THE REPUBLIC OF KENYA

LAWS OF KENYA

THE AMU SAND-DUNES GROUNDWATER CONSERVATION AREA ORDER

NO. 210 OF 2021

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Kenya

Water Act

The Amu Sand-dunes Groundwater Conservation Area Order

Legal Notice 210 of 2021

Legislation as at 31 December 2022

The Amu Sand-dunes Groundwater Conservation Area Order (Legal Notice 210 of 2021)
Contents

WATER ACT

THE AMU SAND-DUNES GROUNDWATER CONSERVATION AREA ORDER

LEGAL NOTICE 210 OF 2021

Commenced on 14 October 2021

[Revised by 24th Annual Supplement (Legal Notice 221 of 2023) on 31 December 2022]

1. Citation

This Order may be referred to as the Amu Sand-dunes Groundwater Conservation Area Order.

2. Interpretation

In this Order, unless the context otherwise requires—

"Act" means the Water Act (Cap. 372);

"Authority" means Water Resources Authority established under section 11 of the Water Act (Cap. 372);

"Amu Sand-dunes Groundwater Conservation Area" means the area demarcated as hydrogeological system controlling groundwater flow within and around the Amu sand dunes as illustrated with blue thick line in the First Schedule;

"Amu Sand-dunes Groundwater Conservation Riparian Area" means all that land and water enclosed within 30 metres from the highest recorded tide or sea level of the Amu Sand-dunes Groundwater Conservation Area; and

"Amu Sand-dunes Groundwater Conservation Protection Guidelines" means the management and conservation guidelines developed by the Authority in respect of Amu Sand-dunes Groundwater Conservation Area and contained in the Second Schedule.

3. Application of Order

This Order shall apply to the use of water and land of the Amu Sand-dunes Groundwater Conservation Area.

4. Declaration of Conservation Area

The Amu Sand-dunes Groundwater Conservation Area is hereby declared to be a Groundwater Conservation Area for the purposes of the Act.

5. Management Guidelines

The Amu Sand dunes aquifer Management Guidelines shall come into effect immediately upon publication of this Order and shall be the basis for conservation of the groundwater resources within the Amu Sand-dunes Groundwater Conservation Area.

6. Public Notices

(1) The Authority shall place signboards and beacons in or near the Amu Sand-dunes Groundwater Conservation Area or in appropriate public places frequented by land and water users and at the Authority's offices; displaying up-to-date information about the condition of the water resources of the Amu Sand-dunes Groundwater Conservation Area.

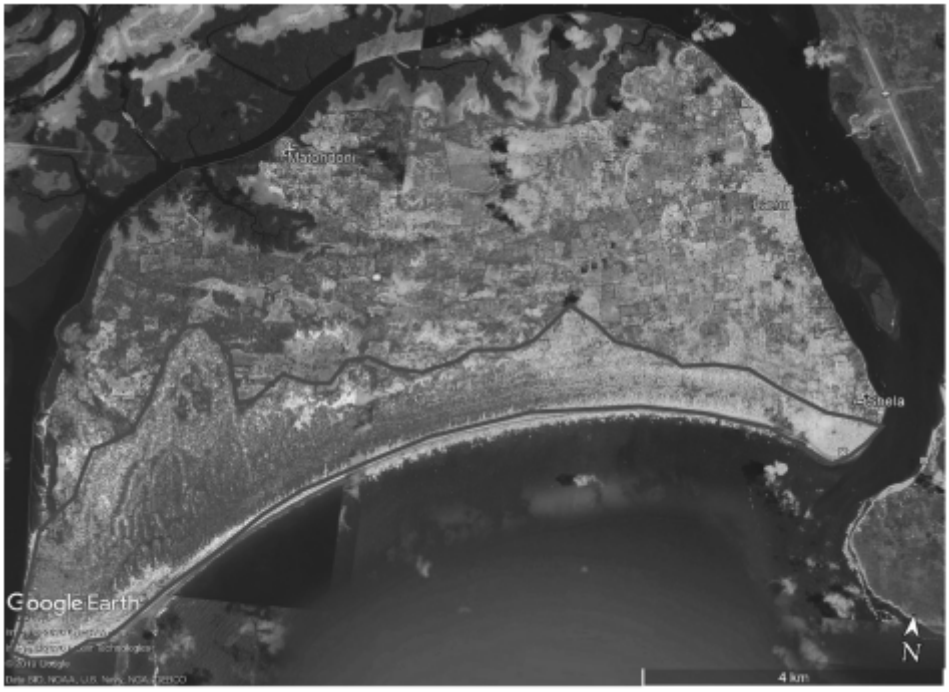
(2) The public notices shall contain information regarding the action required of water or land users to conserve and protect the water resources of the Amu Sand-dunes Groundwater Conservation Area.

