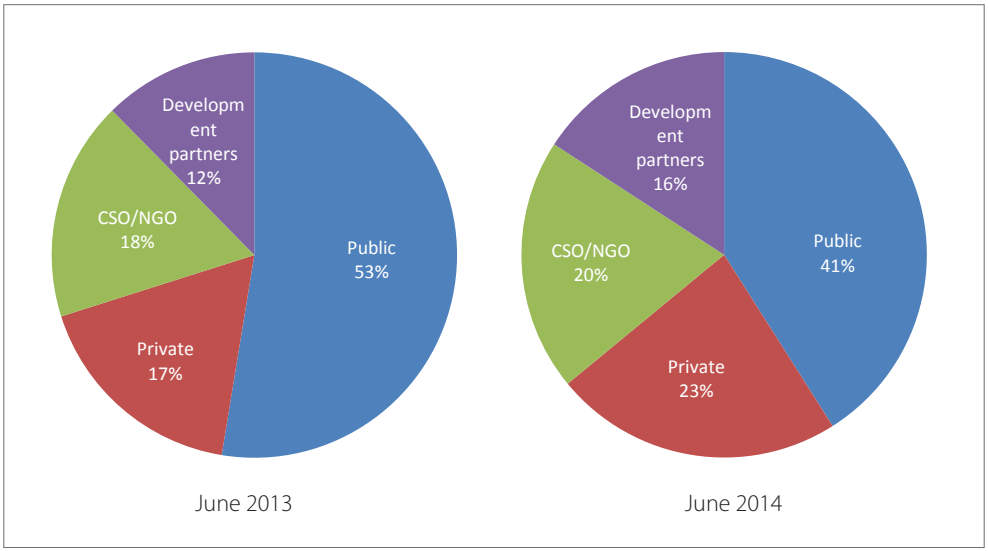
During the year ended June 2013, Athi and Tana Regions had the highest % of public involvement in implementation of catchment management plans. Athi maintained this number by June 2014 while Tana added more of public sector stakeholders. The two regions also registered the highest number of CSOs/NGOs involved in implementation of catchment management activities. Lake Victoria South, Rift Valley and Ewaso Ngiro seem to have engaged comparatively high numbers of private sector stakeholders during the year ended June 2013. Lake Victoria North, unlike the other regions, does not seem to have had many stakeholders in catchment management (Figure 4.11).

Figure 4.11: Comparison of number of stakeholders involved in catchment management by June 2014



Overall, the public sector had the most stakeholders participating in catchment management. Between June 2013 and June 2014, WRMA encouraged more of other stakeholders to participate as well. It appears that WRMA increased its campaign to involve more from the private sector and development partners. Consequently, about 5% more development partners and private sector organisations were added to the total number of stakeholders participating in catchment management by June 2014 (Figure 4.12). The increase likely came from Athi and Lake Victoria South, where the number of development partners and private sector organisations rose significantly by the end of June 2014 (Figure 4.11).

Figure 4.12: Proportion of stakeholders participating in catchment management



4.3.3 Conservation and protection of critical catchments

Critical catchments are those that are vulnerable to degradation, pollution and encroachment. They need to be identified and prioritised for targeted interventions which include conservation and identification of sites for gazettement. The critical catchments identified for conservation and protection are springs, wetlands, ground water recharge areas and riparian zones. Table 4.14 gives details of these catchments, which comprise inventory and status of conservation. During the year ended June 2013, about 20% of identified springs were protected. Lake Victoria North and Rift Valley protected most of their identified springs while Athi identified and protected the least. For wetlands, a total of 38 were identified but none was conserved. Regarding ground water recharge, only one site located in Athi was identified but it is yet to be conserved. In general, less than 20% of the identified critical areas were protected or conserved — except for riparian areas, where 72% of the identified stretch was conserved (Table 4.14).

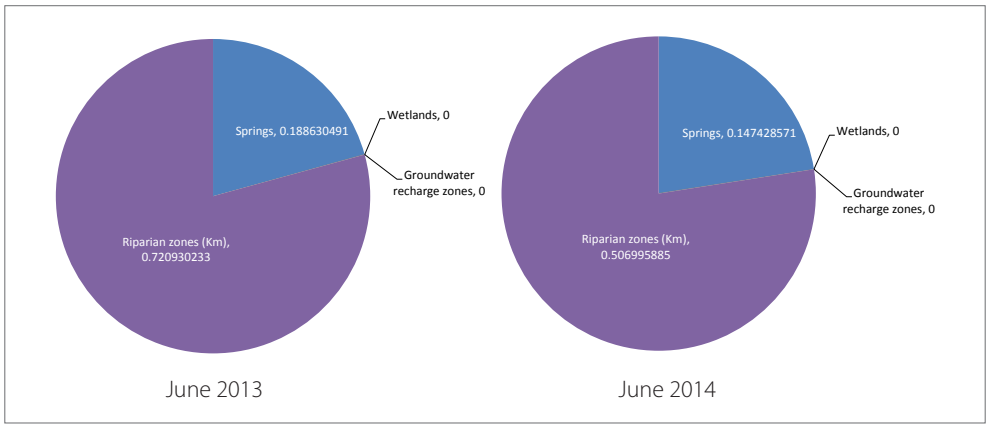
Table 4.14: Inventory of identified critical catchments and numbers conserved

Up to June 2013								
	Springs		Wetlands		GW recharge zones		Riparian zones (km)	
	Identified	Protected	Identified	Conserved	Identified	Conserved	Identified	Conserved
LVN	63	31	6	0	0	0	30	25
LVS	30	6	5	0	0	0	15	10
RV	58	23	6	0	0	0	35	15
Tana	221	9	3	0	0	0	50	30
Athi	6	1	11	0	1	0	20	20
ENN	9	3	7	0	0	0	65	55
Total	**387**	**73**	**38**	**0**	**1**	**0**	**215**	**155**

Up to June 2014								
	Springs		Wetlands		GW recharge zones		Riparian zones (km)	
	Identified	Protected	Identified	Conserved	Identified	Conserved	Identified	Conserved
LVN	160	100	33	0	0	0	40	20
LVS	40	10	5	0	0	0	21	13
RV	7	11	3	0	0	0	21	14.2
Tana	661	5	62	0	0	0	65	40
Athi	6	2	11	0	1	0	33	33
ENN	1	1	6	0	0	0	63	3
Total	**875**	**129**	**120**	**0**	**1**	**0**	**243**	**123.2**

The proportion of identified critical areas conserved/protected dropped by June 2014 (Figure 4.13). Notably, the proportion of the length of protected riparian zones and number of protected springs dropped significantly while the identified wetlands and ground water recharge areas remained unprotected. This analysis shows that WRMA's performance in protecting critical catchments is relatively low and should be improved since it is essential in enhancing availability of good quality water.

Figure 4.13: Proportion of identified critical areas that were conserved/protected by June 2014



4.4 Water resources assessment and monitoring

4.4.1 Effective water allocation system

An effective water allocation system is essential for efficient water sharing and follow-up of water use. WRMA developed a permitting system to help in managing the issuance of permits. Ideally, according to WRMA guidelines, an effective water allocation system should result in issuance of permits within 180 days. In assessing effectiveness of the water allocation system, the ageing (cumulative duration of pending process) analysis was done on issued permits (Table 4.15).

Table 4.15: Ageing analysis of permit processing up to June 2014

Permit category	Pending applications (< 30 days)	Pending applications (30-90 days)	Pending applications (90-120 days)	Pending applications (120-180 days)	Pending applications (>180 days)	Average permit processing time (days)
B	27	122	59	39	538	206
C	1	7	7	5	73	115
D	0	3	6	5	68	134
Average	9.33	44	24	16.33	226.33	151.67

The analysis showed that the water allocation system was effective in processing classes C and D, with average permit processing time shorter than the target 180 days. However, the system was not effective in processing permits in category B, whose average processing time was longer than the target 180 days. On average, the system was effective since it could process the permits within 152 days.

4.4.2 Effective pollution control system

The pollution control system ensures compliance to EDCP and eventual issuance of effluent discharge permits to compliant dischargers. When WRMA conducts pollution and inspection surveys, it updates the system, which then highlights the level of pollution and control measures taken. During the current performance analysis, the proportion of effluent dischargers with ED permits was used to assess the effectiveness of WRMA's effluent discharge control system. Table 4.16 gives a summary of inventory of effluent discharge and control by June 2014.

Only Ewaso Ngiro North region had more than 50% effectiveness in pollution control. Lake Victoria North had no record of effectiveness at all. Athi region, which had the highest number of effluent dischargers, had a very low number of ED permits. This implies that by the end of June 2014 it had a low level of pollution control. The situation was similar in other regions, with low numbers of issued ED permits. In general, WRMA had about 34% effectiveness in pollution control.

Table 4.16: Inventory of EDCP compliance by June 2014

Region	Effluent dischargers with EDCP	EDCPs with permit/ authorisations	Compliant EDCPs	% compliant EDCPs	% EDCPs with permits
LVN	15	0	0	0	0
LVS	21	9	3	14	43
RV	34	17	2	6	50
Tana	12	4	6	50	33
Athi	40	1	20	50	2.5
ENN	16	12	16	100	75
Totals	**138**	**43**	**47**	**34**	33.9

4.4.3 Water resource availability

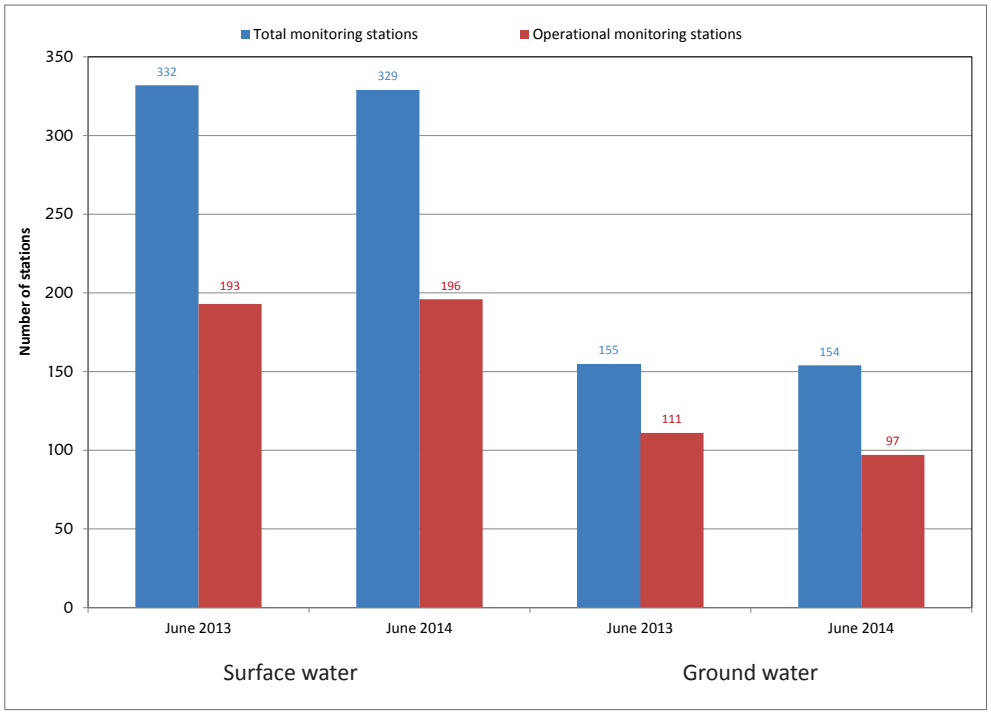
Knowledge of water availability is very important in resource management. WRMA has monitoring stations from which it determines the available water resources. The number of these stations and proportion of operational stations was used to determine WRMA's performance in establishing knowledge of water resource availability. Table 4.17 gives a summary of these monitoring stations by June 2013 and 2014.

