Food and Agriculture Organization
of the United Nations

Annex 2

Feasibility Study – Part B & C

Feasibility Assessment

For the GCF-FAO Project "Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya"

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List of Abbreviations

Agriculture, Forestry and Land Use (AFOLU)
Climate Change Multi-Sectoral Knowledge Platform
Climate Change Units (CCUs)
Climate Resilient Agriculture and Food for Tomorrow project (CRAFT)
Climate Resilient Agriculture for Tomorrow (CRAFT)
Climate resilient, low-carbon sustainable agriculture (CRLCSA)
Climate-Smart Agriculture Multi-Stakeholder Platform (CSA-MSP)
Cooperative Partnership – Cooperative Partnership for Climate Smart Food and Forestry
Cooperative Assessment – Climate Clever Check (CA/CCC)
Cooperative Bank (CB)
Council of Governors (CoG)
County Integrated Development Plans (CIDPs)
County Integration Development Plans (CIDP)
Department of Remote sensing (DSRS)
Danish Agriculture and Food Council (DAFC)
Equity Bank (EB)
Farmer Field School (FFS)
Farmer Organization (FO)
Financial Institution (FI)
Finnish Central Union of Agricultural Producers and Forest Owners (MTK)
Food and Agriculture Organization. (FAO)
Gender Action Learning Systems (GALS)
Gender Action Plan (GAP)
Gender Equality and Social Inclusion (GESI)
Gender-Based Violence (GBV)
Gender Transformative Approach (GTA)
Government Financing of Locally Led Climate Action (G-FLLOCA)
Government of Kenya (GoK)
Green Climate Fund (GCF)
GreenHouse Gas (GHG)
Grievance and Redress Mechanism (GRM)
Gross Domestic Product (GDP)
Human Development Index (HDI)
Integrated landscape management (ILM)
International Centre for Tropical Agriculture (CIAT)
International Fund for Agricultural Development (IFAD)
Kenya Agriculture and Livestock Research Organization (KALRO)
Kenya Climate Change Knowledge Portal
Kenya Climate Smart Agriculture Program (KCSAP)
Kenya Forestry Service (KFS)
Kenya Integrated Agriculture Management Information System (KIAMIS)
Kenya Meteorological Department (KMD)
Kenya Tea Development Agency (KTDA)
Lake Region Economic Bloc (LREB)

Lake Region Economic Bloc (LREB)
Lake Victoria Basin (LVB)
Lake Victoria Basin (LVB)
Lake Victoria Basin Authorities (LVBA)
Land Degradation Surveillance Framework (LDSF)
Land Use and Land Cover Change (LULCC)
Locally controlled forestry (LCF
LTO Nederland (LTO)
Maarifa centre (MC)
Metric tons (MT)
Ministry of Agriculture, Livestock, Fisheries and Cooperatives
Monitoring, Reporting and verification (MRV)
Nairobi Coffee Exchange (NCE)
National Adaptation Plan (NAP)
National Climate Change Adaptation Plan (NCCAP)
National Designated Authority (NDA)
National Environmental Management Authority (NEMA)
Participatory Scenario Planning (PSP)
Persons Living with Disabilities (PLWD)
Rainwater harvesting (RWH)
Savings and Credit Cooperative (SACCO)
Sexual Exploitation, Abuse and harassment (SEAH),
System for Land based Emissions Estimation (SLEEK)
The Coffee Directorate (TCD)
The National Treasury (TNT)
World Bank (WB)

Part B – Context and Baseline

1. Country and Local Context

1.1 Geography

1. Kenya is located in East Africa, bordered by Uganda to the west, Tanzania to the south, Sudan and Ethiopia to the north[1] (see

2. Figure 1) and Somalia to the east. At its highest point, Kenya is 5065 metres above sea level (m.a.sl)[2]; most of the country is within 100 metres above sea level. Over 84% of Kenya's 582,646 sq km[3] geographic area is arid and semi-arid and only around 16% of the land is arable, supporting over 80% of Kenya's population[4].

[1] Kenya Embassy, 2023
[2] Kenya Ministry of Health, 2016
[3] Kenya High Commission, 2023
[4] Kenya Ministry of Environment and Forestry, 2020

FIGURE 1: MAP OF KENYA[5]

3. Kenya has five main water towers – Cherangani Hills, Mount Kenya, Mount Elgon, the Mau Forest Complex, and the Aberdares Ranges – which are all currently threatened by land-use changes and climate change impacts[6]. The only region in Kenya that is not currently experiencing water scarcity is the Lake Victoria Economic Region, which is also the hub for Kenya's agricultural sector.

[5] https://www.un.org/geospatial/mapsgeo/generalmaps The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

[6] (Puzyreva & Roy, 2018)

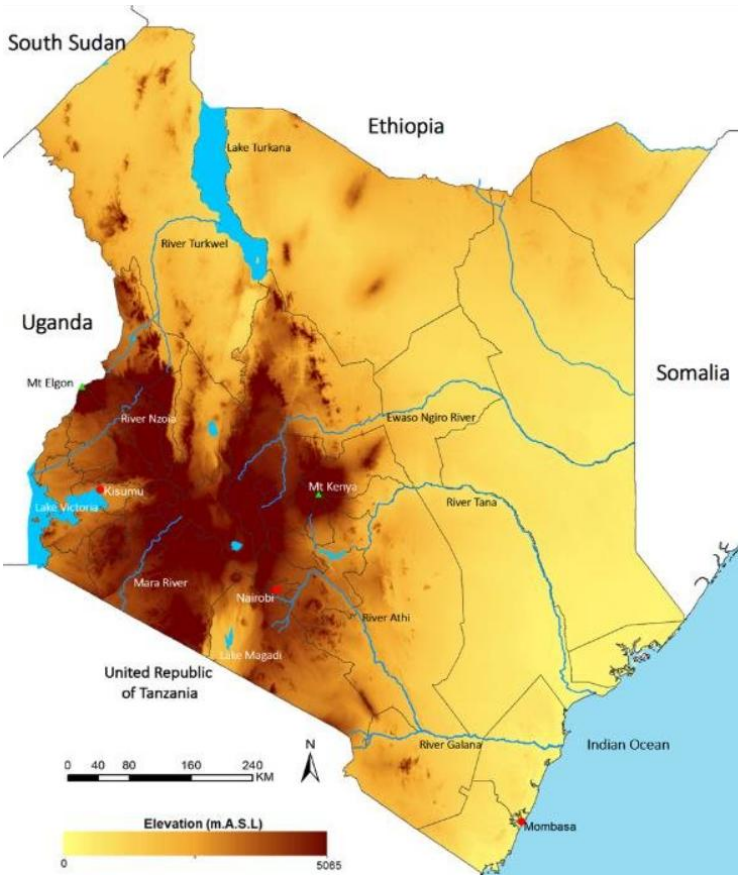


Figure 2: Kenya Elevation Map[7]

4. Elevation varies, with Homa Bay, Migori, Kisumu, Siaya, and Busia ranging from 1000 – 1400 metres above sea leve, [8]while Kisii, east Migori, Nyamira, Bomet, Kericho, Nandi, Vihiga, Kakamega, Bungoma, and Trans-Nzoia range from 1400 to 2200 metres above sea level. The only counties with higher elevation are west Kericho, which can reach 2600 – 3000 metres, and Bungoma's Mt. Elgon region, which reach up to 3500 metres above sea level.

[7] Earthmap.org. Accessed October 2022. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
[8] Earthmap.org. Accessed October 2022.

5. The Lake Victoria Basin (LVB) is in the upper part of the Nile River Basin and shared between Kenya, Uganda, Rwanda, Burundi, and Tanzania (lying between 10 16'N and 10 54'S and longitude 330 55' and 350 51'E)[9]. Lake Victoria is the largest freshwater lake in Africa and second largest in the world, completely fed by rainwater[10]. Most land surrounding the Lake consists in cropland, through there remain some forested areas (see Figure 3).

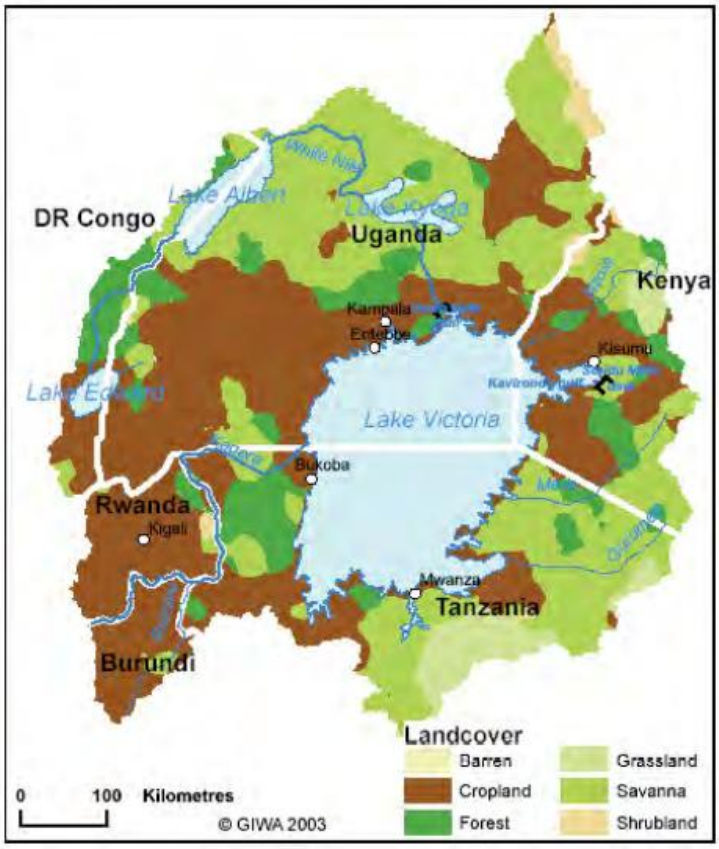


Figure 3: Lake Victoria Basin[11]

6. The 14 Kenyan counties surrounding the Lake and sharing similar agro-ecological conditions have come together to create the Lake Region Economic Bloc (LREB) (Figure 4). The purpose of the LREB is to coordinate and facilitate service delivery; promote trade linkages, investment, and economic activity; enhance public investment and promote developmental research, innovation in social planning and coordination of activities. Importantly, the 14 counties of the LREB share a common vision of sustainable development and are mobilized to take joint action to tackle environmental degradation, poverty and climate change.

[9] Lake Region Economic Bloc, 2015

[10] USAID. 2018. Lake Victoria Basin: Climate Change Adaptation Strategy and Action Plan. Retrieved from: https://www.climatelinks.org/resources/lake-victoria-basin-climate-change-adaptation-strategy-and-action-plan-2018-2023

[11] Eric O. Odada, et.al., 2004, Mitigation of Environmental Problems in Lake Victoria, East Africa: Causal Chain and Policy Options Analyses. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

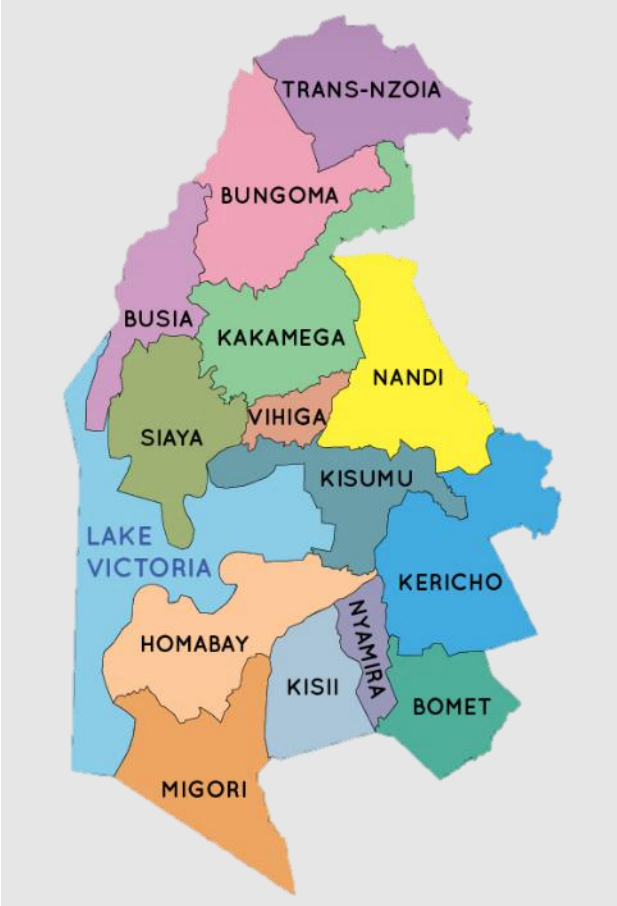


FIGURE 4: 14 COUNTIES OF THE LREB

1.2 Socio-economic Context

7. Kenya is a lower – middle-income country[12]. As seen in Figure 5, Kenya's Human Development Index (HDI) value is 0.575, placing it 152 out of 191 countries[13]. Since 2000, Kenya has seen continuous improvement in its HDI, except for 2019 – 2020 (see Figure 6).

[12] UNDP. 2023. Human Development Index: Country Data. Retrieved from: https://hdr.undp.org/data-center/specific-country-data#/countries/KEN

[13] UNDP. 2023. Human Development Index: Country Data. Retrieved from: https://hdr.undp.org/data-center/specific-country-data#/countries/KEN

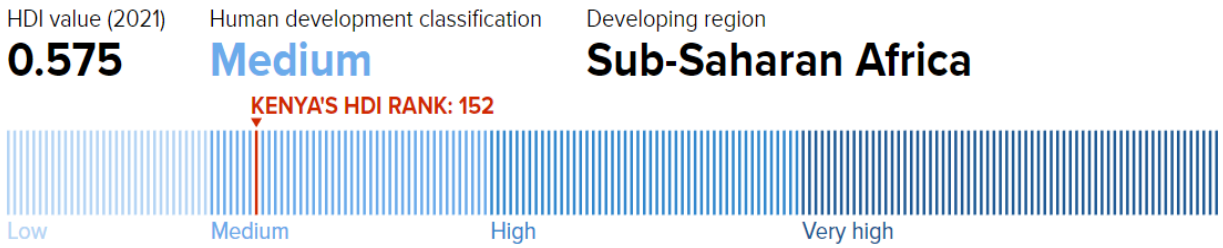


FIGURE 5 KENYA'S HUMAN DEVELOPMENT INDEX 2021[14]

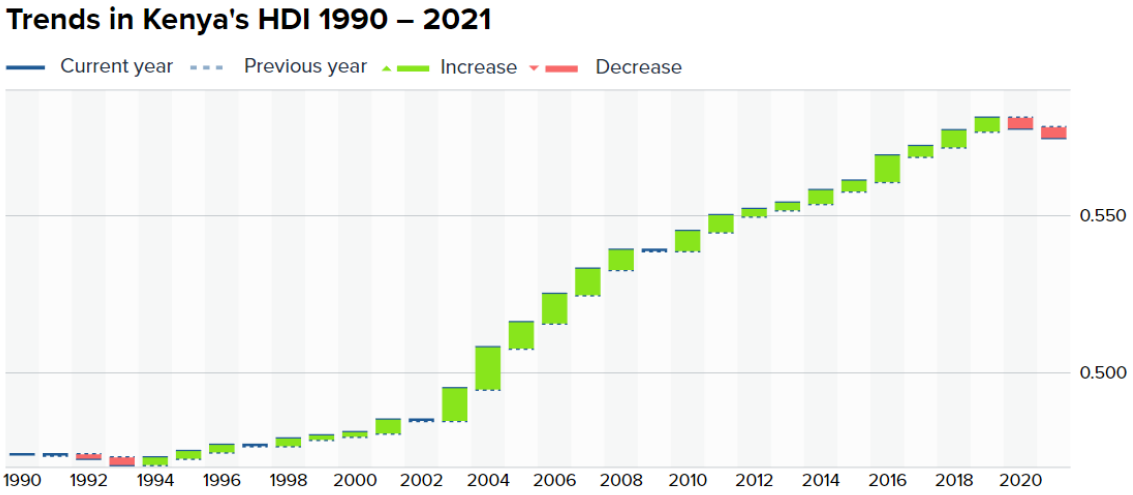


FIGURE 6 TRENDS IN KENYA'S HDI 1990 - 2021[15]

8. By 2030, Kenya's population is forecasted to reach 60.4 million people. Kenya's monetary poverty rate is 35.7% of the total population, or 17 million Kenyans. Monetary poverty is 29.1% for urban populations and 40.1% for all rural populations.[16] In addition, access to goods or services can be restricted by ethnicity, caste, and/or gender (also known as multidimensional poverty).[17] Kenya's multidimensional poverty rate is 53% for the total population (25.22 million people), with women

[14] UNDP. 2023. Human Development Index: Country Data. Retrieved from: https://hdr.undp.org/data-center/specific-country-data#/countries/KEN

[15] UNDP. 2023. Human Development Index: Country Data. Retrieved from: https://hdr.undp.org/data-center/specific-country-data#/countries/KEN

[16] https://www.unglobalcompact.org/what-is-gc/our-work/social/poverty. Monetary poverty, as defined by the UN Global Compact, means to live on the equivalent of $1.90 USD per day.