7. Offences

Any person who contravenes this Order and the provisions of the Amu Sand-dunes Management Guidelines commits an offence and is liable upon conviction to a fine of one hundred thousand shillings or imprisonment for a term not exceeding one year, or both such fine and imprisonment.

FIRST SCHEDULE

AMU SAND-DUNES GROUNDWATER CONSERVATION AREA



SECOND SCHEDULE

AMU GROUNDWATER (CONSERVATION AREA) MANAGEMENT GUIDELINES

MINISTRY OF WATER AND SANITATION

This document was prepared through a consultative process involving area Water Resource Users Associations (WRUA), the County Government of Lamu and other stakeholders spearheaded by WRA

List of Abbreviations

GCA	Ground Water Conservation Area
LAWASCO	Lamu Water and Sewerage Company
NEMA	National Environmental Management Authority
NLC	National Land Commission
KEBS	Kenya Bureau of Standards
KFS	Kenya Forestry Services

KMA	Kenya Marine Agency
KMD	Kenya Meteorological Department
KNBS	Kenya National Bureau of Statistics
KPA	Kenya Ports Authority
KTB	Kenya Tourism Board
KTDC	Kenya Tea Development Corporation
KWS	Kenya Wildlife Services
NMK	National Museums of Kenya
SCMP	Sub Catchment Management Plan
WA	Water Act
WRA	Water Resources Authority
WRM	Water Resources Management
WRUA	Water Resources Users' Association
WWF	World Wide Fund

AMU SAND DUNES AQUIFER GROUNDWATER CONSERVATION AREA MANAGEMENT GUIDELINES

PREAMBLE

These management guidelines were prepared by the Water Resources Authority after extensive stakeholder consultations for the proposed Amu Sand Dunes Aquifer Groundwater Conservation Area (GCA). The stakeholders include; National Government departments (National Museums of Kenya(NMK), Ministry of Interior and Coordination National Government, National Environmental Management Authority (NEMA), Kenya Forest Services (KFS), Kenya Wildlife Services (KWS), County Government of Lamu, AMU Water Resource Users Association (WRUA), Public, Amu Council of Elders and other institutions. The GCA is established in accordance with Fourth Schedule of the Water Act (Cap. 372) and the Water Resources Management Rules, 2007 and subsequent legislations.

The Water Resources Management Rules, 2007 outline the process of identifying areas to be designated as groundwater protection and conservation areas.

Section 23 of the Water Act (Cap. 372), provides that where the Authority is satisfied that in any area special measures for the conservation of groundwater are necessary in the public interest, it may by order published in the *Gazette*, declare the area to be a groundwater conservation area. The Authority is also mandated to impose

such requirements or prohibit such conduct or activities in relation to a groundwater conservation area as it may consider necessary for the conservation of the groundwater.

Accordingly, these Guidelines will come into operation upon publication in the *Gazette* or such other time as the publication shall prescribe.

Section 124 and Part D of the Sixth Schedule of the Water Resources Management Rules 2007, sets out the contents of management rules or plans related to a protected area or groundwater conservation area and may include:

1. Procedures to be applied for the management of the Protected Area or Groundwater Conservation Area;

2. Prohibited activities;

3. Any measures required to be undertaken for water resource conservation and protection;

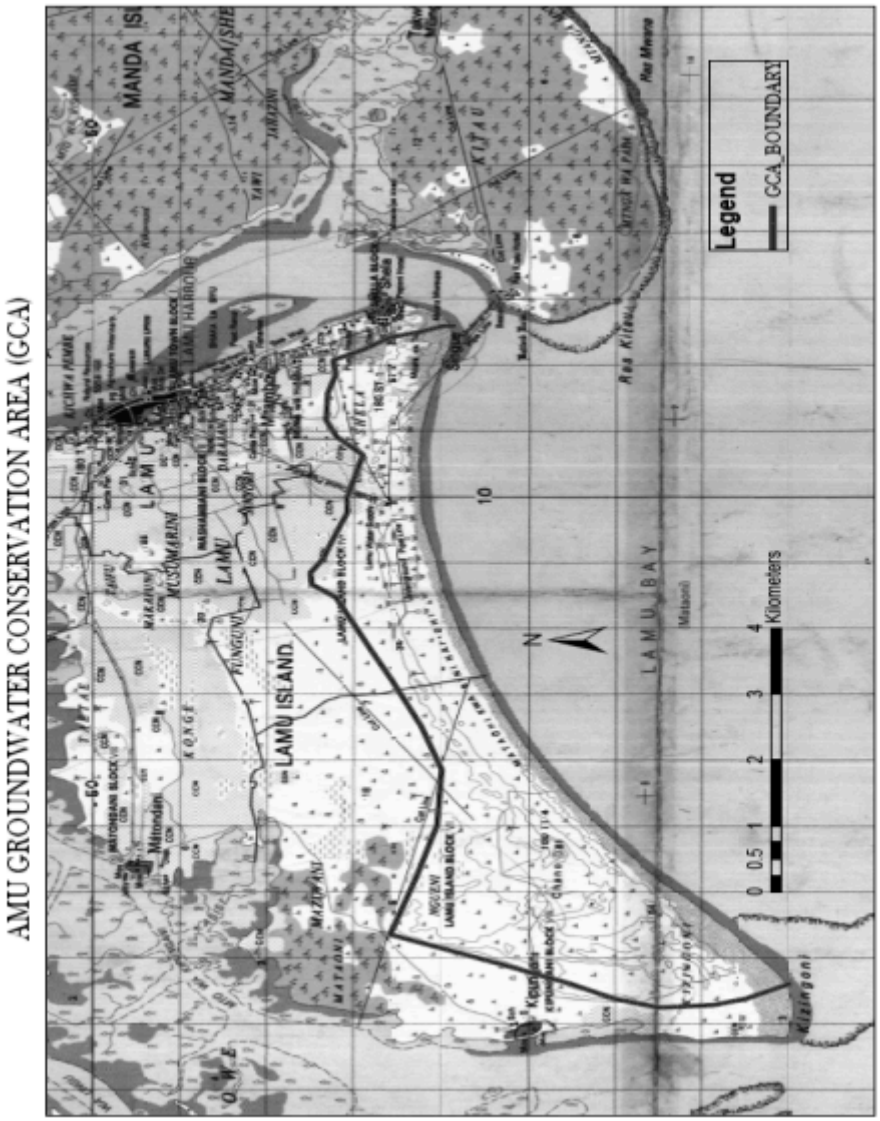
4. The timeframe for implementation of required measures;

5. Any other conditions that the Authority may consider relevant This document presents the proposed management procedures and prohibited activities in the Amu Sand Dunes Aquifer GCA.