Table 4.17: Surface and ground water monitoring stations up to June 2014

Monitoring stations by June 2013							
Regions	Surface water monitoring stations			Ground water monitoring stations			
	Monitoring stations	Stations with water level records	Stations with updated rating curves	Number of monitoring boreholes	Number of operational boreholes	% operational	Boreholes with water rest data
LVN	38	38	38	17	12	71	17
LVS	47	39	5	18	17	92	
RV	74	17	38	48	29	60.4	14
Tana	91	42	68	25	25	100	10
Athi	36	24	23	31	16	52	-
ENN	46	33	26	16	12	75	-
Total	**332**	**193**	**198**	**155**	**111**	**72**	**41**
Monitoring stations by June 2014							
Regions	Surface water monitoring stations			Ground water monitoring stations			
	Monitoring stations	Stations with water level records	Stations with updated rating curves	Number of monitoring boreholes	Number of operational boreholes	% operational	Boreholes with water rest data
LVN	38	38	38	17	13	85	17
LVS	47	39	5	18	9	50	-
RV	74	17	38	48	29	60.4	14
Tana	86	43	35	25	16	64	16
Athi	38	26	23	32	18	56	-
ENN	46	33	26	16	12	75	-
Total	**329**	**196**	**165**	**155**	**97**	**63**	**47**

Up to June 2013, Lake Victoria North had the highest proportion (100%) of operational surface water monitoring stations while Rift Valley had the lowest (23%). Overall, WRMA had 72% of its surface water monitoring stations in operation. On ground water monitoring, all regions had more than 50% of the monitoring stations in operation, which translated into 72% overall operational stations in the country. The number of operational surface water monitoring stations did not change in the year ended June 2014 while those of ground water monitoring stations declined. The number of operational ground water monitoring stations in Lake Victoria South region declined by almost half while those in Tana declined by a third. These declining numbers translated into an overall drop of number of operational stations to 63%. The decline may be attributed to flood damage and vandalism.

Figure 4.14: Number of water resource monitoring stations up to June 2014



The decrease in number of operational stations between June 2013 and June 2014 implied loss in data needed to accurately quantify water availability. Consequently, WRMA's performance in providing knowledge on water resources availability could be said to have declined in proportion to the drop in number of operational monitoring stations from 72% to 63% between June 2013 and June 2014.

In addition to monitoring stations, WRMA also carried out special assessments to establish available water resources. Eight special studies were carried out on ground water resources in Rift Valley, Athi and Ewaso Ngiro North regions (Table 4.18). These were mainly aquifer mapping, hydrogeological assessments, and ground water monitoring. The studies provided insight to the real status of ground water exploitation and potential. In addition, recommendations on the way forward for future ground water assessments, especially in ground water data management, were made. In Ewaso Ngiro North region, three surface water assessments were also carried out in Isiolo, Wajir and Garissa counties. The study gave an inventory of surface water resources and developed surface water availability, as well as water quality for the stated counties.

Table 4.18: Summary of special assessment studies up to June 2014

Region	Number and type of assessment		Achievements of the assessment studies	
	Surface water	Ground water	Surface water	Ground water
LVN	-	-	-	-
LVS	-	-	-	-
RV	-	3 (Kabatini aquifer, Turkana and Marsabit)	-	Aquifer mapping, hydrogeological assessment and ground water monitoring
Tana	-	-	-	-
Athi	-	1 (Tiwi aquifer)	-	Aquifer mapping, ground water monitoring
ENN	3 (Isiolo, Garissa, Wajir)	4 (Isiolo, Garissa, Wajir and Mandera)	Surface water assessment	Hydrogeological mapping, ground water monitoring

4.4.4 Assessment of water resource quality

Assessment of water resources quality aims at establishing the sources and levels of water pollution in a catchment. Water quality assessment and monitoring using data from water quality monitoring stations was undertaken during the two years of reporting. In order to determine WRMA's performance in water quality assessment, the total number of monitoring stations and proportion of operational stations were calculated. The results are summarised in Table 4.19.

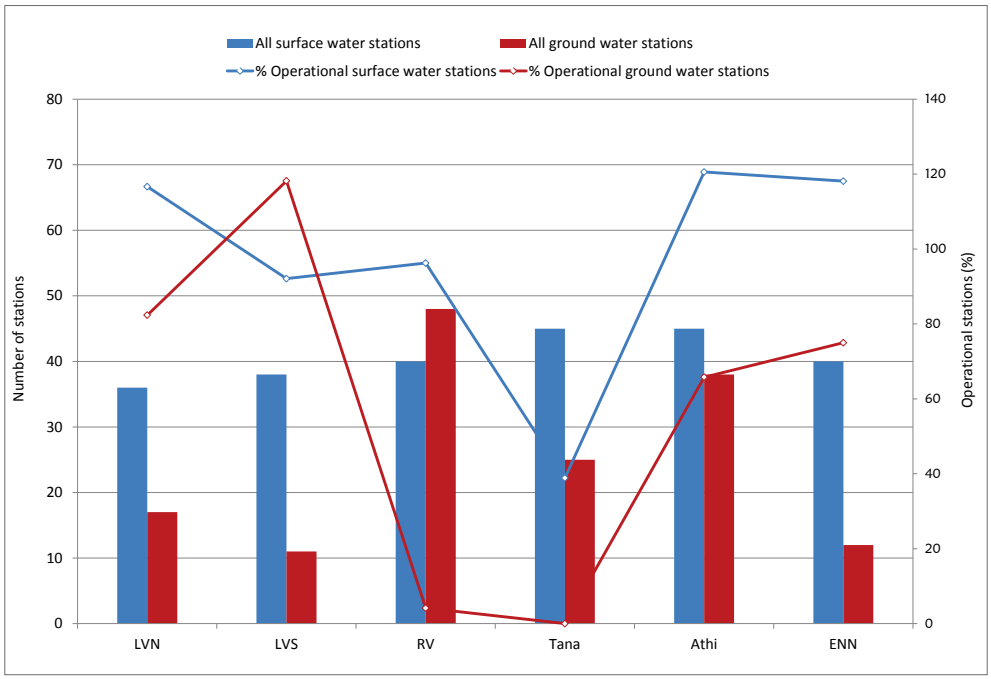
Table 4.19: Status of water quality monitoring

Regions	Surface water quality monitoring stations up to June 2013			Ground water quality monitoring stations up to June 2013		
	Number of monitoring stations			Number monitoring stations		
	All stations	Operational	% Operational	All stations	Operational	% Operational
LVN	36	24	67	17	14	82
LVS	38	20	53	11	13	118
RV	40	22	55	48	2	4
Tana	45	10	22	25	0	0
Athi	45	31	69	38	25	66
ENN	40	27	68	12	9	75
Total	**244**	**134**	**55**	**151**	**63**	**41.7**

Regions	Surface water quality monitoring stations up to June 2014			Ground water quality monitoring stations up to June 2014		
	Number of monitoring stations			Number monitoring stations		
	Total	Operational	% operational	Total	Operational	% operational
LVN	36	36	100	13	12	92.3
LVS	38	20	52.6	9	19	211
RV	41	22	53.7	29	2	6.9
Tana	69	16	23.2	16	0	0.0
Athi	31	31	100	38	25	65.8
ENN	40	31	77.5	12	12	100
Total	**255**	**156**	**61.2**	**117**	**70**	**59.8**

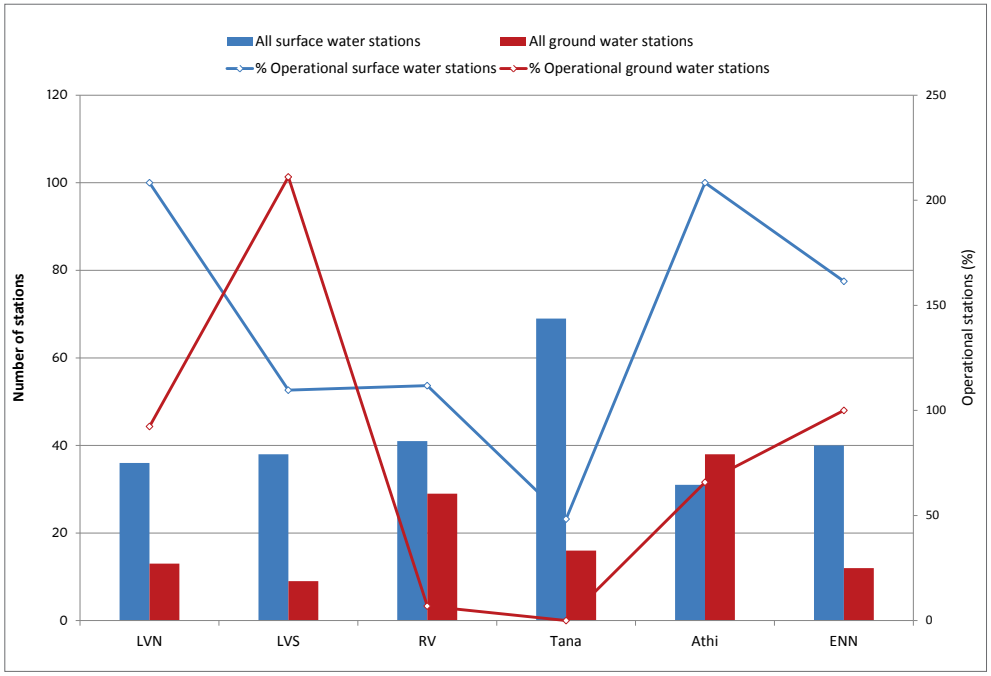
Although Athi and Tana both had high numbers of surface water quality monitoring stations, Athi had the highest proportion (69%) of stations operational by the end of June 2013 (Figure 4.15) while Tana had the lowest (16%). Tana region also had low compliance to ED permits (Figure 4.10) as well as low proportion of implemented SCMPs on catchment conservation (Table 4.10). These imply that Tana had poor performance in surface water quality assessment and control during the financial year ended June 2013. In ground water quality assessment, the Lake Victoria regions (North and South) and Athi had high proportions of operational stations. Athi still showed the highest number of operational stations while Tana had no operational ground water monitoring station (Figure 4.16). In general, Athi had the best performance of all the regions in terms of water quality assessment while Tana had the worst. Overall, WRMA had 55% operational surface water quality monitoring stations (out of 244 stations) and 42% operational ground water quality monitoring stations (out of 151 stations) by the end of June 2013.

