Kenya County Climate Risk Profile Annex: Siaya County

Annex 1

Crop and Livestock Indicators in Siaya County

The following graphs provide more detailed information about aspects of production ad productivity for some of the main value chain commodities considered in this profile.

Table 1: Crop production of major crop value chains in Siaya

Value Chain	**Area** (Ha)	**Total Production** (unit)	**Value** (million KSh)
Cereals			
Maize	85,000	1,530,000 Bags	3,672
Beans	51,000	306,000 Bags	1,836
Sorghum	16,000	192,000 Bags	460.8
Rice	1800	111,600 Bags	803
Tuber Crop			
Cassava	3800	68400 Tons	1,368
Sweet Potato	2500	20000 Tons	1000
Oil Crop			
Ground Nut	2000	12,000 Bags	96
Industrial Crop			
Sugar Cane	1300	65,000 Tons	227
Cotton	1000	1,000 Tons	42
Horticultural Crop			
Kales	1200	8,400 Tons	420
Local Vegetables	310	1,550 Tons	93
Mango	275	4,400 Tons	88
Banana	900	19800	990

Source: County Directorate of Agriculture

Table 2: Livestock production and value major value chains in Siaya

Livestock/ Animal Product *(unit)*	**Quantity**	**Price** (unit)	**Value** (KSh)
Milk *(millions litres)*	2,617,068	60	157,024,080
Beef *(kg)*	3,208,806	300	962,641,700
Mutton Production *(kg)*	203,704	400	81,481,700
Eggs production *(No)*	15,980,696	10	159,806,960
Poultry Meat Production *(kg)*	297,303	500	148,651,426
Fish *(kg)*			
Honey Production *(kg)*	39,590.5	200	7,918,100
Pork (kg)	126,929	300	38,078,800
TOTAL			**1,555,602,766**

Source: Siaya County Development Profile (GoK, 2014)

Annex 2

Productivity and food security indicators for prioritized crops

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 in Embu include maize, sorghum, and beans, local poultry and some of their indicators are detailed below.

Table 3: Productivity and food security indicators

Dimension	Indicators	Crop			
		Maize	**Sorghum**	**Beans**	**Local poultry**
Production and Value	**Harvested area** (acres)	75,542	15,600	47,187	354400
	Production (kg or litres)	1,247,716	169,075	345,785	863,796
	Variation in production	148,614	45,870	19,491	655,260
	Value of production (million KSh)	3,698,613,696	632,187,105	1,996,406,828	345,518,267
Food Security	**Dietary energy consumption** (Kcal/ person/ day)	76.14	2.25	11.50	2.00
	Protein content	9.42	10.62	23.58	17.55
	Iron content	2.71	3.36	8.20	1.04
	Zinc content	2.21	1.67	2.79	1.19
	Vitamin A content	214	0.00	0.00	178

Source: ERA 2015, FAO 2015

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 analyzed. 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 conformed of 100 wettest days per season per year was calculated. Then we identified the 95 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 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) 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/m2, 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 CO2-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 Siaya County, as identified in the ASDSP

Various adaptation strategies were identified by stakeholders and residents of Siaya 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 6: Adaptation strategies

Adaptation strategy	**Household Adoption Rate** (%)	**Value chain**	**Value chain link**	**Inputs**	**Results**	**Challenges**
Soil and water conservation	51	Maize, beans, sorghum	Producer	Labour, construction materials	Improve water retention, reduce soil erosion	High cost of the structures
Tree planting	44.1	All	Producer	Seedlings	Improve microclimate and reduce heat stress; reduce deforestation	Lack of seeds; lack of water; high demand of seedlings
Water harvesting	33	All	Producer	Water pans, water tanks	Increased: yields. Reduced: animal movements, conflicts, distances to water points, diseases	Some of the soils are very porous and cannot hold water; lack of capital to establish some of the adaptations
Feed conservation	8	Local poultry	Producer	Inputs, animal feed	Increased productivity	Lack of information, lack of capital
Irrigation	7.7	All	Producer	Water, irrigation equipment	Increased yields	Cost of equipment, inadequate water for irrigation
Enterprise diversification	5.7	All	Producer	Seeds, fertilisers, Animal structures	Increased yields, increased income	Cost of inputs

Source: ASDSP (2014)