

COUNTY GOVERNMENT OF ISIOLO



MINISTRY OF ENVIRONMENT, ENERGY AND NATURAL RESOURCES

ISIOLO COUNTY CLIMATE INFORMATION SERVICES PLAN



(This page is intentionally left blank)

(This page is intentionally left blank)



Government of Kenya Kenya Meteorological Department

Isiolo County Climate Information Service Plan

June 2018

Prepared by:

Kenya Meteorological Department P. O. Box 30259 - 00100, GPO Nairobi Kenya

With

UK Met Office Fitzroy Road, Exeter United Kingdom EX1 3PB

ACKNOWLEDGMENTS

We wish to acknowledge the support of Ada Consortium (UK Met Office, Kenya Meteorological Department (KMD), Christian Aid, International Institute of Environment and Development (IIED), National Drought Management Authority (NDMA)), National Environment Management Authority (NEMA), the National Government agencies, County Government of Isiolo and the Public Beneficiary Organisations (PBOs) especially Resource Advocary Programme (RAP), for the support towards realising this framework. The communities of Isiolo County also played a very important role in helping to determine which climate services are most relevant to their livelihoods and which communication channels are most appropriate. The framework development Task Team from KMD (Samuel Mwangi, Roselyn Ojala, Ayub Shaka, Dennis Cheruiyot, Benard Chanzu, Ezekiel Muigai-CDM Isiolo, Daniel Wanjuhi-CDM Wajir, William Ndegwa-CDM Kitui, Samuel Odhiambo-CDM Garissa and David Mutua-CDM Makueni); the Ada Secretariat (Victor Orindi, Yazan Elhadi, Mumina Bonaya and Jane Kiiru) and the Ada Consultants (Emma Visman, Robert Powell and Dominic Kniveton; NDMA Isiolo-County (Lordman Lekalkuli), NEMA-Isiolo County (Jackson Muturo), NRM-MTAP (Mustafa Wachu) and many others.

TABLE OF CONTENTS

ACKNOV	VLEDGMENTS	IV
LIST OF F	IGURES	VII
LIST OF 1	ABLES	VIII
LIST OF A	NNEXES	IX
ACRONY	MS	х
KEY TERM	MS GLOSSARY	XII
FOREWO	RD BY THE DIRECTOR, KENYA METEOROLOGICAL DEPARTMENT	XIII
FOREWO	RD BY THE GOVERNOR, COUNTY GOVERNMENT OF ISIOLO	XV
EXECUTI	VE SUMMARY	XVII
1.0 1.1. 1.2. 1.3. 1.4.	BACKGROUND AND CONTEXTBackgroundRoles and Responsibilities of County Meteorological OfficeSummary of Relevant Policies and PlansContext1.4.1.Natural Resources1.4.2.Economic Activities and Food SecurityOverview of Isiolo County Climate	1 2 3 3 3 5 7
2.02.12.22.3	 FRAMEWORK FOR PROVISION OF CLIMATE SERVICES Goals and Objectives Principles 2.2.1 Principle 1- High priority for the needs of climate sensitive sectors 2.2.3 Principle 3 Existing and Planned CIS Initiatives and Projects 2.3.1 Implementation of Kenya's Vision 2030 in Isiolo County 	9 9 10 11 12 12
3.0	 OBSERVATION AND DATA 3.1 The Existing Observations Network 3.2 Future Plans for Observations Network 3.3 Maintenance Plan for Observations Network 3.4 Management of Non KMD Observations 3.5 Data Discovery and Rescue 	14 14 15 16 16 17

4.0	PROVISION OF CLIMATE INFORMATION SERVICES	18				
4.1	Weather forecasts and Climate prediction products					
4.2	Development of weather and Climate Products					
4.3	Approaches to Making Information Locally Relevant	19				
	4.3.1 Technical Downscaling	19				
	4.3.2 Presentation and Language	19				
4.4	Description of Products as Required	20				
	4.4.1 Forecast Products	20				
	4.4.2 Early Warning and Alerts	21				
	4.4.3 Climatological Normals and Trends	21				
4.5	Climate Change Projections	22				
5.0	COMMUNICATION AND DISSEMINATION OF CLIMATE INFOR	RMATION				
	SERVICES AND PRODUCTS	25				
5.1	Electronic Media	25				
5.2	Print Media	25				
5.3	Information Communication Technology (ICT) Platforms	25				
5.4	Social Media platforms					
5.5	CIS Intermediaries					
5.6	County Climate Outlook Fora/Workshops (CCOF)	26				
5.7	Public Barazas	27				
5.8	Existing Traditional Community Networks	27				
5.9	Improving Capacity Of Communities	27				
5.10	User feedback mechanisms/channels	27				
6.0	PLANNING AND BUDGETING	28				
7.0	MONITORING, EVALUATION AND REPORTING	32				
7.1	Monitoring Approach	32				
7.2	Evaluation Approach	32				
7.3	Reporting	33				
ANNEX	ES 34					
Annex 1	: CIS implementation matrix	34				
Annex 2	: Levels of Decision Making	39				
Annex 3	: Observations Inventory	40				
Annex 4	: Automatic weather stations Inventory	43				
Annex 5	: Observation Network Development Plan	44				
Annex 6	Annex 6: Isiolo County M & E Log frame for CIS Plan 47					

LIST OF FIGURES

Figure 1:Map of Isiolo Major towns, topography and elevation	4
Figure 2: Map of Isiolo climatic zones	5
Figure 3: Estimated populations proportion (%) per Livelihood Zone	6
Figure 4: Annual Average rainfall distribution in Isiolo	8
Figure 5: Existing, Proposed & Optimum weather observatories for Isiolo County	15

LIST OF TABLES

Table 1: Sectoral Products Channels	23
Table 2: Thematic budget	29
Table 3: Human Resource implementation County CIS Plan	
Table 4: Isiolo CMO staff Gaps	31
Table 5: Evaluation Stages of ICCISP	32

LIST OF ANNEXES

Annex 1: CIS implementation matrix	34
Annex 2: Levels of Decision Making	39
Annex 3: Observations Inventory	40
Annex 4: Automatic weather stations Inventory	43
Annex 5: Observation Network Development Plan	44
Annex 6: Isiolo County M & E Log frame for CIS Plan	47

ACRONYMS

ADA	Adaptation Consortium
AOGCM	Atmosphere-Ocean General Circulation Models
ASAL	Arid and Semi-Arid Lands
CCCF	County Climate Change Fund
CAP	Common Alert Protocol
CCCPC	County Climate Change Planning Committee
CCIC	County Climate Information Centre
ССМ	Community Climate Monitor
CCOF	County Climate Outlook Fora
CDM	County Director of Meteorology
CEC	County Executive committee
CIDP	County Integrated Development Plan
CIS	Climate Information Services
СМО	County Meteorological Office
CV	Coefficient of Variation
EMIC	Earth System Models of Intermediate Complexity
ENSO	El Nino / Southern Oscillations
FEWSNET	Famine Early Warning System Network
GFCS	Global Framework for Climate Services
ICCISP	Isiolo County Climate Information Services Plan
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
IPCC	Inter-government Panel on Climate Change
KMD	Kenya Meteorological Department
LAPSSET	Lamu Port-Southern Sudan and Ethiopia Transport corridor
MAM	March, April, May rainy season
MDG	Millennium Development Goals
NAP	National Adaptation Plan
NCCAP	National Climate Change Action Plan
NCCRS	Climate Change Response Strategy
NDMA	National Drought Management Authority
NDVI	Normalised Differenced Vegetation Index
OND	October, November, December rainy season
PBO	Public Benefit Organisation
RANET	Radio and Internet (for the communication of hydro-meteorological and climate
	information for development)
RAP	Resource Advocacy Programme
SACCO	Savings and Credit Cooperatives
SCM	Simple Climate Models
SDGs	Sustainable Development Goals
SOPs	Standard Operations Procedures

StARCK+	Strengthening Adaptation and Resilience to Climate Change in Kenya (Plus)
ТОТ	Training of Trainers
UN	United Nation
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework on Climate Change Convention
WCCPC	Ward Climate Change Planning Committee
WMO	World Meteorological Organisation

KEY TERMS GLOSSARY

- End of the rains
- Provides relevant, usable climate information which can
support decision-making across timescales and levels
- Start of the rains
- Probability of occurrence of a number of different
outcomes developed using statistical forecast methods

Foreword by the Director, Kenya Meteorological Department

The mandate of the Kenya Meteorological Department (KMD) is derived from the World Meteorological Organization (WMO) Convention (adopted on 11th October 1947 and revised in 2007) and the executive orders on the organisation and structure of the Government of Kenya. The mandate is to provide accurate and timely weather and climate information services (CIS) for the safety of life, protection of property and conservation of the natural environment. Education and training including research and development are additional functions designated by the WMO to KMD. KMD's Vision statement is "A world class weather and climate service that contributes to sustainable economic development"...

The application of weather, climate and water information and related services helps to improve the safety and well-being of people, reducing poverty, increasing prosperity and protecting the environment for future generations. Meteorological services activities are fundamental contributions to meeting the targets and commitments of the country's strategies such as Kenya's Vision 2030, the United Nation (UN) Sustainable Development Goals, the Rio +20 Earth Summit outcomes on Sustainable Development and the Sendai framework on Disaster Risk Reduction and relevant environment and climate-related conventions.

The Constitution of Kenya (2010) offers the opportunity for services to be moved closer to the citizens at the county and sub-county (constituency) or community/grassroots levels. This opportunity, in turn, calls for a concerted effort by KMD to strengthen its infrastructure and services to reach and have the desired influence upon the community or grassroots level of society, where the most severe impacts of climate variability and climate change are realized.

The Department needs to expand the observation network and decentralize meteorological services as well as improve the dissemination of products and information. This includes setting up County Climate Information Centres (CCIC) and sub-county offices to disseminate weather and climate information and advisories to the relevant agencies and communities, as these offices will be able to downscale the national forecasts for their areas of jurisdictions as part of the Disaster Risk Reduction strategy in line with Global Framework for Climate Services (GFCS).