Figure 4.15: Proportion of operational water quality monitoring stations by June 2013



In the financial year ended June 2014, Tana improved the number of surface water quality monitoring stations as well as the number of operational stations (Figure 4.16). Athi provided information on operational stations only, leaving out the status of stations that were not operational by June 2013. Overall, the proportion of operational surface water quality monitoring stations increased to 61% (out of 255 stations). In ground water quality monitoring, most of the non-operational stations were dropped by June 2014. They included 19 in Rift Valley, nine in Tana, four in Lake Victoria North, and two stations in Lake Victoria South. The removal of non-operational stations from the list of water quality monitoring stations improved the proportion of operational stations to 60% (out of 117 stations).

Figure 4.16: Proportion of operational water quality monitoring stations by June 2014



4.5 Economic and financial management

4.5.1 Improving water use efficiency

In water allocation, water use efficiency is the ratio of the amount of water used to the allocated amount of water. These can be estimated from the water bills and the potential value of the available water to be allocated. Water use is therefore considered more efficient if less water is used against the potential for the same demand. This means that less revenue will be obtained unless the demand increases. Assuming the demand is constant then Table 4.20 (a) and (b) provides the distribution of water use, the efficiency index for the six regions, and the overall for WRMA for the FYs 2012/2013 and 2013/2014. Also shown is the revenue collection efficiency.

Table 4.20 (a): Status of water use charges for the FY 2012/2013

Region	Amount of revenue (million KSh) by June 2013				Efficiency (%)* by June 2013	
	Potential	Target	Billed	Actual collection	Water use	Revenue collection
LVN	35.94	32.47	40.00	28.49	-11.3	87.7
LVS	33.06	25.98	18.02	18.53	45.5	71.3
RV	84.93	48.39	55.31	64.23	34.9	132.7
Tana	108.3	80.54	216.44	73.18	-99.9	90.9
Athi	104.5	123.72	122.55	84.10	-17.3	68.0
ENN	44.29	24.03	54.54	34.06	-23.1	141.7
Total	411.02	**335.13**	**506.86**	**302.59**	**-23.3**	90.3

**Water use = Billed amount/potential amount Revenue collection efficiency = Actual amount/target amount*

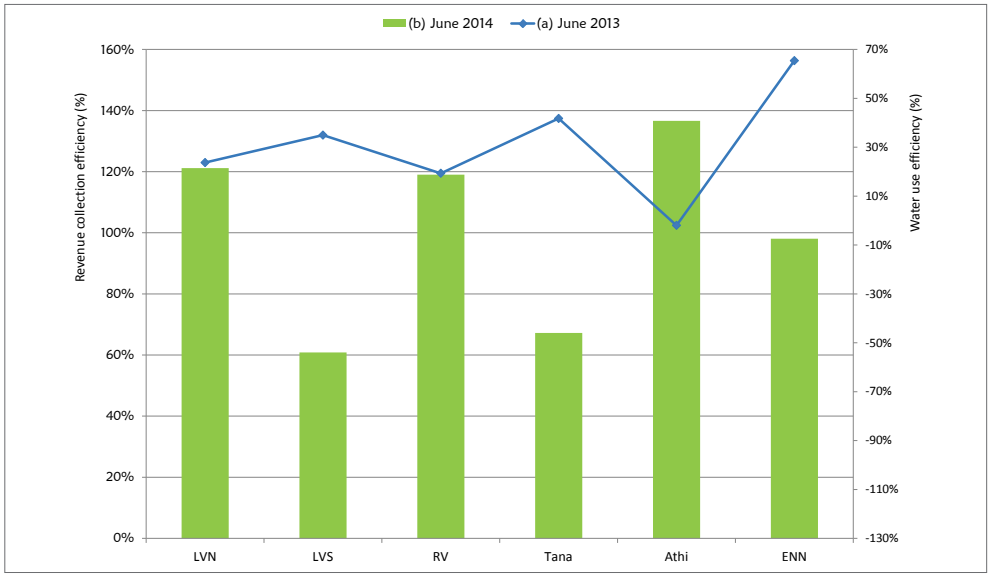
Table 4.20 (b): Status of water use charges for the FY 2013/2014

Region	Amount of revenue (million KSh) by June 2014				Efficiency (%)* by June 2014	
	Potential	Target	Billed	Actual collection	Water use	Revenue collection
LVN	42.11	28.85	32.12	34.96	23.7	121.2
LVS	38.74	26.54	25.2	16.15	35.0	60.8
RV	99.52	68.17	80.3	81.125	19.3	119.0
Tana	126.9	86.92	73.9	58.45	41.8	67.2
Athi	117.1	67.87	119.45	92.72	-2.0	136.6
ENN	51.90	35.55	17.95	34.85	65.4	98.0
Total	476.273	313.9	348.92	318.254	26.7	101.4

**Water use = Billed amount/potential amount Revenue collection efficiency = Actual amount/target amount*

Table 4.20 (a) and (b) can be interpreted to mean that the more positive the water use index, the more efficient water use is likely to be. Since bills are based on meter readings, negative values are only possible if the potentials were not accurately estimated and this was more common in FY 2012/2013. The situation however improved in 2013/2014. An illustration of these findings is shown in Figure 4.17 which also includes the revenue collection efficiency. This is estimated as the ratio of the actual revenue collected against the target and it is another instrument used to ensure that all the water used is paid for. If actual collection is more than the target, as in the case of Rift Valley catchment area in the two FYs, then it means that the region had set low targets. The same applies to Ewaso Ngiro North in FY 2012/2013 and Athi in 2013/2014.

Figure 4.17: Water use and revenue collection efficiencies by June 2014

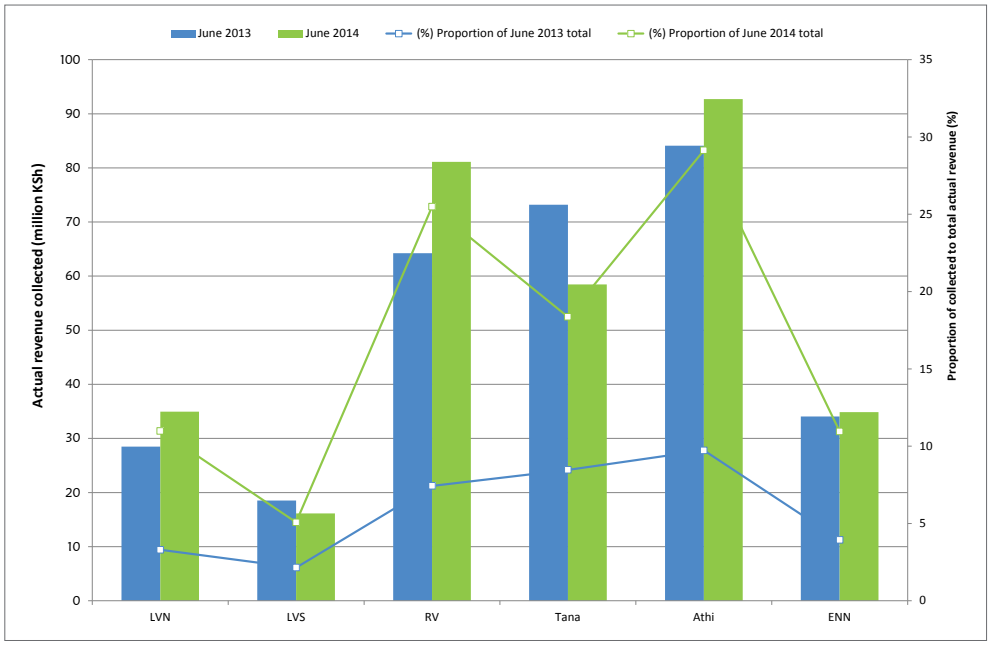


4.5.2 Increasing investment in WRM activities using water revenues

WRMA ploughs back part of the revenue obtained from water use charges and fees into management of the water resources together with regulation. This demonstrates the commitment to improve

services and enhance water availability through participatory implementation of planned activities. The actual amount of revenue collected from water use to support these activities is shown in Table 4.20. Further illustration of these results is given in Figure 4.18 which shows the graphical representation of the distribution of revenue from water use charges in the six regions. The graph shows that Athi and Tana had the highest proportion of revenue while Lake Victoria South had the lowest. The statistics for 2013/2014 shows that Athi still had the largest proportion of revenue while Lake Victoria South had the least, which can be explained by the low potential revenue base for the region.

Figure 4.18: Regional distribution of revenue for the FYs 2012/2013 and 2013/2014



4.6 Information management

4.6.1 Managing water resources monitoring data and information

WRMA has established a database to manage water resources information in the country. The database is in a format compatible with other river basin organisations, major users of water resources information, and data institutions. The database is periodically updated to provide accurate and timely water resources information. A summary of status of this database is given in Table 4.21. The summary shows that the database contains water resources monitoring data updated on a monthly basis except in the Lake Victoria North and Ewaso Ngiro North regions. The summary also paints a picture of a rich database coming from many years of data collection, especially surface water data, which has been available for over 25 years of monthly data.

Table 4.21: Status of water resources monitoring database up to June 2014

Water resources monitoring stations and data frequency up to June 2013									
Region	Operational stations			Duration of data collection			Frequency of update		
	SW	GW	WQ	SW	GW	WQ	SW	GW	WQ
LVN	38	12	38	-	-	-	monthly	monthly	quarterly
LVS	39	17	33	-	-	10	monthly	monthly	monthly
RV	17	29	24	-	-	-	monthly	monthly	monthly
Tana	42	25	10	30	5	5	monthly	monthly	monthly
Athi	24	16	56	30	5	5	monthly	monthly	monthly
ENN	33	12	36	27	7	26	monthly	monthly	quarterly

Water resources monitoring stations and data frequency up to June 2014									
Region	Operational stations			Duration of data collection			Frequency of update		
	SW	GW	WQ	SW	GW	WQ	SW	GW	WQ
LVN	38	15	48	-	-	-	monthly	monthly	quarterly
LVS	39	9	39	-	-	11	monthly	monthly	monthly
RV	17	29	24	-	-	-	monthly	monthly	monthly
Tana	43	16	16	31	6	6	monthly	monthly	monthly
Athi	26	18	56	31	6	6	monthly	monthly	monthly
ENN	33	12	43	28	8	27	monthly	monthly	quarterly

- = no record at the time of reporting SW = surface water GW = ground water WQ = water quality

In terms of permitting, the permit database (PDB) keeps records of the permit processing and permit status. All the permits and permitting information are processed through the database. The summary of PDB in Table 4.21 shows the status of permits and PDB by the end of June 2014. Without the missing records for the three regions (Lake Victoria South, Tana, and Ewaso Ngiro North), the summary in Table 4.21 shows that the PDB was in operation about 38% of the time. Ideally, the PDB should be operational 100% of the time. However, sometimes it can be down owing to server issues or maintenance. Nonetheless, due to its core significance, the PDB should be predominantly operational. In the case shown in Table 4.22, it seems the PDB was not operational for about two-thirds of the time.