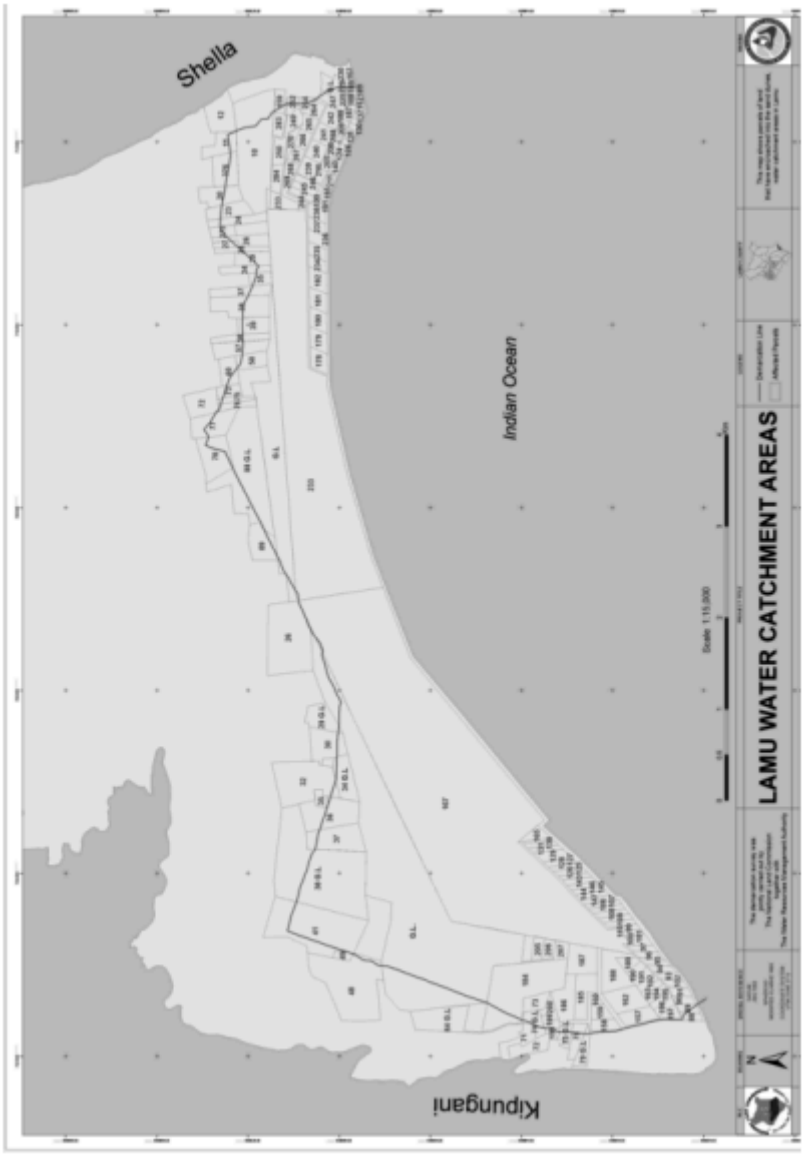
Extent of the Amu GCA

The Amu GCA lies approximately 2 kilometres south of Lamu town and stretches from Kizingoni area at the south western tip of the Island and terminates at Singue area that marks the south eastern edge of the Island near the Shella Village.

The area covered by the proposed GCA is approximately is 19.72 square Kilometres (Map 1a & 1b below)



Map 1(a). Proposed Groundwater Conservation Area (GCA) for the Amu Sand Dunes Aquifer



Map 1(b). Proposed Groundwater Conservation Area (GCA) for the Amu Sand Dunes Aquifer

1. OBJECTIVE

Groundwater is and will continue to be a major source of water for the Amu Island, Lamu Archipelago as well as the Lamu mainland. However, it has been established through Lamu Island sand dunes aquifer mapping study that, more groundwater is being used than is being replenished through natural means. The study inferred that sea water intrusion, over abstraction, loss of vegetal cover and encroachment has created a threat to groundwater availability both in terms of quality and quantity.

To address this problem, the Water Act (Cap. 372) has provided a way for groundwater resources to be managed and protected through establishment of Ground Water Conservation Areas (GCAs) as provided for in Section 23 of the Act.

The objective of the GCA guidelines is to provide a framework under which ground water catchment areas and water resources use will be managed in a manner such that will ensure the groundwater resources is protected and conserved sustainably.

The desired future condition is derived from the current status of Amu sand dunes aquifer. According to Lamu Sand dunes water catchment Mapping Report (2008) and recent data from LAWASCO in 2017 the aquifer has been

experiencing stress. It was found that several wells had turned saline and some had dried. This situation attests to the fact that more groundwater is being extracted at a higher rate than it is replenished.

The desired future condition must provide a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging and prevention of waste of groundwater in the Conservation area.

