



**REPUBLIC OF KENYA**



**COUNTY GOVERNMENT OF MANDERA**

**WATER AND SANITATION SECTOR**

**COUNTY WATER AND SANITATION STRATEGY**

**AND INVESTMENT PLAN**

**2024-2034**

*In Pursuit of Ethical and Beneficial Service*

## FORWARD

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Mandera County stands at a pivotal moment in its development journey. Despite the unique challenges posed by our arid environment, fragile ecosystem, and socio-economic constraints, we remain steadfast in our commitment to transforming the lives of our people through resilient, inclusive, and sustainable development.

The **Mandera County Water and Sanitation Strategy & Investment Plan (CWSSIP) 2024–2034** presents a clear roadmap for addressing the critical gaps in water and sanitation access. It reflects our collective aspirations to achieve a green, healthy, wealthy, and peaceful Mandera. Anchored in national and global development goals—Vision 2030, the Medium-Term Plan IV, and the Sustainable Development Goals—this strategy outlines bold interventions to strengthen water governance, improve sanitation infrastructure, and build climate resilience in the face of recurring droughts and floods.

This long-term plan is the product of wide stakeholder consultations and inter-sectoral collaboration. It aligns with our constitutional mandate and affirms our vision to deliver the most improved water and sanitation services in the region.

As the Governor, I reaffirm my administration's full commitment to the implementation of this strategy. Together, let us build a future where every resident of Mandera County enjoys safe water, dignified sanitation, and the full benefits of sustainable development.



**H.E HON. MOHAMED ADAN KHALIF, EGH**  
**GOVERNOR, COUNTY GOVERNMENT OF**  
**MANDERA**

## **Acknowledgement**

This document has been developed through consultations and stakeholder workshops on Water and sanitation strategies organized by personnel from the Water services, Public Health , Education , Environment and Climate Change departments of County Government of Mandera.

The document draws upon detailed discussions with mulita-sector officials relating to Water supply , Water resources Management , sanitation, Agriculture and Environment. It benefitted from comprehensive assessments on county water resources, Water supply infrastructure, Sanitation infrastructure and WASH baseline assessments for institutions in the county. The content draws on the constitutional and legal mandates, regulations , acts , policies and identified needs and challenges of the sector.

This document is in line with the constitution of Kenya , county Government act (2012) and the water act (2016). The content also draws on reviews of County Integrated Development Plans (CIDPs). It is consistent with the spirit of Kenya vision 2030 and its medium term plans as well as the National Water and Sanitation Investment Plan(NAWASIP).

Lastly I recognize the role played by the staff from the County Departments of Water, Environment and Public Health led by Alinoor Yussuf in preparation of this strategy document. I also thank participants from other departments for their valuable input in harmonization of the document.

It is expected that its implementation will improve the coordination of water and sanitation sector development planning, policy formulation and delivery of targets by strengthening performance management mechanisms for the county government.



Dr. Mohamud Adan Mohamed

COUNTY EXUCUTIVE COMMITTEE MEMBER

Water, Environment, Energy, Natural Resources and Climate Change

## EXECUTIVE SUMMARY

Mandera County is one of the 47 counties of the Republic of Kenya under the new constitutional dispensation. The County borders Ethiopia to the North, Somalia Republic to the East, and Wajir County to the South and West. The county covers an area of 25,991.5 km<sup>2</sup>. The County is characterized by low lying rocky hills located on the plains that rise gradually from 200 meters above sea level at Border-Point One in Mandera East to 970 metres above sea level in Banissa. River Dawa whose source is the Ethiopian highlands flows Eastwards along the county's border with Ethiopia.

There are two ecological zones in the county, that is, arid and semi-arid. Temperatures are relatively very high with a minimum of 24°C in July and a maximum of 42°C in February. Rainfall is scanty and unpredictable averaging 255mm. The 2019 Kenya Population and Housing Survey report (KPHC) showed that Mandera County had a population of 867,457 persons. This comprised 434,976 males (50.14%), and 432, 444 females (49.85%), and 37 intersexes. The county's population is projected to be 935,251 persons comprising of 458,271 males, 476,980 female, 1,007,207 persons, comprising of 493, 531 male, 513,676 female and 1,060,236 persons comprising of 519,513 male, 540,723 male in 2022, 2025 and 2027 respectively.

Food insecurity, environmental degradation, high poverty incidence, poor transport and communication infrastructure, recurrent droughts, outbreak of human and livestock diseases, insecurity, water scarcity, high levels of illiteracy and poor urban and rural planning are key challenges facing the county according to the 1<sup>st</sup> County Development Profile (CDP) released by the Ministry of State for National Planning and Vision 2030 in 2013.

This County water and sanitation strategy shall guide the activities of the County's Water and Sanitation Sector over the 10 years' period beginning the 1<sup>st</sup> of July 2024 to the 30<sup>th</sup> of June 2034. However, the gains made and missed opportunities of the sector shall be monitored on an annual basis and any critical review necessary shall be considered on merit and may be incorporated through a mid-term review of the strategic plan. Among Key Challenges addressed through this strategic plan are Erratic and inadequate rainfall, Recurrent often prolonged droughts, continued unplanned settlements, Limited budgeting allocated for both recurrent and development activities, by rural water service providers, the lack of enough equipment for Rapid Response Boreholes Maintenance Teams, Recurring conflicts among communities, Perennial floods along the river which damages river-based water supplies.

Lack of Adequate water sources in most parts of the county, Under exploitation of ground water sources and inadequate water supply infrastructure. There has been a lot of focus on point

source schemes with low coverage in the past, Poor revenue Base, Lack of funding for the development of sanitation facilities, Lack of community awareness on importance of proper hygiene & sanitation, Weak institutional capacity of WSPs, High & ever rising cost of petroleum/ fossil fuel.

**The Vision** of the Sector is *“To be the Sector with the most improved services in the County.”*

**The Mission** of the sector is *“to ensure; efficient and economical provision of water and sanitation services, increased environmental conservation, appropriate utilization of natural resources and improved access to affordable and environment friendly sources of energy to meet the various socio-economic needs of Mandera county.”*

The core values of the sector in the provision of services to the county shall be as follows; -

- Patriotism
- Honesty
- Accountability & Transparency
- Upholding high levels of ethical & professional integrity
- Commitment to efficient service delivery
- Respect for the roles & rights of stakeholders.
- Respect for the cultural & traditional norms of local communities.
- Demonstrate a high degree of diligence in the discharge of duties & responsibilities.
- Gender sensitivity
- Flexibility and,
- Innovativeness.

In order to adequately respond to the above “Vision” and “Mission” the plan proposes programmes and projects which seek to pursue the following key strategic objectives under the sector during the 2024/2025 - 2033/2034 period: -

- To improve availability and spatial distribution of water sources through appropriate exploitation of existing surface and ground water development potential in the county,
- To improve access to adequate, safe & affordable water and sanitation services both in urban and rural areas to spur economic productivity and enhance living standards,
- To strengthen the institutional capacity of the county Government to effectively deliver water and sanitation services through the review of existing setups and developing the capability of institutions to enhance service delivery,
- To reduce the vulnerability of agro-pastoralist communities to negative impacts of prolonged, often recurring droughts and floods through the implementation of long-term drought and floods mitigation interventions that shall progressively eliminate the need for short – term interventions such as emergency water trucking, and repair of damaged facilities.

To fully implement the planned strategies to achieve each of these strategic objectives, the sector shall require funding to the tune of Kshs 35,672,020,000 over the plan period to fully finance proposed efforts through this plan. Out of this Kshs 21,663,355,000 is proposed to be raised by the county Government as its budgetary support to the sector, Kshs 9,201,776,000 and kshs 2,369,355,000 is proposed to be raised from the National Government institutions supporting the county and Donor agencies respectively. The remaining Kshs 2,137,564,000 is estimated to be the contribution possible through civil society institutions including NGOs operating in the county.

### Location of Mandera County



Source: Kenya National Bureau of Statistics (KNBS 2013)

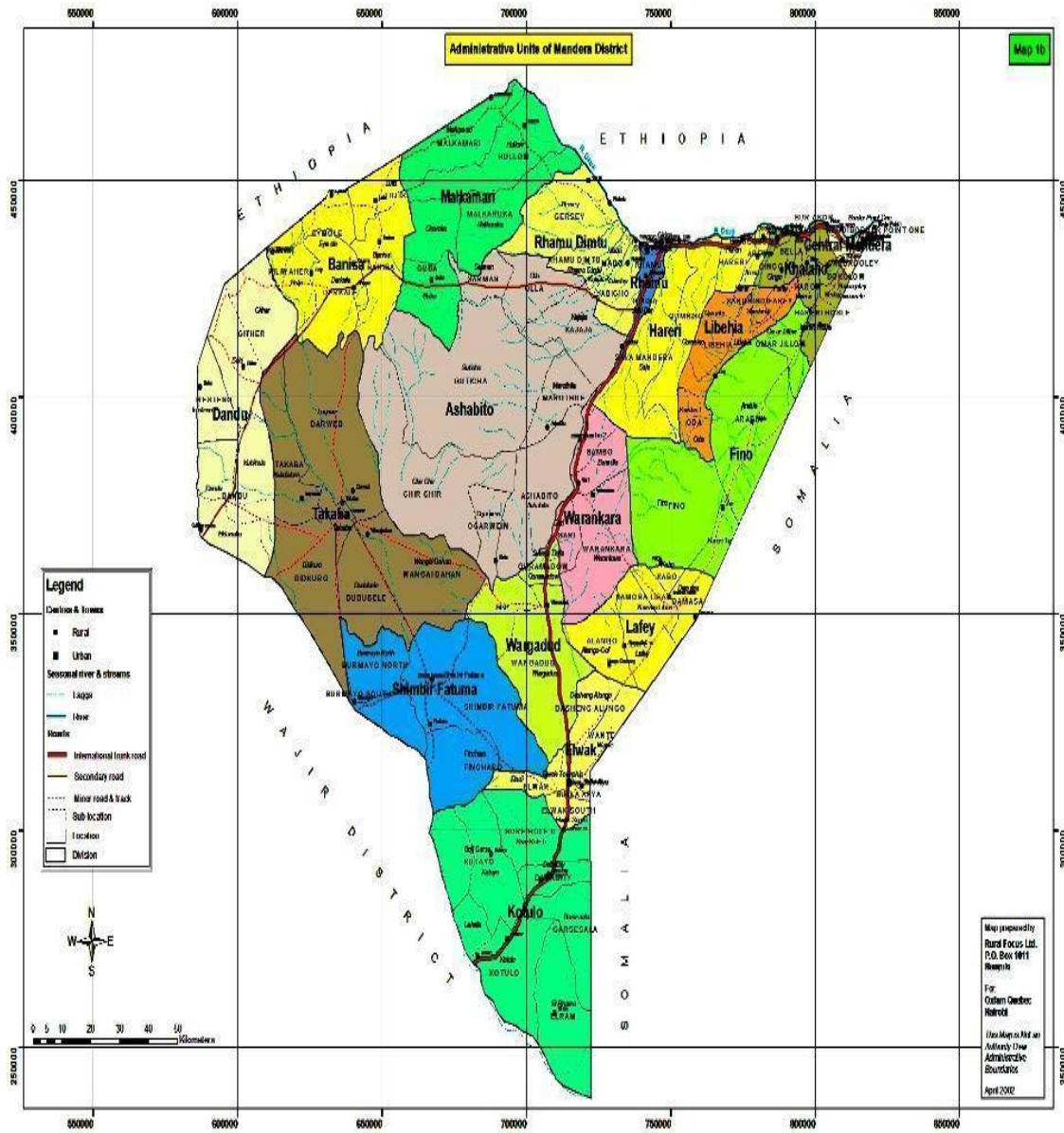


Figure 2: Map showing Mandera County

:Source: County Water Sources Mapping Database

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## ABBREVIATIONS AND ACRONYMS

ALRMP	Arid Lands Resource Management Project
ASALs	Arid Semi-Arid Lands
CA	County Assembly
CBO	Community-Based Organization
CBNRM	Community Based Natural Resources Management
CC	Climate change
CEC	County Executive Committee/ Constituency Environment Committee
CECM	County Executive Committee Member
CFAs	Community Forest Associations
CPC	Community Project Cycle
CSG	County Steering Group
CSOs	Civil Society Organizations
CRM	Changieni Rasili Mali
CWCs	Constituency Water Committees
DFID	UK Department for International Development
DLMC	District Livestock Marketing Council
EIA	Environmental Impact Assessment
EMC	Environmental Management Committee
EMCA	Environmental Management & Coordination Act
ENRM	Environment & Natural Resource Management
FADC	Focal Area Development Committee
GOK	Government of Kenya
IDPs	Internally Displaced Persons
IPCC	Intergovernmental Panel on Climate Change
MWENR	Ministry of Water, Environment and Natural Resources

NALEP	National Agriculture and Livestock Extension Programme
NCCRS	National Climate Change Response Strategy
NCCRSAP	National Climate Change Response Strategy Action Plan
NEMA	National Environment Management Authority
NIC	Non-Individual Connection
NSAs	Non-state Actors
NWHSA	National Water Harvesting and Storage Authority
NWWDA	Northern Water Works Development Authority
O&M	Operation and Maintenance
SCEOs	Sub-County Environmental Officers
SCWOs	Sub-county Water Officers
UFW	Unaccounted for Water
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children Fund
UPC	Urban Project Cycle
WDC	WRUA Development Cycle
WRUAs	Water Resources User Associations
WSP	Water Services Provider
WASREB	Water Services Regulatory Board

## CHAPTER 1: COUNTY SOCIO-ECONOMIC AND POLITICAL CONTEXT

### 1.1 Socio-political and administrative background

#### *1.1.1 Overview of the county's geographic, demographic, and economic context*

Mandera County is located in the Northeastern part of Kenya. It borders Ethiopia to the North, Somalia Republic to the East, and Wajir County to the South and West. It lies between latitudes  $2^{\circ} 11'$  North, and  $4^{\circ} 17'$  North, and longitudes  $39^{\circ} 47'$  East and  $41^{\circ} 4.8'$  East. It covers an area of 25,991.5 km<sup>2</sup>. The County is characterized by low lying rocky hills located on the plains that rise gradually from 200 meters above sea level at Border-Point One in Mandera East to 970 metres above sea level in Banissa.. The rest of topography is low lying, characterized by dense vegetation with thorny shrubs of savannah type. This is especially found along foots of isolated hills, and the area is covered by bushes, shrubs, boulders and invasive '*mathenge*' (*Prosopis juliflora*) coverage. The flat plains make drainage very poor, causing floods during heavy rains. There are no lakes, swamps, but earth pans are common in the county. River Daa whose source is the Ethiopian highlands flows eastwards along the county's boundary with Ethiopia and through Malkamari, Rhamu Dimtu, Rhamu, Hareri, Khalalio and Central Divisions into Somalia at Border Point One (BP1).

There are two ecological zones in the county namely arid and semi-arid. 95% of the county is semi-arid with dense vegetation mainly thorny shrubs and bushes along riverbanks and gullies. Temperatures are relatively very high with a minimum of 24°C in July and a maximum of 42°C in February. Variation in altitude brings differences in temperatures across the county where places near Banisa constituency experiences low temperatures due to neighboring highlands in Ethiopia. Rainfall is scanty and unpredictable averaging 255mm. The long rains fall in the months of March, April and May while the short rains fall in October, November and December. Most parts of the county experiences long hours (approximately 11 hours) of sunshine in a day. This causes high evaporation rates thus causing withering to most of the vegetation before maturity. The continuous sunshine in the county has a potential for harvesting and utilization of solar energy.

According to the 3rd schedule of Mandera County CIDP (2023/2027), the main economic activity in the County is pastoralism, contributing approximately 72% of the total household income. Cross-border trade, artisanal mining, beekeeping, and irrigation-aided agriculture are the other viable ventures.

Beekeeping is gaining popularity in most parts of the county, while irrigated subsistence agriculture is practiced along the Daa River. There is also an emerging practice of irrigation-rain-fed farming which is a new concept for the farmers though costly at the inception. The common livestock breeds reared in the county are goats, cattle, camels, sheep, donkeys, and chicken. Mandera County is a bona fide member of Frontier Counties Development Council (FCDC) Regional Bloc.

### **Administrative and Political Units**

The county is divided into 12 sub-counties namely: Mandera East; Lafey; Mandera North; Banisa; Mandera West, Mandera South, Kutulo, Khalalio, Dandu, Ashabito, Arabia and Kiliwehiri. There are six constituencies namely: Mandera East; Lafey; Mandera North; Banisa; Mandera West and Mandera South. Planning and budget allocation in Mandera County take into account the administrative and political structures to ensure equitable resource distribution and service delivery.

The six constituencies are further subdivided into 30 electoral wards each of which is further subdivided into locations, sub-locations and villages as shown in the table below with their respective area (in Km<sup>2</sup>). The county has two hundred (200) sub-locations and over four hundred and sixteen (**416**) villages; this requires allocation of more resources to provide development and improve service delivery at the sub-locations and village level.

The County Department of Water Services has its structure up to the Ward level with plans to deploy Water Officers to the village level to improve service delivery.

*Table 1 Area (Km<sup>2</sup>) by constituency*

Constituency	Wards	Division	Locations	Sub-locations	Area(Km <sup>2</sup> )
Mandera East	5	5	28	43	2,506
Lafey	5	4	11	15	3,795
Mandera North	5	4	16	23	5,138
Banisa	5	3	14	23	3,944
Mandera West	5	3	13	23	4,018

Mandera South	5	9	47	73	6,541
Total	30	30	129	200	25,939.8

Source: 2019 KNPH Census

Table 2: Number of wards in the county

Constituency		County Wards	Assembly	Constituency		County Wards	Assembly
1	Banisa	Banisa	4	Lafey	Sala	5	
		Derkhale			Fino		
		Guba			Lafey		
		Malkamari			Warankara		
		Kiliwehiri			AlangoGof		
	<b>Total</b>	<b>5</b>	<b>Total</b>	<b>5</b>			
2	Mandera west	Takaba south	5	Mandera north	Ashabito	5	
		Takaba			Guticha		
		Lagsure			Morothile		
		Dandu			Rhamu		
		Gather			Rhamu dimtu		
	<b>Total</b>	<b>5</b>	<b>Total</b>	<b>5</b>			
3	Mandera east	Township	6	Mandera South	Wargadud	5	
		Neboi			Elwak south		
		Khalalio			Elwak north		
		Arabia			Shimbir fatuma		
		Libehia			Kutulo		
	<b>Total</b>	<b>5</b>	<b>Total</b>	<b>5</b>			

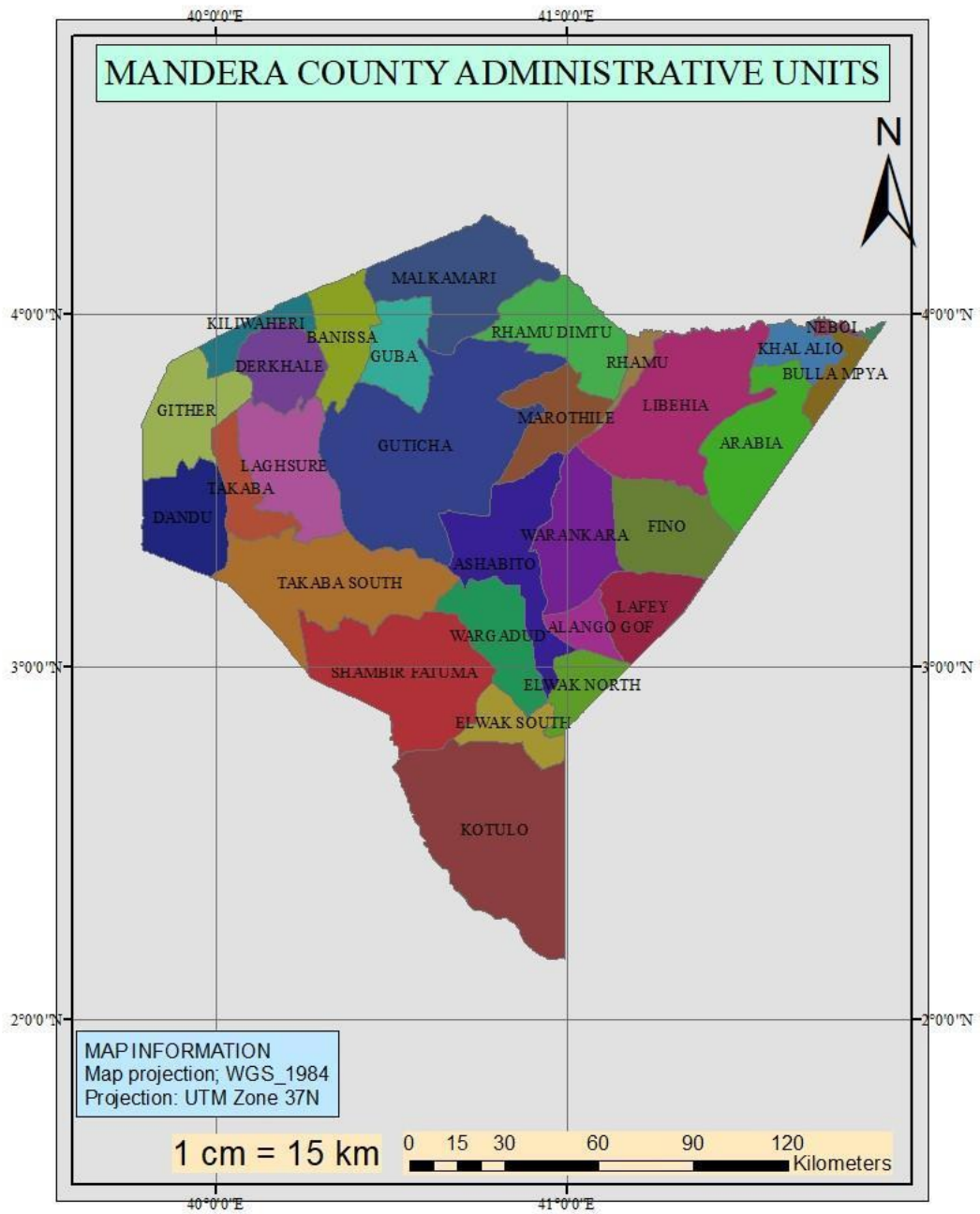


Figure 1: County's Administrative and Political Units.

Source: Kenya National Bureau of Statistics (KNBS)

# MANDERA POPULATION DENSITY

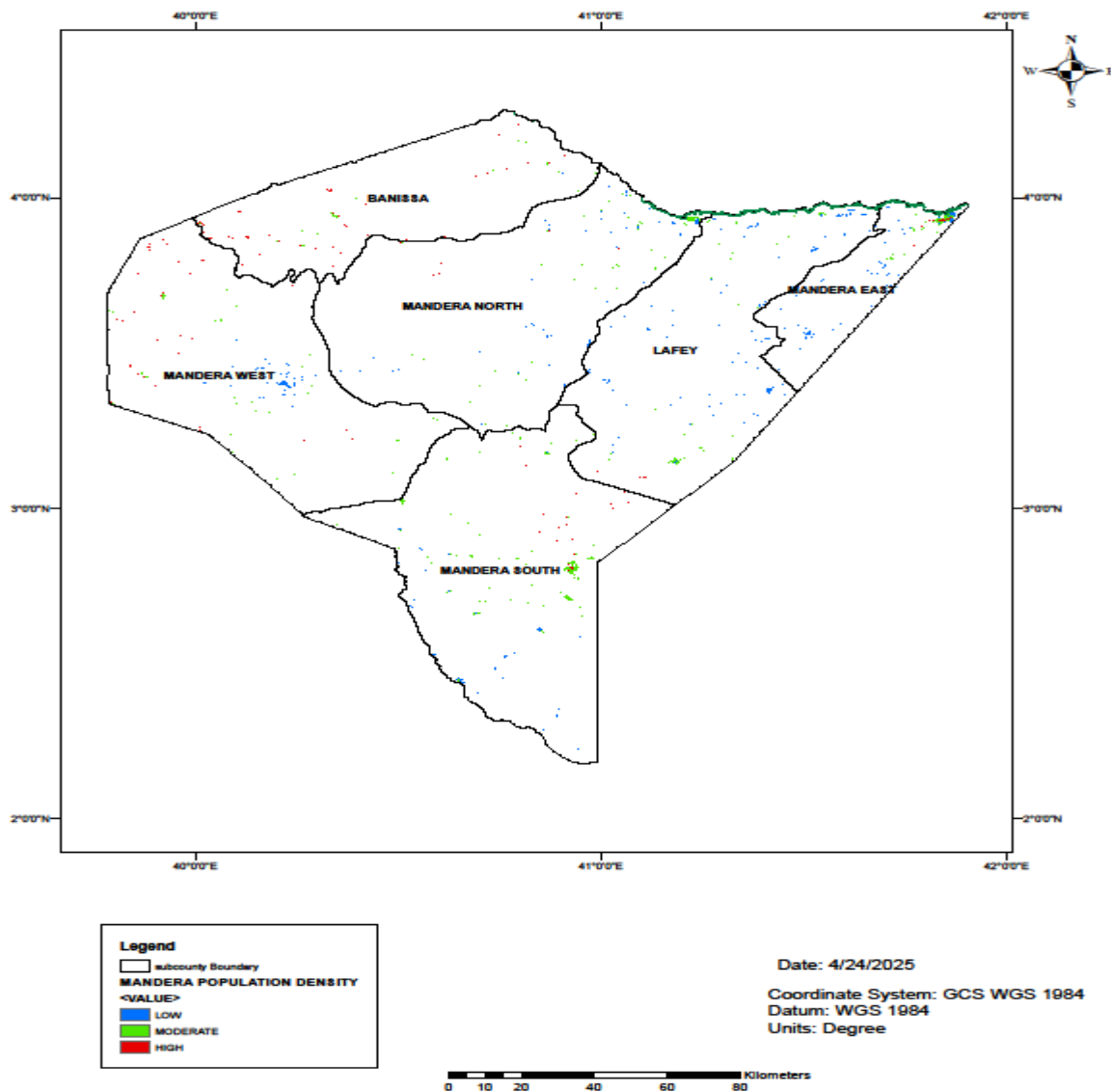


Figure 2: Population Density

## Demographic Features

Demographic features entail the county's: Population Size, composition and Distribution; Population Density and Distribution; Population Projection by Broad Age Groups; Population of Persons with Disability; and Demographic Dividend Potential.

### **Population Size, Composition and Distribution**

The 2019 Kenya Population and Housing Survey report (KPHC) showed that Mandera County had a population of 867,457 persons. This comprised 434,976 male (50.14%), and 432, 444 female (49.85%), and 37 intersexes. The county's population is projected to be 935,251 persons comprising of 458,271 male, 476,980 female, 1,007,207 persons, comprising of 493, 531 male, 513,676 female and 1,060,236 persons comprising of 519,513 male, 540,723 male in 2022, 2025 and 2027 respectively. Below is a tabulated projection of the population by age cohorts based on the 2019 Kenya Population and Housing Survey (KPHC) and the population projection for 2022, 2025 and 2027.

## County Population Age Structure

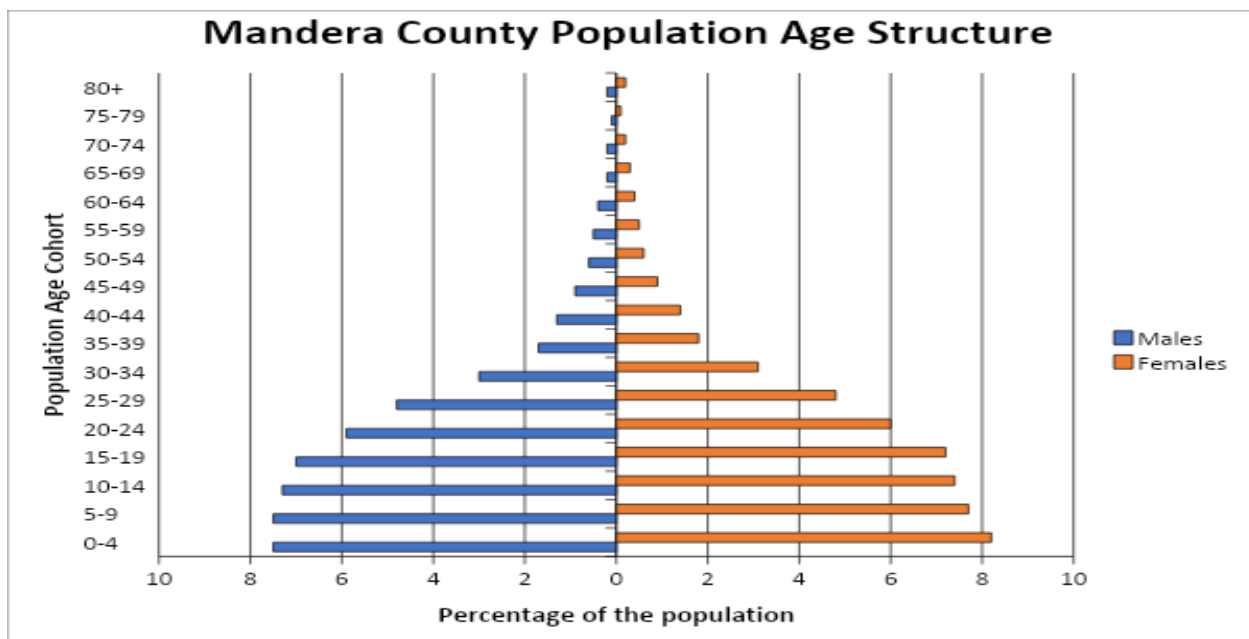


Figure 3: County Population Age Structure

Table 3: Population Projection (by Sex)

Sub-County	Census(2019)				2022 (Projections)			2025 (Projections)			2027 (Projections)		
	Male	Female	Intersex	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<b>Total</b>	434,976	32,444	37	867,457	458,271	476,980	935,251	493,531	513,676	1,007,207	519,513	540,723	1,060,236

Source KNBS 2019

### ***1.1.2 Description of governance structures, including roles of county leadership in water and sanitation***

Mandera County's governance structure for water and sanitation services involves both legislative and executive arms, each with distinct roles and responsibilities. The County Assembly, led by the Speaker, is responsible for legislation, oversight, and representation. It comprises elected and nominated Members of the County Assembly (MCAs) who operate through plenary sessions and various committees. Their duties include vetting and approving nominees for county public offices, approving budgets and expenditures, and enacting laws pertinent to county functions, including water and sanitation services. The County Executive, headed by the Governor, implements policies and manages county departments. Within this arm, the Department of Water, Energy, Environment, and Natural Resources is tasked with ensuring efficient and economical provision of water and sewerage services. This department oversees water resources planning, infrastructure development, operations, and maintenance. Additionally, the county engages with National Agencies and non-governmental organizations through CSG (County Steering Group) and WESCOORD (Water Environment and Sanitation Coordination) forums to enhance WASH (Water, Sanitation, and Hygiene) conditions in the County. Through these structured governance mechanisms and collaborative efforts, Mandera County aims to address water and sanitation challenges, ensuring sustainable and equitable service delivery to its residents.

### ***1.1.3 Discussion of key environmental, socio-political factors affecting water and sanitation service delivery***

Access to safe and reliable water and sanitation remains a pressing challenge due to a combination of environmental, social, and political factors. The arid and semi-arid climate, coupled with low rainfall and the unreliability of water sources like the Daua River and shallow wells, contributes to persistent water scarcity. Climate change further intensifies this issue through more frequent droughts and erratic rainfall, diminishing groundwater recharge and deteriorating water quality. Land degradation from overgrazing and deforestation exacerbates the situation by reducing the land's water retention capacity, causing soil erosion and silting of water sources. Meanwhile, rapid population growth and urbanization increase pressure on already inadequate water and sanitation infrastructure. The nomadic lifestyle of pastoralist communities makes centralized service delivery difficult, and cultural practices such as open

defecation, driven by limited sanitation facilities and hygiene awareness, contribute to health risks. Additionally, gender inequality places a disproportionate burden on women, especially during droughts, as they are primarily responsible for fetching water and managing household hygiene needs. Compounding these challenges are decades of marginalization that have resulted in minimal investment in essential infrastructure, leaving many areas without piped water or functioning boreholes. The shortage of skilled personnel, combined with the historical neglect of the region, hampers the implementation of effective solutions. Insecurity and conflict, often linked to competition over scarce resources and cross-border tensions, frequently disrupt service delivery and force displacement of communities, further straining access to water and sanitation. Attacks on water infrastructure worsen the crisis, while peacebuilding and conflict resolution efforts remain essential for sustainable progress. Addressing these issues requires targeted investment in infrastructure, inclusive community engagement particularly of women and a commitment to long-term peace and resilience in the face of climate and socio-political pressures.

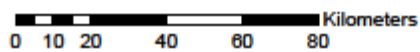
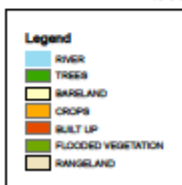
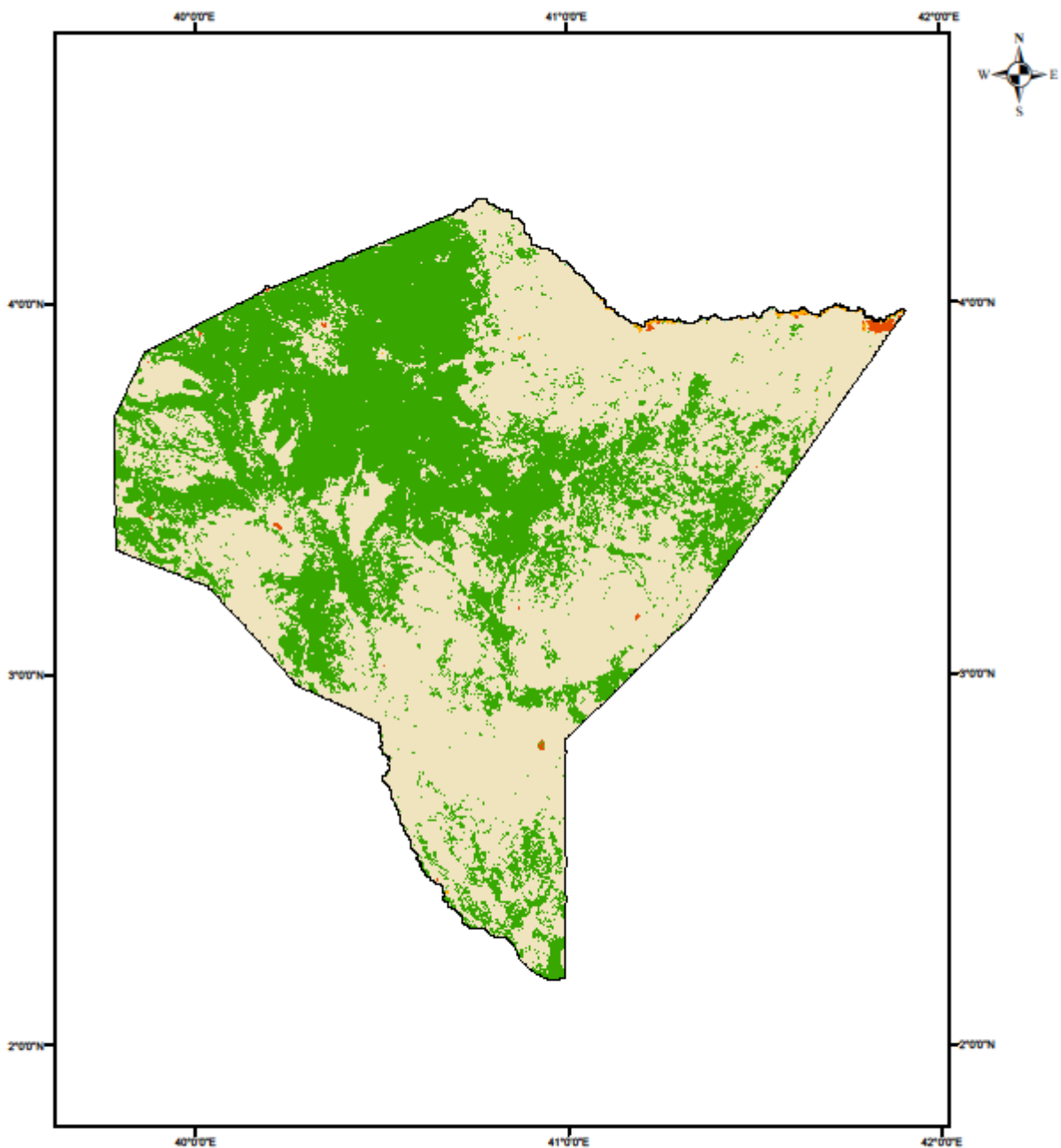
#### ***1.1.4 Existing legal and policy frameworks governing water and sanitation at the county level***

<b>Policy &amp; Legal Framework</b>	<b>Provisions in water &amp; Sanitation</b>
Water Act 2016	This act provides the legal basis for the regulation, management, and development of water resources and water services, The water act provided the functions of the Water Works Development Agencies (WWDAs) & vests the responsibility for provision of water & Sanitation services in the County Government.
National Water Master Plan 2030	This plan sets strategic directions for water resource development to meet rising demand, including infrastructure development, resource management, and service provision
County Integrated Development Plans (CIDPs)	These plans reflect county-level planning for water projects & Sanitation on a five-year period. The current CWSSIP is linked to the CIDP 2022-2027.
Takaba Water Services Master Plan (2024 - 2049)	In collaboration with partners like UNICEF, Mandera County has developed a comprehensive water master plan aiming for universal access to water, sanitation, and

	hygiene by 2049. This plan includes expanding piped water networks and sewerage systems, with significant projects in Takaba Town and its environment in Mandera West Sub- County.
Kenya Environmental Sanitation Strategic Framework (KESSF) 2016-2020	This framework provides a medium-term plan for implementing the Kenya Sanitation Policy and Planning Framework (KESHP) 2016-2030.
Water Services Regulatory Board (WASREB)	This board plays a key role in regulating water services and setting standards for water service providers, as outlined in the Water Act 2016.
National Adaptation Plans (NAPs) 2015 – 2030 and National Determined Contributions (NDCs) 2020	They both call for adequate water management strategies that consider the sector's vulnerability to climate change
The Public Health Act Cap 242	Provides for the framework for taking all the lawful, necessary and reasonably practicable measures for maintaining clean and sanitary conditions & nuisances that are detrimental to health.
EMCA Cap 387	Provides for a framework for the water & effluent quality control & monitoring including the prohibition of water pollutions and effluent discharge & effluent to be discharged into the sewerage system. Polluter pays principles are identified and provided for in the act.
Environmental Health & Sanitation Bill 2020	The bill's primary goal is to provide a framework for county governments to fulfill their sanitation and environmental health responsibilities as outlined in the Constitution.
Vision 2030	The vision commits to ensuring improved water & sanitation services are made available & accessible to all by 2030. The vision seeks to increase sanitation coverage in urban areas to 100% & install improved onsite sanitation site treatment facilities for the population covered by sewerage systems. Prioritizes for the rehabilitation, expansion and development of urban sanitation infrastructure

<p>The National Water and Sanitation Services Strategy (2019-2030)</p>	<p>It envisions sustainable universal &amp; equitable access to safe &amp; affordable water supply, sewer &amp; non-sewer sanitation services to all Kenya by 2030.</p> <p>Specifically, it seeks to increase the coverage of sanitation installations to a sanitation chain(onsite) in the urban setting from 15% to 40% by 2030</p> <p>Increase the coverage of sanitation installations to a sanitation chain (onsite) in the rural setting from 0% to 20%.</p>
<p>The Menstrual Hygiene Policy 2019-2030</p>	<p>The Policy aims to enable women and girls to have access to educational information on Menstrual Hygiene Management (MHM), Menstrual Products, services &amp; facilities &amp; to safely dispose of Menstrual waste.</p>

# LAND USE LAND COVER



Coordinate System: WGS 1984 UTM Zone 37N  
Projection: Transverse Mercator  
Datum: WGS 1984  
False Easting: 500,000.0000  
False Northing: 0.0000  
Central Meridian: 39.0000  
Scale Factor: 0.9996  
Latitude Of Origin: 0.0000  
Units: Meter

## 1.2 Water in the County Economy

Access to safe, clean, sufficient, and sustainable water services remains a critical developmental issue in Mandera County. The constraints to this include: - inadequate water infrastructure, aged and dilapidated facilities, lack of a comprehensive water investments master plan, persistent droughts, inadequate groundwater studies, population growth, and the impacts of climate change. These factors contribute to the constraints faced in ensuring reliable water services, including high operation and maintenance costs, unsuitable geological formations and topography, insufficient funding for infrastructure, and unplanned settlements. However, opportunities for intervention exist, such as leveraging existing water supply infrastructure, the governor's commitment to increase water service access, ongoing water supply projects, and the availability of solar energy and sectoral support from donors and CSR projects.

### ***1.2.1 Integration of water sector development with the county's economic growth strategies***

Reliable water services with the capacity for expansion will enable urban communities, business and industry to grow and attract investment. Economic growth is putting pressure on available fresh water resources across Mandera County. Uncertainty in water availability is a challenge that affects economic growth as improved access to water has a direct impact on communities and people leading to economic benefits. There is a need to ensure access to water for livestock, irrigation and commercial activities in support of economic growth in Mandera county.

The livestock sector plays a critical role in Kenyan GDP and more in the economic progress of Mandera County. The sectors account for about 10% of the entire Kenya GDP and 42% of the agricultural GDP (National Livestock Policy). In Mandera County, livestock keeping is an important economic activity especially among the pastoral and agro-pastoral livelihood groups. They provide sources of livelihood through milk and meat production and market sales. Over the past decade, the importance of the cattle trade among these food economy groups has been increasing due to the high value of cattle and the ever-increasing seasonal demand for slaughtering and restocking in other parts of Kenya.

As population increases, the demand for food increases and subsequently the demand for water for agriculture increases significantly. In a drier area like Mandera County, getting the amount of water used for irrigation is a necessity. Mandera County is principally a semi-arid area with an average rainfall of 275mm per year. This rainfall is unreliable for food production and therefore improved water storage and management holds the key to producing enough food to alleviate the suffering of people. The tourism sector is also an important driver of economic growth with the county priding itself with

one National Game Park namely; Malkamari National Park. These reserves play an important role in promoting the hotel and hospitality industry

### ***1.2.2 Key economic activities dependent on water (e.g., agriculture, industry, tourism)***

Water is a critical resource across major economic sectors, with varying levels of dependency and usage patterns. Below is an assessment of water usage by key sectors—agriculture, industry, and municipal/services—focusing on identifying critical water-dependent nodes within each. These nodes are points where water availability and quality significantly impact operations, economic output, or societal needs.

#### 1. Agriculture Sector

Overview: Agriculture is the largest global consumer of freshwater, accounting for approximately 70% of total withdrawals. Water is essential for irrigation, livestock, and, with significant variations based on climate, crop type, and farming practices.

##### Water Usage:

Irrigation: The primary use, supporting cereal production in the county. Irrigated land (about 20% of cultivated **area**) **highlighting** its high productivity.

Livestock: Requires water for drinking, feed crop production, and processing. **animal production** is particularly water-intensive, with a **high-water** footprint.

##### **Critical Water-Dependent Nodes:**

Irrigation Systems: small-scale irrigation networks (e.g., canal systems in Mandera north and East sub-counties) are vulnerable to water scarcity, inefficient distribution, and poor maintenance. , leads to wastage and reduced system reliability.

High-Value Crops: Cash crops like onions. Disruptions in water supply directly affect yields and economic returns.

Livestock Feed Production: Feed crops require consistent water for cultivation, making them sensitive to drought or reduced groundwater availability.

##### Challenges:

Climate change disrupts rainfall patterns, increasing reliance on irrigation.

Low water-use efficiency underscores the need for better management.

### ***1.2.3 Constraints to economic growth due to water access, quality, and management challenges***

The table below delineates Mandera County's development priorities, their inter-linkage with the water sector, associated constraints, risks, and opportunities. These priorities underscore the county's commitment to addressing pressing challenges such as enhancing water and sanitation services.

*Table 4: Mandera County's development priorities and their inter-linkage with the water sector*

<b>County Development Priorities</b>	<b>Inter-linkage with Water Sector Development</b>	<b>Constraints</b>	<b>Risks</b>	<b>Opportunities</b>
Enhancing access to safe and sustainable water services	Adequate water infrastructure is essential for ensuring safe water provision, which directly impacts public health and economic activities.	Inadequate water infrastructure  Persistent droughts  inadequate funding	Water scarcity  Health hazards due to inadequate water supply  Agricultural and industrial setbacks	>Existing infrastructure  The vast majority of boreholes are operational providing access to water services  >Securing funding from donors and government initiatives (HOA4GWR, K-WASH).  >Governors Manifesto/ political will of the County Executive
Improving sanitation facilities and promoting hygiene practices	Access to sanitation facilities relies on water availability, impacting public health and environmental well-being.	Lack of sanitation infrastructure  Cultural attitudes towards sanitation  Funding shortages	Spread of diseases due to poor sanitation  Environmental pollution	Ongoing sanitation projects  Sectoral support from governmental and non-governmental organizations  behavior change in sanitation practices

<p>Enhancing environmental conservation and sustainable natural resource management</p>	<p>Water resources are crucial for environmental conservation and sustainable resource management, influencing ecosystems, biodiversity, and climate resilience.</p>	<p>Illegal logging  Deforestation  Low tree cover</p>	<p>Degradation of ecosystems  Loss of biodiversity  Vulnerability to climate change  Mushrooming settlement</p>	<p>Afforestation initiatives  Collaborations with national entities  Policy interventions</p>
<p>Promoting renewable energy and mitigating climate change impacts</p>	<p>Water availability influences climate change adaptation, with water scarcity affecting energy generation and agricultural resilience.</p>	<p>Limited knowledge on renewable energy  Inadequate budget allocations  Low resilience to climate change impacts</p>	<p>Inadequate Energy sources  Vulnerability to climate extremes</p>	<p>Potential for Harnessing solar energy  Sourcing funds for green energy projects  Inclusion of climate change issues in development plans</p>
<p>Increase livestock production</p>	<p>Livestock production significantly relies on water availability more so in the wake of climate change</p>	<p>Inadequate water for livestock  Inadequate feeds during drought season</p>	<p>Increase livestock deaths  Low market value for livestock  Recurring droughts causes shortages of water to meet the livestock water needs</p>	<p>Existing support from national government projects e.g ELRP  Enabling political environment.  Governor's manifesto addressing the issue of improved water availability for both domestic and livestock uses.</p>

Increase crop production	Water for irrigation farming	Unreliable and erratic rainfall in the county	Increased Crop failure due over reliance on rainfed agriculture	Existing donor support for water harvesting
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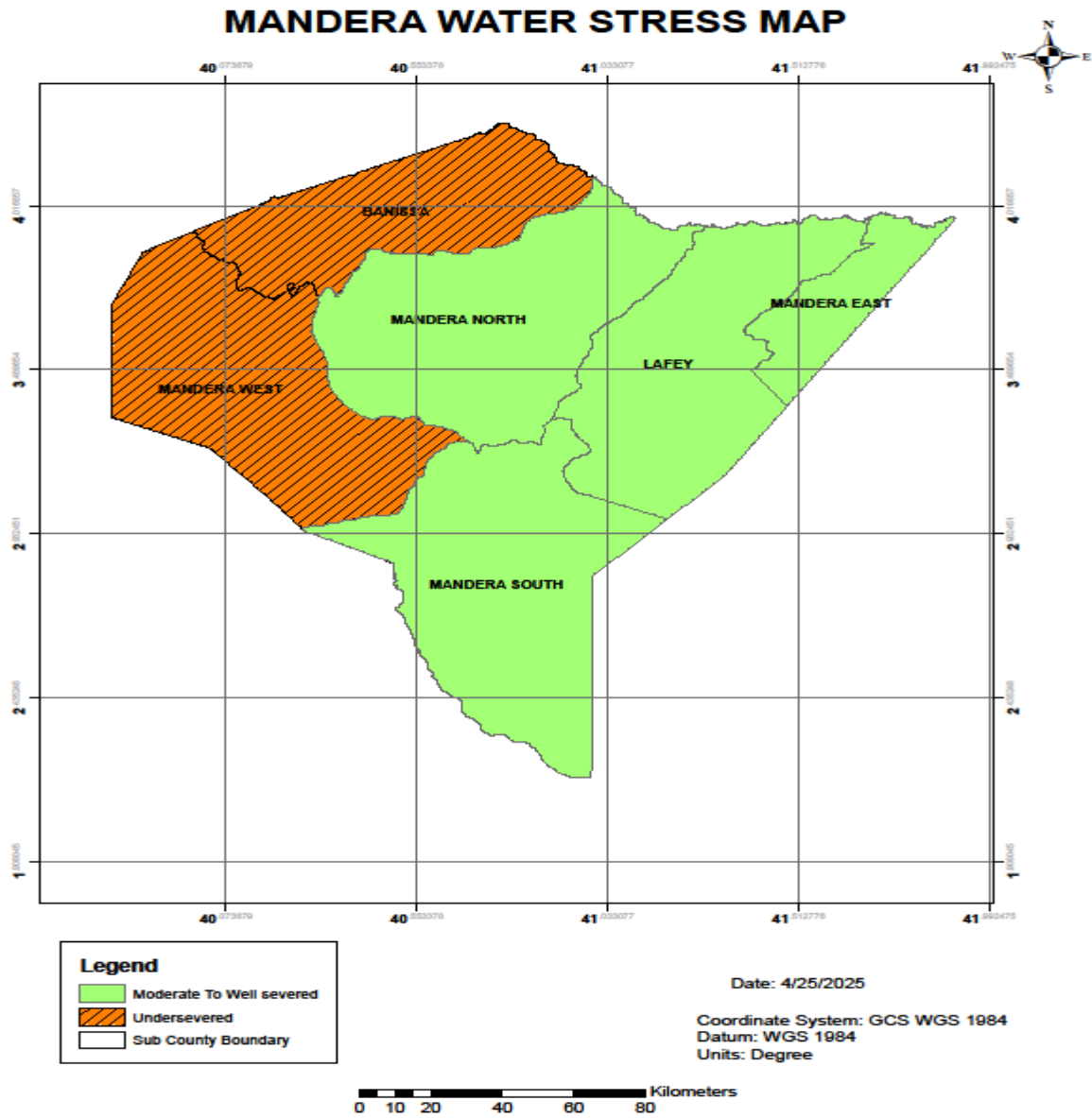


Figure 4: County Water Stress

### ***1.2.4 Risks and opportunities related to water resource availability and climate variability***

Water sustains a wide range of ecosystems, including wetlands, forests, and grasslands, which in turn provide essential ecological services such as water purification, flood regulation, and biodiversity conservation. Implementing sustainable water management practices is vital for safeguarding environmental integrity and ensuring the long-term availability of water resources to support economic development.

#### ***1.2.4.1 Water Source vs. Climate Risk Matrix.***

*Table 5: Water Source vs. Climate Risk Matrix.*

<b>Water Source</b>	<b>Climate Risk</b>	<b>Vulnerability</b>	<b>Severity</b>	<b>Frequency</b>
<b>Shallow Wells</b>	Prolonged Droughts	<b>High:</b> Shallow depth, limited recharge capacity, dependence on local rainfall, poor well construction.	<b>High:</b> Well drying up, water scarcity for domestic use, increased water prices, potential for waterborne diseases.	Increasing: Due to more frequent droughts
	Increased Evaporation	<b>High:</b> Open wells susceptible to evaporation, lack of shading.	<b>Moderate:</b> Reduced water availability, increased reliance on other sources.	Increasing: Due to rising temperatures

<b>Boreholes</b>	Reduced Groundwater Recharge	<b>Moderate:</b> Dependent on rainfall infiltration, potential for over-extraction affecting groundwater levels.	<b>Moderate:</b> Reduced borehole yields, increased pumping costs, potential for borehole failure.	Increasing: Due to reduced rainfall
	Increased Salinity	<b>Moderate:</b> Over-extraction leading to saline intrusion, especially in coastal areas.	<b>Moderate:</b> Reduced water quality, unsuitability for drinking and irrigation, potential health issues.	Possible: Dependent on location and use
<b>Earth Pans</b>	Erratic Rainfall	<b>High:</b> Dependence on seasonal rainfall, high evaporation rates, siltation.	<b>High:</b> Earth pan drying up, water scarcity for livestock, crop failure, increased competition for water resources.	Increasing: Due to rainfall variability
	Flash Floods	<b>Moderate:</b> Risk of dam breaches and siltation, contamination of water sources.	<b>Moderate:</b> Damage to infrastructure, contamination of water supply, loss of livestock.	Possible: Dependent on rainfall intensity

<b>River Daa</b>	Reduced River Flow	<b>Moderate:</b> Upstream water abstraction, climate change-induced runoff reduction.	<b>High:</b> Reduced irrigation potential, water scarcity for domestic use, potential for conflicts over water resources.	Increasing: Due to upstream pressures
	Increased Sedimentation	<b>Moderate:</b> Deforestation and soil erosion in the catchment area, leading to increased sediment load.	<b>Moderate:</b> Reduced water storage capacity, increased water treatment costs, reduced water quality.	Possible: Dependent on land management
<b>Rainwater Harvesting</b>	Unreliable Rainfall	<b>High:</b> Dependence on rainfall patterns, limited storage capacity, infrastructure limitations.	<b>High:</b> Low water yields, limited impact on overall water security, dependence on other sources.	Increasing: Due to rainfall variability

#### ***1.2.4.2 Assessment of gender-specific climate induced vulnerability***

While men often bear the responsibility for managing livestock and securing income, women play a crucial role in household food security, water collection, childcare, and managing household resources. Climate change disrupts these traditional roles and amplifies the burdens on women.

**Livelihoods and Income:** Men are often involved in livestock management and trading, droughts have led to significant livestock losses, affecting their income and status. Women,

who are often responsible for small-scale agriculture face crop failures and reduced market opportunities due to climate-related disruptions such as floods and droughts.

**Food Security:** Women play a central role in household food security, responsible for procuring, preparing, and distributing food. Climate change-induced droughts and floods lead to food shortages and increased food prices. This disproportionately affects women, who often prioritize feeding their children and other family members before themselves, leading to higher rates of malnutrition among women and girls.

**Water Scarcity:** Access to water is a major challenge and climate change exacerbates water scarcity. Women and girls are primarily responsible for water collection, often walking long distances to fetch water, exposing them to risks of gender-based violence and hindering their access to education and other opportunities. Increased water scarcity can also lead to conflict between communities over water resources.

**Health:** Climate change affects human health through various pathways, including increased incidence of waterborne diseases, malnutrition, and heat stress. Women are particularly vulnerable to these health impacts, especially pregnant women and children. The displacement of communities due to climate-related disasters can also disrupt access to healthcare services.

**Gender-Based Violence:** Resource scarcity and displacement can lead to conflict and social unrest, increasing the vulnerability of women and girls to sexual violence, domestic violence, and other forms of abuse (UN Women, 2016).

#### ***1.2.4.3 Risks and opportunities related to climate vulnerability and water security***

Mandera County faces significant risks related to climate variability and water security, which pose serious threats to its economic sustainability. The county's erratic and unpredictable rainfall, long rains from March to May and short rains from October to December often leads to recurrent droughts and occasional floods. This disrupts both agriculture and livestock production which are the backbone of the local economy. High temperatures, low humidity, and over-reliance on limited sources such as the Daa River, shallow wells, earth pans and boreholes worsen water scarcity. Over-extraction of groundwater, coupled with inadequate recharge and rising salinity further depletes water resources.

Inadequate water infrastructure and poor harvesting systems limit water availability and contribute to inter-communal conflicts over scarce resources hence undermining livelihoods, social cohesion, and economic stability.

Despite these challenges, there are considerable opportunities to enhance water security and promote resilience. Investments in rainwater harvesting, sustainable groundwater management and efficient irrigation systems can improve water availability for domestic use, agriculture, and livestock. Diversifying agricultural practices through drought-resistant crops, climate-resilient livestock, and alternative livelihoods such as poultry and beekeeping can strengthen food security and incomes. Infrastructure development, which includes water systems, roads, and renewable energy can unlock economic potential while community-based adaptation efforts like training, early warning systems, and disaster preparedness build local capacity. Proper implementation of existing county policies and acts will ensure long-term sustainability.

#### ***1.2.4.4 Climate-Related Risks and their Ranking***

The table below identifies and ranks the key climate-related risks based on their likelihood and potential economic impact.

*Table 6: Climate-related risks and their ranking*

<b>Risk</b>	<b>Likelihood</b>	<b>Potential Economic Impact</b>	<b>Overall Risk Ranking</b>	<b>Description</b>
<b>Drought</b>	High	High	Very High	Prolonged periods of below-average rainfall leading to water scarcity, livestock deaths, crop failures, and food insecurity. Causes displacement, increased poverty, and resource conflicts.

<b>Floods</b>	Medium	High	High	Intense rainfall events causing flash floods, damage to infrastructure, loss of livestock, destruction of crops, and displacement of communities. Can also lead to outbreaks of waterborne diseases.
<b>Extreme Temperatures</b>	High	Medium	Medium	Prolonged periods of high temperatures leading to increased evaporation, water stress, livestock heat stress, and increased incidence of diseases. Impacts productivity and livelihoods.

To enhance climate resilience and promote sustainable development, Mandera County must implement sector-specific adaptation and mitigation measures that address vulnerabilities in agriculture, livestock, energy, and urban water supply. In agriculture, promoting drought-resistant crops such as sorghum, millet, and cassava, alongside drought-tolerant livestock breeds, can help buffer against erratic rainfall and water scarcity. Complementary measures like water harvesting through sand dams and rooftop catchment systems. Modern irrigation techniques such as drip systems and solar-powered pumps will improve water availability and energy efficiency. In the livestock sector, improved rangeland management practices, including rotational grazing and reseeded will enhance pasture productivity. Livestock off-take strategies, such as insurance schemes and strategic de-stocking, can protect pastoralists during droughts while the construction of water troughs and boreholes in key locations will ensure animals have access to water during dry periods.

Urban resilience can be strengthened by implementing rooftop rainwater harvesting systems and underground tanks to supplement water supply. Developing decentralized wastewater treatment systems for non-potable reuse, such as irrigation and flushing, will help reduce demand on freshwater

sources. Additionally, reducing leakages and installing water metering systems will improve efficiency and ensure sustainable urban water management. These integrated interventions will not only mitigate the impacts of climate change but also support long-term economic stability and improved livelihoods across the county.

