Kenya County Climate Risk Profile Annex: Tana River County

Annex 1

Administrative division of Tana River County

Tana River County is subdivided into three sub-counties namely Bura, Galole and Tana Delta. Tana Delta is the largest of the three, with a land area of 16, 013 km^2 (GoK, 2013a). The county has three constituencies: Bura, Galole, and Garsen, and 15 electoral wards (GoK, 2014a). Figure 1 is a map of Tana River County, showing constituencies, the River Tana, and the agro-ecological zones.

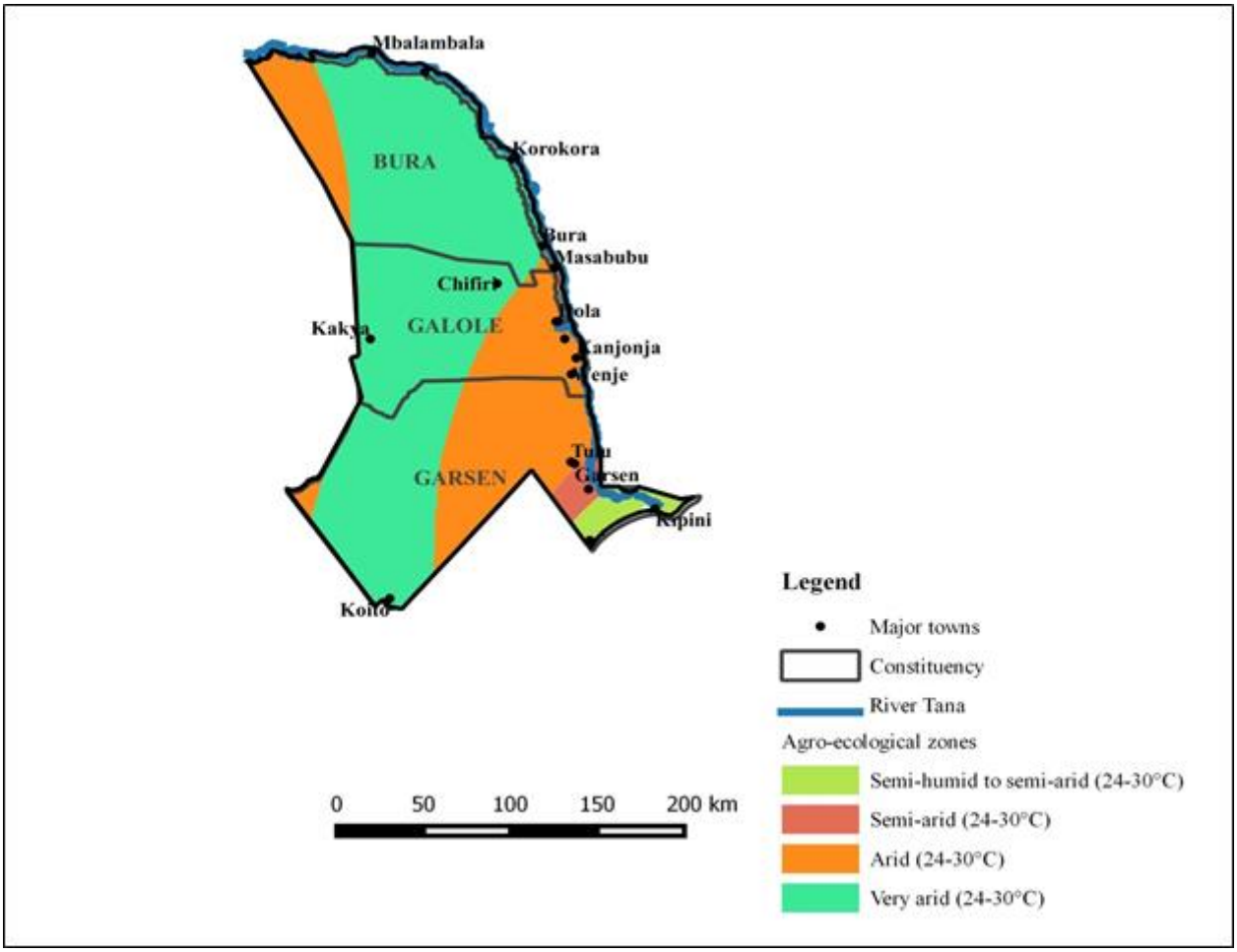

Figure 1: Tana River County Map

Annex 2

Selection of Value Chain Commodities in Tana River

For the development of this County Climate Risk Profile, four major value chain commodities (VCCs) were selected for in-depth analysis, based on their contribution to food security, productivity characteristics and importance to the economy. These VCCs, validated by local stakeholders, have been selected from a list compiled from the above-mentioned documents, using the following prioritization indicators: harvested area (hectares), production (90 kg bags), variation in production (in the past five years), value of production (US$/bag), dietary energy consumption (Kcal/ capita/ day), protein content (g of protein/ 100 g of product), iron content (mg of iron / 100 g of product), zinc content (mg of zinc / 100 g of product), and Vitamin A content (IU Vitamin A / 100 g of product). The VCCs selected are: maize, mango, green gram and goat meat.