Consequently, the desired future condition of the GCA is summed as follows:

1. Groundwater quality remains potable by Kenyan Standards (KEBS: KS 05-459: Part 1: 1996);

2. Annual renewable groundwater recharge is sustained at or over the year 2017 level;

3. Mitigation measures are put in place to cope with climate change effects;

4. Annual groundwater abstraction does not exceed 70% of the total aquifer recharge;

5. Fresh water levels are sustained to wade of sea water intrusion and possibly reverse current intrusion;

6. Conjunctive water use is considered to cope with pressure emanating from population rise and other emerging developments;

7. Other groundwater dependent ecosystems, here identified as flora and fauna , are protected;

To achieve these targets, guidelines on the following aspects of groundwater use, protection and conservation are required:

1. Abstraction limits;

2. Water use prioritization and efficiency;

3. Borehole construction guidelines;

4. Groundwater recharge;

5. Groundwater monitoring;

6. Water allocation guidelines;

7. Conjunctive water use;

8. Pollution control;

9. Enforcement of AMU GCA guidelines and Water Act (Cap. 372);

10. Catchment and Groundwater conservation;

2.1. Abstraction Limits

2.1.1 Maximum allowable production To minimize as far as practicable the

1. Water levels decline does (not to go beyond 30% of the initial water column in the well),

2. Sea water intrusion into the freshwater zone ,

3. Deterioration of water quality within KEBS drinking water standard

4. potential loss of opportunity to construct a new well because of spacing requirements and over abstraction of ground water and

5. Groundwater resources waste

The following guidelines shall apply in the GCA to regulate the production of groundwater.

1. Availability goal

The Water Allocation Guidelines provide for 25% of the tested yield over a 24 hr period, or 60% of the tested yield over a 10-hour period as the maximum allowable production as a general WRM rule. This shall continue to apply in the GCA as it does in all groundwater systems.

2. Permitting goal

Right to access clean and safe water equitably is a constitutional requirement (COK 2010 article 43d) administered through permitting ensuring reserve is not violated.

The goal is to ensure available water resources are allocated in a manner that reserve is addressed and water use is prioritized for current and future domestic purposes.

To minimize wastage and to address the potential loss of opportunity to access groundwater, the permitting goal will also endeavour to match the permitted amount with the applied use. Therefore permitted amounts will be based on the per capita water requirements set out in the Design Manual as reproduced in the Water Allocation Guidelines.

WRA shall therefore make reasonable effort not to grant permit applications for more water production than is actually needed for beneficial use as will be defined within the Amu Sand dunes Water allocation Plan. The Water Allocation Plan shall be developed and will define distances between wells/ boreholes and abstraction limits.

Further in Amu GCA no well shall be operated without obtaining necessary permits from Water Resources Authority in consultation with AMU WRUA as set out in the WRM Rules 2007 and Water Act (Cap. 372).

Permitted use of groundwater will however be reviewed to ensure safe yield is sustainably maintained. Therefore, changes in abstraction and use of groundwater under a current use operating permit may not be made without prior approval of WRA.

3. Water use charges

Water use charges shall apply to all water abstractors as required by Water Act (Cap. 372).

In the case of Amu GCA, abstractors will be subject to specific conditions and penalties that apply to all Groundwater Conservation Areas as specified in the WRM Rules 2007 section 108 and/or any other relevant subsequent legislations.

Exclusions and exemptions

Current use

Existing legal groundwater use in the GCA before the effective date of the GCA management guidelines shall be preserved, to the maximum extent practicable, consistent with WRM Rules 2007 and/or any other relevant subsequent Legislation. Evidence of current use must be presented to WRA before such use may be preserved. Whenever preserved, such use will be regularized by WRA in line with the GCA guidelines.

2.2. Well/Borehole Siting in GCA

Siting of wells/boreholes in the GCA shall be subject to all provisions of the WRM Rules 2007 (section 27) and Codes of Practice for Borehole Siting.

The siting shall be done by a licensed geologist/hydro-geologist. He/she shall compile a hydrogeological assessment report in conformity with WRM Rules Second Schedule including water balance before and after the proposed development.

Further to this, particular emphasis shall be laid to investigation methods which shall include an exhaustive inventory of existing data, including all existing groundwater abstraction in the neighbourhood of the current application without exception. Other Conditions for the Authority to grant an authorisation for drilling the borehole, including limits to abstraction, mandatory borehole design considerations; etc shall be stated by the siting geologist/hydrogeologist in his/her recommendations.

