Kenya County Climate Risk Profile Annex: Garissa County

Annex 1

Major Value Chain Commodities in Garissa

The table below describes the quantity and value of production for some of the most important crops and livestock commodities in Garissa County.

Table 1. Quantity and value of production of livestock and crop products in Garissa County

Livestock and livestock products		
Commodity	**Quantity** (units)	**Value** (KSh)
Milk	61.3 million (liters)	1,830,000,000
Beef	711,200 (kg)	290,000,000
Honey	191,526 (kg)	60,000,000
Mutton	680,000 (kg)	160,000,000
Egg	2,633 (trays)	7,000,000
Poultry Meat	37,418 (kg)	3,900,000
Fish Harvest	14,413 (kg)	700,000
Total		**2,351,600,000**
Crops		
Commodity	**Quantity** (units)	**Value** (KSh)
Sorghum	218	500,000
Maize	2,055	50,000,000
Cowpeas	1,101	4,000,000
Total		**54,500,000**

Source: GoK (2014)

Annex 2

Crop productivity by gender

Differences can be observed between the productivity of the prioritized value chains bsed upon both the gender and age of the head of the household, as well as the growing season in consideration. These differences are captured in the table below.

Table 2. Productivity of main fruits and vegetables

Crops	Area (acres)	Productivity Indicator (by Head of Household)						
		Farmers growing crop (%)			Productivity (kg/acre)			
		Male	Female	Youth	Male	Female	Youth	Total
Tomatoes	0.4	21.1	0.0	10.5	885.1	195.3	1024	739.6
Watermelon	0.3	10.5	0.0	0.0	2607.4	62.0	-	2098.3
Bananas	0.4	15.0	2.5	5.0	46.3	100.0	27.1	48.0
Guava	0.4	5.0	0.0	5.0	850.0	-	1000.0	925.0
Mangoes	0.5	30.0	2.5	10.0	3521.4	642.9	5191.7	3745.1
Oranges	0.4	7.5	0.0	2.5	900.0	-	333.3	758.3
Pawpaw	0.2	2.5	2.5	0.0	11.1	5.3	-	8.2

Source: GoK (2014)

Annex 3

Climate analysis

For the current study, past trends and future projections of precipitation- and temperature-related hazards such as flooding events (including flash floods) and drought during the growing season were analysed. The growing season was defined as follows: the first season (Season 1) is the 100-day wettest period during the months of January to June, while the second season (Season 2) is the 100-day wettest period during the months of July-December. In the case of floods, the focus was on heavy precipitation events during the first and second season, defined as the 95th percentile of daily precipitation. For each pixel, the 95th percentile of daily precipitation distribution consisting of 100 wettest days per season per year was calculated. Then we identified the 95th extreme percentile value which was plotted in time series[1]. Fluctuations in heavy precipitation events can have important consequences on water availability for agriculture, by impacting drought and flood events.

To assess the degree of adequacy of rainfall and soil moisture to meet the potential water requirements for agriculture, the focus was on drought stress, represented by the maximum number of consecutive days in each season where the ratio of actual to potential evapotranspiration (ETa/ETp) is below 0.5. This was calculated for each pixel per season per year[2] by evaluating the soil's water-holding capacity and evapotranspiration in order to define the number of days that could undergo a level of stress.

Two Representative Concentration Pathways (RCPs) were used, also known as the four greenhouse gas concentration (not emissions) trajectories adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. The two RCPs, RCP2.6 and RCP8.5, are named after a possible range of radiative forcing values in the year 2100 relative to pre-industrial values (+2.6 and +8.5 W/m^2, respectively). The pathways are used for climate modelling and research. They describe two possible climate futures, considered possible depending on how much greenhouse gases are emitted in the years to come. RCP 2.6 assumes that global annual GHG emissions (measured in CO_2-equivalents) peak between 2010 and 2020, with emissions declining substantially thereafter. In RCP 8.5, emissions continue to rise throughout the 21st century.

[1] In this case, we only used precipitation as input file.
[2] In this case, as input files we used maximum temperature, minimum temperature, precipitation, solar radiation, and water capacity of soil.

Annex 4

Adaptation options in Garissa, as identified in the ASDSP

Various adaptation strategies were identified by stakeholders and residents of Garissa County in the Government of Kenya's "Agricultural Sector Development Support Programme (ASDSP)" of 2014. The table below compiles these results and disaggregates them by percentage of the population using each practice, as well as percentage based on the gender and age of the head of the household.

Table 3: Adaptation strategies as defined in the ASDSP

Adapt-ation Strategy	Adoption Rate (% by Head of Household)				Value Chain	Value Chain Link	Description of Intervention			
	M	F	Y	All			Technical	Inputs	Expected Result	Possible Challenges
Water harvesting	50	38	45	47	Crops, livestock	Production	Construction of water pans/dams	Tanks, excavation equipment, skilled labour	Increased productivity, sustainable production	Lack of funds, technology, prolonged drought, conflict between water users
Soil/ water conservation	27	21	20	24	Crops	Production	Crop rotation, dams, mulching, manure, tree planting	Seeds, tree seedlings	Increased productivity	Shortage of extension staff
Irrigation	21	28	10	19	Crops	Production	Establishment of farm plots & irrigation system (e.g. canals)	Pumps, canals, tanks	Diversified income source and food	Flooding, high cost of irrigation infrastructure, river change course, resource access
Tree planting	16	28	23	19	Crops, livestock	Production	Establishment of tree nurseries	Seeds/seedlings	Increase food production, feed availability	Shortage of seedlings, land tenure
Change of crop type	11	14	13	12	Crops	Production	Planting new crops	Seeds, fertilizers, chemicals, draught power	Improve resilience	Extension services, high cost of inputs (e.g. seeds)
Alternative employment	9	7	3	6	Crops, livestock	Across value chain	Travel to urban areas or other farm areas	Education and skills	Improved HH income	Low literacy level
Value addition	7	7	3	6	Crops, livestock	Post-harvest	Milk fermentation, packaging of produce	Fermenting containers, Processing plants, Packaging materials (e.g. sacks, transporters)	High income,	Lack of processing plants, poor road network, lack of electricity
Change of livestock type	6	3	5	5	Livestoc k	Production	Buying of new stock (e.g. replacing cattle with camels)	Stock (e.g. camel, goats), Improved breeding stock, facilities	Disease tolerant breeds, improved income	Technology (artificial Insemination), extension services
Diversify enterprise	4	10	3	5	Crops, livestock	Production, post-harvest	Crop farming enterprise	Seeds, equipment/tools, irrigation,	Improved HH income and food	Market for irrigated crops

								chemicals, storage facilities		
Food storage facilities	3	7	5	4	Crops, livestock	Post-harvest	Construction of storage facilities	Storage facilities, pesticides	Good quality produce	Lack of storage facilities, high cost of pesticides
Conserve/ diversify feed	3	0	5	3	Livestoc k	Production	Drying of feed, buying hay	Seeds, storage facilities, harvesting equipment e.g. baler	Reduced animal movement, sustained quality of livestock	Pests, overgrazing
Staggered cropping	2	3	5	3	Crops	Production	Planting different plots at different periods	Seeds, fertilizer, chemicals,	Continuous production hence income	Pest & diseases

Source: GoK (2014) and author compilation