



CLIMATE CHANGE MAINSTREAMING GUIDELINES

AGRICULTURE, LIVESTOCK AND FISHERIES SECTOR





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FOREWORD



Green Africa Foundation was founded in Kenya in the year 2000 with a focus of implementing practical community driven projects towards greening Africa. The organization has actively been implementing a number of projects covering; Climate Change, Policy Advocacy, Environmental Conservation, Agriculture, Water and Energy. The organization has been very instrumental in policy advocacy that has seen through a number of policies coming to fruition both at the county and the national level and with agenda of mainstreaming climate change at the county level taking precedence.

The project that enabled the formulation of these guidelines was a DFID StARCK+ Extension Programme, funded through the Act Change Transform (Act! - NRM component) and implemented by Green Africa Foundation. The project's overall goal was to consolidate prior efforts towards completion of climate change legislation and cross sectoral coordination for enhanced climate change mainstreaming. The objective was to support selected counties, namely Garissa, Marsabit and Wajir to move forward with completion of their climate change legislations and also develop the sectoral climate change mainstreaming guidelines for priority sectors with a view to help give input to the review process of counties CIDPs 2018-2022. This objective was achieved through a programmatic approach and in partnership between Green Africa Foundation and the county governments of Garissa, Marsabit and Wajir, as well as other stakeholders including national government agencies, the private sector and Civil Society Organizations.

These guidelines are intended to assist the County Government of Garissa to attain climate change mainstreaming in the water and sanitation sector by providing a framework for integrating climate change responses for the sector into county planning processes, especially the 2017 - 2022 CIDP, as well as other processes such as performance contracting and budget making.

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Hon. CEC Environment and Natural Resource Garissa County Government

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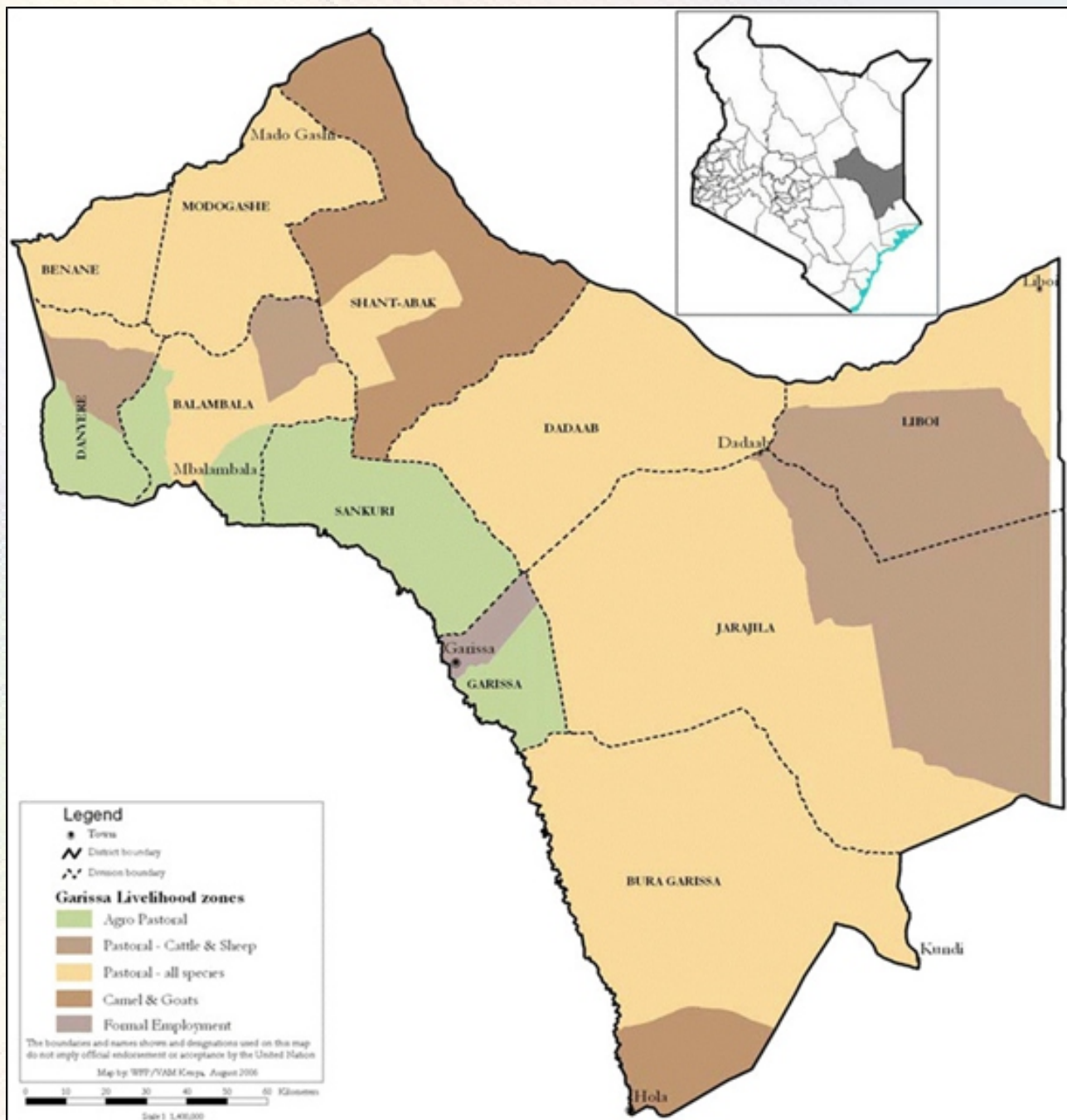
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1.0 GARISSA COUNTY BACKGROUND INFORMATION