[17] http://hdr.undp.org/sites/default/files/2021_mpi_report_en.pdf

accounting for 54% of the poverty rate, or 13.62 million women.[18] More than two thirds of rural Kenyans (67% or 18.7 million people) are experiencing multidimensional poverty, versus 28% or 7.85 million urban dwellers. According to the KNBS 2020 Comprehensive Poverty Report, the %age of Kenya's population suffering from multidimensional poverty is twice as high in rural areas (81.1%) versus urban (40%).

9. According to the HDI Report 2021/2022, Kenyans can expect to live to at least 61.4 years of age at birth and receive 10.7 years of schooling[19]. Kenyan women have a life expectancy of 64.1 years while men have 58.9 years, women receive 10.3 years of schooling instead of the 11.1 years of schooling for men, and the gross national income per capita for women is $3873, while men receive $5084[20] (See Figure 7).

						SDG 3		SDG 4.3		SDG 4.4		SDG 8.5	
		Gender Development Index		Human Development Index		Life expectancy at birth		Expected years of schooling		Mean years of schooling		Estimated gross national income per capita[a]	
				Value		(years)		(years)		(years)		(2017 PPP $)	
		Value	Group[b]	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
		2021	2021	2021	2021	2021	2021	2021[c]	2021[c]	2021[c]	2021[c]	2021	2021
152	Kenya	0.941	3	0.557	0.592	64.1	58.9	10.3[1]	11.1[1]	6.1	7.3	3,873	5,084

FIGURE 7:GENDER DISAGGREGATED HDI KENYA 2021/22

10. Kenya's Gross Domestic Product (GDP) in 2021 was 110 billion USD, or 2,081 USD per capita. Trends are rapidly increasing (7.5% growth rate in 2021[21]). However all sectors faced contraction due to the COVID-19 pandemic, except agriculture which only contracted by 0.1% in 2020 and contributed 22.4 % to the Kenya's 2021 GDP[22]. Impeding Kenya's development are: the increasing public debt (68%),[23] inflation, climate variability and climate change impacts to rain-fed agriculture (which continues to be predominant)[24].

11. Food security in Kenya is closely tied to climate variability and the rainfall regime, particularly in the eastern drylands. In 2022, the March to May long rains showed a fourth consecutive below-average season across most of eastern Kenya. The continuous decline in livestock productivity and crop production resulted in below-average food availability. Livestock deaths due to drought and crop failure continue to constrain household food availability and income, driving Crisis (IPC Phase 3) and Emergency (IPC Phase 4) outcomes in the pastoral areas and Stressed (IPC Phase 2) and Crisis (IPC Phase 3) outcomes in the marginal agricultural areas.

Lake Region Economic Bloc

[18] Multidimensional poverty rate, as defined by UNDP, recognizes that gender, ethnicity, and caste contribute to poverty and measures poverty using three key categories of deprivation: health, education, and standard of living. Kenya National Bureau of Statistics. 2020. *Comprehensive Poverty Report: Children, Youth, Women, Men, & Elderly*; page 15

[19] UNDP, 2022

[20] UNDP, 2022

[21] World Bank Data, last accessed 23/01/2025 https://data.worldbank.org/country/kenya

[22] Vision 2030 Delivery Board, 2022

[23] African Development Bank Group, 2022

[24] World Bank, 2023

12. The LREB is one of the most densely populated regions of Kenya (see Figure 8) with a total population of 14,944,943 including 7,239,652 males, 7,704,922 females, and 366 intersex[25]. The population density is quite high in some counties, ranging from 958 people per km^2 in Kisii to 1,047 per km^2 in Vihiga[26]). The basin population is growing at a rate of 3.5 % each year and doubles every 22 years[27].

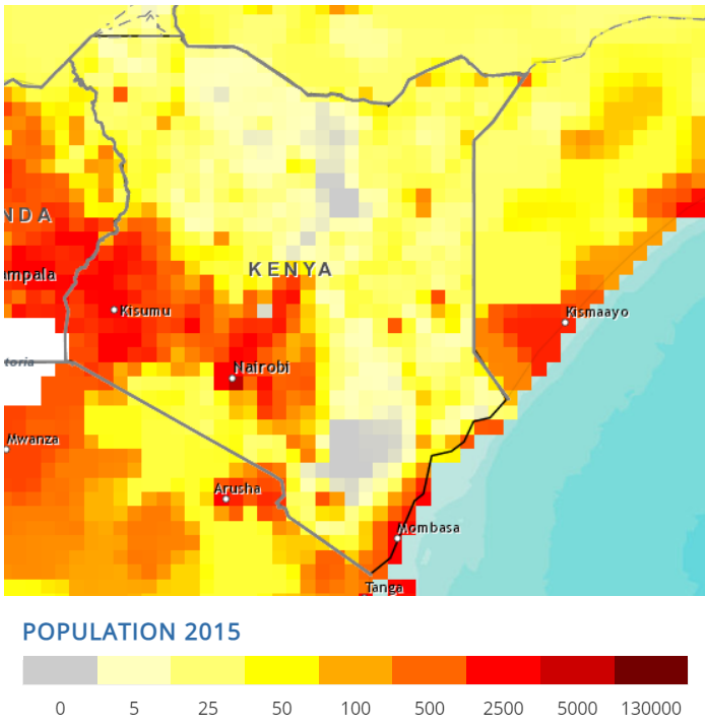


FIGURE 8 POPULATION DENSITY OF KENYA[28]

13. The LREB population has high rates of multidimensional poverty but monetary poverty rate is lower than in some neighbouring counties[29]. Regarding food security, the LREB counties and parts of central Kenya remain relatively protected thanks to continued water availability. However they are closely watched, as agricultural productivity in those areas is also tied to rainfall. Food demand arising from the other regions is likely to create pressure on land use in the LREB.

[25] Kenya National Bureau of Statistics, 2019. The share of the population under 19 years is 44 % with 45 % male and 43 % female; those aged between 15 and 64 constitute 49%, and those above 65 years make up 3 % of the total population.
[26] World Bank , 2023
[27] Kenya National Bureau of Statistics, 2019
[28] World Bank, 2023, The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
[29] KNBS, 2018.

TABLE 1 LREB COUNTIES' DEVELOPMENT INDICATORS

County	Population with Access to Piped Water and Sanitation Services[30]	Percent Population that is Literate[31]	Percent Households with Electrical Services[32]	Life Expectancy	Infant Mortality	Total Road Network	Percent Roads that are Paved	Percent Households Suffering Monetary Poverty[33]	Levels of Food Insecurity	Percent Children below five years of age suffering malnourishment [34]	Percent Children under five years of age suffering stunting [35]
Unit	Percent	Percent	Percent	Years	Per 1000 births	Kilometres (km).	Percent	Percent	Levels[36]	Percent	Percent
Bomet[37]	25	-	65	-	-	2041	11.6	47.7	Phase 1	12	38
Bungoma[38]	67	71.5	27	60	-	-	-	35.5	Phase 1	9	24

[30] County Integration Development Plans, 2018 - 2022
[31] Proxy for having received primary education (receiving an education designed for children from ages 6 – 11; source: UNICEF)
[32] County Integration Development Plans, 2018 - 2022
[33] KNBS Comprehensive Poverty Report 2020
[34] County Integration Development Plans, 2018 - 2022
[35] County Integration Development Plans, 2018 - 2022
[36] FEWS-NET, https://reliefweb.int/report/kenya/kenya-food-security-outlook-june-2022-january-2023 - Integrated Phase Classification (IPC), defines 6 phases of food insecurity: *1) Phase 1 Minimal* - Households are able to meet essential food and non-food needs without engaging in atypical and unsustainable strategies to access food and income*; 2) Phase 2 Stressed* - Households have minimally adequate food consumption but are unable to afford some essential non-food expenditures without engaging in stress-coping strategies; *3) Phase 3 Crisis* - Households either: Have food consumption gaps that are reflected by high or above-usual acute malnutrition OR are marginally able to meet minimum food needs but only by depleting essential livelihood assets or through crisis-coping strategies; *4) Phase 4 Emergency* - Households either: Have large food consumption gaps which are reflected in very high acute malnutrition and excess mortality OR are able to mitigate large food consumption gaps but only by employing emergency livelihood strategies and asset liquidation; *5) Phase 5 Famine* - Households have an extreme lack of food and/or other basic needs even after full employment of coping strategies. Starvation, death, destitution, and extremely critical acute malnutrition levels are evident. (For Famine Classification, area needs to have extreme critical levels of acute malnutrition and mortality
[37] Bomet County Integration Development Plan, 2018 - 2022
[38] Bungoma County Integration Development Plan, 2018 - 2022

Busia[39]	12.5	75	49	47	65	1600	11	68	Phase 1	31	26.5
Homa Bay[40]	41	74 women[41]	13	-	-	10,000	3	33	Phase 1	8.6	21.8
Kakamega[42]	16	83.1	-	59.5	65	4451.3	7	35.1	Phase 1	-	-
Kericho[43]	Less than 50	-	11.8	-	-	2083	Less than 1	29.9	Phase 1	1.4	0.6
Kisii[44]	4	86.5	29.5	61	-	2724	7.7	41.3	Phase 1	-	-
Kisumu[45]	58	-	46.24	59.5[46]	79	671	76.53	34.1	Phase 1	-	18
Migori[47]	-	-	-	-	-	-	-	40.7	Phase 1	-	-
Nandi[48]	22	60	16.5	61[49]	43	5014	5.7	35.9	Phase 1	15	29.9
Nyamira[50]	3.4	46[51]	49.5	-	30	1574.59	10.16	32.3	Phase 1	9.6	26
Siaya[52]	5	80	30	41[53]	111	1672	11	33.1	Phase 1	24.7	12.5
Trans-Nzoia[54]	9.3	-	30.7	58.67	47	4421.7	3.69	34.1	Phase 1	29.2	15.3
Vihiga[55]	16.8	93.8	12	56.2	64	1058.2	19	41.7	Phase 1	6.4	14.6

[39] Busia County Integration Development Plan, 2018 - 2022
[40] Homa Bay County Integration Development Plan, 2018 - 2022
[41] Homan Bay CIDP only lists the literacy rates for women without including men, so total population literacy rate unknown
[42] Kakamega County Integration Development Plan, 2018 - 2022
[43] Kericho County Integration Development Plan, 2018 - 2022
[44] Kisii County Integration Development Plan, 2018 - 2022
[45] Kisumu County Integration Development Plan, 2018 - 2022
[46] Arithmetic mean of 61 years at birth for women and 58 years at birth for men
[47] Migori County Integration Development Plan, 2018 - 2022
[48] Nandi County Integration Development Plan, 2018 - 2022
[49] Arithmetic mean of 59 years for men and 61 years for women
[50] Nyamira County Integration Development Plan, 2018 - 2022
[51] Arithmetic mean of 51 % for men and 41 % for women
[52] Siaya County Integration Development Plan, 2018 - 2022
[53] Arithmetic mean of 38.3 years for men and 43.6 for women, and rounded up to the nearest one
[54] Trans Nzoia County Integration Development Plan, 2018 – 2022
[55] Vihiga County Integration Development Plan, 2018 – 2022

14. The national urban-rural pattern of distribution in multidimensional poverty is repeated in the 14 LREB counties, all of which have over 50% of their populations experiencing multidimensional poverty as seen in Table 2. Furthermore, there are considerable overlaps between monetary poverty and multidimensional poverty.

TABLE 2 PERCENT POPULATION SUFFERING MULTIDIMENSIONAL POVERTY BY COUNTY[56]

County	Percent population suffering multidimensional poverty
Bomet	84.7
Busia	87.6
Bungoma	87.9
Homa Bay	89.5
Kakamega	85.0
Kericho	63.2
Kisii	72.3
Kisumu	54.5
Migori	83.0
Nandi	61.1
Nyamira	81.1
Siaya	80.0
Trans-Nzoia	72.8
Vihiga	76.5

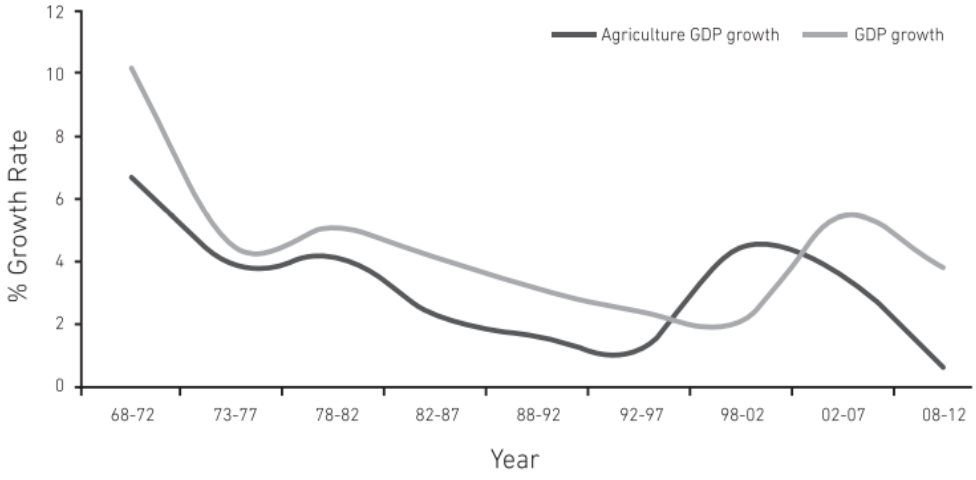
1.3 Agriculture

15. Most Kenyans work in the agriculture sector and 80% of the population is reliant on agricultural output for food security and livelihoods[57]. Of Kenya's 47.6 million people, 18.3 million (38%) are employed in the formal sector[58]. The rest of the population - 29.3 million people (62%) - work in the informal sector, primarily in small-scale agriculture and pastoralism[59]. Statistics indicate that the agricultural sector directly accounted for 22-26 % of Kenya's GDP in 202060 and 65 % of Kenya's

[56] KNBS, 2018
[57] FAO, 2023
[58] Kenya National Bureau of Statistics. 2022. Economic Survey 2022. Retrieved from: https://www.knbs.or.ke/wp-content/uploads/2022/05/2022-Economic-Survey1.pdf
[59] Kenya National Bureau of Statistics. 2022. Economic Survey 2022. Retrieved from: https://www.knbs.or.ke/wp-content/uploads/2022/05/2022-Economic-Survey1.pdf; page 54
[60] 2022 Economic Survey, Kenya National Bureau of Statistics

total exports[61]. Kenya's GDP is so dependent on the agricultural sector that GDP growth mirrors the agricultural sector growth rate (see Figure 9).

FIGURE 9 AGRICULTURAL GDP GROWTH RATE VS NATIONAL GDP GROWTH RATE 1968 - 2012; SOURCE: KENYA MALFI, 2018



Key crops at the national level are sorghum, soybeans, and sugar. Food crops and most horticultural crops (vegetables) are consumed domestically. Of the food crops, maize is a staple cereal crop and accounts for 80% of the national production of cereals nationwide. Meat and dairy dominate the livestock sub-sector, while cut flowers and vegetables dominate horticulture; tea, coffee, and sugarcane, are the main industrial crops. While timber and livestock contribute to Kenya's economy, they are mostly consumed in the domestic market[62].