He/she shall demonstrate in the report that investigation has been exhaustively done for WRA to consider granting the authorization to drill.

For Amu GCA

1. An application for major development within the GCA shall be accompanied by an environmental impact study that demonstrates that the quality and quantity of groundwater in the GCA and the recharge function of the area will be protected, conserved, improved or restored.

2. Groundwater use applications that promote storm water management and infiltration will be given priority in granting of authorisations to drill within the GCA. Such plans shall be subject to approval so that they do not pose groundwater contamination risk.

2.3 Borehole Construction

These guidelines are subject to the Codes of Practice for Construction of Boreholes and should be applied in conjunction with the following documents:

1. The Water Resources Management Rules, 2007 and subsequent legislations

2. The Code of Practice for the Siting of Boreholes

3. The Code of Practice for the Supervision of Construction of Boreholes

4. The Code of Practice for the Test Pumping of Boreholes

5. The Water Allocation Guidelines (2010)

2.3.1 Spacing requirements

To minimize as far as practicable the

a) Drawdown of the water table and the reduction of artesian pressure, to prevent interference between boreholes and to

b) Prevent degradation of water quality the Water Resources Authority will enforce spacing requirements on all new boreholes in the GCA. These will be in accordance with the spacing guidelines outlined in the (4).4 of the Water Allocation Guidelines (2010).

c) In the case of a public supply well field, WRA may waive the spacing requirements on the well field if the applicant submits adequate evidence showing that the increased cone of depression caused by the well field will not increase the impact on nearby existing wells.

This calls for, *inter alia*, appropriately designed pumping tests and well field layout design.

2.3.2 Sanitary seal

The boreholes and wells in the GCA shall be lined to such a depth that will provide a reasonable seal to contaminated or polluted surface water. The area is a high-recharge area that is unconfined thereby highly susceptible to high risk of groundwater contamination

2.3.3 Defective/Unsuccessful wells/boreholes

Abandoning of defective/unsuccessful wells/boreholes shall be subject to sections 8, 9 and 10 of the Fourth Schedule of the Water Act (Cap. 372) and in accordance with the Codes of Practice for Borehole Construction.

The defective well arising from salty water shall be plugged or sealed off securely by the owner of the well to prevent intrusion into the fresh water aquifer thereby rendering the entire aquifer saline.

In addition to backfilling, an abandoned borehole in the GCA shall be sealed in the top 6 metres to ground level with bentonite.

2.4. Pollution Control

These guidelines shall be applied in conjunction with Water Act (Cap. 372) and Part V of the WRM Rules 2007. Due to the need to prevent pollution in the GCA, upon inspection, WRA may provide notice to affected parties and issue orders to prevent pollution. If WRA determines that an emergency situation exists, a temporary order to prohibit pollution and protect public health, safety and welfare shall be issued without notice. The order shall continue in effect for the lesser of fifteen (15) days or until tests are done. If the factual basis for the order is

disputed, the affected parties may lodge a complaint with the Water Tribunal. The order shall however stay in place until the Tribunal determines the appeal.

2.5 Groundwater Recharge, Monitoring and Conservation

The recharge mechanism within the sand dune catchment area is through direct precipitation where rain water infiltrates/percolates within the highly permeable wind- blown sands to augment groundwater storage.

Beneficial land and water management practices that maximize aquifer recharge with good water quality and high quantity will be promoted. Gazettement of the GCA, rain water storage, biodiversity improvement and prohibition of degrading activities such as sand harvesting, deforestation through harvesting of mukoma for traditional liquor are among the proposed best practices.

Aquifer performance will be monitored to provide updated information. Therefore hydromet monitoring networks comprised of telemetric boreholes, full weather stations and a data centre will be established.