1.1 Location and Administrative Units

Garissa County is one of the three counties in the North Eastern region of Kenya. It covers an area of 44,174.1 Km² and lies between latitude 10 58'N and 20 1' S and longitude 380 34'E and 410 32'E. The county borders the Republic of Somalia to the east, Lamu County to the south, Tana River County to the west, Isiolo County to the North West and Wajir County to the north. Garissa County has six sub-counties namely: Fafi, Garissa Township, Ijara, Lagdera, Balambala and Dadaab.



Map of Garissa County

1.2 Climate and Topography

Garissa County is generally characterized by high temperatures throughout the year and range from 20°C to 38°C with the average temperature being 36°C. The hottest months are September, January, February and March, while the months of April to August are relatively cooler. The humidity averages 60g/m³ in the morning and 55 g/m³ in the afternoon. Garissa County is principally a semi-arid area and receives an average rainfall of 275 mm per year. There are two rainy seasons, the long rains from October to December and the short rains from March to May. The dry season is usually marked with a general migration of livestock from the hinterland to areas near River Tana where water is readily available. However, some pastoralists move with their livestock to adjacent counties of Tana River and Lamu in search of pasture.

The County is basically flat and low lying with few hills and rocks, valleys and mountains and rises from a low altitude of 20m to 400m above sea level. The major physical features are the seasonal laghas water ways and the Tana River Basin on the western side.

1.3 Population

According to the Kenya 2009 Population and Housing Census, Garissa County was projected to have a total population of 849,457 in 2017. The average population density is 16 persons per km² in the county with Garissa Township Constituency having the highest population density of 194 persons per square kilometer. The county is sparsely populated with majority of the population being concentrated in areas with infrastructural facilities such as Garissa Township.

1.4 Economic Activities

The main income generating activities practiced in the county includes small scale irrigation crop farming, livestock keeping, fish farming, mining, tourism, and trading. Livestock rearing is the backbone of the county's economy. The main livestock bred are cattle (Boran), goats (Galla), sheep (black headed Persian) and camel (dromedary one humped). The main livestock products are meat, milk, hides and skins. The main crops grown are: watermelons, mangoes, vegetables, tomatoes, paw paws, bananas, cow peas, simsim, maize, beans and green grams.

1.5 Forest Cover and Wildlife

Garissa County has two non-gazetted indigenous forests, namely Boni and Woodlands, most of which are woody trees and shrubs which are mainly browsed by camels and goats and to some extent by grazers like cattle and sheep. The county has 40 Community Forest Associations (CFAs) which are currently inactive. The main wild animal types found in the county are: Elephants, Lions, Cheetahs, Leopards, Hippopotamus, Crocodiles, Grants Gazelles, Thompson Gazelle, Gerenuk, servocat Jackals, Spotted Hyena, Buffalos, Grey Zebras, Topi, Reticulated

Giraffes, white Giraffes, Dik-dik, Hirolas, Wild dogs, Warthogs, Monkeys, birds, butterflies and Baboons which move freely since they are not confined to parks.