16. In the 14 counties of the LREB, major cash crops are: **sugarcane, tea, pyrethrum, and cotton.**[63] Key food crops are: **maize, rice**, and **beans**; and major horticultural crops are: **passion fruits, mangoes, and tomatoes, with** household staples such as **leafy vegetables** (LV).[64] The livestock industry contributes about 10% of the GDP of the country, with the major livestock types in the LREB being dairy cattle, poultry, and goats.[65]
17. Agriculture occupies 72 % of the total working population in the LREB. Most crop farmers are smallholders, meaning plots are usually no more than 0.2 to 1 hectare with chronically low

[61] KIPPRA, 2013
[62] Ministry of Agriculture, Livestock, Fisheries, and Irrigation (MALFI). 2018. *Kenya Climate Smart Agricultural Implementation*
Framework: 2018 - 2027. Page 5.
[63] The Lake Region Economic BluePrint. 2020. Pg 16.
[64] The Lake Region Economic BluePrint. 2020. Pg 16..
[65] Effects of Drought and Floods on Crop and Animal Losses and Socio-economic Status of Households in the Lake Victoria Basin of Kenya, Gichere et al, 2013.

productivity[66]. Livestock farmers also have small herds (typically 3-4 animals) with limited coping capacity and low productivity. Developed cash crop value chains, such as tea and coffee are also practised by smallholders pooling their production through farmer organizations and cooperatives. Industrialized agriculture in the LREB is concentrated around sugar factories, such as the South Nyanza Sugar Company in Migori, Muhoroni and Kibos Sugar and Allied Industries in Kisumu and Mumias Sugar in Kakamega City[67]. As reported in the 2015 Lake Region Economic Blueprint, the main challenges faced by the agricultural sector in LREB are:

a. Declining yields
b. Small size land holdings
c. Increasing population that requires more land for housing and services
d. Inadequate farming techniques and mismanagement
e. Lack of title holding among smallholder farmers

1.4 Environmental Context

18. This section provides a portrait of the environmental conditions in the 14 counties in which the project will operate: Bomet, Bungoma, Busia, Homa Bay, Kakamega, Kericho, Kisii, Kisumu, Migori, Nandi, Nyamira, Siaya, Trans Nzoia, and Vihiga. Given that many of the climate change impacts are felt through – and mitigated through – land use, land use changes and forestry, it is important to ensure that climate-resilient, low-carbon practises promoted by the project are well adapted to current conditions. At the same time, addressing the environmental drivers of climate vulnerability and emissions will increase the resilience and mitigation benefits the project will provide.

19. In **Kakamega** County, the annual rainfall in the county ranges from 1280.1mm to 2214.1 mm per year. The rainfall pattern is distributed all year round with March and July receiving heavy rains while December and February receive light rains. The temperatures range from 18°C to 29°C. It has two main ecological zones namely, the Upper Medium (UM) and the Lower Medium (LM). The Upper Medium covers the Central and Northern parts of the county that practice intensive maize, tea, beans, and horticultural production mainly on small scale; the Lower Medium (LM), covers a major portion of the southern part of the county. In this zone, the main economic activity is sugarcane production with some farmers practising maize, sweet potatoes, tea, ground nuts, and cassava production. There have been intense tree planting campaigns in the county particularly in churches, schools, and other educational institutions where they are informed of the importance of tree planting for domestic and commercial purposes. There are many people with commercial woodlots and small plantations on their farms which are basically for timber, poles and firewood[68].In Lugari for instance , farmers were planting more trees in their farms, both indigenous tree species as

[66] Lake Region Economic Bloc, 2015
[67] Lake Region Economic Bloc, 2015
[68] https://kefri.org/WaterTowers/PDF/Baseline%20Survey%20of%20Trees%20on%20Farm%20Revised%20Draft_ID%20Reviewed-Final.pdf

well as exotic species and most preferred tree species by farmers are for cash income, improvement of soil fertility and fodder[69].

20. **Kisii** County exhibits a highland equatorial climate resulting in a bimodal rainfall pattern with an average annual rainfall of 1,500 mm. The long rains are between March and June while the short rains are received from September to November; with the months of January and July being relatively dry. The maximum temperatures in the County range between 21°C and 30°C, while the minimum temperatures range between 15°C and 20°C. The high and relatively reliable rainfall patterns coupled with moderate temperatures are suitable for growing crops like tea, coffee, pyrethrum, maize, beans, and bananas as well as dairy farming and tree seedling production. The county is promoting Agro-Forestry for income-generating activities through establishment of community tree nurseries in various constituencies. These activities are carried out through the departments of Agriculture, Forestry, NEMA and the Local Authorities in the county. At individual levels, farmers grow the trees mostly for commercial purposes because they have various uses in the day-to-day activities such as firewood, building materials or making timber for furniture use[70].
21. The climate of **Kisumu** County is generally warm with minimal monthly variation in temperatures between 23 °C and 33 °C throughout the year. The rainfall is determined by a modified equatorial climate characterized by long rains (March to May) and short rains (September to November). The average annual rainfall varies from 1000-1800 mm during the long rains and 450-600 mm during the short rains. It is divided into seven agro-ecological zones namely, the coffee zone (UM1), which areas of Koru, also popular for finger millet, bean, sweet potato, sunflower, soybean onion, cabbage, and other vegetables; the lower midland sugarcane covering areas such as Chemelil, Muhoroni, and Nyakach. The area is also home to other crops, including sunflower, soybean, chili, sweet potato, and cucumber crops such as maize, sorghum, finger millet, bean, Dolichos bean, cowpeas, pigeon pea, groundnut, tomato, onion, pumpkin, kenaf, and roselle, also have a high potential for cultivation in the zone; the lower midland cotton zone including areas such as Ahero, Miwani, and Rabuor where green gram, cowpea, chickpea, soybean, groundnut, pigeon pea, are cultivated.
22. **Migori** County experiences an inland equatorial climate modified by the effects of altitude, relief, and the proximity to the large body of water of Lake Victoria. Annual rainfall averages from 700 mm to 1,800 mm with long rains experienced between March and May while short rains occur between September and November. Annual temperatures vary between a mean minimum of 24 °C and a maximum of 31 °C, with high humidity and a potential evaporation of 1800 mm to 2000 mm per year. The lakeshore divisions of Nyatike, Muhuru, and Karungu together with parts of Kegonga experience unreliable and poorly distributed rainfall. The County has six agro-ecological zones ranging from Upper Midland (UM) 1-3 to Lower Midlands (LM) 1-5. The upper zone includes Eastern Rongo, Uriri, Kehancha, Ntimaru, and some parts of Kegonga and the main crops cultivated include maize, beans, tobacco, coffee, sweet potatoes, cassava, vegetables, tea, and sugarcane. The lower zone includes Rongo, Uriri, Mabera, Kegonga Suba East Nyatike, Karungu, Western Nyatike, and

[69] Sikuku, F. O., Apudo, M. G., & Ototo, G. O. (2014). Factorsinfluencing development of farm forestry in Lugari district, Kakamega county, western Kenya. Journal of Agriculture and Veterinary Science, 7, 6-13.

[70] https://www.the-star.co.ke/print/nyanza-page-twentynine/2022-07-04-kisii-youth-plant-trees-to-boost-forest-cover/

Muhuru. The crops grown include maize, beans, tobacco, finger millet, coffee, sweet potatoes, rain-fed rice, finger millet, sorghum, cotton; sunflower, cassava, and sesame.

23. In **Nandi** County, the Northern parts receive rainfall ranging from 1,300 mm to 1,600 mm per annum; while the Southern half which is affected by the Lake Basin atmospheric conditions receive rainfall as high as 2,000 mm per annum. The areas that receive 1500 mm and above are under tea cultivation while relatively drier areas to the East and Northeast, which receive an average rainfall of 1200 mm per annum, mainly grow maize, sugarcane, and coffee. A study in Nandi County states that small-scale farmers grow trees for commercial purposes including Cypress species, eucalyptus Species, and grevillea robusta. Cyprus and eucalypts are the most preferred for the production of timber and power transmission poles while erybotrya japonica is the least preferred due to their low commercial gains. Moreover, the majority of farmers prioritized planting exotic tree species over indigenous tree species due to the market availability and profitability of commercial tree species products[71,72]
24. **Nyamira** County has annual rainfall ranging between 1200 mm-2100 mm per annum. The long and short rain season start from December to June and July to November respectively. The maximum day and minimum night temperatures are normally between 28.7 °C and 10.1 °C respectively, resulting in an average normal temperature of 19.4 °C which is favourable for both agricultural and livestock production. The county's agricultural practices include farming both food and cash crops, livestock farming, beekeeping, and fish farming. Its major food crops include maize, beans, finger millet, sorghum, cassava, sweet potatoes, vegetables, and fruits. Its major cash crops include tea, coffee, pyrethrum, avocados, and bananas. In terms of animals, farmers mainly raise cattle for dairy and beef; goats; pigs; sheep; donkeys; poultry including indigenous chickens, layers, and broilers; rabbits; and bees.
25. **Siaya** County experiences bimodal rainfall, with long rains falling between March and June and short rains between September and December. The southern part is drier towards Bondo and Rarieda sub-counties and is wetter towards the higher altitudes in the northern part particularly Gem, Ugunja and Ugenya sub-counties. On the highlands, the rainfall ranges between 800 mm – 2,000 mm while lower areas receive rainfall ranging between 800 – 1,600 mm. The main food crops are maize, sorghum, beans, cassava and sweet potatoes while cash crops produced are mainly rice, sugarcane and groundnuts. Vegetables produced in the County include; tomatoes, onions, avocado and kale while fruits are mangoes, pawpaw, bananas, oranges and watermelon.
26. **Trans Nzoia** County has a cool and temperate climate with mean maximum temperatures ranging between 23.4 °C and 28.4 °C and mean minimum temperatures ranging between 11 °C and 13.5 °C. The maximum and minimum extreme temperatures are recorded in February(about 34.2 °C) and January (about 6.5 °C) respectively. The county receives annual rainfall ranging from 1000 mm to 1700 mm. The main agricultural practices include the cultivation of maize, sunflower, coffee, wheat

[71] Okumu, J. A., Langat, D. K., & Ojung'a S. O. (2022). Determinants of Commercial Tree Growing Among Smallholder Farmers in Nandi County, Kenya East African Journal of Forestry and Agroforestry, 5(1), 269-285. https://doi.org/10.37284/eajfa.5.1.939.
[72] http://hdl.handle.net/1834/7352

and barley. Livestock production in the county includes dairy farming as well as the rearing of cattle and sheep.

27. In **Bomet** County, rainfall is highest in the lower highland zone with a recorded annual rainfall of between 1000 mm and 1400 mm. The temperature levels range from 16 °C to 24 °C. The main crops produced are: tea; maize; beans; Irish potatoes; sorghum; finger millets; sweet potatoes; tomatoes; cabbages; kales; onions; avocados and coffee. The County has vast livestock breeds, especially cattle and goat dairy breeds such as Friesians, Ayrshire, Jersey, crosses, Toggenburg, Germany Alpine, Kenyan Alpine and Saanen.
28. **Bungoma** experiences two rainy seasons, the long rains – March to July and short rains-August to October. The annual rainfall – 400 mm to 1,800 mm. The annual temperature – 0°c and 32°c due to different levels of attitude County Main crops produced include maize, beans, finger millet, sweet potatoes, bananas, sorghum, Irish potatoes and assorted vegetables. Sugarcane, cotton, palm oil, coffee, tea, sun flower, and tobacco are grown as cash crops in the County. Main livestock in the County include cattle, sheep, goats, donkeys, pigs, rabbits, poultry and bees. Farm forestry in the county mainly focuses on exotic species such a Eucalyptus Sp., Grevillea robusta, Casuarina equisetifolia, Markhamia lutea and Cedar. Trees are mainly grown on boundaries or woodlots where farm sizes permit. The trees are planted mainly for timber, fuel, medicinal value, fruits, poles, windbreak, and boundary marking. Furthermore, woodlots established in Tongaren to supply schools with energy[73].
29. **Busia** County receives annual rainfall of between 760 mm and 2000 mm.The annual mean maximum temperatures range between 26 °C and 30 °C while the mean minimum temperature range between 14 °C and 22 °C. To the extreme Northern part of the county, the land formation and structure makes it suitable for both food and cash crop farming like tobacco and cotton. The lower Northern part covering parts of Nambale, Betula and Amukura in Teso South are suitable for maize, robusta coffee and sugarcane cultivation. The Central and Southern parts of the county are suitable for maize, cotton and horticultural crops.
30. **Homa Bay** County has an inland equatorial type of climate. The climate is, however, modified by the effects of altitude and nearness to the lake which makes temperatures lower than in equatorial climates. Areas around Kasipul Kabondo, Rangwe and Ndhiwa are very fertile, producing bounty harvests of cotton, maize, sugarcane, cassava, banana, pineapples, sorghum, millet, ground nuts, potatoes and sunflowers.
31. **Vihiga** County experiences an equatorial type of climate with fairly well-distributed rainfall throughout the year with an average annual precipitation of 1900 mm. Temperatures range between 14°C – 32°C with a mean temperature of 23°C. The main crops in the county include tea, coffee, bananas, and horticulture crops. Other food crops include maize, beans, cassava, sweet potatoes, vegetables, millet, and sorghum. The main breeds of livestock kept in the County include zebu cattle, dairy cattle, poultry, sheep, goats, pigs, and rabbits.

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73 https://kefri.org/WaterTowers/PDF/Baseline%20Survey%20of%20Trees%20on%20Farm%20Revised%20Draft_ID%20Reviewed-Final.pdf

32. **Kericho** County enjoys favourable climate and receives relief rainfall, with moderate temperatures of 17 °C and low evaporation rates. Temperatures range between 10 °C – 29 °C. The rainfall pattern is such that the central part of the county, where tea is grown, receives the highest rainfall of about 2,125 mm annually while the lower parts of Soin and parts of Kipkelion receive the least amount of rainfall of 1,400 mm annually. The county produces both cash and food crops. The main crops grown include tea, coffee, sugarcane, potatoes, maize, beans, pineapples, horticulture (tomatoes, vegetables among others). Dairy production is the leading livestock enterprise in the county as well as poultry (mainly local chicken), hair sheep, wool sheep, meat goat rearing, beekeeping, pig production and rabbit rearing. In the county, farmers engage in commercial tree planting specifically as a source of income. Exotic trees grown include eucalyptus, gravellia, Nandi flame, Mexican green ash, Pinus, Hekea saligna, D.caffra, Acrocarpus fraxinfolia, Cupressus lustanica and cypress. Eucalyptus is used as a source of energy by the tea factories and electric poles while a cypress has varied usage which includes construction, furniture making among others. The market demand for the tree products is high and this has motivated farmers to engage on them[74].

33. In the Highlands of Kericho, Nyamira, Nandi, and Kisii, the cultivation of food crops such as maize, beans, bananas, and tomatoes and cash crops including tea and pyrethrum is the main economic activity, while in the lowland areas such as Kisumu, Homabay, Siaya and Busia, fishing is a major economic activity. Fishing in combination with farming is practised in Migori with major crops including sugarcane, sorghum, and maize. Cultivation of sugarcane, maize, tea, and soy are prominent in the Western regions of the LREB particularly in Kakamega, Busia, and Bungoma. Additionally, the region also practises livestock farming (zebu cattle, upgrade[75] and pure dairy cows, poultry, local goats, sheep, pigs, rabbits, donkeys)[76].

34. In the region, natural resources are currently overused and being degraded due to unsustainable agricultural and resource management practices, which are partly fuelled by the fast-growing population, rapid increases in food demand (driving land extensification), extreme poverty, and climate change[77]. To replenish depleted natural resources and stop further land degradation, all the while decoupling agricultural growth from the depletion of the natural resource base, investments in sustainable agriculture and natural resource conservation measures are becoming urgent especially considering the changing climate.