Climate change is a serious risk to poverty reduction and threatens to undo decades of development efforts. According to the Earth Summit II Rio +20 (2012) on Sustainable Development, the adverse effects of climate change are already evident, natural disasters are more frequent and more devastating and developing countries are more vulnerable. While climate change is a global phenomenon, its negative impacts are more severely felt by poor communities and poor countries, which are more vulnerable due to their high dependence on natural resources and limited capacity to cope with climate variability and extremes. Moving

the information centres closer will help in sensitizing the relevant communities in line with the Constitution of Kenya (2010).

The potential benefits from enhancing the quality and use of meteorological, climate and hydrological information and products in decision-making are enormous, but realizing these benefits will require improvement in infrastructure, human resources development and engagement between providers and users to improve the process for decision-making and to realise social and economic benefits.

This CIS Plan therefore aims to develop a strategy or a framework for providing climate services at the county level with the user's needs in mind. The implementation of this framework will depend heavily on partnering with all those organisations and individuals whose activity will suffer due to extreme weather and climate impacts.

I am calling upon all stakeholders to support the efforts being implemented to develop relevant and reliable climate information services at county and local level using most appropriate communication channels.

MR. PETER AMBENJE DIRECTOR - KENYA METEOROLOGICAL DEPARTMENT

Foreword by the Governor, County Government of Isiolo

Climate change is one of the most serious global challenges of our time. The scientific evidence on the effects of climate change is overwhelming, both at global and local levels. Given communities' dependency on environmental and natural resources, economic growth and livelihood incomes of both urban and rural populations are highly vulnerable to climatic variability and change (EACCCP, 2011).

Major indications of climate change effects in Isiolo County include temperature increases, rainfall irregularity and intensification, reduced food production, disruption of natural ecosystems and subsequent change and loss of habitats and species. This calls for the need to establish a functional County Climate Information Service that is responsive to the needs of the county residents and their livelihoods.

The County Climate Information Service will play a crucial role in development planning both for managing development opportunities and risks and mitigation and adaptation. Efficient application of climate services requires proper and efficient gathering and processing of weather information. Climate services involve the dissemination of climate information to the public or a specific user.

They also require strong partnerships among providers (e.g., governments, private sector, academic communities, stakeholders) for the purpose of interpreting and applying climate information for decision-making, sustainable development and improving climate information products, predictions and outlooks.

Timely communication of climate information helps prevent the economic setbacks and humanitarian disasters that can result from climate extremes and long-term climate change.

Millennium Development Goals (MDGs) came to an end in 2015 with an exception of MDG number seven (Ensure Environmental Sustainability) which has been extended. This extension deliberately enables nations and governments to institute various mechanisms and strategies to combat adverse effects of ever-worsening climate variability. County Climate Information Services will be used to provide guidance in planning and sustainable development in the county.

Promulgation of the Kenya Constitution in 2010 ushered in a new governance system which also elevated issues of environment and development to human rights, which effectively laid a firm foundation for the establishment and effective management of CIS work. The system will be pivotal in providing a basis for strengthening and focusing countywide actions towards climate change adaptation and mitigation.

The County Government of Isiolo has put into place various initiatives in support of climate change adaptation. One key initiative is the enactment of the County Climate Change Fund Act 2018, which will support climate resilience and adaptation projects in the communities. These initiatives stand to benefit greatly from CIS. This strategy is therefore timely, and will have the full support of the Isiolo County Government.

H.E HON. DR.MOHAMMED KUTI E.G.H GOVERNOR - ISIOLO COUNTY

Executive Summary

Kenya is frequently affected by weather-related disasters, particularly droughts and floods. Drought occurs cyclically and historically it has affected Kenya's economy more significantly than floods. Recurrent droughts have destroyed livelihoods, triggered local conflicts over scarce resources and eroded the ability of communities to cope. Heavy rainfall during the season causes flash floods which mostly affect urbanised areas.

Kenya Meteorological Department has given climate information for many years but the uptake has been limited due to a number of reasons. Most of these reasons revolve around i) relevancy and content of the climate information services, ii) the channels of communication, and iii) understanding of the climate information given to the public. This initiative outlines a proposed framework for Isiolo County Climate Information Services

Plan (ICCISP) which aims to develop and deliver weather and climate information Services Plan (ICCISP) which aims to develop and deliver weather and climate information which can support local, sub-county and county-level decision making at time frames of hours, days, weeks, months, seasons and years in line with the County, national and international development frameworks including the County Integrated Development Plan (CIDP), Constitution of Kenya 2010, Kenya Vision 2030 and the National Climate Change Response Strategy (NCCRS) as well as the Global Framework for Climate Services (GFCS).

The Climate Information Services (CIS) Plan aims to support society to build resilience to future climate change and take advantage of opportunities provided by favourable climate conditions.

The ICCISP has seven chapters which are geared towards addressing the issues raised above.

In chapter one, the framework introduces the mandate of KMD as a national meteorological service in line with national and global policies which guide climate information for sustainable development. The chapter also outlines how KMD plans to provide decentralised climate information services in line with the constitution 2010 that devolved 47 government units. The chapter also gives a profile of the county's climate, economic activities, natural resources and how they will be affected by climate and climate change.

Chapter two discusses the framework for provision of climate services for Isiolo County. The chapter details the goals and objectives of the framework and how KMD, at its county unit, has planned to develop and deliver accessible, timely, relevant climate information that can support local, sub-county and county-level decision making processes for the benefit of community livelihoods and key economic sectors in Isiolo county. These services will be given based on principles well-articulated in the chapter.

Chapter three discusses KMD's observation and data policies and how they will be interpreted to support delivery of services at county level with particular reference to issues

affecting Isiolo county. Plans on the existing and development of future climate monitoring networks are discussed giving the optimum meteorological networks and how data quality will be managed especially from non-KMD climate monitoring networks. There is recognition of the fact that there is no single National Meteorological Service in the world which can have all the stations required without using partners. In this particular case emphasis is placed on community climate monitors.

Chapter four discusses how climate information services and associated products will be provided. This is discussed in light of making the information locally relevant and complete with a list of products that will be generated for sectoral experts and communicated to support decision making.

Chapter five details the channels of communication and dissemination of climate information services and products. This is alive to the fact that Isiolo County is not uniformly developed in terms of communication infrastructure and therefore, other non-conventional communication channels have been recognised as appropriate means of dissemination of climate information.

Chapter six, which is planning and budgeting, recognises the fact that operationalisation of this CIS Plan is expensive and requires financial and human resources that are mobilised well beyond the government provisions.

Chapter Seven deals with Monitoring, Evaluation and Reporting. This is a key component that will serve as a basis from which to track progress of strengthen CIS delivery, support and development of its communication plan. There will be periodic assessment of activities/achievements against the realisation of objectives and outcomes outlined in the plan. All stakeholders will be expected to report on the performance of the CIS Plan in relation to how relevant, reliable, timely and information was provided.

If the plan is properly implemented, it will go a long way towards realizing the Kenya Vision 2030 in Isiolo County and supporting the development of a community which is resilient to the adverse impacts of climate change, as envisioned in the National Climate Change Action Plan (NCCAP).

1.0 BACKGROUND AND CONTEXT

1.1. Background

Weather and climate has significant impacts on many aspects of people's lives and particularly amongst populations whose livelihoods are directly dependent on natural resources. Reliable climate information, including warnings and alerts on severe weather and extreme climate events, is important to support decision making for stakeholders including households, communities, sub-county and county levels. Information about longer term trends in climate variability and change is also vital to support major investments in infrastructure, including dams and roads, as well as conservation of the natural environment.

This County Information Service Plan (CISP) is a framework for development and delivery of CIS in Isiolo County. It was developed in consultation with stakeholders, including experts from across county departments and partner organizations, as well as community members in different livelihood zones. The CISP is a framework intended to support a range of measures for operationalization of KMD's Decentralisation Strategic Plan for CIS provision Isiolo County.

The mandate of Kenya Meteorological Department (KMD) is to provide meteorological, hydrological and related services in support of relevant national needs, including safety of life and protection of property, safeguarding the environment and contributing to sustainable development, as well as to meeting international commitments and contributing to international cooperation which is derived from the World Meteorological Organisation (WMO) Convention adopted on 11 October 1947 and revised in 2007 and presidential execute order of 1977 which created KMD,

KMD Vision:

A world class weather and climate service that contributes to sustainable economic development

KMD Mission:

To provide our customers and stake holders with prompt, accurate and reliable weather and climate products and services for safety of lives, protection of property and conservation of the environment.

County Meteorological Offices will be expected to implement the mission of KMD at county level.

1.2. Roles and Responsibilities of County Meteorological Office

In line with the process of devolution and decentralisation, the KMD district meteorological offices were strengthened with the inception of the new constitution dispensation to County Meteorological Offices (CMOs) in each of Kenya's 47 counties. Established in 2012, the Isiolo County Meteorological Office is the sub-national weather service of KMD and is intended to be an information centre to provide the people of Isiolo County with relevant weather and climate information. Each CMO is headed by a County Director of Meteorological Services (CDM). The CDM is charged with the responsibility of implementing national policies at the county level and delivering CIS which can best inform and support both the development of CIDP and the decision-making needs of the counties' principal sectoral livelihood groups.

Responsibilities of this Office include;

- > Monitoring weather, climate, water, air and noise pollution and related environmental information within the County;
- > Expansion and management of the meteorological observational network within the County;
- > Interpreting and implementing national policies on meteorology and climate change adaptation at the County level;
- > Downscaling of national weather forecasts and climate outlooks to the County level;
- > Issuing public warnings on hazards and extremes related to weather, climate and air pollution;
- > Generating essential weather and climate information to support climatesensitive sectors such as livestock, agriculture and food security, water resources, energy, transport, public health and sanitation, environmental conservation, disaster risk reduction, insurance, mining and tourism;
- > Building public awareness of the use of meteorological data;
- Producing weather and climate information which can support the County's social and economic development;
- > Mainstreaming Meteorological services in the development agenda of the County;
- Promoting the use of local knowledge to build the resilience of communities in dealing with climate change extremes within the County; and
- > Mainstreaming gender in weather, climate and environmental governance in line with the Constitution.