1.6 Water and Sanitation Situation

The main sources of water in Garissa County are River Tana, shallow wells, boreholes, water pans and one dam with the main supplier of treated water being Garissa Water and Sewerage Company (GAWASCO). The other water supply schemes are managed by Water Resources Users Associations (WRUAs) along River Tana. The county is generally water scarce with acute water shortages experienced during the dry season.

Garissa County is water scarce with only 23.8 per cent of the population having access to safe water. Access to piped water is limited to the sub-county headquarters where approximately 27,725 households have connection. The main sources of water in the county is River Tana, springs and boreholes, seasonal laghas and the average distance to the nearest water point is 25Km. In Garissa County only 49.37 per cent of the population use pit latrines while 50.63 per cent of the population uses other means of sanitation such as open defecation in bushes. This has often led to spread of diseases such as cholera. A smaller percentage of the population is connected to sewer and septic tanks.

1.7 Waste Management

The most prevalent method of waste disposal among the residents is through open surface dumping at 59.9% followed by open burning at 25.1% and burying at 15%. This implies that there is no proper management and available legislation/laws in place in the county.

1.8 Energy Situation

About 78.8 per cent of the county's population use firewood as a source of energy for cooking purposes while 18.2 per cent of the population uses charcoal. Electricity is only available in Garissa, Ijara, Dadaab, Bura East and Modogashe, and their environs with only 0.7 per cent of the population having access to electricity. In Hulugho, plans are under way to install two generators to supply power. The Ministry of Energy and department of environment and natural resource, Garissa County has also installed solar power systems in institutions such as health facilities, schools and watering points. The use of renewable sources of energy such as biogas, wind and solar remain low in the county and the potential is extremely high.

2.0 MAINTREAMING CLIMATE CHANGE IN THE AGRICULTURE SECTOR IN GARISSA COUNTY

2.1 Introduction

Like other counties in Kenya, Garissa County's economy is highly dependent on the natural resource base, and thus is highly vulnerable to climate variability and change. Rising temperatures and changing rainfall patterns, resulting in increased frequency and intensity of extreme weather events such as droughts and flooding, threaten the sustainability of the county's development.

Key economic sectors in Garissa County are particularly susceptible to climate change impacts and this threatens to undermine the county's recent and impressive development gains. It is therefore important that the county builds and enhances its climate resilience and adaptive capacity. Building climate resilience requires that Garissa County's systems of governance, ecosystems and society have capability to maintain competent function in the face of climate change. This would aid a return to some normal range of function even when faced with adverse impacts of climate change. Adaptive capacity is key to improving socio-economic characteristics of communities and households as it includes adjustments in behaviour, resources and technologies, and is a necessary condition for design and implementation of effective adaptation strategies. The sustainable development of Garissa County therefore significantly depends on the design and implementation of mechanisms that trigger and enhance climate change resilience and adaptive capacity.

Climate change mainstreaming in the various sectors is necessary to equip various coordinating departments in the county government with the tools to effectively respond to the complex challenges of climate change. In this context, mainstreaming implies the integration of climate change policy responses and actions into county sectoral planning and management processes. This requires explicitly linking climate change actions to core planning processes through cross-sectoral policy integration. This integration operates by providing an overarching guidance system that requires all sectors of the government to implement climate change responses in their core functions. Mainstreaming is a process that encourages cooperation across government departments in planning for a longer-term period; rather than fragmented, short-term and reactive budgeting. County governments are required by law to prepare and implement County Integrated Development Plans (CIDPs), through which climate change actions can be mainstreamed. These guidelines are intended to assist the County Government of Garissa to attain this climate change mainstreaming in the agriculture sector by providing a framework for integrating climate change responses for the agriculture sector into county planning processes, especially the CIDP, as well as other

processes such as performance contracting and the budget making process.