Table 4.22: Water use compliance and permit data base (PDB)

Region	Permitting and database status up to June 2013				Permitting and database status up to June 2014			
	Total authorisations	Permits		% PDB was operational	Total authorisations	Permits		% PDB was operational
		Total	Valid			Total	Valid	
LVN	197	126	122	80	299	134	130	60
LVS	235	103	90	-	305	126	113	-
RV	408	229	213	85	714	309	293	90
Tana	3748	598	585	-	5419	1596	1596	-
Athi	508	409	384	60	738	597	566	80
ENN	197	198	174	-	340	331	304	-
Total	5293	1663	1568	37.5	7815	3093	3002	38.3

4.6.2 Participatory data acquisition and information sharing

Other than managing water resources data through the database, WRMA also relies on stakeholder involvement. This is especially in the area of data acquisition and information sharing. There are water data originating from stations managed by other stakeholders. WRMA acquires such data through stakeholder involvement. Examples of stakeholders whose support WRMA enlisted during the year ended June 2013 are CETRAD, Lake Naivasha Growers Group, Base Titanium, KMD, LVEMP, NBI, and LWF. In addition to data acquisition, WRMA also shared its processed water resources information through the following stakeholders: WRUA, CAAC, Ministry of Water, Environment and Natural Resources, GIZ, and WSTF.[2]

4.7 Stakeholder participation

4.7.1 Effective participation of stakeholders in the basin

Participation of stakeholders in water resources management is a pillar in IWRM. WRMA has been involving stakeholders in various aspects of water resources management. This involvement has been institutionalised through WRUAs according to the Water Act 2002. In assessing WRMA's performance in stakeholder involvement in water resources management, the number of stakeholders was used (Table 4.23), which also includes the CAACs.

Table 4.23: Status of stakeholders participating in water resources management by June 2014

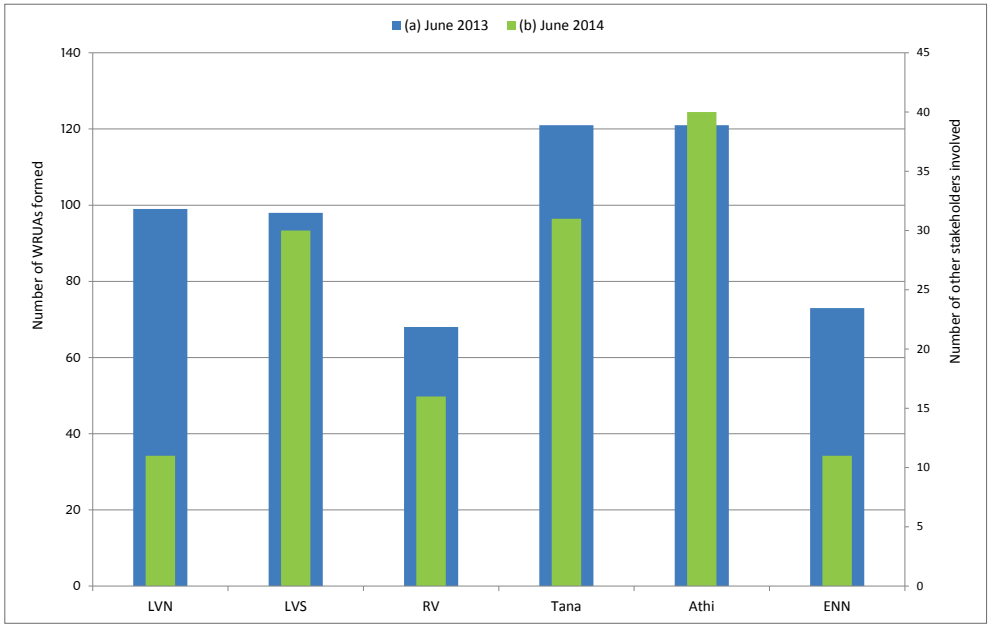
Region	Stakeholders up to June 2013			Stakeholders up to June 2014		
	WRUA	CAAC	Others*	WRUA	CAAC	Others
LVN	76	1	11	99	1	11
LVS	81	1	15	98	1	30
RV	56	1	14	68	1	16
Tana	113	1	24	121	1	31
Athi	113	1	21	121	1	40
ENN	60	1	12	73	1	11
Total	499	6	97	571	6	139

** Includes public and private sectors, NGOs and development partners (Table 4.13)*

During the year ended June 2013, Athi and Tana had the highest number of involved stakeholders in WRM while Rift Valley had the lowest (Figure 4.19). Athi and Tana both had a high number of WRUAs formed. In the following year, Athi and Tana still maintained high numbers of stakeholder involvement compared to the other regions. Lake Victoria South substantially improved by doubling the number of stakeholders as well as increasing the number of WRUAs by 10. Overall, the participation of WRUAs increased by 14% between June 2013 and June 2014 while other stakeholders improved by 43% during the same period. These improvements are assumed to reflect improvements in WRMA's performance in effective involvement of stakeholders in WRM.

[2] *For abbreviations and acronyms used above please see page vi*

Figure 4.19: Stakeholder involvement in WRM



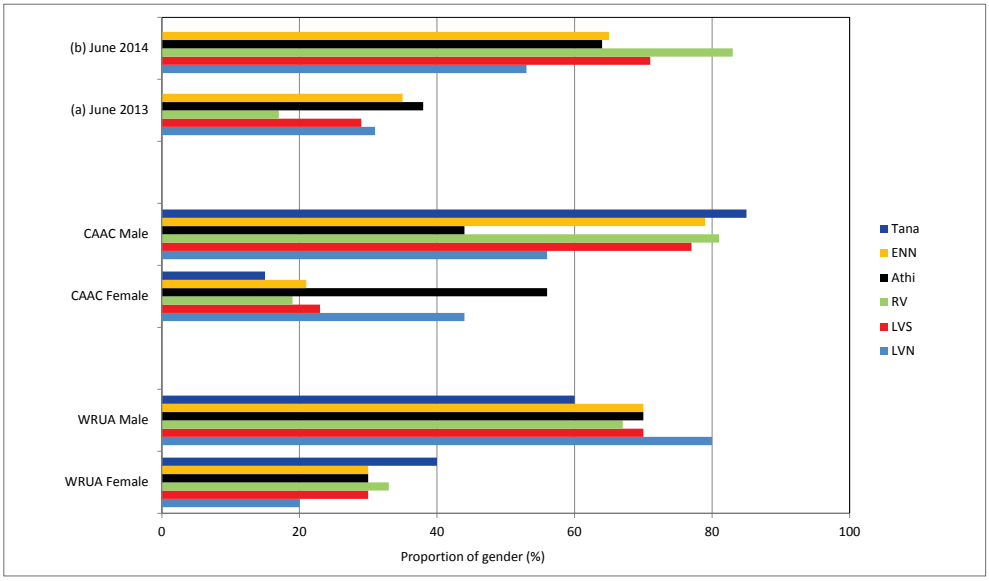
In addition to overall participation of stakeholders in WRM, WRMA also strove to mainstream gender in WRM. Like stakeholder involvement, gender mainstreaming is a key pillar in the IWRM concept. Assessment of WRMA's performance in gender mainstreaming in WRM was done using the proportion of gender representation in different groups of stakeholders in WRM. Three representative groups were used: WRUAs, CAACs, and WRMA. A summary of gender representation in these groups is given in Table 4.24.

Table 4.24: Gender representation in % among representative stakeholders in WRM by June 2014

Regions	WRUAs				CAACs				WRMA			
	Up to June 2013		Up to June 2014		Up to June 2013		Up to June 2014		Up to June 2013		Up to June 2014	
	M	F	M	F	M	F	M	F	M	F	M	F
LVN	70	30	80	20	78	22	56	44	48	30	53	31
LVS	80	20	70	30	77	23	77	23	74	26	71	29
RV	67	33	67	33	82	18	81	19	83	17	83	17
Athi	70	30	70	30	44	56	44	56	64	36	64	38
ENN	78	22	70	30	79	21	79	21	69	31	65	35
Tana	65	35	60	40	77	23	85	15	71	29	69	31

M = % male F = % female

Figure 4.20: Gender representation among WRM stakeholders



The proportion of females in any of the representative stakeholders was lower than that of males except in CAAC in Athi (Figure 4.20). On average, men comprised 70% and women 30% of the stakeholders in WRM. This analysis show that gender mainstreaming in WRM was not yet well established among stakeholder in Kenya as at end June 2014.

4.7.2 Participatory resolution of complaints

Water use conflicts occur due to varied causes. In IWRM, pragmatic and long-lasting solutions to water use conflicts are reached through stakeholder participation. WRMA has attempted this approach to conflict resolution in water use. An inventory of stakeholder participation in conflict resolution is shown in Table 4.25.

Table 4.25: Resolution of complaints through stakeholder involvement

Regions	Up to June 2013			Up to June 2014		
	Complaints	Resolved	% Resolved	Complaints	Resolved	% Resolved
LVN	-	-	-	2	1	50
LVS	4	4	100	2	2	100
RV	-	-	-	-	-	-
Tana	41	19	32	38	19	50
Athi	58	34	58	39	15	38
ENN	5	5	100	17	15	88
Total	108	62	48.3	98	52	54.3

Athi and Tana seem to have had the most water use conflicts while Lake Victoria North and South had the least. In addition, Lake Victoria North and South regions seemed to easily resolve their conflicts through stakeholder participation; this is because they have more water and therefore the problems are less likely to be serious. Tana and Athi, besides having more water use conflicts, only resolved about 40% of them. These two regions had the highest number of effluent dischargers and high numbers of permits, authorisations and pending applications, implying that water use and effluent discharge

issues were the major drivers of water use conflicts. Only about 40% of these problems were adequately addressed. Overall, about 50% of water-use conflicts in the country were resolved through stakeholder involvement by the end of June 2014.

4.8 Flood and drought management

4.8.1 Flood management

Prior to the year ended June 2011, flood management was not mainstreamed in WRMA operations although it is one of WRMA's mandates. Recently a Flood Management Unit (FMU) was established in the organisation. It has undertaken a number of activities and realised the following achievements:

- Mapping flood-prone areas: Budalangi, Lower Yala and Namanjalala (Lake Victoria North); Kano plains, Sondu, Lower Nyakach, Rachuonyo and Nyatike (Lake Victoria South); Narok, Baringo, Turkana (Rift Valley); Kilifi, Kwale, Taveta, Nairobi, and Taita-Taveta (Athi); and Garissa, Wajir, Ijara (Ewaso Ngiro North)
- Initiated non-structural measures
  - Training on flood management: over 40 WRMA technical staff trained on FM in Japan
  - Revision of CMS to include FM
  - Inclusion of FM in WRMA Strategic Plan
  - Developed three IFMPs in the three pilot areas (Lower Gucha-Migori, Lumi, and Isiolo)
  - Developed three FM manuals for the three pilot areas
  - Developed three early-warning systems in the three pilot areas
  - Collaborated with Western Kenya Community Driven Development and Flood Mitigation (WKCDD & FM) programme on early warning for floods and training of WRUAs in areas of flooding of Lower Yala, Lower Sio and lower Nzoia
- Initiated structural measures in three pilot areas (Lower Gucha-Migori, Lumi and Isiolo)
  - Revetment works (gabions)
  - Evacuation centre
  - Raised toilets
  - Raised roads
  - Flood Early Warning System
  - Collaborated with WKCDD&FM programme to develop 3 check dams on river Nzoia and one weir in Kuywa

4.8.2 Drought management

Droughts present a challenge of equitable water allocation since an extended period of low rainfall leads to inadequate supply. During such times the demand for water is very high, leading to increasing competition and eventually conflict. In FY 2012/2013, a total of 62 conflicts over water sharing were resolved. Out of these 34 were in Athi, 19 in Tana, five in Ewaso Ngiro North and four in Lake Victoria South catchment areas. In 2013/2014 some 52 conflicts were resolved, a reduction over the previous year. Among these, Tana resolved 19 cases, the highest number, followed by Athi and Ewaso Ngiro North each with 15 cases, while Lake Victoria South and Lake Victoria North resolved two and one case respectively. Apart from resolution of conflicts, further management of drought was carried out through restriction of abstractions in order to maintain reserve flow. This was mainly carried out in Athi, Tana and Ewaso Ngiro North catchment areas.