1.3. Summary of Relevant Policies and Plans

The ICCISP recognizes that delivering CIS that can support decision-making effectively requires engagement among a wide range of stakeholders. Stakeholders of the ICCISP include: government administration at county, sub-county, ward and village levels; decentralized national government agencies; religious leaders across different faith groups and denominations; local, community and livelihood associations; private sector bodies and national and international public benefit organisations (PBOs); higher learning, community-based organisations and research institutions (among others). As such, the Isiolo Meteorological Office will develop and deliver the ICCISP through linkage with and by supporting the activities of these stakeholder groups.

This CISP supports implementation of national and international climate change policies such as;

- > United Nations Framework on Climate Change Convention (UNFCCC)
- > Intergovernmental Panel on Climate Change (IPCC)
- > National Climate Change Response Strategy (NCCRS)
- > Global Framework for Climate Services
- > Climate Change Act, 2016
- > National Climate Change Action Plan (NCCAP)
- > National Adaptation Plan (NAP)
- > Kenya's Vision 2030
- > Kenya Climate Smart Agriculture Framework, 2017-2026
- > Green Economy Strategy and Implementation Plan (GESIP), 2016-2030

1.4. Context

1.4.1. Natural Resources

Isiolo County is endowed with diverse natural resource base; such as water sources, pasture, woodlands, wildlife among others. These natural resources support the livelihoods of the populations, who are mainly pastoralists. The main water sources include three major rivers: River Ewaso Nyiro, River Isiolo and River Bisanadi in Kinna.

River Ewaso Nyiro is prone to flooding and has a rich potential of fish and large scale irrigation. The floodplain is an important resource for pasture during dry seasons and serve as a refuge during drought conditions for pastoralists.

Isiolo hosts three major national reserves namely; Shaba, Bufallo Springs and Bisanadi game reserves and five wildlife conservancies that are; Nakuprat-Gotu, Naisulu, Leparwa, Mpus Kutuk and Biliqo Bulesa, Figure 1 (see figure 1). These national reserves and conservancies provide a haven for a wide diversity of wildlife: buffalo, eland,

Jackson's hartebeest and herds of Grant's gazelle, and the endemic and now highly endangered species; Grevy Zebra, Gerenuk, reticulated Giraffe, Maasai Giraffe and Somali Ostrich which roam freely in the plains.

Isiolo also hosts five major forest reserves namely; Badha Bisan Ajao, Badha Sotowesa, badha bulfayo and Oldonyiro forests which are very important to pastoralists during dry seasons and also a breeding ground for elephants.



Figure 1:Map of Isiolo Major towns, topography and elevation¹

The county is classified into three ecological zones namely; semi-arid, arid and the very arid, as shown in *figure 2*. The Semi-arid zone covers part of Wabera ward, Bulla Pesa, Burat and Ngare Mara wards and some portion of Oldonyiro ward in Isiolo North constituency. It covers Kinna ward in Isiolo south constituency. This zone receives over 500mm of rainfall annually. The relatively high amount of rainfall is due to influence of Mount Kenya and Nyambene hills in the neighbouring Meru County. The vegetation in this zone is mainly thorny bush with short grass. The Arid zone covers a portion of Chari

¹ Source: https://www.google.co.ke/maps/

and Garba Tulla wards. Rainfall received here ranges between 250 mm and 500 mm annually and supports grassland and few shrubs. The Very arid zone covers Cherab and Sericho wards. Annual rainfall received here is less than 250 mm. This area is hot and dry most of the year.



Figure 2: Map of Isiolo climatic zones²

1.4.2. Economic Activities and Food Security

The backbone of the county's economy is livestock production with over 80 percent of the inhabitants directly or indirectly deriving their livelihood from livestock as shown in *figure 3*. Nomadic pastoralism is the prominent activity in the county and defines the lifestyle of most of the county's inhabitants. Intensive camel dairy production is a less prominent economic activity in the county but lately gaining importance as a business in Isiolo, Nairobi and other urban areas.

² Source: CDMS, Isiolo

The main livestock cattle breeds are Zebu and Boran which are drought and disease resistant breeds mainly for beef production. Goat breeds include the Galla (main), the Small East African and Saanen. A few farmers also keep dairy breeds like the Toggenburg and the Swiss Alpine and many crosses of local and exotic breeds.



Figure 3: Estimated populations proportion (%) per Livelihood Zone

The Black Head Persian breed is the dominant sheep breed in the county, figure 4. The major breeds of camels found in the county are the Somali, the Turkana and the Rendille. The market for the county's livestock are mainly in Nairobi and other neighbouring counties.



Livestock Market in Belgesh in Isiolo County³

³ Source: CDM,Isiolo

A large portion of the county is arid and cannot support meaningful crop farming. However, maize, beans, cowpeas, onions are produced in the areas bordering Meru and Laikipia Counties. Mangoes, paw paws and other horticultural crops are produced in private small-scale irrigated farm along rivers. With limited rain-fed agriculture, the hectares under food crops is small. There are only 1,497 hectares under food crops production. However, the area under food crops is expected to increase to 2,000 hectares with the completion of Rapsu and Malkadaka irrigations schemes.

1.5. Overview of Isiolo County Climate

Isiolo County is mainly arid to semi-arid with two main rainfall seasons, namely the long rains season, which occurs between March and May with the peak in April. The short rains season, which is the most significant, occurs from October to December with the peak in November. Rainfall regime in the County is mainly governed by the Inter-tropical convergence zone, ENSO and vicinity of neighbouring high relief areas among other factors. The areas near Mount Kenya and Nyambene hills (Wabera, Bulla Pesa, Burat, Ngare Mara and Kinna wards) receive over 500mm of rainfall per year. The drier eastern and northern parts of the county receive less than 250mm as indicated in figures 2 & 5. Rainfall in the County is characterized with high inter-annual variability which directly affect hydrological, ecological and biochemical processes, which in turn, influence climate.

This erratic and unreliable rainfall supports limited crop farming over few parts of the county. These areas are Burat, Bulla Pesa, Wabera and Kinna wards where the black cotton soil retains moisture long enough to make crops mature.



Figure 4: Annual Average rainfall distribution in Isiolo⁴

High temperatures are recorded in the county throughout the year, with variations in some places due to differences in altitude. The mean annual temperature in the county is 29⁰ degrees centigrade. The county records on average more than nine hours of sunshine per day and hence has a huge potential for harvesting and utilization of solar energy. Monsoon winds blow across the county throughout the year and attain their peak during the months of July to August developing dust storms. The strong winds provide a huge potential for wind power generation.

The likely effects of climate change in the County manifests themselves in significant increases in year-round temperatures, increased intensity of rainfall during rainfall seasons, shift in rainfall onset and cessation dates, increases in frequency of extreme weather events from year to year weather variation.

⁴ Analysis by CDM, Isiolo

2.0 FRAMEWORK FOR PROVISION OF CLIMATE SERVICES

2.1 Goals and Objectives

The ICCISP aims to develop and deliver accessible, timely, relevant climate information which can support local, sub-county and county-level decision making processes for the benefit of community livelihoods and key economic sectors in Isiolo county.

The specific objectives are to provide:

- Relevant location specific climate information (daily observed rainfall, weekly, monthly and seasonal rainfall forecasts) that supports community level livelihoods and county and sub-county level decision making processes.
- Early warning and Alerts through technological means for sharing information on weather conditions, for example; extreme weather and climate conditions; drought, floods etc. for safety of life and optimization of weather and climate dependent natural resources,
- > Climate smart information
- Sector specific climate information (wind speed and direction, temperature , relative humidity, sunshine hours, radiation, normalised indices (e.g. NDVI⁵, SPI⁶, VCI⁷ etc.) climatological summaries of weather parameters) for county level planning,
- > Relevant climate information to contribute to the development of sector specific advisories for short term and long term planning.

2.2 Principles

This CISP is developed in accordance with the WMO Global framework for climate service (GFCS). The GFCS has been developed based on a set of guiding principles of which the relevance are listed below ;

- > High priority for the needs of climate-sensitive sectors
- > better access and use of climate information by users
- > CISP will address needs in three spatial scales: national, county and ward level
- > Climate services must be operational and continuously updated (sustainability)
- Climate information is primarily a public good and national/county governments will have a central role in the CISP
- > The CISP will facilitate and strengthen existing climate services
- > The CISP will be built through partnerships

⁵ NDVI- Normalized Differential Vegetation Indices

⁶ SPI-Standard Precipitation Index

⁷ VCI- Variability Climate Index

2.2.1 Principle 1- High priority for the needs of climate sensitive sectors

Following these principles, ICCISP has identified five priority areas of appropriate action for reducing vulnerability and enhancing resilience among communities in Isiolo County. These priority areas include: Livestock, agriculture and food security, Disaster risk reduction, Energy, health and Water.

Livestock, agriculture and food security: In an era of rapid population growth, food security remains a major concern. Agriculture is vulnerable not only to market fluctuations but also to climate variability, climate change and natural hazards. Climate services can provide information and guidance on a set of actions that can strengthen the resilience of agriculture and food security systems to climate variability and change.

Disaster risk reduction: Most natural hazards are caused by weather and climate. Userfriendly climate services can help Isiolo County and ward levels to build greater resilience against floods, droughts, storms and other hydrometeorological hazards.

Energy: Energy systems are the engine of economic and social development. Energy generation and planning of operations are markedly affected by meteorological events and energy systems are increasingly exposed to the vagaries of weather and climate affecting both the availability and energy demand. Isiolo County being arid, has potential for solar and wind energy.

<u>Health:</u> Climate variability and climate change have important repercussions on public and animal health. Temperature and rainfall conditions influence the spread of communicable diseases (water borne) while extreme weather events cause injury and death. Sector-specific climate services can empower the health of both human and animal lives.

<u>Water:</u> Isiolo a being water scarce County, water is vital for life, but an over or under supply can threaten life, societies and economies. The amount and availability of water is strongly influenced by climate variability and change. Seasonal climate outlooks together with other climate services and products can greatly improve water supply management.