2.2 Rationale for Climate Change Mainstreaming in the Agriculture Sector

The agriculture sector, including crops, livestock and fisheries, is a priority in Kenya's Vision 2030 because it plays a critical role in improving livelihoods, enhancing food security and increasing GDP and employment. Vision 2030 aims to achieve an innovative, commercially oriented, modern agricultural sector through institutional reforms, increased productivity, land-use transformation, increased access to markets and development of arid and semi-arid lands (ASALs).

The Agricultural Sector Development Strategy 2010-2020 sets out a detailed plan to position the agricultural sector as a key driver for delivering the 10 per cent annual economic growth rate envisaged under the economic pillar of Vision 2030. The vision of the document is “a food secure and prosperous nation” and the strategy aims to increase productivity, commercialization and competitiveness of agricultural commodities and enterprises; and develop and manage key factors of production. Also important is the government's goal of 10 per cent farm forest cover on all agricultural land holding.

The agriculture sector, including crop production, livestock, and fisheries, is one of the economic sectors in Garissa County that is most vulnerable to climate change. Over 80 per cent of the population are dependent on rain-fed subsistence crop production and pastoralism, and are therefore significantly impacted by declining agricultural production due to unpredictable rainfall, reduced soil productivity through erosion and increased evapotranspiration. Besides crop production, Garissa's livestock production relies heavily on natural systems such as rain fed pasture. These livestock systems are very climate sensitive, being vulnerable to the impacts of changing and irregular rainfall patterns and droughts. Greater drought frequency increases livestock morbidity and mortality because of reduced availability of forage, increased disease incidences and a breakdown of marketing infrastructure.

3.0 RISKS AND IMPACTS OF CLIMATE CHANGE IN THE AGRICULTURE SECTOR

3.1 Crop Production Sub-Sector

The major climate change-related challenges in the crops sub-sector include changes in enterprise suitability for specific areas, leading to decrease in profitability; unpredictable timing of farming operations due to seasonal weather variability and reliability, leading to lower production efficiency; losses due to yield reductions, total crop failures, enhanced postharvest losses and increased production costs arising from extreme weather events or reduced land productivity.

Climate change has led to more frequent and intense extreme weather events such as drought, floods, strong winds, hailstorms, and frosts. Droughts lead to loss of investments in crop production due to reduced yields or total crop failure as a result of water stress, inhibiting plant nutrient abstraction from the soil and the vital physiological processes of the plant. Floods lead to anaerobic soil conditions, hindering the ability of the roots to aerobically respire and abstract nutrients from the soil. This results in plant stresses that reduces yields or causes total crop failure. Strong winds lead to breakage, lodging or physical injury of the crop, accelerated evapotranspiration that lead to crop stress and yield reduction. Hailstorms cause physical crop damage, reducing the photosynthetic leaf area and predisposing the plant to disease infections. Drought, floods and strong winds also lead to the destruction of infrastructure such as the silting of dams, clogging and breaking of irrigation and drainage infrastructure; destruction of farm buildings and roads; drying, storage and marketing facilities, as well as agro-based industries. Wet conditions during harvest of cereals lead to enhanced postharvest losses due to rotting and aflatoxin contamination. Strong winds, landslides and dust storms also contribute to the reduction of soil fertility through erosion and translocation of the fertile top soils.

3.2 Livestock Sub-Sector

Climate change is having substantial effects on ecosystems and the natural resources upon which the livestock sub-sector depends. Climate change has led to declining livestock production due to direct and indirect impacts to both livestock and their production systems. In grazing systems, the direct impacts include increased frequency of extreme weather events; increased frequency and magnitude of droughts and floods; productivity losses due to physiological stress occasioned by temperature increase; and change in water availability. The indirect impacts stem from agro-ecological changes and ecosystem shifts that lead to alteration in fodder quality and quantity; change in host-pathogen interaction resulting in increased incidences of emerging diseases; and disease epidemics. In non-grazing systems, the direct impacts include change in water availability and increased frequency of extreme weather events while the indirect impacts include increased resource prices (e.g. feed, water and energy), disease epidemics and increased cost of animal housing (e.g. cooling systems).