Ecological Dynamics

35. The Lake Victoria Basin (LVB) has experienced significant ecological changes since the 1930s induced by various drivers and pressures. The driving forces are both natural and anthropogenic both affecting the environment directly or indirectly. These land degradation forces vary from place to

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[74] https://repository.kippra.or.ke/bitstream/handle/123456789/3013/kericho%20county%20cidp%202013-2017.pdf?sequence=1&isAllowed=y

[75] Crossbreed of pure dairy pure dairy cattle with high milk production potential.

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place.[78] Over the last 40-50 years, the lake and its basin have undergone enormous ecological changes linked to several interrelated problems such as rapid population growth, poverty, land degradation, declining agricultural productivity, and water quality[79]. The major drivers of land-use change and subsequent loss of ecosystems service in the LREB have a strong human dimension [80],[81] drivers such as demographic changes; economic demand and trade; urbanization; agriculture; mining, deforestation; road construction; and impoundments often negatively alter the ecology of the basin. The lake's resources, especially its fish, are at risk due to human-caused pressures such overfishing, alien species invasion, biodiversity loss and increasing eutrophication due to release of sewage and ecological degradation happening around and in upstream water catchments.

36. The LREB is home to one of the densest and poorest rural populations in the world with over 14 million people, which constitute about 30% of the population in Kenya [82]. Due to a high level of poverty, LREB residents commonly harvest wood for household fuel and agricultural processing. Poverty rates in the basin are 50% or more and are especially high in the lakeshore areas of Kenya, where the situation is further compounded by a high incidence of HIV/AIDS and water-associated diseases along waterways[83]. The poverty of most of the inhabitants of the Lake Victoria region is linked to continued land degradation[84].

Land Use and Land Cover Change (LULCC)

37. The LREB has one of the highest rates of urban expansion in Africa[85]. With the influx of people in urban areas, there is increased demand for services and construction materials such as timber and building stones[86] . This has rendered the Lake region susceptible to degradation from rapidly increasing urbanization coupled with poor sanitation and waste management as seen in the case of

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Nzoia where industrial effluents are not adequately treated, thus negatively affecting the quality of the receiving waters[87].

38. Deforestation and land cover conversion are the major driving forces behind land degradation in LREB which takes the form of declining soil fertility, accelerated soil erosion, declining water quality, negative hydrological changes and reduction in land- and water-based biodiversity[88]. LREB has experienced a decline in forests and woodland resources due to indiscriminate harvesting of forest for timber, wood fuel, and building poles, fish curing, and charcoal making[89]. Deforestation in the bloc can also be attributed to the increased land demand for grazing, agriculture and settlement[90].
39. Lake Victoria Vegetation Mosaic which was once a mixture of vegetation types such as wooded savannahs along the lake, montane forests in the Kisii Highlands, moist lowland forests and wetlands/swamps in Siaya County and dry woodlands on top of hills with lateritic soils has completely changed due to its conversion into cultivation fields and pastures and currently only isolated pockets of hilltop forests and woodlands have remained[91]. Variations in climatic conditions and climate-related disasters have been attributed to land use and land cover change in the basin over the years[92] .
40. The destruction of catchment forests and wetlands is linked to the disruption of rainfall patterns, and extreme events of severe droughts and floods.[93] Prolonged droughts have negatively affected water availability and vegetation within the basin. Loss of vegetation increases the %age of bare ground exposed to agents of erosion[94] and some vegetation species take a long time to recover after extreme drought [95]. Apart from the drought events, extreme flooding in the LREB particularly in parts of Busia, Homa Bay and Kisumu counties has often submerged productive lands leading to

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destruction of crops and properties, loss of lives, and erosion[96]. Crop failures, severe water supply shortages, reduced water quality and a decline in hydropower generation capacity due to low water levels being experienced in the LREB is partly attributed to the changing climate[97] . Previous scientific reports have confirmed that eutrophication and climate change are the leading causes of the ecological degradation in LREB[98] .

41. Since the 1970s, land use changes in the Lake Region have occurred with farmland being converted into grazing lands and the expansion of rain-fed agriculture into wetlands and along rivers[99]. Approximately 46% of LREB land resources is fragile[100] and highly vulnerable to different forms of degradation such as deforestation, loss of wetlands, erosion, loss of soil fertility among others[101]. Annual croplands for example increased from 1,285,955 ha (or 37%) in 1990 to 2, 318,807 ha (or 66%) by 2018 (Table 3). An estimated 150, 000 km² of land has been affected by soil degradation since 1980 including as much as 60% of agricultural land[102]. In Kenya, the Lake Victoria wetlands constitute about 37% of the total wetland surface area in the country[103].

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[100] **susceptible to rapid degradation and whose restoration is difficult due to its natural characteristics and geographical location**.

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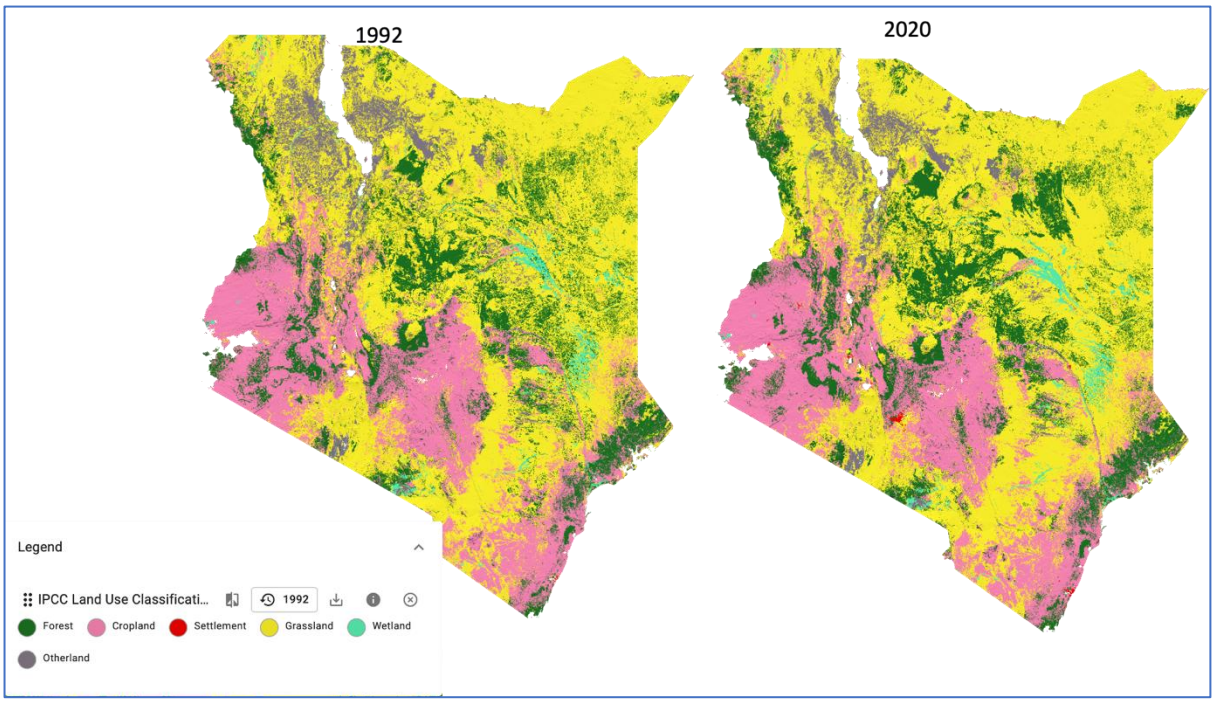
TABLE 3 STATISTICS OF LAND COVER AND LAND USE CHANGE WITHIN LREB BETWEEN 1990 AND 2018; SOURCE: DRSRS 2022)

Class Name	Years													
	1990		1995		2000		2005		2010		2015		2018	
	Area (ha)	% cover	Area(ha)	% cover	Area (ha)	% cov	Area (ha)	% cov	Area (ha)	% cov	Area (ha)	% cov	Area (ha)	% cover
Annual Cropland	1,285,954.7	36.6	1,260,618.6	35.9	1,514,289.5	43.1	1,811,761.5	51.6	2014420.7	57.3	2007965.8	57.1	2,318,806.7	66.1
Dense Forest	226,682.1	6.4	257,962.9	7.3	178,264.8	5.1	205,002.2	5.8	201795.7	5.7	241055.7	6.9	211,904.5	6.0
Moderate Forest	27,858.3	0.8	33,087.7	0.9	26,545.9	0.8	26,911.5	0.8	21953.8	0.6	27396.9	0.8	33,053.1	0.9
Open Forest	31,260.5	0.9	41,846.1	1.2	35,710.1	1.0	22,610.7	0.6	37682.6	1.1	21954.2	0.6	27,145.4	0.8
Open Grassland	688,370.0	19.6	617,536.1	17.6	683,680.0	19.5	419,922.3	11.9	300252.5	8.5	307478.7	8.7	182,766.5	5.2
Other land	9,930.4	0.3	15,692.3	0.4	5,003.8	0.1	13,856.5	0.4	14953.8	0.4	21373.5	0.6	9,930.4	0.3
Perennial Cropland	92,246.8	2.6	103,358.1	2.9	100,415.1	2.9	108,784.3	3.1	143850.5	4.1	112372.5	3.2	74,741.5	2.1
Vegetated Wetland	11,689.9	0.3	12,758.0	0.4	11,345.9	0.3	25,008.9	0.7	31908.7	0.9	18850.9	0.5	13,259.4	0.4
Water body	394,733.9	11.2	393,919.7	11.2	394,958.2	11.2	393,915.5	11.2	391418.6	11.1	393017.4	11.2	394,402.5	11.2
Wooded Grassland	745,826.5	21.2	777,773.7	22.1	564,340.0	16.1	486,779.8	13.9	356315.1	10.1	363087.6	10.3	241,499.1	6.9
Total	**3,514,553.1**	**100**	**3,514,553.1**	**100.0**	**3,514,553.1**	**100.0**	**3,514,553.1**	**100.0**	**3514552.0**	**100.0**	**3514553.1**	**100.0**	**3,507,509.2**	**100.0**

42. About 75 % of Lake Victoria's wetlands area has been affected significantly by human activity with 13 % being severely damaged[104]. In the last fifty years, wetlands in the LVB have been facing serious problems of degradation and their ability to continue providing valuable ecological services is threatened[105]. The main threats to wetlands are reclamation for agriculture, overgrazing, human settlement and encroachment, siltation, pollution (mainly from agriculture and industrial sources) introduction of exotic species such as blue gum trees (Eucalyptus spp.) and overharvesting of water dependent plants. Unsustainable exploitation of papyrus has led to complete loss of some wetlands and causing cascading negative impacts on biodiversity in these important ecosystems[106]. Changing land use and intensity in the wetland has compromised their integrity, resulting into sedimentation, flooding, loss of biodiversity, poor water quality, eutrophication and loss of fish (Figure 10: Side by Side views of Land use in 1992 and 2020, LREB).

FIGURE 10: SIDE BY SIDE VIEWS OF LAND USE IN 1992 AND 2020, LREB[107]



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[107] Map created from earthmap.org, retrieved January 2023, The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

43. Riverine and lacustrine wetlands can be found in various parts of the LREB as shown in Table 4. The major wetlands in the Lake Victoria North Basin (LVNB) are the Yala Swamp, Lake Kanyaboli and the Sio-Siteko River Wetland with the latter being a transboundary wetland. The Kingwal swamp, which was located north of the Nandi hills has now been completely drained for settlement and agriculture[108]. In the Lake Victoria South Basin (LVSB), the wetlands are associated with the Migori, Nyando and Sondu Miriu Rivers, all of which originate in the Mau Forest Complex and drain into Lake Victoria.

TABLE 4: AREA OF WETLANDS IN 14 LREB COUNTIES

County	Area of wetland[109]	Wetland Type
Bomet	1,031 Ha	Marsh
Bungoma	1,904 Ha	Marsh
Busia	22,355 Ha	Open water (90%), Wet Meadow, Marsh, Swamp, wetland in dry area
Homa Bay	160,901 Ha	Open water (92%),Swamp, Flood Swamp, Marsh, Wet Meadow
Kakamega	3,883 Ha	Marsh (81%), Wetland in dry area, wet meadows, swamp, Fen, flood swamp
Kericho	577 Ha	Marsh (93%), samp,wet meadow
Kisii	0	
Kisumu	70,367 Ha	Open water (77%), wet meadow, marsh, Swamp, wetland in dry area, flood swamp
Migori	55,883 Ha	Open water (93%), marsh, swamp
Nandi	835 Ha	Marsh (73%), swamp, wet meadow
Nyamira	32 ha	Marsh
Siaya	356,059 Ha	Open water (93%), Wet Meadow, Marsh, Swamp, wetland in dry area, flood swamp
Trans-Nzoia	275 ha	Marsh
Vihiga	110 ha	Marsh, Swamp, Wet Meadow

Forests and forest degradation

[108] Kenya wetlands atlas, 2012, Ministry of Environment and Mineral Resources, Kenya.
[109] All data from https://www2.cifor.org/global-wetlands/ The total area of wetland includes open water.

44. There are various catchment areas in the LREB, including the Mau Forest Complex, Mount Elgon, Kakamega, Nandi, and Cherangany Hills, which are significant sources of rivers that flow into the lake[110] and support multiple economic activities including agriculture, fisheries, and tourism.

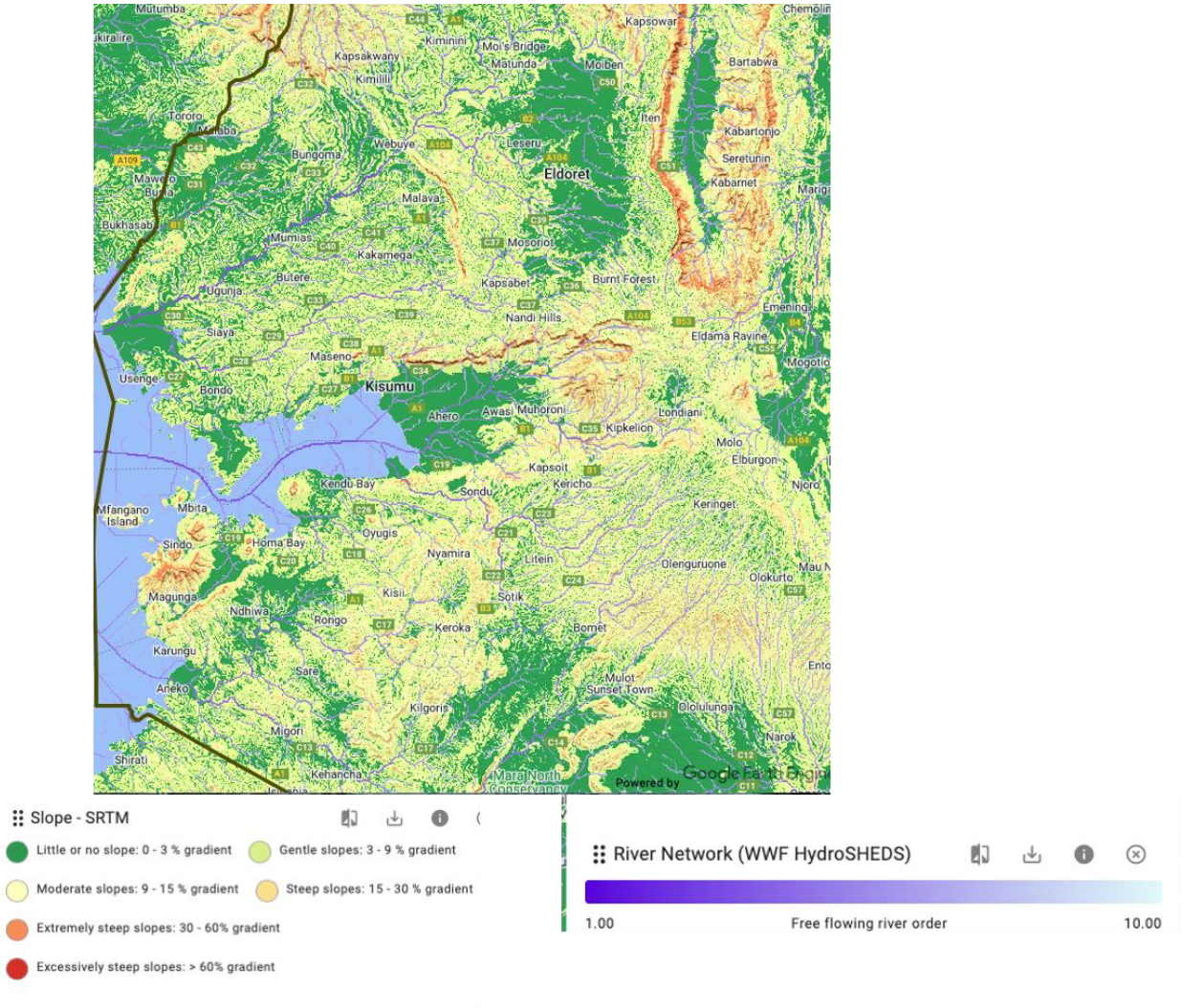

FIGURE 11: MAP ILLUSTRATING ELEVATION AND RIVER NETWORKS[111]

45. Deforestation in the LREB is attributed to agricultural expansion, increased demand for wood fuel and forest products, for settlement and infrastructural related developments for the increasing population. The forest cover has been fluctuating over the years from 1990, 2000, 2010 to 2018 with coverage of 285,801;240,521; 261,432 and 272,103 Ha respectively (Figure 12: Change in Forest

[110] Lake Victoria Basin Commission (2017). Lake Victoria basin-atlas of our changing environment. Kisumu, Kenya: GRID-Arendal. See https://www.grida.no/publications/328

[111] Sourced from earthmap.org; The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Cover in LREB, 1985-2020 . From 1990 to 1995, dense forest cover increased by 0.9% while 1995 to 2000 saw a sudden decline in dense forest cover by 2.2% followed by an increase of 1.8% from 2000 to 2015. However, a slight decline (of 0.9%) was experienced between 2015 and 2018. Dense forest cover loss could be a consequence of clearing forested areas to provide land for other competing uses such as agriculture, and settlement while increase in forest cover could be due to increased agroforestry practises within the region.