2.2.2 Principle 2 - Better access and use of climate information by users

This CISP recognizes that effective CIS needs to: provide reliable probabilistic climate information; be relevant to users' needs and gender sensitivity; be accessible; foster increased trust through developing two-way channels of communication and coproduction of weather and climate information; support increased understanding and communication of uncertainty in climate information and; strengthen appropriate use of probabilistic climate information and sustainable service which is affordable and consistent

In this regard the ICCISP will endeavour to provide support for two principal groups of users, of climate information whose occupations and livelihoods have been identified to be climate-sensitive. First, the government departments within Isiolo County and any other partners whose activities are climate sensitive and fall within the five priority areas will be targeted. Secondly, the community whose livelihoods are climate-dependent will form an important target group. These communities will mainly comprise of farmers, pastoralists, Water Resource Users Association, forest associations, green energy groups, private sector and enterprises.

Agricultural extension services have information but only provide demand-led services, requiring that pastoralists and farmers themselves take the initiative to seek support from the extension services. Amongst planners and policymakers across county line ministries, decentralized authorities and non-governmental organizations access to weather and climate information is currently patchy, with some obtaining information from KMD and others from NDMA monthly updates.

2.2.3 Principle 3 - Address needs at three spatial scales (national, county and within ward levels) users of climate information in Isiolo county are currently receiving information at different levels and/or scale (national, county and ward levels) Despite the different levels or scales targeted with information, the ICCISP proposes employing a range of approaches to ensure scope and content relevant for the different user levels.

2.2.4 Principle 4 - Climate services must be operational and continuously updated (sustainable)

This principle addresses the sustainable and effective updates of CIS incorporating feedback-feedforward aspects of use of climate information. Operationalisation of this ICCISP will therefore consider strategies for implementation which promise sustainability, regular review and update of CIS.

2.2.5 Principle 5 - Climate information is primarily a public good and national/county governments will have a central role in the implementation CISP

Climate services support society's continuing effort to be productive and prosperous, and to manage impacts from climate variability and change. The constitution of Kenya 2010 guarantees unrestricted access to all information. The CMO will collaborate with other Government institutions to ensure availability of climate information as a public good.

2.2.6 Principle 6 - The CISP will facilitate and strengthen existing climate services

This ICCISP recognises that there are already established existing climate service infrastructure and other amenities. In implementing this CISP, the CMO will adhere to the basic principles of complementary and subsidiarity.

2.2.7 Principle 7 - The CISP will be built through partnerships

This ICCISP is anchored on the Kenya Meteorological Department headquarters strategic plan. The CMO will depend first on direct technical support from the KMD for the basic implementation of the plan. The CMO will also welcome support from other partners and stakeholders. CMO will seek collaboration of stakeholders both users and producers of climate related information from among NGO's, CBOs, FBOs, County and National Governments departments and local and international agencies.

2.3 Existing and Planned CIS Initiatives and Projects

The planned Isiolo CIS initiatives aim to develop and deliver weather and climate information which will support local, sub-county, county- and national-level decision making at time frames of hours, days, weeks, months, seasons and years in line with national and international development frameworks including the Constitution of Kenya 2010, Kenya Vision 2030 and the National Climate Change Response Strategy (NCCRS) as well as the Global Framework for Climate Services (GFCS).

2.3.1 Implementation of Kenya's Vision 2030 in Isiolo County

Kenya's Vision 2030 for Isiolo county encompasses a number of major infrastructure projects and social and economic initiatives designed to strengthen resilience and development. These include:

National flagship projects; such as:

- > LAPSSET Project; Lamu Port-Southern Sudan and Ethiopia Transport corridor, Railway line and a highway to pass through Isiolo County;
- > Construction of Resort City in the County;
- > Upgrading of Isiolo airport to an International standards ASAL irrigation development projects;
- > Rural electrification;

- > Development of ICT infrastructure;
- Construction of rural roads Isiolo, Garbatula, Modogashe road and other rural roads;
- > Modernization of the meteorological services programme, and
- > The Advertent Weather Modification Programme⁸.

Interventions to enhance the resilience of the County's population being undertaken across a wide range of governmental and governmental partners include⁹:

- Rehabilitation, Expansion and development of Irrigation schemes along Ewaso Nyiro River, Rapsu and Malka Daka to increase agricultural production in the county to enhance food security;
- > Promotion of drought tolerant crops;
- > Upscaling of outreach health services;
- > Enhancing maintenance and servicing of key community water facilities such as boreholes;
- > Enhancing sustainable environmental conservation to forestall environmental degradation;
- Promote productivity of livestock in the county through provision of artificial insemination, curbing of livestock diseases, provision of water, market information systems, marketing infrastructure and extension services to the herders;
- > Expansion of the irrigated hectares from current 600 hectares to 2,000 hectares;
- > Enterprise and cooperative development to improve access to credit;
- > Value addition through creating light industries;
- > Construction of the Isiolo Abattoir at Burat ward;

⁸ The Advertent Weather Modification Programme (AWMP) is one of the KMD Vision 2030 Flagship projects, whose primary aims include, obtaining more water, reducing hail and lightning strikes damages as well as elimination of fog or associated hazards. Kenya Vision 2030, Performance Contracting Guidelines on the Vision 2030 Project Indicator 2013-14, p39.
⁹ Isiolo County Integrated Development Plan (CIDP), 2013,pg 68-83

3.0 **OBSERVATION** AND DATA

Because meteorological data is key in CIS development, weather and climate monitoring networks are paramount. It is important for Isiolo county meteorological office to establish adequate and serviceable weather and climate monitoring networks in order to deliver effective and relevant CIS to inform decision-making in the county.

3.1 The Existing Observations Network

The earliest weather and climate record dates back from 1930. Through the years a total of 28 rainfall stations have been installed since 1930 in Isiolo County and the data from these stations can be accessed at KMD Headquarters. Annex 3 referred only a lists 23 stations and therefore, the information is not sufficient, thus the plan should have a complete list for ease of reference. The network has been shrinking with time due to the following reasons; insecurity, abandonment, lack of inspection and maintenance and lack of community climate observers among other issues.

To solve these problems, KMD has started automating its observatories by installing automatic weather stations (annex 4) at Garba Tulla, Merti, Archers Post and Madogashe.



Automatic Weather Station at Merti¹⁰

¹⁰ Source: CDM, Isiolo

The organization will also need to document and include in their database all other weather stations that were installed and operated by partners either for research or public use.

3.2 Future Plans for Observations Network

Following an assessment of meteorological infrastructure conducted in the county, an inventory of equipment and their status has been developed as indicated in Annexes 3, 4 and 5.

KMD plans to install the optimised 20km X 20km network in Isiolo County as indicated in Figure 7.



Figure 5: Existing, Proposed & Optimum weather observatories for Isiolo County ¹¹

¹¹ Source: Design by CDM, Isiolo

3.3 Maintenance Plan for Observations Network

KMD prescribes to WMO's standards, processes and procedures for meteorological equipment installation and maintenance to ensure data quality. Calibration of meteorological instruments will be performed in order to ensure high quality data.

3.4 Management of Non KMD Observations

Kenya Meteorological Department (KMD) recognizes the fact that there are many organizations with observation stations but unknowingly make erroneous observations, particularly rainfall data. KMD therefore needs to be in the lead and coordinate standardization processes to assist such organizations to make standardized observations.

KMD will build partnership with organisations, institutions and individuals for collaboration in weather and climate observations. Such collaborations will be done under the WMO Integrated Global Observing System (WIGOS) framework, to ensure improved quality and availability of data and metadata, as well as develop capacity (observations, technical and maintenance) and improve access to data. The department will also define the roles of partner agencies/individuals in order to avoid duplication of functions and activities. The partnership needs to be very clear with distinct roles during implementation of the plan. The partnerships need to be harnessed and strengthened especially with institutions that have already established weather and climate data collection and management systems.

County by-laws to oversee and regulate the installations functioning and operationalization of weather stations for ward level use and community consumption, is put in place using meteorological guidelines, as this will improve the quality of collection and measurement of weather and climate data. However, meteorological departments should not restrict the installations of weather stations.

Role of Community Climate Monitors

There is no national meteorological service which has all the stations desired for delivery of service. Most of them rely on community climate monitors.

KMD will continue to encourage more local institutions and community at large to volunteer and manage observation networks in their respective areas. KMD will empower them through trainings and provision of equipment such as rain gauges. In turn, KMD will use the data to improve service delivery.

3.5 Data Discovery and Rescue

A large amount of data—still useful to CIS development—remains in databanks outside KMD. KMD will try to obtain this data through developing memoranda of understanding with the relevant data holding institutions to ensure it is archived in an easily accessible format.

4.0 **PROVISION OF CLIMATE** INFORMATION SERVICES

Isiolo County Meteorological Office will develop weather and climate information to support decision making across the principle livelihood groups as well as strategic and sectorial county and national government planning.

5.0 Weather forecasts and Climate prediction products

Provision of weather and climate products are generated at different levels i.e. global, regional, national and downscaled to county and ward levels. These national level forecasts are released to CMO as need be for use at the County level. The CMO has a role of downscaling the national level products to local scales in order to address local level needs. Weather and Climate products in Isiolo CMO include: probabilistic weather forecasts ranging from short term (daily, weekly), medium range (monthly) and long term (seasonal), rainfall onset, cessation, distribution, climate summaries and trends. With the support of FACTFIT software, CMO uses historical climate data and local knowledge of climate variability to downscale the national monthly and seasonal forecasts to develop a forecast for Isiolo County. More downscaling software will be developed for CMO by KMD and other international partners to improve the accuracy of the forecasts.

6.0 Development of weather and Climate Products

The products indicated in this CISP will be developed following identified stakeholder needs in the county. Climate change scenarios are available at KMD headquarters and can be downscaled to county level. The CMO will provide:

- > Seasonal, monthly, seven- days, five-days and daily forecasts, as well as summary versions for SMS transmission.
- > The seasonal forecasts will be combined with sectorial expertise to provide livelihood advisories.
- > Warnings of unusual or extreme weather events for transmission via national and county administration, departments agencies as well as a full range of intermediaries and media channels.
- > Weather and climate data, summaries and normals (Rainfall amount and distribution, maximum and minimum temperatures, wind speed and direction, sunshine hours and relative humidity). These products are useful to specific county and national government agencies, NGOs and the community at large for planning for climate sensitive activities.
- > Climate change projections and scenario are important product to support medium term and long term planning.