Extreme weather events, especially droughts and floods lead to reduced pasture and forage availability, degradation of the environment and an increase in destitution. Strong winds and dust storms also contribute to the reduction of forage availability as they erode top soil, thus making grass regeneration difficult even when it rains. Recurring droughts have caused heavy losses to livestock, forcing an estimated 30% of livestock owners out of pastoralism in the past 20 years. According to the World Bank, estimated livestock mortality as a result of

drought is about 10–15% above normal in the affected areas, which is equivalent to 5% of Kenya's livestock population. Between 2008 and 2011, drought caused losses in livestock that amounted to about KSh. 700 billion. Extended periods of drought erode livelihood opportunities and community resilience and leads to undesirable coping strategies that damage the environment and impair household nutritional status, further undermining long-term food security.

3.3 Fisheries Sub-sector

Extreme weather events such as heavy tropical storms and drought incidences that are projected with the changing climate affect fisheries and aquaculture through acidification of the water bodies, changes in sea temperatures, circulation patterns and associated ecological changes. These changes have the potential of altering the physico-chemical properties of the fish habitats. Consequently, fish feeding, migration and breeding behavior will be directly affected while indirectly the changes will affect growth, mortality and reproduction. The changes manifest in the fish through increased metabolism that culminates in smaller body size and a smaller brood, sex determination that favors the prevalence of females over males, expansion and/or contraction of suitable habitats. The changes also leads to shifts in the distribution of fish stocks due to alteration or reduction of feeding grounds, reduction in breeding grounds, and changes in migratory circuits that connect life stages, thereby affecting successful completion of the life cycle and successful recruitment, a factor that will translate into reduced earnings for the fisher folk.

4.0 STRATEGIES AND GUIDELINES FOR MAINSTREAMING CLIMATE CHANGE IN THE AGRICULTURE SECTOR IN WAJIR COUNTY

STRATEGIC ISSUE 1: VULNERABILITIES DUE TO CHANGES IN TEMPERATURE REGIMES AND PRECIPITATION PATTERNS.			
Strategic Goal: Enhanced adaptive capacity and resilience of farmers and pastoralists to the adverse impacts of climate change			
Strategic Objective: Institute measures to reduce the vulnerabilities of farmers and pastoralists to changing temperature regimes and precipitation patterns.			
Mainstreaming Strategies and Guidelines		Timeline	Responsible
I	The County Government will invest in systems for provision of accurate, timely and reliable climate/weather information to inform decisions of actors in crops, livestock value chains. This will involve collaboration with national government agencies such as the Kenya Meteorological Department and National Drought management Authority for the establishment, improvement, modernization and maintenance of weather infrastructure; integration of scientific and indigenous knowledge and technical skills and capacity building on weather data analysis, packaging, dissemination and use of early warning weather information.	By 2020	Departments of Environment, Agriculture, Livestock
II	The County Government will promote and facilitate the adoption of crop varieties, livestock breeds and agro-forestry tree species that are adapted to varied weather conditions and tolerant to associated emerging pests and diseases. This will involve breeding and promoting the use of crop and forage varieties, livestock breeds and agro-forestry tree species that are tolerant to flooding, drought, strong winds, hailstorms, heat waves, frost and emerging pests and diseases.	Continuous	Departments of Environment, Agriculture, Livestock
III	The County Government will invest in the development of appropriate low-cost technology, taking into account indigenous knowledge along crops, livestock and agro-forestry value chains. This will entail participatory research that includes crops and forage varieties, livestock breeds and agro-forestry tree species that are able to withstand weather variations; facilitating the adoption of	Continuous	Departments of Environment, Agriculture, Livestock

	crop varieties, livestock breeds and agro-forestry tree species; providing efficient extension and advisory services, and improving the capacity of communities to use new or existing technologies.		
IV	The County Government will promote diversification of enterprises and alternative livelihoods. This will include incorporation of integrated farming, pastoral and agro-pastoral production systems based on agro-ecological zones and priorities, agro-forestry and non-agricultural enterprises such as bee keeping, aquaculture, cottage industries for gum and resin, tree nurseries and demonstration centres.	Continuous	Departments of Environment, Agriculture, Livestock, Trade, Industry
V	The County Government will invest in enhancement of productivity and profitability of agricultural enterprises. This will entail promotion of use of improved technologies such as water harvesting/conservation structures, use of manure, conservation agriculture, integrated pest management and post-harvest approaches such as improved storage and investments in distribution networks for agricultural and livestock products and market access.	Continuous	Departments of Environment, Agriculture, Livestock, Trade, Industry

STRATEGIC ISSUE 2: VULNERABILITIES DUE TO EXTREME WEATHER EVENTS

Strategic Goal: Reduced vulnerabilities of farmers and pastoralists to extreme weather events.