# DROUGHT SEVERITY MAP

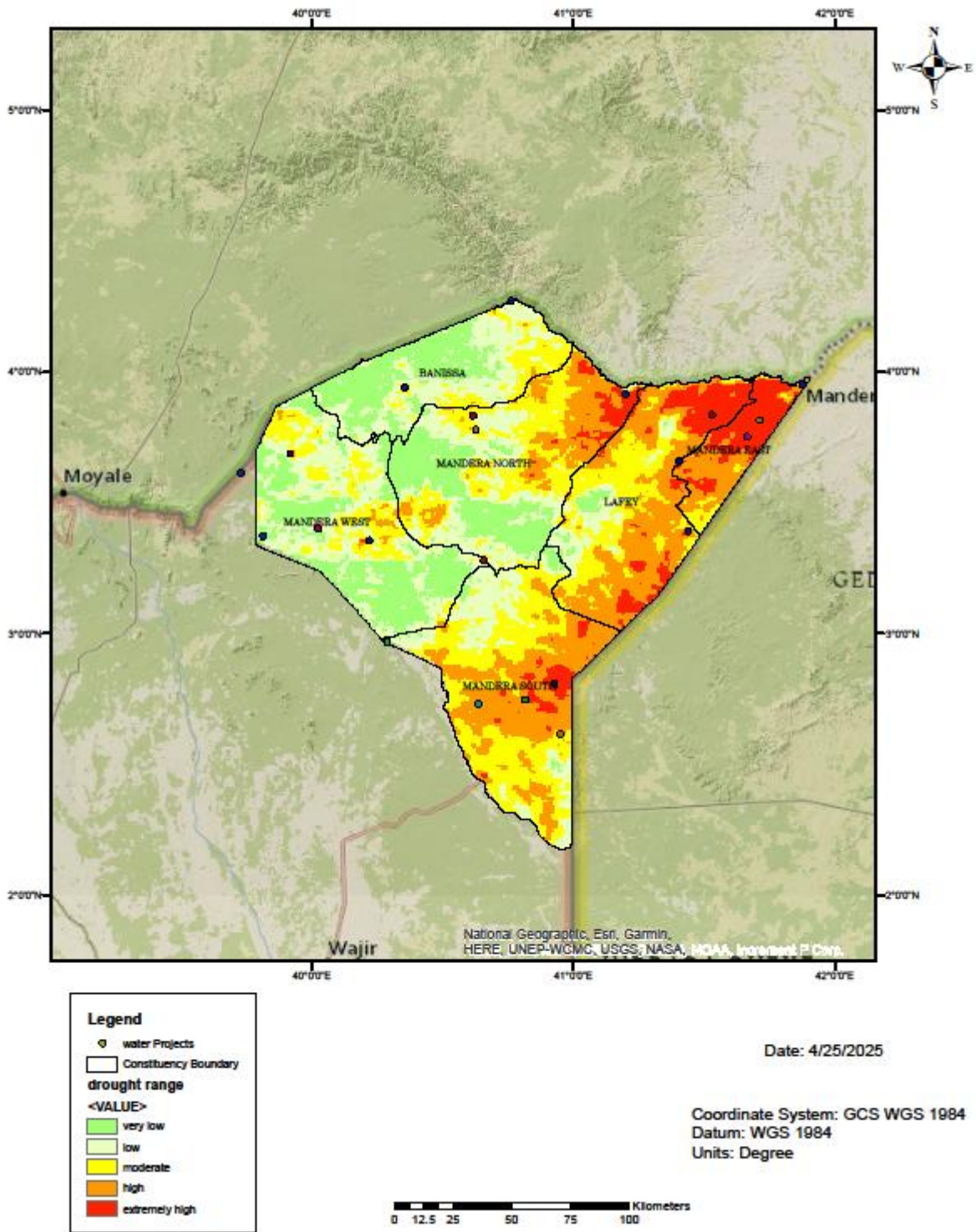
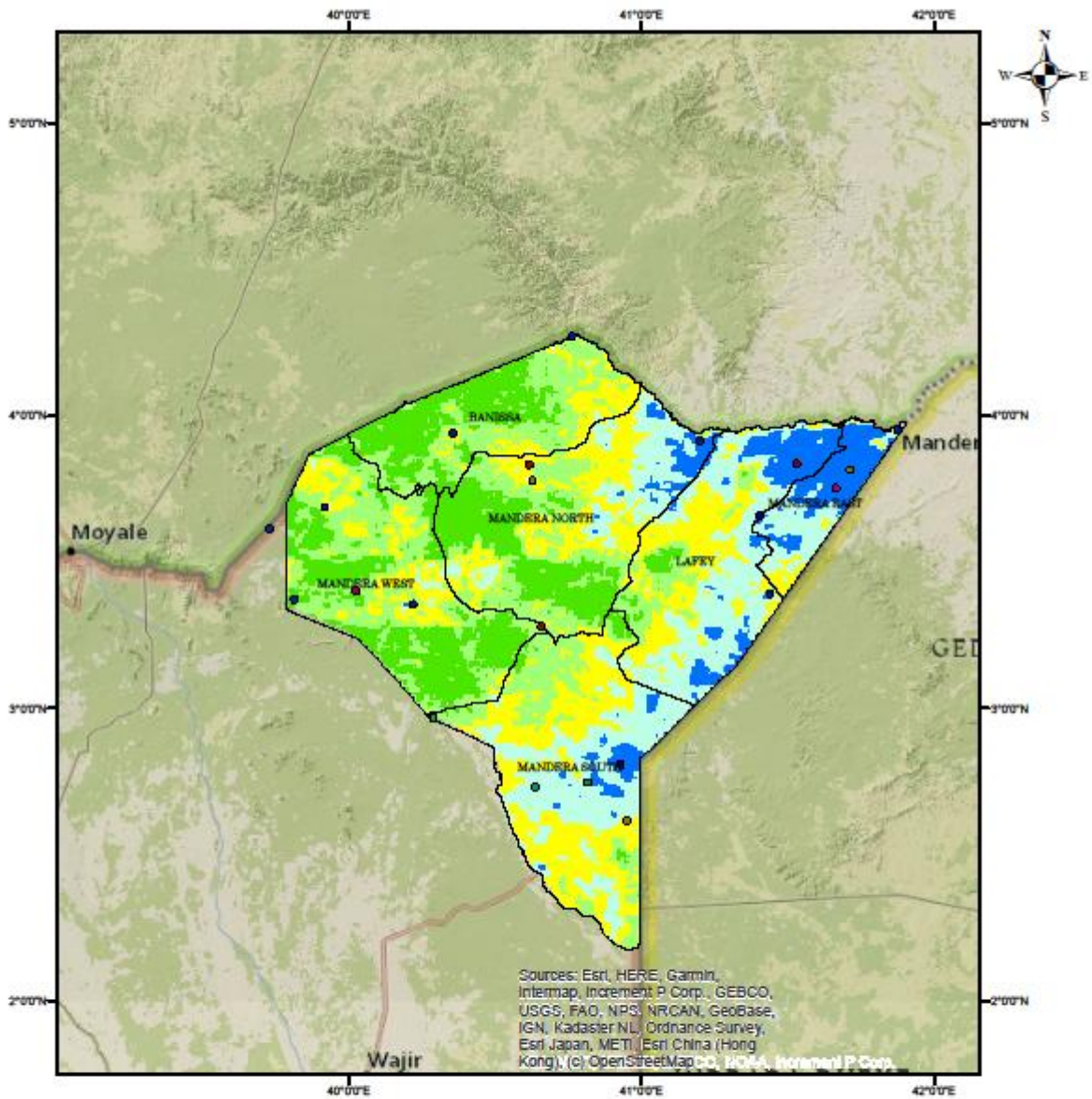


Figure 5 Drought severity map

# FLOOD RISK MAP



**Legend**

- water Projects
- Constituency Boundary
- Flood Risk**
- <VALUE>**
- very low
- low
- moderate
- high
- extremely high

Date: 4/25/2025

Coordinate System: GCS WGS 1984  
Datum: WGS 1984  
Units: Degree



Figure 6: Flood severity map

#### ***1.2.4.5 Adaptation and Mitigation measures***

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## CHAPTER 2: WATER, SANITATION, AND HYGIENE SERVICES

### COVERAGE STATUS

#### 1.1 Water Resources Available for the County

##### *2.1.1 Overview of available water sources (surface water, groundwater, rainfall)*

Mandera County is an entirely arid and semi-arid region. Over 60% of the population living in the county are nomadic pastoralists who entirely depend on livestock rearing as a means of livelihood. Due to rapid land degradation compounded with the glaring effects of global warming, the county suffers prolonged drought emergencies every 3 years which usually have adverse effects such as loss of lives and livelihoods on local rural communities in the county.

The water availability per capita in the county presently is estimated to be 93m<sup>3</sup> per person per year. This is against the figure of 570m<sup>3</sup> per person per year which is the minimum international threshold required to support the socio-economic needs of a populace including industrialization, irrigation, domestic, livestock, municipal and cultural water supply needs.

The water sector faces challenges such as : Limited Occurrence of Ground Water in terms of quantity, quality and spatial distribution, Unreliable rainfall that is often inadequate and sporadic occurrences of flush floods causing extensive damage to water sources and water services provision infrastructure., Inadequate financial resources to meet water provision needs and demands in the county, Recurrent and often prolonged droughts and, The major sources of water for domestic, irrigation and livestock use within the County include:

River Daua: This is a seasonal river, the only one in the County which runs from the West to the East for about 160 kms along the Kenya – Ethiopia border. It usually has surface flow for about 7-8 months annually. During the remaining 5 - 4 months every year, the surface flow dries up but subsurface flow goes on ensuring permanent water availability under its sand bed. It often overflows heavily, flooding the whole of the lower Daua river basin during good to heavy rainfall. The river is the most significant water resource in the county. In addition to providing water for domestic and irrigation use, there are many access routes (“Malkas”) through which livestock access the river. Daua River is the main source of groundwater recharge within the river basin and the adjacent areas. About 25% of the population of Mandera County relies directly or indirectly

on Dawa River (Rapid Trans-Boundary Assessment of the Dawa River Basin, Draft IGADD – IWRM Kenya Report, 2015).

#### *2.1.1.1 Inventory of water resources and their capacity.*

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### Water Availability Assessment

#### **Topographic characterization**

Drainage plays a crucial role in hydrological analysis. To support this assessment, the team acquired a 15-meter spatial resolution Digital Elevation Model (DEM) from the Alaska database at <https://search.asf.alaska.edu/>. The DEM was re-projected from the global WGS 1984 coordinate system to WGS 84 / UTM Zone 37N (EPSG: 21097). The reprojected DEM was then processed using the open-source QGIS 3.28 version. Following fundamental principles of catchment delineation and terrain modeling, key hydrological characteristics were extracted, including the watershed boundary and stream network. The analysis confirmed that the river generally flows from different recharge areas towards river Dawa and others to Mandera South. The topography, stream network and watershed boundary contributing to the proposed bridge locations are illustrated in Figure below.

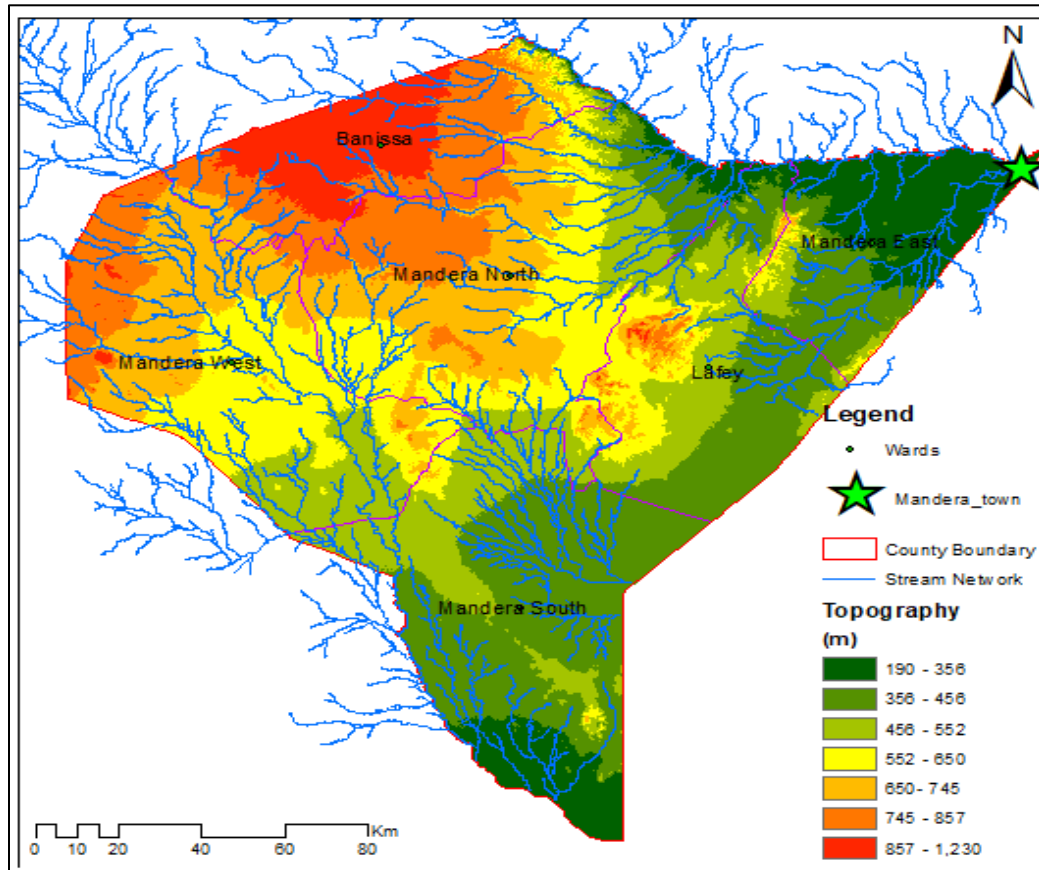


Figure 7. topographic distribution of Mandera County

Water availability was accomplished using the Australian Water Balance Model (AWBM). The streamflow was simulated at daily time steps, using chirps as the rainfall input and grass referenced evapotranspiration as evaporation input. The simulated flows and Flow duration curves for each subbasin is presented in sections below;

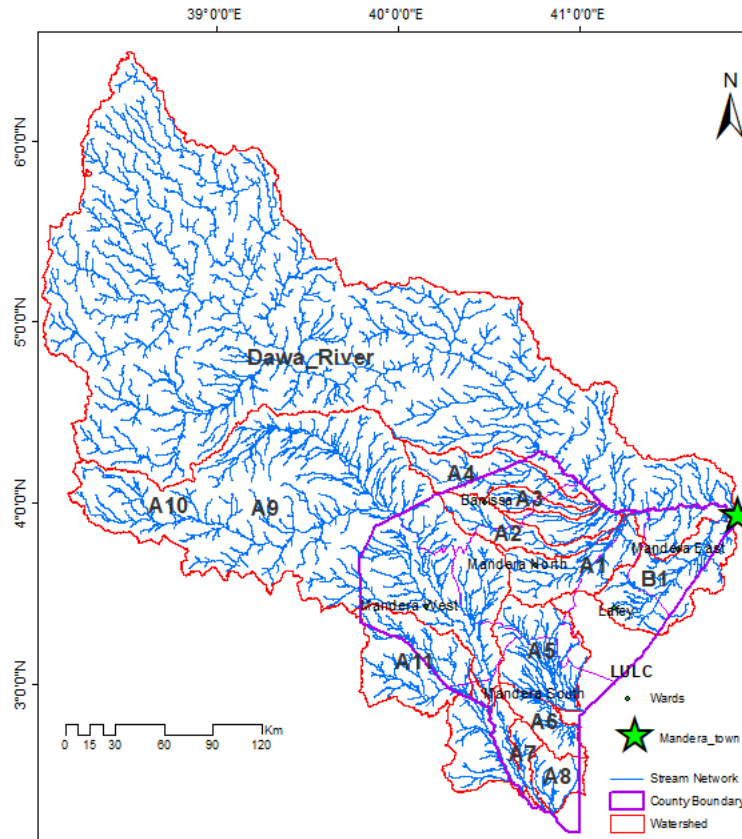


Figure 0-8: Watershed Boundary

Name	x	y	Area (m <sup>2</sup> )	Area (km <sup>2</sup> )	Areas
Dawa River	39.642	4.797	55277831643.000	55277.832	Mandera East / North
B1	41.482	3.572	3210802420.190	3210.802	Fino, Arabia & Bulla Mpya
A1	40.947	3.645	2264159291.800	2264.159	Marothile
A2	40.605	3.862	1454036595.990	1454.037	Guba & Marothie
A3	40.722	4.001	631393079.249	631.393	Rhamu Dimtu
A4	40.485	4.156	2082970764.530	2082.971	Malkamari
A5	40.771	3.176	2808062574.320	2808.063	Ashabito & Wargadud
A6	40.797	2.787	989678614.474	989.679	Elwak South
A7	40.692	2.611	505334628.639	505.335	Wargadud, Kotulo
A8	40.861	2.486	919699935.881	919.700	Khoror

A9	39.702	3.688	26669075351.300	26669.075	Gurar, Lagh Sure, Takaba, Gither, Derkhale, Kiliwaheri
A10	39.562	3.887	21036326469.700	21036.326	Gurar, Lagh Sure, Takaba, Gither, Derkhale, Kiliwaheri
A11	40.068	3.122	3368598025.450	3368.598	Takaba

## 1.2 Water Availability Assessment for Subbasin A1

The streamflow was simulated using the Australian Water Balance Model (AWBM). Chirps' rainfall was used as inputs alongside Grass referenced evapotranspiration. Results are as shown below in Figure 4-1.

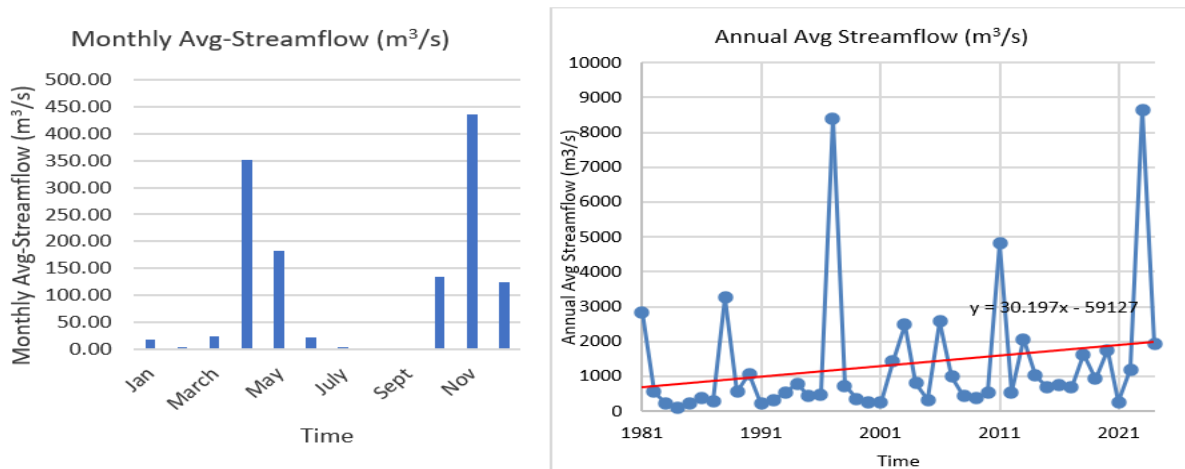


Figure 0-9: Streamflow for subbasin A1

Total monthly streamflow is about 350m<sup>3</sup>/s for the month of April and over 420 m<sup>3</sup>/s in November. The annual total however is slightly over 8900 in November. This indicates a high potential watershed for rainwater harvesting. The flow duration curve is presented below in Figure 4-2.

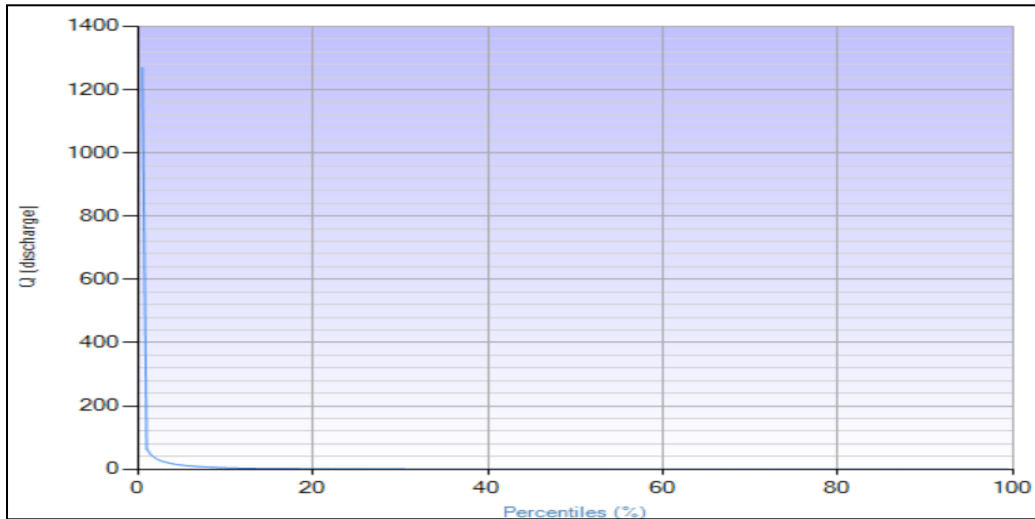


Figure 0-10: Flow Duration Curves for subbasin A1

The FDC shows a flattened curve with low flows having higher exceedances. Specific values are presented in Table 4-1.

### 1.3 Water Availability Assessment for Subbasin A2

Streamflow simulation was carried out using the Australian Water Balance Model (AWBM), incorporating CHIRPS rainfall data and grass-reference evapotranspiration. The corresponding results are presented in Figure 4-3.

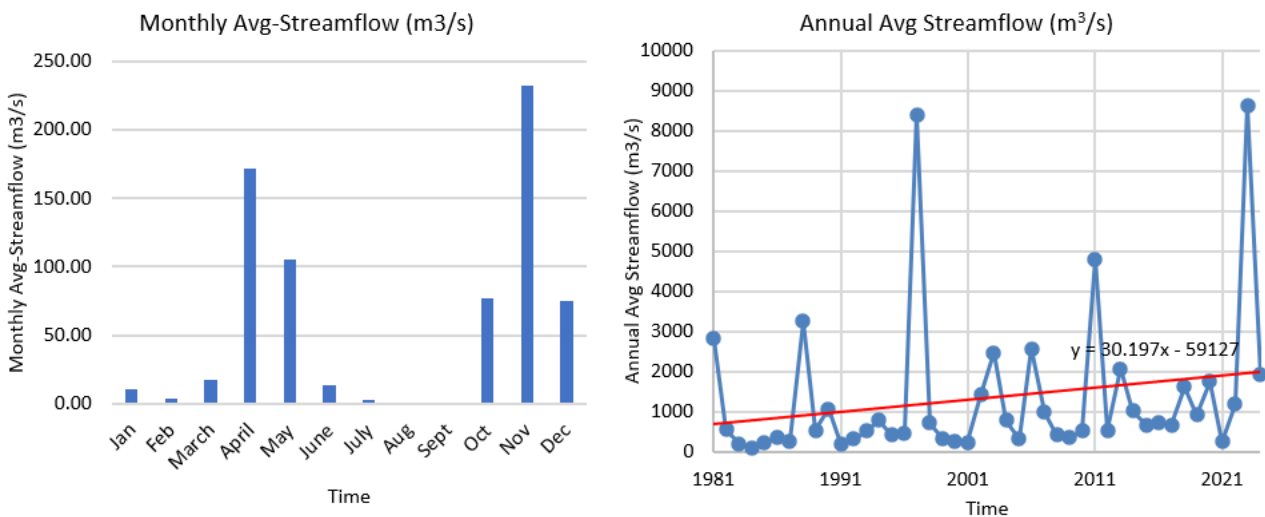


Figure 0-11: Streamflow for subbasin A2

Subbasin A2 has lower values of about 235 m<sup>3</sup>/s in November though it provides a potential for water storage during the wettest months. Annual streamflow projects upto 8900 m<sup>3</sup>/s indicating it is highly productive.

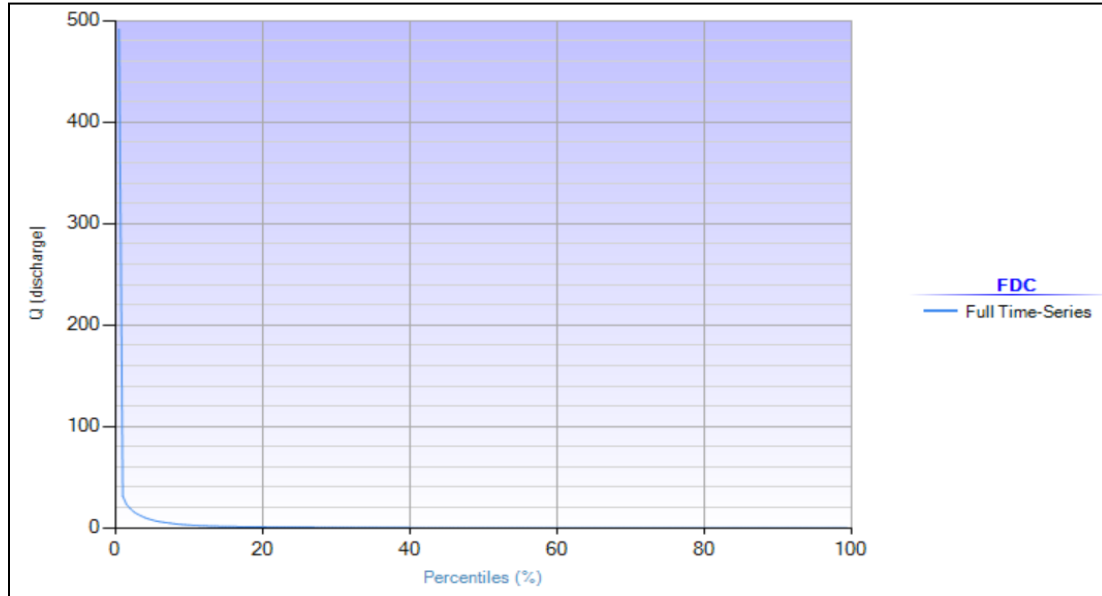


Figure 0-6: Flow duration curve for subbasin A2

The FDC values are presented in Table 4-1.

### 1.5 Water Availability Assessment for Subbasin A3

Using the AWBM model, streamflow was estimated with CHIRPS precipitation and grass-based evapotranspiration data serving as inputs. Figure 4-5 illustrates the findings.

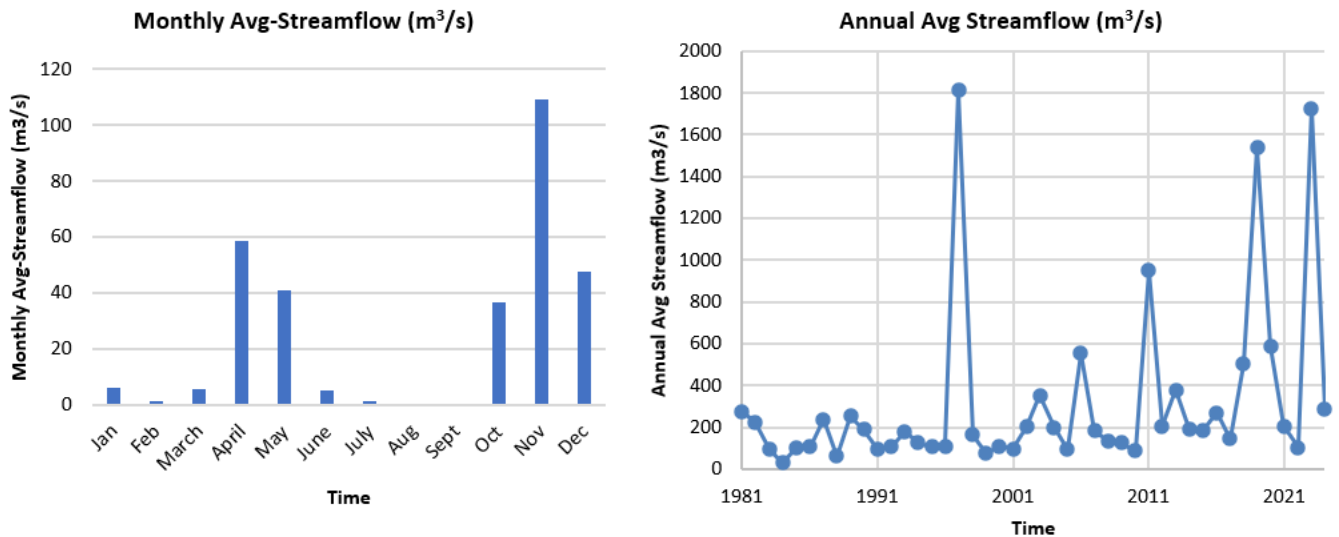


Figure 0-13: Streamflow for subbasin A3

Subbasin 3 depicts low streamflow of about 110 m³/s being the highest. The subbasin commands an ephemeral subbasin which has low productivity. However, the outlet can be utilized for rainwater harvesting. The annual streamflow highly fluctuates and thus, the county government can do an informed timing to harvest the flows during the wettest months.

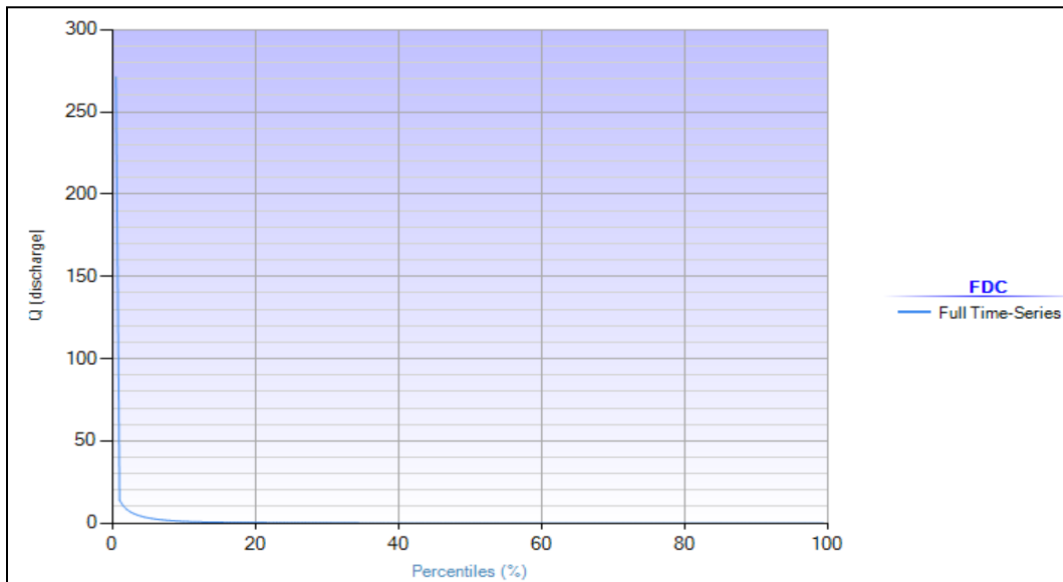


Figure 0-14: Flow duration curves for subbasin A4

As shown in Figure 4-6, the flow is low but with strategic utilization, the flows can be harvested for domestic water use and for livestock.

### 1.6 Water Availability Assessment for Subbasin A4

Figure 4-1 displays the streamflow output generated by applying the Australian Water Balance Model with CHIRPS rainfall and grass-referenced ET as input variables.

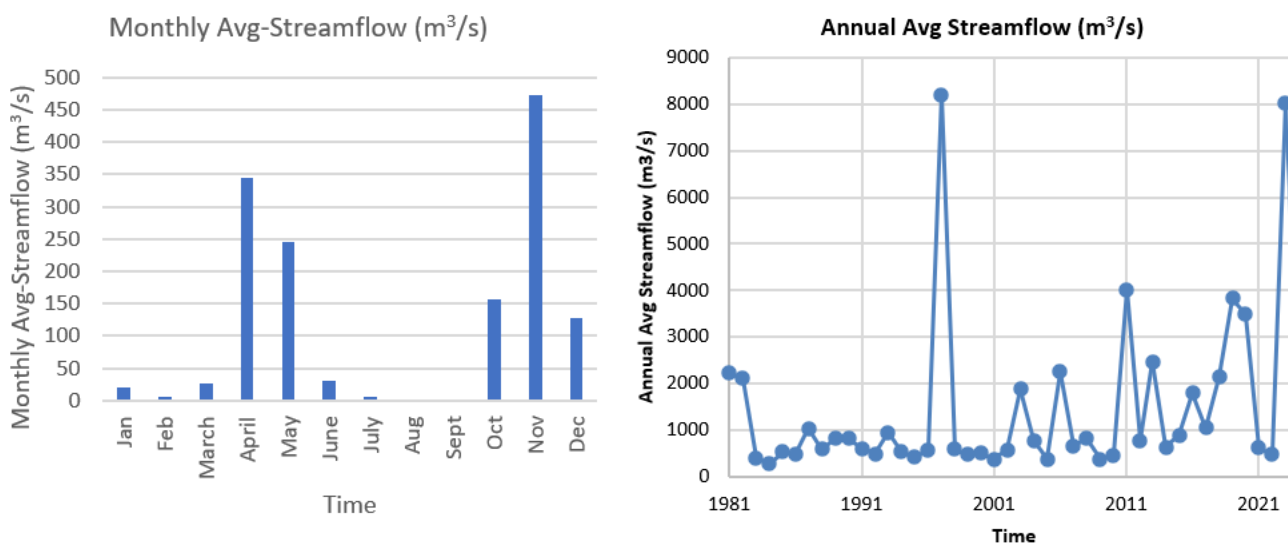
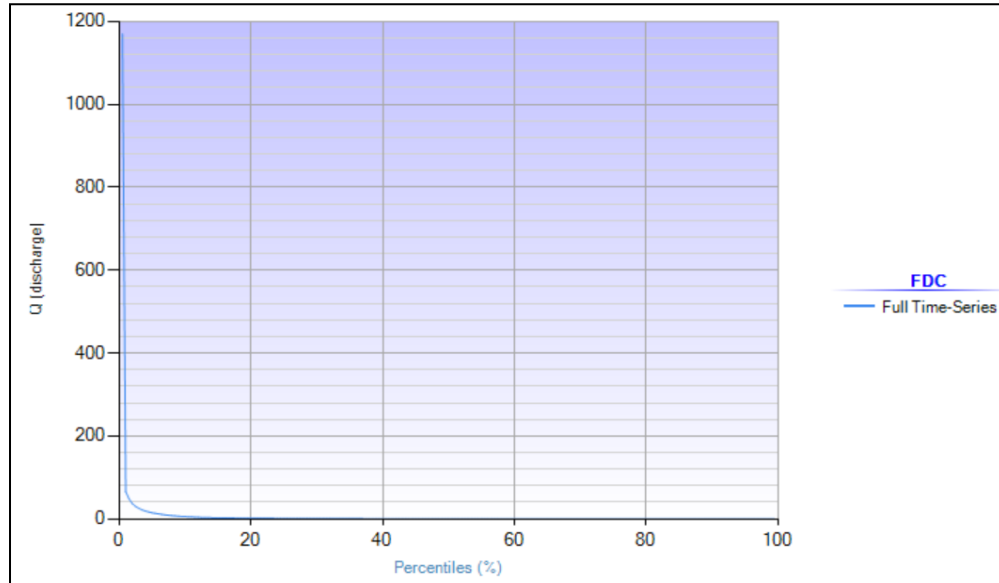


Figure 0-15: Streamflow for subbasin A4

The subbasin has a moderate potential for rainwater harvesting as it generates significant flows with monthly totaling to about 470 m<sup>3</sup>/s in November and 350 m<sup>3</sup>/s in April. The peaks have increased in terms of annual flows and hence, it is key to identify key locations for water pan construction.



*Figure 0-16: Flow duration curves for subbasin A4*

FDC values for Figure 4-8 are presented in Table 4-1.

### 1.7 Water Availability Assessment for Subbasin A5

To simulate streamflow, the Australian Water Balance Model was employed, utilizing CHIRPS rainfall and grass-reference evapotranspiration. The resulting data is shown in Figure 4-9.

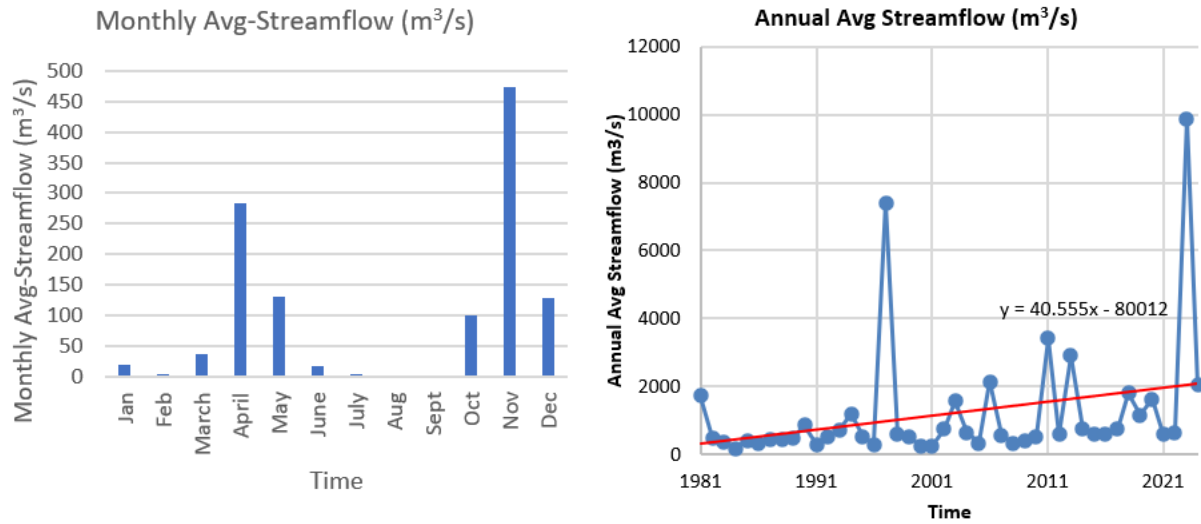


Figure 0-17: Streamflow for subbasin 5

450 m<sup>3</sup>/s of flow is observed as available during the months of November as this was computed from the daily long-term simulated flows. If this is utilized, it can serve the communities sustainably. However, this has shown an increase over time in terms of annual flows and it is a potential for the county to consider this.

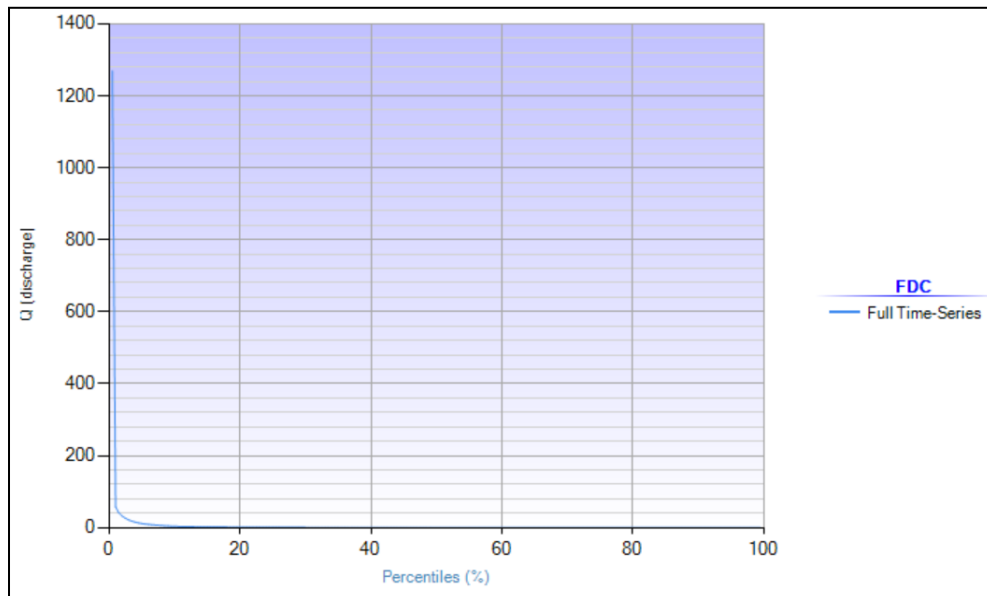


Figure 0-18: Flow duration curves for subbasin 5

FDC values for Figure 4-10 are presented in Table 4-1.

### 1.8 Water Availability Assessment for Subbasin A6

CHIRPS rainfall and grass reference evapotranspiration were used as inputs into AWBM to simulate streamflow, with the outcomes summarized in Figure 4-11

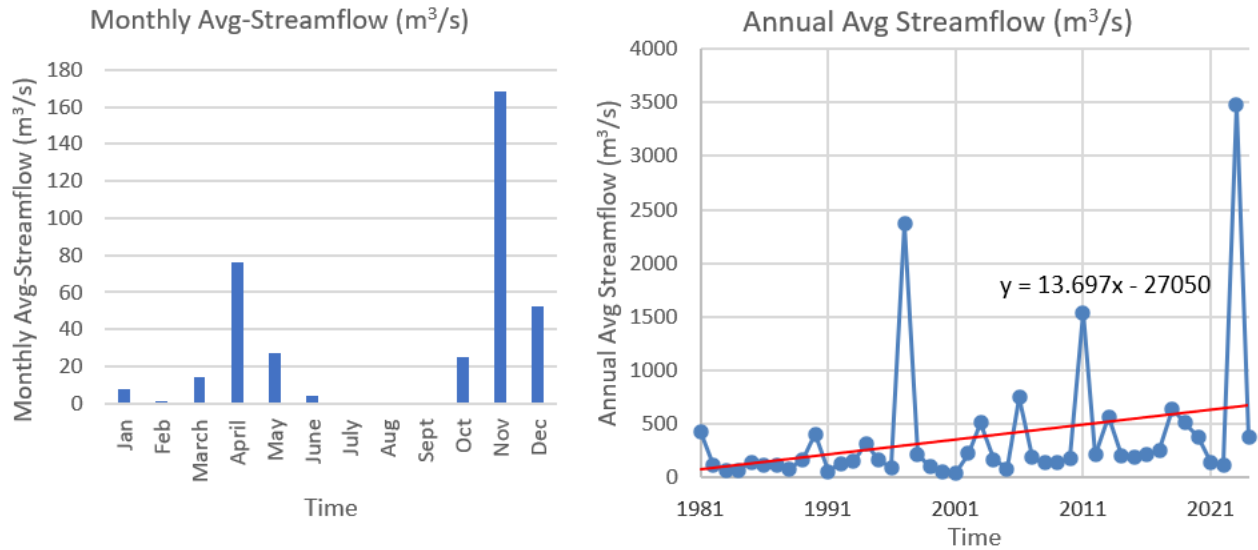


Figure 0-19: Streamflow for subbasin 6

Subbasin 6 is a low flow basin whose water availability potential is low. However, alternatives can be explored to identify some areas where moderate or low volume water pans can be installed.

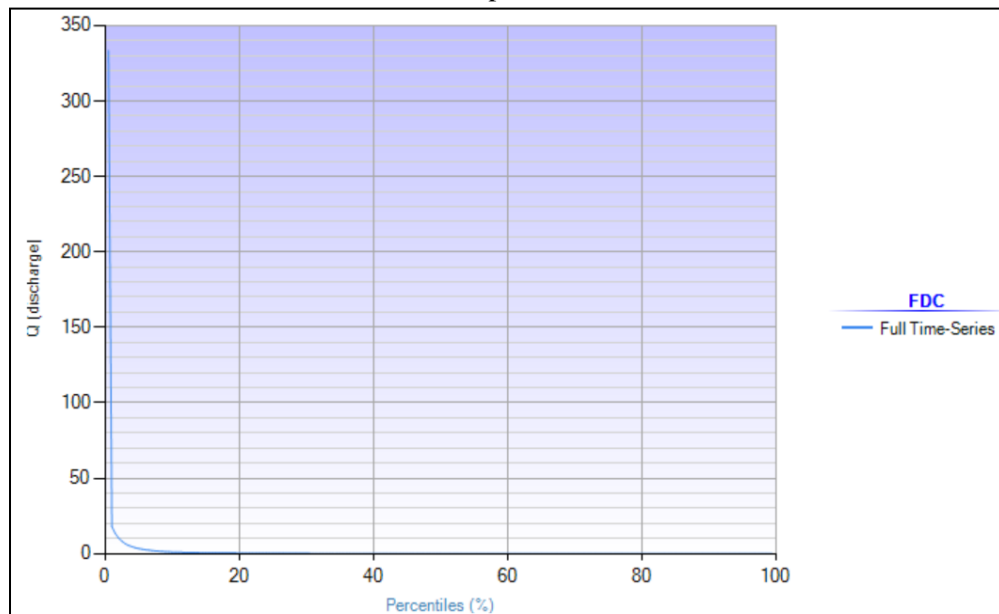


Figure 0-20: Flow duration curves for subbasin A6

FDC values for Figure 4-12 are presented in Table 4-1.

### 1.9 Water Availability Assessment for Subbasin A7

The Australian Water Balance Model (AWBM) used CHIRPS precipitation and grass ET to simulate streamflow. Figure 4-1 presents the model results.

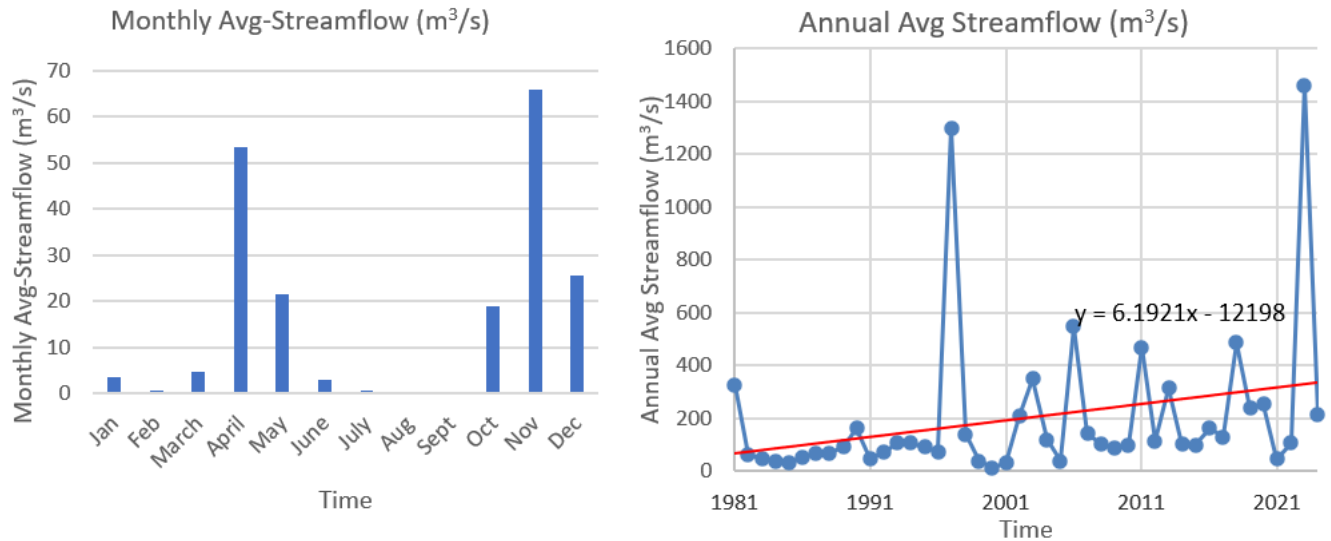


Figure 0-21: Streamflow for subbasin A7

Subbasin 7 resembles flow regime exhibited by subbasin 6 and hence it is a low flow subbasin. Options for low volume water pans of about 60 m³/s on monthly basis can be explored to capture the storms during the wet months.

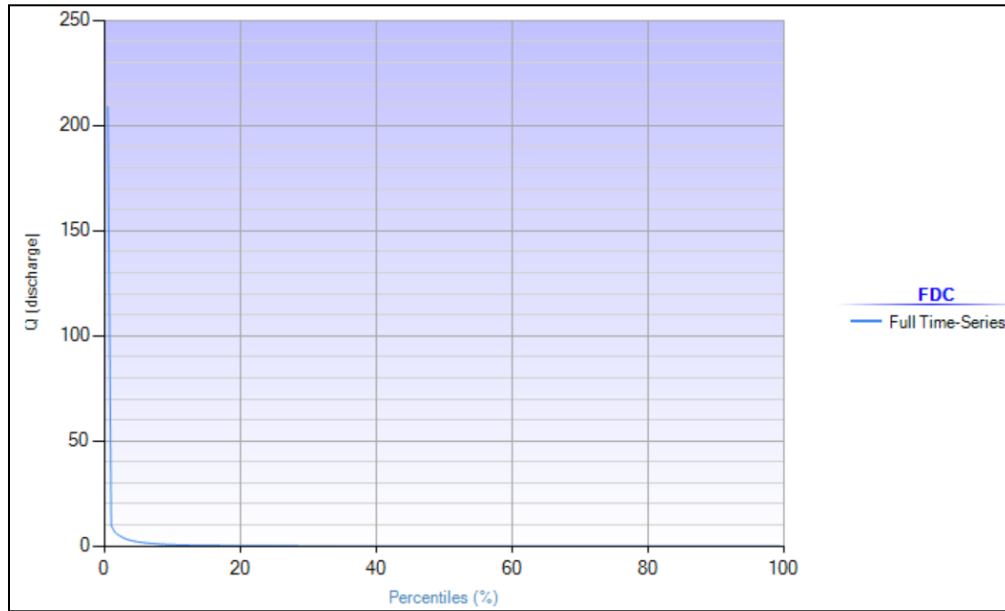


Figure 0-22: Flow duration curves for subbasin A7

FDC values for Figure 4-14 are presented in Table 4-1.

### 1.10 Water Availability Assessment for Subbasin A8

Streamflow was modeled through AWBM, relying on CHIRPS rainfall and grass-referenced evapotranspiration data. The results are detailed in Figure 4-15.

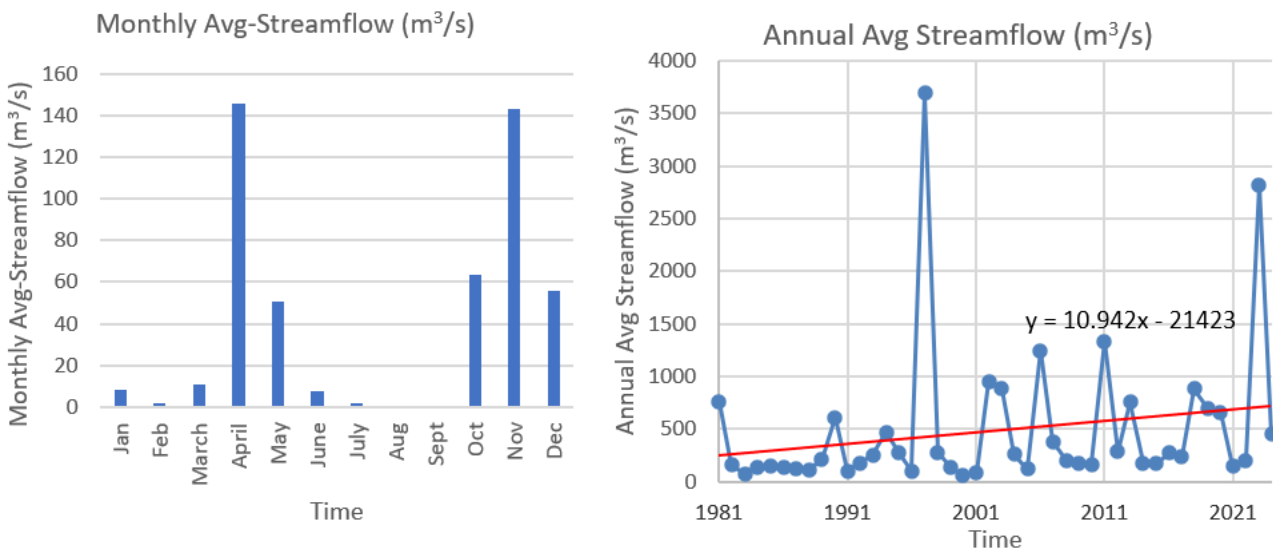


Figure 0-23: Streamflow for subbasin A8

Subbasin A8 shows an annual potential of 500 m<sup>3</sup>/s in average and about 140 m<sup>3</sup>/s during the months of April. Small water pans and check dams

across sections of the stream routing this subbasin can be installed to enhance water harvesting.

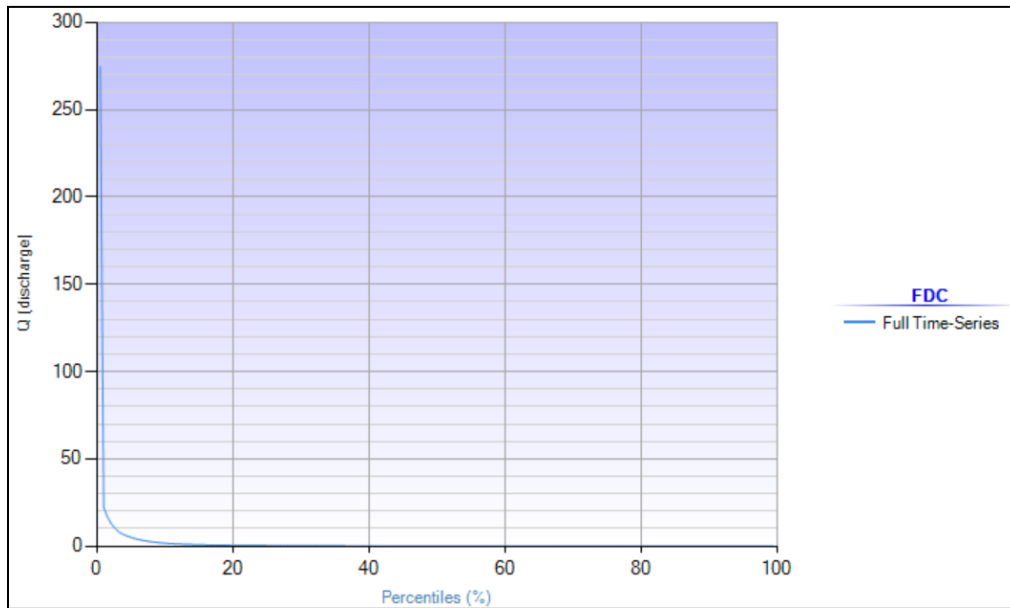


Figure 0-24: Flow duration curves for subbasin A8

FDC values for Figure 4-16 are presented in Table 4-1.

### 1.11 Water Availability Assessment for Subbasin A9

Employing CHIRPS rainfall and grass-based evapotranspiration, streamflow was simulated using AWBM, as illustrated in Figure 4-17.

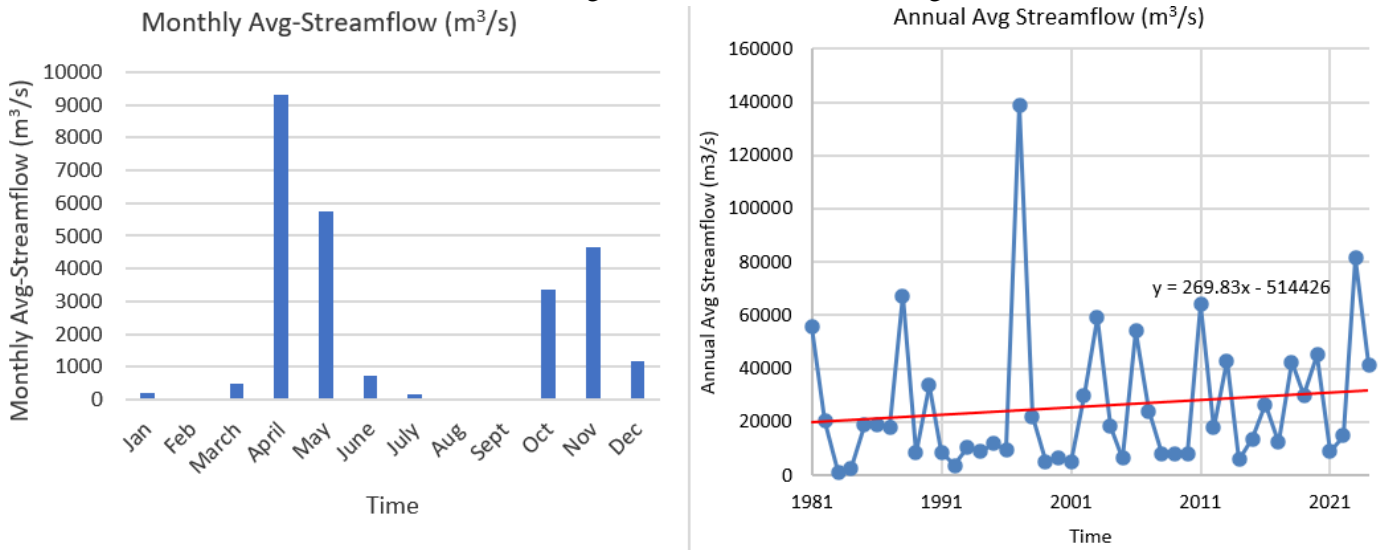


Figure 0-25: Streamflow for subbasin A9

Subbasin A9 is expansive and has moderate to higher potential of rainwater

harvesting because of its capability to provide 14000 m<sup>3</sup>/s during the months of April and across the MAM season as well as about 8000 m<sup>3</sup>/s across the October to December season.

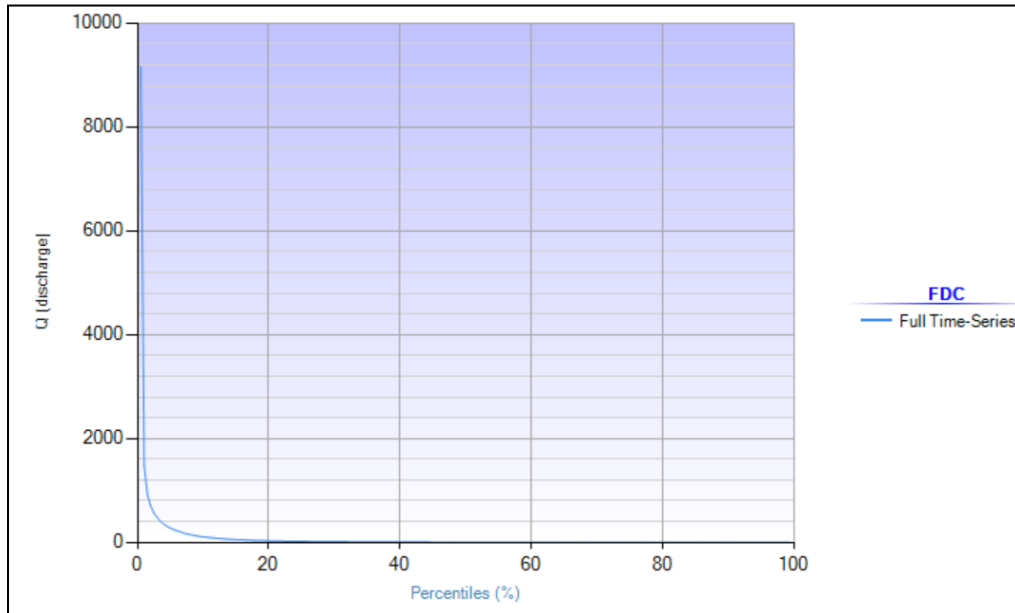


Figure 0-26: Flow duration curves for subbasin A9

FDC values for Figure 4-18 are presented in Table 4-1.

#### 4.10. Water Availability Assessment for Subbasin A10

The simulation of streamflow involved the AWBM model with CHIRPS rainfall and grass-reference ET inputs. The results are provided in Figure 4-19.

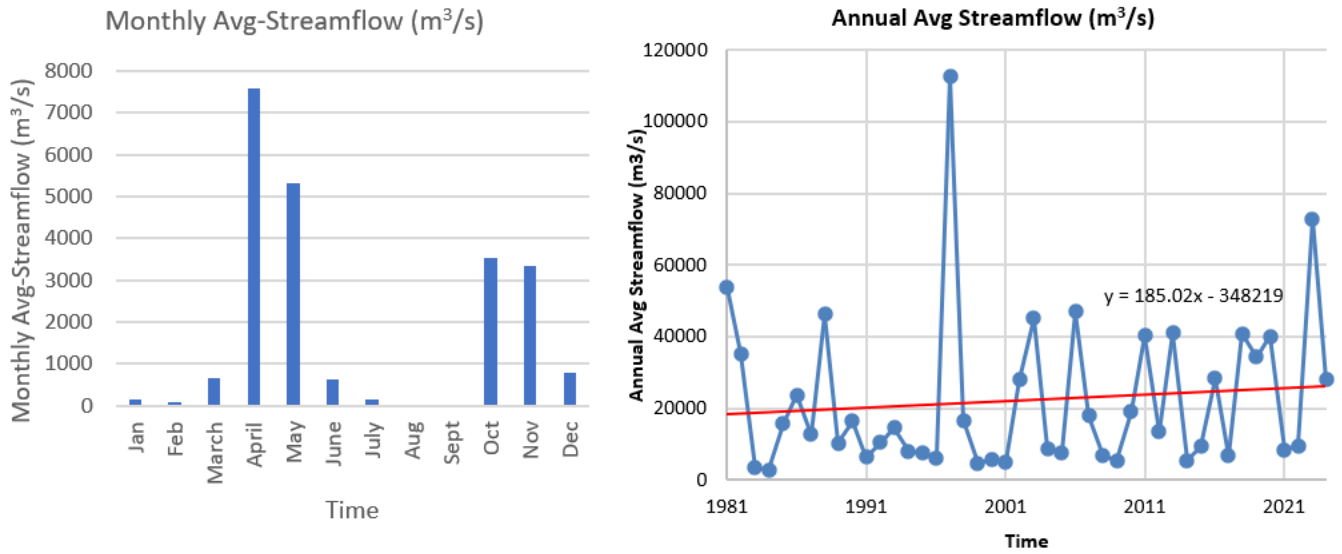


Figure 0-27: Streamflow for subbasin A10

Subbasin A 10 has moderate to higher potential of water provision to communities and livestock of about 13000 m<sup>3</sup>/s during the MAM season and about 7000 m<sup>3</sup>/s during the second low season of OND. Annual trend however shows shocks which need to be evaluated to increase more rainwater harvesting.