Table 1 : Value Chain selection indicators

Indicator	**Value Chain Commodity**			
	Maize	Mango	Green gram	Goat meat
Harvested Area (Ha)	6,224	1,148	1,340	N/A
Production (90 Kg bags)	130,240	189,222	13,400	4,252
Variation in production	N/D	N/D	N/D	N/D
Value of production (US$) *	4,124,266	2,436,666	1,072,000	N/D
Dietary energy consumption (Kcal/ capita/ day)	361	60	347	109
Protein content (gr of protein/100 gr)	6.93	0.82	23.86	20.6
Vitamin A content (IU Vitamin A/100 gr)	214	1082	114	0
* A dollar was an equivalent of 90 Kenyan Shillings; ** In the case of goat meat, production was converted to 90 Kg Unit.				

Sources: County Crops Department, 2015 and USDA

Annex 3

Crop productivity by Head of Household

Differences can be observed between the productivity of the prioritized value chains based 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 Crop productivity (kg/acre) by gender

	Average total productivity		**Male-headed households**		**Women-headed households**		**Youth-headed households**	
	Season 1 (2012-2013)	Season 2 (2013)	Season 1 (2012-2013)	Season 2 (2013)	Season 1 (2012-2013)	Season 2 (2013)	Season 1 (2012-2013)	Season 2 (2013)
Maize	377	392	360	371	417	417	414	515
Green Grams	143	149	199	156	No data	No data	192	90
Mango	2,967	No data	4,139	No data	375	No data	1,625	No data

Source: GoK (2014a)

Annex 4

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. A 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 95 extreme percentile value, which was plotted in time series. 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 by evaluating soil's water capacity and evapotranspiration in order to define the number of days that could undergo a level of stress.

Two Representative Concentration Pathways (RCPs), also known as the four greenhouse gas concentration (not emissions) trajectories adopted by the IPCC for its fifth Assessment Report (AR5) in 2014 were used. 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.

Annex 5

Adaptation options in Tana River, as identified in the ASDSP

Various adaptation strategies were identified by stakeholders and residents of Tana River 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

Adaptation strategy	% Adoption, by Head of Household				Value Chains	Value Chain Activity	Inputs	Results	Challenges
	M	F	Y	Total					
Tree planting/ Agroforestry	10	11	0.0	7.6	All	Production	Seedlings	-Still low tree cover	Water scarcity
Soil-water conservation (e.g. cover crops, inter-cropping)	7.2	22	3.7	7.6	Maize Mango Green Gram	Production	Mango Seedlings	-Good water holding capacity - change in crop mixes -increased yields	Water scarcity; poor soils; insecure land tenure
Improved crop varieties (e.g. early maturing)	4.3	0.0	26	9.5	Maize Mango Green Gram	Production	Hybrid Seeds Pesticides Fertilisers	-Increased yields -reduced use of inputs	Low technology adoption
Water harvesting	51	33	30	44	All	Production	Water Pans; Shallow Ends; Water Tanks	-Reduced distance to water source -increased yields -reduced livestock movement -irrigation utilization	No funds; water scarcity; intrusion by other members
Staggered cropping	2.9	0.0	0.0	3.8	Green Gram	Production	Seeds Fertilisers Water	-Increased yields -reduced disease incidences	Lack of inputs; low technology adoption
Improved livestock breeds	26	44	44	30	Goats Camel	Production	Hybrids; Vaccinations	-Good livestock quality -high production	Social norms
Feed conservation	16	33	22	19	Live-stock	Production	Fodder; Baler; Storage Facility	Reduced livestock movement; reduced conflicts; good livestock quality; high	Low uptake; water scarcity; insecure land tenure; storage

								production	facilities
On-farm diversification	2.9	22	11	7	Live-stock Crops	Production Marketing	Seeds, Fertiliser; Irrigation	Increased income; better livelihoods; food security	Lack of inputs; lack of capital
Value addition (e.g. drying, nyirinyiri, processing)	42	33	30	38	Live-stock Crops	Marketing	Processor Transporter Packaging Material	High prices; increased shelf-life	Low capacity; poor infrastructure
Food storage facilities	3	22	0.0	4	Maize Green Gram	Post-Harvest	Pesticides Storage Facilities	Food availability; post-harvest losses	Low food production post harvest loss
Seek employment,/ Abandon agriculture	4	1	4	8	Live-stock Crop	Production	Skills Education	Stable incomes urban migrations	Congestion in urban areas

Source: GoK (2014a) and author compilation.