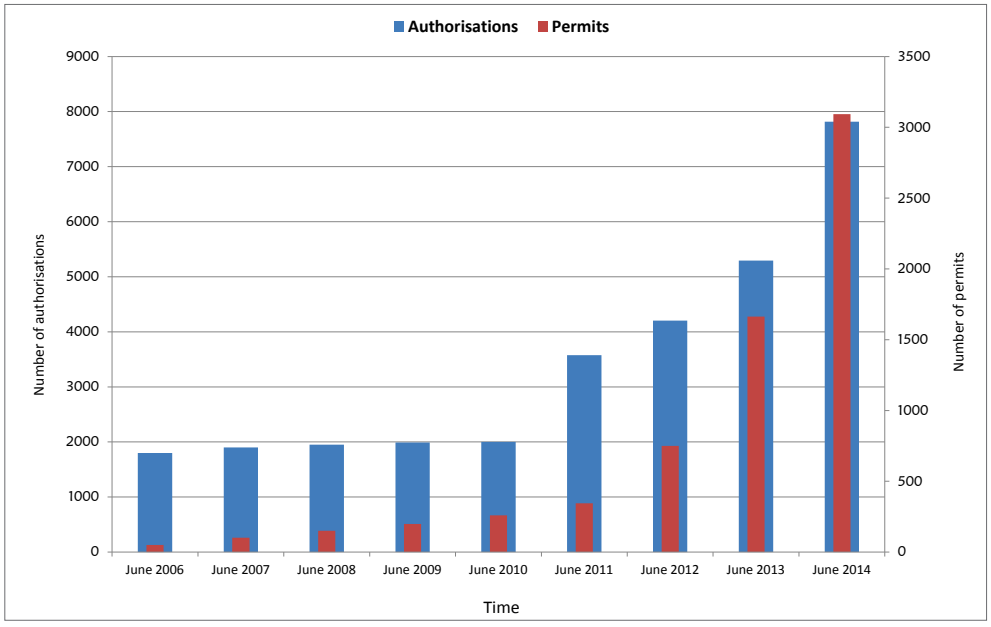
5 Trend analysis of WRMA performance

Trend analysis was carried out in order to assess consistency in WRMA performance. This was done using indicators with data from the time when WRMA was operationalised in 2005. Using trends it is possible to identify areas of strength and weakness in management of water resources and therefore make strategic interventions for improvement.

5.1 Permitting trend

TThe trend in permit processing trend has shown an upward progression since June 2006. However, between June 2006 and June 2009, the rate of growth slowed. This was more pronounced in the issuance of authorisations than permits. After June 2009, the growth of both permits and authorisations improved. The number of issued authorisations was significantly higher than those for permits except in 2014 (Figure 5.1).

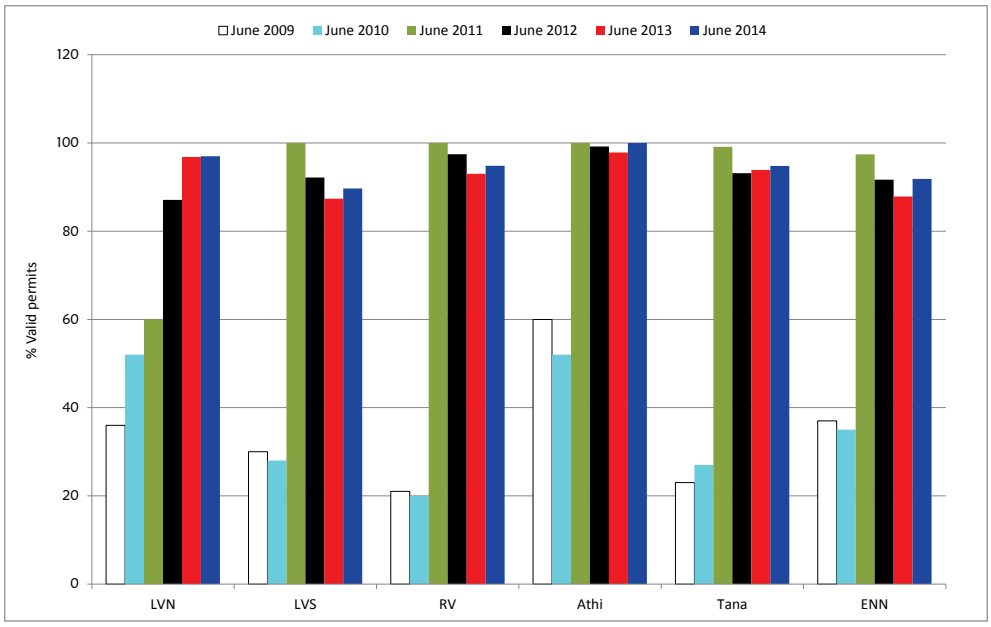
Figure 5.1: The trend in permit processing from June 2006 to June 2014



The slow pace in permit processing before 2010 was because WRMA was still putting up systems and structures for executing its functions following operationalisation in 2005. With these in place, the rate of permit processing improved.

Trend analysis was also done for the proportion of valid permits to total permits (Figure 5.2). It showed that in Lake Victoria North the proportion had been consistently increasing from 2009 to 2014. Ewaso Ngiro North, Rift Valley and Lake Victoria South had a declining pattern from the year ended June 2012. From the year ended June 2011, the proportion of valid permits in Athi and Tana remained high and fairly constant (about 98% in Athi and 94% in Tana).

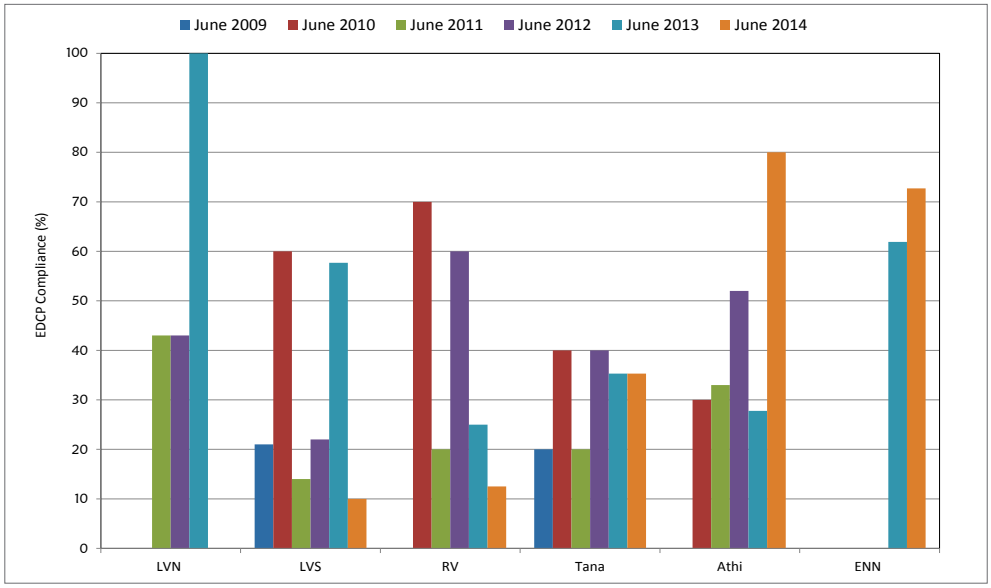
Figure 5.2: Trend of proportion of valid permits in the six regions



5.2 Progress in point source pollution control

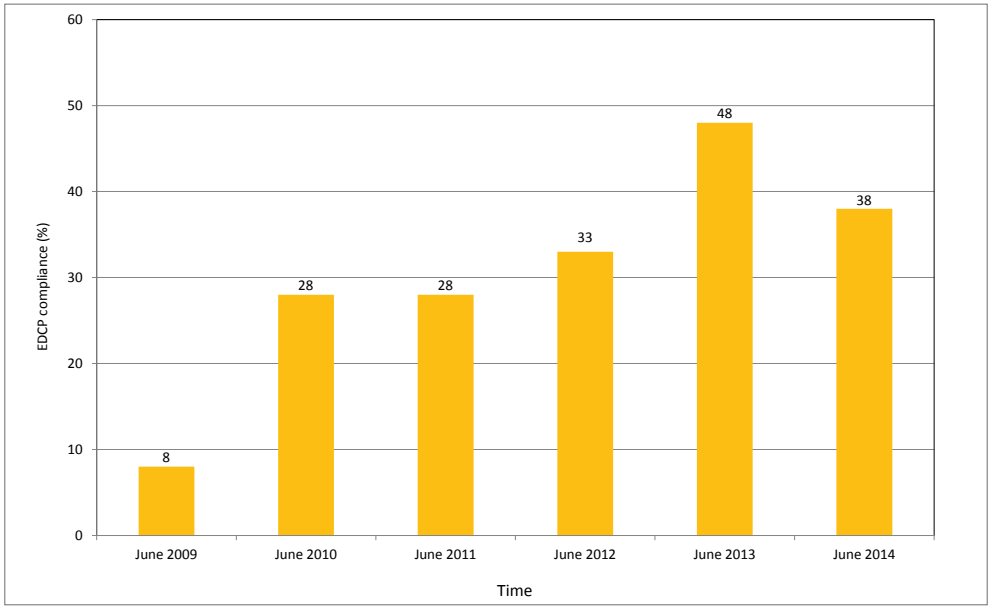
Progress in point-source pollution control was analysed using trends in EDCP compliance. Using data since FY June 2009, the analysis showed that Tana, Athi and Lake Victoria North had increasing trends in EDCP compliance (Figure 5.3). Consequently, these regions can be considered to have emphasized the control of point-source pollution in their respective catchment areas. Lake Victoria South had a declining trend in EDCP compliance during this period; consequently it was taken to have had a slow or declining progress towards point-source pollution control. There were many data gaps in Ewaso Ngiro North region, therefore its progress in point-source pollution control was not clearly ascertained because it presented only two years of data.

Figure 5.3: Trend in EDCP compliance in the six regions of WRMA



The trend in overall EDCP compliance showed a slow growth between the years ended June 2009 and June 2013 and subsequent decline between June 2013 and June 2014 (Figure 5.4). The decline after June 2013 implies that the gains in point-source pollution control between June 2009 and June 2013 could have been lost during the year ended June 2014.