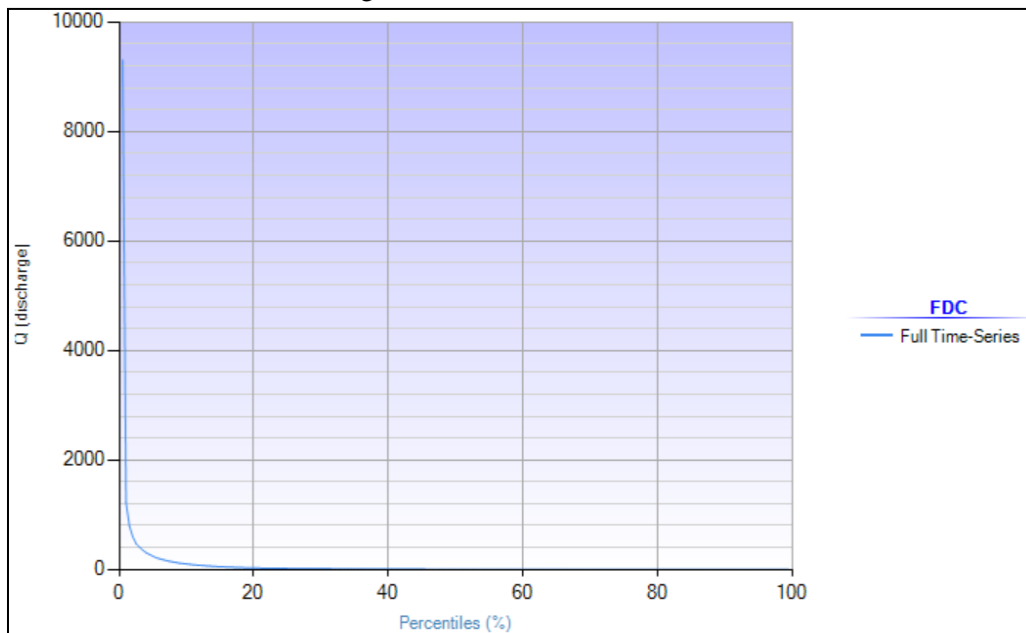


Figure 0-28: Flow duration curves for subbasin A10

FDC values for Figure 4-20 are presented in Table 4-1.

#### 4.11. Water Availability Assessment for Subbasin A11

Using CHIRPS rainfall alongside grass-reference evapotranspiration, the AWBM was run to simulate streamflow. The results can be seen in Figure 4-21.

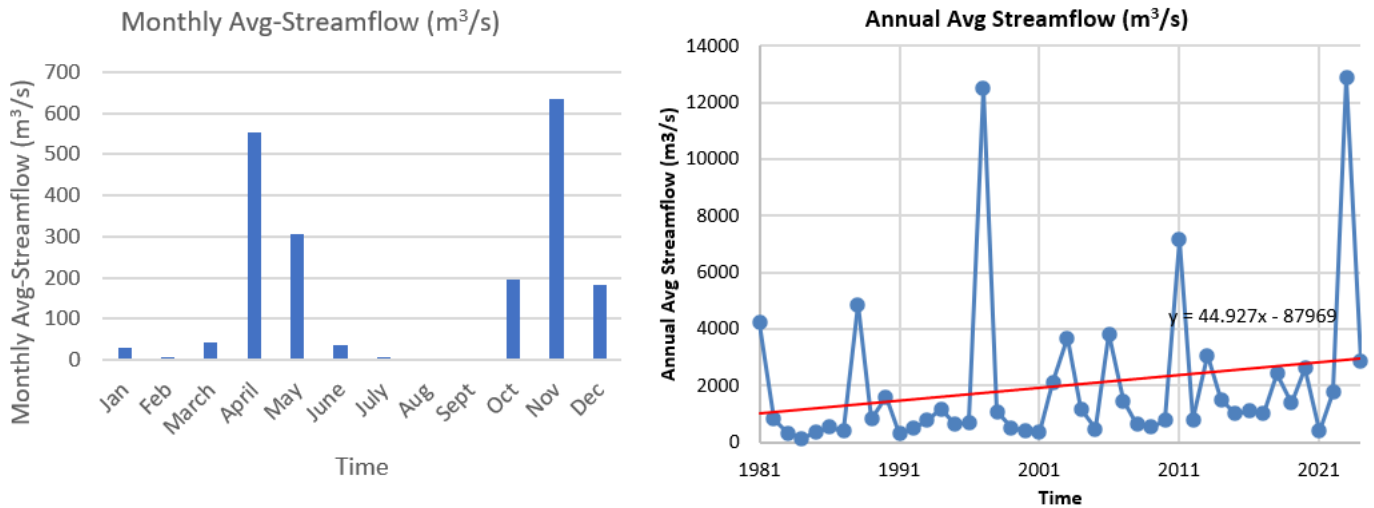


Figure 0-29: Streamflow for subbasin A11

As seen in Figure 4-21, it is empirical that subbasin A11 generates low flows and thus the county government can be utilized some of the flows through low volume water pan harvesting. The challenge is also depicted across the annual flows over time due to unpredictability and climatic changes.

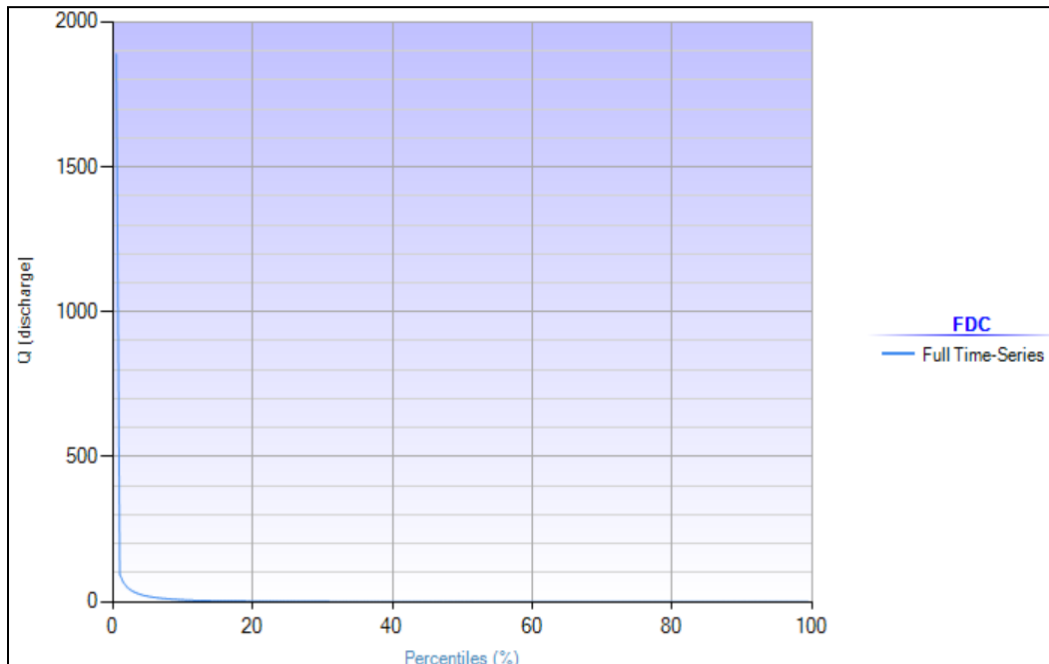


Figure 0-30: Flow duration curves for subbasin A11

FDC values for Figure 4-22 are presented in Table 4-1.

#### 4.12. Water Availability Assessment for Subbasin B1

Streamflow estimation was performed using the AWBM model, with CHIRPS rainfall and grass-reference evapotranspiration as the primary input datasets. The simulation results are depicted in Figure 4-23.

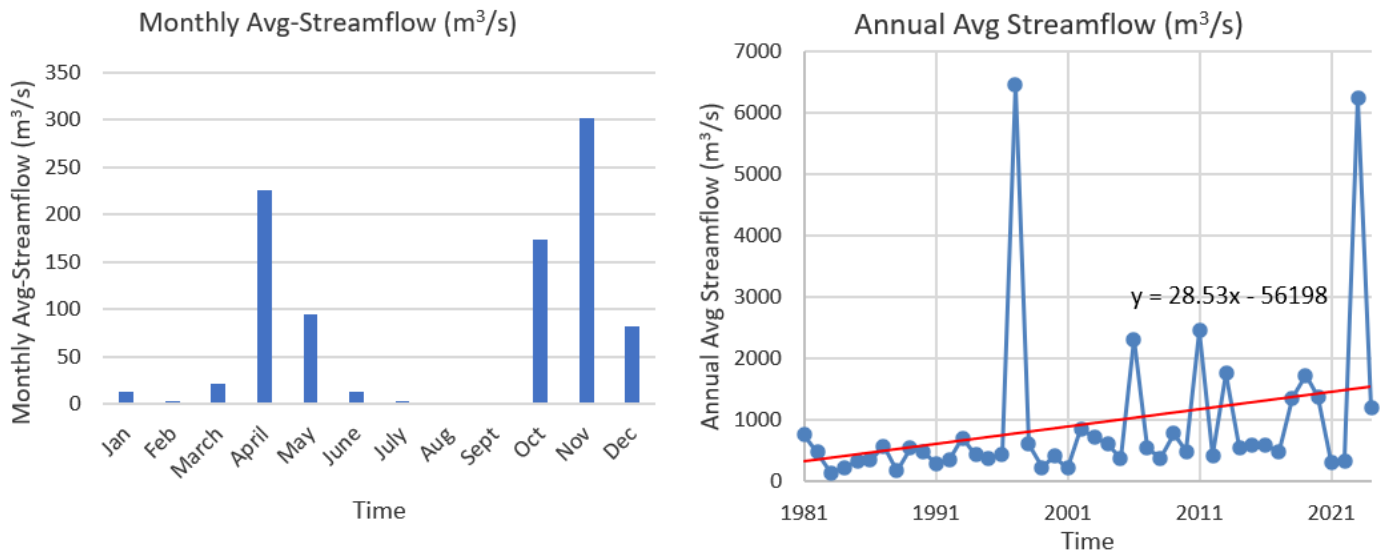


Figure 0-31: Streamflow for subbasin B1

B1 shows a low volume characteristic which only offer some small water pan construction potential. The annual flows is also highly fluctuative and hence unreliable. Looking at the graphs, there is low potential of only harvesting about 220 m³/s in April and about 300 m³/s in November which is significantly to sustain the growing populations.

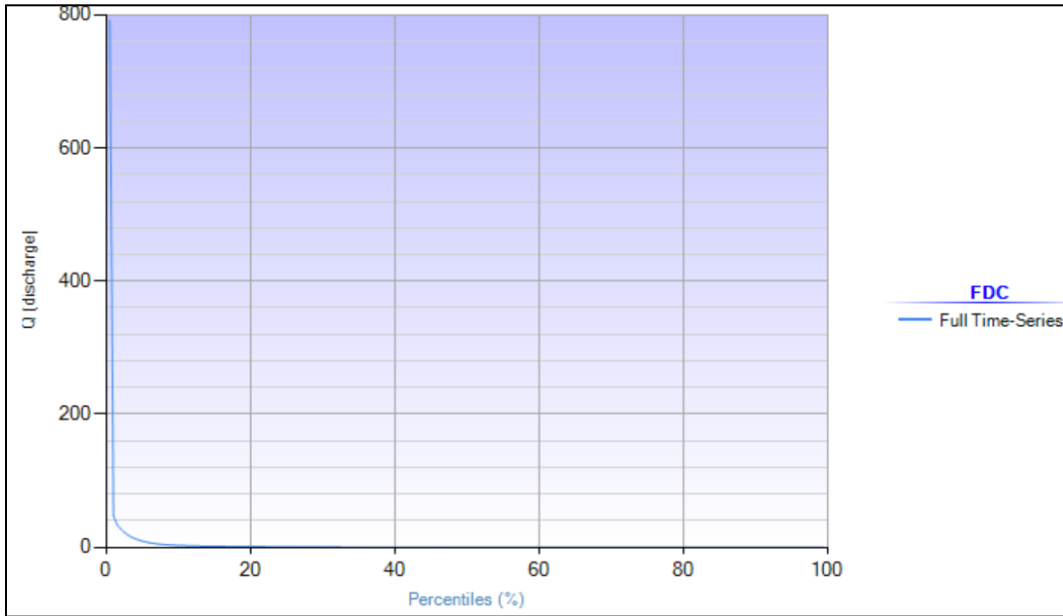


Figure 0-32: Flow duration curve for subbasin B1

FDC values for Figure 4-24 are presented in Table 4-1.

#### 4.13. Water Availability Assessment for Dawa river subbasin

By integrating CHIRPS rainfall and grass-based evapotranspiration into the Australian Water Balance Model, streamflow was successfully simulated. The output is illustrated in Figure 4-1.

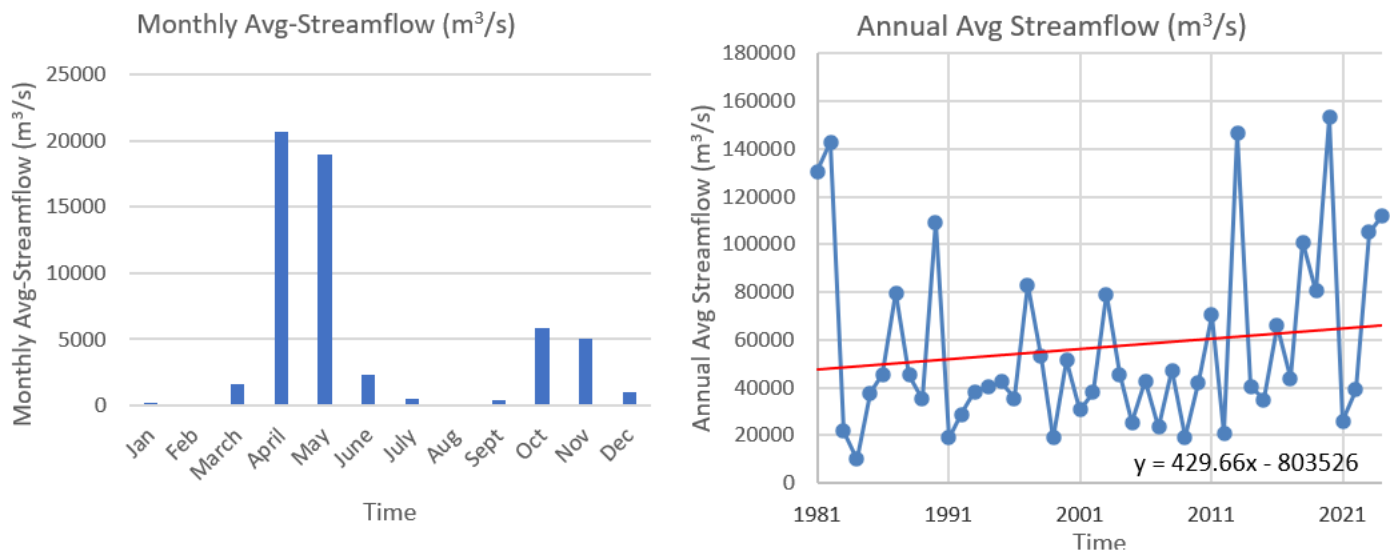


Figure 0-33: Streamflow for Dawa river subbasin

River Dawa is a permanent river and currently it serves Mandera town and its suburbs. Based on this, it is considered a reliable river capable of providing upto 20000 m³/s and 18000 m³/s during the months of April

and May respectively. However, the county is notified of the highly fluctuating flows since its usage is multiple across the two countries and hence, sustainable water use is required.

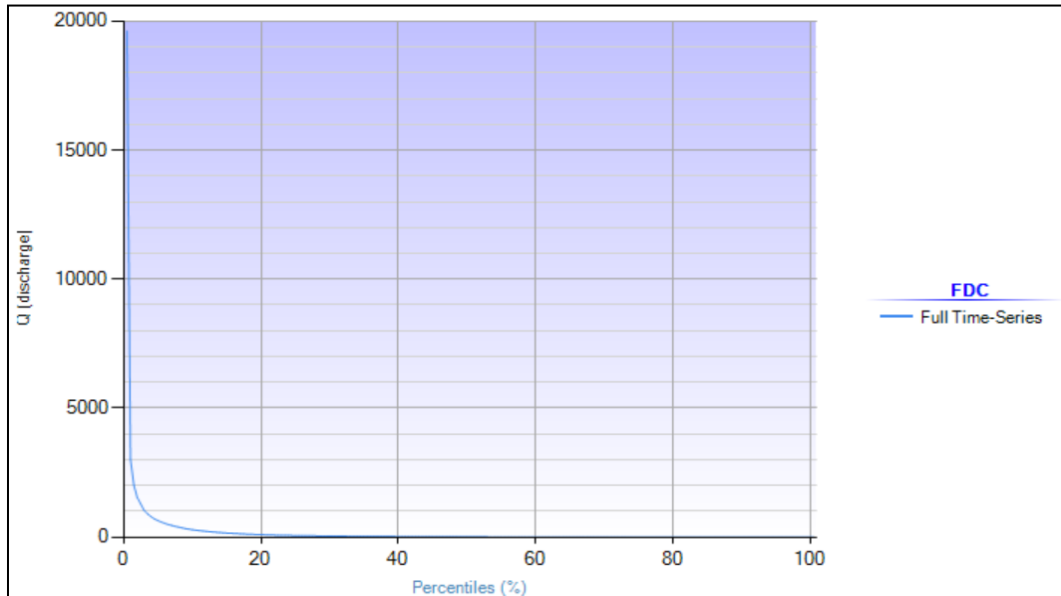


Figure 0-34: Flow duration curves for Dawa river subbasin

FDC values for Figure 4-8 are presented in Table 4-1.

#### 4.14. Summary of Flow Duration Curves

Summary of Flow duration curves at  $Q_{50}$ ,  $Q_{80}$ ,  $Q_{85}$ ,  $Q_{90}$  &  $Q_{95}$

Table 0-1: Summary of Flow Duration Curves ( $m^3/day$ )

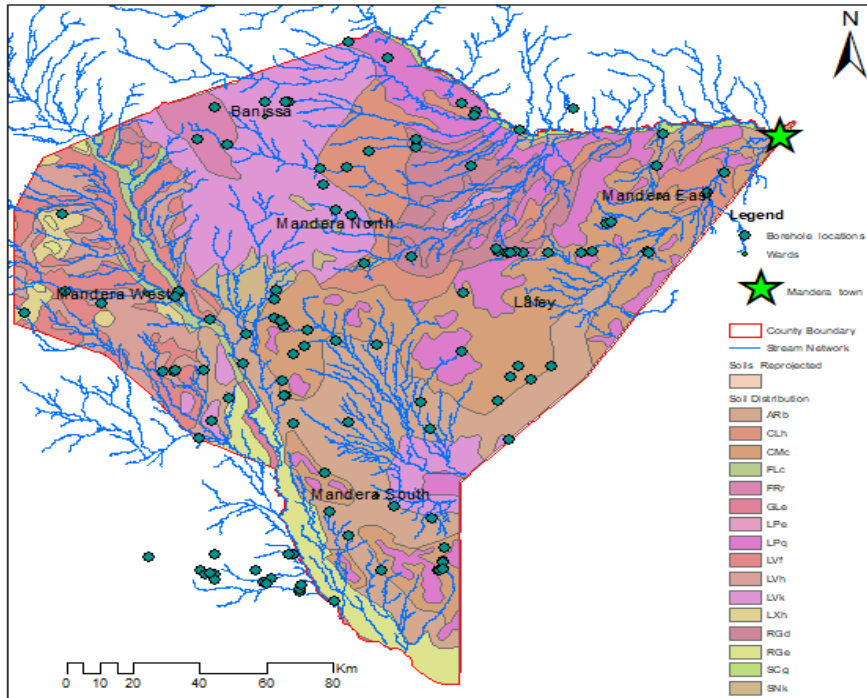
Name	$Q_{50}$	$Q_{80}$	$Q_{85}$	$Q_{90}$	$Q_{95}$
Dawa River	883246.913	65530.4577	38877.67221	21517.2847	9327.589171
Mandera	5524.7067	213.5339	105.9617	37.8176	1.7971
A1	10200.5603	498.1629	273.6018	131.6376	38.4367
A2	7633.4575	391.9680	215.2800	102.4466	32.6390

A3	2828.7205	140.5151	76.8088	38.1251	13.3725
A4	15138.6631	851.5494	475.1032	225.3728	74.7388
A5	8310.7056	335.8933	175.0356	75.7168	16.4420
A6	2246.8389	91.3537	46.9750	21.2456	6.6787
A7	1222.0594	44.6999	22.2662	8.2771	1.1837
A8	3182.5110	126.8664	64.0382	25.6436	5.3482
A9	218657.0244	10732.0396	5739.9387	2475.6783	405.7500
A10	252169.9744	18861.0114	10814.4712	5450.2476	2123.2702
A11	15176.3136	741.1628	407.0626	195.8494	57.1858

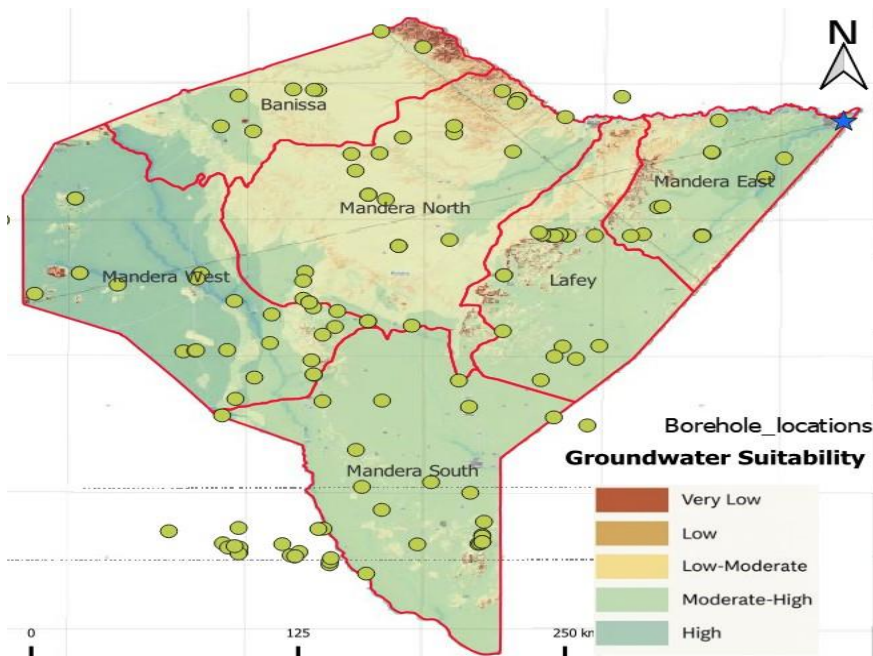
The analysis of water availability in Mandera County reveals that the Dawa River remains the most reliable and sustainable water source, offering critical support to both domestic and agricultural needs across the region. However, the presence of several ephemeral rivers, many of which serve as sand rivers, presents a valuable yet underutilized opportunity for water harvesting and seasonal storage.

As climate change intensifies, with rising temperatures and shifting rainfall patterns, the region is likely to face greater water scarcity and unpredictability. This underscores the urgent need for sustainable, adaptive water resource strategies. These may include enhanced sand dam construction, borehole rehabilitation, streamflow monitoring, and integrated surface-groundwater management tailored to each ward's unique conditions.

Investing in such climate-resilient water infrastructure now will be essential to safeguarding livelihoods, ensuring public health, and supporting long-term development across Mandera County.



*Ground water sources*



*Figure 35 ground water potential in the county*

## Rainfall Analysis

### 1.1 Data records

In order to assess the hydrological characterization, chirps' rainfall dataset was considered for the period 1981 and 2024 at daily time-steps. This was considered to have an overview of the long-term insights into the water availability. This was done for the average weighted mean rainfall and for each subbasin. Each is presented in subsequent sections.

### 1.2 County average weighted rainfall and temperature

Chirps datasets at a spatial resolution of 4.8 km was utilized for rainfall characterization while ERA5 having a spatial resolution of 9.6 km was used to analyze temperature.

#### *Rainfall*

To assess County average rainfall, the shapefile was zipped and loaded into the google earth engine editor after which the table asset shared file was loaded into the climate engine. Results are as presented below in Figure 3-1, 3-2 & 3.3.

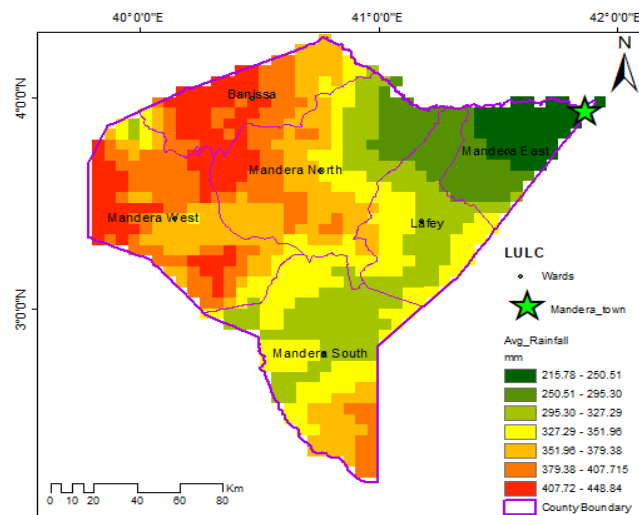


Figure 0-1: Spatial rainfall distribution

Figure 3-1 indicates that higher rainfall is experienced in Manderla West and Banisa areas. However, the Manderla East exhibits low rainfall.

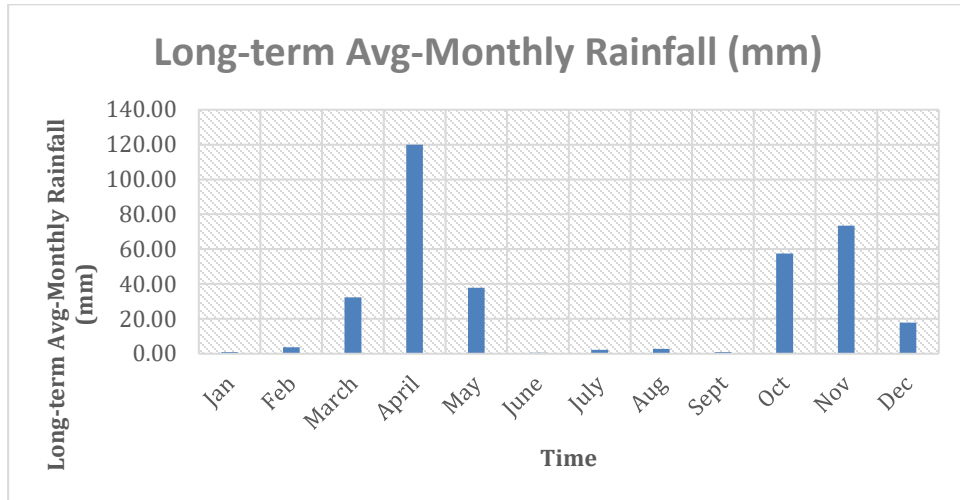


Figure 0-2: Long-term Avg-Monthly Rainfall (mm)

Average monthly rainfall is higher across two seasons of March, April and May through the second season of October, November and Dec.

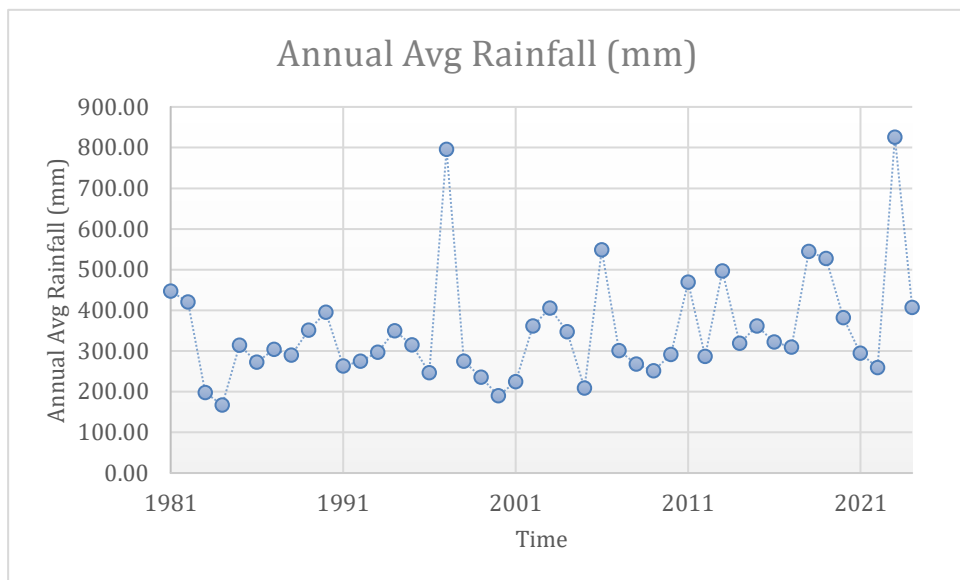


Figure 0-3: Annual Avg Rainfall (mm)

Annual rainfall is between 180 mm to 800 over the long-time period, an indication that characterizes the county as being a semi-arid region.

### Temperature

ERA5 temperature at daily timesteps was used for long-term analysis and the seasonal fluctuation is as presented below in Figure 3-3.

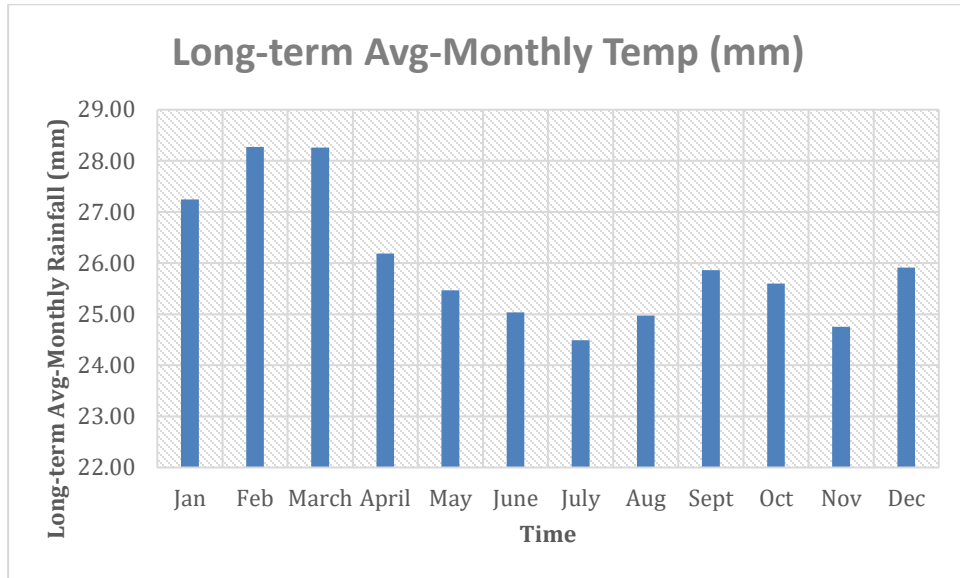


Figure 0-4: Long-term Avg-Monthly Temp (mm)

As shown in Figure 3-3, mean temperature is high during the months of January to March and low in July. However, the high temperature starts from December through the March cycle.

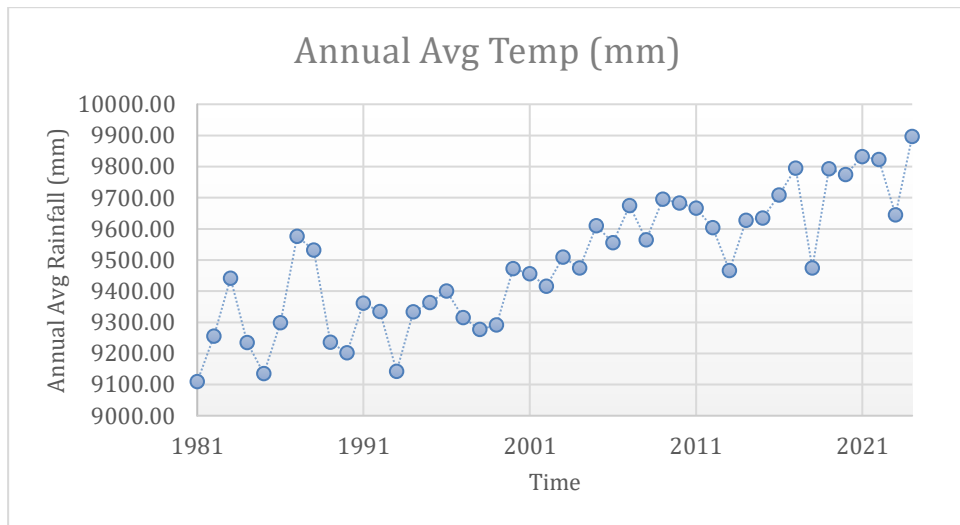


Figure 0-5: Annual Avg Temp (mm)

As shown in Figure 3-4, the total mean temperature has been increasing over time, a scenario which is associated with regional climate change dynamics. This would likely lead to more evaporation leading to extreme water shortages.

*Spatial distribution of water resources across the county.*

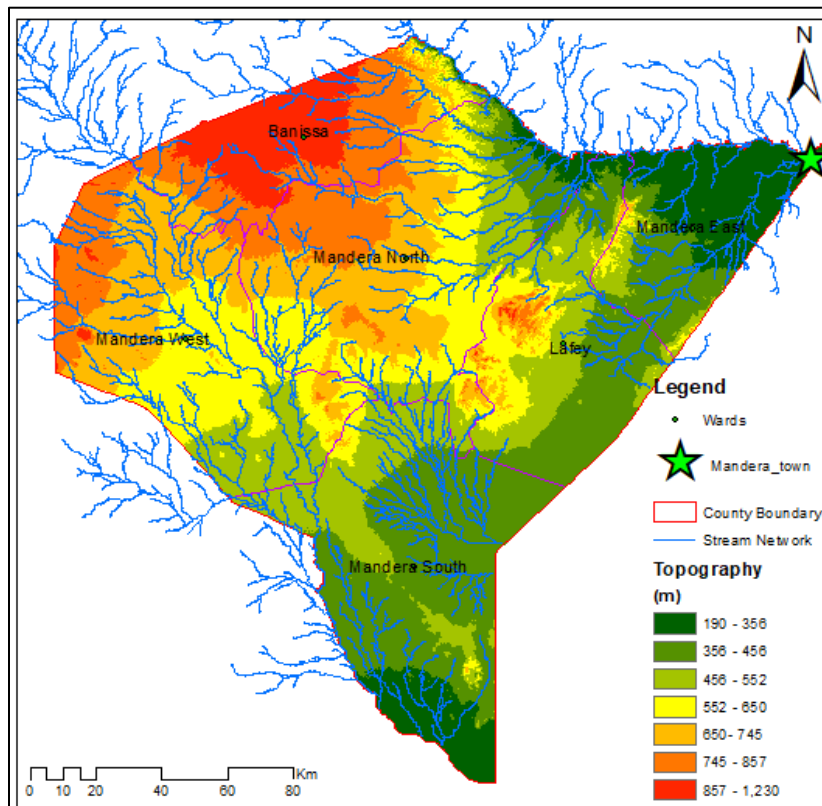


Figure 6

As illustrated in Figure 39, The West part of the County is higher draining a section of the County Southwards in Mandera South. The Northern and Central parts slopes towards Mandera town and Dawa river, which is a transboundary river bordering Kenya and Ethiopia. Using the topography, the watershed were delineated and results presented

To meet the future demands for the area, there are opportunities to develop a multipurpose Dam across the Dawa river to meet domestic and irrigation water demands through utilization of transboundary water resource management plan. This will also address the effects of recurring floods which negatively impacts water supply systems along the riverline areas.

**Infiltration Gallery Wells (IGWs):** There are 23 Water supply facilities between BP1 and Rhamu Dimtu along the Dawa river basin whose water sources are 6 – 7m deep Infiltration Gallery Wells dug along the riverbank. These IGWs produce on average between 15,000 and 20,000 litres of water per hour and are depended upon by about 200,000 people living within BP1, Mandera town, Neboi, Fiqow, Bulla Haji, Bur Abor, Dareqa, Khalalio, Aresa, Hareri, Sala 2, Yabicho, Kalmalab and Kalicha areas. These are about 25% of the County's entire population.

**Earth Pans/Dams:** There are over 268 Water Pans with capacities ranging from 15,000m<sup>3</sup> to 500,000 m<sup>3</sup>. About 70% of these water pans have volume below 60,000m<sup>3</sup> which are regarded as not having much impact on Water Security due to seepage and high rate of Evaporation. The figure below illustrates the distribution of earthpans in Mandera County.

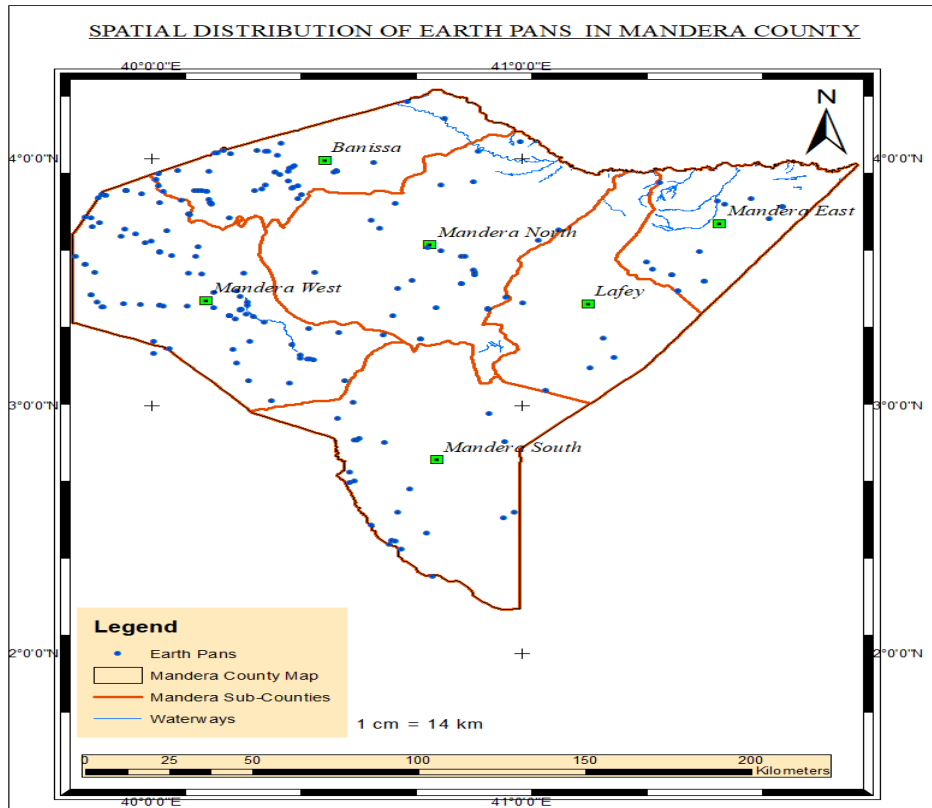


Figure 7: Distribution of Earth pans in Mander County

“Berkads”/ Underground Tanks: There are over 200 Underground tanks across the County with capacities ranging from 60-5003m<sup>3</sup>. These UGTs impound water during the rainy season and can last for about 1-4 weeks depending on their capacity and the population served. They are also used as Storage tanks for water trucking during drought.

Boreholes: The County has 224 operational boreholes. These are deep wells of about 30 – 300 m below the ground level. The yield of these boreholes ranges from 1.53m<sup>3</sup>/h to about 433m<sup>3</sup>/h. They are mostly operated by diesel Generators as a source of power which has made the Operation and Maintenance costs of these boreholes high and unbearable.

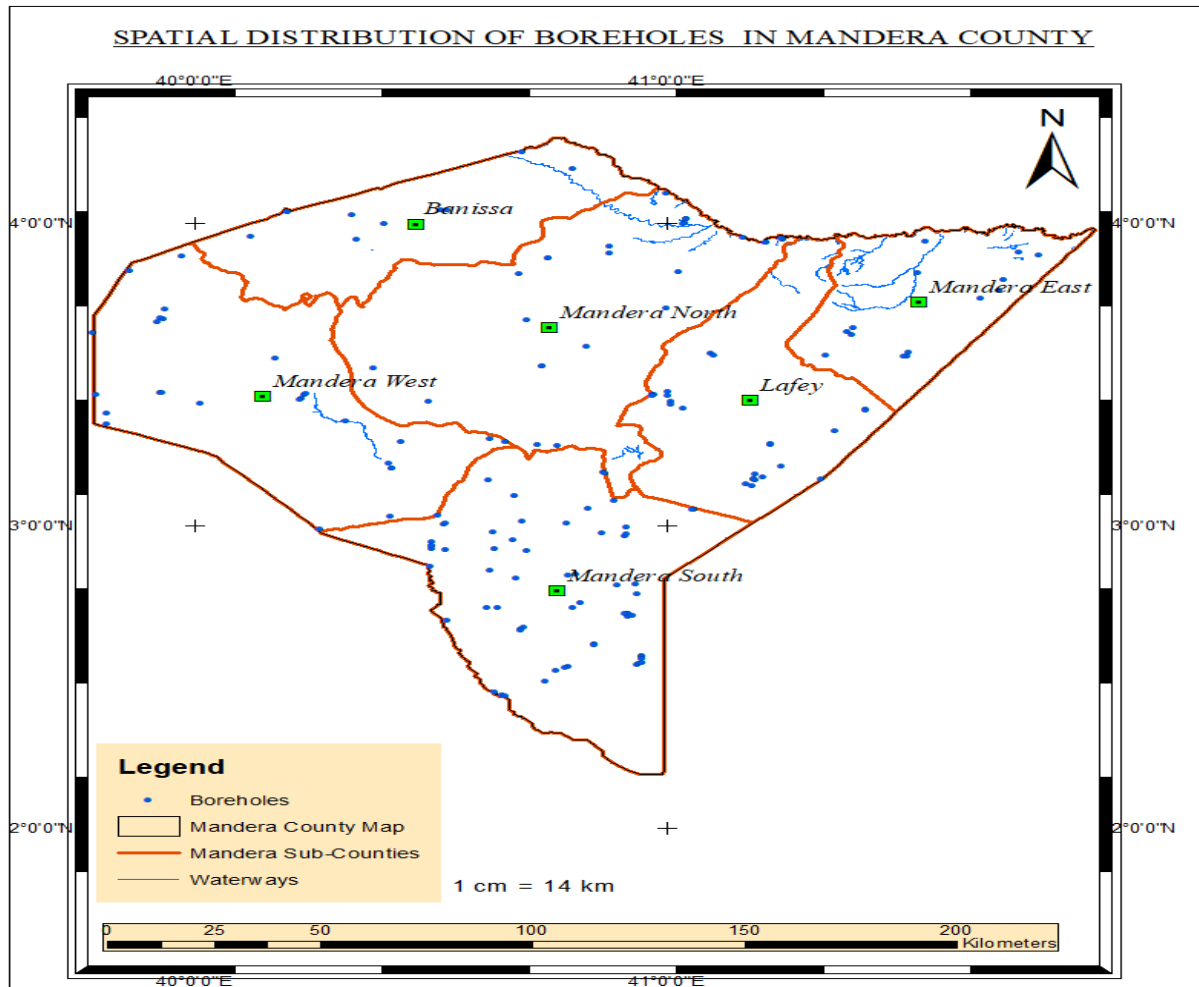


Figure 8: Distribution of Boreholes in Mander County

### 2.1.2 Current water abstraction and usage patterns

#### Existing Water Abstractors

Based on preliminary consultations and mapping of water sources, Mander County hosts numerous authorized and informal water abstractors, primarily concentrated along River Daua, boreholes, shallow wells, and Earth pans. While official Water Resource Authority (WRA) records were not available at the time of this assessment, data from community interviews and WRUAs suggests the following:

Abstractor Type	Estimated Number	Primary Use	Method	Estimated Volume (m <sup>3</sup> /day)	Authorization Status

Community Boreholes	200	Domestic and Livestock	Pumped (diesel/solar)	10–50	Authorized
Private Irrigators	30+	Small-scale irrigation	Pumped	50–100	Mostly unauthorized
Public Institutions	10+	Domestic/institutional	Pumped	20–80	Authorized
Water Trucks (Vendors)	30+	Domestic resale	Pumped	Variable	Informal

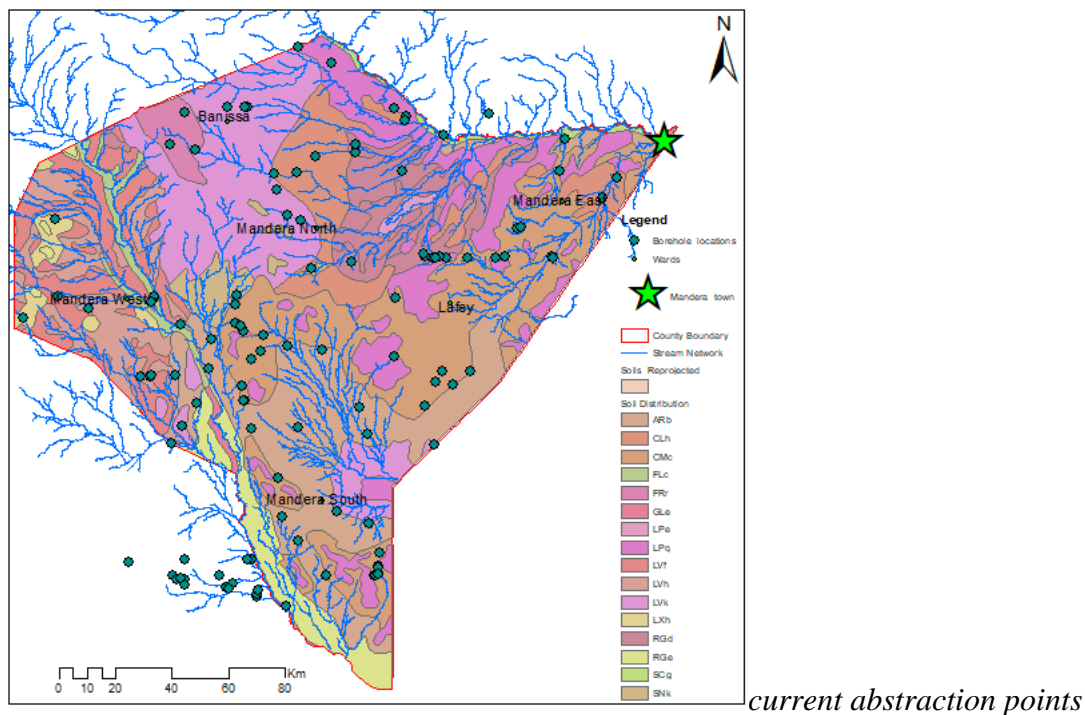
### Sectoral Water Use and Trends

Water demand in Mandera is largely driven by domestic use, livestock, and small-scale irrigation. Gender and/or Social While hard data on gender or social disaggregation is not currently available, typical trends across similar counties suggest:

- **Domestic Use:** Women and girls are the primary collectors and users of household water.
- **Livestock:** Predominantly male-managed activity, critical in pastoral zones.
- **Small-Scale Irrigation:** Mixed-gender participation but often male-dominated in decision-making and resource control.

### Water Use by Sector (Indicative)

Sector	% Share (Est.)	Notes
Domestic	50%	Rising demand due to urbanization and population growth.
Livestock	30%	Heavily seasonal; peaks during dry months.
Irrigation	15%	Growing due to County-led farming programs.
Institutional/Industrial	5%	Includes schools, health facilities



### ***2.1.2 Seasonal variations and climate-related vulnerabilities affecting water supply***

Seasonal fluctuations in water availability significantly impact service delivery in Mandera County, where the climate is characterized by erratic and bimodal rainfall patterns. The long rains from March to May and the short rains from October to December are often inconsistent in both duration and intensity, leading to periods of extreme water scarcity followed by sudden flooding. During dry seasons, dwindling surface water sources such as the Daua River, along with limited recharge of shallow wells, boreholes, and earth pans, severely constrain access to water for domestic use, agriculture, and livestock. This not only disrupts livelihoods but also hampers the delivery of essential services such as health, education, and sanitation, where water is critical for operations and hygiene.

In drought conditions, healthcare facilities face water shortages that compromise hygiene standards and patient care, while schools struggle to maintain cleanliness and sanitation, sometimes forcing closures. Agricultural productivity declines sharply due to lack of irrigation water, threatening food security and increasing reliance on emergency relief. Conversely, during

the rainy season, flash floods damage infrastructure such as roads, water pipelines, and sanitation systems, isolating communities and delaying the delivery of aid and services. These seasonal extremes strain already fragile systems and highlight the urgent need for climate-resilient water infrastructure and improved water management practices to ensure consistent and equitable service delivery across the county.

**Drought Risk:** Drought risk in the County is extremely high, particularly due to the region's dependency on groundwater for its water supply. Over 90% of water for domestic and livestock use comes from boreholes and shallow wells, many of which are not drought-resilient (NDMA, 2021). The region has experienced a marked decline in rainfall over recent decades, with average annual rainfall dropping below 300 mm in some areas. This has severe implications for water availability; as groundwater levels decline, the pressure on existing sources increases, leading to unsustainable extraction rates. The county experienced severe droughts in 2017, 2019, and 2021, with the 2017 drought classified as one of the worst in decades, affecting 80% of Mandera's population (UNICEF, 2017). During this drought, water trucking became a common emergency response, but it was not sufficient to meet the needs of the population.

The IPCC's Sixth Assessment Report (AR6) predicts that drought frequency in Mandera could increase by up to 30% by 2050 under the SSP5-8.5 scenario (high emissions), exacerbating water scarcity (IPCC, 2021). This trend will severely strain groundwater resources, leading to potential conflicts over water access. Prolonged drought periods could result in the over-extraction of groundwater, causing many of the boreholes to dry up or become non-functional due to inadequate recharge.

Sanitation services are also highly vulnerable to drought. The scarcity of water limits hygiene practices, leading to increased risk of diseases such as cholera and diarrhoea. Poor hygiene practices due to lack of water access were reported in over 60% of households during the 2017 drought (World Health Organization, 2017). This creates public health risks, especially in crowded areas like Mandera Town, where water shortages affect both personal hygiene and the proper functioning of sanitation infrastructure. The World Health Organization (WHO) emphasizes the critical role of water in maintaining public health, indicating that inadequate access to clean water increases vulnerability to waterborne diseases, particularly in drought-stricken areas.

**Flood Risk:** Flood risk in Mandera County is moderate, primarily affecting areas near seasonal river such as the Daua River, which borders Ethiopia. While floods are less frequent than droughts, flash floods cause significant damage to water supply and sanitation systems. In 2018, heavy rains and flash floods displaced over 6,000 families and led to widespread contamination of water sources (Kenya Red Cross, 2018). Contaminated water from floods can lead to outbreaks of waterborne diseases such as cholera and dysentery, particularly in urban and refugee settlements.

Reports indicate that extreme rainfall events have increased in frequency, with recent analyses showing a 30% rise in heavy rainfall days over the last decade. Flooding in Mandera is exacerbated by poor land management practices, such as deforestation and overgrazing, which increase surface runoff and reduce soil absorption. These practices, combined with extreme rainfall events, increase the likelihood of soil erosion and landslides. Landslides, though not as common as floods, pose a risk to both rural and peri-urban areas, where critical infrastructure like roads, latrines, and water pipes are often unprotected. The IPCC AR6 projects that rainfall intensity will increase by 10-20% by 2050 under SSP2-4.5, leading to more frequent and severe flood events (IPCC, 2021).

Flood risk is also closely tied to sanitation services. Flash floods can overwhelm latrines and septic tanks, causing overflows that contaminate water supplies. This risk is particularly high in informal settlements where sanitation infrastructure is inadequate or poorly maintained. In 2018, cholera outbreaks in Mandera were partly linked to the overflow of pit latrines during floods (UNICEF, 2018). Additionally, Mandera's proximity to the Ethiopian border increases its vulnerability to flooding due to shared water resources. Cross-border rivers, such as the Daua River, bring additional flood risk during periods of heavy rainfall upstream in Ethiopia.

**Temperature Risk:** The rising temperatures in the county present a high risk relating to water demand and resource management. Climate projections indicate an average temperature increase of 1.5 to 2 degrees Celsius by 2050, significantly raising the demand for water in both agricultural and domestic contexts. This increased demand is likely to lead to the over-extraction of groundwater, further depleting already stressed aquifers. The impact on water supply and sanitation facilities cannot be overstated; the heightened heat stress not only affects the availability of water but also contributes to the proliferation of waterborne diseases. The Kenya Medical Research Institute reports a direct correlation between rising temperatures and increased

incidences of diseases such as cholera and dysentery, emphasizing the urgent need for strategic planning in water management and sanitation services.

Temperature risk in Mandera County is high, driven by rising global temperatures that are projected to increase under all emissions scenarios. Currently, daytime temperatures in Mandera frequently exceed 38°C, and under the SSP5-8.5 scenario, temperatures are expected to rise by an additional 2-3°C by 2050 (IPCC, 2021). Higher temperatures increase the rate of evapotranspiration, reducing the availability of surface water and increasing the demand for groundwater resources. The rising temperatures directly increase water demand, both for domestic and livestock use, intensifying the over-extraction of groundwater, and further depleting already stressed aquifers. Higher temperatures also place stress on sanitation systems, which are reliant on water for proper functioning. Heat stress further impacts public health, as extreme temperatures can lead to heat-related illnesses and increase the prevalence of waterborne diseases such as typhoid and cholera due to poor water quality and limited access to clean water.

The World Health Organization (WHO) has identified Mandera as highly vulnerable to the health impacts of rising temperatures, particularly in densely populated areas where water shortages, poor sanitation, and inadequate waste management create conditions for disease transmission (WHO, 2019). The Kenya Medical Research Institute reports a direct correlation between rising temperatures and increased incidences of diseases such as cholera and dysentery, emphasizing the urgent need for strategic planning in water management and sanitation services. During periods of extreme heat, households use more water for cooling and hygiene, but this increases the risk of groundwater depletion as water resources become scarcer.

The combined effects of rising temperatures and water scarcity will disproportionately impact vulnerable groups, including pastoralist communities, children, and the elderly. Pastoralist communities, who rely on livestock, are particularly affected by heat stress, as higher temperatures reduce the availability of pasture and water for animals, leading to livestock deaths and increased competition for water resources.

*Table 2: Climate hazard risk ranking matrix table*

		<b>Impact Ranking</b>
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<b>Climate hazard</b>	<b>Risk Area</b>	<b>1 - Negligible</b>	<b>2 - Minor</b>	<b>3 - Moderate</b>	<b>4 - Major</b>	<b>5 - Catastrophic</b>
<b>Drought</b>	Water sources				4	
	Human settlements			3		
	Sanitation facilities			3		
<b>Extreme temperatures</b>	Water sources		2			
	Human settlements				4	
	Sanitation facilities		2			
<b>Flooding/ Landslides</b>	Water sources				4	
	Human settlements				4	
	Sanitation facilities				4	

Table 3: Climate hazard risk frequency ranking matrix

Frequency ranking	Frequency Occurrence in a Year	Description
5 - Very Frequent	>100%	Occurs several times in a single year
4 – Frequent	50 to 100%	Occurs once in a 1-to-2-year period
3 – Common	10 to 50%	Occurs once in a 2-to-10-year period
2 – Occasional	1 to 10%	Occurs once in a 10-to-100-year period
1 – Rare	<1%	Occurs once in over 100 years

Table 4: Matrix of Climate Risks and Impacts

Climate Risk	Severity of Impact	Estimated Number of Affected Households	Key Indicators
Drought	High	120,000	<ul style="list-style-type: none"> <li>- Decreased agricultural productivity</li> <li>- Reduced access to water</li> <li>- Increased food insecurity</li> <li>- Malnutrition and health issues</li> </ul>
Flood	Medium	60,000	<ul style="list-style-type: none"> <li>- Disruption of infrastructure and services</li> <li>- Contamination of water sources</li> <li>- Spread of waterborne diseases</li> <li>- Displacement of households</li> </ul>

Table 0-5: Effects of water availability on services in Mandera County

Sub-county / Ward	Health	WASH	Irrigation & Agriculture	Livestock	Domestic Water Supply
<b>Banissa</b>	Clinics face long dry spells; sanitation-related disease risk	Poor latrine sanitation due to low water access	Minimal irrigation; most farming rain-fed and vulnerable	Heavy livestock losses during droughts; seasonal flooding affects grazing	High reliance on few boreholes; some are saline or seasonal
<b>Mandera North</b>	Access to healthcare compromised by lack of water at facilities	Low latrine-to-user ratio worsened in dry months	Streams are seasonal; unreliable for sustained farming	Nomadic herding affected by flash floods and prolonged dry spells	Many boreholes, but fluctuating water tables lead to pump failures
<b>Mandera West</b>	Health posts lack water storage; long treks worsen maternal care	Poor hygiene during dry months, especially in schools	Dry riverbeds limit traditional irrigation; soils moderately suitable	Seasonal stream surges cause animal drowning or displacement	Boreholes moderately distributed; refilling intervals vary
<b>Mandera East</b>	Urban health centers stretched by population and water demand	Water rationing affects sanitation, especially during dry spells	Peri-urban gardens affected by water stress	Livestock influx from rural areas during droughts increases pressure	Many boreholes but over-extraction reduces recharge potential
<b>Lafey</b>	Cholera hotspots after flooding due to shallow sanitation systems	Poor drainage worsens latrine overflow in wet season	Limited agricultural productivity; reliant on erratic rainfall	Water scarcity in dry season leads to migration conflicts	Streams highly seasonal; boreholes unevenly distributed
<b>Mandera South</b>	Sparse facilities struggle with hygiene due to water scarcity	Deep boreholes often nonfunctional or poorly maintained	Occasional farming along floodplains disrupted by storm runoff	Cattle migration driven by storm-damaged grazing routes	Stream surges damage shallow wells; boreholes concentrated in lower south

### *Characterization of climate change impact in the county*

1. **Increasing Temperatures:** Consistent with global trends, the County has experienced a noticeable increase in average temperatures over the past few decades. Studies have shown a significant upward trend in both maximum and minimum temperatures, contributing to increased heat stress and evapotranspiration rates.
2. **Variable Rainfall Patterns:** Rainfall patterns in the County are highly variable, characterized by frequent droughts and occasional floods. While there may not be a

statistically significant trend in overall rainfall amount, evidence suggests increased variability and shifts in the timing and intensity of rainfall events. This is reflected in the increased frequency of short, intense rainfall episodes followed by prolonged dry periods.

3. **Increased Frequency and Intensity of Extreme Events:** The region has witnessed an increase in the frequency and intensity of extreme weather events such as droughts, floods, and heatwaves. These events have devastating consequences for livelihoods, infrastructure, and the environment.

### **Future Climate Projections.**

Climate models project the following changes in the County under various emission scenarios:

- **Further Temperature Increase:** Climate models consistently project a continued increase in average temperatures throughout the 21st century. The magnitude of the increase depends on the emission scenario, with higher emissions leading to more significant warming.
- **Changes in Rainfall Patterns:** Projections for rainfall are less consistent, with some models predicting a slight increase in overall rainfall and others projecting a decrease. However, most models agree on increased rainfall variability, with more frequent and intense droughts and floods.