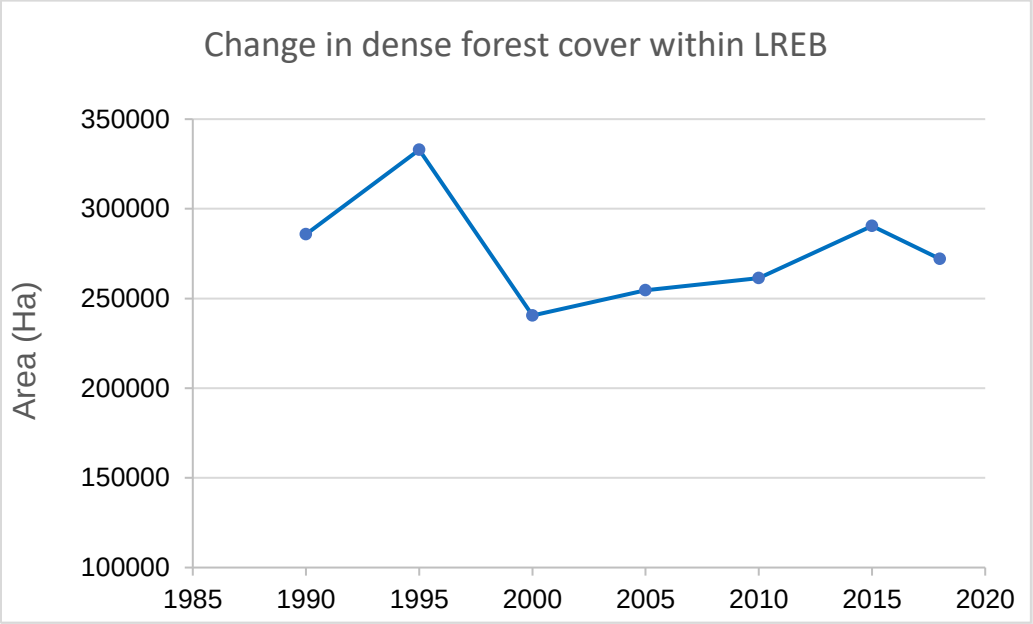

FIGURE 12: CHANGE IN FOREST COVER IN LREB, 1985-2020

46. From 1990 to 1995, *open forest* increased by 0.3% followed by a decrease 0.6% between 1995 and 2005. The period 2005 to 2010 saw an increase of 0.5%, followed by decrease of 0.5% (2010 to 2015), then increase of 0.2% (2015 to 2018). The increase is attributed to vegetation recovery from shrublands to open forests.
47. *Wooded grassland* increased by 0.9% from 1990 to 1995 then declined by 12% between 1995 and 2010. From 2010 to 2015, it increased by 0.2% followed by a decrease of 3.4% between 2015 and 2018. Increase in wooded cover in some areas and a loss of natural vegetation in other areas could be attributed to cropland expansion and overgrazing.
48. Additionally, implementation of the Farm Forestry Rules (2009) under the Agriculture Act, requiring at least 10% forest cover in every private farm, might have contributed some of the gains in forest cover in LREB.

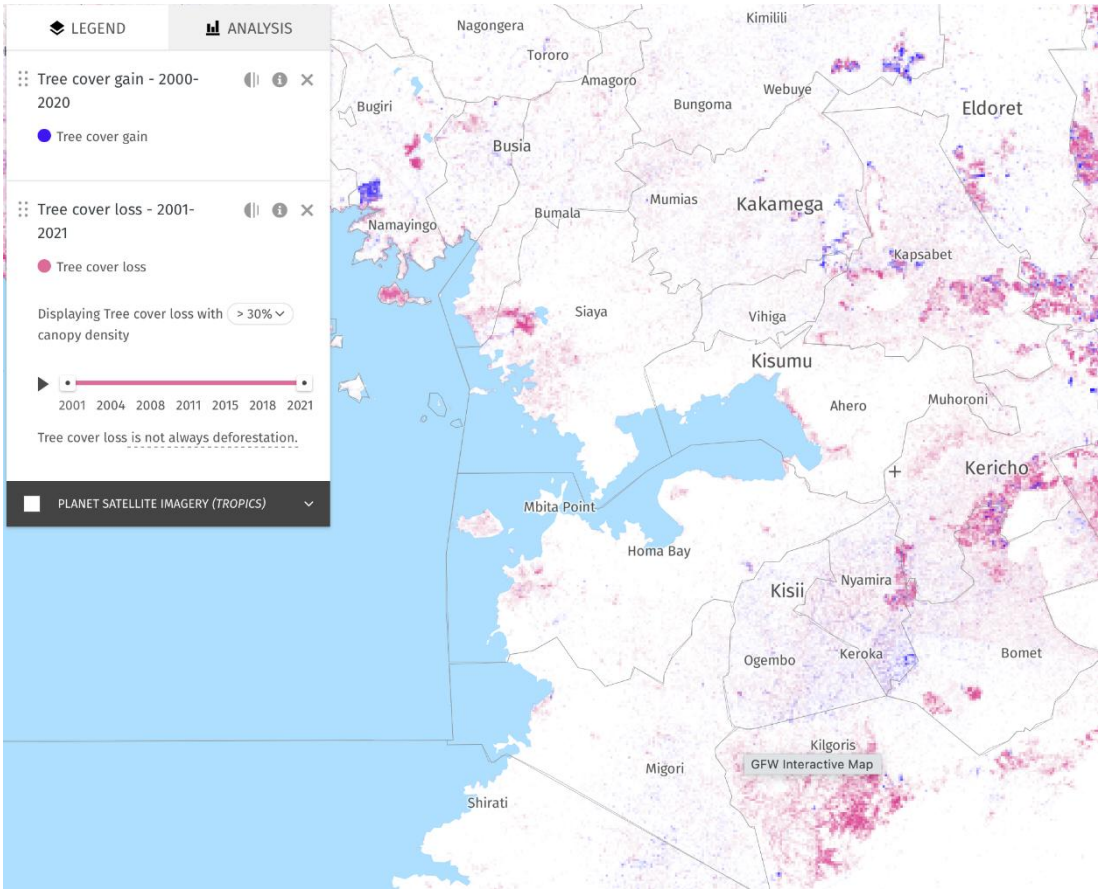

FIGURE 13: TREE COVER GAINS AND LOSSES 2000-2021[112]

49. Three of the five major water towers in Kenya namely Mau Forest Complex, Cherangany Hills, and Mt. Elgon are found within the LREB and are the main sources of many rivers feeding into the lake. The Water Towers are central to the economic and social well-being of the country providing over 75% of the country's water resources[113]. Over the last few decades, Kenya's water tower forests have suffered increased degradation. All three forest blocks are surrounded by areas that are highly vulnerable. Of the three water towers, Mt. Elgon is the least vulnerable with 57% under the Low category. Due to the projected stress from future climate scenarios, the vulnerability of the water towers will increase in the future. Mau Forest has lost at least a quarter of the indigenous forest cover in the past few decades and this degradation has also occurred in Mt. Elgon and Cherangany Hills. Between 2000 and 2010, deforestation in Kenya's water towers was estimated to be about 50,000 hectares. Overall vulnerability will increase in the water towers leading to erosion of the resilience of the exposed ecosystems and the communities that rely on ecosystem services these

[112] Global Forest Watch; The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

[113] GoK (2013). National Climate Change Action Plan 2013-2017 . Nairobi: Government of Kenya.

landscapes provide[114]. The Government of Kenya (GoK) has pledged to restore 5.1 million hectares of forests by 2030. This is estimated to sequester 0.48 Gt of carbon dioxide[115].

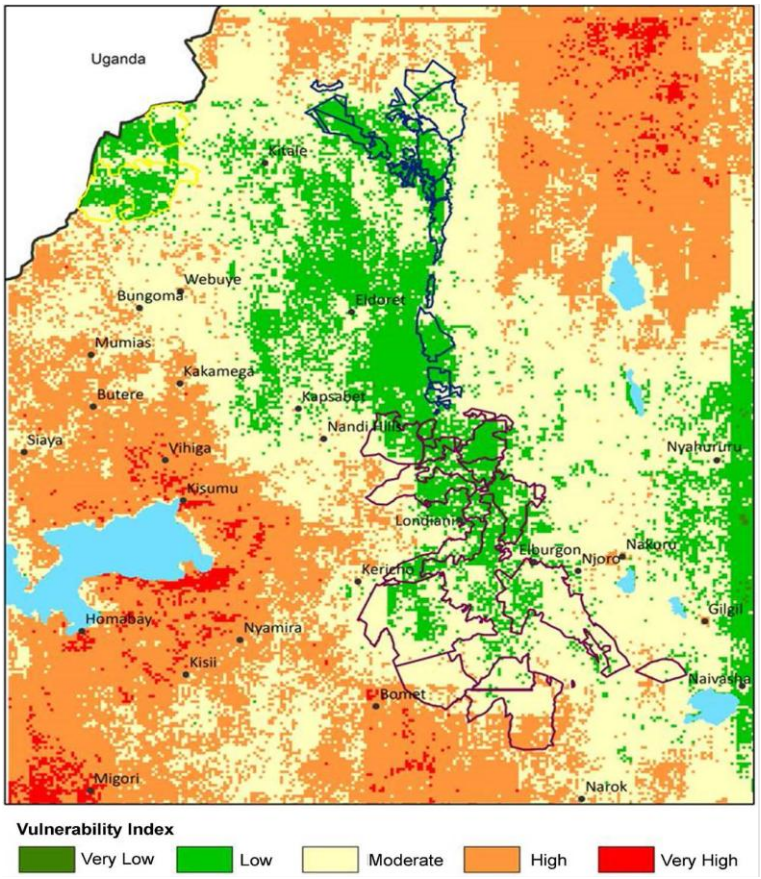

FIGURE 14: CLIMATE CHANGE VULNERABILITY INDEX MAP OF THE WATER TOWER ECOSYSTEMS[116]

Agriculture as a driver of land use change

[114] Mwangi, K. K., Musili, A. M., Otieno, V. A., Endris, H. S.,Sabiiti, G., Hassan, M. A., Tsehayu, A. T.,Guleid, A., Atheru, Z., Guzha, A. C., DeMeo, T., Smith, N., Makanji, D. L., Kerkering,J., Doud, B., & Kanyanya, E. (2020).Vulnerability of Kenya's Water Towers to Future Climate Change: An Assessment to Inform Decision Making in Watershed Management. American Journal of Climate Change, 9, 317-353.https://doi.org/10.4236/ajcc.2020.93020

[115] Mwangi, K. K., Musili, A. M., Otieno, V. A., Endris, H. S.,Sabiiti, G., Hassan, M. A., Tsehayu, A. T.,Guleid, A., Atheru, Z., Guzha, A. C., DeMeo, T., Smith, N., Makanji, D. L., Kerkering,J., Doud, B., & Kanyanya, E. (2020).Vulnerability of Kenya's Water Towers toFuture Climate Change: An Assessment to Inform Decision Making in Watershed Management.American Journal of ClimateChange, 9, 317-353.https://doi.org/10.4236/ajcc.2020.93020

[116] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

50. Land use and land cover (LULC) changes in the LREB are mainly driven by small-scale agricultural activities [117]. The land use analysis undertaken by the Department of Remote sensing (DSRS)[118] portrays a steady increase in annual cropland between 1990 and 2018 by 29.5% from 1,285,954.7 ha to 2,318,806.7 ha. This could be attributed to increase in population that has created the demand for more food to sustain the increasing population in LREB region. Between 1990 and 2010, perennial cropland increased by 1.5% followed by a decline of 2% from 2010 to 2018. The increase in perennial cropland could be attributed to increased demand for food production due to the increasing population, while the decrease could be attributed to the problems of land degradation which could sometimes make farmers abandon agricultural farms which have become infertile over time due to intense cultivation. Additionally, this variation could have resulted from the gradual shifting of households from farming to fishing due to unpredictable rain-fed agricultural production.

Erosion

51. Approximately 45% of the land in the Lake Victoria Basin is susceptible to water erosion, which is widespread in several areas. A study on impact of land use/cover changes on soil erosion in western Kenya between 1995 and 2017 found that farms contributed more than 50% of soil loss in both years, followed by grass/shrub (7.9% and 11.9%); forest(16% and 11.4%) in 1995 and 2017 respectively[119]. Nyando basin is a major source of sediment into Lake Victoria with 61% of the basin of 3,500 km^2 constituting a source area with average erosion rates of >40 t/ha/yr. Since 1963, the total soil loss to the lake has averaged 3.2 million metric tons per year. Unsustainable farming practices especially in Lake Victoria basin hilly zones, 34iparian areas and wetlands, generate serious soil erosion[120]. In some parts of the LREB where leasing of land is practiced, leased lands are badly degraded since tenants have no incentive to invest in soil conservation for the land they do not own. There are also no strict rules governing the use of leased land for instance in Katuk-Odeyo of Nyando sub-basin where Kalenjins[121] lease land to luos[122] for crops and grazing[123].