Figure 5.4: Trend in overall EDCP compliance from 2009 to 2014



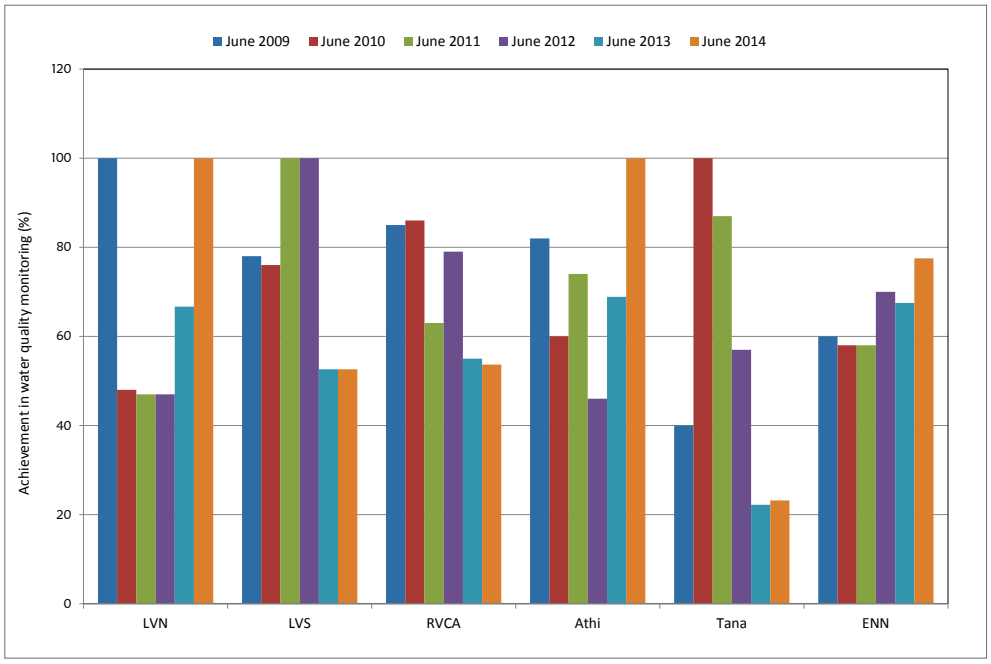
5.3 Progress in non-point source pollution control

WRMA monitors non-point source pollution in catchment areas using data from water quality monitoring stations. Although the level of water quality should be the direct indicator of non-point source pollution, in this performance report the number of operational stations was used as an indicator of WRMA's performance. In this regard, progress in non-point source pollution control was analysed using the proportion of operational water quality monitoring stations.

5.3.1 Surface water quality monitoring

Progress towards control of non-point source pollution of surface water showed that Lake Victoria South, Rift Valley and Tana regions had a declining trend in proportion of operational stations (Figure 5.5). Consequently, they had declining success in monitoring surface water quality. By extension, this trend implied slow progress towards the control of non-point source pollution of surface water resources in these regions. The trend in Ewaso Ngiro North showed improvement between June 2009 and June 2014 (Figure 5.5). It was the only region which registered consistent improvement in controlling non-point source pollution of surface water resources. Athi and Lake Victoria North did not show any pattern.

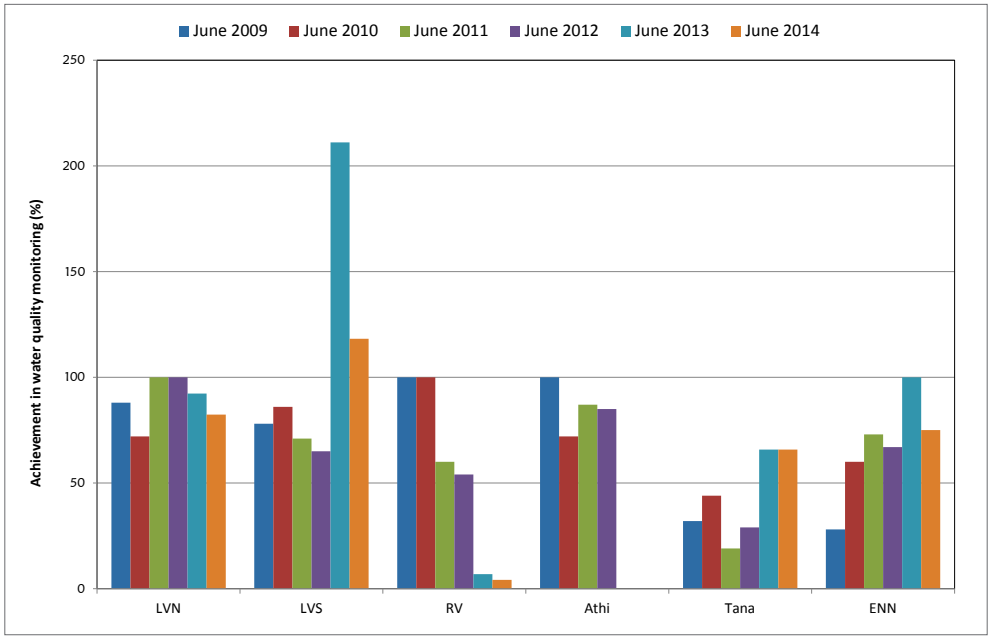
Figure 5.5: Trend in surface water quality monitoring in all the six regions of WRMA



5.3.2 Ground water quality monitoring

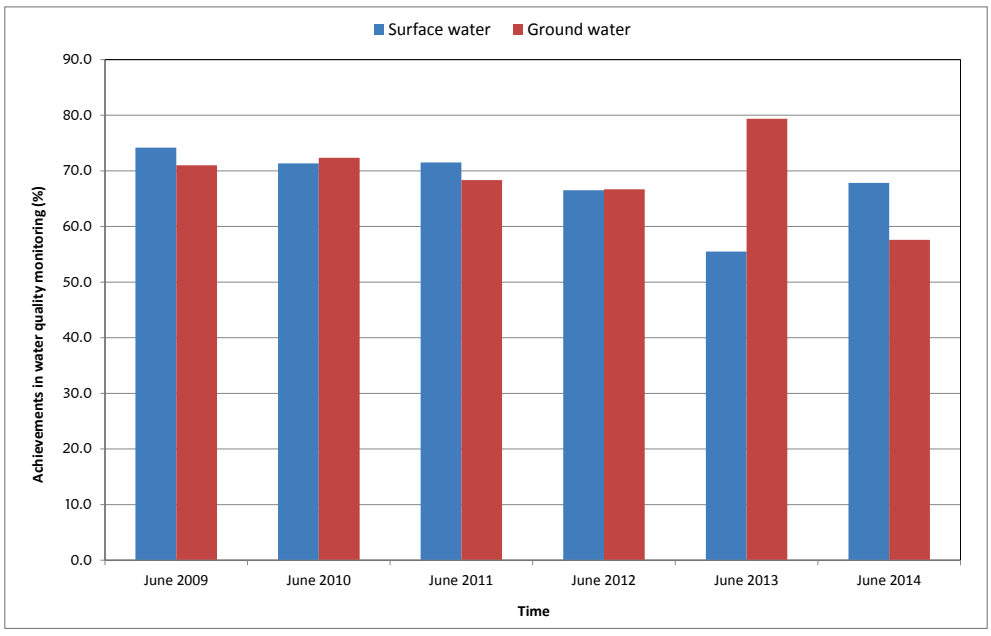
The trend of ground water quality monitoring showed a general decline for Rift Valley. Lake Victoria North also had a decline in progress after June 2011. Lake Victoria South, after showing a decline up to June 2012, registered the best improvement in water quality monitoring between June 2012 and June 2014. Tana and Ewaso Ngiro North regions showed an improving trend in water quality monitoring and are considered to have made good progress towards control of non-point source pollution. As in surface water quality monitoring, Athi did not show any discernible pattern of ground water quality monitoring with time.

Figure 5.6: Trend in ground water quality monitoring in all six regions



The trend of overall water quality monitoring for both ground water and surface water showed a steady decline in achievement (Figure 5.6). These patterns show that the control of non-point source pollution did not progress well. Deliberate efforts are needed to reverse the declining trend.

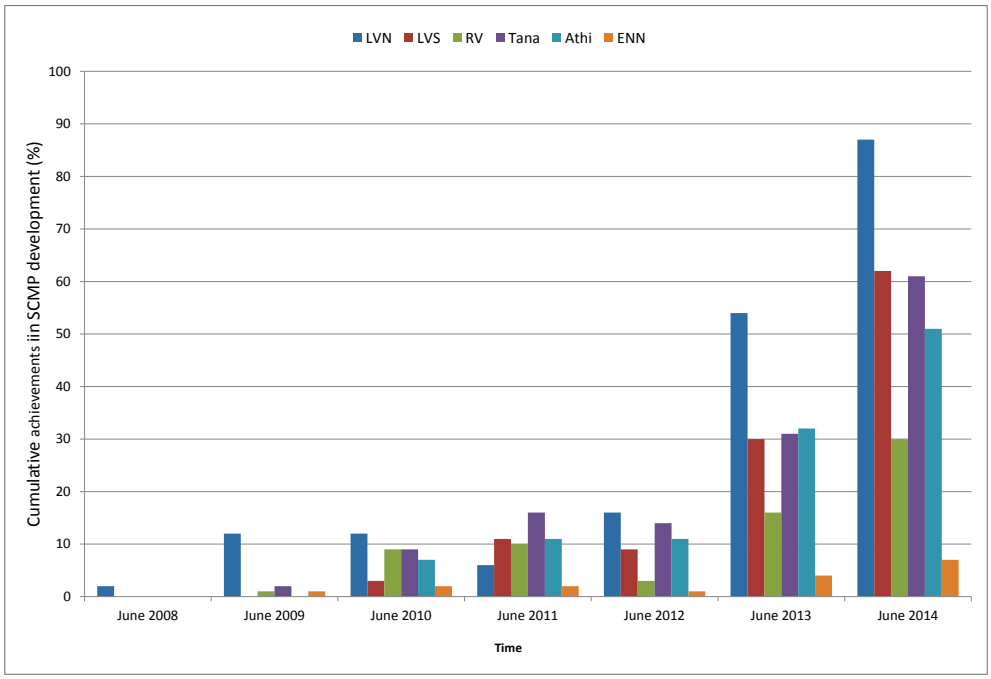
Figure 5.7: Trend in overall water quality monitoring



5.4 SCMP development

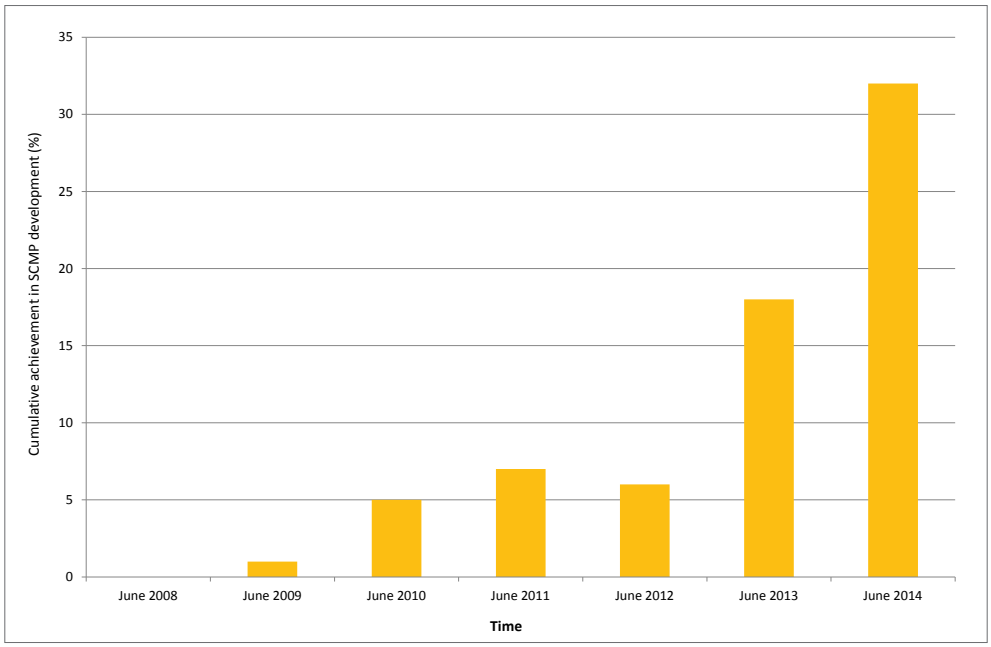
The cumulative development of SCMPs with time for all the regions showed increasing growth (Figure 5.8). Before June 2009, all regions had developed less than 10% of the targeted number of SCMPs. By the end of June 2014, they had developed over 50% of the target number of SCMPs except in Rift Valley and Ewaso Ngiro North. Ewaso Ngiro North had the lowest performance over the years. Up to the end of June 2014, it had not developed even 10% of the target.