### **Impacts of Climate Change.**

The projected climate changes are expected to have significant impacts on various sectors.

- **Water Resources:** Increased temperatures and erratic rainfall will exacerbate water scarcity, leading to increased competition for limited water resources, especially between humans and livestock. Decreased river flow and groundwater recharge are also expected.
- **Agriculture and Livestock Production:** Increased temperatures and drought will negatively impact crop yields and livestock productivity. Pastoralists, who rely on livestock for their livelihoods, are particularly vulnerable. Changes in vegetation composition and reduced grazing areas are anticipated.
- **Human Health:** Increased temperatures can lead to heat stress, dehydration, and the spread of vector-borne diseases such as malaria and dengue fever. Water scarcity and poor sanitation can also increase the risk of waterborne diseases.

- **Security:** Climate change can exacerbate existing social, economic, and political tensions, leading to increased conflict over scarce resources such as water and grazing land.

### ***2.1.3 Water resource challenges, such as pollution, over-extraction, climate change and watershed degradation***

#### **Climate Change**

- ✓ **Reduced Rainfall and Prolonged Droughts:** Climate change projections indicate an increase in the frequency and intensity of droughts in East Africa, including Mandera County. Decreased rainfall leads to reduced water availability in rivers, streams, and groundwater recharge areas, directly impacting water supplies for communities, livestock, and agriculture.
- ✓ **Increased Evaporation Rates:** Higher temperatures associated with climate change accelerate evaporation rates, further diminishing surface water resources. This is particularly damaging to shallow water sources like pans and dams, crucial for livestock and domestic use in rural areas.
- ✓ **Erratic Rainfall Patterns:** Shifting rainfall patterns, characterized by shorter rainy seasons and more intense rainfall events, can lead to increased runoff and soil erosion, impacting water quality through increased sediment loads and nutrient pollution.

#### **Unsustainable Water Management Practices**

- ✓ **Over-abstraction of Groundwater:** Increased demand for water for domestic use, livestock, and irrigation has led to the over-extraction of groundwater resources in many areas. This can lead to depletion of aquifers, reduced water table levels, and increased salinity, making water unsuitable for consumption and agriculture.
- ✓ **Inefficient Irrigation Practices:** The use of traditional irrigation methods, like flood irrigation, leads to significant water wastage through evaporation and runoff. Poorly managed irrigation schemes can also contribute to waterlogging and soil salinization, reducing agricultural productivity and further impacting water resources.

- ✓ **Lack of Water Harvesting and Storage:** Limited investment in water harvesting and storage infrastructure hinders the ability to capture and utilize rainwater effectively. This results in a reliance on limited surface and groundwater sources, making communities more vulnerable to water scarcity during dry periods.

### **Pollution from Human and Livestock Activities.**

- ✓ **Open Defecation and Poor Sanitation:** Inadequate sanitation facilities and widespread open defecation contribute to the contamination of surface and groundwater resources with pathogens, leading to waterborne diseases. This poses a significant health risk, particularly for vulnerable populations like children and the elderly.
- ✓ **Livestock Waste Contamination:** High livestock densities in some areas lead to the accumulation of animal waste near water sources, contaminating the water with bacteria, nitrates, and phosphates. This can degrade water quality, making it unsuitable for human and livestock consumption.
- ✓ **Agricultural Runoff:** The use of fertilizers and pesticides in agricultural activities can lead to the contamination of surface and groundwater with harmful chemicals. This can have detrimental impacts on human health and aquatic ecosystems.
- ✓ **Solid Waste Management:** Inadequate solid waste management practices lead to the dumping of waste near water sources, contributing to the pollution of water with chemicals, pathogens, and other contaminants.

### **Transboundary Water Resource Competition**

- ✓ **Shared Water Resources:** Mandera County relies heavily on the Daua River, a transboundary water resource shared with Ethiopia. Increased water demand in both countries can lead to competition for water resources, potentially causing conflicts and impacting water availability in Mandera County.
- ✓ **Upstream Water Use:** Water resource development and utilization activities upstream in Ethiopia can impact the flow and quality of water reaching Mandera County. This highlights the need for effective transboundary water management agreements and cooperation to ensure equitable access to water resources.

## **Strategies for conservation and sustainable management,**

Various strategies have been initiated by government agencies, NGOs, and local communities to address pressing environmental challenges. Rangeland management programs, including controlled and rotational grazing, destocking, and the establishment of grazing blocks, aim to alleviate pressure on degraded lands and encourage vegetation regeneration. While some localized success has been observed particularly in areas where grazing pressure has been reduced these initiatives remain scattered and limited in scale due to enforcement challenges, low community participation, and the absence of viable alternative livelihoods. Water resource management initiatives, such as the construction of boreholes, water pans, and rainwater harvesting systems, are more widespread but often suffer from poor maintenance, lack of technical expertise, and climate-related vulnerabilities such as siltation and evaporation. These projects yield short-term improvements in water access but are often unsustainable in the long run and can inadvertently contribute to groundwater depletion and resource-based conflicts if not carefully managed.

Other efforts include greening programs and agroforestry aimed at increasing forest cover. However, these are typically small-scale and face significant obstacles, such as low seedling survival due to harsh climatic conditions and limited community engagement. Community Conservation groups such natural resource management committees represent a promising approach to biodiversity protection and resource regulation. Environmental awareness and education campaigns are also underway, but their impact is curtailed by limited funding and minimal outreach to marginalized populations. Lastly, drought mitigation strategies such as early warning systems, the promotion of drought-resistant livestock breeds, and livelihood diversification have gained attention.

### ***2.1.4 Climate Change Vulnerability Assessment***

The potential impacts of climate change on available water resources are significant and multifaceted. For surface water, increased evaporation and potentially decreased rainfall will reduce water volume. Reduced rainfall will also lead to lower water levels limiting access to water for both livestock and domestic use. At the same time, more intense and frequent rainfall events could result in flash floods, damaging critical water infrastructure such as boreholes and hafirs, while also increasing the risk of waterborne diseases.

For groundwater resources, decreased rainfall and higher evapotranspiration will reduce recharge rates, leading to a decline in groundwater levels. This, coupled with over-extraction, may cause salinization, which deteriorates water quality and renders it unsuitable for drinking and agricultural use. As groundwater becomes more limited, competition over access is likely to increase, heightening the risk of conflict between communities. Water quality overall is expected to decline due to reduced dilution of pollutants in rivers and aquifers, while flood-induced erosion and sedimentation will further degrade the capacity and cleanliness of water bodies.

### **Vulnerability assessment**

- Identification of climate hazards affecting water and sanitation (e.g., droughts, floods, rising temperatures).

**DROUGHTS:** Droughts are the most significant climate hazard impacting the County, with far-reaching consequences for water, sanitation systems. As droughts persist, they severely reduce the availability of water by drying up surface sources such as seasonal rivers, earth pans and causing a decline in groundwater levels. This makes accessing water both difficult and costly for communities. As these water sources shrink, the concentration of pollutants increases, leading to the degradation of water quality and a heightened risk of waterborne diseases, particularly in vulnerable populations.

The effects of drought extend beyond water access and quality. Livestock, which form the backbone of livelihoods in Mandera, suffer massive losses during drought periods, affecting food security and household water availability, especially where milk serves as a key source of hydration. The scarcity of water also fuels competition among communities, often resulting in tensions and conflict, including cross-border disputes. Additionally, prolonged dry conditions can damage critical water infrastructure like boreholes and pipelines, further reducing the reliability of water supply systems and complicating efforts to maintain WASH services during periods of crisis.

**Floods:** The County is highly susceptible to flash floods during periods of intense rainfall, particularly during El Niño events. These floods pose serious threats to water, sanitation, and hygiene (WASH) systems. One of the immediate consequences is the contamination of water sources floodwaters often carry pollutants that infiltrate shallow wells, boreholes, and

surface water, significantly increasing the risk of waterborne diseases such as cholera and Typhoid.

In addition to water contamination, floods frequently damage sanitation infrastructure, including latrines and waste disposal systems. This destruction often results in open defecation and unsanitary conditions, further exacerbating health risks. Flooding also displaces entire communities, severing their access to clean water and functional sanitation services, and disrupting WASH programs. Moreover, the aftermath of floods often leaves behind stagnant water, which becomes a breeding ground for mosquitoes and other disease vectors increasing the incidence of illnesses such as malaria and dengue. These cascading effects underscore the need for resilient and adaptable WASH infrastructure in the face of extreme weather events.

**Rising Temperatures:** Rising temperatures driven by global climate change are intensifying water stress. Higher temperatures accelerate evaporation from surface water sources, reducing already limited supplies, while increasing water demand for drinking, sanitation, and livestock. Climate change also disrupts rainfall patterns, making precipitation more erratic and unpredictable, which raises the risks of both droughts and floods. These changes not only reduce water availability but also degrade water quality, as warmer conditions encourage the growth of harmful algae and bacteria in water sources.

### 1.3 Water supply services coverage and gaps

#### ***2.2.1 Status of water supply infrastructure (urban vs. rural)***

In Mandera County, 34.6% of residents use improved sources of water. The use of improved water sources is higher in urban areas as compared to rural areas. In 2022 there were 117 primary schools and 61 secondary schools. Additionally, there is 1 Teachers Training College, one Technical Training College and 6 Polytechnics. There are 75,837 children within the primary school age group and 23,404 children within the secondary school age group consisting of 51.5% of the total population. The county has a total of 114 health facilities whose operation largely depends on availability of safe and reliable water supply (2022). In addition to these services, the county has several public facilities ranging from prisons, market places, hotels and restaurants.

Table 6: water supply coverage and Gaps

S/No.	Water Supply in:	Service provision	Water Sources/ treatment	Existing Water Infrastructure/coverage	Energy source	Gaps in service provision
1	Mander municipality	Mandera Water and Sanitation Company	Infiltration galleries / Chlorination  20 no with a yield of 15-20m <sup>3</sup> /hr  boreholes With 14-40m <sup>3</sup> /hr yield	Generally, these water supplies have rising, distribution and transmission pipelines, About 11 No. Elevated steel tanks, masonry tanks, 2,500 Individual connections, water 13 kiosks for peri-urban centres	Mechanized ( Gensets)  Pumping systems	>Limited storage and distribution infrastructure >High None-revenue water (55%) >Limited water sources >High energy costs >Inadequate capacity of technical staff in water service provision >Lack of water treatment infrastructure >In-efficiency in governance issues for WSPs

2.	Elwak Municipality and surrounding areas	Elwak Water and Sanitation Company	6 no. Boreholes with yield of 12m <sup>3</sup> /hr	<ul style="list-style-type: none"> <li>&gt;30km rising main</li> <li>2 booster stations with 225m<sup>3</sup> Surface tank</li> <li>&gt;25km Distribution and transmission pipelines,</li> <li>&gt;3No. Elevated steel tanks(90-160m<sup>3</sup>)</li> <li>&gt;1,700 Individual connections,</li> <li>&gt;15 water kiosks for peri-urban centers</li> </ul>	Gensets/Solarized	<ul style="list-style-type: none"> <li>&gt;Limited storage and distribution infrastructure</li> <li>&gt;High None-revenue water (60%)</li> <li>&gt;Limited water sources</li> <li>&gt;High energy costs</li> <li>&gt;Inadequate capacity of technical staff in water service provision</li> <li>&gt;In-efficiency in governance issues for WSPs</li> </ul>
3	Small-Medium sized towns	Rhamu, Lafey, Takaba, Kutulo, Wargadud,	<ul style="list-style-type: none"> <li>&gt;boreholes 8-15m<sup>3</sup>/hr)</li> <li>&gt; Earth pans (20,000-80,000m<sup>3</sup> capacity)</li> </ul>		Gensets/Solarized	<ul style="list-style-type: none"> <li>&gt;Limited storage and distribution infrastructure leading to inadequate access to services.</li> <li>&gt;High None-revenue water</li> <li>&gt;Limited water sources</li> <li>&gt;High energy costs</li> </ul>

		Khala lio and Shim bir Fatu ma				<ul style="list-style-type: none"> <li>&gt;Inadequate capacity of technical staff in water service provision</li> <li>&gt;Lack of water sanitation infrastructure</li> </ul>
4	Other Rural Water Supplies	Other settle ment s	<ul style="list-style-type: none"> <li>&gt;boreholes 8-15m<sup>3</sup>/hr)</li> <li>&gt; Earth pans (15,000-10,000m<sup>3</sup> capacity)</li> </ul>	Apart from the water sources most of the centres have Ground Level Masonry tanks, Rising Mains, Animal troughs, some have water kiosks serving households.	Genset s/Solari zed	<ul style="list-style-type: none"> <li>Limited storage and distribution infrastructure</li> <li>&gt;High Non-revenue water</li> <li>&gt;Limited water sources</li> <li>&gt;High energy costs</li> <li>&gt;Inadequate capacity of technical staff in water service provision</li> <li>&gt;Lack of water sanitation infrastructure</li> </ul>

## **Social and gender disaggregated water supply with focus on the impact on vulnerable population and women**

Access to safe and reliable water supply is a critical human need, but its availability and management disproportionately affect vulnerable populations, particularly women and girls, due to social and gender inequities. Below is an analysis of the social and gender-disaggregated impacts of water supply, focusing on vulnerable populations and women, grounded in available evidence and critical examination of county patterns.

Vulnerable populations—including rural communities, urban poor, indigenous groups, people with disabilities, and women—face the brunt of this crisis due to systemic inequities.

women and girls are primarily responsible for water collection, spending an estimated 200 million hours daily globally on this task. This burden limits their opportunities for education, income generation, and leisure.

**Social Exclusion:** Marginalized groups (e.g., low-income households, ethnic minorities, and those in informal settlements) often rely on distant or contaminated water sources, exacerbating health risks and economic strain.

*Specific Impacts on Women and Girls:* **Physical and Health Burdens:** Women carrying heavy water loads (30–40 kg) face musculoskeletal damage and long-term health issues. Exposure to contaminated water increases risks of infections like urinary tract infections and, in some cases, higher rates of cancers (e.g., bladder and breast cancer linked to arsenic or disinfection byproducts).

**Gender-Based Violence (GBV):** Women and girls face heightened risks of harassment and assault while fetching water or using shared sanitation facilities.

**Psychosocial Stress:** The constant pressure of water collection, coupled with limited agency in water governance, leads to psychosocial distress. In Ethiopia, women reported limiting water intake and hygiene practices due to scarcity, affecting mental and social well-being.

**Reproductive Health:** Lack of private sanitation facilities correlates with adverse pregnancy outcomes, such as preterm birth and low birth weight, particularly in regions with high rates of open defecation.

**Economic Disempowerment:** Time spent on water collection (often 2–6 hours daily in rural areas) prevents women from engaging in paid work or education, reinforcing economic dependency. In agricultural settings, women's productivity is 20–30% lower than men's due to limited access to water for irrigation.

**Intersectional Vulnerabilities**

Rural vs. Urban Divide: Rural women walk longer distances to water sources, while urban poor women in slums face long queues or reliance on expensive water vendors.

Age and Disability: Adolescent girls and women with disabilities face unique challenges, such as inaccessible water points or lack of menstrual hygiene facilities, increasing their dependence on others.

Cultural Norms: Patriarchal structures, as seen in rural Brazil, assign water-related tasks to women based on the sexual division of labor, limiting their agency and reinforcing social stigmas.

Indigenous and Nomadic Communities: In regions like Mongolia or Kenya’s Turkana County, women in nomadic or indigenous groups face environmental and cultural barriers, with drought forcing longer treks for water, impacting livestock-based livelihoods.

## 2.2.2 Percentage of the population with access to improved water services

### Water service level

Table 7: Water service level

Water Service Level	Number of people in the county currently served under this rung		
	Rural	Urban/per-urban	Total
SAFELY MANAGED SERVICE: Number of people in the county collecting water from an improved water source/piped water which is located within their houses, available when needed, free from contamination.	7,704	28,662	36,336
BASIC SERVICE: Number of people in the county drinking water from an improved water source/piped and non-piped provided the collection time is not more than 30 minutes round trip. The source is not inside the users' dwelling but maybe located at a standpipe/kiosk, a protected well, spring.	42,000	9,200	51,200
LIMITED SERVICE: Number of people in the county collecting water from an improved water source/piped and non-piped water but the collection time exceeds 30 minutes roundtrip from the users dwelling	120,189	222,450	342,639
UNIMPROVED SERVICE: Number of people in the county collecting water from an unprotected well or spring at a high risk of contamination	225,325	51,331	276,565
NO SERVICE: Number of people in the county with no access to a water source thus collecting water from open surfaces, rivers, ponds, irrigation canal etc	224,467	51,793	276,260

<b>TOTAL</b>	<b>619,685</b>	<b>363,436</b>	<b>983,000</b>
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### ***2.2.3 Service delivery challenges (e.g. non-revenue water, maintenance issues***

Generally, Water Services provision mandates vests on the County Water Department. There exist 2 Water Services Providers namely Mandera Water and Sewerage Company (MANDWASCO) and Elwak Water and Sewerage Company (ELWASCO) who are in-charge of Water and Sewerage service within the two municipalities of Mandera and Elwak. Services in other rural areas are delivered by the department of water services through sub-county water offices.

The water services operations in the two municipalities face significant revenue generation challenges caused by high None-revenue Water levels. the two WSPs receive grants from the county to meet their service delivery obligations.

However, services in rural areas including Operation and maintenance activities run smoothly with timely solutions to challenges of breakdowns

*Operational inefficiencies and their impact on service provision:* Some of the major inefficiencies include breakdowns of pumping systems during high demand seasons, high cost of fuel for diesel generators, low revenue returns, non-revenue water

These challenges often lead to water supply disruptions hence negatively affecting access to reliable water services

*Potential solutions for reducing non-revenue water and improving reliability:* None-water management requires a holistic approach where the water service providers are expected to establish a NRW management plan embedded in their Performance Improvement Actin Plans.

*Table 8:Non-Revenue Water Management*

<b>NRW Aspect</b>	<b>isses</b>	<b>potential solutions</b>
Physical loses	pipe bursts	timely repair of bursts
Physical loses	leakages	provision of O&M tools

commercial loses	illegal connections	enforcement of WASREB regulations
commercial loses	non-metered connections	metering of all conections
commercial loses	revenue collection inefficiencies	installation e billing systems
commercial loses	meter reading inaccuracies	installation smart meters

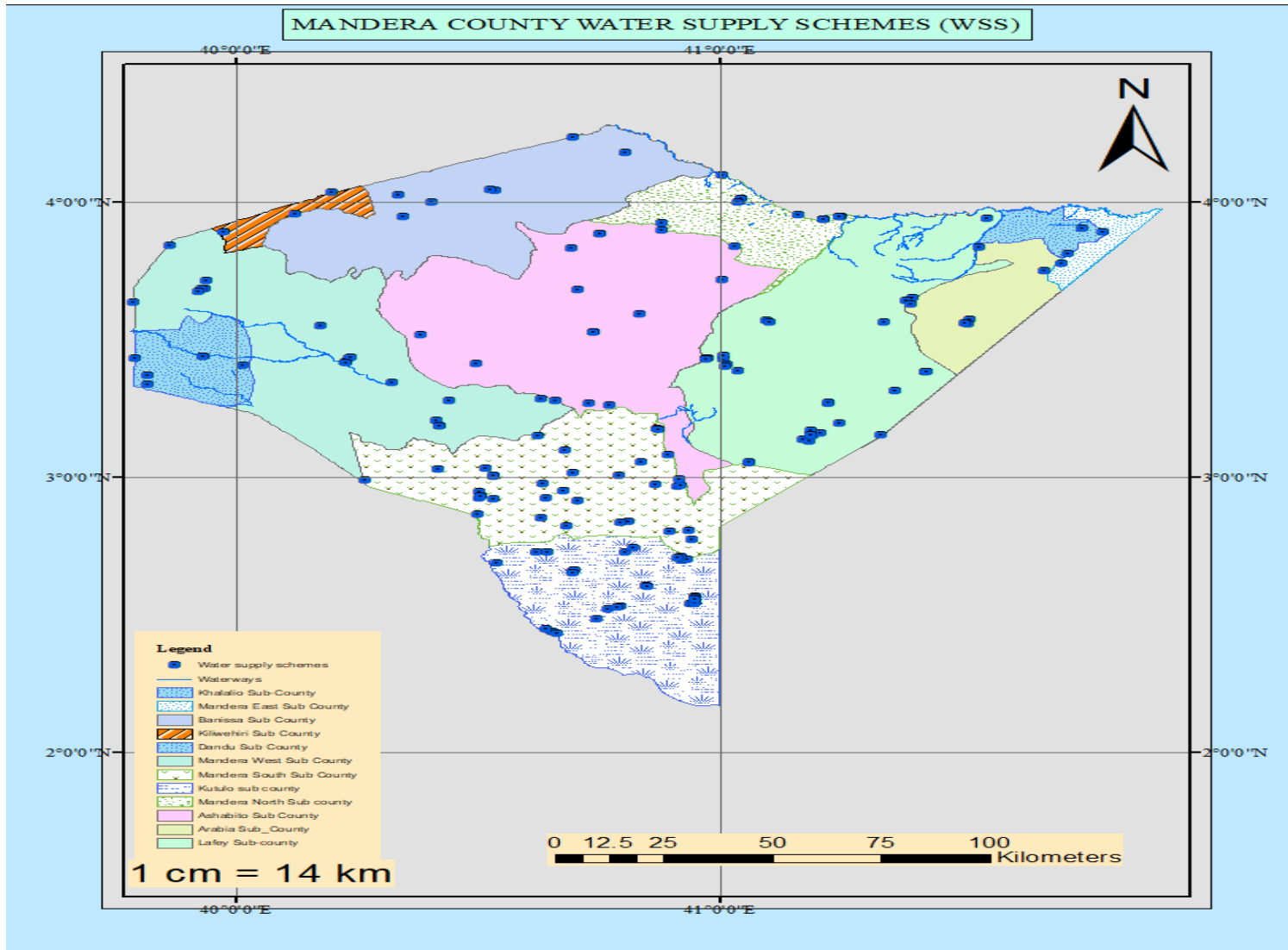


Figure 44: County Water Supply Schemes

## 1.4 Sanitation Services Coverage and Services Gaps

### ***2.3.1 Status of household sanitation access (sewered vs. non-sewered options)***

Sanitation plays a significant role in the national development agenda of a country with respect to the social, economic and environmental health spheres. Inadequate sanitation, open defecation, and poor hygiene practices, are associated with diseases such as diarrhoea, cholera, typhoid, hepatitis, polio among others. The global Sustainable Development Goal (SDG) target 6.2, requires countries to achieve by 2030, access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations. Like in many contexts, sanitation remains poorly funded, and this is mainly attributed to low prioritization of sanitation at policy level. Investment in water and sanitation programs have always been highly towards water services which negates the efforts made in investing in sanitation services provision.

The 2016-2030 KESHP also recommends that promotion of environmental sanitation and hygiene should be based on six building blocks:

- Construction and proper use of clean latrines
- Safe treatment and disposal of faecal sludge
- Sustained handwashing practices
- Food hygiene
- Safe water handling and proper use.
- Maintenance of clean home environment

Rural & Urban Sanitation: Rural Sanitation remains a big challenge in Kenya, the problem is more protracted in Arid and Semi-Arid Land (ASAL) counties with 85% of the population practicing open defecation (OD) in 15 high-burden counties according to the Kenya Population and Housing Census (2019 KPHC). In 2019, at least half of the households in Mandera County used pit latrines.

Mandera is one such county with open defecation estimated at 39.4% of the households practicing open defecation representing 342,312 Persons across the county. The level of burden varies across the sub-counties, these include: Banisa 61.2%, Mandera West (42.2%), Mandera South (30.7%), Kutulo (41.6%), Lafey (35.5%) and Mandera East (17.5%). On Toilets coverage: In 2019, at least half of the households in Mandera County used pit latrines. The sewerage system is currently (2024) being developed in Mandera town to cover initial 600 households. No other sub-counties have the sewerage system in place.

Off-site sludge Management: Off-site sludge management is sub-optimal in Mandera. Currently (2024) there are about 2 exhausters which are operating within the Municipalities of Mandera Town and Elwak town. The exhausters are on request and do not operate on a daily basis as demand for the services are low. Main users of the exhausters are mainly institutions and hotels. Household usage are low as the majority of the households opt for digging alternative pits when it gets filled up and largely practice containment.

Mandera town, Elwak, Banisa and Takaba town have sludge drying beds. Sludge are mainly contained in pit latrines, emptying done mainly through mechanical emptying where tanker trucks directly pump fecal sludge into the truck, then transported and disposed into an open dry bed. The dry beds have soak away pits. Treatment is not done currently as the sludge is allowed to sun dry.

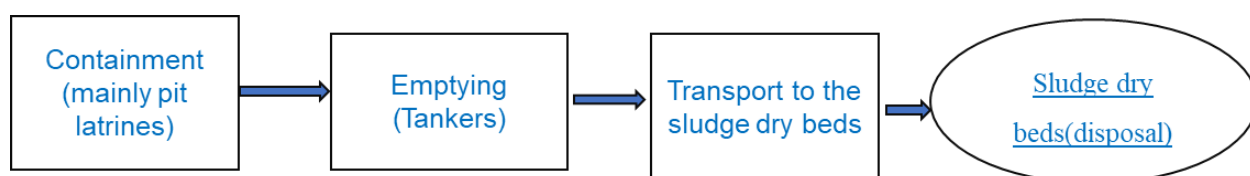


Figure 10: Cross-sectional view of the fecal flow diagram, Mandera, 2024

### Sanitation service level

The sanitation service level based on the Joint Monitoring Program (JMP) for the county have shown different levels across the ladder, Unimproved sanitation of 25.8% representing a total of 223,804 persons (154,425 rural & 69,379 urban/peri-urban population); Limited sanitation of 31.1% representing a total of 269,779 persons (186,148 rural & 83,632 urban/peri-urban) and basic level sanitation of 3.6% representing 31, 228 persons (21, 548 rural & 9681 urban/peri-urban).

Table 9: Mandera Sanitation Service Level

Sanitation Service Level	Rural	Urban/peri- urban	Total
<p><b>SAFELY MANAGED SERVICE:</b> Number of people in the county using improved sanitation facilities that are not shared with other households and where excreta is safely-disposed in situ or transported and treated off-site</p>	0	334	334
<p><b>BASIC SERVICE:</b> Number of people in the county who use improved sanitation facilities which are not shared with other households</p>	21,548	9,681	31,228
<p><b>LIMITED SERVICE:</b> Number of people in the county who use improved sanitation facilities shared with other households</p>	186,148	83,632	269,779
<p><b>UNIMPROVED SERVICE:</b> Number of people in the county who use pit latrines without slabs or platform, hanging latrines or bucket latrines</p>	154,425	69,379	223,804
<p><b>OPEN DEFECATION:</b> Number of people in the county practicing open defecation</p>	236,195	106,116	<b>342,312</b>

Source: KNBS, 2019

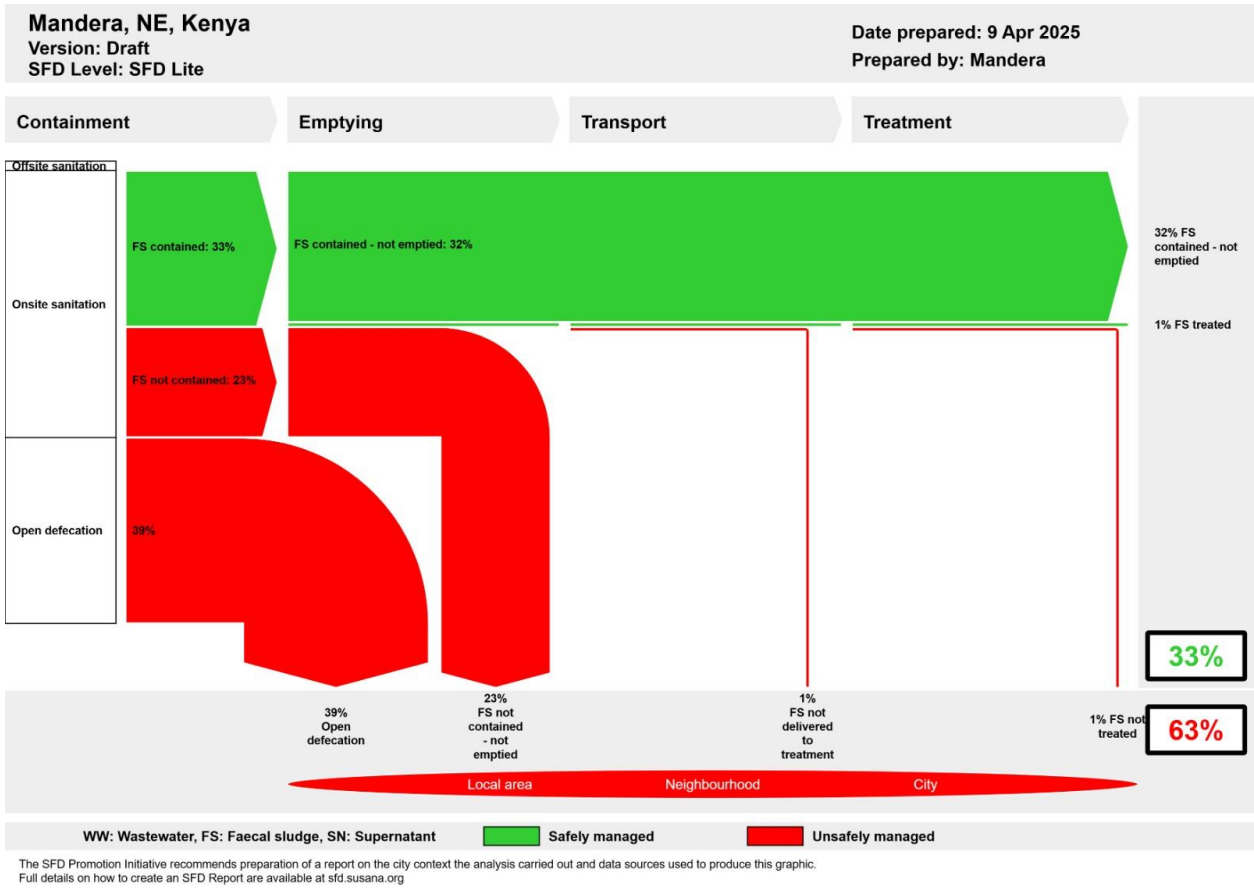


Figure 11: Mandera Shit-flow diagram

The SFD helps visualize and understand how faecal waste flows (and escapes) through the city’s infrastructure from defecation to disposal or end-use. As per the SFD it is noted that 33% of the shit produced in Mandera is managed mainly through containment in covered pit latrines while 63% is unsafely managed indicating to a glaring gap in the management human fecal matter. It is highlighted that OD stands at 39%, while 23% of FS is not contained nor emptied and only 1% of the faecal matter emptied mainly from the septic tanks and disposed in dry beds fecal sludge management.

### 2.3.2 Coverage of public and shared sanitation facilities, including market centers and informal settlements

Market Infrastructure: Before the advent of devolution, there were five (5) main markets with three hundred and fifteen stalls (315), five ESP shade. The County Government has increased the number of markets by building fifteen (15) new modern markets with six hundred and ninety-two (692) stalls, three bale shades with a capacity of one hundred forty-two stands (142).

Modernization of the Market Infrastructure ongoing like the multi-million shillings Elwak SME Park. The facility is a modern state market with two hundred and ten (210) stalls, one hundred and twenty-six (126) bales shade, forty milk/meat section, fifteen eateries and parking yard, that will provide a good business environment to the locals and a business hub Centre for cross border trade.

In Mandera Town, markets like the bus park suffer from insufficient toilet facilities. It's observed that existing toilets are often filled to capacity and unsanitary, forcing individuals to walk long distances to find usable facilities. Additionally, there is a lack of hand washing stations, increasing the risk of disease transmission.

Before devolution, market sanitation in Mandera County was severely underdeveloped:

- Most market areas lacked public toilets, proper drainage, and waste disposal facilities.
- Open defecation was common due to the absence of functional sanitation infrastructure.
- Vendors operated in unhygienic conditions, increasing the risk of waterborne and communicable diseases.

**Current Sanitation Challenges:** Despite improvements in market infrastructure, sanitation in many markets—especially informal ones—remains a pressing concern:

#### Inadequate Public Toilets

- Many markets within the county still lack enough toilets to serve growing populations of traders and customers.
- Some available facilities are poorly maintained or quickly fill up due to overuse.

#### Lack of Clean Water and Handwashing Stations

- Water scarcity in the region makes regular cleaning and handwashing difficult.
- This challenge has been particularly problematic during health crises like cholera outbreaks or COVID-19.

#### Poor Waste Management

- Solid waste disposal remains inconsistent, with garbage often dumped in open areas near market sites.
- Overflowing bins and lack of segregation of organic and non-organic waste have been reported in places like Mandera Town Bus Park Market and Border Point One.

#### Government & Community Efforts to Improve Sanitation

**Investments in Sanitation Facilities:** The county has started integrating sanitation amenities in newly constructed markets like the Elwak SME Park. These include designated waste collection areas, toilets, and water points. Projects funded under devolution are slowly closing the gap in hygiene infrastructure.

**Community-Led Initiatives:** Public health campaigns are being run in collaboration with NGOs to promote cleanliness. In some informal markets, traders have formed sanitation committees to manage waste disposal and toilet maintenance.

**County Water and Sanitation Master Plan:** While currently focused on towns like Takaba, the ripple effect is expected to improve sanitation standards across markets by 2040.

**Opportunities for Improvement:** PPP models (Public-Private Partnerships) for managing toilets and cleaning services.

- Regular waste collection contracts and designated dumpsites near markets.
- Public hygiene education for market users on proper waste disposal and handwashing.

While Mandera County has made notable progress in modernizing market spaces, sanitation remains a key area for further investment and community engagement. With ongoing infrastructure projects and a focus on cross-border trade, improving hygiene will be essential for sustainable market growth and public health

## **SANITATION SERVICE MODELS**

### **1. Community Led Total Sanitation (CLTS)**

Open defecation (OD) can have devastating consequences for public health and can be a barrier to education and economic opportunity. Exposure of water and food through fecal contamination may cause diarrhoea and other faecal-oral diseases. Mandera was not spared in the cyclic outbreaks of water-borne diseases such as cholera outbreaks (in 2016, 2019 and 2022), gastro- enteritis among others due to poor sanitation.

CLTS has been adopted as the main approach for rural sanitation development by all governments and partners and was the foundation of Kenya Rural Sanitation and Hygiene Protocol 2022.

The CLTS protocol listed the additional outcome criteria for each of the subsequent phases, which included: use and maintenance of institutional WASH facilities, safe storage and handling of food, safe storage and handling of drinking water, personal hygiene, clean villages with no

visible solid waste or stagnant water, and the presence of a community monitoring system for open defecation. The RUSH Protocol sets out a phased approach including three grades.

- **G1 Open Defecation Free (ODF)** is focused on behaviour change and the elimination of the unsafe return of excreta to the open (e.g. unsafe excreta return through open defecation or unsafe disposal of child excreta and diapers).

- **G2 Safe & Sustainable** is focused on the safe management of toilets, hands, food, water and animal wastes to block the primary routes of faecal exposure and faecal-oral contamination, and on more sustainable services.

- **G3 Clean & Healthy** is focused on more permanent and safely managed services and on other critical aspects of environmental sanitation and hygiene, to create a “clean and healthy environment” for rural Kenyans as required by the *2016-2030 Kenya Environmental Sanitation and Hygiene Policy*.

Mandera has adopted CLTS as an approach for delivering sanitation at household level. With over 900 villages and close to half of the households practising open defecation, households are encouraged to build and use their own latrines/toilets. The approach which was piloted in 58 villages across the sub-counties has proved effective with more than 90% of villages reaching Open Defecation Free (ODF) status. However, some of the limitations in this approach is that Pastoralism/nomadic lifestyle has made the approach difficult as communities move even after constructing toilets. In addition, there has been limited resources for implementation and the poverty nature of the households.

#### 2.3.3.2 Market-Based Sanitation (MBS)

This is a private-sector-led approach that encourages households to invest in improved sanitation solutions by creating demand and improving supply chains. Most of the urban and pre-urban households use the blend of market-based sanitation

Effectiveness:

- Encourages innovation in latrine technologies and financing options.
- Has led to increased access to improved sanitation, especially in peri-urban and urban areas.

Shortcomings:

- High initial cost limits access for low-income households.
- Requires strong market systems, which are weak in many rural areas.
- Regulatory gaps may lead to poor-quality sanitation products.

### ***2.3.3 Assessment of fecal sludge and wastewater management and existing treatment facilities***

Faecal Sludge Management (FSM) includes emptying, transporting, treating, and safely disposing of faecal sludge from pit latrines and septic tanks. FSM in the county is sub-optimal with fewer sub-counties having rudimentary faecal sludge management systems (open dry beds). The county has a new sewerage system coming up at the county headquarter.

Effectiveness:

- Improves sanitation and public health by reducing environmental contamination.
- Expands safe sanitation access in urban and peri-urban areas

Shortcomings:

- Sewer systems are expensive and have stalled over time.
- Fewer households may benefit from the system
- Weak enforcement of FSM regulations leads to unsafe disposal.
- Inadequate treatment facilities in many sub-counties

#### **Emptying**

The emptying services for the decentralized systems in Mandera is relatively inactive, with just 2 exhausters operating and providing services at a disproportionately high cost (up to 30,000 Ksh/job). Less than 1% of Mandera's sanitation facilities are stated to have been emptied (Kenya National Bureau of Statistics, 2022)– this is significantly lower than other Counties. The total potential market for emptying in Mandera is approximately \$1 million/annum with semi-mechanized emptying services for pit latrine users in urban and rural environments. This can be introduced via use of formalized manual emptying, PuPu pumps, or Pits. A distinct effort will need to be made to develop services that are appropriate for the prevailing sanitation technology: pit latrines. While significant sewer upgrades are underway; the acute water shortage in Mandera will likely be a barrier to its widespread adoption and emptying services will continue to be required.

#### **Treatment**

Mandera County lacks treatment facilities for human waste. The market size is considered in terms of m<sup>3</sup>/day; assuming that urban dwellers use more modern facilities and more water than rural dwellers- however, assumptions may be high given the acute water shortages in Mandera. The

total treatment deficit for human waste is approx. 38,000 m<sup>3</sup>/day; with 24,000 m<sup>3</sup>/day of this demand in urban centres. A treatment plant of 6,000 m<sup>3</sup>/day is under construction in Mandera.

### Re-Use

There is no active reuse market in Mandera County – nor is there waste reaching treatment infrastructure which can be converted to reuse products. Should waste be collected from the urban, rural and total population – the potential market is estimated at \$137,000, \$94,000 and \$43,000 respectively. Culture was reported as a significant barrier to waste reuse in Mandera County. In the absence of nearby markets for sale, it is not recommended that waste to value be pursued unless an industrial client can be secured for the products.

### Mandera Sewerage Systems

There are plans by Northern Water Works Development Agency (NWWDA) through the Mandera Water and Sanitation Project funded by AfDB to develop a sewer and treatment plant which is ongoing. The project is for the construction of a waterborne wastewater disposal system for Mandera Town. The project is being implemented for a 20-year design period, with the ultimate design year being 2040 and ultimate design population of 432,938 persons. The scope of works for the project will involve construction of new wastewater stabilization ponds treatment works with a design capacity of 6,000 m<sup>3</sup>/day and construction of a collector sewerage systems of 48.5km of sewers ranging in diameter from DN225 (secondary) to DN900 (Trunk) Precast Concrete Pipes (PCP). A lack of water access is predicted to be a significant risk in the pursuit of water based sanitation in Mandera County.

### *2.3.4 Sanitation challenges, including waste management, hygiene practices, and cultural barriers*

Challenge	Market Size	Opportunity
Low quality of rural pit latrines in households	~34,000 units	<ul style="list-style-type: none"> <li>· Sales of upgrade products for sanitation facilities e.g. improved user interfaces, floors, doors etc.</li> <li>· Mass upgrade or replacement of rural pit latrines via a product that can be rolled out on credit to aid affordability</li> </ul>

Lack of toilets in areas of high population density	Unknown	<ul style="list-style-type: none"> <li>· Provision of ultra-affordable toilets for urban populations</li> <li>· Provision of ‘sanitation as a services’ e.g. container-based sanitation, where households can pay for access to sanitation as a monthly subscription</li> </ul>
Open defecation	~61,000 units	<ul style="list-style-type: none"> <li>· Develop approach to toilet provision for those open defecating focused on radical affordability or raising subsidy</li> </ul>
High cost of improved pit latrines/ septic tanks	~ 4,000 new toilets required each year	<ul style="list-style-type: none"> <li>· Development of standardised, affordable, sustainable sanitation product</li> </ul> <p>that can be sold to the masses, that bridges the financial gap between a basic pit latrine (150,000 KSh) and a septic tank (600,000 KSh)</p>
Low quality of sanitation facilities in Institutions – particularly primary schools	~350 primary schools ~100 secondary schools	<ul style="list-style-type: none"> <li>· Development of a specific technical and financial product that aids schools to upgrade their sanitation facilities</li> </ul>
Shortfall of 20 public toilets	20 public toilets	<ul style="list-style-type: none"> <li>· PPP with County Government to identify funding sources for expansion of public toilet network in return for contract to operate the toilets</li> </ul>
Absence of exhauster trucks in small towns	~4,000 emptying jobs required per year in urban areas	<ul style="list-style-type: none"> <li>· Develop formal waste management services for small towns</li> <li>· Integrate faecal sludge and solid waste management services to increase on affordability and reach</li> </ul>

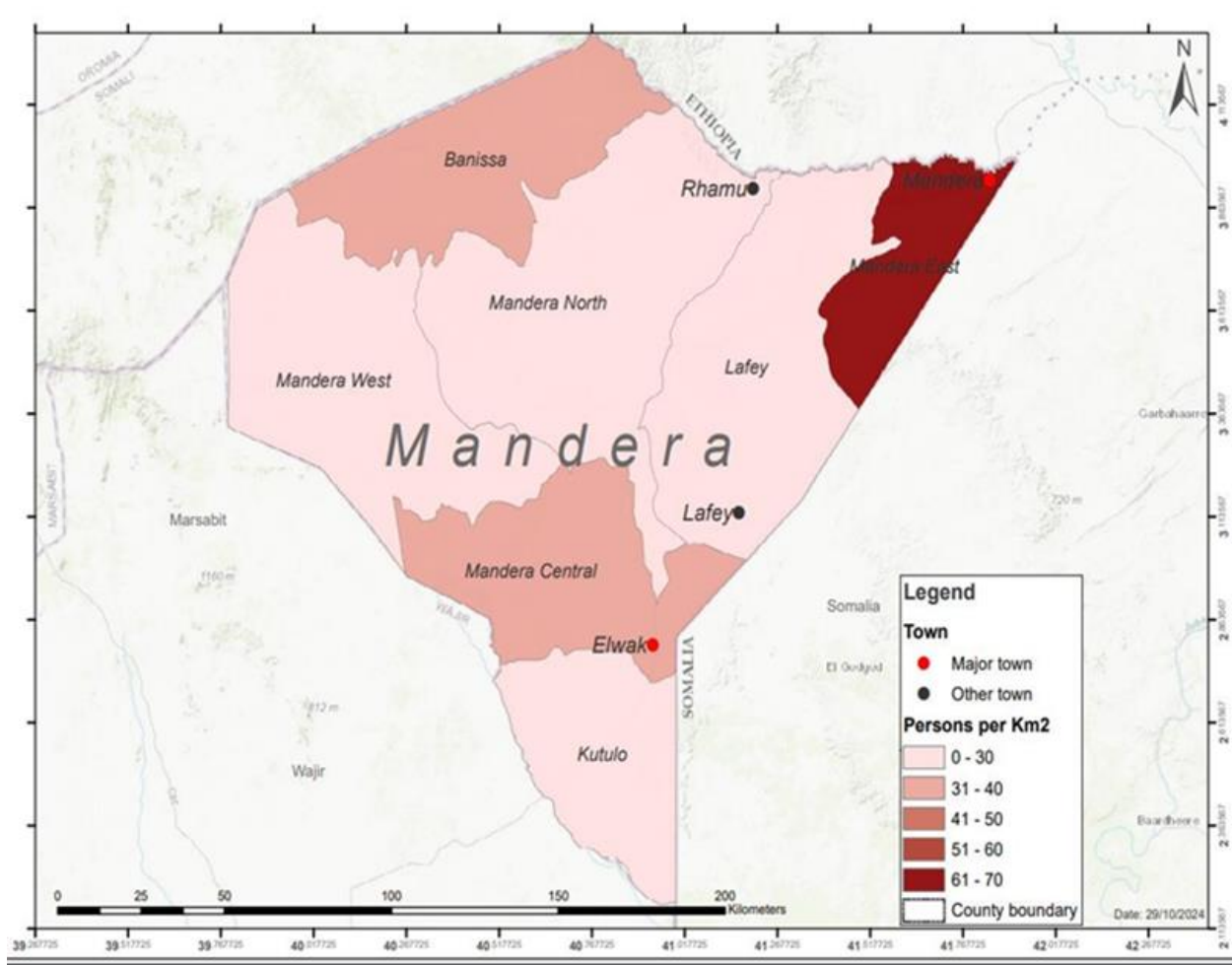


Figure 12: Sanitation infrastructure in Manderla County

### Climate Risks Affecting Sanitation Infrastructure

Climate risks, particularly drought and floods, severely impact sanitation infrastructure in Manderla County, leading to increased waterborne diseases and displacement. The county's water scarcity and reliance on unsafe water sources are exacerbated by climate shocks, rendering sanitation infrastructure vulnerable. The county's sanitation systems are under strain from both droughts and floods. Extended dry periods reduce water availability, complicating the operation of sanitation facilities. Conversely, intense rains, such as those from the 2023 El Niño, can overwhelm existing infrastructure, leading to the collapse of latrines and the spread of waterborne diseases

**Drought and Floods:** Manderla County is prone to recurrent droughts and floods, both of which pose significant threats to sanitation infrastructure. Droughts can deplete water sources, while floods can damage or destroy latrines, wastewater treatment, fecal sludge systems and other sanitation facilities.

**Displacement and Livelihood Impacts:** Extreme weather events can displace communities, leading to increased crowding in temporary shelters and further straining already limited sanitation resources. Disrupted livelihoods, particularly in agriculture and livestock, also exacerbate the vulnerability of communities to climate shocks and their impact on sanitation.

**Vulnerable Infrastructure:** Sanitation infrastructure in Mandera is already fragile, and climate change exacerbates its vulnerability. Flooding can wash away or damage latrines, wells, and other sanitation structures, while drought can lead to the drying up of water sources and the accumulation of waste.

**Sanitation demands:** In 2024, Mandera County successfully implemented Community-Led Total Sanitation (CLTS) in 58 selected villages, with a notable achievement of 50 villages in Lagsure Ward, Takaba, being declared open defecation free. The County Health Department aims to build on this success by intensifying demand creation, health education, and promotion of low-cost sanitation solutions like "Bora Choo" and "Choo Bora." These initiatives are tailored to improve sanitation access for both rural and urban populations. The adoption of sanitation services, including the construction and use of household latrines, has been commendable, demonstrating a positive community response to these interventions.

However, the sanitation needs in public spaces, particularly in markets and major towns, remain a significant challenge. Public sanitation facilities (PSFs) in these areas are limited and primarily managed by market committees to maintain hygiene and sanitation. These facilities operate on a pay-per-use basis, making them accessible but insufficient to meet the high demand in bustling commercial hubs. With growing population pressures and economic activity in Mandera, there is an urgent need to scale up investments in public sanitation infrastructure, especially in markets and public spaces, to ensure a hygienic environment for all residents and visitors.

**Hygiene Practices:** Hygiene practices form critical infection prevention and control measures. Hand hygiene with soap and water has been promoted as an effective preventive measure against various health-related issues, including diarrheal diseases, undernutrition, and neglected tropical diseases.

**Handwashing:** Hand washing with soap is the single most cost-effective intervention in preventing diarrheal diseases. The four critical hand washing moments include: after visiting the toilet/latrine, before cooking, before eating and after taking children to the toilet/latrine as shown in Table 26. Most households had their members wash hands before eating (78.8%) and after the toilet (71.2%) with 63.1% washing hands before cooking and 50.6% after taking the child to the toilet. Hand washing in all the 4 critical times was at 31.0%. 28.0% of households reported using soap and water when washing their hands.

Table 11: Handwashing critical times

Handwashing Instances	No.	Percentage
After toilet	477	71.2%
Before cooking	423	63.1%
Before eating	528	78.8%
After taking children to the toilet	339	50.6%
<b>At 4 critical times</b>	<b>208</b>	<b>31.0%</b>
Soap and water	149	28.0%

**Source:** Mandera Integrated Nutrition and Mortality Survey conducted in July 2023

**Hygiene services in health care facilities:** Water, Sanitation and Hygiene (WASH) services are essential to quality health and healthcare. It is estimated that more than 9% disease burden and 6% of deaths can be prevented by improving WASH (Bartram and Platt, 2010). As part of quality health care, health care facilities need to have safe and accessible water supply, clean and safe sanitation facilities, hand hygiene facilities at point of care and toilets and appropriate waste disposal systems.

Routine hygiene promotional activities with water and soaps have been ongoing in health care facilities (HCFs) to reduce hospital acquired infections. There is a need to conduct assessment in all health care facilities through WASH-Facility Improvement Tool (WASH-FIT).

Mandera has 112 health care facilities (7 level 4, 20 Health Centres and 85 dispensaries). More than 90% of level 2 & 3 health facilities depend on either water bowsers or rainwater harvesting and lack/inadequate water collection tanks either underground or plastic water tanks have been detrimental to the availability of water within these facilities.

## Challenges facing Urban Sanitation Services

### 1. Limited Access to Sanitation Services

Mandera County faces significant challenges in providing adequate sanitation services, particularly in urban areas. Factors such as rapid population growth, urbanization, and resource constraints contribute to limited access to proper sanitation facilities. This situation poses health risks and environmental concerns.

### 2. Capacity Constraints in Monitoring and Evaluation (M&E)

Effective monitoring and evaluation are crucial for ensuring the success of sanitation projects. However, the following challenges have been identified as Mandera County's M&E systems, including:

- **Limited Technical Expertise:** There is a shortage of personnel with specialized skills in M&E practices, hindering effective oversight of sanitation projects.
- **Inadequate Training:** Insufficient training programs for staff involved in M&E processes lead to gaps in knowledge and implementation.
- **Resource Limitations:** Financial and logistical constraints impede the establishment and maintenance of robust M&E systems.

### **3. Weak enforcement/regulatory standards**

These include:

- **Weak Regulatory Frameworks:** Existing policies may lack clarity or robustness, making enforcement challenging.
- **Limited Compliance Monitoring:** There is inadequate monitoring to ensure adherence to established sanitation standards by service providers.
- **Resource Constraints:** Insufficient funding and resources limit the capacity to enforce regulations effectively.

### **4. Accountability Mechanisms**

Ensuring accountability in urban sanitation services involves:

- **Stakeholder Engagement:** Active involvement of community members and stakeholders in planning and decision-making processes enhances transparency and accountability.
- **Public Feedback Systems:** Implementing mechanisms for residents to report issues and provide feedback on sanitation services promotes responsiveness.

## ***2.3.5 Opportunities to Strengthen County-Wide Sanitation Service Delivery***

To improve sanitation service delivery in Mandera, several opportunities can be leveraged, including policy reforms, technological advancements, community engagement, and strategic partnerships. Below are key opportunities:

### **1. Strengthening Governance and Policy Implementation**

- **Enforcing Existing Sanitation Policies:** Strengthening the enforcement of national and county-level sanitation regulations can ensure compliance with service quality standards.
- **Enhancing Multi-Sectoral Coordination:** Strengthening coordination between health, water, and environmental sectors can improve service delivery and sustainability.

## 2. Leveraging Public-Private Partnerships (PPPs)

- **Private Sector Investment:** Encouraging private sector participation in sanitation infrastructure development, such as waste treatment plants and public toilets, can improve access.
- **Social Enterprise Models:** Supporting social enterprises that provide affordable, innovative sanitation solutions (e.g., container-based sanitation, low-cost latrines).

## 3. Strengthening Community-Led Approaches

- **Scaling Up Community-Led Total Sanitation (CLTS):** Expanding CLTS initiatives can enhance behavioral change and reduce open defecation in rural and peri-urban areas.
- **Integrating Sanitation into Community Health Programs:** Training Community Health Promoters (CHPs) on sanitation and hygiene promotion can enhance awareness and uptake of improved sanitation practices.
- **Engaging Local Leaders and Religious Institutions:** Leveraging local influencers to advocate for better sanitation practices can drive community participation and behavior change.

## 4. Investing in Climate-Resilient Sanitation Infrastructure

- **Flood-Resistant Sanitation Facilities:** Constructing elevated or flood-resistant latrines in flood-prone areas to reduce contamination risks.
- **Water-Saving Technologies:** Promoting dry sanitation options such as EcoSan toilets in areas with water scarcity.
- **Improved Wastewater Management:** Establishing proper fecal sludge treatment and safe disposal systems to minimize environmental pollution.

## 5. Enhancing Monitoring and Data-Driven Decision-Making

- **Digital Sanitation Monitoring Systems:** Implementing digital tools (e.g., GIS mapping, mobile data collection) to track sanitation service coverage and gaps.
- **Periodic Sanitation Assessments:** Conducting regular evaluations to inform policy decisions and service improvements.
- **Community Feedback Mechanisms:** Establishing reporting platforms (hotlines, community scorecards) to enhance accountability in service delivery.

## 6. Expanding School and Healthcare Facility Sanitation Programs

- **School WASH Programs:** Investing in sanitation infrastructure in schools to ensure safe, inclusive, and gender-responsive facilities.
- **Healthcare Facility Hygiene Improvements:** Strengthening WASH-FIT (Water, Sanitation, and Hygiene – Facility Improvement Tool) implementation in healthcare settings to enhance infection prevention and control.
- **Menstrual Hygiene Management (MHM):** Providing adequate sanitation facilities and materials for menstrual hygiene in schools and public spaces.

## 7. Increasing Public Awareness and Advocacy

- **Mass Media Campaigns:** Using radio, social media, and local networks to educate communities on sanitation and hygiene best practices.
- **Behavior Change Communication (BCC):** Implementing targeted BCC strategies to encourage the adoption of improved sanitation behaviors.
- **Advocacy for Increased Budget Allocation:** Engaging policymakers and stakeholders to prioritize sanitation funding and investment.

### **County Formal and informal stakeholders in the sanitation Sector**

*Table 10: County Formal and informal stakeholders in the sanitation Sector*

<b>S/ N</b>	<b>Stakeholders</b>	<b>Roles and Responsibilities</b>
.	<b>Mandera County Government</b>	Responsible for developing sanitation policies, allocating funds, implementing

		projects, and overseeing sanitation activities across the county.
.	<b>MoWSI</b>	Provides technical expertise, guidance, and standards related to sanitation projects.
.	<b>MOH</b>	development of sanitation guidelines and policies,
.	<b>KNBS</b>	Collects data on sanitation access and usage through surveys like the Kenya Demographic and Health Survey (KDHS).
.	<b>WSPs</b>	Responsible for managing water and sanitation infrastructure, including maintenance and service delivery.
	<b>RACIDA</b>	Support CLTs, hygiene promotion, Capacity building
	<b>Save The Children</b>	Support CUs, Support CLTs, hygiene promotion, Capacity building
	<b>OSDA</b>	Hygiene Promotions, Staff training, Drilling of boreholes
	<b>Action Against Hunger</b>	Support CUs, Hygiene promotion, Capacity building, Support development of sanitation infrastructure.
	<b>Kenya Red Cross Society</b>	Hygiene promotion
0	<b>DRC</b>	Hygiene promotion, Capacity building, Support development of sanitation infrastructure
1	<b>Islamic Relief</b>	Hygiene promotion, Capacity building, Support development of sanitation infrastructure

	<b>Development Partners</b>	Provide funding and technical support for large-scale sanitation projects.
	<b>County Commissioner's Office:</b>	Plays a role in coordinating security and ensuring smooth implementation of sanitation initiatives.
	<b>Community Leaders</b>	Crucial for mobilizing communities, advocating for sanitation needs, and facilitating behavior change.
	<b>Local Health Facilities</b>	Promote hygiene education and link sanitation issues to health outcomes.

## 1.5 ACCESS TO WASH FOR SCHOOLS AND HEALTHCARE FACILITIES

### ***2.4.1 WASH in Schools***

Drinking water, sanitation and hygiene (WASH) beyond the household, and particularly in the school setting, is crucial to the health and education of children. Children spend a significant portion of their day at school where WASH services can improve educational opportunities and decrease the potential for disease transmission between students. In recognition of the importance of WASH in this setting, WASH in schools is implicitly and explicitly captured in Sustainable Development Goals (SDGs) 6.

Mandera County has a total of **410** schools (348 primary including ECDE centres, and 62 secondary). Most of the schools in rural areas are set up and depend on water bowsers and surface water. Mandera WASH in schools’ assessment done in July 2024, indicated the following findings.

A total 348 primary and ECDE centers have been assessed across the county, the total enrollment at the time of the survey was **201, 714** pupils (117,705 males and 78,262 females), with 3455 males with disability and 2292 females with mobility challenges.

The water supply across these schools is uneven, with many schools facing significant challenges in accessing clean and reliable water sources. In the Assessment conducted in July 2024, it was reported that about 38.5% (n=134) have consistent and reliable access to clean water throughout the year whereas 28.7% (n=100) Schools have inconsistent water supply either seasonal or insufficient to meet daily needs. A significant number of schools 32.7% (n=114) have reported to have no access to water within the school.