The timeframe and content of CIS products are outlined in table 1in page 19.

7.0 Approaches to Making Information Locally Relevant

Relevance may be achieved by identifying local scale climate variations with features or locally measured climate parameters. In Isiolo county relevance of climate information as provided in this CISP will be achieved by establishing climate measurements at local scales (community level), provision of climate information in understandable language and capacity development. Indigenous and local knowledge existing among communities will be incorporated in generating and reporting climate information for purposes of local relevance.

7.1.1 Technical Downscaling

Three technical approaches will be followed for purposes of creating relevance in climate information. First, weather and climate parameters measured at local level will be used to downscale the national forecast using FACTFIT and other downscaling tools. This will ensure that communities have ownership of the information. Towards this objective weather instruments as indicated above will be installed in collaboration with local communities who will identify Community Climate Monitors (CCM).

Secondly, this CISP will seek to improve knowledge of the local factors affecting the climate of Isiolo county. In this regard, the CMO will seek ways of integrating conventional scientific methods and the indigenous knowledge from among the communities to strengthen relevance of climate information.

Thirdly, Consistent with the principle of building trust this CISP will endeavour to create relevance of the climate information through developing two-way channels for communication and co-production of weather and climate information together with stakeholders. The CMO will initiate a pilot study to identify how local knowledge may support communication of KMD forecasts.

7.1.2 Presentation and Language

Isiolo County meteorological office will be issuing weather and climate information in English and Kiswahili. However, it is necessary to translate the information into the local language (Borana, Samburu, Turkana, Meru), to increase understanding and uptake of information among the resident communities. This information will be packaged according to the targeted audience. Interpretation of meteorological terms into local languages in form of a dictionary (English/Samburu/Borana/Turkana/Meru), will be done to further improve understanding of climate information. Locally relevant graphical representation of some phenomena or information will be explored.

8.0 Description of Products as Required

Reliable daily, weekly, monthly and seasonal information, as well as warnings and alerts on extreme weather events will be developed to support decision-making among society and community. Information on climate variability, trends and change which is vital to support major investments in infrastructure, including dams and roads, as well as conservation of the natural environment will be developed.

8.1.1 Forecast Products

Weather and climate forecast products are statements of future weather/climate conditions issued for different time scales ranging from hours, days, weeks, months to seasons. It is based on conditions that are known at present and assumptions about the physical processes that determine the future state of weather and climate. Several scales of climate and weather products are issued by KMD and also available at Isiolo CMO. These are seasonal, monthly, weekly, five- days and daily forecasts of weather and climate.

a) The seasonal forecast

Seasonal forecast is a three months rainfall outlook usually developed on a regular basis by KMD headquarters in Nairobi. The seasonal climate outlook depicts the amount and distribution of rainfall patterns for two major rainfall seasons in Isiolo county (MAM) and (OND). The seasonal forecast also has indications of onset and cessation dates of the rain season and gives the characteristics of the season, such as when season is at its peak. The forecast is issued at least one month ahead of the start of the season. The forecast is issued based on tercile probabilities of occurrence of the normative rainfall. The seasonal forecast will be downscaled to capture local climate features for purpose of relevance use at the ward level.

b) The Monthly forecast

The monthly forecast is climate outlook depicting the amount and distribution of rainfall patterns within the month. The forecast is issued every end of the month to give indication of a climate outlook of the coming month. The forecast is a normative indication of the expected rainfall performance of that month. The month is divided into two parts, with the first half a little more detailed and the last half more general. This product updates the seasonal forecast.

c) Weekly forecast

The weekly forecast depicts the amount and distribution of rainfall patterns within the week. The forecast is issued every Monday to give indication of weather conditions in the coming week. It is also used to update the monthly forecast.

d) Daily forecast

The daily forecast is an indication of weather conditions expected in the next 24 hours for a particular area. It is used to update the weekly forecast. Upon demand, a five-day forecast is issued on a running basis to give an indication of the next five- days, updated daily.

8.1.2 Early Warning and Alerts

Early warnings and alerts are statements issued by meteorological service on weather and climate hazards. These are issued for purposes of disaster risk reduction to enable prevention of loss of life ,destruction of property , economic losses and environmental degradation from weather/climate hazards. KMD will follow standard operating procedures (SOPs) in indicating the level of danger from the hazard. The Isiolo county CMO will maintain a continued link of early warning and alert information from KMD headquarters for the purpose of advising on imminent weather/climate hazards in Isiolo County. Specific severe weather and extreme climate events often experienced in Isiolo include; drought, strong winds, dust storms and flash floods.

8.1.3 Climatological Normals and Trends

Climatological Normals are averages of climatological elements (e.g. temperature, rainfall, wind, sunshine, radiation, cloudiness) over specified long-term periods of 30-plus years (rolling decadal thirty years period e.g. 1961-1990; 1971-2000;1981-2010) and location. Climatological trends are temporal indications of long-term changes of the averages of the climatological elements.

Climatological normals and trends are useful for two major purposes:

- a) Benchmark or reference against which climate conditions (especially current or recent conditions) can be assessed and
- b) They are widely used (implicitly or explicitly) as indicators of the conditions likely to be experienced in a given location.

The CMO will generate climatological normals and trends for the relevant climate elements for specific locations in Isiolo County. These normals and trends will be used to inform the development programmes in the county, as stipulated in the CIDP.

9.0 Climate Change Projections

Climate change projections are scenarios of future climate based on a hierarchy (scales and complexities) of models types, ranging from Atmosphere-Ocean General Circulation Models (AOGCMs) and Earth System Models of Intermediate Complexity (EMICs) to Simple Climate Models (SCMs). These models are forced with storyline/pathways of emission concentrations of greenhouse gases and other constituents.

Climate Change scenarios offer ways of identifying and examining challenges posed by climate change. Selecting projections for Isiolo County requires careful consideration of the natural resources of the county and how they are sensitive to climate. Downscaling climate projections increases the spatial resolution of climate information and makes projections more relevant to natural resource managers by allowing decision-makers to better visualize what these different scenarios imply to the county.

For Isiolo, CMO will develop downscaled scenario projections for relevant climate elements (rainfall and temperature) at different time spans (decadal, quarter century, half century, century) to support medium and long-term visionary planning (e.g CIDP, County Visions).

Table 1. below shows a range of products that will be generated for sectoral experts to support planning.

Table 1: Sectoral Products Channels

Products	Product Description	Channels for communication	Lead organization(s)
Unusual and extreme weather events	For example very heavy rain likely to cause flash flood, strong winds	All channels including via County Government Administration, churches, police, schools, local alarm systems, SMS to CIS intermediaries, via community, local and regional radio, social media	KMD direct to County Government and NDMA, police service, CIS intermediaries and radio stations
Daily	Forecast of rainfall intensity, humidity at geographic location(s), Reported Rainfall Amount, Unusual weather-related events	Radio SMS	KMD to NDMA KMD to principal regional, local and community radio stations KMD to CIS intermediaries
Weekly	Forecast for next 7 days including rainfall location and intensity, temperature, cloud cover, fog, strong winds, advice on daily rate for irrigation	Radio SMS (including via schools) Email and KMD website	KMD to regional, local and community radios and CIS intermediaries on Saturday or Sunday
Monthly	Forecast for the next month on rainfall location and intensity, temperature, extreme weather events. Potentially include local knowledge	Radio and SMS Email and KMD website	KMD to regional, local and community radios and CIS intermediaries Included in NDMA monthly bulletins
Seasonal	Onset, quality, distribution, cessation of rains, extended dry spells Livelihood advisories developed with ASDSP and Ministries of Agriculture, Livestock and Fisheries Potentially include local knowledge	County Climate Outlook Forum Workshop KMD website and via email Barazas and discussions led by CIS intermediaries Phone-in radio shows Summary by SMS	 KMD in collaboration with relevant ministries and partners CIS intermediaries within ongoing activities KMD with technical experts from County Ministries/research institutes

			KMD to CIS intermediaries
Climatological Normals and Trends	Climatological Normals are averages of climatological elements (temperature, rainfall, wind, sunshine, radiation, cloudiness) over specified long term periods (30 years plus) and location. Climatological trends are temporal indications of long-term changes of the averages of the climatological elements.	Policy document	County government planning office
Change Projections	Projections scenarios.Downscaled scenarios	Policy Documents	County Government planning office

10.0 COMMUNICATION AND DISSEMINATION OF CLIMATE INFORMATION SERVICES AND PRODUCTS

Climate information as an important factor in decision making and needs to be communicated efficiently and effectively. Kenya Meteorological Department undertook an assessment of user climate information needs including channels of communication and dissemination. Key issues among the findings include the need to establish a Isiolo County Climate Information Centre at Isiolo town to act as a one stop shop for stake who may wish to make weather related interventions. Following the holders identification of user needs a communication strategy has been developed. This section presents the communication strategy to be used in ICCISP. This strategy, recognizes that there are different levels of users who require different platforms of communication and also emphasising on the two-way (feedback/feedforward) communication approach. Several channels and platforms have been identified for use in this strategy. Electronic media, Print media, ICT, Intermediaries, County Climate Outlook fora/workshops (CCOF), concert, dances and songs, and barazas. In this strategy, efforts will be made to develop a weather/climate dictionary in the local languages for easy of understanding of climate information among the communities. Efforts will be made to improve capacity of communities to uptake CIS.

11.0 Electronic Media

Many Kenyans have access to the radio and watch TV. Local FM radio stations have been identified among the local communities as having the most extensive reach. This is especially important for short and medium term forecasts. The communication strategy in the ICCISP, will greatly depend on the use of mass media (radio , TV). Electronic media is best suited for summary CIS statements, which are intended to give guidance on general decision-making. There will be need to strengthen use of radio to reach a bigger audience; increase range of the Ranet Radio.