Figure 5.8: Trend of cumulative achievements in SCMP development for all regions



In general, the progress towards attaining the overall target number of SCMPs had been improving steadily (Figure 5.9). However, the average rate of overall achievements in SCMP development up to June 2014 was low. The main contributing factor is the slow progress from Rift Valley and Ewaso Ngiro North regions.

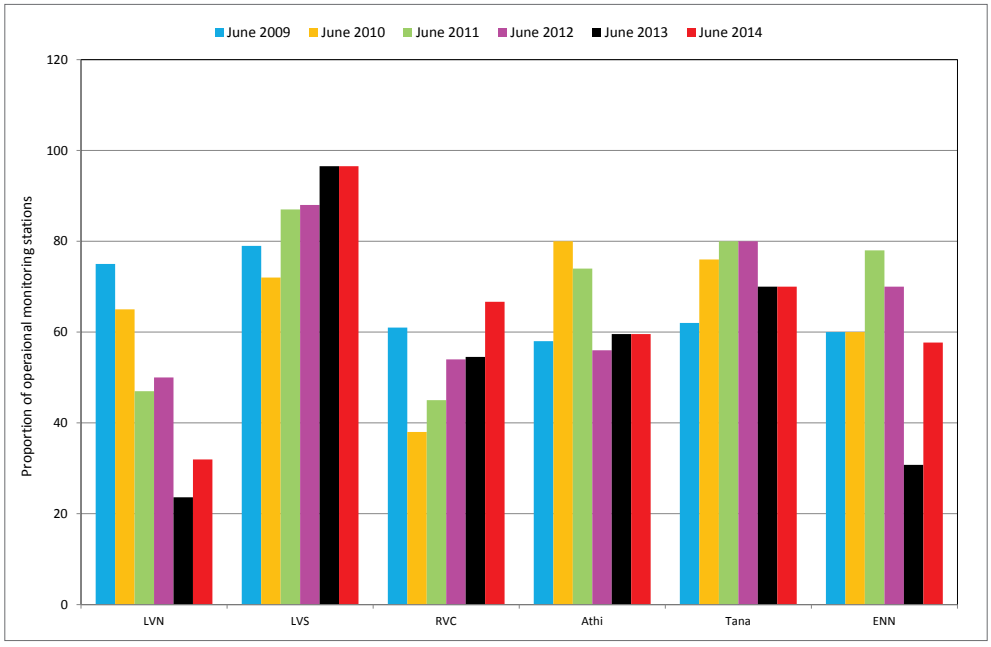
Figure 5.9: Trend of overall cumulative achievements in SCMP development



5.5 Trend in surface water monitoring

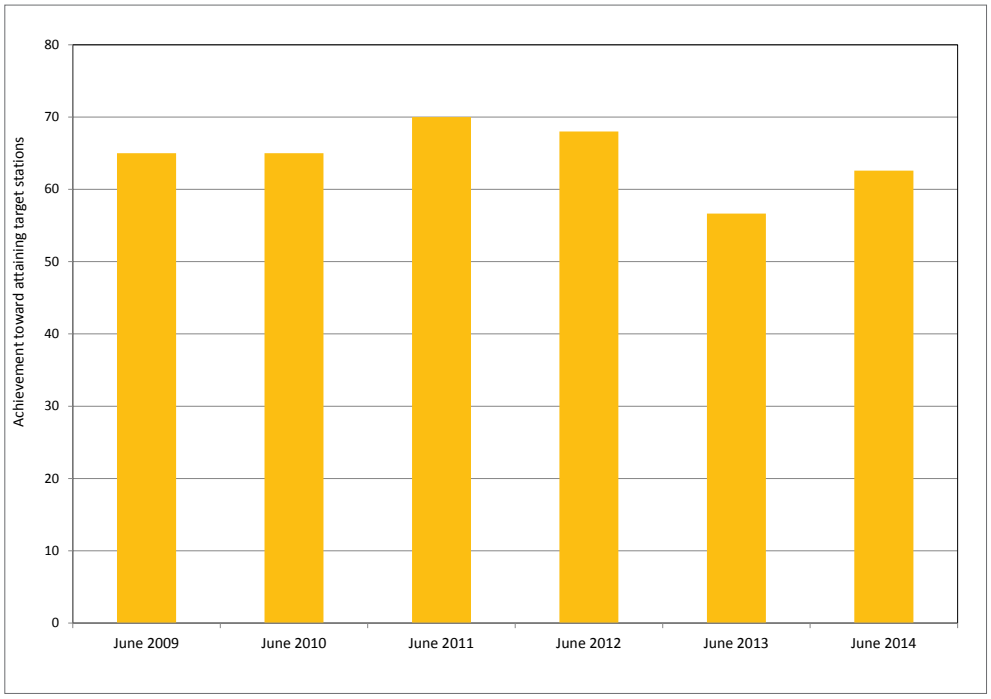
The trend in surface water monitoring was analysed using the proportion of target CMS stations in each region over time. The trend for Lake Victoria North and Ewaso Ngiro North showed a decline in attainment of target CMS monitoring stations (Figure 5.10). Lake Victoria South, Rift Valley and Tana showed improving progress while Athi had inconsistent performance over the years.

Figure 5.10: Trend of achievement of target CMS stations for surface water monitoring for all regions



Overall, the progress towards attaining the target number of CMS monitoring stations had been slow. Since June 2011, the progress had been declining, which implies that WRMA has not improved its monitoring of surface water resources.

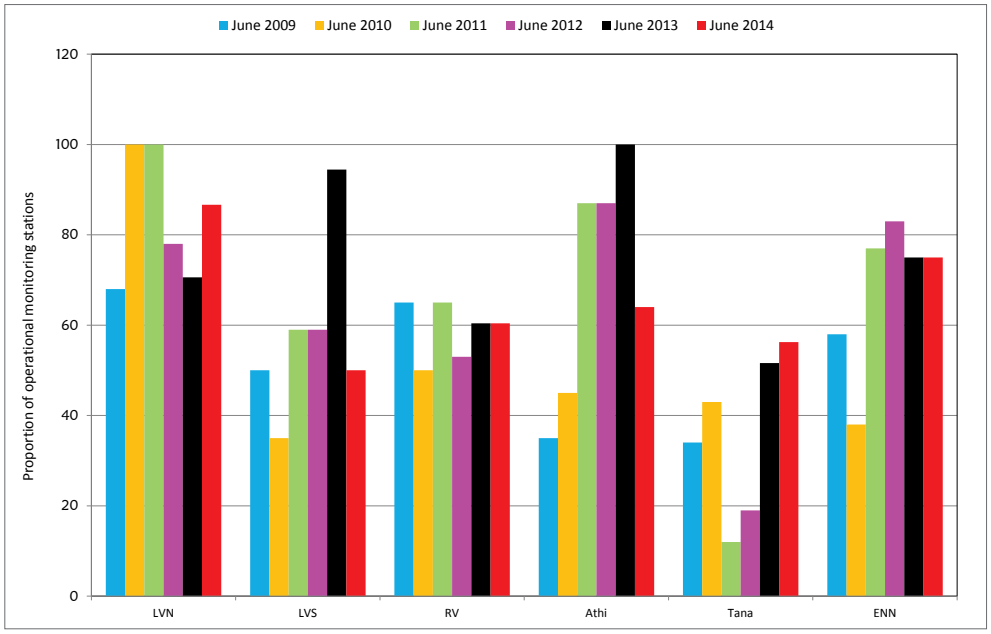
Figure 5.11: Trend of achievement in overall target CMS stations for surface water monitoring



5.6 Trend in ground water monitoring

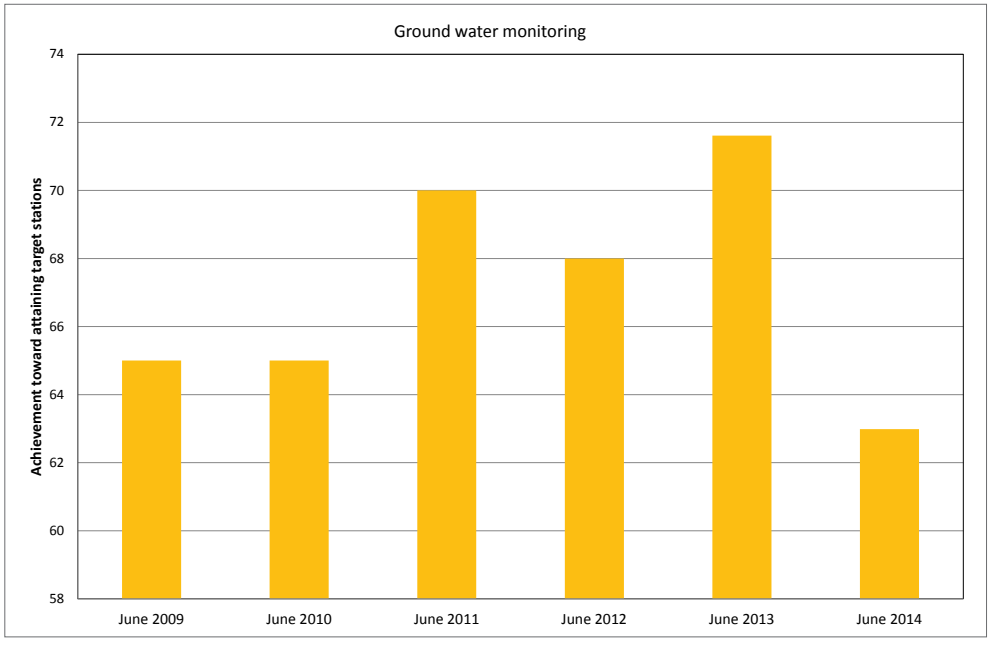
The trend in ground water monitoring was analysed using the proportion of operational monitoring stations in each region. The trend showed that four out of six regions — Lake Victoria South, Athi, Tana and Ewaso Ngiro North — had increasing their number of operational stations over time (Figure 5.12). The increasing trend implies that they improved their ground water monitoring over time and hence their performance in this function since June 2009. Lake Victoria North registered a decreasing trend and Rift Valley did not show any trend.