Table 11: water availability in schools

Water Availability	Response (NO.)	Percentage (%)
Available	134	38.5%
Sometimes Available	100	28.75%
Not Available	114	32.75%
<b>Total</b>	<b>348</b>	<b>100.00%</b>

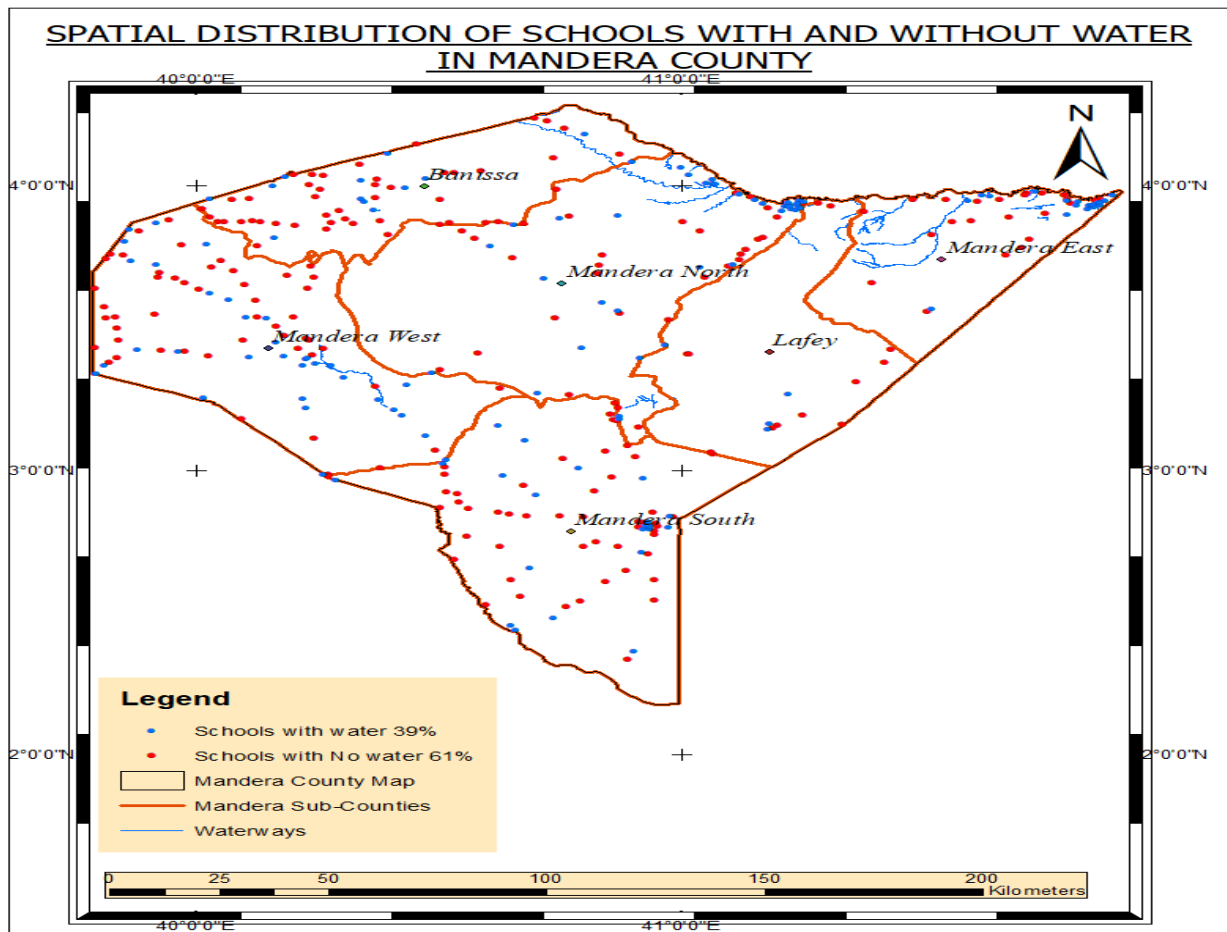


Figure 13: Spatial distribution of schools with and without water in Mander County

Schools without water face difficulties in maintaining basic hygiene and sanitation standards. This contributes to the spread of waterborne diseases and impacts the health of students and staff. Lack of water leads to poor hygiene practices, which results in illnesses and absences. This impacts student performance and learning outcomes. Schools with inadequate water supply find it difficult to implement school feeding programs effectively, which depend on access to water for cooking and cleaning. The absence of water often affects girls more than boys, as girls may be forced to miss school during menstruation due to lack of water for proper sanitation.

Water access in Mandera County’s schools remains a significant challenge, with approximately one-third of the schools lacking any form of water supply. Addressing this issue requires concerted efforts from the government, NGOs, and community stakeholders to ensure that all schools have access to clean and safe water, which is fundamental for promoting health, education, and equity in the region.

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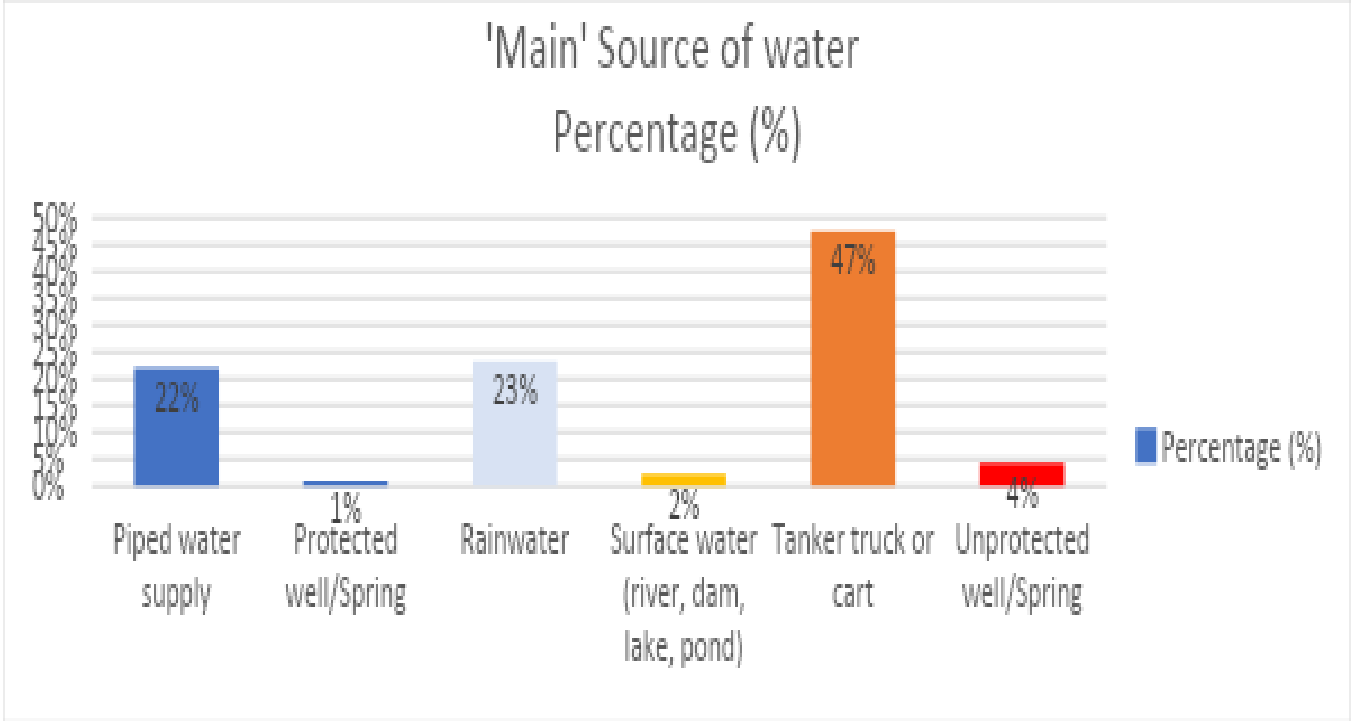


Figure 49: Main Source of Drinking Water

Tanker trucks or carts are the primary source for about 48% (n=110) of the schools, indicating a heavy reliance on external water supply solutions. Rainwater harvesting is the second most common source, used by 23% (n=54) of schools. Piped water supply serves 22% (n=51) of schools. Only 2% (n=5) and 1% (n=2) of schools use surface water and protected wells/springs,

respectively. Portions of schools 4% (n=10) depend on unprotected wells/springs, which can pose health risks.

This data underscores the need for improved and sustainable water solutions in schools, particularly in reducing reliance on tanker trucks and expanding piped water and rainwater harvesting systems.

### **Location of the Main Source of Water:**

Only 33% (n=78) of schools have water sources directly on their premises. 13% (31) have access to water within 500 meters of the school, which is relatively close but may still pose challenges in terms of transporting water. 54% (125) rely on water sources located more than 500 meters away from the school, indicating a significant portion of schools face challenges in accessing water, which can impact time, health, and sanitation. This data highlights the need for better infrastructure to bring water closer to schools and reduce the reliance on distant sources.

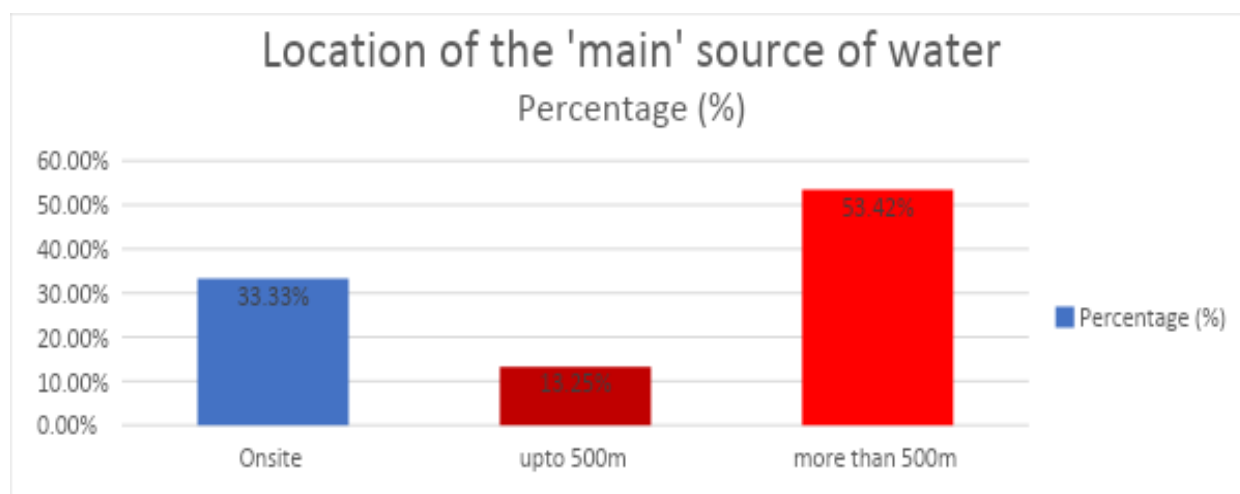


Figure 15 Location of the 'Main' Source of Water in Schools

### **Distance of Latrines/Sanitation Facilities to the main water source**

It was observed that 26.5% (n=62) schools have sanitation facilities (such as latrines) located within 30 meters of the water source. 73.5% (n=172) schools do not have sanitation facilities within this proximity to the water source.

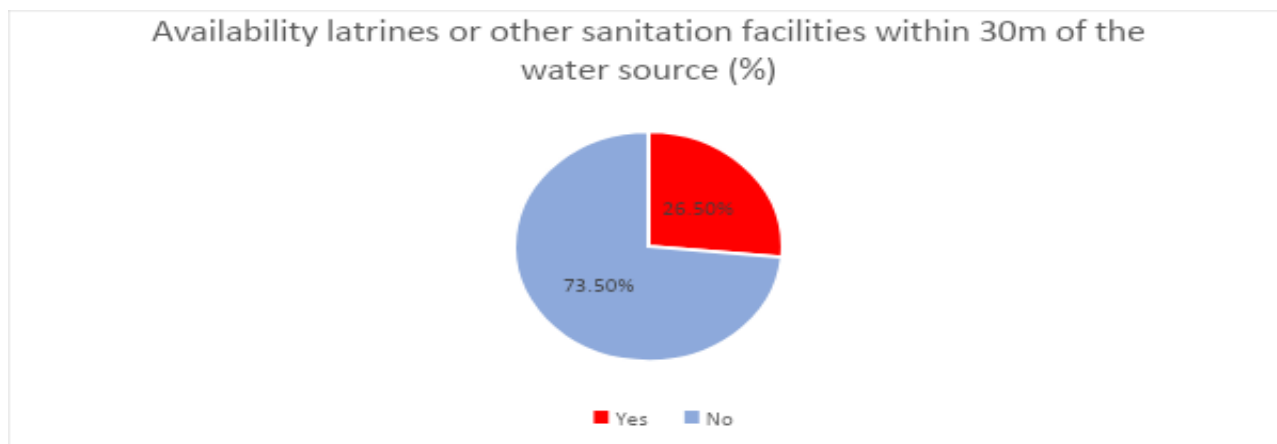


Figure 16 *Sanitation Facilities Proximity to the Water Sources*

This is significant because sanitation facilities close to water sources can increase the risk of water contamination. Ensuring proper distance between sanitation facilities and water sources is crucial to prevent contamination and improve overall hygiene and health standards in schools.

### Water Quality in Schools

When asked about the water quality whether it conforms to the national standards or not, about 18% (n=42) schools have reported to have water sources that are compliant with national drinking water standards. 44% (n=103) schools do not meet these standards, while 38% (n=89) schools were unsure whether their water source complies with national standards.

Table 12: Compliance of Water Sources with National Standards

<b>Main water source compliant with national standards for drinking water</b>	<b>No.</b>	<b>Percentage (%)</b>
Compliant	42	18%
Not Compliant	103	44%
Not known	89	38%
<b>Total</b>	<b>234</b>	<b>100%</b>

This highlights that nearly half of the schools have non-compliant water sources, while a significant portion is uncertain about the safety of their water. This underscores the need for water quality testing, awareness, and improvement in water safety to ensure students have access to clean drinking water.

### Water Quality Test

When asked about whether water quality tests were done on the drinking water only about 2.2% (n=5) respondents reported that water quality tests are conducted on their drinking water. A significant 83.3% (n=195) respondents said that water quality tests are not conducted. About 14.5% (n=34) respondents were unaware whether such tests were done.

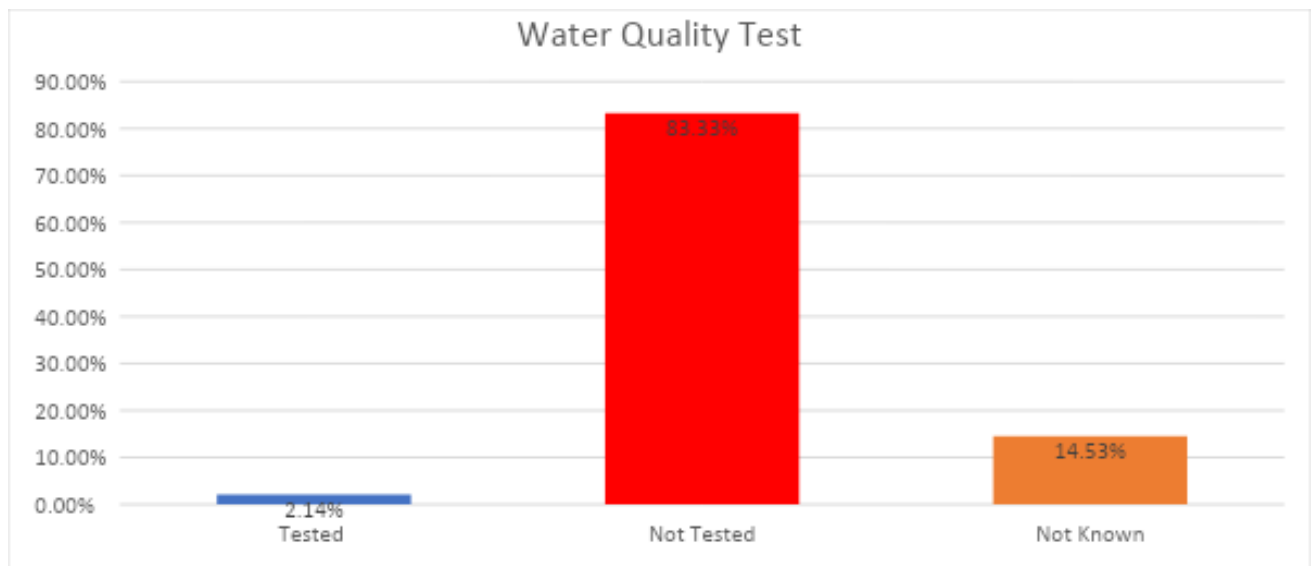


Figure 17: Water Quality Test

The overwhelming majority of respondents 83.3% (n=195) indicated that water quality tests are not conducted on their drinking water. This is a significant concern for public health, especially in areas where waterborne diseases are prevalent or water contamination is likely.

The data suggests an urgent need for interventions to ensure more regular testing of drinking water. It also highlights the importance of awareness programs to educate communities on the significance of water quality monitoring and safe consumption practices.

### Water Storage Facilities

74% (n=258) schools have reported to have water storage facilities. 26% (n=90) schools do not have water storage facilities.

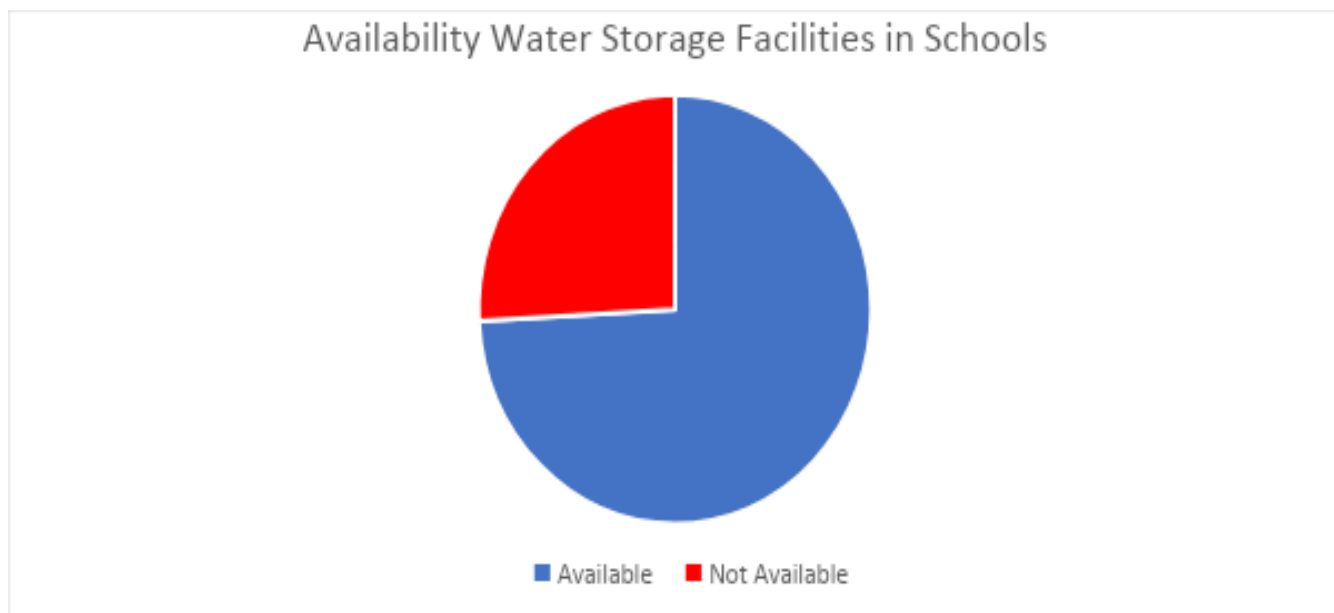


Figure 18: *Availability of Water Storage Facilities in Schools*

This data indicates that while the majority of schools have some form of water storage, a significant portion (over a quarter) lacks this essential infrastructure. The absence of storage facilities can affect water availability during periods of water scarcity, making it crucial to improve storage capacity across all schools.

**Type of Water Storage:**

Plastic tanks are the most common form of water storage used by about 53% (n=175) schools accounting for a significant portion of schools. Concrete/masonry storage is the second most common, either used alone 24% (n=81) schools or in combination with plastic tanks (75 schools). A small number of schools 1% (n=3) schools rely on other storage types such as elevated tanks or jerricans.

Table 13: Type of Storage Facilities

Type of storage	No.	Percentage (%)
Concrete	81	24%
concrete, plastic	75	22%
Plastic Tank	175	53%
Other - elevated tank, jerrican	3	1%

<b>Total</b>	<b>334</b>	<b>100.00%</b>
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**State of Water Storage:**

It was established that 71% (n=184) schools have water storage facilities that are in working condition. 28% (n=73) schools have storage facilities that are not working but can be repaired. Only 1% (n=3) schools have storage facilities that are damaged beyond repair, indicating a relatively low rate of irreparable damage.

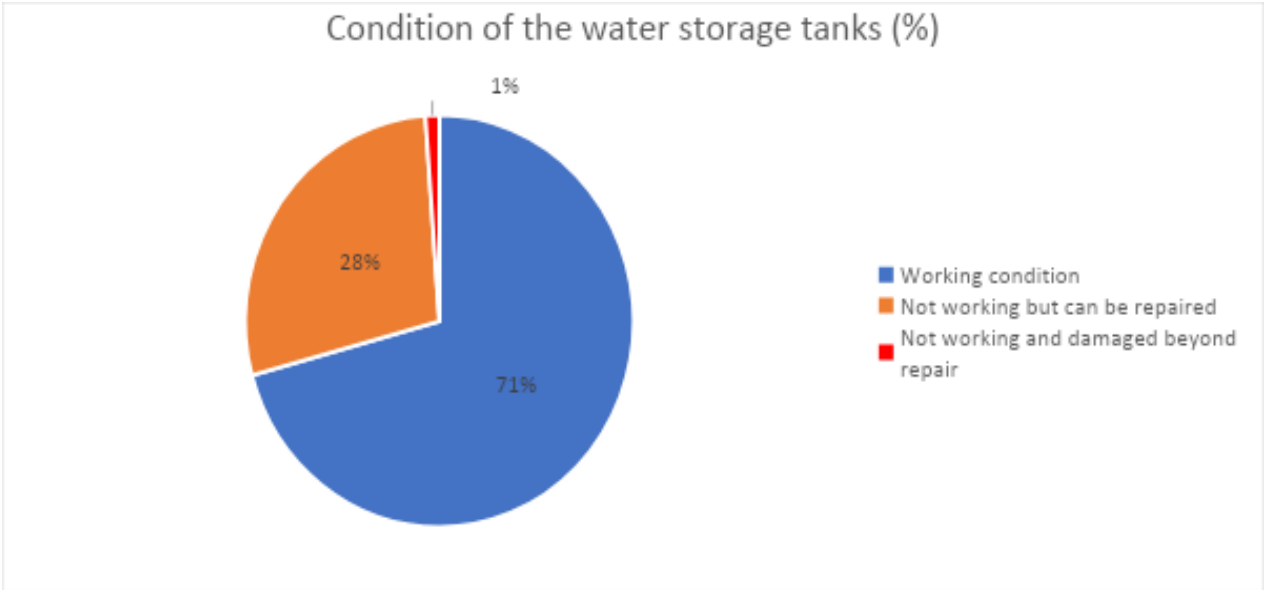


Figure 19: Condition of Water Storage tanks in schools

While the majority of schools have functional water storage facilities, the data indicates that many schools could benefit from repairs or upgrades to ensure consistent water availability. Improving and maintaining water storage systems, particularly in schools using plastic and concrete tanks, is essential for enhancing water security.

**Sanitation Infrastructure in Schools**

Addressing sanitation in schools in Mandera County is essential for promoting health and improving educational outcomes. Continued efforts and collaboration among various stakeholders are needed to create a sustainable and hygienic learning environment.

The assessment has revealed that toilets are readily available in schools standing at 73% while still a significant number of schools lacked sanitary facilities representing 26% while toilets separation for both genders stood at 56.53% of the schools reported to have separate toilets for different genders and 43.46% did not have such provisions. The toilets in schools were not aligned to the disability friendly framework as 82.6% of the school did not conform to the ease of

accessibility by disabled persons and only 17.3% did consider disability friendly infrastructure. The toilets were generally considered to be safe at 61.48% while the state of the toilets indicated that 48.40% were in working conditions, 47.34% not working but can be repaired and 4.24% are damaged beyond repair.

*Table 14: sanitary facilities in Schools*

<b>Toilet availability</b>	<b>No.</b>	<b>Percentage</b>
Available	281	73%
Not Available	67	26.80%
<b>Separate toilets for both genders</b>	<b>No.</b>	<b>Percentage</b>
Yes	160	56.53%
No	123	43.46%
<b>Disability friendly sanitary facilities</b>	<b>No.</b>	<b>Percentage</b>
Yes	49	17.30%
No	234	82.60%
<b>Safety of Toilets</b>	<b>No.</b>	<b>Percentage</b>
Yes	174	61.48%
No	109	38.51%
<b>Conditions of the toilets</b>	<b>No.</b>	<b>Percentage</b>
Working condition	137	48.40%

Not working but can be repaired	134	47.34%
Not working and damaged beyond repair	12	4.24%

Anal cleansing is predominantly practiced with 85.86% and this mainly informed by the Islamic faith which majority of the pupils professes while 14.13% did not practice anal cleaning and this can be mainly attributed to the non-locals and people of other faiths.

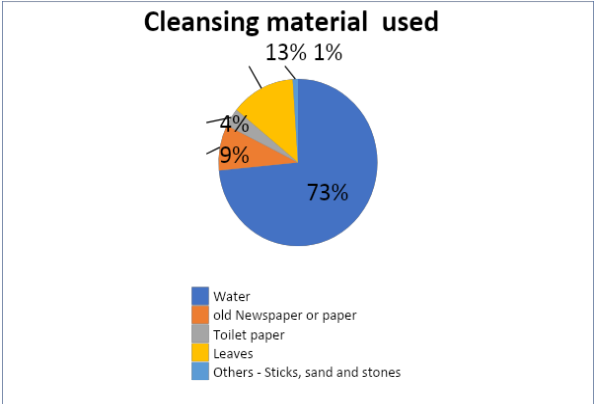
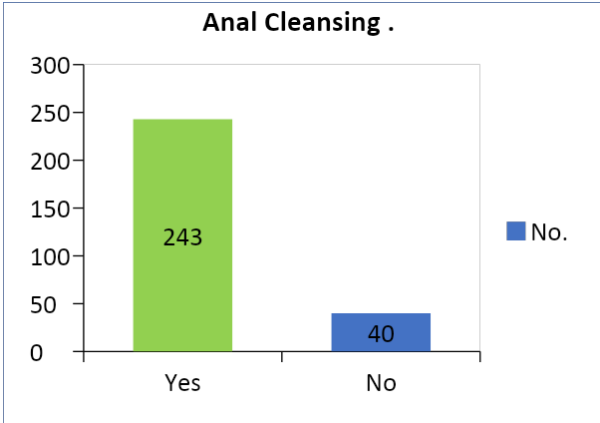


Figure 20: *practice anal cleansing*

The assessment highlighted that the main cleansing materials used in schools is water with 73% of the school population using it, while in remote and rural schools' leaves were used as a cleansing material standing at 13%, toilet paper at 4%, old newspapers at 9% and the least means of cleansing at 1% which includes the use of sticks, sand and stones.

Majority of the schools did not have a well-designed rain/storm drainage system with 91.16% of the schools reporting lacking proper drainage systems and only 8.83% reported to have basic drainage systems. Fecal sludge emptying are not readily available in the county with only 1.14% of the schools reporting to have used or are aware the availability of such services while majority of the schools revealed that 95.42% cannot access sludge emptying services and 3,42% are not aware of such services.

Table 15: Fecal Sludge Services

<b>Faecal emptying services</b>	<b>NO. of Schools</b>	<b>%</b>
Yes	4	1.14%
No	334	95.42%
Don't know	12	3.42%
<b>Have the latrines or septic tanks been emptied in the past 1 year?</b>	<b>No. of Schools</b>	<b>%</b>
Yes	1	1%
No	349	99%
<b>Are latrines or septic tanks emptied (or are latrines securely covered) when they fill up?</b>	<b>No. of Schools</b>	<b>%</b>
Yes	24	6.86%
No	326	93.14%
<b>Availability of sludge emptying services</b>	<b>No. of Schools</b>	
No.	350	100%

### **Hand Hygiene in Schools**

Hand washing is a simple yet crucial practice for maintaining hygiene and preventing the spread of diseases. Hand wash practices are not common in schools as only 23% of the schools have functional and readily available hand washing facilities and 77% did not have access to functional hand washing facilities. The common type of hand washing facility in schools is container with tap accounting for 60.81% followed by permanent (concrete/Metal) stationed with multiple taps at 29.27%, single pipe taps represented by 10.8% and the least type of hand wash facility in schools is the tippy tap at 2.7% respectively. Availability of soap and water in schools

for complete disinfection is a common public health concern since 59% of the schools only utilize water alone for hand disinfection and only 24% have readily available soap and water, while 16% of the schools did not have neither soap nor water.

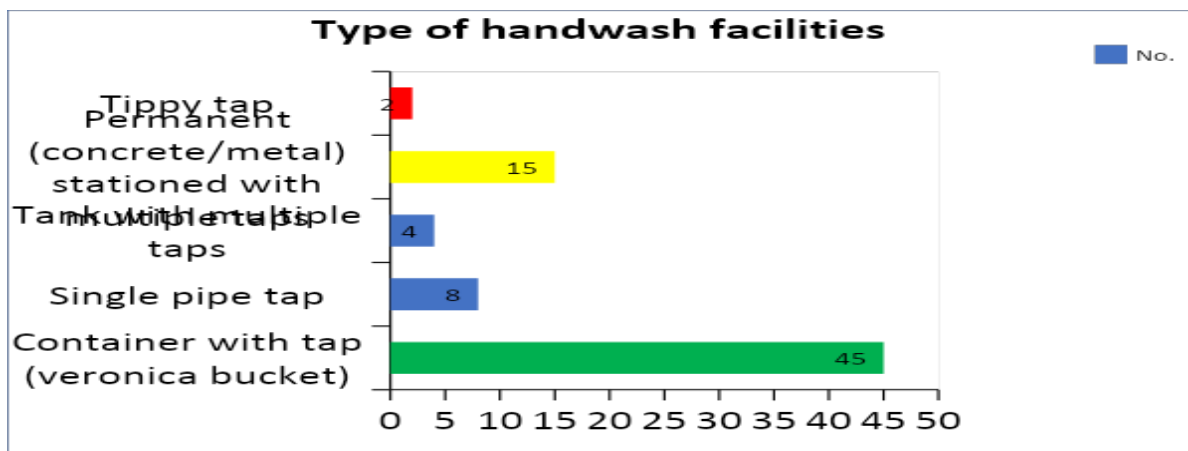


Figure 21: Type of handwashing facilities



Figure 22: Availability of Soaps and Water

### Menstrual Hygiene Management (MHM)

Access to better menstrual hygiene management practices in Kenya is poor, and the problem is more dire in ASAL counties. Poverty coupled with pastoral culture, low levels of hygiene behaviour, poor and inadequate sanitation facilities as well as access to sanitary products for both in schools and out of school girls has resulted in high levels of hygiene related infections. The inability to properly dispose of sanitary waste has resulted in a constant eyesore and health hazard.

In Mandera, Interventions to improve on MHM in the county have been inadequately resourced as it is not prioritized within the context of county planning and budgeting. Efforts

through partners have reached a handful of adolescent and young girls with the kits, however, this is just too little. Interventions in improving access should be geared towards procurement of the MHM kits, sensitization, and training of teachers in schools and continuous health promotion activities to adolescent girls in schools especially in hard-to-reach areas.

Menstrual Hygiene Management involves educating students about menstrual health, providing access to sanitary products, and creating a supportive environment to address the needs of menstruating students, based on the assessment, majority of the schools were lacking safe spaces for MHM representing 98.27% and only 1.72% have created safe spaces for MHM. I

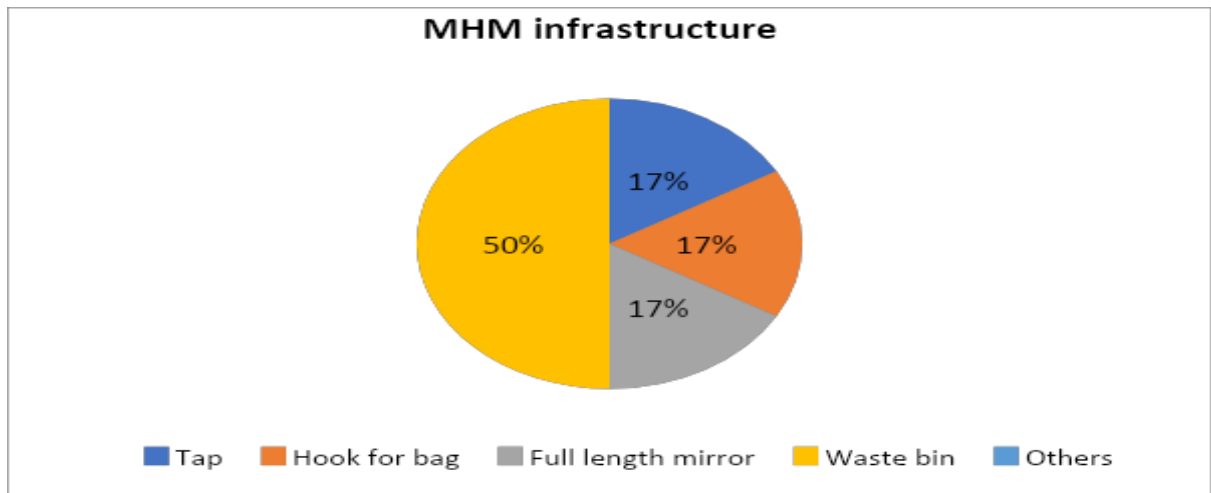


Figure 23:MHM infrastructure

**Sanitation Facilities:** Sanitation facilities encompass a wide range of infrastructure designed to manage human waste and maintain hygiene standards. In Mandera county, the availability and quality of sanitation facilities vary significantly across different regions and communities. According to Kenya Population and Census Report 2019, Mandera Sanitation facilities are mainly: Pit latrines covered (28.3%), pit latrines uncovered (23.4%) and VIP latrines (2.8%) with 39.4% relieving in open/bushes.

**Waste Management:** Effective waste management is essential for mitigating environmental pollution and protecting public health. In our county, waste management practices vary widely, with some areas lacking formal waste collection and disposal services.

Collection Infrastructure: the county has designated fenced solid waste collection points in all the sub county headquarters with Garbage collection trucks and enough personnel operating in six sub counties. The available waste disposal methods are: open dump sites, landfilling and incineration

Waste Recycling and Recovery: Promoting waste recycling and recovery initiatives can help reduce the burden on landfills and create economic opportunities. We will explore existing initiatives and identify opportunities for expansion

#### ***2.4.2 WASH in Health Care Facilities (HCFs)***

Water, Sanitation and Hygiene (WASH) services are essential to quality health and healthcare. It is estimated that more than 9% disease burden and 6% of deaths can be prevented by improving WASH (Bartram and Platt, 2010). As part of quality health care, health care facilities need to have safe and accessible water supply, clean and safe sanitation facilities, hand hygiene facilities at point of care and toilets and appropriate waste disposal systems.

Routine hygiene promotional activities with water and soaps have been ongoing in health care facilities (HCFs) to reduce hospital acquired infections. There is a need to conduct assessment in all health care facilities through WASH-Facility Improvement Tool (WASH-FIT).

Mandera has 112 health care facilities (7 level 4, 20 Health Centres and 85 dispensaries). More than 90% of level 2 & 3 health facilities depend on either water bowsers or rainwater harvesting and lack/inadequate water collection tanks either underground or plastic water tanks have been detrimental to the availability of water within these facilities.

Connection of water to the health care facilities such as installation of water-tanks for collection of rain-water harvest, water from boreholes and or water bowsers, provision, and installation of handwashing facilities with water and soap, sensitization of health care providers on water and sanitation hygiene promotional messages will have ripple effect of quality of care, IPC, prevention of water related illnesses, and enhance staff morale.

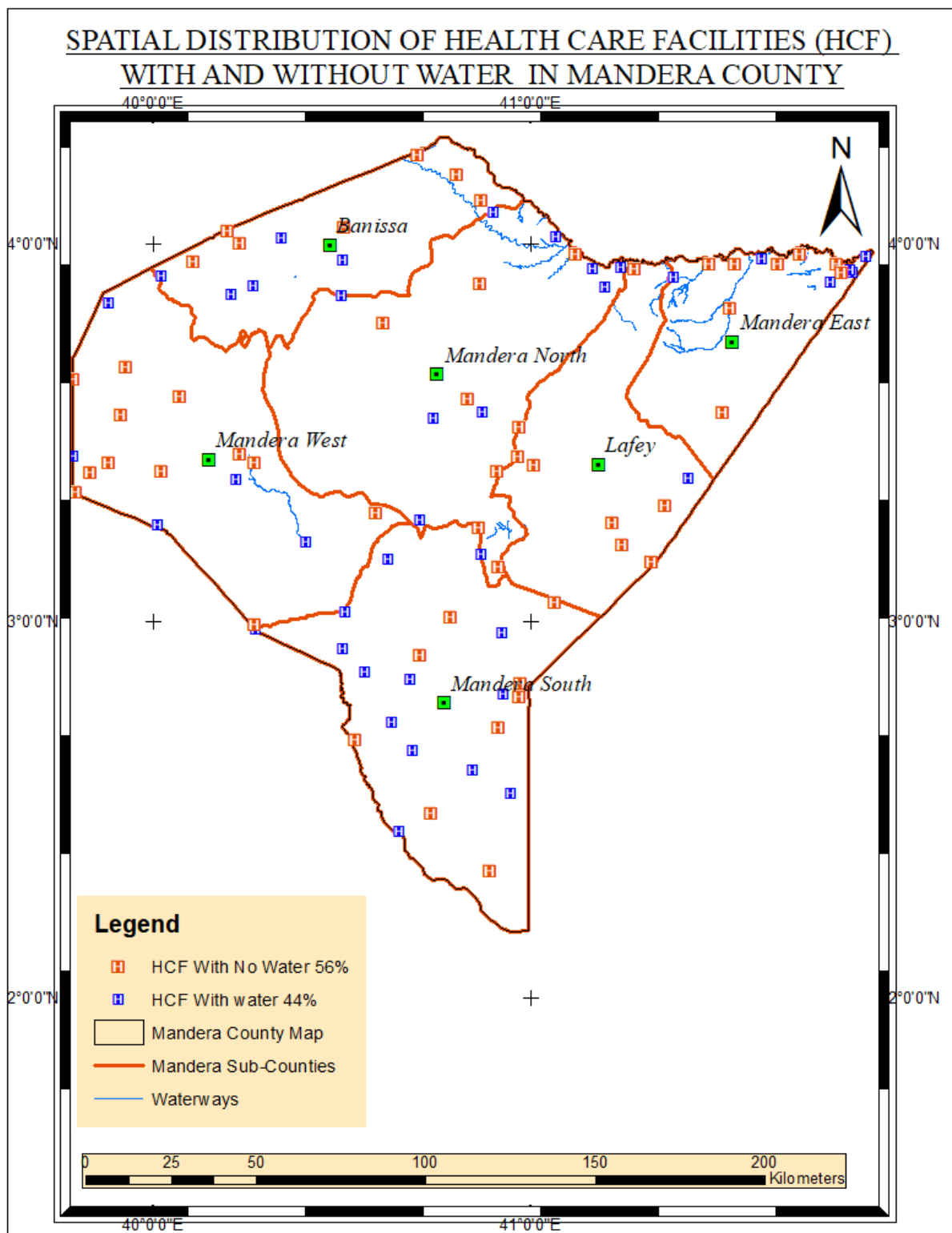


Figure 24: spatial distribution of HCF with and without water

**Sanitation Infrastructure in HCFs:** The assessment was conducted in 96 HCFs (Level 2 & 3) across the county. It was established that 90% (n=86) of HCFs have at least a form of toilet while 10% (n=10) have no toilets facilities at all. 88% (n=76 HCFs) of the sanitation facilities are pit latrines with slabs, with 6% (n=5 HCFs having pit latrines without slabs as shown in the table xx below.

Table 16: : Pit Latrines

TYPE	NO. OF HCF	%
Pit latrine with slab	76	88
Pit latrine with slab Flush / Pour-flush toilet to septic tank or pit	1	1
Pit latrine with slab Flush / Pour-flush toilet to sewer connection	1	1
Pit latrine with slab Pit latrine without slab	5	6
Pit latrine without slab	2	2
Pit latrine without slab Pit latrine with slab	1	1
<b>TOTAL</b>	<b>86</b>	<b>99</b>

**Locations of toilets:** On the location of the toilet facilities in HCFs, 73% (n=63 HCFs) have the toilet facilities situated outside the health facility building but within the premise compound, only 21% (n=18 HCFs) have water piped into the facility building.

Table 17: Toilet Locations

LOCATION	NO. OF HCF	%
Off-premise	2	2
Outside the health facility building, but on-premise	63	73
Outside the health facility building, but on-premise Within the health facility building	2	2
Within the health facility building	18	21
Within the health facility building Outside the health facility building, but on-premise	1	1
<b>TOTAL</b>	<b>86</b>	<b>99</b>

**Segregation of the toilet facilities:** Most of the HCFs, 62% (n=53 HCFs) have toilets that are dedicated for staff, however, 69% (n=59 HCFs) have toilets that are not disaggregated by gender (Male or female). It is important to note that most of the HCFs, 92% (n=79) have no toilet facility

that is dedicated for Menstrual Hygiene Management, in addition, 85% (n=73 HCFs) have no toilets that are accessible by people living with disability (PWD).

Table 18: availability of segregated toilet facilities

Toilets	Yes	No	Total	%	%	% No
If the toilets are dedicated for staff	53	33	86	62		38
If the toilets are Sex-Separated	27	59	86	31		69
If the toilet has Menstrual Hygiene	7	79	86	8		92
If the toilets are accessible to PWD	13	73	86	15		85

### Conditions of the toilets

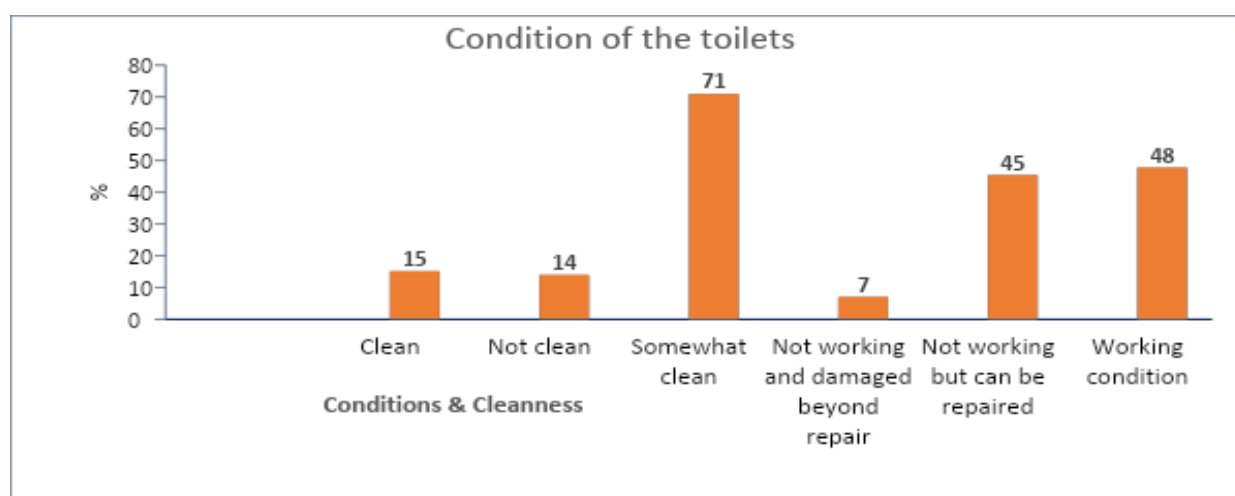


Figure 25: condition of the toilet

On the conditions and cleanliness of HCFs, Only 15% (n=13 HCFs) were found to be clean, 71% (n=61 HCFs) are found to be somewhat clean. 45% (n=39) HCFs have toilet facilities that are not working and need repair while 48% (n=41 HCFs) are reported to be in good working condition.

**Safely Managed Sanitation:** Safely managed sanitation refers to the hygienic separation of human waste (feces and urine) from human contact and the environment and ensuring that waste is safely treated and disposed of. It is a higher standard of sanitation than basic services and includes three key criteria:

1. **Use of improved sanitation facilities:** These include facilities that hygienically separate human waste from human contact, such as flush or pour-flush toilets connected to piped sewer systems, septic tanks, or pit latrines with slabs.

2. **Not shared with other households:** To qualify as safely managed, the sanitation facility must not be shared with other households.

3. **Safe disposal or treatment of waste:** The waste must either be treated on-site (like in a properly managed septic tank or pit latrine), transported and treated off-site, or safely disposed of into a sewer system with wastewater treatment.

Based on the assessment, it was established that 91% (n=78 HCFs) have no fecal emptying services. In addition, 94% (n=81 HCFs) reported that their latrines have not emptied in the last one year. The table 14 below fecal sludge management in HCFs

*Table 19: fecal sludge management in HCF*

<b>Fecal emptying Services</b>	<b>No. of HCF</b>	<b>%</b>
Don't know	6	7
No	78	91
Yes	2	2
<b>If the latrines have been emptied in the last one year</b>	86	
No	81	94
Yes	5	6

**Hygiene Practices:** Hygiene practices form critical infection prevention and control measures. Hand hygiene with soap and water has been promoted as an effective preventive measure against various health-related issues, including diarrheal diseases, undernutrition, and neglected tropical diseases.

**Handwashing Practices at HHs level:** Hand washing with soap is the single most cost-effective intervention in preventing diarrheal diseases. The four critical hand washing moments include: after visiting the toilet/latrine, before cooking, before eating and after taking children to the toilet/latrine as shown in Table 26. Most households had their members wash hands before eating (78.8%) and after the toilet (71.2%) with 63.1% washing hands before cooking and 50.6% after taking the child to the toilet. Hand washing in all the 4 critical times was at 31.0%. 28.0% of households reported using soap and water when washing their hands.

*Table 20: Handwashing critical times*

<b>Handwashing Instances</b>	<b>No.</b>	<b>Percent</b>
After toilet	477	71.2%
Before cooking	423	63.1%
Before eating	528	78.8%
After taking children to the toilet	339	50.6%
At 4 critical times	208	31.0%
Soap and water	149	28.0%

Source: Mandera Integrated Nutrition and Mortality Survey conducted in July 2023

**Presence of Hand Hygiene in HCFs:** On presence of hand hygiene facilities, 35% (n=34 HCFs) reported there're hand wash facilities but none are functional, they lack both water and soap. In 33% (n=32 HCFs), hand wash facilities are non-existent. Only 1/3 of the public health facilities reported to have hand wash facilities that are functional with both water and soap.

*Table 21: presence of hand hygiene in HCFs*

<b>If there is Hand Hygiene facilities at the HCF</b>	<b>NO. OF HCF</b>	<b>%</b>
No - no hand hygiene facilities at points of care	32	33
No - there are hand hygiene facilities at points of care but not functional, or lacking soap and water or alcohol-based hand rub.	34	35
Yes - there are functional hand hygiene facilities at points of care with soap and water or alcohol-based hand rub.	30	31
<b>Presence Hand Hygiene at one or more points</b>		
No, no handwashing facilities near toilets (within 5 meters)	64	67
No, there are handwashing facilities near the toilets but lacking soap and/or water	18	19
Yes	14	15

**Condition of Hand Wash Facilities:** 55% (n=35 HCFs) reported to have handwash facilities that are in good working condition, whereas, 23% (n=15) and 22% (n=14) reported to have handwashing facilities that are either damaged and those that can't be repaired completely respectively.

*Table 22: condition of hand washing facilities*

<b>Condition of the Hand Wash facilities</b>	<b>NO. OF HCF</b>	<b>%</b>
Not working and damaged beyond repair	14	22
Not working but can be repaired	15	23

Working condition	35	55
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**Type of Hand Wash facilities:** Most of the hand wash facilities, (68%) were containers with a tap either a 20L bucket or a 50L tank or 100L tanks.

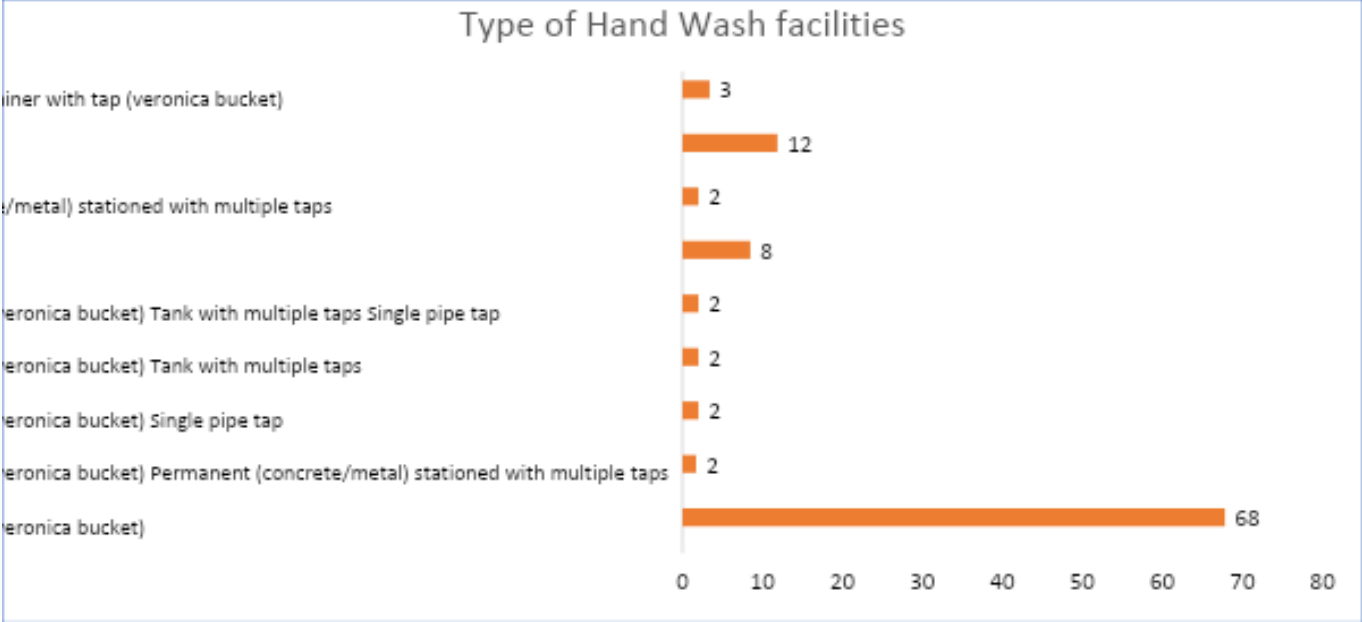


Figure 26: Type of hand washing Facilities:

**Health Care Waste Management:** Health-care waste contains potentially harmful microorganisms that can infect hospital patients, health workers and the general public. Other potential hazards may include drug-resistant microorganisms which spread from health facilities into the environment.

Adverse health outcomes associated with health care waste and by-products also include:

- sharps-inflicted injuries;
- toxic exposure to pharmaceutical products, in particular, antibiotics and cytotoxic drugs released into the surrounding environment, and to substances such as mercury or dioxins, during the handling or incineration of health care wastes;
- chemical burns arising in the context of disinfection, sterilization or waste treatment activities;
- air pollution arising as a result of the release of particulate matter during medical waste incineration;

- thermal injuries occurring in conjunction with open burning and the operation of medical waste incinerators; and
- radiation burns

The study has shown that **59% (n=57)** of the health care facilities are doing appropriate standard waste segregation while **25% (n=24)** did not practice waste segregation protocols and **16% (n=15)** of the health facilities did not even have the standard health waste segregation bins.

Table 23: *Health Care Waste Management*

Segregation of Health Care Waste	NO. HCF	%
No, bins are not present	15	16
bins are present but do not meet all requirements or waste is not correctly segregated	24	25
Yes, waste is segregated into three labelled bins	57	59
TOTAL	96	100%

**Treatment/Disposal of Infectious Waste at HCF:** Proper Treatment and disposal of infectious health care waste is of paramount public health and environmental health importance. The healthcare assessment has revealed that **49%(n=47)** were doing waste burning in a protected pit, while **26%(n=25)** were incinerating waste using burning chambers and only **1%(n=1)**, was using standard incinerator and **24%(n=23)** were disposal waste through open burning.

**Treatment/disposal of sharps waste at HCF:** Worldwide, an estimated 16 billion injections are administered every year. Not all needles and syringes are disposed of safely, creating a risk of injury and infection and opportunities for reuse.

The healthcare facility assessment has highlighted that **38%(n=36)** of the health care sharps are burned in a protected pit, while **28%(n=27)** are incinerated using burning chamber and only **3%(n=3)** are using standard two chamber incinerators. Almost **7%(n=7)** of the health care waste is untreated and dumped off-site. Open burning in sharps management accounts **23% (n=22)**

Table 24: Treatment/Disposal of Infectious Wastes at HCF

<b>TREATMENT/DISPOSAL OF INFECTIOUS WASTE AT HCF</b>	<b>NO. OF HCF</b>	<b>%</b>
Burning in a protected pit	47	49
Incinerated (other) / Burning chamber	25	26
Incinerated (two chamber, 850-1000 °C incinerator)	1	1
Open burning	23	24
<b>TREATMENT/DISPOSAL OF SHARPS WASTE AT HCF</b>	<b>NO. OF HCF</b>	<b>%</b>
Burning in a protected pit	36	38
Incinerated (other) / Burning chamber	27	28
Incinerated (two chamber, 850-1000 °C incinerator)	3	3
Not treated, but collected for medical waste disposal off-site	7	7
Open burning	22	23
Open dumping without treatment	1	1
<b>TOTAL</b>	<b>96</b>	

**Water Accessibility:** The assessment that was carried out in 96 health care facilities revealed that 27% (n=26) of those facilities have access to water at all times, while 28% (n=27) have partial access to water indicating need for improvement in water accessibility. A significant proportion of the health care facilities 45% (n=43) have no access to water.

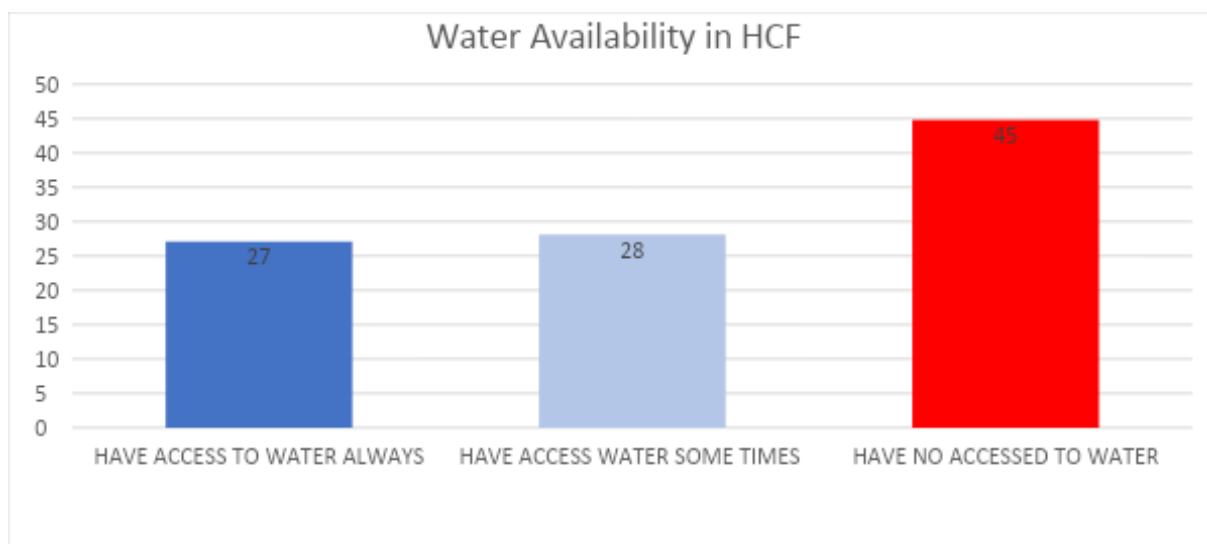


Figure 27: Water Access in Healthcare Facilities

**Source of water for HCF:** The HCF WASH Survey revealed a diverse range of water sources, with tanker trucks and rainwater collection as the primary methods of supply. Water trucking was found to be main source of water for HCF accounting for 38.5% (n=37), followed by rainwater harvesting with a representation of 32.3% (n=31) HCFs, 19.8% (n=19) access water through piping system either inside or outside the facility. Surface water as source accounts for about 5.2% (n=5) and the least source of water the HCFs being boreholes.

Table 25: Sources of Waste for HCF

Sources	No. of HCF	Percentage (%)
Borehole / Tube well	4	4.2
Piped supply inside the building	9	9.4
Piped supply outside the building	10	10.4
Rainwater	31	32.3
Surface water (river, dam, lake, pond)	5	5.2
Tanker truck	37	38.5
TOTAL	96	100%

**Distance from Water Sources:** This analysis examines the distance of the main water sources from the HCF, as indicated in the table below. Understanding the distribution of these distances can provide insights into accessibility and potential challenges faced by HCF.

Water source being 500m and above, this category has the highest representation, with 44% (n=42) HCF. This indicates a significant number of HCF are far from their water sources, which could lead to increased time and effort in water collection. 40% (n=38) HCF have water sources located within their premises. This proximity suggests better access and convenience, likely reducing the burden of water collection. Only 17% (n=16) HCF have their main water at a distance of up to 500m, indicating that a relatively small number of HCF have water sources that are moderately accessible.

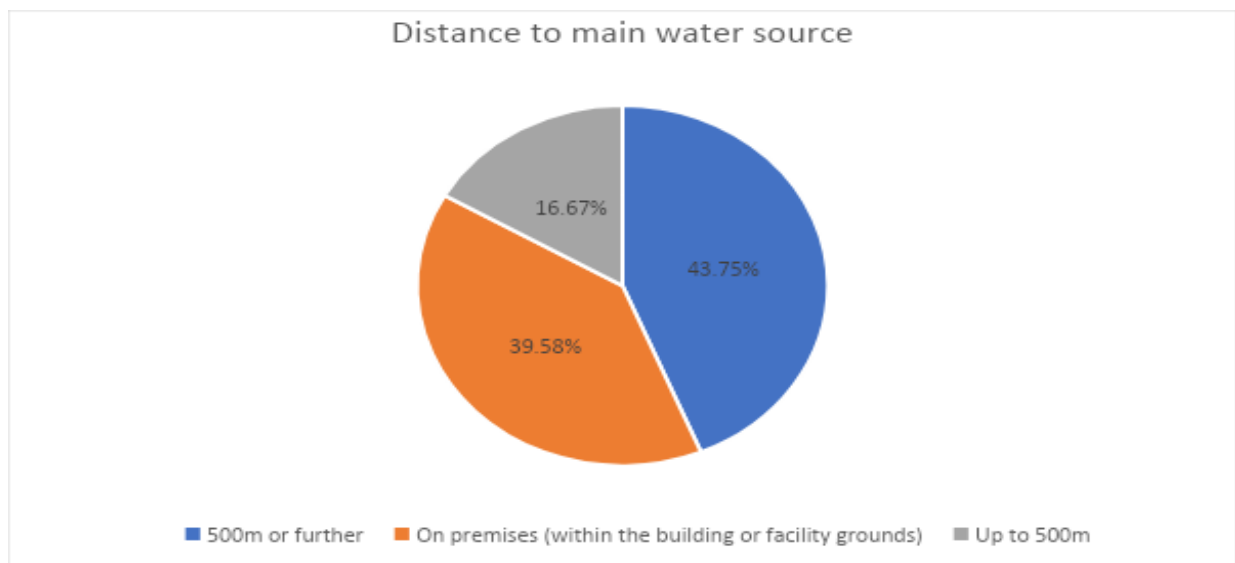


Figure 28: Distance to Main Water Sources

**Sanitations facilities within 30m from the water source:** It was observed that 32% (n=31) healthcare facilities have sanitation facilities located within 30 meters of their water sources. This indicates that many facilities may face challenges in contamination of the water source. 68% (n=65) Health care facilities have no sanitation facilities or latrines within 30 meters of the water sources.

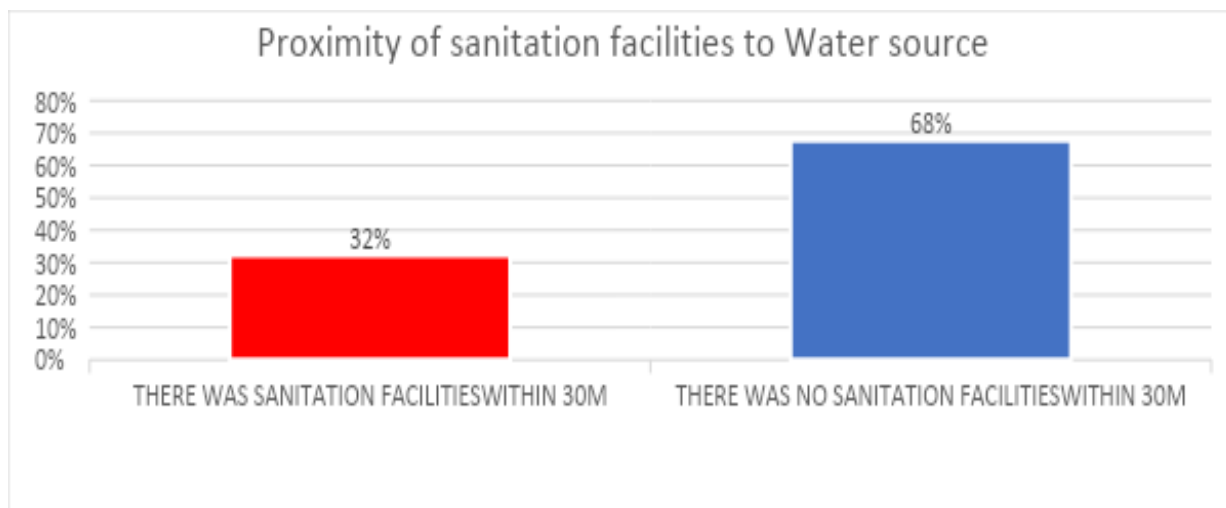


Figure 29: Proximity of Sanitation facilities to Main water Sources

**Treatment of water from the main source for drinking:** The treatment of water for drinking purposes at Health Care Facilities (HCFs) based on the provided data reveals important insights: **Treated vs. Untreated:** Out of 82 HCFs, 48 (59%) treat their water, while 34 (41%) do not. This indicates a slight majority of facilities are ensuring water treatment before consumption, which is a positive sign for public health.