12.0 Print Media

Print media comprises of newspapers, fliers, brochures, bulletins and magazines. This media has an advantage over all others because it does not limit the quantity of content to be communicated. This makes it better for communicating short and medium term CIS and advisories for decision making..

13.0 Information Communication Technology (ICT) Platforms

In recent times, information and communication technology (ICT) have become a prominent and important tool for development in Kenya. In this strategy, ICT includes communication through cellular phones, internet, email, websites, satellite systems and video conferencing among others. In this ICCISP, ICT will be used to share climate information with both communities and government in Isiolo county. Email, internet (Websites) and Video conferencing will be used for official communication at county and

sub-county levels. These platforms have capacity to carry detailed analysis of climate information and are also favoured for their easy access and low cost.

Cellular phones have taken prominence among society/communities in the recent days. They are widely accepted and used as a way of effective communication, often facilitating development at grass-root levels. Cellular phones have features that enable mass communication of climate information on different platforms, from bulk SMS to social media. These platforms will be used to communicate the following types of products;

- > Highlights of the seasonal forecast;
- > Monthly and weekly updates;
- > Daily updates and forecast;
- > Alerts and warning of hazardous weather.

14.0 Social Media platforms

Social media platforms including whatsapp, facebook and twitter will be used as channels of sharing Climate Information Services within the county. This will complement other ICT channels like blogging as it is easily accessed and utilised using cellular phones and computers.

15.0 CIS Intermediaries

This communication strategy envision collaboration with community opinion leaders for the purposes of delivery of climate information at the ward level. KMD will identify from among the communities' intermediaries, who are persons prepared to receive weather and climate information and share it through their existing networks and partners. The process of identifying the intermediaries in Isiolo county will take account of the distribution of the population in order to have equitable representations of climate information among all communities. Through this approach, relevant local scale climate information will reach the farthest members of the society.

16.0 County Climate Outlook Fora/Workshops (CCOF)

The use of expert information among the communities requires continued consultation and collaboration among diverse stakeholders representing all users of this information. This collaboration will be attained by creation of county climate outlook forum (CCOF). The Isiolo CMO will work with other government departments and key stakeholders to constitute members of these fora. This forum will be used to discuss the downscaled seasonal forecasts, related subsequent local impacts and development of advisories to address those impacts. This forum will provide the opportunity for two way learning (feedback/feed forward) among users and providers of probabilistic climate information.

17.0 Public Barazas

Public barazas remain an important channel of communicating climate information especially in areas where there is low coverage of cellphone network. This is mainly working with local chiefs/administration to use public meetings to disseminate the information to communities. Use of community members who understand local sign language can be helpful to audience with hearing impairment.

18.0 Existing Traditional Community Networks

These are the community structures that exist for other reasons but has potential to reach huge numbers of community members. Examples include; Dedha, the Sub-areas andvillage elders. This provides an additional channel to the intermediares. This approach provides a good alternative access to information by the visually impaired.

19.0 Improving Capacity Of Communities

Effective use of CIS requires supporting a wide range of stakeholders to access, understand and appropriately apply climate information within specific decision-making processes across timescales. Towards this objective, Isiolo CMO will organise awareness creation and sensitisation programmes for the communities. CMO in collaboration with stakeholders will carry out projects which will build resilience among the communities in the County.

20.0 User feedback mechanisms/channels

Receiving feedback from users of the climate information on a continuous basis is important in ensuring that information is accessed and utilised effectively and efficiently. It provides opportunity for timely adjustments to barriers and challenges experienced. Communities will continue to provide information to improve the systems and contents of information relayed. This include a toll free number, hotline numbers, suggestion boxes in public spaces, Community feedback reference groups that receive and record complaints as well as relay feedback to communities and the CDM/county.

21.0 PLANNING AND BUDGETING

The operationalization of this CISP requires a financial plan to enable management of financial resources necessary for its effective implementation. Creating a budget is the most effective way to ensure availability of financial resources. This section outlines the financial planning and budgeting for Isiolo CISP and explains how Kenya Meteorological Department envisages the implementation of the same. It suggests action points, which would ensure effective availability of finances and ensure that the CISP is practical. Establishing a Meteorological service is expensive because it involves procurement of highly specialized equipment and software that are not readily available locally. An effective CIS requires the following items:

- i. Meteorological infrastructure (observation, communication, data processing and product development, dissemination, office space etc.)
- ii. Operation and maintenance budget
- iii. Human Resource (technical staff, capacity building)
- iv. Research and Development
- v. Office equipment (Computers, workstations, laptops, furniture, transport, Mobile phones)

The ICCISP will be funded by multiple sources including the KMD, county Government, County Climate Change Fund, Green Climate Fund (national) and Department of Rangeland Management who play a critical role in livestock production which is the mainstay economic activity in the county. The estimated cost of meteorological infrastructure for Isiolo County is given in the Table 2.

Table 2: Thematic budget

Thematic Area	ISIOLO			Т	otal	
	Financial Year/ (Kshs. In Million)				(ł	<shs.in million)<="" th=""></shs.in>
	2016/17	2017/18	2018/19	2019/20	2020/21	
Establish county level weather and climate						
services infrastructure	20.29	63.09	65.65	47.60	10.14	206.77
Data collection and exchange infrastructure	1.91	0.06	0.16	0.11	0.06	2.30
Processing, Product development and						
archival infrastructure	3.00	0.00	0.00	0.00	0.00	3.00
uptake of product and services infrastructure	10.21	200	1.00	1.00	0.00	14.21
Establish county data management						
infrastructure	3.20	2.05	1.00	0.30	0.30	6.85
Total	38.61	67.20	67.81	49.01	10.50	233.13

Table 3: Human Resource implementation County CIS Plan

Human resource management	Human Resource to implement County Climate Service Plan:	No. of personnel
and development	County Director for Meteorological Service	1
	Deputy County Director for Meteorological Service	1
	Office Assistant -1 (secretary)	1
	Clerical Officer-1	1
	Drivers -2	2
	Meteorologists	3
	Meteorological Technologist	3
	Meteorological Observatory staff-8 (per observatory)	16
	RANET FM Radio station Staff -18 pax (optimum)	18
	Community Climate Observers (2 observers X 5 observatory per ward X 10 wards)	100
	No. of staff promoted to the job groups equivalent to civil servants working under county Government	
	No. of staff trained for performance-related courses	All

Table 4: Isiolo CMO staff Gaps

Position	Optimum	In-position	Gap	Remarks
County Director for Meteorological Service	1	1	0	
Deputy County Director for Meteorological Service	0	0	1	
Office Assistant (secretary)	1	0	1	
Clerical Officer-1	1	0	1	
Drivers -2	2	0	2	
Meteorologists	3	0	3	
Meteorological Technologist	3	0	3	
Meteorological Observatory staff	8	0	8	
RANET FM Radio station Staff	18	13	5	Serious consultation needed to transfer the function to county government

22.0 MONITORING, EVALUATION AND REPORTING

23.0 Monitoring Approach

The framework for monitoring of the ICCISP is still under review, it will include coverage of the indicators included in the ICCIP log frame (see annex 6) and consider progress in supporting climate-related decision making at local, sub-county and county levels across the plan period.

Those partnering in the implementation of the ICCISP will develop baselines (see table 1) on current access, relevance and use of existing climate information services. This will serve as a basis from which to track progress in efforts to strengthen CIS provision and support the development of a CIS communication plan which can work through established systems of trust, ongoing related activities of relevant ministries and NGO partners, and existing coverage of regional and local radio stations and mobile phone networks.

Monitoring of the delivery of commitments on the ICCISP will be done through stakeholder feedback meetings quarterly and will be conducted on a continuous basis with regular review and revision of the ICCISP as per implementation and monitoring indicate.

24.0 Evaluation Approach

Periodic assessment of activities/achievement will be necessary particularly in relation to realization of objectives and outcomes outlined in the plan. The CIS implementation will adopt a three stage evaluation structure to ensure that operational plans are geared towards targets set out in this plan. The evaluation plan is as follows:

Evaluation stage	Calendar
Inception	To be undertaken at beginning of the plan period
Seasonal Forecasts verification	To be conducted at the end of every season (3 every year)
Mid term	To be undertaken within the third year of the plan period
End term	To be undertaken at the end of the Fifth year

Table 5: Evaluation Stages of ICCISP

Where evaluation reports highlight deviations management is expected to undertake timely review to clarify what follow up and actions are required.

25.0 Reporting

The CMO will undertake regular post-seasonal reviews to assess progress and make the revisions required to develop accessible, timely decision-relevant CIS for Isiolo County. It is proposed that the County Meteorological Office will provide an annual report reviewing progress in implementing the ICCISP to KMD Head Office, County Chief Officer for Climate Change who will further circulate to other County Ministries and decentralized national authorities. This report will be taken to an existing County forum for discussion across key Ministries and ICCISP stakeholders.