Figure 5.12: Trend of achievement of target CMS stations for surface water monitoring for all the regions



In general, the progress towards improving performance in ground water monitoring was steady between June 2009 and June 2013 (Figure 5.13). After that the performance declines, which implies that WRMA started losing the gains it had previously made.

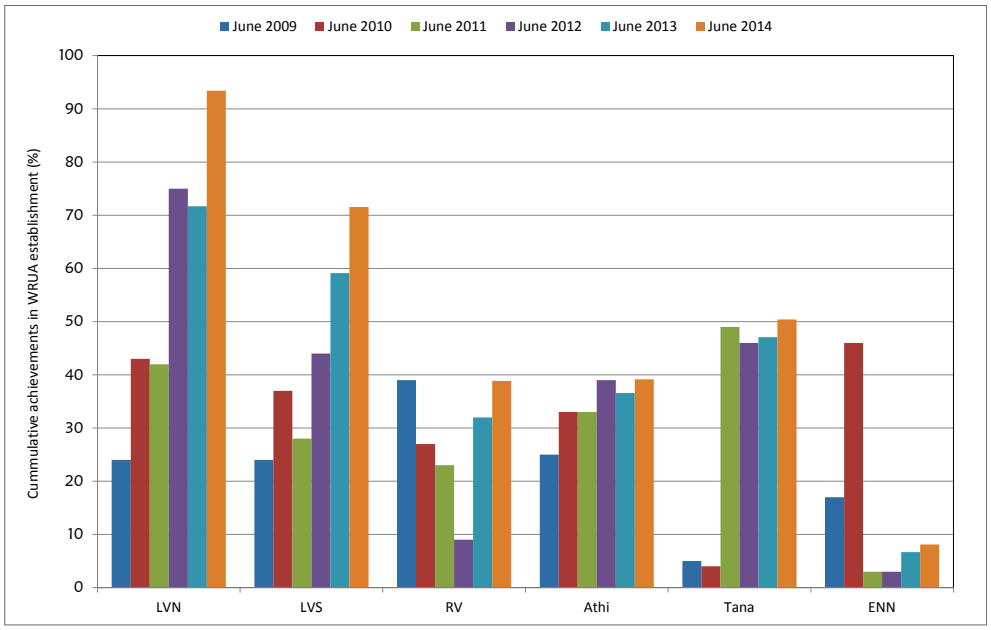
Figure 5.13: Time-series trend of performance in overall ground water monitoring



5.7 Trend in WRUA establishment

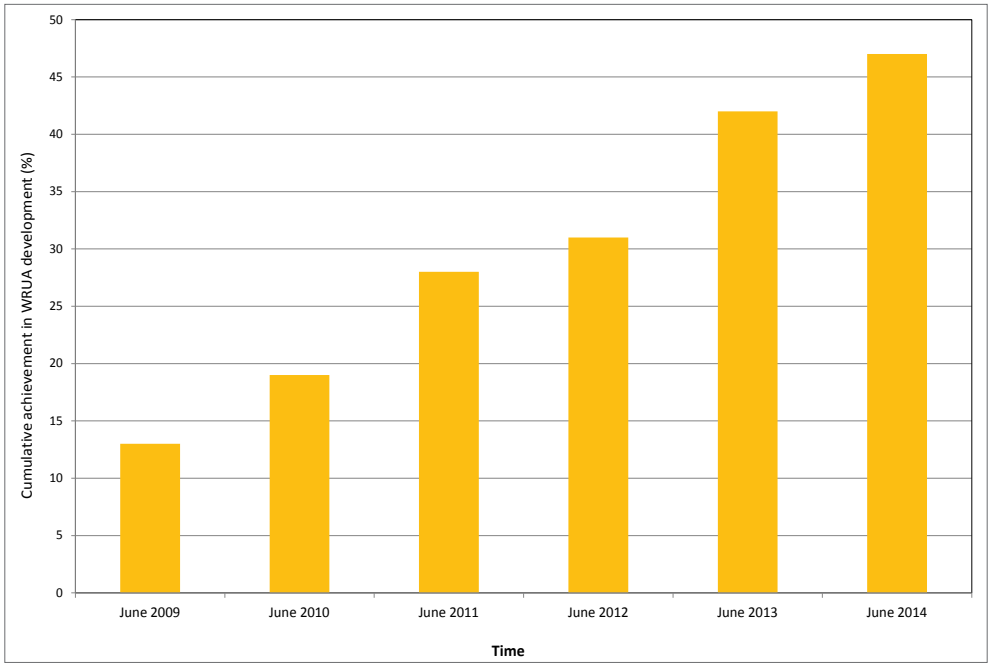
The performance trend in WRUA establishment was analysed using the proportion of potential WRUAs established per year for each region. The Lake Victoria region (South and North) showed increasing performance in WRUA establishment, to reach over 70% by the end of June 2014 (Figure 5.14). Athi and Tana regions also had improved performance, reaching 50% and 38% of the target by the end of June 2014 respectively. Rift Valley and Ewaso Ngiro North regions showed a declining trend up to June 2012 and then picked up again steadily. By the end of June 2014, Rift Valley had matched its earlier June 2009 performance of 39%. Ewaso Ngiro's performance has not yet recovered after the fall at the end of June 2012.

Figure 5.14: Trend of achievement in WRUA development across all six regions



The performance in overall WRUA development showed a growing trend between June 2009 and June 2014 (Figure 5.15). The performance had a steady growth to reach over 45% by the end of June 2014. However, despite the steady performance, not even half the target number of WRUAs have been established.

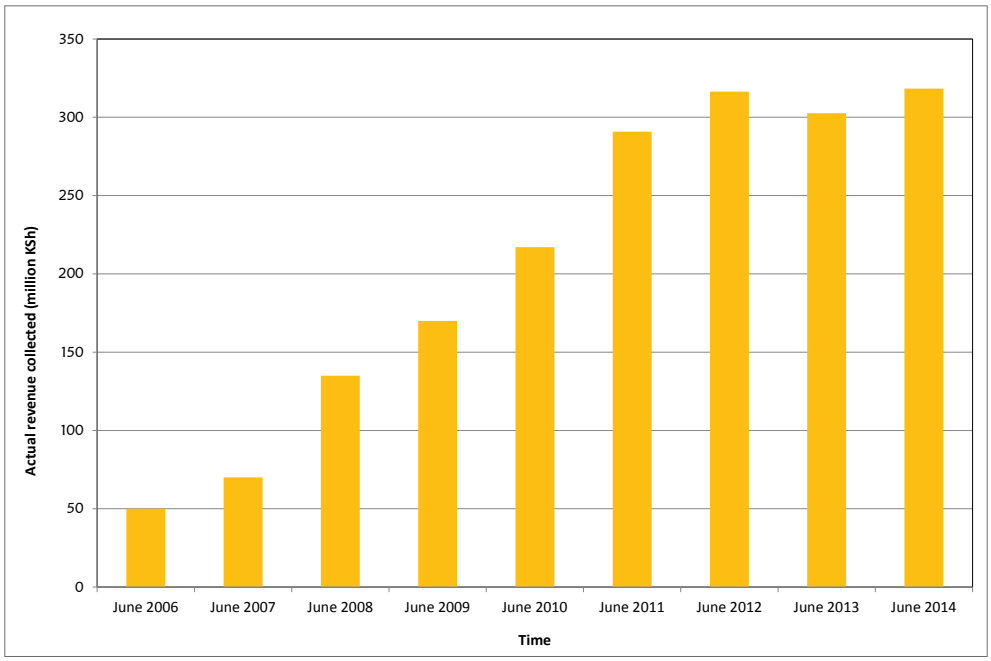
Figure 5.15: Trend of achievement in overall WRUA development



5.8 Trend in compliance to water use charges

WRMA has over time increased its performance in collection of water use charges (Figure 5.16). However, after June 2012 the collection seems to have levelled off. One possible reason is that WRMA could be reaching all revenue that is practicable to collect. Another reason could be declining compliance due to weak enforcement. Whichever the reason, the trend gives indication of the maximum possible revenue from water use charges. Since the revenue is used in financing WRM activities, it is useful in determining the gap in the budget and therefore the need to explore other funding options.

Figure 5.16: Trend in actual revenue collection since 2006



6 Conclusions

This report has given an insight into the performance of WRMA and the progress made in management of water resources since operationalisation in 2005. It has covered major areas in water resources management with analysis focusing on areas where data was available. One area extensively covered is water allocation, which is the crux of water resources management and the core function of WRMA. Analysis was undertaken using information from the Permit Database (PDB) since it is more accurate than regional data and gives a realistic reflection of performance.

The analysis emphasized permit categories B,C and D because these are the categories where water use fees are paid, but also recognised category A as a way of ensuring that all the water is accounted for including that intended to meet basic human needs and the environment. The functioning of the PDB and the level of performance realised in permitting is revealed by the indicators. The emphasis on permitting shows that WRMA is focusing more on regulation of water resources as it main core function.

Pollution control has also been given emphasis for both point and non-point sources as a way of safeguarding water resources. This is evidenced by the increasing compliance of effluent dischargers. Water use fees are also increasingly being accepted by water users, as evidenced by the fact that payments have steadily increased from the time of operationalisation of water resources management as a separate entity. Increasing compliance also implies that WRMA has enhanced enforcement of regulations, therefore strengthening its regulatory capacity.

Given the integrated nature of water resources management, stakeholder involvement is essential for sustainability and WRMA has provided adequate space for their participation. The report has revealed that stakeholders from the public and private sectors, CSOs/NGOs and developments partners are increasingly getting involved, especially in catchment protection and improvement of water quantity as well as quality. As WRMA continues to undertake these activities and also informs the public on the progress it is making, it is envisaged that water resources management will be more visible in the near future and will attract more players.

7 Recommendations

The performance of WRMA has continued to improve as provided in this report, which is mainly based on data from PDB and especially in as far as water allocation is concerned. This, together with data from reports and interviews, ensures that the data used in the analysis has provided information that realistically represents the performance of the organisation.

To further improve performance, the following recommendations have been made for follow up:

- The process of bringing permit data into PDB should be accelerated so that analysis of indicators under this function should capture all the data in permitting
- Stakeholder participation should be recognised in terms of type of contribution; for example, whether they are providing support or they are participating to build synergy and therefore save on cost of undertaking cross-cutting functions
- Progress made in shared functions, such as protection of vulnerable catchments that affect water resources, and enhancement of water resources availability, should be recognised in terms of resource input from the participating institutions and the benefits accruing to target groups.

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Zusammenarbeit (GIZ) GmbH

Designed by Tara Consultants Ltd
E. info@taraconsult.com

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Accounting for every drop

Water Resources Management Authority
P.O. Box 45250 – 00100 Nairobi, Kenya
Tel: +254 20 273 2291/272 9048
Fax: +254 20 272 9950
Email: wrma@wrma.or.ke
Website: www.wrma.or.ke

german cooperation
DEUTSCHE ZUSAMMENARBEIT

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