3. EXEMPT AND PROHIBITED ACTIVITIES

3.1 Prohibited Activities The prohibited activities will be as per WRM Rules 2007

Sixth Schedule to the following activities that are considered high-impact uses due to the probability and/or potential magnitude of their adverse effects on groundwater and shall be prohibited in the GCA:

1. Tillage or cultivation on the sand dunes;

2. Clearing of indigenous trees/vegetation on the sand dunes;

3. Building of permanent structures;

4. Disposal of any form of waste within the sand dune: large capacity septic, untreated waste disposal wells, open defecation cemetery, untreated sewage waste disposal wells, cesspools, industrial waste , pit latrines;

5. Excavation of soil or development of quarries;

6. Planting of exotic species that may have adverse effect to water resources;

7. Landfills;

8. Construction of permanent residential structures;

9. Sand harvesting;

10. Activities that would significantly reduce the recharge to aquifers obstruction of dune formation;

11. Radioactive waste disposal sites;

12. Charcoal burning, grazing, harvesting of Mukoma tree for traditional brew;

13. Or any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the water resource.

3.3 Enforcement

The enforcement of management guidelines and prohibitions shall be in accordance with provisions of the Water Act (Cap. 372), Water Resources Management Rules 2007 and other subsequent legislations.

These shall include, inter alia, PART VIII - Water Use Charges, entails and additional five per cent to the water use charges. The itemized prohibited activities shall be enforced and complied with to all respective Authorities and the public through the gazette notice. GROUNDWATER CONSERVATION MEASURES

4.1 Conservation activities

The following activities will be undertaken to roll out the conservation plan post- gazettement:-

1. Public awareness campaigns following Gazettement of the GCA.

2. Reconciliation of the water permit database for the GCA with the actual abstraction points to ensure all existing groundwater abstractions are authorized.

3. Reconciliation of water use with the permit database to capture the actual abstraction against the permitted abstraction.

4. Review of permits to equitably match water needs with the permitted abstraction. A moratorium shall be declared for those found to be over- abstracting and their permits regularized to reflect the actual abstraction conditions, as long as the reviewed water use limit has been assessed positively and the permit revised accordingly.

5. Review of the Second Schedule (Technical Reports) contents of Hydrogeological Assessment Report for borehole siting in the GCA to include specific requirements for conservation areas. The revised rules will give reporting guidance to include definitions of the recharge/discharge conditions, identify groundwater/surface water interactions, characterize vulnerability to contamination, and provide a pre-to-post project water balance analysis and recommendation of appropriate mitigation measures.

6. Coordination with the Lamu County Government physical planning, agriculture, water, sanitation departments and NEMA to highlight GCA management guidelines and technical advice on County by-laws where required.

7. Installation of dedicated monitoring wells for the various aquifer levels in the GCA.

8. Enforcement of WRM Rules and GCA management guidelines.

9. Implementation of WRUA SCMP incorporating ecotourism activities The Management Plan for the Amu GCA will comprise of the Water use plan, aquifer protection plan, conservation and recharge enhancement plan, aquifer protection plan education plan and ecotourism plan. The management plan will be reviewed every so often as to match the conservation needs and issues.

WATER USE PLAN

The objective of this water use plan is to protect the long term water storage and supply capacity of the aquifer by controlling average annual abstractions with respect to recharge.

Water use plan Activity	*Timeframe*	//Cost (Kenya Shillings)//	*Responsibility*
Establish the water balance	2019	5,000,000	WRUA, Lamu County Government, WRA, LAWASCO, NMK
Develop water allocation plan for the Amu GCA	2019	55,000,000	WRUA, Lamu County Government, WRA, LAWASCO, NMK
Enhance Water use efficiency (introduction of technologies)	Continuous	10,000,000	WRA, NMK, WRUA, LAWASCO, Lamu County Government
TOTAL		70,000,000	
AQUIFER PROTECTION PLANThe objective of the aquifer protection plan is to protect it by encouraging activities that enhance water quality and by discouraging activities that degrade it.			