Table 26: Treatment of water from the main sources for drinking

WHETHER THE WATER IS TREATED AT HCF	NO. OF HCF	PERCENTAGE (%)
THE WATER IS TREATED	48	59
THE WATER IS NOT TREATED	34	41
<b>TOTAL</b>	<b>82</b>	<b>100</b>

Methods of water treatment used in HCF: The data presented outlines the methods of water treatment utilized at a health care facility (HCF). Chlorination is the predominant method with 98% (n=47) HCFs, indicating a strong reliance on this technique for disinfection. Its high effectiveness and low cost likely contribute to its widespread use. Only one facility employs filtration. Table below shows different methods employed in HCFs to treat drinking water.

Table 27 Methods of Water Treatment used in HCFs

<b>METHODS</b>	<b>NO. OF HCF</b>	<b>PERCENTAGE (%)</b>
Filtration	1	2
Boiling	0	0
Chlorination	47	98
SODIS	0	0
Ultraviolet disinfection	0	0
others	0	0
<b>TOTAL</b>	<b>48</b>	<b>100</b>

**Compliance With National Standard of Water:** From the Survey, it was established that only 32% (n=20) of the facilities have met the national standards for drinking water. This indicates a significant gap in compliance, which could have implications for public health. A substantial 48% (n=30) of facilities are not compliant. This raises concerns about water quality and suggests that nearly half of the assessed facilities may be posing risks to consumers. The "Don't Know" category constitutes 21% (n=13) of the total.

Table 28 Drinking Water Compliance with National Standard

<b>STANDARD</b>	<b>NO. OF HCF</b>	<b>PERCENTAGE (%)</b>
Compliant	20	32
Not Compliant	30	48
Don't Know	13	21

<b>TOTAL</b>	<b>63</b>	<b>100</b>

**Water Storage Facility in the HCF:** A significant majority 88% (n=84) of healthcare facilities have water storage tanks. This suggests that most facilities are equipped to manage their water supply, which is crucial for ensuring availability during peak demand or emergencies. About 13% (n=12) of facilities do not have water storage available. This could pose serious challenges, especially in situations of water scarcity or disruption in supply, potentially compromising patient care and hygiene.

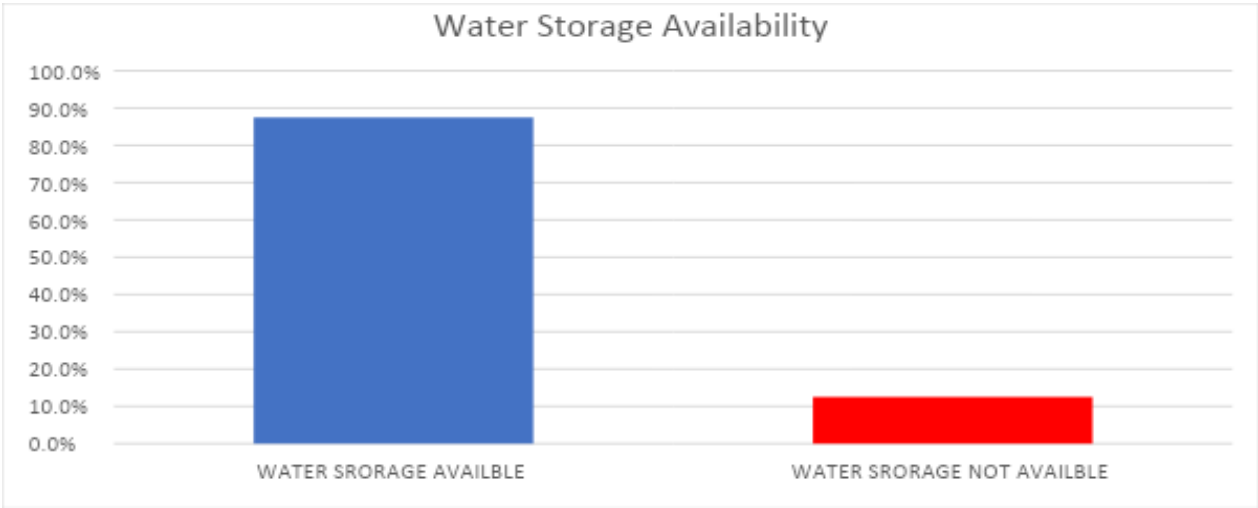


Figure 25: Availability of Water Storage Tanks

**Type of water storage tanks:** The predominant storage method is plastic tanks used by 75% (63) of facilities. This may be due to their lightweight nature, cost-effectiveness, and ease of installation. However, it raises concerns about durability and potential leaching, depending on the tank material quality. Concrete tanks represent 18% (n=15) of storage types either used alone or with plastic tanks. They are durable and have a longer lifespan but are more expensive and harder to install compared to plastic options. Metal Tanks were the least used category with about 1% (n=1) HCF using it

Table 29: *Types of Water Storage Tanks in HCFs*

TYPE OF STORAGE	NO. OF HCF	PERCENTAGE (%)
Concrete tank	6	7
Concrete tank Plastic tank	9	11
Metal tank	1	1
Plastic tank	63	75
Plastic tank Concrete tank	5	6
<b>TOTAL</b>	<b>84</b>	<b>100</b>

**Condition of water storage facilities:** A significant percentage 79% (n=66) of the units are functioning well, which is a positive indicator of the facility's overall capacity. The 21% (n=18) of units that are not working but can be repaired indicates an opportunity for improvement. If these units are repaired, the facility could increase its operational capacity considerably.

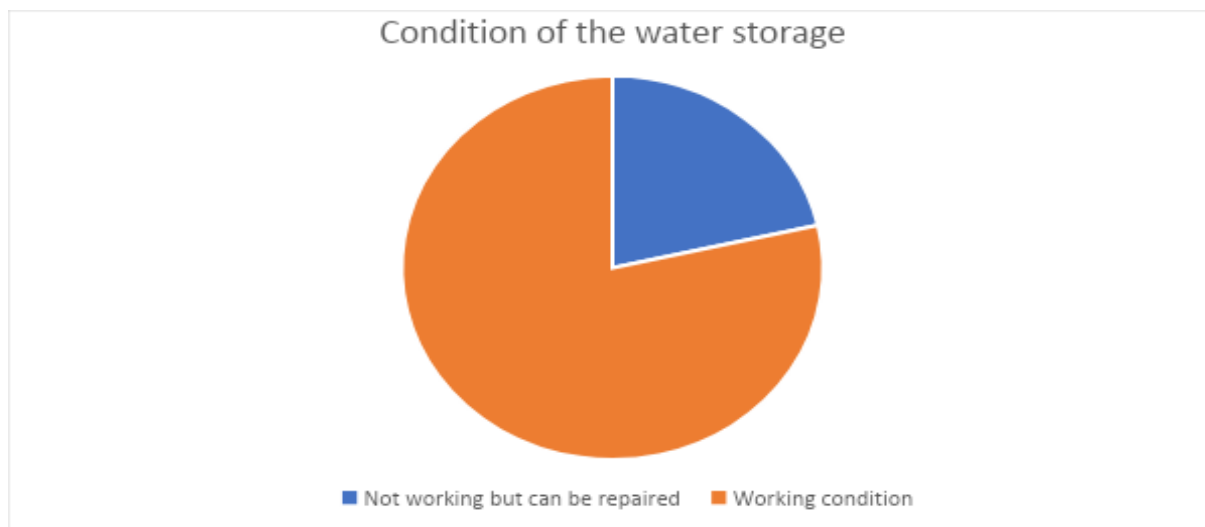


Figure 26: Condition of the Water Storage Facilities in HCFs

### Condition of the water distribution points

Table 33: Water Distribution points Status

CONDITION	NO. OF HCF	PERCENTAGE (%)
Not working and damaged beyond repair	9	9
Not working but can be repaired	26	27
Working condition	61	64
TOTAL	96	100

A significant majority (64%) of the items are operational, indicating effective functionality and reliability. 27% of the items are not functioning but could potentially be restored, suggesting opportunities for maintenance or refurbishment. Only 9% fall into damaged beyond repair category, which is relatively low and indicates that most items are either functional or can be repaired.

### Current financing modalities in delivering WASH services for school and healthcare facilities

#### County Government Budget Allocations

Sanitation investment by the County Government is normally meagre and often biased towards solid waste management. However, through matching funds requirements the county has been allocating funds for WASH, however, the actual release and expenditure has been low. Investment on household latrines has been done through social housing programs especially to vulnerable and needy households in the county.

### **Donor and Development Partner Funding**

Funding for WASH in Schools and HCFs are mainly supported through development partners such as UNICEF mainly for hygiene promotion activities, capacity building and some level of sanitation facilities improvement through rehabilitation and renovation works. This is often time-bound, with risks of unsustainability post-project.

**Service Provision:** Service provision encompasses the delivery of sanitation services to communities, institutions, and businesses. Ensuring equitable access to reliable sanitation services is a priority for promoting public health and social development. Construction of sanitation facilities is done by the department of water services and the two water service providers. CLTS and hygiene activities are undertaken by the department of public health and garbage collection in the urban areas is undertaken by the municipalities while those in rural areas are done by the department of circular economy.

Assessment of the distribution of sanitation services across different demographic groups and geographical areas to identify disparities and prioritize interventions in underserved communities is undertaken to ensure equity and accessibility.

Analyzing the affordability of sanitation services for households and businesses to ensure that cost does not become a barrier to access.

### ***2.4.3 HYGIENE PROMOTION PROGRAMS IN EDUCATIONAL AND HEALTH CARE FACILITIES***

Mandera County has been actively implementing hygiene promotion programs in educational and healthcare facilities to address public health challenges. These initiatives are crucial in a region characterized by limited access to clean water, sanitation facilities, and healthcare services.

#### **Hygiene Promotion in Educational Facilities**

1. Menstrual Hygiene Management (MHM) Programs: Organizations like the Nomadic Assistance for Peace and Development (NAPAD) have conducted MHM sensitization sessions in schools such as Khalalio Primary School. These programs aim to educate students, particularly girls, on menstrual health, reduce stigma, and provide essential hygiene products to ensure regular school attendance.

2. School WASH Initiatives: Collaborations between local authorities and NGOs have led to the installation of handwashing stations and the construction of sanitation facilities in schools.

These efforts are part of broader Water, Sanitation, and Hygiene (WASH) programs designed to improve hygiene practices among students and staff.

### Hygiene Promotion in Healthcare Facilities

1. Infrastructure Improvements: The Danish Refugee Council (DRC) and NAPAD, with funding from the German Federal Foreign Office, have supported healthcare facilities like Koromey Dispensary by installing elevated water tanks, booster pumps, and constructing Ventilated Improved Pit (VIP) latrines. These enhancements aim to improve sanitation standards and service delivery in healthcare settings.

2. Cholera Response and Vaccination Campaigns: In response to cholera outbreaks, the Mandera County government has launched oral cholera vaccination campaigns targeting over 175,000 residents in Mandera East Sub County. These campaigns are accompanied by public health education on hygiene practices to prevent the spread of the disease.

### Ongoing Hygiene Awareness Initiatives

1. Community Health Education: Community Health Volunteers (CHVs) play a pivotal role in disseminating hygiene messages, conducting sanitation inspections in schools, and educating the public on the importance of handwashing and safe water practices. These efforts are supported by partners such as OSDA.

2. Collaborative Efforts: Partnerships between the Mandera County government, UN-Habitat, and organizations like Accept International have led to the establishment of One Stop Youth Resource Centres equipped with handwashing stations. These centers serve as hubs for hygiene education and community engagement.

### Potential areas for improvement and expansion.

- Construct additional gender-segregated latrines.
- Ensure handwashing stations have water and soap regularly.
- Build facilities that are inclusive of children with disabilities.
- fully integrate WASH and health topics into the school curriculum.
- Use interactive, child-friendly materials and methods (drama, art, storytelling).
- Promote peer-led health clubs in every school
- Establish school-based distribution of menstrual products.
- Train teachers (especially female staff) to deliver MHM education confidently.
- Include local women-led enterprises to produce reusable pads for sustainability.
- set up rainwater harvesting systems where feasible.

- Develop backup water storage and purification system
- Invest in safe incinerators for medical waste.
- Provide color-coded waste bins and regular staff training.
- Partner with local waste contractors for collection and disposal.
- Promote eco-friendly and drought-resilient sanitation solutions.
- Train local artisans to maintain WASH infrastructure for long-term impact.
- Collaborate with businesses for hygiene product supply and infrastructure support.
- Encourage local innovation in low-cost hygiene solutions (e.g., tippy taps, reusable pads).

### *Challenges and gaps in service provision*

## **Challenges and Gaps in Menstrual Hygiene Management (MHM)**

### **1. Limited Access to Menstrual Products**

Many girls cannot afford sanitary pads or have no regular supply, which leads to use of unsafe alternatives (rags, paper, leaves), discomfort, infections, and absenteeism from school. Few sustainable or locally sourced distribution systems exist.

### **2. Inadequate Sanitation Facilities**

Many schools and healthcare centers lack gender-separated, private toilets with water for washing and disposal bins. Girls feel unsafe or embarrassed managing menstruation at school. Poor maintenance and lack of investment in infrastructure tailored for MHM needs.

### **3. Lack of Menstrual Health Education**

Menstruation is often not taught comprehensively in schools or communities. Girls (and boys) remain misinformed, and harmful myths and taboos persist. Teachers often lack training or feel uncomfortable discussing menstruation.

### **4. Cultural Taboos and Stigma**

Menstruation is considered dirty or shameful in some communities. Girls may face bullying, isolation, or restrictions during their period. Few community-wide programs challenge these norms or promote open conversation.

### **5. Insufficient Training for Service Providers**

Health workers and teachers are often not equipped to advise on or support MHM. Lack of guidance for adolescent girls in school and at clinics. MHM is not always included in training modules for education and health staff.

### **6. Waste Disposal and Environmental Concerns**

No safe systems for disposing of used menstrual products. Improper disposal leads to environmental pollution and health risks. Lack of bins, incinerators, or guidance on eco-friendly alternatives (e.g., reusable pads).

## **Challenges and Gaps in Medical Waste Management**

### **1. Inadequate Waste Segregation at Source**

Medical waste (sharps, infectious materials, pharmaceuticals) is often mixed with general waste. Increases risk of infection, injury, and environmental contamination. Lack of color-coded bins, staff training, and consistent enforcement of segregation protocols.

### **2. Lack of Proper Disposal Infrastructure**

Many health facilities lack incinerators, autoclaves, or proper landfills. Medical waste may be dumped in open pits, burned in the open, or buried unsafely. Limited investment in sustainable, safe disposal technologies.

### **3. Insufficient Staff Training and Awareness**

Healthcare workers and cleaners may not be trained on safe waste handling. Leads to poor compliance with safety standards and increased occupational hazards. Waste management training often excluded from onboarding or continuous professional development.

### **4. Poor Waste Collection and Transportation Systems**

Delays in removal, unsafe transportation, and increased public health risk. Lack of coordination between facilities and municipal waste management services.

### **5. Inconsistent Policy Enforcement**

National or county-level medical waste management guidelines may exist but are not enforced uniformly. Gaps in regulation lead to wide disparities in safety and hygiene standards. Weak monitoring, lack of penalties, and limited budget for health inspections.

### **6. Environmental and Public Health Hazards**

Burning waste in open air releases toxic fumes (e.g., dioxins from plastics). Poses risks to community health and contributes to air and water pollution. Lack of clean and affordable disposal alternatives like high-efficiency incinerators or sterilization.

## 1.6 WASH PLUS: MULTIPLE WATER USES SERVICES.

The water demand analysis usually incorporates domestic and livestock water needs for rural areas and only domestic demand for Urban areas. Irrigation water use aspects are handled under the department of Agriculture and irrigation. Small scale irrigation systems in riverine areas are served by irrigation systems specifically designed for them. While in other areas small pans are used as sources for irrigation water through utilization of solar pumping systems. In rural setups livestock water needs are considered in terms of design of infrastructure such as animal troughs and livestock water points at borehole sites. Further some earth pans in rural areas are specifically allocated for livestock water use.

Majority of water development in rural areas are of small capacity that only support water for domestic use and to a smaller extent water for livestock. To enhance economic growth, there is a need for water development that places more emphasis on poverty reduction and job creation. In this regard the water department is committed to influence productive uses of water which simultaneously improves livelihoods, create youth employment and raise water sale revenue necessary for water service provision viability. In this regard, the department will integrate multiple use water development to create demand for water especially for livestock, irrigation, commerce and industry.

-The design of water pans in rural areas of the county includes water demands for domestic use, livestock as well as small scale irrigated crop needs. These irrigation schemes are along the riverine areas with specific designs for the crops to be grown.

-Water harvesting and storage for the various uses in the county can be macro water harvesting for domestic, livestock and irrigation use as well as micro catchments water harvesting for crop production like water spreading buds and contour buds.

The County Department of Water and Sanitation has been actively building water pans and dams for both domestic and livestock purposes. Meanwhile, the Department of Agriculture and Irrigation is also developing water pans to support small-scale irrigated agriculture, which additionally cater to domestic and livestock needs. Water Resources Users' Associations are involved in managing all water resources.

Donor-funded initiatives aimed at climate change adaptation and mitigation have supported investments in water harvesting across both departments, focusing on crop production, livestock, and domestic usage. Capacity building for Water Resources Users' Associations and Irrigation Water Resources Users' Associations is ongoing, particularly for projects backed by donors.

As part of reaching the education sector, education institutions are connected with water systems to promote hygiene and sanitation in the school set up, additionally schools engage in

small-scale farming (kitchen gardening) to enhance learning and supply greens to the school kitchen to alleviate malnutrition.

Project Management Committees (PMCs) are established during the construction and implementation of water infrastructure projects to facilitate smooth operations at the community level for all departments involved in water-related initiatives. Additionally, efforts for the rehabilitation and desilting of existing water pans have been supported by both sectors to enhance livelihood assets within the food security framework. Both county government departments and non-governmental organizations (NGOs) are also engaged in providing plastic tanks and constructing underground tanks at the household level to support livelihoods.

**The county faces several challenges related to the management of multiple water uses:**

- **Population Growth:** Mandera county faces rapid population growth that has led to uncontrolled settlement expansion, this has adversely impacted water harvesting practices and planning efforts.
- **Climate Change Impacts:** The effects of climate change are becoming increasingly evident, resulting in frequent droughts and land degradation that diminish underground water availability. Additionally, flooding can cause extensive damage to already established water infrastructure, while pollution from agricultural activities, such as pesticide use, further contaminates water sources posing significant barriers to sustainable water use in the county.
- **Vulnerable Water Structures:** Many water harvesting systems feature are open and on unprotected surfaces, making them susceptible to wildlife and other unintended animals, which compromises the quality of the harvested water.
- **Leadership Conflicts and poor governance:** Community institutions, including Water Resources Users' Associations and Irrigation Water Resources Users' Associations, frequently experience ongoing leadership disputes. These conflicts can disrupt both water usage and pricing mechanisms, leading to compromised water quality as sanitation structures near water harvesting sites may not be adequately maintained, resulting in increased contamination risks.
- **Limited Water Treatment Options:** In rural areas, there is minimal water treatment available, further compromising the quality of water accessible to local communities and posing health risks to residents.

## CHAPTER 3: WATER AND SANITATION SERVICES INSTITUTIONAL STRUCTURE AND FINANCING

### 3.1 Sector Governance and Services delivery models

#### *3.1.1 Overview of institutions responsible for water and sanitation service provision*

The department of water services is responsible for overall water and sanitation service provision. Its role includes planning, implementing, and monitoring water services to ensure they meet community needs.

Two water service providers serving Mandera and Elwak municipalities: Mandera Water and sanitation company (MANDWASCO) and Elwak water and Sanitation Company (EL WASCO). These companies specifically serve Mandera and Elwak municipalities, managing water supply, sanitation, and related services to the residents.

In areas outside of Mandera and Elwak, the Department of Water Services delivers water services through sub-county offices. These offices handle the administration and implementation of water projects, maintenance of infrastructure, and community engagement to improve access to water. The department also in collaboration with public health departments focuses on rural sanitation, promoting community-led total sanitation (CLTS) initiatives. CLTS encourages communities to take charge of their sanitation issues, leading to improved hygiene practices and infrastructure development at the grassroots level.

The structure is designed to ensure that water and sanitation services are efficiently provided and managed, with clear roles for different organizations and departments. This collaborative approach helps address the diverse needs of communities, improving public health and access to essential services.

Institutional governance mechanism that provides for inter-collaboration across the sectors such as agriculture in irrigation development, with department of water and sanitation

Provide the institutional governance mechanism of Community organizations such as WRUAs and project committees with delegated responsibility for WS

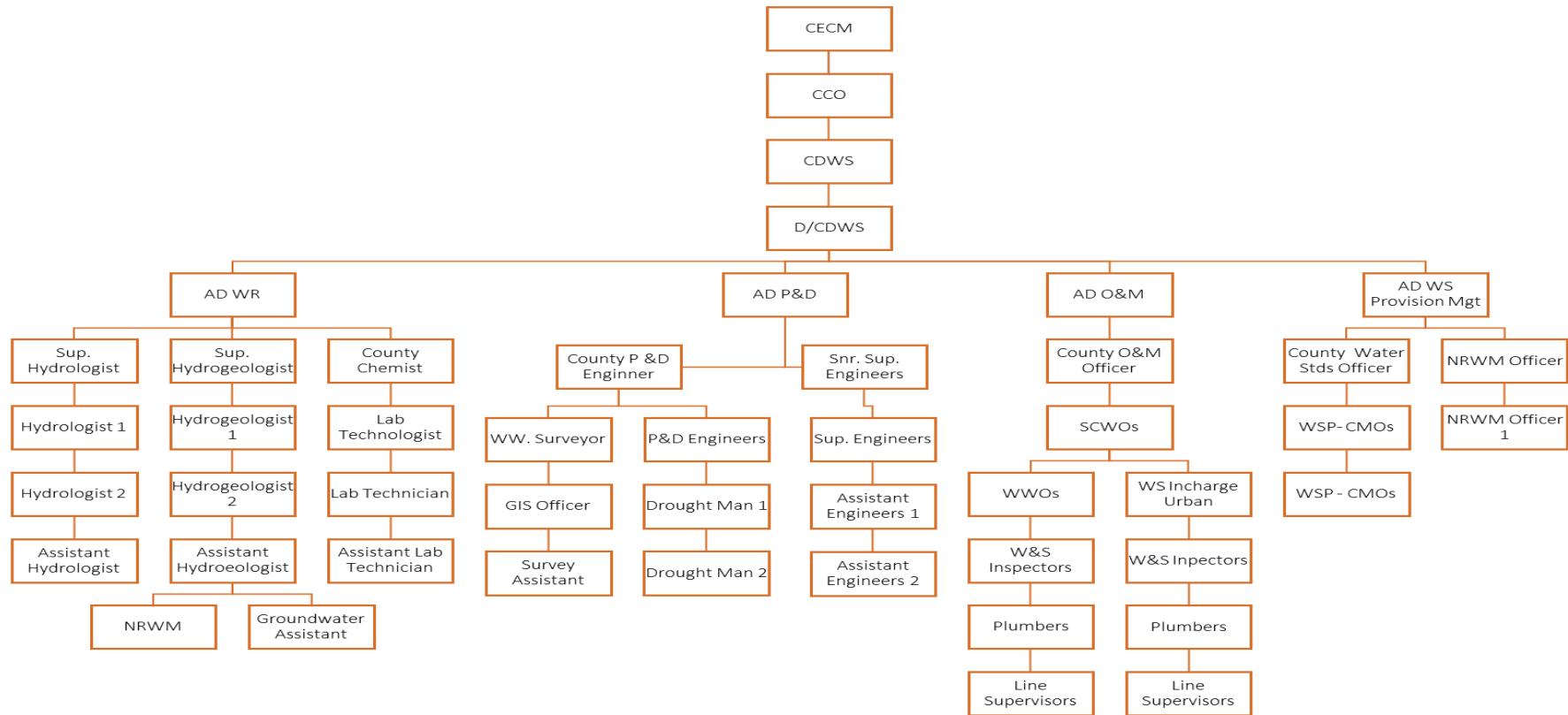
***3.1.2 Role of county government, Water Service Providers (WSPs), and community-based organizations***

S/N	Stakeholders	Main function and responsibilities
1.	Water Resources Authority	Setting, monitoring, and enforcing regulations for water resources management and use
2.	National and county governments:	Responsible for the provision of water services, infrastructure development, and financing
3.	National Water Harvesting and Storage Authority	National public water works for water resource storage and flood control.
4.	WASREB	Setting and monitoring of national standards for water services provision and asset development; evaluating, recommending, and approving tariffs; setting and enforcing license conditions for water service providers (WSPs); protecting the rights and interest of consumers of water services

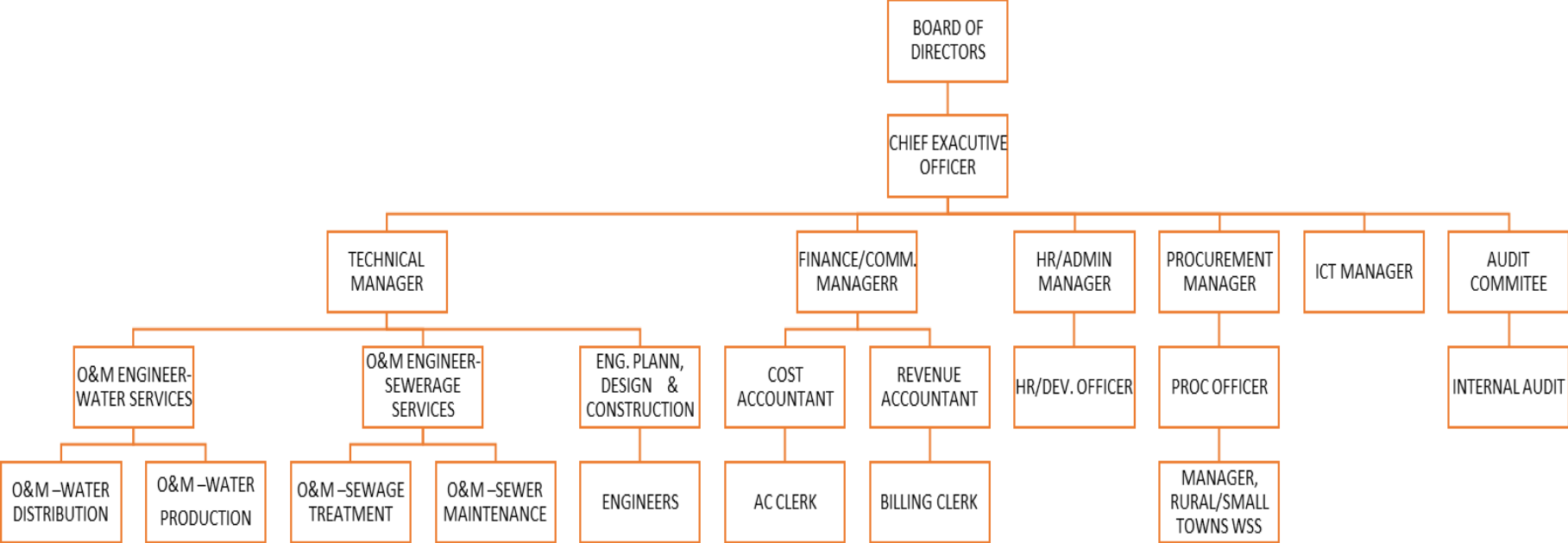
5.	Water Sector Trust Fund (WSTF)	Financing the development and management of water services in marginalized and underserved areas, including community-level water resources management, and providing conditional and unconditional grants to the counties. Also supports research activities related to management of water resources and water services, sewerage, and sanitation.
5.	County governments through licensed county or cross-county WSPs	Water and sanitation service provision in commercially viable areas and development of county assets for water service provision (or county public water works)
6.	County governments through contracted community associations, public benefits organizations, a private person or licensed WSPs	Water and sanitation service provision outside of commercially viable areas.
7.	Water Tribunal	Conflict resolution in the water sector
8.	Northern Water Works Development Agency (NWWDA)	Development, maintenance, and management of national public water works within the institution's area of jurisdiction, technical and capacity-building support to county governments
9.	Development partners	Provide financial support and other assistance to water services
10	RACIDA	Rehabilitation of water sources, Drilling of new borehole
11	Save The Children	Provide financial support and other assistance to water services

12	OSDA	Rehabilitation of water sources, Drilling of new boreholes
13	Action Against Hunger	Provide financial support and other assistance to water services
14	Kenya Red Cross Society	Rehabilitation of water sources, Drilling of new boreholes
15.	National Drought Management Authority (NDMA)	Rehabilitation of water sources,
	DRC	Provide financial support and other assistance to water services
10.	Islamic Relief	Rehabilitation of water sources, Drilling of new boreholes  Provide financial support and other assistance to water services
11.	Institutions (e.g., universities, colleges, Health facilities)	Consumers of water services.
<b>INFORMAL STAKEHOLDERS</b>		
1.	Communities	Consumers of waters services
2.	Private shallow well owners Association	Providers of water services to the residents of Mandera County (vending)
3.	Water Boozers Association	Transportation and conveyance of water from the wells to the Household level (vending)
4	Donkey Cart Water Provider	Provision of water to vulnerable households and small scale water consumers. (vending)

Figure 27: Institutional structure



# Structure of WSPs



### 3.2 Sector for funding arrangements

The water and sanitation services are financed by the county Government shareable revenue through the department of water services while the two water service providers are given annual grants by the county government. Further, the WSPs get donor funding and other conditional grants through the Water Sector Trust Fund in addition to their own revenue collection streams. WASH services in the county are generally supported by partners.

Table 30: Sector funding arrangements water sector

S/N	Stakeholders	Main function and responsibilities
1.	Water Resources Authority	Setting, monitoring, and enforcing regulations for water resources management and use
2.	National and county governments:	Responsible for the provision of water services, infrastructure development, and financing
3.	National Water Harvesting and Storage Authority	National public water works for water resource storage and flood control.
4.	WASREB	Setting and monitoring of national standards for water services provision and asset development; evaluating, recommending, and approving tariffs; setting and enforcing license conditions for water service providers (WSPs); protecting the rights and interest of consumers of water services
5.	Water Sector Trust Fund (WSTF)	Financing the development and management of water services in marginalized and underserved areas, including community-level water resources management, and providing conditional and unconditional grants to the counties. Also supports research activities related to

		management of water resources and water services, sewerage, and sanitation.
<b>5.</b>	County governments through licensed county or cross-county WSPs	Water and sanitation service provision in commercially viable areas and development of county assets for water service provision (or county public water works)
<b>6.</b>	County governments through contracted community associations, public benefits organizations, a private person or licensed WSPs	Water and sanitation service provision outside of commercially viable areas.
<b>7.</b>	Water Tribunal	Conflict resolution in the water sector
<b>8.</b>	Northern Works Development Agency (NWDAs)	Development, maintenance, and management of national public water works within the institution's area of jurisdiction, technical and capacity-building support to county governments
<b>9.</b>	Development partners	Provide financial support and other assistance to water services
<b>10</b>	RACIDA	Rehabilitation of water sources, Drilling of new borehole
<b>11</b>	Save The Children	Provide financial support and other assistance to water services
<b>12</b>	OSDA	Rehabilitation of water sources, Drilling of new boreholes

13	Action Against Hunger	Provide financial support and other assistance to water services
14	Kenya Red Cross Society (KRCs)	Rehabilitation of water sources, Drilling of new boreholes
15.	National Drought Management Authority (NDMA)	Rehabilitation of water sources,
	Danish Refugee Council (DRC)	Provide financial support and other assistance to water services
10.	Islamic Relief (IRK)	Rehabilitation of water sources, Drilling of new boreholes Provide financial support and other assistance to water services
11.	Institutions (e.g., universities, colleges, Health facilities)	Consumers of water services.

Table 31: Sector funding arrangement

S/N	Stakeholders	Roles and Responsibilities
1.	<b>Mandera County Government</b>	Responsible for developing sanitation policies, allocating funds, implementing projects, and overseeing sanitation activities across the county.
2.	<b>MoWSI</b>	Provides technical expertise, guidance, and standards related to sanitation projects.

3.	<b>MOH</b>	development of sanitation guidelines and policies,
3.	KNBS	Collects data on sanitation access and usage through surveys like the Kenya Demographic and Health Survey (KDHS).
4.	WSPs	Responsible for managing water and sanitation infrastructure, including maintenance and service delivery.
5	RACIDA	Support CLTs, hygiene promotion, Capacity building
6	Save The Children	Support CUs, Support CLTs, hygiene promotion, Capacity building
7	OSDA	Hygiene Promotions, Staff training
8	Action Against Hunger	Support CUs, Hygiene promotion, Capacity building, Support development of sanitation infrastructure.
9	Kenya Red Cross Society	Hygiene promotion
10	DRC	Hygiene promotion, Capacity building, Support development of sanitation infrastructure
11	Islamic Relief	Hygiene promotion, Capacity building, Support development of sanitation infrastructure
12.	Development Partners	Provide funding and technical support for large-scale sanitation projects.
13.	County Commissioner's Office:	Plays a role in coordinating security and ensuring smooth implementation of sanitation initiatives.

14.	Community Leaders	Crucial for mobilizing communities, advocating for sanitation needs, and facilitating behavior change.
15.	Local Health Facilities	Promote hygiene education and link sanitation issues to health outcomes.

### Operation and maintenance gaps

Energy sources	Gaps	Sustainability measures
Diesel generators	High cost of fuel	Investments in solar energy Investments in hybrid systems
Solar panels	Breakdowns	Training of electrical technicians on solar system maintenance
Pumping systems	Frequent breakdowns	Capacity building of Rapid response teams

### None Revenue Water Management Gaps

NRW aspects	Gaps	Sustainability measures
Physical losses	Bursts and leakages	Provision of O&M tools Capacity building of technicians
Commercial losses	Un-accounted for water Non-metred connections	Installation of meters

Commercial loses	Illegal connections	Put in place rapid response measures to eliminate illegal connections
Commercial loses	Billing inefficiencies	Put in place electronic and verifiable billing systems to improve efficiency
Commercial loses	Tampering with meters	Installation of smart meters

### 3.1.4 public private partnerships

No existing public private partnerships exist currently in the water service delivery. However, the county is exploring ways of collaborating with rural communities in water resource conservation and management to realize ownership and help in Integrated Water Resource Management.

### 3.3 Sector Funding Arrangements

#### ***3.3.1 Sources of funding (county budgets, national government transfers, development Revenue generation models, including tariffs and user fees***

#### **Revenue Generation Models**

##### **a) the tariff structure**

The county government based on the regulatory board will employ the Increasing Block Tariff (IBT) for water and sewerage, where customers are charged progressively higher rates as their water consumption increases. Under the IBT, the rate per unit of water increases as the volume of consumption increases. Consumers will pay a lower rate in the first block of consumption and pay a higher price up to the limit of the subsequent block, until the highest block of consumption. At the highest block consumers can use as much water they desire, but for each additional water unit consumed they pay the highest price in the rate structures. The IBT will be applied to all consumer categories except Multi Dwelling Units (MDUs)/Gated Communities/ Standpipes, Bulk supply and water Kiosks. Distinct Tariff Structure will be adopted for Water and Sewerage services based on the justified costs of each service.

The structure will consist of the following:

- a) Customer categories and consumption blocks
- b) The rates applicable to each category and consumption block in Ksh.

The applicant will be required to meter all their customers. The WSP shall not bill any customer on zero consumption but only on actual volume consumed as per the conditions of the license.

### **Considerations for Consumer Categorization**

#### **a) Domestic**

The tariff structure will allow for the provision of a lifeline tariff to ensure that all households access water services. The first block shall be 1st 1-6M<sup>3</sup> will be a “life - line tariff”, charging the lowest rate which may be lower than the cost of supplying a unit of water. This rate will be determined by the unit cost of a billed unit and the degree of cross subsidy available both within or among the various customer categories or percentage of the average tariff (e.g., 50-70%) for the consumption of up to 6M<sup>3</sup>.

#### **b) Yard Taps**

Private yard connections serving multiple households either within the compound or in neighboring compounds, a tariff may be prescribed at a uniform rate. The WSP will be required to provide information on any such connections including the No. of units & billed volumes by these units to facilitate development of a workable tariff.

#### **c) Water Kiosks and Public Standpipes**

For Informal settlements where a household connection may not be possible, Water Kiosks and Public Standpipes may be utilized. For these, the water price per cubic meter shall be at a uniform rate and not be higher than the life-line block of the tariff. The resale price shall include a reasonable margin for the operators but should not significantly differ from the social tariff for household connections. The WSP has the obligation to ensure that the consumers are charged the approved resale price. Other income generating activities of the kiosk operator should be promoted to enhance operational incentives but not conflict with the core-business of provision of the water service.

#### **d) Tariffs for Commercial/ Industrial/ Government/ Institutional Consumers**

The water services tariffs applied to commercial, industrial, government and institutional customers shall be at full cost recovery. The lower block is wider than the domestic category to accommodate the nature of their activities. The subsequent blocks are incrementally priced to give an incentive for water conservation.

#### **e) Sanitation Levy**

A WSP may submit a proposal for the imposition of a Sanitation Levy within its service area alongside its initial or regular tariff application for water and sewerage services. The amount payable by consumers as sanitation levy shall be determined by the regulatory board from time to time. The proceeds of the levy shall only be applied to the prescribed sanitation related activities approved by

the regulatory board. The Levy shall be applicable for the duration of the approved tariff and its implementation shall be monitored alongside the water and sewerage tariff implementation.

### **Approach to tariff setting**

WASREB will employ the Cost - Recovery approach where at a minimum, the WSPs cover their recurrent costs (Operations and Maintenance). Ultimately the WSPs 'tariffs should reach full cost recovery to ensure long-term sustainability where in addition to covering O&M Costs, the tariffs cover debt service, investments and asset renewal in addition

### **Costs for Consideration in Tariff Determination**

#### **a) Operations**

- Direct Costs (e.g. electricity, chemicals)
- Staff Costs •Administration
- Board of Directors
- Regulator costs

#### **b) Maintenance**

- Periodic ✓time-based/ Routine
  - Preventive ✓Based on random insp.
  - Corrective
  - Predictive ✓experience
- overhaul

#### **c) Debt Service**

- Principal
- Interest
- \*on CAPEX

#### **d) Investment**

- Infrastructure
- Operational Assets Asset Renewal
- Replacement of Ageing/ Obsolete Assets
- Administrative Assets

- Software

e) **Asset Renewal**

- Replacement of Ageing/ Obsolete Assets

**Applicable Pricing Model**

The tariff (T) (price) of water is based on a cost recovery model, whereby the tariff to be paid by consumers is adequate to cover the justified costs of the water service provider. The model for tariff determination is illustrated below: -  $T=O+M+DS+IC+AR$

Where: O = Operations Component M = Maintenance Component DS = Debt Service Component I = Investment Component AR = Asset Renewal Component

## 4 CHAPTER 4: PLANNING SCENARIOS AND OPPORTUNITIES TO ACHIEVE COUNTY-WIDE UNIVERSAL ACCESS

The modelling and development of Water Supply and Sanitation (WSS) service coverage scenarios for Mandera County is aiming to achieve universal access by 2030. The approach is divided into several key steps, each designed to ensure that investments are optimized and decision-makers can track progress toward the goal.

The SDG (Sustainable Development Goal) Service Ladder classifies the service levels into; safely Managed, Basic service, Limited Services and No Service for Water Supply. For sanitation, the SDG ladder could include: Safely managed, Basic Managed Sanitation, No Sanitation Service

The Investment/Technology Mix Scenarios can be categorized into Low-cost technologies (Boreholes, wells, community taps), intermediate technologies (Piped water systems, rainwater harvesting, and latrines with improved designs) and High-investment technologies (Sewer networks, household connections, treatment plants).

Data on planned and ongoing WSS projects were collected and organized. This includes gathering information from the County Government, National Government, and WASH partners. The data was classified into four major categories: Urban water supply, Rural/small towns' water supply, urban sanitation and rural sanitation. This comprehensive dataset will provide a detailed understanding of the projects already in place and those still in planning stages, forming the foundation for scenario modelling.

Next, WSS service coverage scenarios were modelled using the SDG service ladder, under various investment and technology mix assumptions. The modelling will project what can be achieved countywide by 2030 based on different service levels (e.g., safely managed, basic, limited) for both water supply and sanitation. The county's historical performance in project implementation will also be considered to ensure realistic projections. The collected data on ongoing and planned projects were then analysed to estimate the impact on service coverage. By considering factors such as project completion rates, cost overruns, and timelines, the modelling will reveal coverage gaps where additional investments are required. The output will show whether the current projects are sufficient to achieve universal access or if further investments are necessary.

The findings advise the development of an interactive tool to visualize this analysis. These tool may include:

- GIS maps to represent current and future WSS coverage across urban and rural areas.
- Dashboards that display metrics such as service coverage growth over time and the impact of different investment options.

- Scenario simulation features, allowing stakeholders to adjust variables like funding allocation and technology mix to explore different coverage outcomes.

If ongoing and planned investments do not achieve universal access, the tool will propose additional investments, along with a phased implementation plan. This plan will prioritise critical areas and outline a timeline for achieving universal access by 2030 or beyond. This integrated approach ensures that the county can make informed, data-driven decisions and efficiently allocate resources to achieve its WSS service coverage goals by 2030.



#### 4.1 Sector Historic Expenditure patterns for water and sanitation

##### 4.11 Analysis of past funding allocations and expenditures in water and sanitation

Table 32: Departmental Financial allocation against expenditure 2018/19-2022/2023

Year	Budget allocation ksh(million)		Exchequer Issues ksh(million)		Expenditure ksh(million)	
	Rec	Dev	Rec	Dev	Rec	Dev
2022/23	381.18	1523.77	387.62	1486.08	368.02	1473.36
2021/22	794.18	1450.12	789.08	1393.61	789.08	1393.61
2020/21	898.65	1651.58	888.95	1585.06	888.95	1580.96
2019/20	575.89	1151.41	564.82	871.99	564.82	849.9
2018/19	410.74	1691.49	407.61	1592.32	391.11	1592.32

Source: CBIRR 2018/19-2022/23

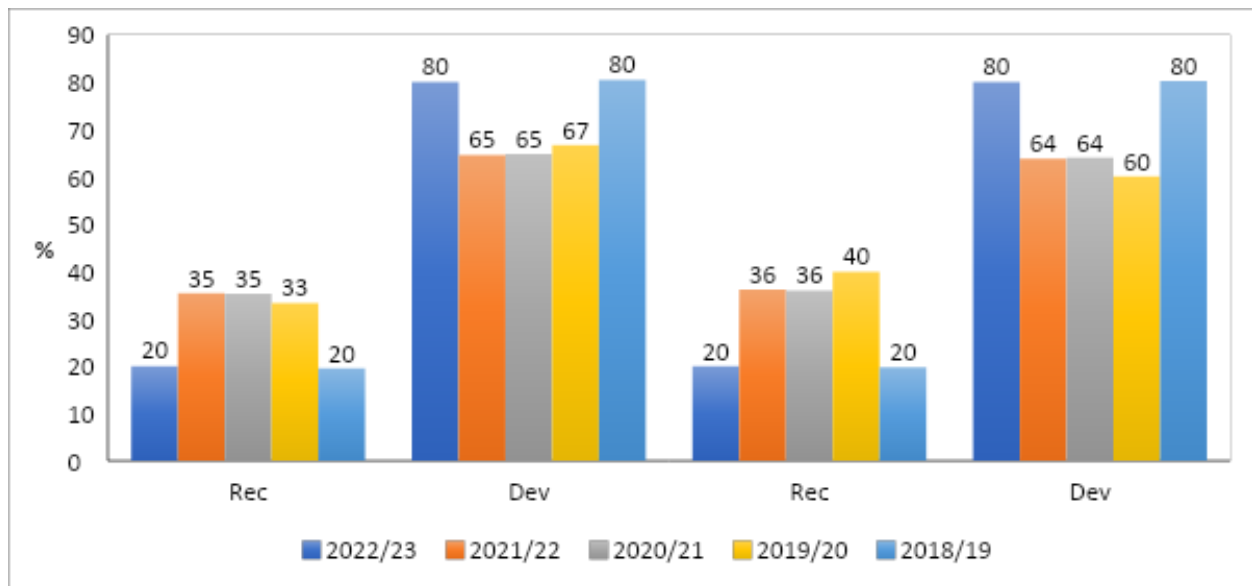


Figure 29: Trends in the County Budget Allocations for the FY 2018/19-2022/23

## 4.2 WSS service coverage scenarios, Investments and Reform Needs

### *Projections of future service demand based on population growth, urbanization and climate*

The trends in the budget allocation against the expenditure shows that the department of water services of Mandera recurrent expenditure and developmental expenditure are within the range of the provisions of PFM Act. The county had the highest allocation and expenditure on development (80%) for the FY 2022/23 and 2018/2019. The county provides grants to the two WSPs (MANDWASCO and ELWASCO) for improvement of water infrastructures in urban municipalities, development of surface water and ground water sources, development of water supply and sanitation infrastructures.

The county is therefore, based on the previous year's prioritisation of developmental budgets in the right trajectory to continue improving access to water supply and sanitation facilities to the residents of Mandera.

### **SERVICE LEVEL SCENARIOS**

Table 33 *Household water sanitation services(WSS)*

	Year	Safely managed			Basic			Limited		
		Rural	Urban/Peri urban	Total	Rural	Urban/Peri urban	Total	Rural	Urban/Peri urban	Total
HH Water Supply	2024	1,279	4,777	6,056	7,000	1,533	8533	2000	37075	39,075
	2030	34,200	22,800	57,000	68,400	45,600	114,000	11,400	7600	19,000
HH Sanitation	2024	0	56	56	3591	1614	5,205	31025	13939	44,963
	2030	1,376	13767	15143	157320	70680	228,000	196,650	88,350	285,000

## INVESTMENT MIX SCENARIOS

Table 34: *Investment mix Scenarios water*

<b>WATER</b>					
<b>Year</b>	<b>Institutions</b>	<b>Piped with major bulk water source development</b>	<b>Piped without major bulk water source development</b>	<b>Non piped/off grid</b>	<b>Total</b>
2030	HHs	50,000	120,000	20,000	190,000
	Schools	294	142	50	486
	Healthcare centres	50	50	30	130
	Markets	20	9	1	30

Table 35: *Investment mix Scenarios sanitation*

<b>SANITATION</b>					
<b>Year</b>	<b>Institutions</b>	<b>Conventional/Condominium sewerage with major treatment</b>	<b>Conventional/Condominium sewerage without major treatment</b>	<b>On site sanitation with FSM</b>	<b>Total</b>
2030	HHs	5506	15143	228,00	248,649
	Schools	10	20	416	446
	Health care centres	5	20	112	137
	Markets	5	20	15	40

***Policy and institutional reforms needed for effective service expansion***

Public private partnerships investments enabling the environment embedded in the water bill to facilitate private sector investment in Water and sanitation coverage.

Urban and rural sanitation coverage to be prioritized under the county water and sanitation policy. WASH requirements for all public facilities including markets, health facilities, public stadiums, schools are covered under the county annual work plans.

Municipalities to avail public sanitation facilities at markets and bus stations

The department of donor coordination which is under the office of the governor is tasked with coordination of donor mobilization and collaboration to enable the county secure funding in WASH sector through reaching out to various stakeholders in Water and sanitation.

***Investment needs to close service gaps and improve sustainability***

Year	Category	HH served	Source of funds	Remarks
2030	urban water supply	22,800	CG/NG	last mile connectivity
2030	Peri-urban water supply	45,600	CG/NG/Partners	last mile connectivity
2030	Small-Medium Towns	34,200	CG/NG/NGO	Water supply and Storage infrastructure
2030	Other rural areas	68,400	CG/K-WASH/HOAGRP/FLOCCA	Development of watersources, Water supply and Storage infrastructure

# CHAPTER 5: SECTOR INVESTMENT PLAN, INSTITUTIONAL REFORMS AND FINANCING STRATEGY

## 5.0 Strategic objectives for the sector

### *5.1.1 Vision and key priorities for water, sanitation, and hygiene services*

#### **Vision**

The vision of the Sector is *“A County with sufficient water and sanitation services with effective governance structures for sustainable water and sanitation service delivery.*

#### **Mission**

The mission of the sector is *“to ensure; efficient and economical provision of water and sanitation services and increased environmental conservation.*

#### **Objectives**

- To improve availability and spatial distribution of water sources through appropriate exploitation of existing surface and ground water development potential in the county,
- To improve access to adequate, safe & affordable water and sanitation services both in urban and rural areas to spur economic productivity and enhance living standards,
- To strengthen the institutional capacity of the county Government to effectively deliver water and sanitation services through the review of existing setups and developing the capability of institutions to enhance service delivery,
- To reduce the vulnerability of agro-pastoralist communities to negative impacts of prolonged, often recurrent droughts and floods through the implementation of long-term drought and floods mitigation interventions that shall progressively eliminate the need for short – term interventions such as emergency water trucking, and repair of damaged facilities.

*Strategic priorities aligned with county development plans.*

● Table 41 Strategic Priorities and Interventions for Water Supply Infrastructure Development

<b>Priorities</b>	<b>Interventions</b>
<p>a) Increased availability &amp; accessibility of water for domestic, livestock, commercial &amp; cultural uses</p>	<ul style="list-style-type: none"> <li>&gt; Drill, equip &amp; construct Borehole water supply schemes.</li> <li>&gt; Rehabilitation of existing water conservation structures (Desilting and expansion)</li> <li>&gt; Construct medium to large sized Dams.</li> </ul>
<p>b) Improved Water &amp; Sanitation services delivery capacity</p>	<p>Establish &amp; capacitate sustainable water service providers.</p>
<p>c) Increased financial sustainability in the provision of water &amp; sanitation services.</p>	<p>Upgrade and rehabilitate existing rural and urban water supply schemes to improve their efficiency, reliability &amp; coverage.</p>
<p>d) Improved Institutional Capacity for the delivery of water &amp; sanitation services</p>	<ul style="list-style-type: none"> <li>Equip 24hr rapid response maintenance teams to react swiftly to emergency breakdown.</li> <li>Establish a GIS based water &amp; sanitation services information system to monitor impact of efforts.</li> </ul>

### ***5.1.2 Alignment with Kenya’s national water strategy, national financing plan (NAWASIP) and SDG 6 goals***

#### **Policy and Legal Framework Governing Water Services in Mandera County**

Water service provision in Mandera County is guided by several national and county-level policies and legal frameworks. These include:

#### **Key National and County Policies and Acts**

1. **The Constitution of Kenya (2010)** – Recognizes access to clean and safe water as a basic human right under Article 43.
2. **The Water Act (2016)** – Establishes the legal framework for water management, defining roles for national, county governments, and regulatory agencies.
3. **Environmental Management and Coordination Act (EMCA) 1999** – Provides guidelines on environmental sustainability, pollution control, and conservation of water sources.
4. **Kenya Vision 2030** – Emphasizes improved water supply, sanitation services, and infrastructure development for economic growth.
5. **National Water Policy (2021)** – Outlines strategies for universal access to safe water and sanitation services.
6. **Mandera County Integrated Development Plan (CIDP)** – Provides a five-year strategic plan for improving water and sanitation infrastructure at the county level.
7. **Kenya National Adaptation Plan (NAP) 2015-2030** – Addresses water security and climate change adaptation measures.
8. **Public Finance Management Act (2012)** – Regulates financial resource allocation for development projects, including water services.
9. **Water Sector Trust Fund Act** – Provides a framework for mobilizing donor support for water and sanitation investments.
10. **Mandera county water ACT (2023)**-water services provision and regulation.
11. **Irrigation Act (2019)** – Governs irrigation development and its integration into water resource planning.

*How the plan contributes to national and global targets.*

To support the implementation of SDG 6, the UN General Assembly declared the period from 2018 to 2028 as the International Decade for Action, “Water for Sustainable Development” (Water Action Decade). The year 2023 marked the halfway milestone for SDG 6 progress. With only seven years remaining until the conclusion of the 2030 Agenda for Sustainable Development, urgent and decisive action is required to alter the current trajectory and expedite advancements on Sustainable Development Goal (SDG) 6.

This position is reiterated in Africa Agenda 2063, a strategic framework for the socio economic transformation of the African continent over 50 years, that emphasizes the importance of achieving universal access to clean water and adequate sanitation services for all African citizens by 2063. Despite the SDG 6 targets being universally applicable and aspirational, each government must decide how to incorporate them into national planning processes, policies, and strategies based on national realities, capacities, levels of development, and priorities. With seven years remaining until 2030, a ‘quantum leap’ is necessary to accelerate the vision for 2030

National Outlook on the Attainment of SDGs

The Ministry of Water, Sanitation, and Irrigation is responsible for ensuring that everyone has the right to clean and safe water, adequate sanitation, and sufficient food to support the country’s development; as outlined in Article 43 of the Constitution, which guarantees these rights to all citizens. By 2030, the Ministry aims to achieve universal access targets for Water Supply and Sanitation (WSS) services. These include ensuring 100% access to water in both urban and rural water supply services. For sanitation, the targets are 40% access to sewerage in urban areas and 100% access to improved sanitation facilities near households in rural areas, with focused investment in rural sanitation services to eliminate open defecation in the 15 (fifteen) counties where it’s most prevalent.

The county aims to achieve these targets through implementation of proposed interventions by way of investments in Water and sanitation both in urban and rural areas.

*Key commitments under the Sustainable Development Goals (SDGs).*

SDG	Target
6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3	By 2030 improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

***Cross-sectoral integration, including climate resilience and environmental conservation***

Water service provision in Mandera is managed through a combination of county and national institutions:

*Table 36: Water utilities in Mandera county*

<b>Water Utility</b>	<b>Role &amp; Responsibility</b>
<b>Mandera Water and Sanitation Company (MADWASCO)</b>	Supplies water and sanitation services to Mandera Municipality

<b>Elwak Water and Sanitation Company (EL WASCO)</b>	Manages water and sanitation services in Elwak town
<b>Sub-County Water Offices</b>	Handle rural water supply projects, including boreholes and earth pans
<b>Water Resource Users Associations (WRUAs)</b>	Community-based organizations managing water catchments
<b>Kenya Water Towers Agency (KWTA)</b>	Conservation and management of water catchments and towers
<b>Water Resources Authority (WRA)</b>	Regulates water abstraction and water resource management
<b>National Drought Management Authority (NDMA)</b>	Coordinates drought response, including water supply for affected communities
<b>National Water Works Development Agency</b>	development of water infrastructure i.e dams and water supply infrastructure.

### Existing Stakeholders in Water Sector

Several stakeholders play a role in water service provision, financing, and governance in Mandera County.

#### Government Agencies

- **Ministry of Water, Sanitation, and Irrigation** – National-level oversight and policy direction.
- **County Department of Water Services** – Implements water and sanitation projects in collaboration with other entities.
- **National Environmental Management Authority (NEMA)** – Ensures environmental compliance in water projects.

#### Development Partners and Donors

- **Water Sector Trust Fund (WSTF)** – Provides grants and funding support for water projects.
- **World Bank (WB)** – Supports large-scale water infrastructure projects.
- **United Nations Children's Fund (UNICEF)** – Assists in water, sanitation, and hygiene (WASH) initiatives.
- **European Union (EU)** – Provides funding for climate-resilient water systems.

- **USAID – Kenya RAPID Program** – Focuses on rural water access and climate resilience.
- **African Development Bank (AfDB)** – Supports water infrastructure development.
- **Red Cross Kenya** – Engages in emergency water supply interventions.

#### **Private Sector and Community-Based Organizations**

- **Public-Private Partnerships (PPPs)** – Collaborate with the county to improve water infrastructure.
- **NGOs & Civil Society Organizations (CSOs)** – Advocate for sustainable water management.
- **Community-Based Water Management Committees** – Oversee rural water projects.
- **Faith-Based Organizations** – Support borehole drilling and water distribution initiatives

## 5.2 Water Supply Infrastructure Investment Plan

### *5.2.1 Planned projects for new water supply systems and rehabilitation of existing ones*

The strategic priorities and interventions for water supply infrastructure development in Mandera county is as follows:

The county government will undertake a county water master plan to guide the implementation of proposed water supply investments county wide.

The department will continue to prioritize last mile connectivity for Urban and peri urban areas in the county to ensure access to water and sanitation services. Small towns are the first entry points for communities that drop out of rural livelihoods to migrate into the urban areas and probably constitute the highest proportion of poor people. Small towns have fewer complexities and provide quick implementation of piped water reticulation systems for last-mile connectivity at lower costs for a large population, providing an opportunity to strengthen and establish regulated WSPs to operate the water system sustainably can significantly contribute to safely managed water systems. To accelerate the attainment of the SDGs, the County Department of Water Services wishes to assess, map, plan, appraise and design efficient and effective small town water systems through County budget allocations and attract climate funding/financing from development partners/banks.