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[117] Mugo, R., Waswa, R., Nyaga, J. W., & Ndubi, A. (2020). Quantifying Land Use Land Cover Changes in the Lake Victoria Basin Using Using Satellite Remote Sensing : The Trends and Drivers between 1985 and 2014. (September). https://doi.org/10.3390/rs12172829

[118] DRSRS, 2022. Land Use and Land Cover Change Analysis. Nairobi

[119] Kogo BK, Kumar L, Koech R. Impact of Land Use/Cover Changes on Soil Erosion in Western Kenya. *Sustainability*. 2020; 12(22):9740. https://doi.org/10.3390/su12229740

[120] Odada, E.O., Olago, D.O. and Ochola, W., Eds., 2006. Environment for Development: An Ecosystems Assessment of Lake Victoria Basin, UNEP/PASS

[121] Ethnic group

[122] Ethnic group

[123]World Agroforestry Centre, 2006. Improved Land Management in the Lake Victoria Basin: Final Report on the TransVic project. ICRAF Occasional Paper No. 7. Nairobi. World Agroforestry Centre

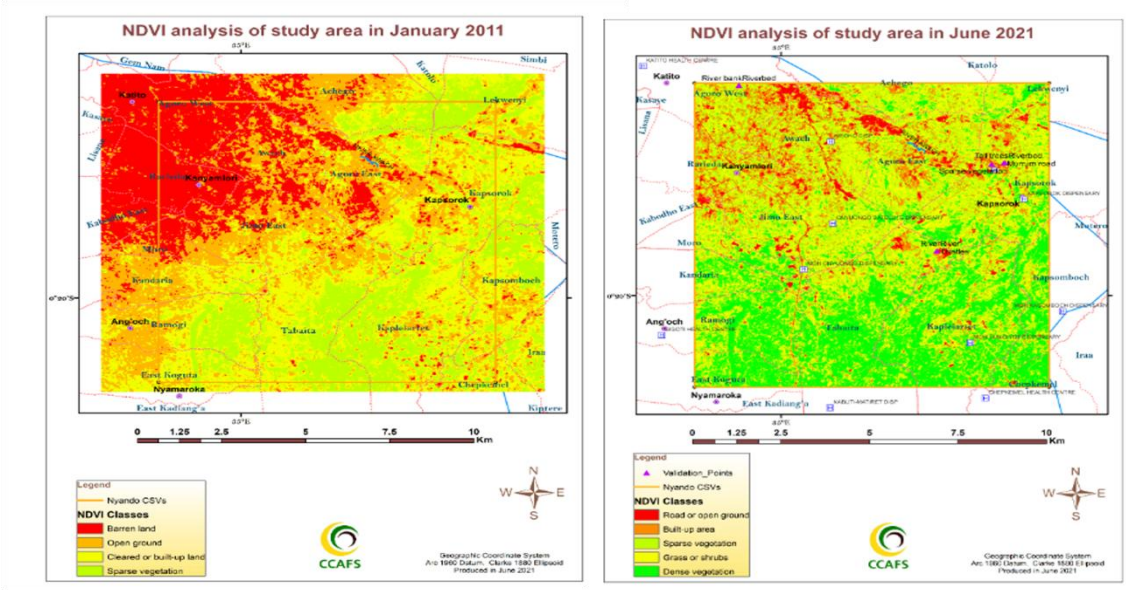

FIGURE 15: *SIDE BY SIDE VIEWS OF MAP OF NYANDO SUB-BASIN FOR THE YEAR 2011 AND 2021*[124].

52. Changes in run-off rates have already begun to manifest and are also expected to increase with the incoming changes in rainfall patterns (Figure 17). This will exacerbate soil erosion particularly in areas where soil cover is decreased[125].

Land degradation

53. Various types of soil and land degradation are seen in LREB, including soil erosion, increased sediment loading of water bodies, loss of soil fertility, salinity, reduced ground cover, and the reduced productive capacity of pastures. The risk of land degradation fueled by land use and land cover changes is considered high in many parts of LREB, while it is already manifesting in northern and eastern parts of Kenya, where degradation is already severe[126].

[124] Source: Chelangat R, Okoth K, Setey R, Musuya D, Ochieng B. 2021. Village Endline Survey: Site Analysis Report for Nyando - Katuk Odeyo, Kenya. CCAFS Report. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[125] See for example Kogo, Benjamin & Kumar, Lalit & Koech, Richard. (2020). Impact of Land Use/Cover Changes on Soil Erosion in Western Kenya. Sustainability. 12. 9740. 10.3390/su12229740.

[126] Mulinge, W. *et al.* (2016). Economics of Land Degradation and Improvement in Kenya. In: Nkonya, E., Mirzabaev, A., von Braun, J. (eds) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer, Cham. https://doi.org/10.1007/978-3-319-19168-3_16

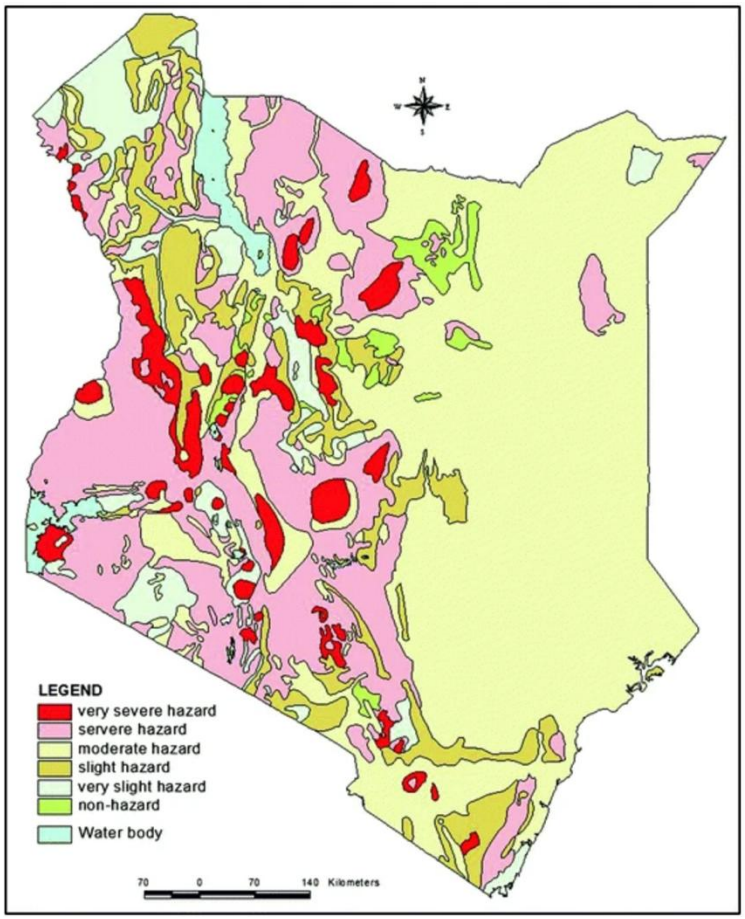

FIGURE 16: LAND DEGRADATION HAZARD[127]

Water availability

54. Lake Victoria is the second-largest freshwater lake in the world presenting the area with enormous water and aquatic resources. River Nzoia, Sio, Yala, Nyando, Kibos, Sondu-miriu, Kuja, Migori, Riaria, and Mawa are the major rivers within the basin in Kenya flowing into Lake Victoria. They contribute over 37.6% of its surface water inflows. The total natural surface water within the LREB equals 12,392 MCM/yr while the annual groundwater recharge for the LREB is approximately 3,603 MCM/a[128]. The annual groundwater recharge for the Lake Victoria Basin is estimated 2,821 MCM/a

[127] Securing Land for Sustainable Livelihoods: Perspectives on Land Reform & Contract Farming in Kenya, The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

[128] The World Bank. (2013). Kenya Water Security and Climate Resilience Project. Retrieved from https://projects.worldbank.org/en/projects-operations/project-detail/P117635?lang=en&tab=ov operations/projectdetail/P117635?lang=en&tab=overview

in 2050 [129], with a sustainable annual groundwater yield of 508 MCM/a. Lake Victoria North Basin (LVNB) Projected sub-basin precipitation and temperature changes under climate change.

55. The natural run-off in the basin is expected to decrease between 6% and 15% in most areas across the basin, with the largest decrease occurring in the Yala swamp sub-basin. The total surface water run-off from the LVN Basin is projected to decrease with almost 8% to 5 177 MCM/a. Even though rainfall is projected to increase, the expected increase in temperature and associated evapotranspiration due to the dense vegetation in the basin, will thus result in a net reduction in surface water run-off from the basin[130]. Lake Victoria South Basin (LVSB) Projected sub-basin precipitation and temperature changes under climate change. The natural run-off in the basin is expected to decrease in most sub-basins by between 1% and 3%, with some sub-basins staying unchanged or slightly lower or higher. The total surface water run-off from the LVS Basin is projected to decrease with 1.4% to 6 674 MCM/a. Recharge in the basin will increase by 3% to 2 154 MCM/a, while the potential groundwater yield is expected to increase by 4% to 303 MCM/a[131] (Figure 17).

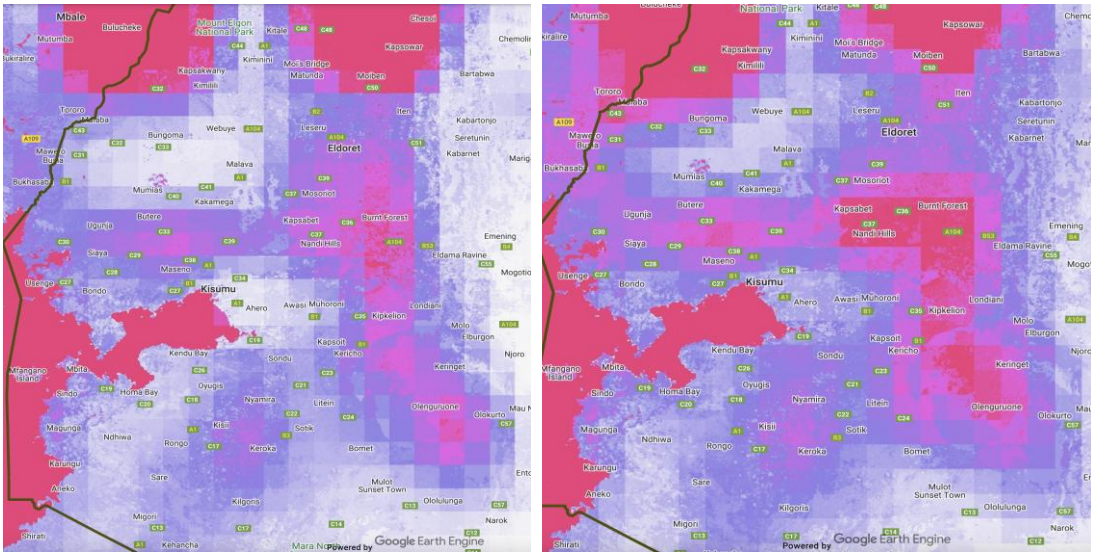

FIGURE 17: RUN-OFF RATES 2000-2022

[129] Jica (2013). The Development Of The National Water Master Plan 2030

[130] Aurecon AMEI Limited.2020.Lake Victoria North Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp.

[131] Aurecon AMEI Limited.2020.Lake Victoria South Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp.

56. Water supply in most parts of the basin is medium to high[132] due to the generally good availability of surface and groundwater. However, frequent shortages are experienced during the dry season due to limited storage, hence, not meeting domestic, industrial and irrigation needs especially for areas receiving low amounts of rainfall. Most of the water currently consumed in the LREB is for domestic and industrial use, followed by irrigation. The water is sourced directly from Lake Victoria, rivers, small dams, and pans and from groundwater. Over 40% of the population lack access to safe potable water[133].

57. The estimated total water demand café the LREB Basin as of 2018 equates to 919 MCM/a (see Table 5[134]) and demand is expected to grow[135], as seen in Table 6. The total irrigated area in the LVN Basin is estimated as 3 629 ha (2018). This represents an increase of about 93% compared to the 2010 irrigation area of 1 876 ha. In 2018, the livestock water demand in the Lake Victoria North Basin (LVN) was estimated at 29 MCM/a[136]. The total current (2018) irrigated area in the Lake Victoria South Basin is estimated as 16 616 ha. Of this, about 5 500 ha is large-scale irrigation. This represents an increase of about 26% compared to the total 2010 irrigation area of 13 200 ha as determined in the NWMP 2030 and confirms the increase in irrigation in the basin[137]. A study by JICA (2019) however gives total area under irrigation to be 57, 475 Ha. There are currently no large hydropower installations in the LVNB [138] , while in there is only one existing dam in the LVSB Basin: the Sondu-Miriu Dam on the lower Sondu River with a storage capacity of about 1 MCM, is used for hydropower production. Various other small dams and pans occur throughout the Basin with a combined storage of 5.3 MCM/a[139].

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[132] Medium- water supply is enough for everybody but can go down to alarm state. High - water supply is satisfactory.

[133] Lake Region Economic Bloc. 2014. Lake Region Economic Bloc blue print. Kisumu & Mulwa, F., Li, Z. and Fangninou, F.F. (2021) Water Scarcity in Kenya: Current Status, Challenges and Future Solutions. Open Access Library Journal, 8, 1-15. doi: 10.4236/oalib.1107096

[134] The World Bank. (2013). Kenya Water Security and Climate Resilience Project. Retrieved from https://projects.worldbank.org/en/projects-operations/project-detail/P117635?lang=en&tab=ov operations/projectdetail/P117635?lang=en&tab=overview.

[135] JICA Study Team (Ref. Main Report Part A, Sub-section 5.2.3)

[136] Aurecon AMEI Limited.2020.Lake Victoria North Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp.

[137] Aurecon AMEI Limited.2020.Lake Victoria South Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp

[138] Aurecon AMEI Limited.2020.Lake Victoria North Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp.

[139] Aurecon AMEI Limited.2020.Lake Victoria South Intergrated Water Resources Management and Development Plan,Final Report. Technical Report prepared for the Ministry of Water,Sanitation and Irrigation,Republic of Kenya by Aurecon.AMEI Limited,Ebene,Mauritius,264 pp

TABLE 5: WATER REQUIREMENTS IN THE LAKE VICTORIA BASIN PER SECTOR

Sector	Total Volume (MCM/a)
Large-scale irrigation	99
Small Scale irrigation	197
Domestic and Industrial	505
Livestock	91
Others	27
Total	**919**

TABLE 6:LREB PRESENT AND FUTURE WATER DEMANDS BY CATCHMENT AREA (MCM/YEAR)

Catchment Area	2010	2030	2050
Lake Victoria North Catchment Area[140]	228	1,337	1,573
Lake Victoria South Catchment Area[141]	385	2,953	3,251

1.5 The 6 Value Chains

58. Value chains were selected through a participatory process, in which counties ranked value chains according to 10 criteria, including environmental and climate considerations, socio-economic considerations, level of organization and demand, technical needs and gaps and feasibility, which are explained in detail in Section 6.1 of this document. After consultation missions in the LREB, the value chains selected were: coffee, dairy, fruit trees, indigenous vegetables, poultry, and tea (Table 7).

TABLE 7 MAIN VALUE CHAINS IN EACH COUNTY

	Value Chains					
Counties	*Coffee*	*Dairy*	*Fruit Trees*	*Indigenous Vegetables*	*Poultry*	*Tea*
Bomet	**X**		**X**			**X**

[140] Includes Bungoma, Busia, Kakamega, Nandi, Trans Nzoia, Vihiga
[141] Includes Bomet, Homa Bay, Kericho, Kisii, Kisumu, Migori, Nyamira and Siaya

Bungoma	X			X	X	X
Busia				X		
Home Bay		X				
Kakamega		X		X		
Kericho	X	X	X			X
Kisii	X	X	X	X		
Kisumu		X	X		X	
Migori	X	X		X		
Nandi	X		X	X	X	
Nyamira	X	X		X		X
Siaya			X			
Trans-Nzoia	X	X		X	X	X
Vihiga		X	X		X	

Coffee

Coffee

59. Kenya is the fifth-largest coffee producer in Africa producing 34,5 tons in 2020/2021 season. In Kenya, coffee is grown by both smallholder farmers in cooperatives and private estates (Figure 10) as a cash crop for export purposes. Coffee-growing areas are located within the Western, Rift Valley, Central Kenya and Mount Kenya regions (Figure 11). Coffee is grown in the high potential areas between 1,400 and 2,200 metres above sea level, with temperature ranging from 15°C to 24°C, in red volcanic soils that are deep and well drained. In the LREB, more specifically in Kisii, Bungoma, Kericho, Nandi and Bomet, Arabica coffee is widely grown (Figure 11 and Figure 12) and used for exportation due to its high quality worldwide[50], growing the following varieties[51]:

    - SL 28 – a variety more suitable to medium to high altitudes;
    - SL 34 – suitable to high altitudes and good amount of rainfall, although less resistant to coffee berry disease, coffee leaf rust, and bacterial blight of coffee;
    - K7 – a coffee leaf rust resistant and coffee berry disease-resistant varieties, suitable to lower altitudes;
    - Ruiru 11 is adaptable to all coffee-growing areas, it allows for an intensive production with higher density (2500-3300 trees/ha compared to 1300 trees/ha of other traditional varieties), its production started recently, and it is coffee berry disease and leaf-rust resistant;
    - Batian variety has high yields and is suitable to all coffee-growing areas, it is resistant to coffee berry disease and leaf rust and has lower trade-offs between the time of planting and the time of coffee production (after the 2nd year compared to the 3rd year for traditional varieties, after which they last up to 60 years), thus favourable for farmers to have a more rapid return on investment.