Aquifer Protection Plan Activity	*Timeframe*	*Cost*	*Responsibility*
Gazettement of GCA	Up to 2020	87,000,000	WRA, MWS
Enforcement of Amu GCA guidelines and other legislations	Continuous	15,000,000	WRA, National Govt
Total		102,000,000	
CONSERVATION AND RECHARGE ENHANCEMENT PLANThe objective of the conservation and recharge enhancement plan is to maximize aquifer recharge with good water quality and quantity by promoting beneficial land and water management practices.			
Activity	*Timeframe*	*Cost*	*Responsibility*
Study of ground water potential and bio-diversity (Identifying endemic/ invasive/ endangered species for both flora and fauna)	2019	6,400,000	WRA, ICRAF,KFS,WWF, NEMA,KFS,KEFRI
Re-vegetation of the catchment area	Continuous	38,100,000	WRUA, WRA, KFS
Rain water storage enhancement.	Continuous	68,000,000	WRA, CSWB Lamu County Government and WRUA
Restricting activities that may lead to pollution and destruction of the eco system	Continuous	14,400,000	WRA, Lamu County Government, NMK, KFS, WRUA, NEMA
Alternative livelihood activities	Continuous	50,000,000	WRA, NMK, WRUA, ASDP, Agriculture, fishing and livestock, KFS, Trade, KWS
Regulation of development of wells/ boreholes within GCA	Continuous	7,000,000	WRA ,LAWASCO, Lamu County Government, CSWSB
Water use plan Activity	*Timeframe*	*Cost (Kenya Shillings)*	*Responsibility*

Regulation of abstraction limits	Continuous	3,800,000	WRA, WRUA, County Commissioner
Controlling encroachment and review of grants	Ongoing	65,000,000	NLC, WRA, Lamu County Government
Sub Catchment Management Plans Implementation	Ongoing	20,000,000	WRUA, WRA, NMK, Lamu County Government, NEMA, WSTF
Establish WRA satellite centre for Lamu	2019 –2022	15,000,000	WRA, NMK, NEMA, Lamu County Government
Total		287,700,000	

MONITORING PLAN

The objective of the monitoring plan is to collect water resources data and maintain a comprehensive scientific database on the Amu aquifer that provides information on water levels, electrical conductivity, well performance, aquifer response to pumping, general water quality (salinity) and hydrometrological parameters.

Action	*Time frame*	*Costs*	*Responsible*
Establish and maintain Groundwater monitoring networks	2018	60,000,000	WRA
Establish and maintain hydromet networks	2019	50,000,000	WRA
Ground water sampling and analysis	Continuous	30,000,000	WRA
Establish a water resources database for ground water quality and ground water levels	2019	30,000,000	WRA
Groundwater assessment and modeling of the Amu aquifer	2019	10,000,000	WRA, Consultant
Aquifer assessments in Lamu other areas	2019-2022	20,000,000	WRA, Lamu County Government

Capacity Building	Continuous	1,000,000	Stakeholders and WRA
Total		201,000,000	

EDUCATION PLAN

The objectives of this education plan is to publish and disseminate information on the Amu GCA Management for sustenance of fresh water aquifer in the sand dunes.

Activity	*Timeframe*	*Costs*	*Responsible*
Establish an Amu GCA management working group comprising of key stakeholders	3 months after Gazettement	5,000,000	WRA/Lamu County Government, NMK
Publish and disseminate the best practices and prohibited activities within the sand dune aquifer.	Continuous	10,000,000	WRA, Lamu County Government, NMK ,NEMA,WRUA
Promote best programs on Water Sanitation and Health	Continuous	2,100,000	WRA, Lamu County Government, Public health office/WRUA
Disseminate information on Amu aquifer and its recommended management guidelines	July 2017 - June 2022	29,000,000	WRA, Lamu County Government,WRUA
Total		46,100,000	

ECOTOURISM PLAN

The objective of the ecotourism plan seeks to enhance sustainable conservation of the sand dunes by promoting nature-based experiences of the local communities while ensuring ecological, economic and social needs.

Action	*Timeframe*	*Cost*	*Responsibility*

Conceptualize the ecotourism in Amu sand dunes {walkway Nature trails (bio-diversity), Hiking, Camping, filming, tour guides Bird watching, Viewpoints (highest peaks), Dig a day (Archeological sites especially in the low lying areas)}	Jan 2019 - July 2019	16, 500,000	WRA, NMK, KTB, KTDC, NEMA, WWF, KWS, Lamu County Government
Establish walkways around and within Amu GCA and other related infrastructures	Nov 2019 – Nov 2020	57,000,000	WRA, NMK, NEMA, KWS, KTB, KWS, Lamu County Government, Amu WRUA
Total		57,000,000	