The following are the specific proposed investments in water supply infrastructure

Table 37: Proposed investments in water supply infrastructure

Area	Project name	HH served	Investments
Urban	Upgrading of Mandera Water supply infrastructure	20,000	Storage, last mile connectivity and treatment works
	Elwak Water supply rehabilitation	10,000	Storage , last mile connectivity and energy efficiency
Peri-urban	Upgrading and Augmentation of Chamu water supply.	3,000	Rising and distribution mains Storage tanks and consumer connections
	Upgrading and Augmentation of Makaba water supply	20,000	Development of surface water sources, drilling of boreholes Storage tanks , last mile connectivity and treatment works
	Upgrading and Augmentation of Banisa water supply	3,500	Development of surface water sources, drilling of boreholes Storage tanks , last mile connectivity and treatment works
	Upgrading and Augmentation of Lafey water supply	3,200	Drilling of boreholes Storage tanks , last mile connectivity and consumer connections
Small to medium towns			
	Upgrading of Dandu water supply infrastructure	2,400	Composite Filtration units , rising and distribution lines , storage tanks and consumer connections
	Upgrading of Ashabito Water supply	2,100	Composite Filtration units , rising and distribution lines , storage tanks and consumer connections
	Did Kuro water project	1,400	Expansion of earth pan , treatment works rising and distribution pipes and storage tanks
	Wargadud Water supply scheme	2,500	Drilling of boreholes, installation of Storage tanks rising and distribution mains and consumer connections

	Shimbir fatuma Water supply scheme	2300	Drilling of additional boreholes, installation of Storage tanks rising and distribution mains and consumer connections
	Kutulo Water supply project	2800	Construction of high volume earth pan , construction of storage tanks , treatment works rising and distribution mains
	Rhamu Dimtu Water supply	2200	Drilling of borehole, storage tanks , water kiosks and distribution pipelines
	Upgrading of Fino Water project	2500	Construction of storage tanks , water kiosks and distribution pipelines
	Augmentation of Khalalio water supply	2900	Construction of shallow wells , storage tanks rehabilitation of water kiosks and consumer connections
	Upgrading of Kiliwehiri water supply	2700	Expansion of water pan , treatment works rising and distribution pipes , storage tanks and water kiosks
Other rural areas		17,000	>Drilling of boreholes , >construction of storage tanks , >rising and distribution pipelines construction of water pans > construction of treatment works

# DROUGHT RISK MAP

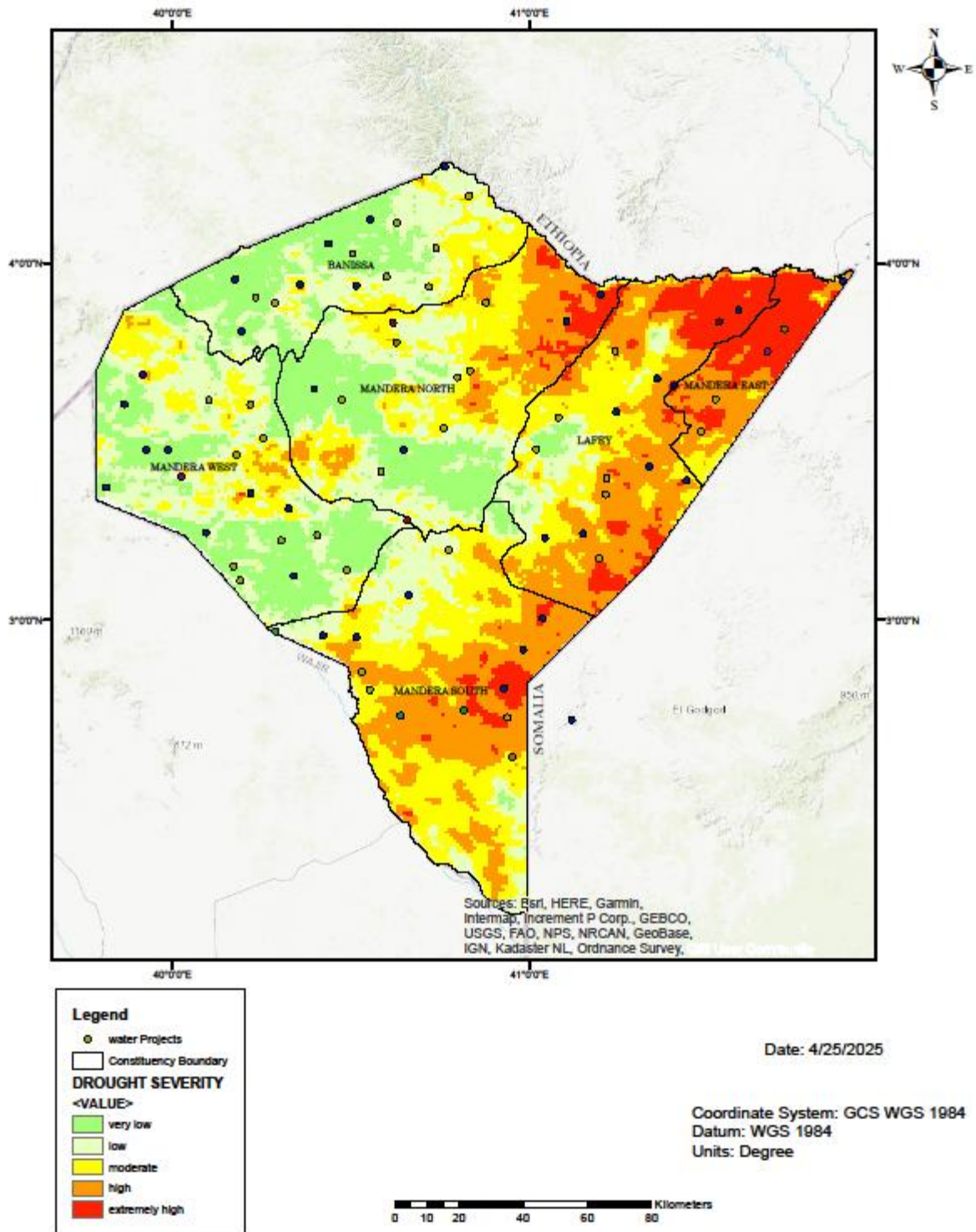


Figure 30 drought risks



### ***5.2.2 Consideration of MUS/WASH+ approaches in design and implementation*** **Multiple Use Systems / WASH+**

The MUS approach includes ensuring consideration of Agriculture and livestock water needs and related infrastructure in the design of water schemes. Design of resilient water sources with respect to recurring droughts and climate change will be an important aspect in the design of water supply systems. During droughts livestock migration usually puts significant pressures on some borehole sources. This calls for strategic planning for location of these boreholes for Ending drought emergencies.

Mandera requires integrated multiple water usage due to water scarcity challenges. In order to maximize efficiency of available water resources and meet its water diverse needs for its population, it is prudent to accommodate an integrated approach on water resource utilization across various sectors including domestic use, Agriculture, Livestock, commercial usage such as small business (butcheries, hotels and institutions) and sanitation. This aims at prioritizing access to clean and safe water by developing water infrastructures such as boreholes, water pans, dams and piping networks. Availability of these infrastructure will reduce waterborne diseases and improve food security as well as promote sustainable farming through irrigation systems.

-This will also ensure availability of reliable water supply for livestock to sustain herds under prolonged drought, a measure that aims to enhance livestock productivity and maintain economic stability for pastoralists in Mandera.

-Largely, these efforts will improve the overall quality of life for the population. During the design of these water infrastructures, environmental protection, management compliance, resource suitability and water quality management should be adhered to with interventions such as establishment of tree nurseries, prevent pollution hence reduce land degradation by planting tre

**List of specific investments, their estimated costs, expected beneficiaries, and environmental/social risks**

Table 38: list of proposed investments in water

Name of Proposed Project/Investment			No. of Households to be served out of this project/investment	Total estimated Capex KES
	Ward	Project Location coordinates		
Khaliyo Bella Dariqa Rural Water Project	Khaliyo	0796192E, 0415149.6N	4,750	210,000,000
Shimpir Fatuma Rural Water Project	Shimpir	0403228E, 030226N	4,624	120,000,000
Wargadud Rural Water Project	Wargadud	0405213E, 031020N	3,274	100,000,000
Hareri Aresa Rural Water Project	Libehia		3,214	80,000,000
Arabia Odha Rural Water Project	Arabia	0767176E, 0404589N	2,863	90,000,000
Tarbey Rural Water Project	Guba	0679656E, 0423804N	2508	70,000,000
Hullo Rural Water Project	Guticha	40°48'01.098' , 4°11'11.2956'	2,508	70,000,000
Kalicha Rural Water Project	Ashabito		1,758	50,000,000
Fino Rural Water Project	Fino		1,959	60,000,000
Alungu Rural Water Project	Alungu		1,959	60,000,000
Elram Rural Water Project	Kutulo		1,777	60,000,000
Falama Rural Water Project	Kutulo	0404622E, 025044N	1,777	60,000,000

Gesirebki odha Rural Water Project	Kutulo	0716968E, 0289176N	1,777	50,000,p000
Kheira Ali Rural Water Project	Waranqara	0410034E, 034308N	1,708	45,000,000
Kamor liban Rural Water Project	Fino		1,708	60,000,000
Dabacity Rural Water Project	Kutulo		1,708	55,000,000
Kukub Rural Water Project	Derkale	40°22'08.0832" , 3°54'29.7192"	1,708	55,000,000
Borehole 11 Rural Water Project	Kutulo		1,708	48,000,000
Shir shir Rural Water Project	Guticha	0407370E, 035281N	2,400	50,000,000
Marothile Rural Water Project	Marothile	0405102E, 033417N	3,100	44,000,000
Lanqurac Rural Water Project	Guticha	0680811E, 0417711N	1,900	47,000,000
Garse Rural Water Project	Rhamu Dimtu	0410411E, 040140N	1,252	50,000,000
Burabor Bulla hajji Fiqow Rural Water Project	Khalaiio	41.35594, 3.56554	3,500	130,000,000
Libehiya Farey Serohindi water project	Libehia	0781176N, 0424318E	1,740	42,000,000
Bambo Rural Water Project	Waranqara		1,120	40,000,000

Elele Rural Water Project	Wargadud	0403020E, 031844N	2,750	40,000,000
Charifuda Qalaqalesa Rural Water Project	Shimbir	0403302E, 025108N	1,950	30,000,000
Waachile Rural Water Project	Elwak soouth	0684304E , 025108N	2,400	25,000,000
Orgaya Rural Water Project	Wargadud	0684304E, 0362599N		40,000,000
Malkaruqa Rural Water Project	Mikamari	40°48'01.098", 4°11'11.2956"		28,000,00
Burmaya Garse Rural Water Project	Shimbir	0643253E, 0328120N		35,000,000
Meriile Rural Water Project	Banisa			40,000,000
Wayam lencha Rural Water Project	Banisa	0702078E , 0303706N		20,000,000
Boji garse Rural Water Project	Kutulo			30,000,000
Murudho Rural Water Project	Banisa	0408784E, 039008N		30,000,000

Kamor Elle Hareri hosle Bida Rural Water Project	Libehia	0801494E, 0422194N	150,000,000
Qumbiso Rural Water Project	Libehia		60,000,000
Duse Bima Rural Water Project	Takaba	0613864E, 603179.8N	33,000,000
Bulla Madina Rural Water Project	Takaba	0580925E, 0399618N	30,000,000
Tesoramo Rural Water Project	Dandu		28,000,000
Qorobo saglan Rural Water Project	Gither		32,000,000
Irestino Rural Water Project	Dandu	0580925E, 038363N	30,000,000
Dandu Rural Water Project	Dandu	380241E, 603179.8 N	300,000,000
Dadachdera Rural Water Project	Takaba south		30,000,000
Nyat alio Rural Water Project	Kutulo	0682603.26E, 0301962.92N	18,000,000
Qalaqalesa Rural Water Project	shimbir	0403302E, 025108N	30,000,000
Tutes Rural Water Project	Shimbir		20,000,000
Choroqo Rural Water Project	Guba		20,000,000
Farjana Rural Water Project	Ashabito		20,000,000

Walena dertu Rural Water Project	Elwak north		20,000,000
Bode Rural Water Project			20,000,000
Quramadhow Rural Water Project	Ashabito	0405155E, 031500N	20,000,000
Dagahturtur Rural Water Project	Ashabito	0408784E,0392 49N	20,000,000
Dagmarer Rural Water Project	Ashabito	0405001E, 034426N	20,000,000
Omar jillow Rural Water Project	Arabia	0796205N,0415 132E	20,000,000
Bachile Rural Water Project	Takaba	0613864E, 0376001N	100,000,000
Bolowle Rural Water Project	Takaba south		110,000,000
Gither Rural Water Project	Gither	0601969E 0407555N	175,000,000
Ashabito Rural Water Project	Ashabito	3.43N, 40.87 E	90,000,000
Warankara Rural Water Project	Waranqara		100,000,000
Kiliweheri Rural Water Project	Kiliwehiri		200,000,000
Burashum Rural Water Project	Derkale		170,000,000
Damoog Earth Pan and water supply	Wargadud		120,000,000
Guba Sowle Earth Pan & Water supply	Banisa	0679656E 0423804N	140,000,000

Ameyi earth pan and water supply	Banisa		50,000,000
Expansion of Qofole Earth Pan and water supply	Dandu	590493.8E 372664N	55,000,000
Qaba maalim musa and water supply	Banisa	0678656E 0423504N	85,000,000
Expansion and desiltig of Urile Earth Pan and water supply	Derkale		52,000,000
Sake Rural Water Project	Dandu	0678556E 0423509N	70,000,000
Watiti Rural Water Project	Dnadu	0678666E 0423804N	18,000,000
Derkale Rural Water Project	Derkale	0679656E 0423604N	18,000,000
Burduras Rural Water Project	Gither	0678658E 0423509N	18,000,000

Tarama Rural Water Project	Derkale	0674656E 0425504N	18,000,000
Kobadadi Rural Water Project	Shimbir	0677656E 0423808N	18,000,000

### 5.3 Sanitation and Hygiene Services Investment Plan

#### 5.3.1 Priority sanitation projects, including non-sewered sanitation and fecal sludge management

The department of Public Health Services has prioritized the following key interventions to enhance Sanitation and Hygiene services in the County. This investment will be implemented jointly by the department through the County Government support and strategic partnerships with donors and other local implementing agencies.

#### Priority Investments in Sanitation and Hygiene

Priorities	Interventions	Est. Cost
Improved Institutional Capacity for the delivery of sanitation services	Microplanning and development of Mandera County ODF roadmap	20,000,000
	Capacity development of PHOs/CHAs/CHPs on National guidelines for verification & certification of ODF	
	Monitor & manage the activities of all WSPs` in sanitation services provision	
Develop DTFs & sewerage systems in populated and rapidly growing towns.	Proposed construction of Standardized regular PSF for Public Institutions and markets within the county with decentralized treatment facilities (DTF)	100,000,000
	Develop sewerage infrastructure for Elwak & Mandera towns	3,000,000,000
	Development of 7 No. fecal sludge management facilities	210,000,000
Improved Sanitation facilities at HHs level and Community wide sanitation	Construction of VIP Latrines for vulnerable households in rural areas across the county	200,000,000
	Improved sanitation services in the communities	
	Implement Community-wide sanitation for all villages/communities and institutions	
Improving Sanitation in Institutions (Schools & HCFs) including menstrual health and hygiene practices among girls in Schools and out of Schools	Proposed construction of septic tanks in 20 No. high volume health centres	100,000,000

	Proposed rehabilitation of septic tanks in 3 sub-county hospitals (Takaba SCH, Banisa SCH and Mandera North SCH )	30,00,000
	Construction of 4 No. sewerage works/DTF in 4 Sub-County Hospitals	40,000,000
	Sanitation investments in 450 Schools and 113 HCFs- Construction of new toilets/rehabilitation & renovation works for existing toilets/Provision of handwash facilities & MHM in Schools	100,000,000
Ensuring sustainable access to improved rural sanitation by declaring 100% of villages ODF by 2030	Community-Led Total Sanitation (CLTS), Demand creation and Behaviour change communication activities, Certify 100% of the villages in Mandera.	82,500,000
	Blend rural sanitation i.e Market based sanitation & incentive-based sanitation.	35,000,000
	Enhance community involvement in hygiene & sanitation services through PHAST, CHAST, CTC	25,000,000
Increased financial sustainability in the provision of sanitation services	Investments in improving Organizational efficiency.	12,500,000
Total est.		3,925,000,000

## **5.3.2 Strategies for Implementing Sanitation Options**

### ***5.3.2.1 Behavioral Change and Market-Based Sanitation Initiatives in Mandera County***

#### **A. Strategies for Promoting Improved Sanitation Practices**

1. Use of Local Champions and Role Models
  - Identify respected local leaders, CHVs, teachers, and religious figures to serve as sanitation champions.
  - These champions will influence positive sanitation behaviors through regular community dialogues and barazas.
2. Integration of Sanitation Messages in Routine Health Promotion
  - Incorporate hygiene and sanitation messaging in ANC visits, immunization clinics, and during outreach services.
  - Utilize school health programs to reinforce key sanitation messages among pupils and their families.
3. Radio and Mobile Messaging Campaigns
  - Partner with local FM stations and mobile service providers to air consistent messages on handwashing, safe disposal of child feces, and toilet use.
  - Leverage drama and storytelling formats in Somali to increase audience engagement and comprehension.
4. Promotion of Household Latrine Upgrading
  - Encourage gradual improvement of latrines from basic pits to improved ventilated or lined options through incremental upgrades.
5. Community Sanitation Scorecards
  - Introduce scorecards at village level to create competition and accountability in improving sanitation status.

#### **B. Strategies for Promoting Private Sector Participation in Sanitation Services**

1. Support Local Sanitation Entrepreneurs (Toilet Builders and Suppliers)
  - Train local artisans and masons on low-cost, context-appropriate latrine designs (e.g., dome slab, sanplats).
  - Link them with financial institutions or micro-credit schemes to support scaling up.
2. Sanitation Marketing Campaigns
  - Develop campaigns that showcase affordable, aspirational toilet options to stimulate demand.
  - Use "live model toilets" in public places or model households to demonstrate quality and design options.
3. Subsidy or Voucher Schemes for Vulnerable Households

- Engage private sector actors to deliver toilets to vulnerable households using a voucher approach while maintaining a market system.
- 4. Partnership with Hardware Suppliers
  - Facilitate agreements with local hardware stores to stock and promote sanitation-related products (e.g., slabs, handwashing stations, tippy taps).
  - Offer incentives for bundling products and services as "sanitation starter packs."
- 5. Create an Enabling Environment for Private Investment
  - Work with County Trade and Public Health Departments to simplify licensing, reduce levies, and provide tax incentives for businesses investing in sanitation.
  - Map and publicize opportunities for investment, especially in fast-growing trading centers and schools.
- 6. Waste Management Services Development
  - Encourage private operators to engage in latrine pit emptying and safe sludge management through training and provision of equipment like gulper pumps.

### **5.3.2.2 WASH Investments for Schools and Healthcare Facilities**

#### **A. Inclusive Hygiene Infrastructure Development**

1. Construction and Rehabilitation of Gender-Sensitive Latrines
  - Prioritize construction of separate latrines for boys and girls in schools, and male/female toilets in health facilities.
  - Ensure latrines have handwashing facilities with water and soap, are accessible to persons with disabilities (PWDs), and provide privacy.
2. Preventing Toilet Loss in Public Institutions
  - Introduce sustainable toilet technologies suited to the terrain and water availability in Mandera (e.g., ventilated improved pit latrines, pour-flush latrines with lined pits).
  - Train school Boards of Management (BOMs) and health facility committees on basic latrine maintenance and budgeting for repairs.
  - Include WASH infrastructure in facility and school improvement plans to ensure sustainability.
3. Integration of WASH in School and Facility Planning
  - Embed WASH indicators in the School Improvement Plans (SIPs) and Annual Work Plans (AWPs) for health facilities.
  - Encourage public institutions to allocate at least 10% of their development budgets to WASH infrastructure and services.

#### **B. Circular Economy Approaches in School Sanitation**

1. Safe Sludge Reuse and Resource Recovery Pilots
  - Explore small-scale, eco-friendly sludge treatment methods that convert waste into compost for tree planting in schools.

- Introduce urine-diverting dry toilets (UDDTs) in water-scarce areas for easier waste separation and reuse.
- 2. WASH Clubs as Agents of Environmental Stewardship
  - Strengthen school WASH clubs to manage sanitation facilities, promote handwashing, and champion reuse of treated wastewater for gardening.
  - Promote innovations like tippy taps made from recycled materials and water-saving handwashing stations.
- 3. Composting and Organic Waste Reuse
  - Promote composting of biodegradable school waste to enrich school gardens, reducing reliance on chemical fertilizers and promoting environmental education.

### **C. Ensuring Safe Sanitation Access for Vulnerable Populations**

1. Inclusive Design of Toilets
  - Construct accessible latrines with ramps, handrails, and enough space for caregivers to assist persons with disabilities.
  - Provide signage and lighting to improve safety and usability, particularly for girls and women.
2. Community Support Mechanisms
  - Work with local leaders and community groups to identify vulnerable children and patients (orphans, PWDs, elderly, etc.) and ensure they have safe access to sanitation within schools and health facilities.

### **D. Menstrual Hygiene and Health Management (MHHM) in Schools and Health Facilities**

1. Provision of MHHM Materials and Facilities
  - Distribute reusable sanitary pads to girls in public schools and provide MHHM kits in adolescent-friendly corners at health facilities.
  - Ensure the presence of disposal bins, private changing rooms, and water availability in girls' toilets.
2. Training and Awareness on MHHM
  - Train teachers, school nurses, and health workers on menstrual health education and counselling.
  - Use culturally sensitive IEC materials to break taboos and normalize menstruation discussions.
3. Engagement of Boys and Men
  - Include male students, fathers, and teachers in menstrual health awareness sessions to promote acceptance and support.
4. Monitoring and Feedback Mechanisms
  - Establish MHHM reporting indicators in school health records and health facility tools to track progress and inform policy decisions.

### **5.3.2.3 Faecal Sludge Management**

Effective management of faecal sludge is paramount for mitigating health risks and environmental pollution in Mandera County. The following strategic interventions are proposed for the safe management of the faecal sludge.

#### **Promotion of On-Site Faecal Sludge Management**

- Recognizing the absence of operational sewerage systems, prioritize the promotion of on-site faecal sludge management solutions, such as septic tanks and pit latrines, particularly in rural and peri-urban areas.
- Provide technical assistance and guidelines to households and businesses on the construction, maintenance, and desludging of on-site sanitation facilities to ensure proper management of faecal sludge.

#### **Capacity Building for Desludging Services**

- Strengthen the capacity of local service providers to conduct safe and efficient desludging of septic tanks and pit latrines.
- Train county and sub-county officers on FSM standards, planning, and monitoring.
- Facilitate training programs on desludging techniques, equipment maintenance, and safety protocols to enhance the professionalism and effectiveness of desludging services.

#### **Establishment of Faecal Sludge Treatment Plants**

- Based on the absence of operational sewerage systems, prioritize the establishment of faecal sludge treatment plants to manage waste effectively.
- Collaborate with relevant stakeholders to identify suitable locations and technologies for treatment plants, considering factors such as proximity to urban centers and environmental impact.

#### **Community-Led Total Sanitation (CLTS) Programs**

- Implement CLTS programs to mobilize communities towards achieving open defecation-free status.
- Train local artisan on the construction of the local based sanitation facilities using locally available materials
- Provide technical support and resources to communities interested in constructing and managing community toilet facilities, fostering a sense of ownership and accountability.

#### **Innovative Financing Mechanisms**

- Explore innovative financing mechanisms, such as sanitation bonds or public-private partnerships, market-based sanitation to fund the construction and maintenance of public and community toilets.

- Utilize community-based approaches, including theater performances and door-to-door outreach, to effectively disseminate sanitation messages and encourage behavior.

## **Private Sector Engagement**

- **Public-Private Partnerships (PPP):** Collaborate with private entities to manage faecal sludge services, including collection, transport, and treatment.
- **Market-Based Solutions for FSM:** Support entrepreneurs and SMEs that offer faecal sludge management services, including the production of end products like compost or energy from sludge.
- **Financial Incentives for Private Operators:** Provide subsidies, loans, or tax breaks for private companies engaged in FSM, especially for establishing treatment plants and purchasing sludge collection equipment.

### 5.4 Water Resources Management and Catchments Conservation Investment Plan

#### ***5.4.1 Planned investments in watershed protection, groundwater recharge, and pollution control***

There exists Policy, legal & regulatory framework for water resources management at the national level. WRA is mandated to manage and regulate water resources. Water resources management efforts by WRA are not proactive and more regulatory in nature due to low funding limiting local capacity for sustainable water resources management. There are 11 registered WRUAs in the County. Only 1 of the 11 existing WRUAs has operational SCAMPs. At the County level there are no specific NRM Policies, Laws, rules & regulations though it is managed by the county government. Limited information on ground water development potential in the county has led to the underutilization of groundwater resources. Inadequate institutional capacity to respond to calamities & natural disasters.

Addressing the challenges in water resource management in Mandera County requires a comprehensive and collaborative approach. Here are some recommendations to improve water resource management in the county:

#### **Enhance Proactive Measures**

Advocate for increased funding for water resource management initiatives to enable the Water Resources Authority (WRA) to take proactive measures rather than merely regulatory actions.

#### **Development of County-level Policies**

Collaborate with the national government to develop specific Natural Resource Management (NRM) policies, laws, rules, and regulations tailored to the unique needs and challenges of Mandera County. Ensure that these policies align with the national framework and contribute to sustainable water resource management.

## **Groundwater Development Potential Assessment**

Conduct a comprehensive assessment of the groundwater development potential in the county to better understand and utilize available groundwater resources.

### **Enhance catchment and sub catchments protection**

-Catchments provide water for domestic use for people, livestock, wildlife and for irrigation purposes. It also benefits flora and fauna. Water catchment areas can also be tourism and recreational areas. As a result of these vital roles, the County Government of Mandera in collaboration with the Water resources authority(WRA) will develop a regulatory framework to restrict and protect all catchment areas.

-Natural catchments areas like hills, mountains and ridges where surface water drains from to a common channel and reservoirs will be gazetted and protected in collaboration with the local community

### **Specific ways of Catchment conservation**

The County Government shall endeavour to conserve catchment areas by: -

1. Appropriate land use planning and management
2. Undertake catchment risk management assessment and implementing actions recommended
3. Have plans and development controls
4. Monitoring, protection and rehabilitation of water reservoirs
5. Prevention of soil erosion and land degradation
6. Community engagement and education- Constitute community disaster risk reduction committees to support in case of emergencies like floods
7. Fire management
8. Rain water harvesting-implementing systems to collect and store rainwater reducing runoff and enhancing groundwater recharge.

## **Nature Based Solutions**

-Investments in development of wetlands for waste disposal and environmental conservation

-Mapping of all wetlands in the county and impose restriction/protection measures as well as forming community led committees to support in management.

-The county Government shall consider catchment wide approach in catchment protection for surface water sources

-Research and Innovations-Funding research and new technologies and method for efficient water use and management

-Flood controls, irrigation ditches/canals and farm ponds shall constitute some of water the investments

### ***5.4.2 Integrated approach to water resource planning across different sectors***

#### **One water planning and investment approach**

The county government shall form a sectoral team to develop protocols for county water infrastructure investments planning, implementation and monitoring in order to have a harmonized water project planning and management. The team shall have defined roles and objectives to enhance their mandate.

The various sectoral water demands and use shall be prioritized and investment plans developed with specified time lines. The distribution and spread of the water investments shall be considered to ensure county wide coverage.

This strategy emphasizes the coordinated development and management of investments for water, health, agriculture, environment and climate change departments to maximize economic and social welfare while ensuring environmental sustainability.

#### **Key components for one water planning and investment approach**

The components include: -

- a) Sustainability focus- Prioritizing conservation and ecosystem health in water planning
- b) Holistic Assessment-Evaluating water needs across sectors such as agriculture industry and domestic use
- c) Stakeholder Engagement-Involving community, government and business men in decision making process
- d) Adaptability-Designing flexible systems that can respond to climate change and other emerging challenges
- e) Monitoring and Evaluation-Track the entire planning process, implementation, completion as well as evaluating the achievement of intended objectives.

## **Interventions**

a) **Water Reservoirs**-This shall include infrastructures like dams, water pans, Boreholes, underground water tanks, farm ponds, Weirs, shallow wells, irrigation ditches, canals and provision of plastic tanks at household level.

-The sectoral technical team formed shall come up with specifications, standards, designs and bill of quantities (BQs) for all the investments to guide contracting and implementation.

-Project management committee (PMC) shall be formed and capacity build to monitor implementation of the investment to full completion.

- Water resources users' associations shall be formed and capacity built to support management of the investment to ensure sustainability and achievement of the intended objectives.

b) **Catchment conservation**- This shall include activities such as: -

- i. Preparation for logistics and budgets
- ii. Identification and mapping of all water catchments and wetlands
- iii. Community sensitization on catchment conservation
- iv. Feasibility study
- v. Water catchment plan development
- vi. Land demarcation for the catchment area
- vii. Construction works and fencing
- viii. Operation and maintenance of catchment
- ix. Formation and capacity building of community catchment management committees
- x. Monitoring and evaluation

c) **Construction of water treatment plants**-The sectoral technical team shall come up with specifications, designs and BQs of the treatment plant to be undertaken.

d) **Forest plan Developments**-This shall include activities such as: -

- i. Preparation for logistics and budgets
- ii. Identification and mapping of all forests to be protected/conserved
- iii. Community sensitization on importance of forest protection
- iv. Feasibility study
- v. Forest plan activity planning to include tree nurseries establishment, planting and replanting of different plant species, profiling of plant species, general plants management and control like selective plant harvesting

- vi. Construction and maintaining of pathways through the forest
- vii. Preventing fire
- viii. Monitoring and evaluation

e) **Sectoral technical Team**-This shall undertake: -

- i. Harmonized participatory planning of all WASH investments
- ii. Develop protocols for the designing and implementing water infrastructural investments
- iii. Supervise and monitor implementation of all water related investments across the departments
- iv. Develop meeting schedules to assess the progress made and performance of completed WASH investments
- v. Develop as well as review county water and sanitation strategy and investment plans over a specified time
- vi. Develop research and innovation county proposals on WASH related technologies for future improvements in the sector
- vii. Conduct scheduled participatory monitoring and evaluation of all WASH investments and offer advisories accordingly
- viii. Participate in capacity building of project management committees and water resources users' associations
- ix. Technically support county executive in development of water, sanitation and hygiene policies
- x. Support sector departments during annual development of work plans and budgets of water related investments

## 5.5 Institutional Reforms and Services Delivery Models (SDM)

### **Function of County Governments in Water and Sanitation Services**

The Constitution of Kenya provides for the functions of the County Governments to include among others county public works including water and sanitation services. County governments are required to implement specific National government policies on natural resources and environmental conservation including soil and water conservation, and forestry.

### **Legal Framework for Water Services Provision under the Water Act 2016**

The Water Act, 2016 was enacted by parliament to provide a framework for the regulation, management and development of water resources, water and sewerage services; and other connected purposes across the Republic. The Act recognizes that provision and management of water services is a shared function, distributed between the National and County governments.

Section 158 of the Water Act, 2016 provides that a County government shall subject to sections 117 and 120 of the County Governments Act 2012, give effect to national water services standards and conditions set by the Regulatory Board for purposes of ensuring consumer protection; and take into consideration the requirement relating to tariffs gazetted by the Regulatory Board while imposing tariffs.

County governments are also required in law (Water Act Section 94) to put in place measures for provision of water services to rural areas which are considered not to be commercially viable in compliance with standards set by the National Regulator. This is aimed at ensuring quality of service in keeping with the normative content of the right to water.

### ***5.5.1 Proposed models for urban and rural service delivery***

#### **Proposed structure and service delivery models**

Mandera County is committed to ensuring equitable and sustainable water supply and sanitation (WSS) service delivery across both urban and rural areas. To achieve this goal, the county proposes a combined institutional structure and service delivery models tailored to the diverse needs of its population.

#### **Service Delivery Models (SDMs) for Urban Areas**

Mandera Water and Sewerage Company (MANDWASCO) and Elwak Water and Sanitation Company (ELWASCO) will continue to play a central role in urban water and sanitation service provision, adhering to WASREB regulations and other guidelines.

The delineation of service areas will be clearly defined to avoid overlaps and ensure efficient service delivery. Structures for ensuring accountability and financial transparency will be established within the service providers to uphold good governance practices. Roles and responsibilities between the service providers, county government, and water users will be clearly defined to promote collaborative decision-making and effective service provision.

#### **Service Delivery Models for Rural Areas**

Mandera County recognizes the need to extend water service provision to remote rural areas currently underserved.

The county will explore the establishment of rural -based Water and sanitation Service Providers (WSPs) in rural constituencies to ensure localized management and decision-making. These WSPs will operate under a framework that prioritizes commercial viability and sustainability while adhering to WASREB standards. Special attention will be given to defining operational structures for efficient operation and maintenance (O&M) services, particularly in remote rural areas facing challenges due to inadequate infrastructure.

Mandera County's institutional structure will prioritize inclusivity, transparency, and accountability in WSS service delivery to ensure equitable and sustainable service delivery.

The County Government will provide oversight and support to both urban and rural service providers, ensuring alignment with county-wide development goals. Mechanisms for stakeholder engagement, including water users and communities, will be established to ensure their voices are heard in decision-making processes. Continuous monitoring and evaluation will be conducted to assess the effectiveness of service delivery models and address any emerging challenges promptly.

The County Government of Mandera will play a central role in overseeing water service delivery, in coordination with WASREB to ensure compliance with national regulations and standards.

The county will establish or designate licensed WSPs to operate in various regions. These providers will be accountable for meeting service delivery standards and tariff structures.

WASREB will provide oversight on service quality, financial management, and tariff regulation to ensure affordability, equity, and efficiency.

**Consolidated Utilities for Economies of Scale:** In urban areas, the county will likely focus on consolidating services under larger, more formal urban utilities. These utilities will benefit from economies of scale, enabling them to offer commercially viable services with the necessary infrastructure for piped water and sewage systems. To improve efficiency, Mandera may explore PPP models where private entities invest in infrastructure while the public sector retains control over key resources and regulation. Larger urban utilities might employ cross-subsidization, where higher-income areas or consumers subsidize services for lower-income or peri-urban communities to ensure equitable access.

The county government may provide technical assistance, capacity building, and subsidies for rural providers to ensure sustainability and compliance with minimum water quality standards. For hard-to-reach areas and pastoralist communities, the county may adopt mobile water services (e.g., water trucking) or establish water kiosks to ensure all populations, including nomadic communities, have access to safe drinking water. For marginalized communities, the county could implement subsidies or vouchers to reduce the financial burden of water services.

**Cost Recovery with Affordability:** While the county will aim for cost recovery to make services financially viable, tariffs will be structured according to WASREB's guidelines, ensuring affordability for all segments, especially vulnerable groups. A tiered tariff structure could be implemented to charge higher rates for higher water consumption while ensuring lower rates for essential use, thus balancing commercial viability with social equity. **Water Resource Management:** The county will ensure the sustainable management of water resources, focusing on water conservation, protection of catchment areas, and reducing wastage through efficient systems and practices. To ensure long-term sustainability, there will be investments in maintaining and upgrading infrastructure, with emphasis on reducing non-revenue water (leakages and unauthorized connections).

### ***5.5.2 Governance and accountability mechanisms for water service providers***

#### **Accountability and financial transparency in operation and maintenance(O&M)**

a) Financial Transparency Mechanisms:

All WSPs will be required to record and maintain transparent financial information related to the operation and maintenance of water schemes. This includes regular reporting on revenue collection, expenditures, and investment in infrastructure. WSPs will undergo **independent audits** to ensure financial integrity, with the results being made public. This will help build trust between the community, county government, and the service providers. Tariff setting will follow guidelines from **WASREB**, ensuring that rates are transparent, fair, and reflective of the cost of service delivery while being affordable for consumers.

b) Accountability Structures:

**Performance Contracts:** WSPs will sign performance contracts with the County Government, outlining key performance indicators (KPIs) such as water quality, service coverage, reliability, and financial management. These contracts will be monitored periodically to ensure compliance.

Service providers will establish platforms for **customer feedback and complaints**, allowing water users to hold them accountable. These platforms will include customer hotlines, community meetings, and digital platforms for transparency. WSPs will be accountable to the regulatory body, **WASREB**, by submitting **performance reports** that detail operational efficiency, service quality, and financial health.

c) Roles and Responsibilities.

a. **Water User Committees** will participate in decision-making, and ensure community-driven management of resources. Users will also be responsible for **paying tariffs** and reporting service issues to WSPs or local authorities.

b. **County Government:** The County Government will serve as the **primary oversight authority** for water services within its jurisdiction. This includes:

c. **Licensing and Regulating WSPs:** Ensuring that service providers are licensed and operate in accordance with national guidelines.

d. **Infrastructure Development and Maintenance:** The county will provide resources for the development and rehabilitation of water infrastructure (e.g., pipelines, reservoirs).

e. **Capacity Building and Technical Support:** The county will offer technical support to rural and small-scale providers, ensuring they have the knowledge and resources to manage and operate water schemes and standard operating procedures effectively.

f. **Monitoring and Enforcement:** The county will enforce compliance with standards and regulations, ensuring accountability in both peri urban and rural water service delivery.

g. **Water Service Providers (WSPs):**

WSPs, whether large utilities or small-scale providers, will be responsible for the **daily operation and maintenance** (O&M) of water schemes, ensuring consistent water supply and quality.

They will be tasked with **billing and revenue collection**, using transparent and efficient systems to ensure financial sustainability.

WSPs will ensure that they meet the **performance standards** set by WASREB and the County Government, including service quality, water safety, and infrastructure upkeep.

SPs will also be responsible for **engaging with communities** through public meetings, customer care systems, and feedback mechanisms to ensure services meet user needs

d) Ensuring Accountability Through Governance Structures

**Water Services Boards:** Each service provider will have a **governing board** that includes representatives from the County Government, communities, and possibly other stakeholders. These boards will ensure that decisions related to service delivery, infrastructure, and finances are made transparently and inclusively.

**Community Involvement:** In rural areas, Community members will participate in key decision making regarding the operation, maintenance, and expansion of local water schemes to foster a sense of responsibility.

*e)* Operational Structure Definition

To ensure efficient service delivery across diverse regions:

The SDM must include **clear operational structures** for the WSP, tailored to rural settings. This means defining roles, responsibilities, and accountability mechanisms specific to each area, allowing the WSP to manage its service areas without overstretching.

*f)* Operation and Maintenance (O&M) Services

WASREB guidelines emphasize that WSPs must deliver **reliable and sustainable O&M services** in all their areas of operation. **Allocate resources efficiently** to ensure that rural areas receive the same level of service quality as urban centers. This includes water infrastructure maintenance, repair, and service continuity in rural regions.

Incorporate a **tiered O&M strategy** where the scale and complexity of services vary based on the population size, geography, and accessibility of each region.

*g)* Addressing Remote Rural Areas

One of the significant challenges is that rural areas, especially those far from urban centers, might be **disadvantaged** by a WSP that is too large and spread thin. Under the WASREB framework, the following measures should be included in the SDM to address this:

**Decentralized service units** in rural regions to reduce response times for O&M issues and enhance localized management of water schemes.

**Community-based partnerships** for areas that are difficult for the WSP to cover directly. These partnerships would allow local management of small-scale water schemes under WSP supervision.

*h)* Resource Allocation and Financial Planning

The expansion plan must follow WASREB's guidelines for **resource allocation and financial management**, ensuring the WSP has the financial and human capacity to manage a larger service area.

Establish a **budgetary allocation** plan for expanding into rural areas, including costs for infrastructure development, staffing, and ongoing maintenance.

**Cross-subsidization** models can be implemented where urban revenues help support the sustainability of rural water schemes, ensuring affordability and financial viability.

*i)* Monitoring and Performance Evaluation

The WASREB guidelines also require strong **performance monitoring systems**:

Implement **performance contracts** between the county and the WSP to ensure service standards are met in all areas, including rural communities.

Regular **audits and evaluations** to measure service quality, financial performance, and the sustainability of operations in both urban and rural regions.

**Customer feedback systems** to ensure that rural communities can report issues and hold the WSP accountable for service provision.

## 5.6 Sector Financing requirements and Sourcing Plan

The Department of Water has various specific goals it has been mandated to achieve in the pursuit of the county's sector development goals which have been outlined. The county government will continuously provide leadership in dedicating public finance for the implementation of the plan before the mobilization of additional resources from the national government and external partners. This means that the implementation of the strategic plan will be shared between multiple players including the county government, national government and development partners.

### *5.6.1 Estimated costs for planned investments and reforms*

#### **Needed financial resources.**

The total amount of financial resources required for the implementation of the county water and sanitation strategy for the 10 years is Kshs **35,672,020,000**. The amounts needed in each of the 10 years between 2024/2025 and 2033/2034FYs is shown by the table below.

Table 47: Required Financial Resources

Required Funding (Kshs)		2024/25FY	2025/26	2026/27	2027/28FY	2028/29FY	2029/30FY	2030/31FY	2031/32F	2032/33	2033/34	TOTAL (kshs)
	Re current Funding	367,360,000	391,480,000	435,780,000	466,780,000	503,320,000	504,320,000	543,320,000	563,220,000	583,120,000	603,720,000	4,962,420,000
	Development Funding	3,050,500,000	3,191,500,000	3,971,500,000	4,141,500,000	4,132,500,000	3,678,500,000	2,614,400,000	2,511,400,000	1,561,400,000	1,556,400,000	30,709,600,000
	<b>GR AND TOTALS</b>	<b>3,417,860,000</b>	<b>3,582,980,000</b>	<b>4,407,280,000</b>	<b>4,608,280,000</b>	<b>4,635,820,000</b>	<b>4,182,820,000</b>	<b>3,157,720,000</b>	<b>3,074,620,000</b>	<b>2,144,520,000</b>	<b>2,160,120,000</b>	<b>35,672,020,000</b>

### *5.6.2 Strategies to mobilize funding from public, private, and donor sources*

#### **Expected Sources of Funds**

In order to fast-track the implementation of this county water and sanitation strategy, the Sector intends to adopt the following fundraising plan

Potential Sources of funding for the Plan		Annual Anticipated Budgetary Contributions to the Sector (%)										Total Contribution Anticipated (Kshs)
		2024/ 25FY	2025/ 26FY	2026/ 27FY	2027/ 28FY	2028/ 29FY	2029/ 30FY	2030/ 31FY	2031/ 32FY	2032/ 33FY	2033/ 34FY	
	Budgetary Support from County Government	60%	70%	65%	65%	60%	60%	60%	55%	55%	55%	21,663,355,000
	National Government Support (outside funding to county)	30%	20%	25%	25%	25%	30%	30%	25%	25%	25%	9,201,76,000

	Funding from well-wishers, communities & Donors through Civil Society	5%	5%	5%	5%	10%	5%	5%	10%	10%	10%	2,369,355,000
	Direct support to Sector by Donor Agencies through existing County Gov't structures	5%	5%	5%	5%	5%	5%	5%	10%	10%	10%	2,137,564,000
<b>GRAND TOTALS (KSHS)</b>		<b>3,417,860,000</b>	<b>3,582,980,000</b>	<b>4,407,280,000</b>	<b>4,608,280,000</b>	<b>4,635,820,000</b>	<b>4,182,820,000</b>	<b>3,157,720,000</b>	<b>3,074,620,000</b>	<b>2,144,520,000</b>	<b>2,160,120,000</b>	<b>35,372,020,000</b>

### **Planned Resource Mobilization Strategies**

In order to gain the absolute confidence of the County and National Governments, Civil Society and Donor Agencies and, achieve the financial sustainability of the sector, the following fundraising, and utilization strategies shall be pursued by the leadership and management of the sector: -

- The establishment & strengthening of County Water Services Providers to develop the institutional capacity and revenue generation base from the delivery of Water and Sanitation Services,
- The prudent use of funds to maintain confidence of county & national Governments and the trust of Donor Agencies,
- The establishment of support for civil society organizations such as NGOs to enable them to increase their contributions to the Sector,
- The establishment of a fund-raising unit in key departments such as Water and Sanitation whose main role would be to develop programme/ project proposals to be submitted to Sector funding Agencies and, Bi-lateral and multilateral donors,
- The adherence to strict financial management, accounting & evaluation procedures to enhance real culture of accountability and transparency and,
- The involvement of sector/ sub-sector stakeholders in the initiation, planning, implementation, coordination, monitoring, and evaluation of activities related to the implementation of the strategic plan.

## CHAPTER 6: ENVIRONMENTAL AND SOCIAL ASSESSMENT

### 6.1 Environmental, Health, and Safety in the WASH Sector

#### Introduction

Mandera County is the most populous county in North eastern counties of Kenya and is an Arid and Semi-Arid Lands (ASALs) with diverse geographical zones, including riverine and rain-fed ecosystems. The Water, Sanitation, and Hygiene (WASH) sector in the county faces a complex range of environmental and public health risks. Addressing these challenges requires integrated and sustainable solutions, such as strengthening environmental safeguards, enhancing public health infrastructure, and ensuring the safe and equitable delivery of WASH services. These measures are critical to improving the well-being and resilience of Mandera's diverse and often vulnerable communities.

Vulnerable populations to environmental, and health risks in Mandera includes:

- Pregnant mothers, elderly individuals, and persons with disabilities face higher risks in areas without accessible, safe WASH facilities.
- Children under five are most at risk from waterborne diseases and poor hygiene conditions,
- Nomadic and pastoralist communities, especially in the Rural areas of Mandera county, face mobility-related barriers to sustained access to safe water and sanitation.

#### Key Environmental Risks

##### a) Water Source Contamination

- Surface water pollution from agricultural runoff, livestock waste, and poor sanitation practices is common around water bodies such as Water pans, River Daua, Laggas, and seasonal streams.
- Groundwater contamination occurs due to improper siting of pit latrines near shallow wells and boreholes, especially in peri-urban areas and flood-prone lowlands of Mandera South and Mandera town.
- Limited capacity for wastewater treatment results in greywater and raw sewage being discharged directly into the environment.

##### b) Unsustainable Water Abstraction

- Over-reliance on boreholes and shallow wells, especially in Mandera South and Lafey Sub-counties, might lead to declining groundwater levels and degradation of aquifers in the near future.
- Unregulated and unmonitored water withdrawals from the only river and springs disrupt natural flow regimes, creating water shortage downstream.

##### c) Degradation of Water Catchment Areas

- Deforestation and land degradation in key catchments such as the Gari Hills, Dandu Hills, Kiliweheri, Takaba and Banisa have increased soil erosion and siltation of the water bodies, impacting the capacity and lifespan of water pans and seasonal rivers.

- Encroachment and poor land-use practices near riparian zones for instance charcoal burning as a fuel and a livelihood source has contributed to habitat destruction and loss of buffer zones critical for water quality protection.

#### d) Waste Accumulation and Pollution

- Inadequate solid waste management in growing market centers (e.g. Mandera Town, Elwak, Rhamu, Banisa, Takaba, and Lafey) results in waste getting their way into drainage channels and wetlands, contaminating nearby water sources.

- Lack of proper sewage management systems in the county leads to improper disposal of faecal waste and waste water creating both environmental and public health hazards.

#### e) Climate Change and Variability

- Mandera is increasingly affected by climate-induced risks such as prolonged droughts, erratic rainfall, and flash floods, which damage WASH infrastructure and reduce water availability.

- Flooding during heavy rains often overwhelms latrines and surface drainage, causing raw sewage to contaminate surface water bodies.

- In addition, climate induced risks have led to migration and displacement of people creating serious humanitarian crises for instance water shortages, poor sanitation issues, competition for the scarce resources during drought leading to resource-based conflicts.

### Key Public Health Risks

#### a) Waterborne Diseases

Diarrheal diseases, including cholera and typhoid as well as Kalazar, Dengue fever and respiratory infections are prevalent, especially during the rainy season when surface water sources are contaminated by runoff and overflowing latrines.

Consumption of untreated water from unprotected sources like laggas, rivers, water pans, and shallow wells common in areas like Banisa, Mandera South, and parts of Mandera North exposes communities to E. coli and other pathogens.

Poor water storage and handling practices at the household level further increase the risk of contamination.

#### b) Inadequate Sanitation

The percentage of basic sanitation for the entire county is 36%. Large sections of the population, particularly in remote areas of the county, practice open defecation (39.4%) due to a lack of household latrines, increasing exposure to fecal contamination.

Overcrowded or poorly maintained public sanitation facilities, particularly in schools, markets, and health centers, contribute to unhygienic conditions and the spread of disease.

In flood-prone areas, especially in low lying areas of Mandera South Sub-County, flooding of latrines lead to widespread contamination of surface water and surrounding environments which pose a risk of water borne diseases.

- Many rural health facilities and ECDE centers lack reliable water supply and adequate sanitation, compromising infection prevention and control (IPC) efforts.

- Schools often operate with limited or poorly maintained WASH infrastructure, contributing to absenteeism and poor health outcomes among pupils.

#### c) Limited Hygiene Practices

Low awareness and limited access to handwashing facilities with soap contribute to high rates of preventable infections, especially among children under five. This has increased the prevalence of cholera, typhoid and Respiratory infections in Mandera. Poor menstrual hygiene management in schools and public institutions affects the health, dignity, and school attendance of adolescent girls.

#### d) Vector-Borne Diseases

Stagnant water due to poor drainage and sanitation infrastructure provides breeding grounds for disease-carrying mosquitoes, increasing the risk of malaria and Dengue fever. Due to perennial flooding Mandera County was mapped as a high-risk for Dengue fever and other vector borne diseases in Kenya. Inadequate waste disposal attracts flies and rodents, which are vectors for various diseases such as leptospirosis and intestinal worm infections.

### **Occupational Health and Safety (OHS) Concerns**

#### **a) Exposure to Biological Hazards**

Waste handlers handling raw sewage, emptying pit latrines, or managing open drains are regularly exposed to pathogens such as bacteria, viruses, and parasites, increasing risks of infections like hepatitis, cholera, and typhoid.

Lack of personal protective equipment (PPE) gloves, boots, overalls, and masks further heightens vulnerability to contamination.

#### b) Chemical Exposure

Usage of chlorine and other disinfectants in water treatment and cleaning without proper handling procedures can cause respiratory issues, skin burns, and eye irritation.

Agricultural runoff and industrial pollutants in water sources may expose workers to toxic chemicals during water source protection, sampling, or treatment.

#### c) Ergonomic and Physical Hazards

WASH workers involved in manual excavation, pipeline repair, and borehole drilling often face musculoskeletal injuries, slips, trips, and falls due to poor site conditions and the lack of mechanical support.

Sanitation workers are sometimes required to enter confined spaces such as septic tanks or manholes, posing risks of asphyxiation or collapse.

#### d) Insecurity and Gender-Based Violence

- Female sanitation workers and cleaners working in remote or poorly lit areas (e.g., public latrines, marketplaces, and schools) are at risk of harassment or assault.

- WASH workers in conflict-prone or cattle-rustling areas may face personal security threats, particularly when working in isolated communities or insecure zones.

#### e) Lack of Training and Awareness

- Many WASH workers, particularly in community-run or informal systems, lack training in basic occupational health and safety practices and emergency response.
- There is minimal awareness of workers' rights and protections, leading to underreporting of injuries or unsafe conditions.

### **Mitigation Measures**

- Promote climate-resilient and eco-sensitive WASH technologies such as ecological sanitation (ecosan), rainwater harvesting, and solar-powered water supply systems.
- Invest in catchment protection and reforestation programs to safeguard water sources and reduce erosion.
- Strengthen wastewater and solid waste management systems, especially in urbanizing centers.
- Expand access to safe drinking water through protected sources, water treatment, and household-level water purification technologies.
- Invest and scale up hand hygiene promotion, especially in schools, health facilities, and public spaces to reduce disease transmission and support IPC.
- Strengthen surveillance systems for water-related disease outbreaks and ensure timely public health responses.
- Customize and implement Occupational Health and Safety Guidelines for WASH workers, aligned with the Occupational Safety and Health Act (OSHA), 2007.
- Ensure mandatory provision of PPE and first aid kits for waste handlers, all WASH staff and contractors.
- Conduct regular capacity building and refresher training for WASH workers and waste handlers on safety protocols, hazard identification, and emergency response and
- Implement Community-Led Total Sanitation (CLTS) and other behavior change programs to eliminate open defecation.
- Institutionalize incident reporting mechanisms and worker health monitoring systems across all public WASH facilities.
- Incorporate gender-sensitive safety measures, including secure working environments and awareness on harassment prevention.

### **Environmental and Social Assessment**

Mandera County faces significant WASH (Water, Sanitation, and Hygiene) challenges, driven by its arid climate, ecological fragility, and increasing population pressure. To protect public health and ensure environmental sustainability, the establishment of a robust permitting and monitoring framework is imperative.

### **Current Permitting Landscape in the county**

#### **Water Use and Abstraction Permits**

All water service providers (WSPs), community water projects, and individual abstractors must obtain permits from the Water Resources Authority (WRA). These include boreholes, shallow wells, and river intake systems. However, compliance remains low due to limited awareness and enforcement capacity.

#### **Effluent Discharge Permits**

Any entity discharging wastewater into the environment must obtain an Effluent Discharge License (EDL)

from the National Environment Management Authority (NEMA). This is critical for health facilities, Municipal and other centres sewerage systems (e.g. Mandera municipality, Elwak and Rhamu).

### **Environmental Impact Assessments (EIAs)**

New WASH infrastructure projects such as piped water schemes, sewage treatment systems, and major boreholes must undergo ESIA screening/ESIA Report development and acquire NEMA approval and license.

### **Public Health Compliance**

WASH facilities must meet health standards set by the Ministry of Health and enforced through the County Public Health Department, including sanitary inspections, waste management protocols, and hygiene promotion. Permits will only be awarded for compliance.

### **Monitoring Plans**

To ensure adherence to Environmental, Health, and Safety (EHS) standards, Mandera County should adopt a multi-tiered monitoring approach that actively engages regulatory agencies, county departments, and local communities.

#### **a) Environmental Monitoring**

##### **Water Quality Testing:**

Periodic testing of water sources for microbial and chemical contaminants, especially in high-risk zones (e.g. near livestock markets, flood-prone areas along river DAUA).

##### **Sanitation Impact Monitoring:**

Regular inspection of pit latrines, septic systems, and communal sanitation facilities for leachate, overflow, or vector breeding.

##### **Biodiversity and Ecosystem Monitoring:**

Monitoring of ecosystems affected by WASH infrastructure especially wetlands and riparian zones to ensure minimal disturbance and promote rehabilitation efforts.

#### **b) Health Risk Surveillance**

##### **Disease Surveillance and Outbreak Reporting**

Collaboration with the County Disease Surveillance Unit to track incidences of WASH-related diseases (e.g. cholera, Kalazar, Dengue fever, Chikugunya), particularly during rainy seasons and respiratory infections during dry seasons.

##### **Hygiene Behavior Monitoring:**

Routine assessments of handwashing facilities, menstrual hygiene management, and sanitation usage across institutions (schools, health centers) and households.

#### **c) Occupational Safety Monitoring**

##### **Inspection of Sanitation Workers' Conditions:**

County inspectors should monitor the use of PPE, adherence to safe handling of human waste, and reporting of health complications among WASH personnel.

#### Audit of Construction and Maintenance Activities:

Ensure contractors and community workers adhere to safety standards during the installation and repair of WASH infrastructure.

#### Institutional Responsibilities

Agency/Institution	Key Roles in Permitting and Monitoring
NEMA	Issues EIA licenses, monitors effluent discharge
WRA	Regulates water abstraction and pollution control
County Government (Public Health, Water, and Environment Departments)	Implements inspections, licenses service providers, monitors hygiene and safety
Public Health Officers (PHOs) and Environmental inspectors	Conduct routine inspections and enforce sanitation bylaws
Community Water Management Committees	Conduct local-level monitoring and reporting

#### 6.2 Social Assessment for the WASH Project in Mandera County

Mandera County's WASH project success will depend on meaningful community participation, culturally sensitive consideration, behavior change, and adaptive service delivery. Proactive mitigation of social risks will enhance inclusivity, equity, and long-term sustainability.

#### Socio-Demographic and Cultural Context of the County

Social issue	Description
Population	867,457 (KNBS, 2019) spread across 9 sub-counties.
Ethnic groups	Predominantly Murule, Gare, Dagodia and Corner-tribe communities
Livelihoods	Pastoralism, Agro-pastoralism, along river daua, and mixed farming
Water stress	Arid/semi-arid and faces frequent droughts and water scarcity.
Gender roles	Women and girls are primarily responsible for water collection and household sanitation; this often limits their access to education and income-generating activities
Education	Low literacy and school attendance in rural areas; poor sanitation a key contributor to absenteeism and dropout.

Cultural norms	Traditional practices e.g. Open defecation influence attitudes toward hygiene, latrine use, and menstruation management
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### Social Risks and Mitigation Measures

Social Risk	Description	Mitigation Strategy
Marginalization of pastoralist communities	Mobile lifestyles limit access to fixed infrastructure	Provide water at strategic points, and community-managed boreholes
Gender exclusion	Women bear WASH burden but are underrepresented in decision-making	Promote 50% women in WASH committees; gender-sensitization training
Water-based conflict	Competition for scarce resources i.e. water and pasture among communities in border zones and inter county borders	Support inter-community resource sharing pacts, peace committees, and joint water points
Inadequate inclusion of PWDs and elderly	Facilities may not consider disability or aging needs	Incorporate inclusive design standards and social audits
Hygiene resistance due to cultural norms	Resistance to latrine use or MHM	Localized hygiene campaigns via elders, chiefs, churches, and youth groups
Land use conflict	Land disputes in arid areas may disrupt WASH sites	Verify land ownership before construction; involve elders and land boards
School WASH challenges	Poor sanitation leads to absenteeism and dropout, especially for girls	Prioritize latrine construction, MHM stations, and hygiene education
Elite capture and corruption risks	Local elites may skew project benefits	Transparent budgeting and public participation in procurement and implementation

## Opportunities for Positive Social Impact

Area	Approach
Educational attainment	More consistent school attendance with improved school WASH
Youth engagement	Skills training and engagement during infrastructure development
Peacebuilding	Cross-community water access can improve social cohesion
Women's empowerment	Through WASH leadership and time savings
Improved health	Reduced prevalence of diarrheal diseases and cholera outbreaks (notably in flood-prone areas)

### Grievance Management (GM)

The project will adapt and tailor the existing county Grievance Management (GM) structure to align with and support the specific objectives and requirements of the current initiative.

#### The WASH project GM Approach:

Channels - Village elders, assistant chiefs, WASH committee reps, toll-free hotline, and SMS

Timelines - Resolution within 7 working days

Accessibility - Translators and visual materials for low-literacy communities

Accountability - Regular tracking of complaints in M&E reports

Social Assessment for Mandera County – Affordability and Stakeholder Management willingness and Ability to Pay

In Mandera County, affordability and inclusive stakeholder management are critical enablers for effective and sustainable WASH interventions. Balancing the financial realities of residents with strategic engagement of diverse stakeholders will foster equity, trust, and long-term service functionality.

In the County, water affordability is constrained during dry seasons when vendors charge KES 35–50 per 20-liter jerrycan, which is unaffordable for poor households.

#### Affordability Risks

Risk	Description	Affected Groups
High cost of water from vendors	Especially during dry spells or when infrastructure breaks down	Rural poor, elderly, women
Inability to contribute to O&M	Community-managed water points risk breakdown due to unpaid fees	Marginalized and low-income households
Exclusion from private sanitation	Latrine construction costs (~KES 35,000–50,000) are unaffordable without subsidies	Landless households, informal settlements

## **CHAPTER 7: Implementation Roadmap, Monitoring and Evaluation, and**

### **Communication Plan**

#### **7.1 Strategy and Investments Implementation Plan**

##### ***7.1.1 Step-by-step action plan for executing the strategy***

The plan is to be implemented over a 10-year period beginning 1<sup>st</sup> July 2024 and ending 30<sup>th</sup> June 2034. Although the plan is expected to be implemented largely with resources voted to the county Government (i.e. between 40 – 60% of strategy implementation budget), significant contributions shall be expected from the national Government (10 -30%), multi-lateral and Bi-lateral Donors (5 – 25%) and civil society (5%)

The following basic principles shall guide the implementation of the plan; -

- Active stakeholder involvement and participation,
- Integration of effective planning, coordination, monitoring and evaluation,
- Promotion of transparency and accountability and,
- Application of focused, yet flexible implementation mechanisms.

In order to enhance the absorption capacity of funds allocated by the county Government and Donor agencies to the county, basic approaches are envisaged in the implementation of the strategic plan for the sector.

#### **County level programmes/ projects implementation approach**

The Sector Chief Officer and Departmental Directors at the sub-sector head offices at county level shall be responsible for the implementation of such programmes/ projects. The Chief Office shall report directly to the CEC member who shall in turn report to the Governor in the implementation of the strategic plan. The sub-sector Director shall report to the chief officer. interventions shall be proposed at both county and sub-county levels but shall be approved by the CEC after receiving the inputs of stakeholders who shall include ward and constituency leaders.

#### **7.2 Monitoring and Evaluation Plan**

To achieve the set goals in this plan, the County will put in place an institutional structure to implement, monitor and evaluate the activities in order to ensure that they are undertaken at the right time and in the most efficient and cost-effective way. This will be done by involving all stakeholders in monitoring and evaluation and set up a quality feedback mechanism.

In monitoring the implementation of this strategic plan, the department will compare the execution performance against parameters outlined in the detailed implementation matrix of this plan and take corrective action, where necessary within the constraints of defined time, available resources and quality parameters. The monitoring and evaluation framework will aim at ensuring that an M&E Unit will be established in the department and resourced appropriately. This unit will also liaise with other implementation partners including national

government, development partners and NGOs to consolidate all planning and implementation data and information and a single database. Mechanisms for collecting programme data on all activities and programmes are enhanced. It will also ensure that information on all key performance indicators is available bi-annually and on an incremental basis. A database is established to capture information on all activities implemented. An annual review is undertaken on the progress in implementation of activities. Responsibilities are assigned for the collection, analysis and evaluation of performance information with a mechanism for capturing, storing and sharing lessons learnt and best practices. A mid-term review of the strategy will be carried out after 5 years so as to up -date the second half of the Strategic Plan as necessary and project the next strategy planning phase.