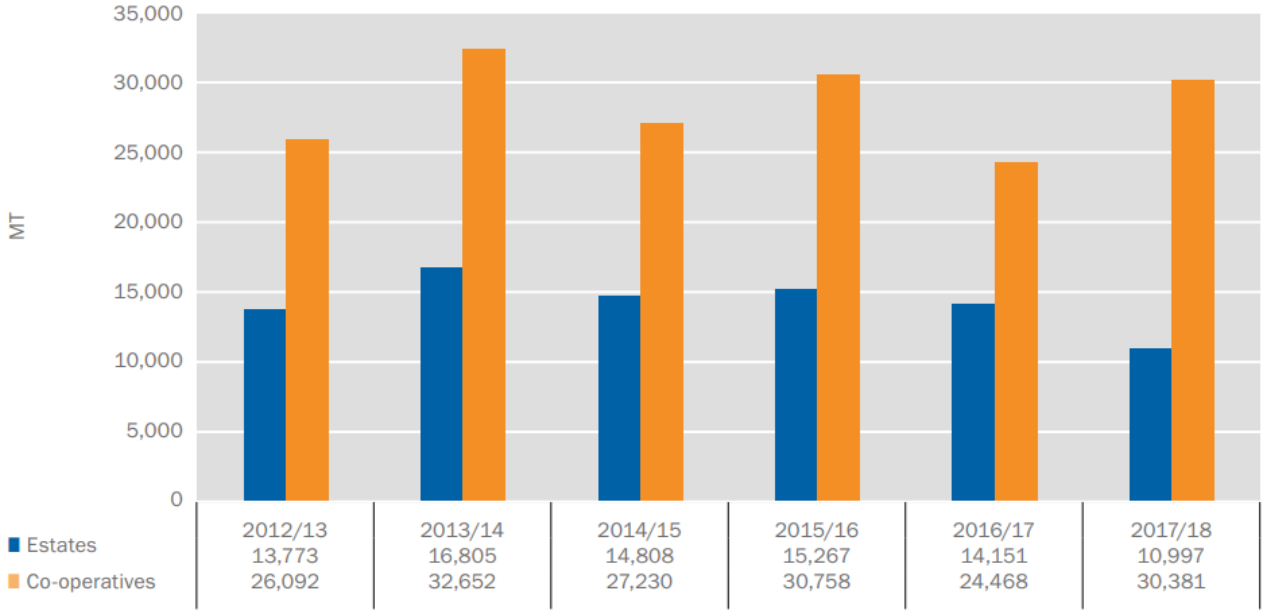


Figure 10. Estates and cooperatives coffee yearly production (MT). Source: International Coffee Organization (2019)[52].

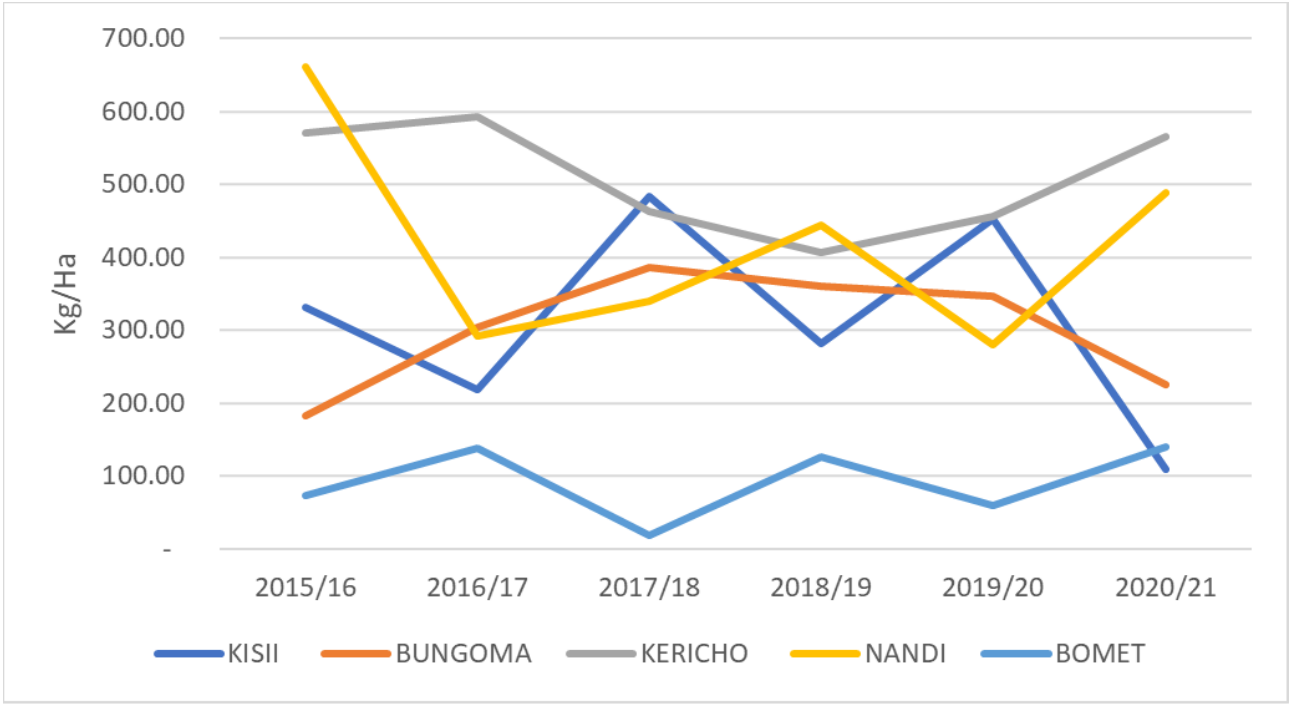


Figure 11. Coffee yearly production per county. Source: Kenya National Bureau of Statistics (2023).

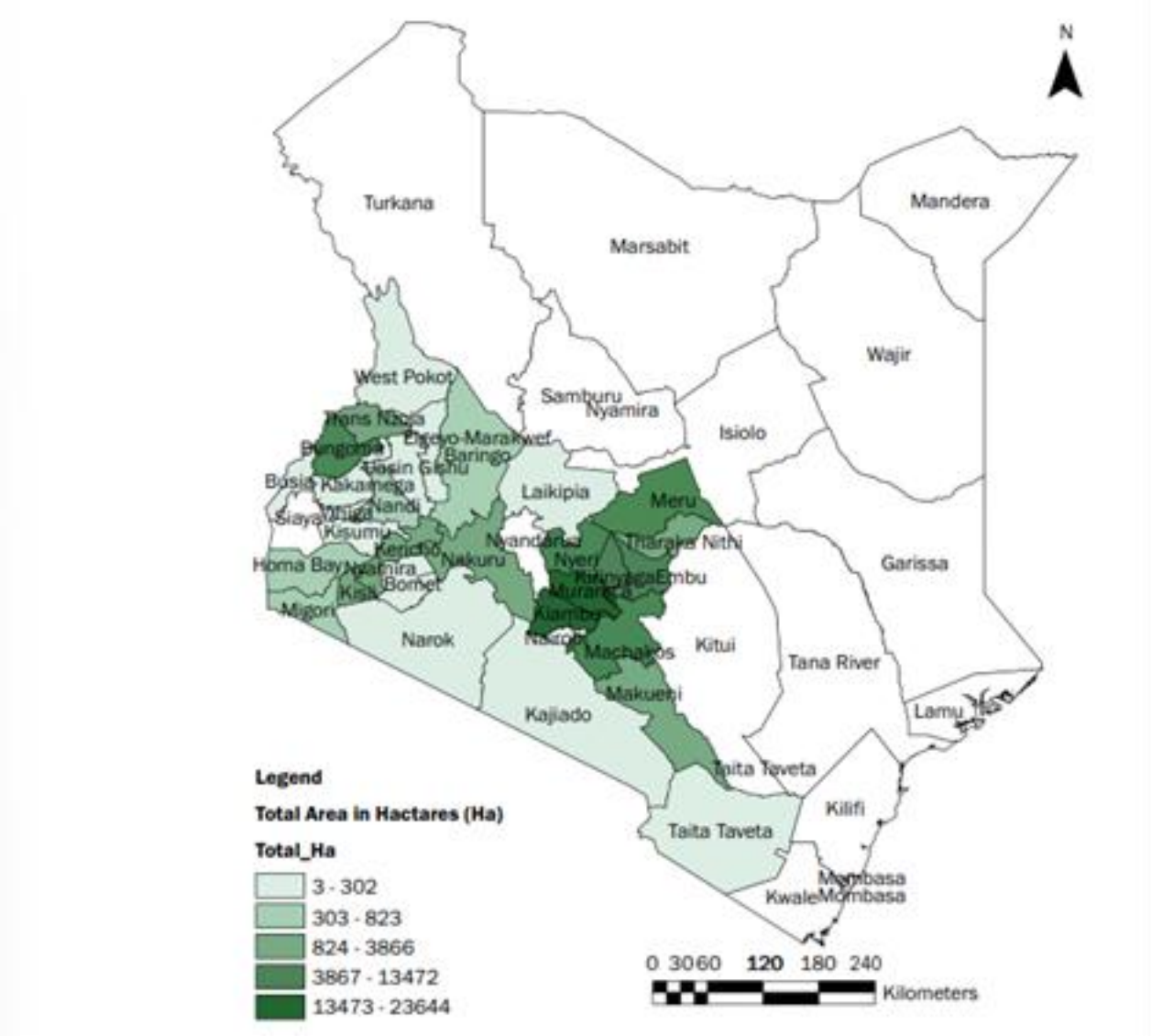


Figure 12. Coffee growing counties as of 2019[142]. Source:[53].

60. As seen in Table 8 below, the coffee value chain has few steps between production and consumption. Coffee is extremely valuable and is one of the dominant value chains in LREB. Climate change risks are rising temperatures, more severe and frequent extreme events such as droughts, floods, greater pest and disease incidence, and soil degradation.

[142] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

61. Node 1, production, is conducted by 800,000 smallholder farmers and 3000 plantations nationwide, with smallholder farmers accounting for 40-60% of Kenya's coffee production. In the LREB, Bomet, Bungoma, Busia, Homa Bay, Kisii, Nandi, Nyamira, Siaya, and Trans Nzoia are the main coffee producing counties. Smallholder farmers also control 75% of the land used for coffee production approximated at 119,617 hectares nationally. Farmers receive extension services and relevant inputs from Coffee Research Foundation (CRF), Kenya Coffee Planters' Association (KCPA) and private sector actors. While estates/plantations directly send their coffee berries to processors, smallholder farmers aggregate their production via cooperatives.

62. Node 2 is comprised of the post-collection/aggregation processing, which can either be wet or dry milling. In the wet milling process, coffee berries are first washed, then pulped to remove skin and pulp, then fermentation 48 to 72 hours. After fermentation, seeds are washed to clear all remaining pulp and then sun dried for 14 days or until the moisture content is 11%. During the rainy season the coffee is covered with polythene sheets to avoid wetting. Some of the big commercial estates use mechanical drying. In the dry milling process, the green coffee is placed on wire mesh tables and left to dry until the required moisture content of 11% is attained. Once it is dried, the coffee beans are hulled where the dry pulp and parchment are removed in a single operation.

63. Once dried, the pulped coffee is sorted by size and density and graded as parchments 1-3. Parchment 1 is the heaviest coffee. Parchment 2 is the medium density coffee. Parchment 3 or P-Lights is the lightest one. The grading of the coffee does not affect its quality, but rather its class instead. The parchments are then weighed, packed into bags, and transported to millers for milling. Secondary processing occurs at the mills, where coffee is weighed using a digital weighing machine, analyzed for quality, and then undergo hulling. After hulling, coffee beans are graded by size, weight, and density, colour flaws, and other imperfections[143].

64. After processing, coffee enters Node 3, Trading. The coffee market is conducted primarily via weekly auctions at the Nairobi Coffee Exchange (NCE). The NCE accounts for over 80% of the total sales. The rest of the coffee is marketed through the direct sales. Registration and licensing to participate in auctions is conducted by the Coffee Directorate who issues yearly licence to commercial marketing agents, growers, and coffee exporters[144]. Growers who register with the Coffee Directorate can sell

[143] Coffee grades range from 1 (worst) to 10 (best), this allows to further sort coffee within a grade. Grades E, AA, AB and PB are regarded as the premium grades. Kenya AA is one of the world's finest specialty coffees. Grade AB consist of bean types A and B mixed and is the most plentiful in a particular consignment and used to represent other grades. Other grades include: SB (sorted beans), UG (ungraded) cherry and HE (hulled ears). Mbuni coffee is graded as MH (Mbuni Heavy) and ML (Mbuni Light) depending on the density.

[144] Coffee exporters link the Kenyan coffee-producing counties to foreign markets. They also provide finance to both sellers and buyers (taking on the price risk). They undertake the overseas marketing and commercialization of coffee. They do logistics functions and have coffee quality expertise. Kenyan coffee export market is segmented into traditional, specialty and emerging markets. About 60% of the coffee is exported to the traditional market which is made up mainly of countries in the European Union. About 20% of coffee is exported to the specialty market that is led by the USA and includes Japan, Canada and some countries from the European Union. About 15% of the coffee goes to the emerging coffee markets which includes the Gulf region, China, Korea, Malaysia among others and have developed affinity for Kenyan coffee grades: T, C, MH, ML, and UGs . The rest of the coffee is roasted, packaged and sold domestically

their beans directly to overseas buyers. Currently, there are 11 licensed commercial marketing agents and 22 grower marketers.

65. Warehousing is overseen by 7 commercial warehouses and 14 private warehouses registered and licensed by the Coffee Directorate. They store the coffee for the commercial marketing agents as they await to present it at the Nairobi coffee exchange for auctioning and afterwards for export at the port[145].

66. Node 4, Consumption, consists of both the export and domestic market with 95% of Kenya's coffee being exported and 5% is domestically[146] consumed. The largest buyer of coffee from Kenya in 2020/2021 was Belgium at 20% followed by the US at 15%. The others were Germany, Korea and Sweden at 13%. 10% and 7% respectively. The domestic market is highly diversified: mainstream coffee blends, informal coffee hawkers, independent coffee shops, and global chains such as Java Coffee, Savannah, Café Deli & Delicatessen, Art café and Bakery Ltd., and the Avanti Group of restaurants.