ANNEXES

Annex 1: CIS implementation matrix

Strategic Objective 1	To Strengthen count	y level weather a	and climate servi	ces for buil	ding	comm	nunity	/ resil	ience	to climate (change
Strategy	Activity	Output	Indicator	Target for five years	or Time frame					Budget (Kshs. M)	Responsibility
					Yr1	Yr2	Yr3	Yr4	Yr5		
Establish county level weather and climate services infrastructure	Construct observatories; at Isiolo international Airport and Garba Tulla RANET station Acquire and Install instruments; Acquire and Install AWS at least 2 per Sub-County	Operational met station. Weather data	No. of Synoptic stations No. of AWS	2	0	0	1	1	0	103.00 30.33	Director & CDM Director & CDM
	Acquire and Install Automatic rain gauges at least 2 per ward Acquire and Install Manual Rain gauges at least 10 per ward	rainfall data Rainfall data	No. of Automatic rain gauges No. of Manual Rain gauges	20	2	4	4	6	4	6.00 3.60	CDM

Acquire and Install	Weather data	No. of Weather	1	0	0	0	0	1	2.50	Director & CDM
Weather radar receiver at		radars receiver								
the airport		terminals								
Acquire and Install	Pollution data	No. Of pollution	1	2	1	0	10	1	7.49	Director & CDM
pollution monitoring		monitoring								
equipment at Isiolo town		equipment								
Acquire and Install	Temperature data	No. of Thermal	6	1	2	2	1	0	4.20	Director & CDM
Thermal stations		station								
Acquire and Install	Hydrometeorologic	No. of stations								Director & CDM
automatic hydromet	al data		2	0	1	0	1	0	5.00	
station hydromet stations										
along Ewaso Nyiro River										
and Isiolo river										
Instrument Inspections	Calibrated	No. of	42	4	10	10	10	6		CDM
and calibration cost	Instruments	Instruments							10.39	
		Calibrated								
		No. of inspection	20		4	4				
		trips	20	4	4	4	4	4		
Acquire and Install	Satellite data	No. of Satellite	1	0	0	0	1	0	34.26	Director & CDM
Satellite ground receivers	received	Ground receiving								
		stations								

Data collection and	Acquire mobile data	data from	No. of Data								Director & CDM
exchange	collection tools (mobile	community	collection tools	100	20	20	20	20	20	0.60	
infrastructure	phones)	observers Collected									
	Acquire communication	Communication	No. of software								Director & CDM
	software (bulk SMS)	between Mobile		1	1	0	0	0	0	1.00	
		data collectors &									
		County AMSS									
		enabled									
	Acquire Data collection	data from	No. of Data	1	0	0	0	0	0	0.30	Director & CDM
	workstation (for adat	community	collection								
	exchange) to collect and	observers received	workstation								
	disseminate rainfall data										
	from CCMs										
	Acquire Video/ skype	Enable	No. of Video								Director & CDM
	Teleconferencing facilities	simultaneous	Tele-conferencing								
	for county offices	weather forecast	facilities	1	0	0	1	0	0	0.25	
	for county offices	conferencing and									
		update from all									
		regions of Kenva									
	Acquire rapid response	Rapid response to	No. of hotlines								Director & CDM
	telecom for county	warning of rapid		1	0	0	0	1	0	0.15	
	offices (hotlines)	moving hazards									
		(floods etc) before									
		they cause harm.									
Improve data	Acquire Forecast	Downscale global,	No. of Forecast	5	5	0	0	0	0	1.50	Director & CDM
processing and	Interpretation Tools	regional & national	Interpretation								
	(software)	scale forecasts to	Tools								
											1

product		county and									
development		community scale									
	Acquire Forecaster Work	Improved capacity	No. of Forecaster								Director & CDM
	Station to link with NMC	for rapid	Work Station	1	1	0	0	0	0	1.00	
	Forecastor work station	development of									
		county and									
		community scale									
		climate information									
	Acquire License d	Precision of	No. of								Director & CDM
	Geographical Information	positioning of	Geographical	1	0	0	0	0	0	0.50	
	Systems (GIS) software	county and	Information								
		community level	Systems (GIS)								
		information									
Increase uptake of	Develop Web pages	Enable online	No. of Web pages	1	1	0	0	0	0	0.01	Director & CDM
products and	hosted on KMS website	uptake of County									
services		level information									
	Develop Information	awareness creation	No. IEC materials	10	1	2	3	3	1	0.10	Director & CDM
	Education										
	Communication materials										
	Maintenain RANET FM	Disseminate widely	No. of Radio	1	1	0	0	0	0	10.00	CDM
	Radio stations	sector/livelihood									
		information									
	Instal public Display	reach public with	No. of Public	1	1	0	0	0	0	0.10	CDM
	systems at Isiolo town	climate information	Display systems								

	Acquire exhibition display	Effective outreach	No. of Exhibition								CDM
	systems (LCD Beamer)	and demonstration	display systems	1	1	0	0	0	0	4.0	
		of potentials in	(LCD Beamer)								
		climate information									
		(conference, video									
		teleconference,									
		boardrooms etc.)									
	Develop a link between	Feedback and feed	No. of e-	5	2	1	1	1	0	2.0	CDM
	CMO and key	forward between	platforms								
	stakeholders	CMO and users	developed								
	Acquire High speed	Access to data at	No. of High speed	1	1		0	0	0	0.75	Director & CDM
	Internet connection for	national, regional &	Internet	T	1				0	0.75	
	county offices	international	connection								
Establish county		centres									
Data management	Acquire information	Forward &	No. of	1	1	0	0	0	0	0.10	Director & CDM
infrastructure	telecommunication	feedback data	information								
	exchange system	between HQ and	telecommunicatio								
		counties	n exchange								
			system								
	Acquire and Install	Data processed and	No. of Database	1	1				0	1.00	Director & CDM
	Database management	archived	management	T		0		0	0	4.00	
	system at the base		system								
	station										
Total Budget in Ksh	s. M									233.13	

Annex 2: Levels of Decision Making

Level of decision making	Principal planning and sectorial bodies and frameworks which ICCISP seeks to support
County level	County Integrated Development Plan (Governor's Office)
	County Steering Group on Drought Emergency, (CSG)
	Ministry of Environment, Energy and Natural Resources
	Ministry of Agriculture, Water and Irrigation
	County Climate Adaptation Committee , (CAPC)
	Executive Finance Committee and Budget and Economic Forum
	County's Disaster Management Committee
	County Environment Committee
Ward level	Ward Adaptation Committees (WAPCs)
	Council of elders (Deedha)
	WRUA

Annex 3: Observations Inventory

No.	ID	Name	Begin date	Lat (°N)	Long(°E)	Alt (M) AMSL	Ward	Status	Remarks
1	8838000	Merti DC Office	1953	1.07	38.67	320	Cherab	Not	To be revived: Replace
								operational	missing instruments, recruit
									and train observers
2	8838004	Merti Shaba	1988	1.05	38.63	305	Cherab	Abandoned	closed
3	8838003	Merti Town	1988	1.07	38.67	305	Cherab	Abandoned	Closed
4	8938003	Bulesa Scheme	1973	0.9	38.50	366	Cherab	Abandoned	To be transferred to Bulesa
									dispensary
5	8938004	Kula Mawe	1973	0.58	38.20	732	Kinna	Not	To be revived: Replace
		Chief's Office						operational	missing instruments, recruit
									and train observers
6	8938000	Garba Tulla	1950	0.53	38.52	457	Garba	Not	To be revived: Replace
		police station					Tulla	operational	missing instruments, recruit
									and train observers
7	8938009	Benane boarding	1973	0.50	38.65	427	Garba	Not	To be revived: Replace
		Primary school					Tulla	operational	missing instruments, recruit
									and train observers

40

8	-	Sericho Police	-	0.73	39.17	259	Sericho	Has rainfall	To be registered , recruit and
		station						instrument but	train observers
								not operational	
9	8939000	Modo Gashe	1962	0.72	39.18	259	Sericho	Has rainfall	To be registered , recruit and
		Police station						instrument but	train observers
								not operational	
10	8839001	Sericho Chief's	1953	1.15	39.10	259	Sericho	Abandoned	To be transferred to Sericho
		House							AP Camp
11	8838001	Iresa Boru	1973	1.10	38.95	244	Sericho	Abandoned	To be revived: Replace
		Chief's office							missing instruments, recruit
									and train observers
12	8838002	Garfasa Irrigation	1987	1.02	38.62		Garba	Abandoned	To be transferred to Garfasa
		scheme					Tulla		dispensary
13	8938008	Malkadaka	1986	0.82	38.55	366	Garba	Abandoned	To be transferred to
		Irrigation scheme					Tulla		Malkadaka dispensary
14	8937113	Isiolo Police	1993	0.35	37.58	1097	Wabera	Not	To be revived: Replace
		Division						operational	missing instruments, recruit
		Headquarters							and train observers
15	8937035	Archers Post	1946	0.62	37.67	864	Ngare	Operational	To calibrate instruments
							Mara	but under	
								WARM	

41

16	8037003	Isiolo Agriculture	1930	0.35	37.58	1104	Wabera	Operational	Recruit and train more
		office							observers
17	8938001	Kinna agriculture	1969	0.32	38.20	701	Kinna	Operational	Recruit and train more
		office							observers
18	8937101	Isiolo L.M.D.	1980	0.37	37.55	1158	Burat	Abandoned	To be revived: Replace
		Headquarters							missing instruments, recruit
									and train observers
19	8937102	Kipsing Holding	1980	0.52	7.37	975	Oldo Nyiro	Abandoned	To be revived: Replace
		Ground							missing instruments, recruit
									and train observers
20	8937103	Longopito	1980	0.70	37.13	1150	Oldo Nyiro	Abandoned	To be transferred to
		Holding Ground							Longopito Primary School
21	8938005	Rapsu Scheme	1973	0.28	38.22	671	Kinna	Abandoned	To be revived: Replace
									missing instruments, recruit
									and train observers
22	8936101	Oldo Nyiro	1993	0.63	36.98	1524	Oldo Nyiro	Operational	Recruit more observers
		Police Station							
23	8937063	Samburu Lodge -	1963	0.58	37.55	914	Ngare	Abandoned	To be revived: Replace
		Isiolo					Mara		missing instruments, recruit
									and train observers

Annex 4: Automatic weather stations Inventory

No.	Name	Lat (°N)	Long(°E)	Status	Recommendation
1	Merti DC Office-KMD	1.07	38.67	Not operational	Maintenance
2	Garba Tulla police station	0.53	38.52	Not operational	Maintenance
3	Modo Gashe Police station	0.72	39.18	Not operational	Maintenance
4	Archers Post	0.62	37.67	Operational but not transmitting Data	Pay transmission charges to Safaricom Ltd.
5	Merti DC Office-ENNDA	1.07	38.67	Not registered by KMD	Register and Calibration by KMD
6	ENND HQ Isiolo	0.35	37.58	Not registered by KMD	Register and Calibration by KMD