### **Implementation, Monitoring, and Evaluation Matrix**

Implementation of the plan will depend on clarity of measures, adequacy and proper allocation of resources and responsibilities and effective coordination. The Implementation, Monitoring and Evaluation Matrix comprising Project name, Cost estimate, Time frame, monitoring indicators, monitoring tools, implementing agency, source of funds and the project implementation status as presented below will assist in the assessment of programs and projects implementation during the plan period.

#### **7.3 Communication and Advocacy Plan**

The County will develop a communication strategy embedded in this County water sector strategic plan to ensure timely release of information to internal users and external stakeholders. This reduces speculation and disputes likely to occur due to poor communication, misunderstanding among stakeholders or poor handling of disputes raised by the community or other stakeholders in the sector. A great communication strategy entails a complaints and feedback mechanism for timely dispute resolution and safeguarding of service delivery through adherence to transparency and accountability among the service providers at different levels

The Department shall increase public awareness of the sectoral feedback and complaints and feedback mechanism through a well-coordinated process that guarantees whistleblower rights and timely resolution of complaints. Enhance county officers' capacity to communicate directives to secure water resources during crises and to strengthen accountability and resource related dispute resolution when they arise in a timely manner. Finally, the Department will; design awareness campaigns targeting the special interest and vulnerable groups to encourage and increase their usage of the reporting complaints and feedback mechanism.

A well-rounded communication strategy is essential to reach a diverse, mostly rural population. Given the limitations in literacy and access to traditional media, use multi-channel communication strategies that are accessible to all.

- **Radio Broadcasting:** Radio remains the most reliable medium in ASAL (Arid and Semi-Arid Lands) regions. Regular segments on local radio stations can focus on WASH best practices, the benefits of the One Water approach, and water conservation. Include interviews with experts, local leaders, and community members sharing success stories.
- **Social Media for Youth Engagement:** For the younger, more tech-savvy population, social media platforms such as WhatsApp, Facebook, and local Somali-language YouTube channels can be used to spread WASH-related messages and updates about the strategic plan.

- **SMS Alerts:** For mobile phone users, SMS notifications in Somali or Swahili can be an effective way to send out regular reminders about water conservation, safe water storage, and hygiene practices.
- **Public Service Announcements (PSAs):** Use PSAs on radio, in mosques, and through community announcements to reinforce the need for improved water practices. These should be frequent and cover different WASH-related topics.
- **Participatory Community Theater:** Develop community theater performances that focus on WASH issues, which can be performed during market days or at community gatherings. This can be an engaging way to communicate critical messages.
- **Multilingual Content:** Ensure all content is translated into the local Somali language to reach the widest possible audience. Simplified Swahili can also be used in areas with more mixed populations.

### **Awareness Campaigns**

Awareness campaigns should aim to educate and mobilize the community about the "One Water" strategy and its benefits, focusing on sustainable water use and conservation. Given the high illiteracy rates and nomadic lifestyle, consider the following methods:

- **Engage Local Leadership and Religious Leaders:** Traditional and religious leaders hold significant influence in pastoralist communities. They can be key advocates in spreading awareness through community gatherings, mosque sermons, and clan meetings.
- **Community Barazas and Mobile Outreach:** Use regular community meetings (barazas) to discuss water issues, rights, and responsibilities. Mobile outreach programs could reach nomadic communities who move frequently.
- **Use of Visual and Oral Communication:** Since literacy levels are low, campaigns should be heavy on visuals and storytelling. Use simple illustrations, diagrams, and infographics to explain water conservation, sanitation, and hygiene practices. Radio programs in local languages like Somali can be extremely effective in reaching wide audiences.
- **Role of Women and Youth:** Women, being the primary managers of household water, and youth can be targeted as change agents. Design specialized training for women on water hygiene and conservation and engage youth through digital platforms or in-person sessions.
- **School Programs:** Leverage schools to run WASH programs for children and families. ECDE teachers, who are part of ongoing capacity building, can become critical allies in teaching children basic hygiene and water management skills, making it easier to introduce these concepts at the household level.

### **Advocacy for WASH Issues**

Advocacy efforts will require multi-stakeholder engagement, focused on influencing policies, raising public awareness, and ensuring that WASH priorities are integrated into the broader development agenda.

- **Stakeholder Mapping and Collaboration:** Identify key stakeholders, including government departments (Water, Agriculture, Health), NGOs, international donors, and community-based

organizations (CBOs) to create a coordinated effort. Advocacy will be stronger when multiple voices push for the same WASH agenda.

- **Community-Led Total Sanitation (CLTS) Approach:** Given the poverty and high illiteracy rates, consider introducing CLTS, which empowers communities to find local solutions to sanitation issues. This approach encourages behavioral change and helps reduce open defecation through communal efforts.

- **Leverage Existing Structures:** Utilize Water Resources Users' Associations (WRUAs) and Irrigation Water Resources Users' Associations (IWRUAs) to advocate for equitable and sustainable water usage while integrating WASH issues into their roles. PMCs can also be engaged in advocacy efforts to ensure that water projects align with community needs.

- **WASH Champions:** Train local WASH champions from within the community to advocate for clean water and sanitation practices. These individuals can be key in lobbying for better resource allocation and influencing behavioral change.

### **Engagement with Donors and Policymakers**

- **Host Policy Dialogues:** Facilitate regular dialogues between the county government, donors, and policymakers to ensure alignment between the water strategic plan, WASH advocacy, and ongoing donor-funded projects related to water infrastructure and climate adaptation.

- **Utilize Donor Platforms for Amplification:** Engage with donor-funded platforms that work on climate adaptation and water projects to further the advocacy efforts. These platforms often have a broader reach and can help amplify the WASH-related messaging across various networks

### **Monitoring and Feedback**

- **Community Feedback Mechanism:** Set up feedback loops with communities to monitor how well the message is understood and being implemented. Regular surveys and focus groups can help assess the effectiveness of the communication strategies and make adjustments.

- **Use of WRAs for Reporting:** WRUAs can provide real-time data on how the community is adopting WASH practices and whether water infrastructure is being used sustainably.

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## APPENDIX 1: IMPLEMENTATION MATRIX

s/ n o	PLAN NED ACTI VITI ES	OUTPU TS INDICA TOR	Ta rge t for ten yea rs	ANNUAL TARGETS AND ESTIMATED COSTS PER YEAR (KSHS)																				SOURCES OF FUNDS	IMP. AGENC IES	
				YR 1	CO ST (in Mil lion )	YR 2	Co st (in Mil lion )	YR 3	Co st (in Mil lion )	Yr 4	Co st (in Mil lion )	Yr 5	Co st (in Mil lion )	YR 6	Co st (in Mil lion )	YR 7	Co st (in Mil lion )	YR 8	Co st (in Mil lion )	YR 9	Co st (in Mil lion )	YR 10	Co st (in Mil lion )			Amou nt (in Millio n)
<b>1</b>	<b>OBJECTIVE 1 : Improve availability &amp; spatial distribution of water sources</b>																									
1.1	Water resources assessment and mapping	Satellite assisted ground water exploration conducted	2	1	11									1	11									22	County Government/NTNL GVT/DONORS	Department of Water services
		GIS based database & mapping done & updated annually	7	1	5	1	5	1	5	1	5			1	5			1	5	1	5			35	County Government/NTNL GVT/DONORS	Department of Water services
1.2	Drill and equip Boreholes	Hydrogeological surveys conducted	20	20	4	20	4	20	4	20	4	20	4	20	4	20	4	20	4	20	4	20	4	40	County Government/NTNL GVT/DONORS	Department of Water services
		Boreholes drilled and pump tested	15	15	87	15	87	15	87	15	87	15	87	15	87	15	87	15	87	15	87	15	87	870	County Government/NTNL GVT/DONORS	Department of Water services

		Successful Boreholes equipped and provided with basic WSP facilities (pump houses, tanks, troughs, pipelines & water kiosks)	150	15	180	15	180	15	180	15	180	15	180	15	180	15	180	15	180	15	180	15	180	1,800	County Government/NTNL GVT/DONORS	Department of Water services
1.3	Construct water conservation structures (Dams, Pans, Sand Dams & underground tanks)	Hydrological surveys & detailed site investigations done & designs developed	80	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	8	1.2	12	County Government/NTNL GVT/DONORS	Department of Water services
		Medium sized (30,000 - 150,000C M) earth dams/pans with hygienic water draw-off systems constructed	120	12	672	12	672	12	672	12	672	12	672	12	672	12	672	12	672	12	672	12	672	6,720	County Government/NTNL GVT/DONORS	Department of Water services
		Sunken and traditional sand dams in	20	2	20	2	20	2	20	2	20	2	20	2	20	2	20	2	20	2	20	2	200	County Government/NTNL GVT/DONORS	Department of Water services	





















	certified through CLTS																							NTNL GVT/DONORS	
	No. of HHs & markets with blend Rural Sanitation.	600	0	-	60	3.5	60	3.5	60	3.5	60	3.5	60	3.5	60	3.5	60	3.5	100	6	80	4.5	35		
	Awareness community involvement in hygiene & sanitation services through PHAST, CHAST, CTC & CLTS approaches	48	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	4	2.5	25	County Government/NTNL GVT/DONORS	Department of Water/HEALTH services
<b>TOTAL FOR WAT-SAN</b>				<b>3011</b>		<b>3218.5</b>		<b>4285.5</b>		<b>3863.5</b>		<b>3856.5</b>		<b>3365.5</b>		<b>2301.4</b>		<b>1596.4</b>		<b>1558.9</b>		<b>1307.9</b>	<b>28315.1</b>		

## APPENDIX 2: MONITORING MATRIX

S/N O	ACTIVITIES	OUTPUTS INDICATOR	BASELIN E	Targe t fot ten years	ANNUAL TARGETS										Sources of Data	FREQUENC Y OF REPORTING	RESPONSIBL E INDIVIDUAL
					YR 1	YR 2	YR 3	Yr4	Yr5	YR6	YR7	YR8	YR9	YR10			
1.1	Water resources assessment and mapping	Satellite assisted ground water exploration conducted	2	2	1					1					DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		GIS based database & mapping done & updated annually	0		1	1	1	1		1		1	1		DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
1.2	Drill and equip Boreholes	Hydrogeological surveys conducted	424	200	20	20	20	20	20	20	20	20	20	20	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Boreholes drilled and pump tested	224	150	15	15	15	15	15	15	15	15	15	15	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Successful Boreholes equipped and provided with basic WSP facilities (pump houses, tanks, troughs, pipelines & water kiosks)	172	150	15	15	15	15	15	15	15	15	15	15	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
1.3	Construct water conservation structures (Dams, Pans, Sand Dams & underground tanks)	Hydrological surveys & detailed site investigations done & designs developed	281	80	8	8	8	8	8	8	8	8	8	8	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Medium sized (30,000 - 150,000M3) earth dams/pans with hygienic water draw-off systems constructed	12	120	12	12	12	12	12	12	12	12	12	12	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Sunken and traditional sand dams in 35 lagas	1	20	2	2	2	2	2	2	2	2	2	2	DEPARTMEN T OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE

		in Mandera County designed & constructed															
		Large sized (600,000-800,000lt) underground tanks (UGTs) constructed	0	30	3	3	3	3	3	3	3	3	3	3	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
2.1	Rehabilitate existing water conservation structures	Small sized pans/ Dams desilted & fenced		100	10	10	10	10	10	10	10	10	10	10	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Strategic Earth Pans/ Dams expanded, lined & Rehabilitated		100	10	10	10	10	10	10	10	10	10	10	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
	Rehabilitate existing rural water supply schemes	Pipeline extensions, renewal of electro-mechanical equipments, construction of kiosks & troughs undertaken		80	8	8	8	8	8	8	8	8	8	8	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		No of storage tanks constructed/ rehabilitated	268	100	10	10	10	10	10	10	10	10	10	10	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Rural water utilities upgraded	160	200	20	20	20	20	20	20	20	20	20	20	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
2.2	Urban water supply and sewerage maintenance	Water supply and sewerage systems maintained	6	4	1	1	1	1	1					DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE	
2.3	Develop water supply schemes for key rapid growing small-medium towns within the county	Master plans established	1	20	2	2	2	2	2	2	2	2	2	2	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		No of hydrogeological surveys	10	30	3	3	3	3	3	3	3	3	3	3	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Rural Water supply schemes constructed/ upgraded	16	80	8	8	8	8	8	8	8	8	8	8	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Inter basin water transfer water studies undertaken	0	2	1					1					DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE

		No of high-tech survey equipment and design software purchased	1	3	1		1			1					DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
2.4	Incorporate Water Quality analysis & treatment in the provision of water services	County Water Quality Analysis Laboratory Established & maintained	0	3	1			1			1				DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Water treatment plants developed for all affected schemes	0	10	1	1	1	1	1	1	1	1	1	1	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Household water purification techniques promoted through trainings and distribution of Aquatabs & domestic filters	1	200,000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING
2.5	Water shed management and harvesting structure	Water catchment areas protected	0	30	3	3	3	3	3	3	3	3	3	3	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
2.6	Maintain water services provision facilities to meet O&M and management standards	Routine & corrective maintenance checks regularly conducted	3	300	30	30	30	30	30	30	30	30	30	30	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Adequate O&M and technical back-stopping support including spare parts provided through SCWOs		300	30	30	30	30	30	30	30	30	30	30	30	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING
2.7	Upgrade water supply systems for urban Towns	Mandera and Elwak town water supply reticulation systems improved	2	4	1	1	1	1							DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
2.8	Establish and operationalize county water services providers	Policy and legal frameworks developed with stakeholders	0	3		1	1	1							DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		County water service providers supported	2	4		1	1	1	1							DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING

3.1	Develop the capacity of the county Water department to manage the provision of WAT-SAN services	Motor vehicles procured		6 4WD vehicles		1	1	1	1	1	1				DEPARTMENT OF WATER SERVICES DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE	
		Office equipment procured for use at headquarters and sub-county offices	4	10 Offices	1	1	1	1	1	1	1	1	1	1	1	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Drilling Rigs procured	0	4 Rigs		1	1									DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Exhausters for major towns procured	2	7		1	1	1	1	1	1	1	1			DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Water & sanitation services information system backed by GIS & mapping capability developed at county & sub-county levels	0	10	1	1	1	1	1	1	1	1	1	1	1	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
3.2	Establish, & support sustainable water service providers (WSPs)	Establishment of legal water services delivery entities (WSPs)	2	5	1	1	1	1	1						DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE	
		Established WSPs capacity built in Governance, O&M, Financial Management, strategic management & Administrative & reporting systems	0	6	1	1	1	1	1	1						DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		All county and Sub-county technical staff trained in the development, performance	0	50	5	5	5	5	5	5	5	5	5	5	5	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE

		monitoring & management of WSPs															
4.1	Establish sufficient capacity for response to water services provision emergencies county wide	Custom made fully equipped Rapid Response 4WD vehicles (preferably Land cruiser double cabins) procured for each Rapid Response Team	2	6	1	1	1	1	1	1					DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Standby pumping equipment's procured & installed at all motorized water supply scheme which lack such equipments		80	8	8	8	8	8	8	8	8	8	8	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Water boozers for use in sub-counties procured	7	10	1	1	1	1	1	1	1	1	1	1	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
		Investigations, Planning and design for mega multi-purpose water reservoirs carried out	0	10	1	1	1	1	1	1	1	1	1	1	DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
	Construct mega Dams and man made lakes along Daua river & Lag Sure seasonal river	Mega multi-purpose reservoirs constructed	0	6	1	1	1	1	1	1					DEPARTMENT OF WATER SERVICES	QUARTERLY PROGRESS REPORTING	CCO WATER SERVICE
<b>SANITATION SERVICES</b>																	
5.1	Microplanning and development of Mandera County Sanitation & ODF roadmap	Mandera Sanitation and ODF roadmap developed	0	1	1	-									DEPARTMENT OF PUBLIC HEALTH	ACTIVITY REPORT- QUATERLY	CCO-PUBLIC HEALTH
5.2	Capacity development of PHOs/CHAs/CHPs on National guidelines for	No. of PHOs, CHAs and CHPs trained on CLTS Approaches	0	100 PHOs, 200 CHAs,	30 PHOs, 40 CHAs	40 PHOs, 80 CHAs	30 PHOs, 80 CHAs , 500	400 CHPs	400 CHPs	-	-	-	-		DEPARTMENT OF PUBLIC HEALTH	ACTIVITY REPORT- QUATERLY	CCO-PUBLIC HEALTH

	verification & certification of ODF			2000 CHPs	, 200 CHPs	, 500 CHPs	CHPs										
5.3	Proposed construction of Standardized regular PSF for Public Institutions and markets within the county with decentralized treatment facilities (DTF)	No of PSFs for public places, markets and institutions developed	1	100	10	10	10	10	10	10	10	10	10	10	DEPARTMENT OF PUBLIC HEALTH	ACTIVITY REPORT- QUATERLY	CCO-PUBLIC HEALTH
5.4	Construction of VIP Latrines for vulnerable households in rural areas across the county	No of VIP latrines constructed for Vulnerable HHs	-	2500 HHs	250	250	250	250	250	250	250	250	250	250	Department of Public Health & Social Services	Quarterly reports	CCO-Public Health and CCO-Social Services
5.5	Proposed rehabilitation of septic tanks in 3 sub-county hospitals (Takaba SCH, Banisa SCH and Mandera North SCH)	No of Septic tanks rehabilitated	0	3	1	1	1								Health Services	Quarterly reports	CCO-PUBLIC HEALTH & CCO-Medical Services
5.6	Construction of 4 No. septic tanks in 4 level 4 Hospitals	No. of Septic tanks with DTF constructed for level 4 Hospitals	3	4		1		1		1			1		Health Services	Quarterly reports	CCO-PUBLIC HEALTH & CCO-Medical Services
5.7	Develop sewerage infrastructure for Elwak, Takaba, Banisa, Mandera and Rhamu towns.	Sewerage infrastructure developed for Elwak, Takaba, Mandera and Rhamu	0	4		1		1		1			1		DEPARTMENT OF WATER & DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-WATER SERVICES AND CCO-PUBLIC HEALTH
5.8	Community-Led Total Sanitation (CLTS), Demand creation and Behaviour change communication activities, Certify 100% of the villages in Mandera.	No. of Villages declared ODF and sustaining CWS	60	916	70	100	100	100	100	100	100	100	100	46	DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-PUBLIC HEALTH
5.9	Blend rural sanitation i.e Market based	No. of HHs with blend Rural Sanitation	0	600	60	60	60	60	60	60	60	60	100	80	DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-PUBLIC HEALTH

	sanitation & incentive-based sanitation.																
5.10	Enhance community involvement in hygiene & sanitation services through PHAST & CHAST.	% of HHs involved in hygiene and sanitation services through PHAST & CHAST	20%	100%	30%	30%	40%								DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-PUBLIC HEALTH
5.11	Sanitation investments in Schools	Sanitation facilities constructed & expanded in Schools	100	450	40	50	50	40	50	50	50	40	40	40	DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-PUBLIC HEALTH
5.12	Sanitation investments in HCFs	Sanitation facilities constructed & expanded in HCFs	15	130	10	10	15	10	10	10	10	10	10	10	DEPARTMENT OF PUBLIC HEALTH	MONTHLY PROGRESS REPORT	CCO-PUBLIC HEALTH

Table 39 water supply scheme in Mandera County

## Annexes

### WATER SUPPLY SCHEMES FOR MANDERA COUNTY

SCHEME NAME	LOCATION	WARD	GPS LOCALITY		YIELD (M <sup>3</sup> /Hr)	PUMP SIZE (Kw)	WATER QUALITY	POPULATION SERVED(As per Cens.2019)		STATUS
			N	E				HUMAN (PERS)	LIVESTOCK (LU)	
Lafey	Lafey	Lafey	3.153661	41.185406	10	7.5		3500	4000	Operational
Alango	Alungu market	Alungu	3.0833	41.096	9	7.5		1400	4500	Operational
Damasa	old safaricom mask	Lafey	3.19	41.32	10	7.5		2100	4000	Operational
Fino	behind the hospital	Fino	3°27'0" N	41°31'60"	8	7.5		2800	2500	Operational
Kamor Liban	KPLC Road	Fino	3.1516	41.1813	7	7.5		1800	3500	Operational
Kabo	Next to kabo mosq	Lafey	3.1617	41.1309	5	7.5		900	2000	Operational
Gari	warankara road	warankara	3.2604	40.5754	2.5	5.5		700	2500	Operational
Warankara-	Warankara Centre of the town	warankara	3.2458	41.0002	2	5.5		1200	3000	Operational

Bambo -	Bambo Village		3.313	40.5812	2					Operational
Sala	Near the river	Sala	3.5617	41.1652	10	7.5		2200	2000	Non-operational
Sheikh Barrow	Centre of Sheikh Barrow location	Fino	3.1945	41.1517	7	7.5		1200	3000	Operational
Arabia -1	Arabia	ARABIA	3.561001N	41.507050E	14	7.5	fairly saline	35000	75000	Operational
Arabia Girls	Arabia				7					Operational
Arabia Boys	Arabia	ARABIA	3.559397N	41.506028E	7	7.5	fairly saline	500	600	Operational
Sarohindi	Sarohindi				2					Not Operational
Omar jillow	Omar jillow	ARABIA	0796205N	0415132E	5	7.5	fairly saline	-	-	Operational
Bella	Bella	KHALALIO	41.35594	3.56554	8	5.5	saline	2916	400	Operational
Gadudia	Gadudia	KHALALIO	41.30436	4.02021	8	5.5	fresh	2378	500	operational
Karo	Karo				5					Not operational
Garba Qoley	Qarba qoley				3					Not operational
Mandera U-1	Mandera town				50					operational
Mandera u-2	Mandera town				50					operational
Mandera U-3	Mandera town				50					operational

Mandera U-4	Mandera town				50						operational
Mandera U-5	Mandera town				50						operational
Farey	Farey				5						Operational
Hareri Hosle	Hareri Hosle				7						non-Operational
Koromei	Koromei				8						non-Operational
Koromei Farm	Koromei				7						non-Operational
Odha	Odtha	ARABIA	3.654882N	41.394328E	1.5	5.5	fairly saline	8900	24000		Operational
Libehia	Labihya	LIBIHIA	0781176N	0424318E	5	5.5	saline	30000	20000		Operational
Qumbiso	Labihya	LIBIHIA	-	-	-	-	-	-	-		DRY
ARESA	Aresa	LIBIHIA	3.941458N	41.549022E	7	7.5	Fresh	2000	1300		new unequipped
County HQTs	Mandera town				8	7.5					New unequipped
Omar jillow 2	Omar jillow	ARABIA	0796192E	0415149N	21	7.5	Fairly saline	1320	1200		Operational
Libehia	Libahya	LIBIHIA	0781075E	0424522N	13	7.5	Saline	30000	20000		Operational
Hareri Hosle	Hareri Hosle	KHALALIO	0796192E	0415149.6N	12	7.5	Saline	819	760		Operational
Bitar	Bitar	KHALALIO	0801494E,	0422194N	8	7.5	Saline	442	635		Operational

Odha	Odha	ARABIA	0767176E,	0404589N	5	7.5	Saline	8900	24000	Operational
Mandera Sec Sch	Township				7					Operational
El-Ram -2	Elram		2.2028	40.5325	14					Operational
Dabacity	Dabacity		2.3645	40.5024	5					Operational
Garse sala	Garse sala		2.3619	40.5109	5					Operational
Kutulo -1	Kutulo		2.2646	40.3904	48					Operational
Dimu	Dimu		2.3716	40.5235	5					Operational
Borehole11	Borehole		2.4255	40.5501	15					Operational
Burmayo	Burmayo		0401537E	025846N	2	2	Saline			Operational
Shimbir fatuma	Shimbir fatuma		0403228E	030226N	16	7.5	Fairly saline			Operational
Fincharo	Fincharo		0402906E	025445N	7	7.5	saline			Operational
El-Hache	El-Wak		0405603E	024747N	5	7.5	Saline			Operational
Wargadud-1	Wargadud		0405213E	031020N	30	7.5	Fresh			Operational
Wargadud -2	Wargadud		0405208E	031037N	30	7.5	fresh			Operational
Qalanqalesa	Qalanqalesa		0403322E	025147N	8	7.5	Fairly saline			Operational
El Tuul	El -Tuul		0403323E	025301N	5	7.5	Saline			Operational
Gutayu-1	Gutayu				8					Operational
Umur Siid	Private		0404718E	025009N	5	7.5	saline			Operational
Chachabole	Barwako		0403709E	030932N	3	7.5	fairly saline			Operational
El-Wak	Elwak		0405612E	024837N	30	7.5	fresh			Operational
Borehole11(2)	Private				7					Operational
Buke	Buke		0404409E	025414N	5	7.5	fairly saline			Operational
Dawder	Dawder		0404622E	025044N	5	5.5	saline			Operational

Boji Garse 2	Boji Garse				2					Operational
Dadach Majani	D/Majani				3					
Falama	Falama				8					Operational
arsa Damu	Garsa Damu		0405639E	024950N	7	7.5	saline			Operational
Gode	Gode				5		saline			Operational
Aba Bosone	Aba Bosone		0405450E	025928N	5	7.5	saline			Operational
Harsanga	Harsanga		0405432E	030144N	7	7.5	saline			Operational
Dololo	Dololo		0405323E	025917N	5	7.5	saline			Operational
Tuuli	Tuuli		0404838E	025154N	2	2	saline			Operational
Kob Adadi	Kob Adadi		0401911E	031800N	5	7.5	saline			Operational
Nyatt Alio	Nyatt Alio				3					Operational
Gutayu -3	Private				7					Operational
Boji Garse	Boji Garse				2					Operational
Irres Kinto	Irres Kinto		0402211E	031823N	2		fresh			Not Operational
Elele	Elele		0403020E	031844N	5	7.5	Fresh			Operational
Harbate	Harbate		0403037E	025305N	5	7.5	saline			not operational
Makutano	Makutano		0404733E	0250155N	5		saline			Operational
El-kuro	El-kuro				3					Operational
Kutulo Girls	Kutulo Girls Sec				5					Operational
Irres Suki	Irres Suki				3	5.5	saline			Operational
Falama-	Elwak town		0715402E	0281110N	72	7.5	fairly saline			Operational
Wachile	Wachile		0684304E	0362599N	10	7.5	Fairly Saline			Operational

Irres Kinto 2	Irres Kinto		0402234E	031834N	0		fairly saline			not Operational
Qalanqalesa 2	Qalanqalesa		0403302E	025108N	5	7.5	saline			not operational
Elele 2	Elele				3		fairly saline			not operational
Dabacity 2	Dabacity				5					not operational
Orgay	orgay		0684304E	0362599N	10.4	7.5	Fresh			Operational
Redam	redam		0688282E	0333540N	10	7.5	fresh			Operational
Sukela Bima	sukela bima		0404709E	0404709N	14	7.5	Fresh			Operational
Yado	yado		0736632E	0327400N	12		Fairly Saline			not operational
Gesrebki Oda	Gesrebki oda		0716968E	0289176N	12		Fresh			Operational
Harwale	harwale		0684422E	0408914N	8		Fairly Saline			Operational
Nyatt Alio 2	Nyatt Alio		0682603.26E	0301962.92N	4		Fresh			Operational
Charifuda	charifuda		0680924E	0315502N	12	7.5	Fresh			Operational
Iresuki	Iresuki		0712746E	0331289N	10	7.5	Fresh			Operational
Elwak	elwak				12	7.5	Fairly Saline			Operational
Burmayo	Burmayo		0643253E	0328120N	16.4	7.5	Fairly Saline			Operational
Elram A	Elram A				10	7.5	Saline			Operational
Dimu	Dimu		0698201E	0280909N	4	7.5	Saline			Operational
Corner S	Corner S		0709900E	0340896N	12	7.5	Fresh			Operational
Ada Qaalo	Ada Qaalo		0702078E	0303706N	17	7.5	Fairly Saline			Operational
Dadach Qoloy	Dadach Qoloy		0696636E	0360978N	10	7.5	Saline			Operational

Shimbir Fatuma	Shimbir Fatuma		403202E	025349N	5		Fairly Saline			Operational
Gode	Gode				10	7.5	Fairly Saline			Operational
Kutayu	Kutayu		0688175.12E	293546.14N	15	7.5	slightly saline			Operational
Gamurey	Gamurey		0683805.83E	0270217N	6		Fresh			Operational
Lehele 2	Lehele				1.5					Operational
Borehole11(3)	Borehole 11		0713099E	0299797N	6	7.5	Fairly Saline			Operational

Girissa	Girissa & Dooday	Rhamu	0411451E	035655N	22	7.5	fresh	15000		Operational
Rhamu	Rhamu	Rhamu	0411235E	035614N	100	15	fresh	20000		Operational
Shirshir	Shirshir	Guticha	0407370E	035281N	9	7.5	fresh	8000	30000	Operational
Olla	Olla	Guticha	0408784E	039008N	8	7.5	fresh	15000	35000	Operational
Guticha	Guticha	Guticha	0404952E	033537N	10	7.5	fresh	10000	30000	Operational
Qurac Madow	Qurac Madow	Ashabito	0405155E	031500N	2.5					Abandoned
Marothile	Marothile	marothile	0405102E	033417N	10	7.5	saline		30000	Operational
Darab Adadi	Darab Adadi	Guticha	0405001E	034426N	10	7.5	fresh	5000	25000	Operational
Shantole Pry	Shantoley Pry	Rhamu	041325E	035601N	5					Abandoned
Rhamu Dimtu	Rhamu Dimtu	Rhamu Dimtu	0410411E	040140N	15	7.5	fresh	15000	5000	Operational
Girissa -3	Girissa & Dooday	Rhamu			24	7.5	fresh	5000		Operational
Rhamu-5	Rhamu	Rhamu			30	15	fresh	8000		Operational
Ogorweine	Ogorweine	Ashabito	0410034E	034308N	12	7.5	fresh	4000	25000	Operational

Kubi	El-Ben	marothile	0410034E	034308N	30	7.5	saline		30000	Operational
Ashabito 1	Ashabito	Ashabito	0405200E	033254N	7	7.5	slightly saline		15000	Operational
Sukela Tinfi	S/Tinfi	Ashabito	0405439E	032347N	2.5	5.5	fresh	2000	5000	Operational
Sarman	Sarman	Guticha	0406890E	038349N	7	5.5	fresh	3000	20000	Operational
Goofa	Goofa	Guticha	0404150E	033019N	3	3	slightly saline	1500		New
Bur John Pry	Bur John	Rhamu Dimtu	0405342E	040448N	3	3	slightly saline	1200	2000	New
Shantole Pry	Shantoley Pry	Rhamu	0411325E	035601N	5					not operational
Rhamu Dimtu	Rhamu Dimtu	Rhamu Dimtu	0410411E	040140N	15	7.5	fresh	1000	3000	Operational
Rhamu Dimtu-2	Rhamu Dimtu	Rhamu Dimtu	0410409E	040140N	12					Not Equipped
Damog Pry	Damog	Ashabito			2					Not Equipped
Garsey Pry	Garsey	Rhamu Dimtu	0410005E	040403N	8	7.5	slightly saline	2000	20000	Operational
Marodiley 2	Marothile	Marothile	0405102E	033417N	10	7.5	saline		20000	Not Equipped
Ashabito 2	Ashabito	Ashabito	0707276E	0392370N	12	7.5	slightly saline	5000	20000	Operational
Arda Agarsu	Arda Agarsu	Ashabito	0716489 E	0281810N	15	7.5	Fresh	3000	5000	Operational
Kalmalab	Kalmalab	Rhamu Dimtu	0739899E	0437331N	15	7.5	Fresh	4000		Operational
Garab Laaq	Garab Laaq	Guticha	0694148E	0429839N	10	5.5	Fresh	2000	6000	Operational
Dai Dai	Dai Dai	Guticha	0689331E	0407151N	6	5.5	Fresh	3000	25000	Operational
Lanqura	Lanqura	Guticha	0680811E	0417711N	3	5.5	Fresh	2000	5000	Operational
Barwaqo 2	Barwaqo	Guticha	0725105E	0424681N	10	7.5	Fairly soft	2300	21000	Operational

Shir shir 2	Shir shir	Guticha	0692949E	0390123.9N	8	7.5	Fresh	6000	30000	Operational
Qorahey	Qorahey	Rhamu Dimtu	0410353E	040008N	8	7.5	FRESH	5000		Operational
Dagahturtur	Dagahturtur	Guticha	0408784E	039249N	5	5.5	FRESH	2300	25000	Operational
yabcho	yabcho	Rhamu Dimtu			10					not operational
yabicho B	yabicho B	Rhamu Dimtu	0411009E	035649N	7	7.5	fresh	5000		Operational
Saqira	Saqira	Guticha	0404949E	034131N	5	5.5	fairly soft	1500	3000	Operational
Usubey	Usubey	Rhamu Dimtu	0410928E	035720N	4	7.5	fresh	3000		Operational
Jikow	Jikow				5					Not exist
Eresteno	Eresteno	Dandu			2	7.5	saline	9300	7400	Operational
Sukela kuli	Sukela kuli	tkb south			3	11	extremely saline	200	300	not Operational
Wanqay Dahan	W/Dahan Livestock	tkb south	3.3466085E	40.3204817N	24	22	saline	4590	3000	not Operational
Amasa	Bulla Billow	tkb south			8	7.5	saline	2000	4000	Operational
Darwet 1	Takaba area	lagsure	40.2323166	3.4344344N	39	15	fresh	3000	5000	Operational
Kobadadi 1	Kobadadi	tkb south	3.2073707E	40.4103815N	5	7.5	saline	2000	3500	Operational
Qarsa Hama	Qarsa Hama	Dandu	0584673E	038363N	3	5.5	saline	4600	8200	Operational
Gagaba	Gagaba	gither	0580925E	0399618N	5	2.2	Saline	600	1280	Operational
Arges Awara	Arges Awara	Dandu	0580925E	0399618N	2	7.5	Saline	4500	6100	Operational
Dandu 2	Dandu	Dandu	380241E	603179.8 N	20	7.5	Fairly Saline	11,000	10,000	Operational
Bachile	Bachile	takaba	0613864E	0376001N	2	2.2	Saline			
Khalafow	Khalafow	gither	408914E	0684422N	2	2.2	Saline	2354	800	Operational

Har Shilmi	Har Shilmi	gither	0580925E	0399618N	2	2.2	Fairly Saline	765	1260	Operational
Qofole	Qofole	Dandu	590493.8E	372664N	3	7.5	Saline	8000	5200	Operational
Gither 2	Gither		0601969E	0407555N	6	3	Fresh	2700	2000	Operational
Burduras	Burduras				4	2.2	fresh	4886	3000	Operational
Kobadadi 2	Kobadadi 2				4					Operational
Malkamari	Malkamari	malkamari	40°41'39.055 2"	4°14'19.032"	2.5	5.5	saline	10,872	18,280	Operational
Eymole	Eymole				8					Operational
Ummur	Kiliwehiri				1.5					Operational
Hullow	Hullow	malkamari	40°48'01.098' '	4°11'11.2956' '	8	7.5	fairly saline	8,654	12,000	Operational
Lulis	Lulis	banisa	40°19'56.546 4"	4°01'36.1992' '	1.5	5.5	fairly saline	10,828	14,400	Operational
Banisa	Banisa	banisa	40°22'08.083 2"	3°54'29.7192' '	1.3	5.5	fairly saline	18,430	2,000	Operational
Domaal	Domaal	malkamari	0669101E	0447306N	8	7.5	fairly saline	1851	10500	Operational
Tarbey	Tarbey	guba	0679656E	0423804N	1.1	5.5	saline	5734	6500	operational
Kiliwehiri	Kiliwehiri	Kiliwehiri	395856	3.54110	8	5.5	Fresh	2300	6400	operational
Birkan	Birkan	Kiliwehiri	40.0730	3.57420	10	5.5	fresh	1500	6000	operational
boode	boode	derkale	40°17'13.880 4"	3°55'29.6652' '	1	5.5	saline	3305	5000	Operational
					<b>1806.2</b>					

## SURFACE WATER SOURCES

### Sub-county: Mandera West

S/no	Name of water source	ward	Capacity (m3)	Status
1	Lagsure	lagsure	60,000	Needs proper fencing
2	Hopi	lagsure	30,000	Needs desilting and proper fencing
3	Darwed	Lagsure	50,000	Needs desilting
4	Awacho sambur	lagsure	40,000	Sambur needs new dam, current one does not have water holding capacity
5	Donqay	lagsure	40,000	Needs proper fencing
6	Qorobo Saglan	lagsure	40,000	Needs desilting and fencing
7	Ogothe 1	lagsure	20,000	Needs fencing
8	Ogothe 2	lagsure	20,000	Needs desilting and fencing
9	Tubadi	Takaba	60,000	Needs proper fencing and desilting and expansion
10	Garale	Takaba	80,000	Heavily silted so there is needs for desilting and expansion

11	Sigenge	Takaba	50,000	Needs desilting and expansion
12	Ardahalo	Takaba	20,000	Needs fencing
13	Bachile 1	Takaba	20,000	Needs expansion and desilting
14	Bachile 2	Takaba	30,000	Desilting and expansion
15	Bachile 3	Takaba	20,000	Needs desilting
16	Kubdishan	Takaba	30,000	Needs proper fencing and desilting
17	Iyan Abikula	Takaba	15,000	Needs desilting and expansion
18	Wayam Dera	Takaba south	20,000	Needs desilting and expansion
18	Qarsa Qoroma		20,000	Needs expansion and desilting
19	Gagaba 2	Dandu	60,000	Needs expansion and desilting
20	Hardimtu	Gither	20,000	Needs expansion and fencing
21	Iddikinisa		20,000	Needs desilting and expansion
22	Harshilmi 2	Dandu	60,000	Needs desilting
23	Duse bima	Takaba	30,000	Needs desilting and expansion
24	Lagkaro	Lagsure	20,000	Needs desilting and expansion
25	Didkuro 2	Takaba south	60,000	Needs expansion
26	Gobo gala	Gither	60,000	Needs proper water channels

26	Sake 2	Gither	30,000	Needs desilting and expansion
27	Sake 3	Gither	60,000	Expansion and desilting
28	Gesrebki	Gither	60,000	Proper fencing and desilting and expansion
29	Qarsa dima	Gither	20,00	Needs desilting, expansion and fencing
30	Didkuro 1	Takaba south	20,000	Needs expansion
31	Ayan	Takaba south	40,000	Needs for expansion
32	Itlal	Takaba south	20,000	Needs for expansion
33	Bolowle	Takaba south	20,000	Needs desilting and expansion
34	Bolowle 2	Takaba south	30,000	Needs for desilting and expansion
35	Kobadadi 1	Takaba south	60,000	Needs complete rehabilitation
36	Kobadadi 2	Takaba south	30,000	Newly constructed after completely washed away by floods. Needs fencing
37	Lagwarera	Takaba south	110,000	Needs desilting and proper fencing
38	Duduble	Takaba south	15,000	Needs desilting, expansion and fencing
39	Kotkoto	Takaba south	30,000	Needs desilting and expansion
40	Haradi	Gither	60,000	Needs for desilting and expansion
41	Burduras	Gither	20,000	Needs for desilting and expansion

42	Kalafow	Gither	30,000	Needs for desilting and expansion
43	Hodhan	Gither	15,000	Needs for desilting and expansion
44	Warwiney	Gither	15,000	Needs for desilting and expansion
45	Kobeturiti	Gither	20,000	Needs for desilting and expansion
46	Dobu	Gither	15,000	Needs for desilting and expansion
47	Sukela lowo 1	Gither	15,000	Needs for desilting and expansion
48	Sukela lowo 2	Gither	20,000	Needs for desilting and expansion
49	Sigirsoida	Gither	20,000	Needs for desilting and expansion
50	Kosaye	Gither	60,000	Needs for desilting and expansion
51	Madina	Gither	20,000	Needs for desilting and expansion
52	Hardimtu	Gither	20,000	Need complete rehabilitation
53	Malaba	Gither	60,000	Needs for desilting and expansion
54	Sake1	Gither	60,000	Needs for desilting and expansion
55	Sake 2	Gither	60,000	Needs for desilting and expansion
56	Gagaba	Gither	60,000	Needs for desilting and expansion
57	Tesoramo	Gither	20,000	Needs for desilting and expansion
58	Harbuyo	Gither	30,000	Needs for desilting and expansion

59	Bula mpya	Gither	60,000	Needs for desilting and expansion
60	Harshilmi	Gither	60,000	Needs for desilting and expansion

**Sub-county: Dandu**

S/N	Name of water source	Ward	Capacity (M3)	Population (HH)	Status
1.	Harbuyo	Dandu	30,000m3	650	Requires fencing
2.	Qofole	Dandu	70,000m3	1200	Requires rehabilitation of embankment, Inlets and spill way.
3.	Dandu pan 1	Dandu	60,000m3	1500	Heavily silted, requires fencing
4.	Dandu 2	Dandu	20,000m3	1500	Requires fencing and heavily silted
5.	Dandu 3	Dandu	20,000m3	1500	Embankment breached
6.	Dandu 4	Dandu	20,000m3	1500	Requires fencing
7.	Dandu 5	Dandu	20,000m3	1500	Requires fencing

8.	Alati 1	Dandu	20,000m3	1500	Requires fencing
9.	Alati 2	Dandu	20,000m3	1500	Heavily silted. Requires fencing.
10.	Arges Awara	Dandu	20,000m3	710	Heavily silted. Requires fencing.
11.	Didkoba 1	Dandu	20,000m3	815	Requires fencing
12.	Didkoba 2	Dandu	20,000m3	815	Heavily silted.
13.	Bulla panga	Dandu	20,000m3	515	Embankment breached. Heavily silted
14.	Ada dimtu	Dandu	30,000m3	520	Heavily silted. Requires fencing.
15.	Eresteno 1	Dandu	100,000m3	1150	Embankment breached. Requires fencing and draw off system.
16.	Eresteno 2	Dandu	20,000m3	1150	Heavily silted
17.	Mansho	Dandu	20,000m3	630	Heavily silted.
18.	Abarkatu	Dandu	20,000m3	600	Requires fencing
19.	Gagaba 1	Dandu	20,000m3	950	Heavily silted

20.	Gagaba 2	Dandu	30,000m3	950	Embankment breached.
21.	Harshilmi 1	Dandu	30,000m3	720	Embankment breached. Requires fencing.
22.	Tesoramo	Dandu	20,000m3	640	Heavily silted.
23.	Kubihalo 1	Dandu	20,000m3	690	Requires desilting
24.	Kubihalo 2	Dandu	20,000m3	690	Requires fencing
25.	Qarsahama 1	Dandu	80,000m3	621	In good conditions
26.	Qarsahama 2	Dandu	20,000m3	621	Heavily silted
27.	Datach dera	Dandu	20,000m3	455	Heavily silted
28.	Alosaden	Dandu	20,000m3	535	Requires fencing

**Sub-county : Mandera South**

	<b>Names of Water Supply Scheme</b>	<b>Location</b>	<b>Protection/ Fence</b>	<b>Storage Capacity</b>	<b>Operational Status</b>	<b>Status</b>
1	shimpir Earth Pan	shimpir	None	60,000	Operational	it has temporary fence and silted on one side
2	burmayo Earth Pan	burmayo	fenced	120,000	Operational	own by private vender as WUA
3	qalanqalesa Earth Pan	qalanqales	None	12,000	Operational	Not fenced
4	qalanqalesa 2 Earth Pan	Jabbi	None	15,000	Operational	
5	qalanqalesa 3 Earth Pan	B/West	None	20,000	Operational	
6	charifuda Earth Pan	charifuda	Fenced	Operational		Requires expansion and Fencing
7	Elele gofo Earth Pan	Elele	None	Operational		Requires Fencing
8	Elele dambala Earth Pan	elele	None	Operational	silted	Requires Fencing
9	Dololo Earth Pan	dololo	None	Operational	Heavily Silted	
10	Awal bandira Earth Pan	wargadud	None	Operational	require expansion and disilting	fencing is also required
11	Buqe Earth Pan	Buqe	None	Operational	silted	require fencing

13	Chachabole Earth Pan	chachabole	None	Operational	partially silting	Requires expansion and fencing
14	kobadadi earth Pan	kobadadi	None	Operational	Break its banks and it has no water	Needs renovation urgently
15	Kobadadi 2 earth pan	Fincharo	fenced	Operational	fenced	require pump, extension, and troughs
	Kobadadi 3 earth pan	fincharo	fenced	operational	“	“
17	Fincharo earth pan	fincharo	fenced	operational	“	“
16	Eltul Earth pan	Eltul	None	Operational	silted	
19	Sukela Tinfi Pan-1	S/ Tinfa	None	Operational	unfenced	
20	Sukela Tinfi Pan-1	S/ Tinfa	None	Operational	require piping and pump	

**Sub-county : Kutulo**

S/NO	NAME OF WATER SOURCE	WARD	CAPACITY m3	REMARKS
1.	Kutulo	kutulo	80,000 and 40,000 m3	Highly silted and it require relocation  It requires desilting and repair of inlet.
2.	Kutayu	Kutulo	60,000 m3	Silted and inlet channel required  Silt trap silted it also need draw off system.
3.	Nyat alio	Kutulo	60,000 m3	
4.	Elram	Kutulo	40,000 m3 and 60,000 m3	Expansion is on gonging  Silted no fencing
5.	Abbey ummur	Kutulo	40,000 m3	Heavy silted
6.	Duse	Kutulo	60,000 m3	Good condition only fencing require repair

7.	lehele	Kutulo	100,000m3 and 30,000m3	Good condition
8.	Sukela dima	Kutulo	60,000 m3	Require desilting fencing and draw off system
9.	Dimu	Kutulo	30,000m3	Expansion is on-going
10.	Boji garse	Kutulo	500,000m3 and 60,000m3	Inlet and silt trap distracted by lag sure water heavy silted

**Sub-county : Banisa**

S/NO	NAME OF WATER SOURCE	WARD	CAPACITY m3	Status
1.	BANISA	Banisa	110,000	<ul style="list-style-type: none"> <li>•It requires silt trap</li> <li>• requires fencing and two monopump</li> <li>• requires 4No, 10,000L plastic tank</li> </ul>
2.	Lulis	Banisa	100,000 m3	<p>Silted and inlet channel required</p> <p>Silt trap silted it also need draw off system.</p>

3.	Marille	Banisa	60,000 m3	Requires desilting and inlet rehabilitations
4.	Gurdis	Banisa	200,000m3	Need desilting and silt trap
5.	Malkamari	Malkamari	60,000 m3	
6.	Hullow	Malkamari	60,000 m3	Requires fencing
7.	Guba	Guba	60,000m3 and 20,000m3	Heavily silted, requires inlet rehabilitations and a silt trap
8.	Choroqo	Guba	20,000 m3	Require desilting fencing and draw off system
9.	Diribor	Derkale	60,000m3	Requires draw off system
10.	Qorobo abero	Derkale	60,000m3	Requires spillway
11.	Borashum	Derkale	60,000m3	Heavily silted
12.	Derkale	Derkale	20,000M3	Requires expansion
13.				

Sub-county : Mandera North

S/no	Name of Water Source	Ward	Capacity (m <sup>3</sup> )	Remarks
1	Jabi 1 earth pan	Rhamu	20,000	Requires Complete rehabilitation
2	Garse earth pan	Rhamu dimtu	20,000	Desilting and fencing

Sub-county : Lafey

S/NO	Name of Water Source	Ward	Capacity (m <sup>3</sup> )	Status
1	Lafey earth pan	Lafey	20,000	
2	Damasa earth pan	Lafey	40,000	
3	Kamoro liban earth pan	Lafey	15,000	
4	Kabo earth pan	Lafey	50,000	
5	Fino earth Pan	Fino	50,000	
6	Sheikh barrow earth pan	Fino	25,000	
7	Alungu earth pan	Alungu	50,000	
8	Waranqara earth pan	Waranqara	80,000	
9	Gari earth pan	Waranqara	60,000	
10	Bambo earth pan	Waranqara	60,000	

11	Kheira Ali earth pan	waranqara	60,000	
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Sub-county : Arabia

S/NO	NAME OF WATER SOURCE	WARD	CAPACITY	Status
1.	Qumbiso earth pan	Libihiya	80,000M <sup>3</sup>	Heavily silted
2.	Saro Hindi Earth pan	Arabia	30,000 M <sup>3</sup>	No fence
3.	Libihiya Earth pan	Libihiya	60,000 M <sup>3</sup>	Heavily silted
4.	Farey Earth pan	Arabia	20,000 M <sup>3</sup>	No fence
5.	Arabia Earth pan	Arabia	20,000 M <sup>3</sup>	Heavily silted
6.	Omar Jilliow Earth pan	Arabia	25,000 M <sup>3</sup>	No fence
7.	Odha 1 Earth pan	Arabia	60,000 M <sup>3</sup>	Heavily silted
8.	Odha 2 Earth pan	Arabia	30,000 M <sup>3</sup>	Silted

Sub-county : kiliwehiri

S/NO	NAME OF WATER SOURCE	WARD	CAPACITY(M3)	REMARKS
1	Kiliwehiri twins earthpan	Kiliwehiri	60,000	Need fencing and communal water point for easy management and collection of revenue.  High siltation in the siltrap area and hence desilting of the earthpan is needed
2	Kiliwehiri greenhouse earthpan	„	90,000	Urgently needed fencing and damliner polythene.
3	Eymole twins earthpan	„	60,000	Needed fencing and communal water point for easy management and collection of revenue.

4	Birkan earthpan	„	30,000	Needed fencing of the earthpan.
5	Orgogle earthpan	„	30,000	Reguire expansion and fencing of the earthpan
6	Achini earthpan	„	30,000	Need desilting and fencing of the earthpan.
7	Garsebibi earthpan	„	20,000	Need fencing of the earthpan.
8	Dambagale earthpan	„	20,000	Require damliner polythene and fencing of the earthpan.
9	Garbi earthpan	„	30,000	Fencing of the earthpan is required.
10	Funantesol earthpan	„	30,000	Fencing of the earthpan is needed.

11	Funanteso2 earthpan	„	20,000	Fencing of the earthpan is required.
12	Kulumay earthpan	„	30,000	Desilting and fencing of the earthpan is required.
13	Khararidertu earthpan	„	20,000	High siltation of the earthpan and hence desilting and fencing is needed.
14	Darkengaba earthpan	„	20,000	Fencing of the earthpan is required.
15	Qotqot earthpan	„	20,000	Fencing of the earthpan is required.
16	Umur earthpan	„	30,000	High siltation of the earthpan in silttrap and the dam and hence desilting and fencing is needed.

17	Qatis earthpan	„	20,000	Desilting and fencing of the earthpan.
18	Ameyi earthpan	„	30,000	Require damliner polythene.
19	Dakaboor earthpan	„	30,000	Fencing of the earthpan is require.
21	Darkensaden earthpan	„	30,000	Fencing of the earthpan is required.
22	Urile earthpan	„	30,000	Fencing and piping water from the earthpan to the centre.
23	Duduble earthpan	„	20,000	High siltation of the earthpan and therefore is required fencing and desilting.
24	Ardaedi earthpan	„	20,000	Fencing is required.

**Sub-county : Ashabito**

S/NO	Name of the water source	Ward	Capacity{m3}	Status
1	Kub earthpan	Marothile	30,000m3	Requires proper inlet
2	Ashabito earth pan1	Ashabito	60,000m3	Requires fencing and desilting
3	Ashabito earthpan2	Ashabito	20,000m3	Requires draw off system and fencing
4	Ogorwein earth pan	Ashabito	30,000m3	Requires fencing
5	Yaqila earthpan	Guticha	50,000m3	Requires fencing and draw off system
6	Guticha earthpan	Guticha	50000m3	Requires fencing
7	Hagarjis earth pan	Guticha	30000m3	Requires draw off system
8	Shandarmod earthpan	Guticha	50000m3	Requires fencing
9	Daidai earth pan	Guticha	40000m3	Requires fencing
10	Lanqura earthpan	Guticha	50000m3	Requires fencing
11	Jikow earh pan	Guticha	30000m3	Requires fencing and draw off system
12	Gofa earth pan	Guticha	40000m3	Requires fencing
13	Qurdubo earthpan	Guticha	50000m3	Requires fencing

14	Sarman earthpan	Guticha	20000m3	undercontruction
15	Korma adow earthpan	Guticha	20000m3	Requires fencing
16	Olla earthpan	Guticha		Underconstruction
17	Sukelatif earthpan1	Ashabito	30000m3	Requires fencing
18	Sukelatif earthpan2	Ashabito	50000m3	Requires fencing and desilting

### **Water Quality**

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It's an important measure of the suitability of water for various uses, including drinking, recreation, agriculture, and industrial processes. Mandera County relies on surface and ground water sources, for domestic and other uses. Increased pastoralism has led to increased pollutants that have posed a potential threat to surface water quality. This in turn poses a potential adverse health effect on the residents relying largely on surface water sources. Water from the infiltration galleries is chlorinated before distribution in riverine areas. Household chlorination is done on a small scale by residents relying on water pans.

According to the Mandera health and nutrition survey report (2023), 20.3% of households reported treating their drinking water. Of these 78.7% treated their water using treatment chemicals such as Aqua tabs and PUR while 59.6% through boiling and pot filters. 63.1% of households store their drinking water in closed containers while 36.9% store in open containers.

Mobile water quality monitoring is done regularly for basic physical, chemical, and microbiological parameters using DE-LAQUA.

## SWOT Analysis, Water and Sanitation

Table 40: *SWOT Analysis of the County's Water and Sanitation*

	<b>STRENGTHS</b>	<b>WEAKNESSES</b>	<b>OPPORTUNITIES</b>	<b>THREATS</b>
<b>3.1.</b>	<p><b>Water Services</b></p> <ul style="list-style-type: none"> <li>&gt;The county has good potential for the development of surface, sub-surface and ground water sources.</li> <li>&gt;There is 6 urban and 184 rural water supply schemes in the county.</li> <li>&gt;Water services delivered by 2 water companies and county water department in rural areas.</li> <li>&gt;Sufficient demand for water exists from</li> </ul>	<ul style="list-style-type: none"> <li>&gt;All surface water sources in the county are seasonal.</li> <li>&gt;Underutilization of the County's ground water development potential</li> <li>&gt;Poor spatial distribution of permanent &amp; reliable water sources</li> <li>&gt;Limited coverage of water supply systems which are mostly point sources with limited water storage &amp; distribution facilities.</li> <li>&gt;High water production costs as most schemes use diesel powered pumping equipment.</li> <li>&gt;Very high levels of UFW and stocks of abandoned but serviceable pumping equipment</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Increase availability &amp; accessibility of water through the development of permanent surface water sources such as large Dams &amp; Man-made lakes and increased drilling &amp; equipping of Boreholes following Satellite based ground water resources mapping.</li> <li>&gt;Improve reliability &amp; coverage of existing water supply sources &amp; schemes through rehabilitation of existing systems and de-silting of small –medium sized Dams/ Pans</li> <li>&gt;Utilization of Solar/ wind powered water pumping technologies to</li> </ul>	<ul style="list-style-type: none"> <li>&gt;Negative politics</li> <li>&gt;Prolonged/ recurrent droughts</li> <li>&gt;Ethnic based conflicts</li> <li>&gt;Trans-boundary nature of river Daua</li> <li>&gt;Overstretched use of facilities by neighbouring nationals</li> <li>&gt;Floods</li> </ul>

	<p>populations of about 1.2million people &amp; the over 1 million heads of livestock</p> <p>&gt;There is a Sub-County water office in each of the 12 sub-counties.</p> <p>&gt;There are 7 operational Water Boozers, 2 Crane truck, and 2 Rapid response maintenance teams.</p> <p>&gt;There are national &amp; regional WSP support institutions such as NWSB, WSTF &amp; WASREB</p> <p>&gt;There are national policy &amp; legal frameworks to guide the provision of water</p>	<p>due to poor adherence with maintenance standards.</p> <p>&gt;Poor institutional capacity of rural WSPs</p> <p>&gt;Low levels of financing, inadequate &amp; lack of suitable motor vehicle to support operations, water trucking &amp; Rapid response maintenance team actions constraints performance of Sub- County water offices.</p> <p>&gt;Lack of fast-moving spare parts dealer in the county make essential spare parts inaccessible.</p> <p>&gt;Lack of Meters &amp; Service delivery</p>	<p>reduce recurrent water production costs.</p> <p>&gt;Establishment of appropriate institutional capacity to develop, monitor &amp; manage WSPs/ WUAs e.g. A county Water Services Board</p> <p>&gt;Mandera county is one of the counties earmarked to benefit from the K-WASH and the Horn of Africa GWR program.</p> <p>&gt;Establishment of better equipped &amp; efficient rapid response maintenance teams</p> <p>&gt; Mandera county</p>	
	<b>STRENGTHS</b>	<b>WEAKNESSES</b>	<b>OPPORTUNITIES</b>	<b>THREATS</b>

	<p>Services</p> <p>&gt;There is adequate technical capacity to develop water &amp; sanitation services</p>	<p>&gt;The national water policies &amp; legislations prepared under the old constitution are not cognizant of the principles of devolution.</p> <p>&gt;High poverty prevalence among local communities</p> <p>&gt;Most Boreholes have saline water and water from Dams/ Pans &amp; the river is raw.</p> <p>&gt;Poor maintenance of Water services provision facilities</p>	<p>&gt;Devolution of water services</p> <p>&gt;Adequate human &amp; livestock population</p> <p>&gt;Increased metering of water sources, facilities &amp; consumers</p> <p>&gt;Improved linkages with national &amp; regional WSP support institutions</p> <p>&gt;Re-alignment of national water policies &amp; legislations with the provisions of constitution of Kenya 2010</p> <p>&gt;Formulation of additional county level policies &amp; legislations for county specific WSP issues</p> <p>&gt;Provision of de-salination plants</p> <p>&gt;Treatment of water from surface water sources</p> <p>&gt;Establishment of water quality testing laboratory</p>	<p>Climate change risks</p>
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			>Improved maintenance of water facilities & equipment	
3.2.	<p><b>Sanitation Services</b></p> <p>&gt;There are in-situ waste disposal systems such as pit latrines &amp; septic tanks are in use.</p> <p>&gt;SCWOs &amp; SCPHOs undertake provision &amp; coordination of sanitation facilities &amp; services.</p> <p>&gt;Islamic way of life which highly promotes hygiene and Sanitation</p>	<p>&gt;Sanitation coverage is generally very low within the county.</p> <p>&gt;Lack of Exhausters forces people to abandon filled up pit latrines &amp; septic tanks.</p> <p>&gt;Limited funding has in the past constrained the development of sewerage and storm water drainage systems in the county,</p> <p>&gt;There is limited awareness among members of the public on the importance of maintaining high personal &amp; environmental hygiene &amp; sanitation standards.</p> <p>&gt;Uncoordinated sanitation activities by different actors with minimal impact</p>	<p>Devolution of sanitation services</p> <p>&gt;Improved sanitation coverage through the development of sewerage, storm drainage &amp; in-situ waste disposal systems</p> <p>&gt;Establishment of mobile Exhauster services in all major towns in the county,</p> <p>&gt;Enhanced capacity of local communities to progressively achieve hygiene &amp; sanitation transformation using PHAST, CHAST, CTC &amp; CLTS approaches.</p> <p>&gt;improved coordination of sanitation efforts</p>	<p>&gt;Negative politics</p> <p>&gt;Prolonged/ recurrent droughts</p> <p>&gt;Ethnic based conflicts</p> <p>&gt;Water scarcity</p> <p>&gt;Food Insecurity</p>

		<p>&gt;Poor drainage of settled areas leading to disease outbreaks &amp; contamination of water resources</p>	<p>&gt;Improved drainage in all major towns</p> <p>&gt;Increased protection of water catchment areas</p>	
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