Strategic Objective: Institute measures to reduce the vulnerabilities of farmers and pastoralists to extreme weather events.

Mainstreaming Strategies and Guidelines		Timeline	Responsible
I	The County Government will develop and implement systems for early warning and response, and ensure preparedness for extreme weather events. This will involve collaboration with the relevant National Government agencies in developing effective early warning systems, producing and disseminating of downscaled weather information on extreme weather events, and the preparation of contingency plans to end drought and flood emergencies.	Continuous	Departments of Environment, Agriculture, Livestock, Disaster Risk Reduction

II	The County Government will invest in the development and use index-based multi-peril agricultural insurance. This will involve collaboration with private insurance companies in the identification and development of diverse agricultural insurance products, capacity enhancement among actors to support insurance product availability, and the sensitization of product users along the value chains to take up agricultural insurance as a means of risk transfer.	By 2020	Departments of Environment, Agriculture, Livestock, Trade

STRATEGIC ISSUE 3: VULNERABILITIES DUE TO UNSUSTAINABLE NATURAL RESOURCE MANAGEMENT

Strategic Goal: Enhanced resilience of agriculture systems to climate change impacts through sustainable natural resource management.

Strategic Objective: Mainstream sustainable natural resource management into production systems to enhance resilience of the farmers, pastoralists and fisher-folk.

Mainstreaming Strategies and Guidelines		Timeline	Responsible
I	The County Government will establish baselines and undertake inventory of the existing natural resources. This will entail reviewing and collating information on existing natural resources and their distribution; undertaking inventory and mapping of natural resources; and developing and maintenance of database for natural resources at County and Sub-County levels.	By 2019	Departments of Environment, Agriculture, Livestock, Forest, Wildlife, Water
II	The County Government will promote sustainable management and utilization of natural resources. This will involve the development of a framework for sustainable natural resource management. This includes integrated soil health management to include soil testing and nutrient management, soil and water conservation, conservation agriculture; restoration of degraded soils and conservation of soil biodiversity; protection of riparian reserves, wildlife corridors and stock routes; and management of invasive species in cropping and grazing systems (e.g. Prosopis Juliflora).	Continuous	Departments of Environment, Agriculture, Livestock, Forest, Wildlife, Water

III	<p>The County Government will invest in climate smart water harvesting and storage, irrigation infrastructure development and efficient water use. This will entail incorporation of components that enhance resilience such as drip irrigation of crops, non-water intensive aquaculture, non-wasteful livestock watering, agroforestry for soil water conservation, development of water harvesting and storage structures, development of appropriate irrigation infrastructure and technologies including use of clean energy such as wind and solar for pumping irrigation water; and promotion of effective and efficient agricultural water use, including waste water management.</p>		<p>Departments of Environment, Agriculture, Livestock, Forest, Wildlife, Water</p>
IV	<p>The County Government will promote and support conservation and propagation of germplasm of species with adaptive capacity. This will involve the establishment of in-situ and ex-situ genetic resources conservation areas/centres, the identification of species of livestock, crop and agro-forestry tree species that are adaptive and tolerant to adverse weather conditions, breeding, multiplication and field trials and demonstrations.</p>		<p>Departments of Environment, Agriculture, Livestock, Forest, Wildlife, Water</p>
V	<p>The County Government will invest in research, technology development and dissemination for sustainable natural resource management. This will entail participatory and collaborative research towards development of suitable sustainable natural resource management technologies and innovations as well as technology packaging and transfer to end users e.g. farmer's field schools, exhibitions, demonstrations, exchange visits, ICT, and electronic and print media.</p>		<p>Departments of Environment, Agriculture</p>
VI	<p>The County Government will establish and implement mechanisms for resolving natural resource use conflicts. This will entail the development of mechanisms for identification</p>		<p>Departments of Environment, Agriculture, Livestock, Forest, Wildlife, Water</p>

	of potential natural resource conflict hotspots; the profiling of the natural resource conflict hotspots; and the development of mechanisms for conflict resolution, taking into account traditional conflict resolution mechanisms.		
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