Annex 5: Observation Network Development Plan

No.	ID	Name	Lat (°N)	Long(°E)	Alt (M) AMSL	Ward
1	8838000	Merti DC Office	1.07	38.67	320	Cherab
2	8938004	Kula Mawe Chief's Office	0.58	38.20	732	Kinna
3	8938000	Garba Tulla police station	0.53	38.52	457	Garba Tulla
4	8938009	Benane boarding Primary school	0.50	38.65	427	Garba Tulla
5	To be registered	Sericho Police station	0.73	39.17	259	Sericho
6	8939000	Modo Gashe Police station	0.72	39.18	259	Sericho
7	8838001	Iresa Boru Chief's office	1.10	38.95	244	Sericho
8	8937113	Isiolo Police Division Headquarters	0.35	37.58	1097	Wabera
9	8937035	Archers Post	0.62	37.67	864	Ngare Mara
10	8037003	Isiolo Agriculture office	0.35	37.58	1104	Wabera
11	8938001	Kinna agriculture office	0.32	38.20	701	Kinna
12	8937101	Isiolo L.M.D. Headquarters	0.37	37.55	1158	Burat
13	8937102	Kipsing Holding Ground	0.52	37.37	975	Oldo Nyiro
21	8938005	Rapsu Scheme	0.28	38.22	671	Kinna
14	8936101	Oldo Nyiro Police Station	0.63	36.98	1524	Oldo Nyiro
15	8937063	Samburu Lodge - Isiolo	0.58	37.55	914	Ngare Mara
16	Proposed	Gotu-Chief's Office	0.78	38.08	666	Ngare Mara

17	Proposed	Urura Borehole	1.55	38.78	282	Cherab
18	Proposed	Hurura Primary school	1.73	38.62	314	Cherab
19	Proposed	Dadacha Bassa Dispensary	1.30	38.96	256	Cherab
20	Proposed	Adhewarabesa Primary School	1.37	38.90	261	Cherab
21	Proposed	Malkagalla Dispensary	1.27	38.80	264	Cherab
22	Proposed	Korbesa Dispensary	1.21	38.79	276	Cherab
23	Proposed	Bulesa Dispensary	0.97	38.53	335	Chari
24	Proposed	Bisan Biliqo Dispensary	0.89	38.48	383	Chari
25	Proposed	Ngare Mara Primary School	0.51	37.65	940	Ngare Mara
26	Proposed	Kom D.O. office	1.08	38.04	621	Chari
27	Proposed	Kom KWS Camp	1.08	38.04	618	Chari
28	Proposed	Biliqo Bulesa Conservancy	1.09	38.09	585	Chari
29	Proposed	Eldera AP. Camp	0.60	38.84	363	Sericho
30	Proposed	Sericho AP's camp	1.13	39.11	229	Sericho
31	Proposed	Badana Dispensary	1.12	38.84	243	Sericho
32	Proposed	Garfasa Dispensary	0.94	38.59	323	Garba Tulla
33	Proposed	Malkadaka Dispensary	0.84	38.49	323	Garba Tulla
34	Proposed	Eskot Dispensary	0.13	38.50	367	Garba Tulla
35	Proposed	Tana Primary	0.68	38.41	540	Garba Tulla
36	Proposed	Iresa Buru Chiefs Office/Dispensary	1.08	38.84	270	Garba Tulla

37	Proposed	Boji Chief's office	0.57	38.34	625	Kinna
38	Proposed	Barambate AP Camp	0.73	38.27	578	Kinna
39	Proposed	Duse Primary School	0.40	38.35	595	Kinna
40	Proposed	Korbesa Primary School, Kinna	0.19	38.36	496	Kinna
41	Proposed	Samburu Simba lodge	0.60	37.62	864	Ngare Mara
42	Proposed	Sarova Shaba Game lodge	0.66	37.71	806	Ngare Mara
43	Proposed	Isiolo International Airport	0.34	37.59	1137	Wabera
44	Proposed	Burat West Chief's office	0.38	37.57	1070	Burat
45	Proposed	Waso Location Chief's office	0.33	37.56	1176	Bura Pesa
46	Proposed	Mulango AP Patrol Base	0.46	37.44	1099	Burat
47	Proposed	Nooloroi Primary School	0.56	37.34	980	Oldo Nyiro
48	Proposed	Parkuruk Primary School	0.57	37.00	1780	Oldo Nyiro
49	Proposed	Nantodu Chief's Office	0.73	37.07	1226	Oldo Nyiro
50	Proposed	Labarishereki Primary School	0.60	36.93	1634	Oldo Nyiro
51	Proposed	Longopito Primary School	0.70	37.16	1131	Oldo Nyiro
52	Proposed	Lenguruma Primary School	0.62	37.16	1183	Oldo Nyiro
53	Proposed	Mpuskutuk Conservancy	0.70	37.30	982	Oldo Nyiro

Annex 6: Isiolo County M & E Log frame for CIS Plan

Result	Indicators	How will this be measured	Time frame	Responsibility
IMPACT	Impact Indicator 1			
Increased use of weather and climate information and mainstreaming into development and sector policies, plans and programmes supports sustainable development in the County	Value of avoided losses per county due to use of climate information.	Qualitative and quantitative assessments	Over 5 years	CDM, CCCF structures, County Department in charge of climate change, other stakeholders.
	Number of people with improved resilience	Qualitative and quantitative assessments	Over 5 years	CDM, CCCF structures, County Department in charge of climate change, other stakeholders.
OUTCOME	1	1	1	1
Increased use of reliable, co-produced and accessible weather and climate services based on better	Number of projects and programmes where integration of climate services is adopted for development.	Review of projects and programmes	Annual	CDM, County Department in charge of climate change
data, information, knowledge and tools to inform national, sub- national and community level policy, planning and decision-making in the county	Number of organization's and institutions and government departments/ ministries/ institutions reporting 'improved' or 'considerably improved' use of weather and climate information to inform their decision making	Assessments of organization performance in relation to climate information services.	Annual	CDM, County Department in charge of climate change

OUTPUT 1	Number of households reporting the use of climate information/services to inform responses to climate extremes	Qualitative and quantitative assessments	Annual	CDM, CCCF structures, County Department in charge of climate change, other stakeholders.
Strengthened enabling environment for the generation, uptake and	Volume of government and donor funding targeting climate services plans	Assessment of funding flows from various sources	Annual	CDM
use of weather and climate services to support development.	Number of joint initiatives between Development Partners/Stakeholders and CMO-KMD that support an enabling environment for the delivery of weather and climate services	Assessments of stakeholder programs an joints CIS related programs	Annual	CDM
	Number of FORAS held by CMO- KMD to influence government decision makers on the use of weather and climate information	Assessment of KMD, CMo work plans	Annual	CDM
	Number of new interagency agreements to strengthen climate services (e.g. MoUs/service level agreements between CMO-KMD and line ministries, NGOs etc for co- production of products and services, long term investment planning and funding)	Assessment of KMD, CMo work plans	Annual	CDM
	Number of government policies and plans that have mainstreamed weather and climate services	Review of government policies and plans	Annual	CDM, County Department in charge of climate change, other stakeholders.

OUTPUT 2				
Innovative interdisciplinary	Number of research outputs directly	Qualitative and quantitative	Annual	CDM, CCCF structures,
research programme (a)	contributing to the development,	assessments		County Department in
supports the generation,	uptake or understanding of new			charge of climate change,
uptake and use of weather	climate services			other stakeholders.
and climate services and (b)	Number of CIS products produced and	Assessments of metrological	Annual	CDM, KMD
builds sustained intellectual	used	outputs		
leadership in climate science	No. of initiatives the leadership is	No. of county and sub-county	Annual	CDM, CCCF structures,
in the country/county	taking in uptake and use of CIS at local	climate change forums		County Department in
developed.	level	No. of forums held at grass		charge of climate change,
		roots that generate interest in		other stakeholders.
		CIS		
		New initiatives at the County		
OUTPUT 3				
Improved data at historical,	Functional met systems for production	Assess the functionality of	Annual	CDM, KMD
present and future	and dissemination of climate	the system at the county level		
timescales and better	information services and products			
production systems support				
the generation of improved	Number of new/improved	Assessments of technology	Annual	KMD, CDM
weather and climate	technology/hardware and related	hardware and related capacity		
information and services	capacity for production of climate	transfer from national to local		
	services at county level	level.		
	Number of improved observations	Assessments of observation	Annual	CDM
	network with long term plans for	network		
	operation and maintenance in place			
OUTPUT 4	1	1	1	
Strengthened national -sub-	Number of County Climate Outlook	Assessments of PSPs in the	Annual	CDM
national networks and	Forum (PSP) processes initiated and/or	county		
partnerships support	strengthened			

improved generation,	Number of partnership networks with	Assessment of County	Annual	CDM
uptake and use of climate	programmes to promote uptake and	Climate Change programmes		
information	use of weather and climate	and others supporting the		
	information	uptake of climate information		
	Number of private sector	Assess the level of use of	Annual	CDM
	organizations engaged in sensitization,	climate information services		
	processing and using climate services	across various sectors		
	at the county level			
OUTPUT 5	1	1	1	
Improved access to weather	No. of households, organizations,	Assessment of the level of	Annual	CDM
and climate information at	government department using climate	use across various actors		
sub-national and community	information for planning and decision			
levels through strengthened	making			
capacity of and integration	No of people responding to climate	Impact assessment of	Annual	CDM
between CMOs,	information messages	climate information		
collaborators and users that				
promotes improved service	No of people participating in climate	Assessment of climate	Annual	CDM
development and delivery	information dissemination events	information events		
	% increase number of institution	Assessment of climate	Annual	CDM
	disseminating weather information	information dissemination		
		efforts		
OUTPUT 6:	1			
Evidence and learning on	No of community bases investments	Assessments of community	Annual	KMD, CDM, CCCF
the effectiveness and use of	guided by climate information	based projects		structures, County
climate and weather				departments
information services is	Number of research/knowledge		Annual	KMD, CDM, CCCF
generated and used to	products on the effectiveness, of			structures, County
inform policy				departments

climate and weather information services.			
Number of project evaluations and impact assessments generating evidence and learning on climate information	Evacuation assessments	Annual	KMD, CDM, CCCF structures, County departments

DISCLAIMER



This research is funded by UK Aid from the UK Government. However, the views expressed do not necessarily reflect the views of the UK Government.