TABLE 8 COFFEE VALUE CHAIN ACTORS AND MODEL[147]

Value Chain Node	Value Chain Actor	Activity
1. Inputs	Smallholder Farmers Estates/Plantations	• Planting and harvesting of coffee bean
	Cooperatives	• Aggregate/collect harvest coffee berries from smallholder farmers
2. Production	Primary Processing (Wet or Dry Milling)	• Coffee berries are processed via wet or dry milling process • After processing, coffee beans are bagged and transported to Miller *Wet Method:* • Coffee berries are fermented for 48 – 72 hours • Coffee berries are washed to remove pulp from fermentation • Coffee berries are then dried in the sun for up to two weeks or until moisture content is 11% *Dry Method:* • Coffee is sun dried for two weeks or until 11% moisture content first • Coffee beans are then hulled and placed in sacks

[145] Both Kenya and the international coffee markets depend heavily on coffee traders/exporters to supply green coffee for roasting and packing. Almost 95% of the Kenya's coffee is exported in green form every year, and only 5% is exported in roast and ground form mainly within the Africa. This is because the consuming countries prefer freshly ground and brewed coffee. According to Coffee Directorate, there are 84 registered and licensed coffee dealers/exporters. Sasini Ltd, Domarns Coffee Limited, Nairobi Java House are some of the known coffee dealers.
[146] There are about 25 coffee roasters in Kenya, of which 4 are grower marketers and 1 university. The growers and private roasters are licensed to roast, pack and market Kenyan coffee locally and internationally. Coffee is purchased through auction and after roasting is retailed in major urban centres and coffee shops. The domestic market consumes both locally produced and imported coffee products. The locally produced coffee brands include Java, Dormans and Gibsons coffee and are sold in retail outlets in Uganda, Tanzania and Rwanda.
[147] FAO, 2022 – see Annex 23 for full reports

		• Sacks are aerated for up to 6 months and then sent to secondary processing
	Secondary Processing	• Coffee beans are weighed with digital weighing machine • Quality control analysis conducted • Beans are then hulled • Beans are then graded 1(worst) to best (10) • In Kenya beans are also graded AA, AB, PB, C, E ,TT, and T[148]
3. Certification	International certifiers (e.g. Fairtrade International, Rainforest Alliance, etc.) ,	• Develop, regulate, and certify sustainability and fair-trade certification of certified and non-certified coffee producers
4. Trading	Marketing Agent	• Nairobi Coffee Exchange (NCE) markets Kenyan coffee[149]
	Auction	• Held weekly by the NCE • Market where auctioneers sell to dealers/exporters
	Warehouses	• Warehouses store coffee post-auction but before export to foreign markets or distribution to local customers
	Dealers/Exporters	• Buy coffee for local sales and overseas exports
5. Consumption	Domestic Customer	• Coffee roasters[150] who are licensed to roast, pack, and market coffee • café, coffee brands, delis, delicatessens, and restaurants
	Overseas Buyer	• Foreign brands, foreign coffee importers

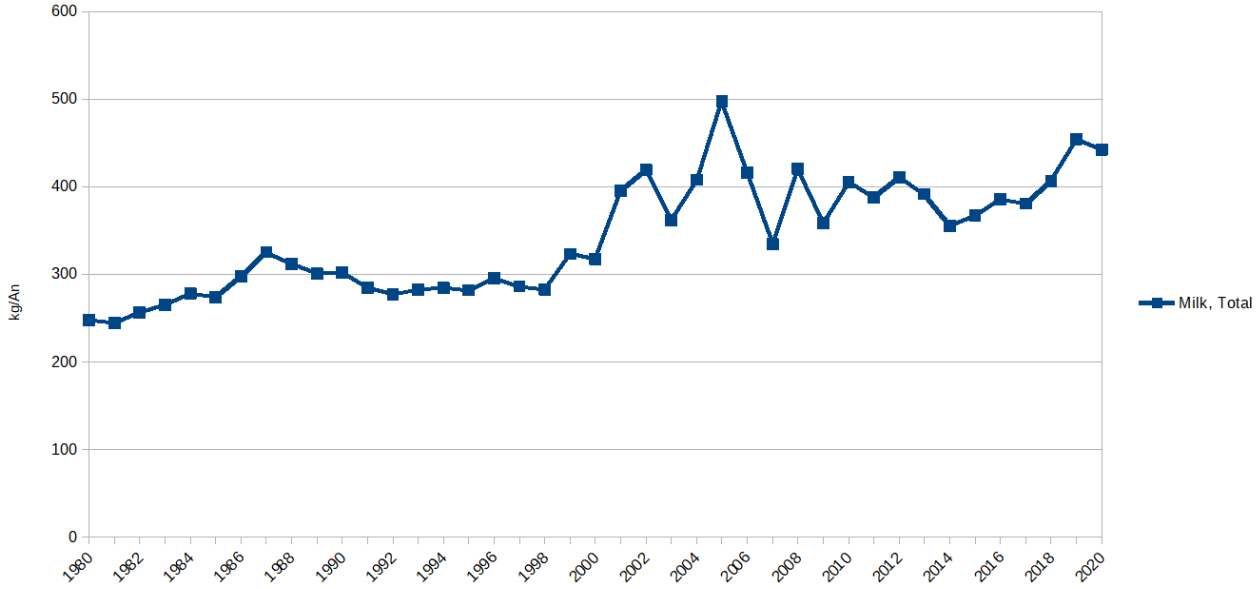
Dairy

67. In East Africa, the livestock sector is key for the region's cash income and countries' gross domestic products. FAO statistics at country level on annual milk production (kg/An) indicate moderate interannual variability (Figure 15). In Kenya, from 600,000 to 1.8 million households produce milk, of which 70-80% is processed, marketed, and consumed. The number of producers, the livestock population, and total production have increased in the LREB to meet the needs of the increasing population[64] (Figure 16). Dairy cooperatives are fundamental in the sector since they organize the coordination between producers and processors. There are also individual producers who sell raw milk directly to the industry. The thermoneutral zone (TNZ), or optimal temperature for lactating dairy cows oscillates between 5°C and 22-25°C [65],[66].

[148] Defined by size, shape, and density of bean. Kenya AA coffee is considered a specialty coffee and Kenya's coffee produces the spectrum of grades. Source: https://www.grandrapidscoffee.com/portfolio-item/coffee-grading-in-kenya/#:~:text=Grades%20in%20Kenya%20are%20assigned,%2C%20E%2C%20TT%20and%20T.

[149] 80% of Kenya coffee sales go through the NCE

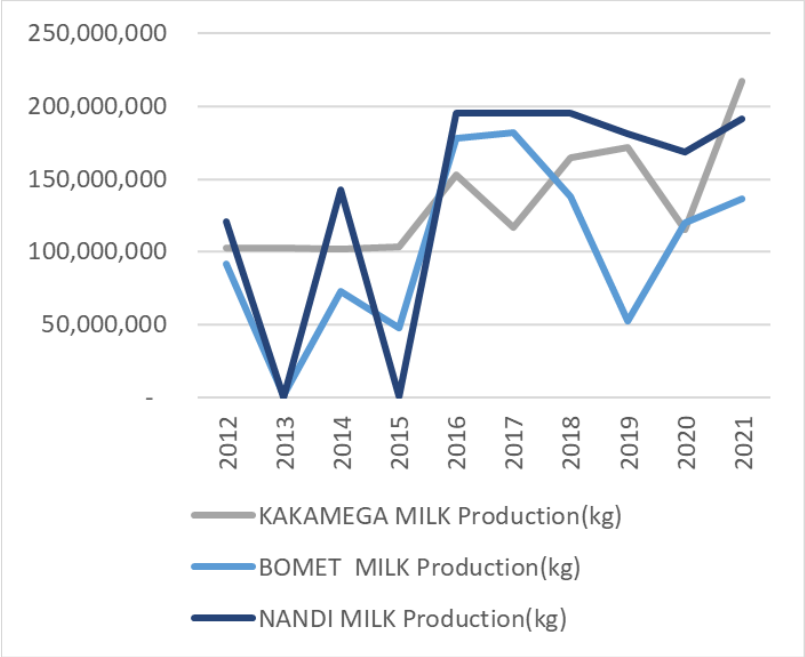
[150] There are 25 licensed coffee roasters in Kenya

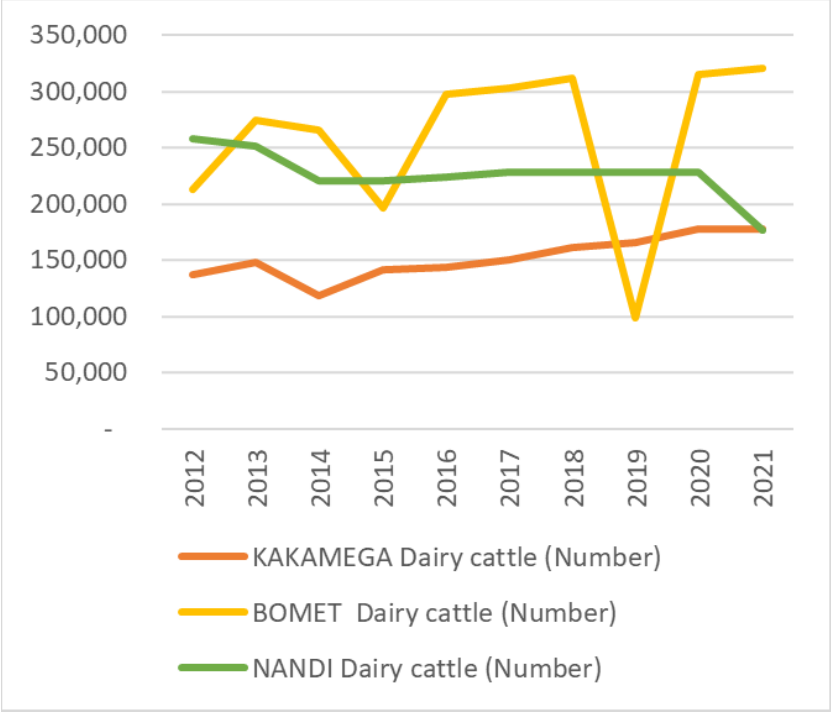


68.

FIGURE 15. TOTAL MILK PRODUCTION (KG/AN) IN KENYA. SOURCE: FAOSTAT (2022)[67].

Figure 16. Dairy cattle production per county (left) and milk production per county (right). Source: Kenya National Bureau of Statistics (2023).





69. In Kenya, dairy is a vibrant subsector with an estimated value of 4.5% of the Agriculture GDP, and 12% to the national GDP. It is, however, a major contributor to GHG emission being responsible for about 12.3 million tonnes CO2 eq. The GHG profile is dominated by methane (95.6 %); nitrous oxide (N2O)

and carbon dioxide (CO2) contribute 3.4 % and 1 % of the total emissions, respectively. The main dairy producing counties in LREB are Homabay, Kakamega, Kericho, Kisii, Kisumu, Migori, Nyamira, Nandi, Trans-Nzoia and Vihiga. As seen in Table 9, the Kenyan dairy value chain has six nodes or stages from input to consumption.

TABLE 9: DAIRY VALUE CHAIN ACTORS AND MODEL; SOURCE: FAO, 2022

Value Chain Node	Value Chain Actor	Activity/Role Played
1. Input	Feed & Fodder Farmers	Fodder growing
	Equipment Suppliers	Suppliers
	Veterinarians	Livestock health maintenance
	Feed Manufacturers	Manufacturing feed for cows
2. Production	Dairy Farmers[151]	Farm management and milking
	Cooperatives	Extension services
	Aggregators	Storing and transportation
3. Chilling, Bulking & Transportation	Chilling centres	Cooling
	Bulk cooling	Bulking
	Insulated milk tankers	Transportation
4. Processing & Packaging	Cooperative plant	• Processing • Filtration • Cream Separation • Pasteurization • Homogenization • Cheese making
	Private plant	
	Government plant	
5. Retail	Wholesalers	Transportation, Advertising
	Retailers	Marketing, Selling
6. Consumption	Domestic consumer	Consumption

70. Node 1: Dairy inputs. Dairy inputs are used minimally[152] but are diverse depending on local community traditions and if the dairy farm is oriented towards domestic consumption or commercial production for sale to local processors.

71. Node 2: Smallholder farmers are the primary producers with an estimate > 1 million smallholder farmers nationally, and 80% of all milk producers in LREB153 . Each smallholder farmer has 1.2 to 2 ha and about two to five head of cattle, yielding about 5 kg of milk per cow per day or 3650 kg to 9125 kg of milk annually154. The current annual milk production is estimated at about 5.2 billion litres with the bulk being cow milk155.

[151] Primarily smallholder farmers, but there are medium and large scale farms.

152 Within Node 1, feed constitutes 70-80% of total input costs.

153 2000 medium and large-scale farms produce the other 20% of Kenya's total milk production.

154 In practice, Kenyan dairy farmers can produce 2000 to 2400 litres (roughly 1 litre is equal to 1 kg) per lactation (a lactation is about 10 months: BC Dairy, 2023, link: https://bcdairy.ca/how-a-cow-makes-milk/#:~:text=Cows%20produce%20milk%20for%20about,give%20birth%20to%20another%20calf). which is lower than the global average of 18,000 litres. Of the milk produced, 42% is consumed on-site while 58% is brought to market. Over 70% of Kenyan milk is sold through the informal sector.

155 Per capita consumption is expected to grow at 6% per annum. It has been estimated that by 2022, there will be a deficit of 3.52B litres of milk.

72. Node 3: Cooperatives are important to the smallholder farmers in Node 2, as they provide extension services that help smallholder farmers buy feed, but also help aggregate production for transportation, and some even have cooling facilities for storage and producing dairy products in Node 4. The number of registered cooperatives and unions in Kenya has almost doubled from 345 in 2012 to 623 in 2018.

73. Node 4: There are an estimated 500 chilling plants throughout Kenya with a capacity to chill about 3.4m litres of milk per day. However, many are operating under capacity, are poorly managed and lack proper operation systems, creating massive losses. The chilling plants are mainly operated by cooperatives and milk processors[156].

74. Node 5: Processing and Packaging. There are currently 34 registered processors and 68 cottage industries[157]. The main players are Brookside, New KCC, Meru Dairy Union and Githunguri Dairy who control over 80% of the pasteurized milk market. Most milk processors operate at half capacity and their sales account for about 12% of fresh milk sales. Processed milk has continued to grow with the total milk processed in 2021 above 800 million litres and increase from 680 million litres reported in the previous year. Expanding markets for processed dairy domestically and export is critical to get current dairies operating at capacity.

75. Node 6: Milk marketing. This is done formally and informally with the informal sector estimated to control over 70% of marketed milk. The key players in this node are supermarkets, kiosks, milk bars and general shops. An emerging market is milk dispensing or 'vending machines' especially in the urban areas. While dispensers do provide an opportunity to upscale distribution, consumer safety of consuming dispensed milk needs to be addressed.

76. Node 7: Consumption. Most of the milk produced in Kenya is consumed domestically with a per capita consumption estimated at 139 litres per year and growing at 2.8% annually for the next 10 years. 85% of processed milk is sold as fresh milk either as short life pasteurized milk or long-life UHT milk while 3 % is processed to make yogurt, 7 % as fermented milk and 3 % is sold as powdered milk. The remaining 2 % is processed with value-added products such as cheese and butter[158].

Fruit tree

77. In the LREB, the production of fruit trees such as banana and avocado are increasing in its importance for food security (Figure 13 and Figure 14), and job and market opportunities for the local communities and producers.

78. *Banana* is produced by farmers with different levels of income and farming types, and particularly by women and youth groups at small- and medium scale and within mixed farming systems. The main varieties produced include Grand Nain, William, Apple, dwarf Cavendish, and Uganda green. Musa species is grown in Kisii. Hot and humid areas with temperatures 28-38°C are optimal climatic conditions for banana growth, with altitudes from 0 to 1800 m above sea level and optimal soil pH 6-7.5 (with tolerance levels up to 4.5). 1000 mm/year of rainfall is required, distributed equally year-round (100-120 mm/month). Temperatures below 13°C delay the growth of the fruit. Bananas are

156 The Government purchased 350 coolers which were distributed to cooperatives in 2018/2019
157 KDB, 2021
158 KDB, 2017

harvested 90-150 days after the fingers start to form. Banana trees can last up to 8-10 years with average yields 30-45 tons/ha under adequate management practices[54].

79. *Avocado* production and exports are increasing quickly. The commercial production area is estimated at about 7,500 hectares, with marketable production fluctuating between 60,000 and 90,000 metric tons.[55] Avocado production (*Persea Americana*) is suitable to the tropical and sub-tropical climate of the LREB. Avocado production in Kenya is still dominated by backyard trees, mainly for personal consumption. According to the results of a survey conducted in western counties of Kenya, including Busia among the LREB counties, most farmers own indigenous or non-certified avocado trees, which are subject to low prices at the market stage[56]. In addition, the results of the survey reported limited farmers' membership to cooperatives due to low coordination, education, income, and awareness of opportunities. Farmers are also subject to high costs for products harvesting, grading, and transportation which discourage them from improved sustainable and resilient production, since they directly manage the harvest and transportation activities without additional technological and institutional support, and often receive late payments.

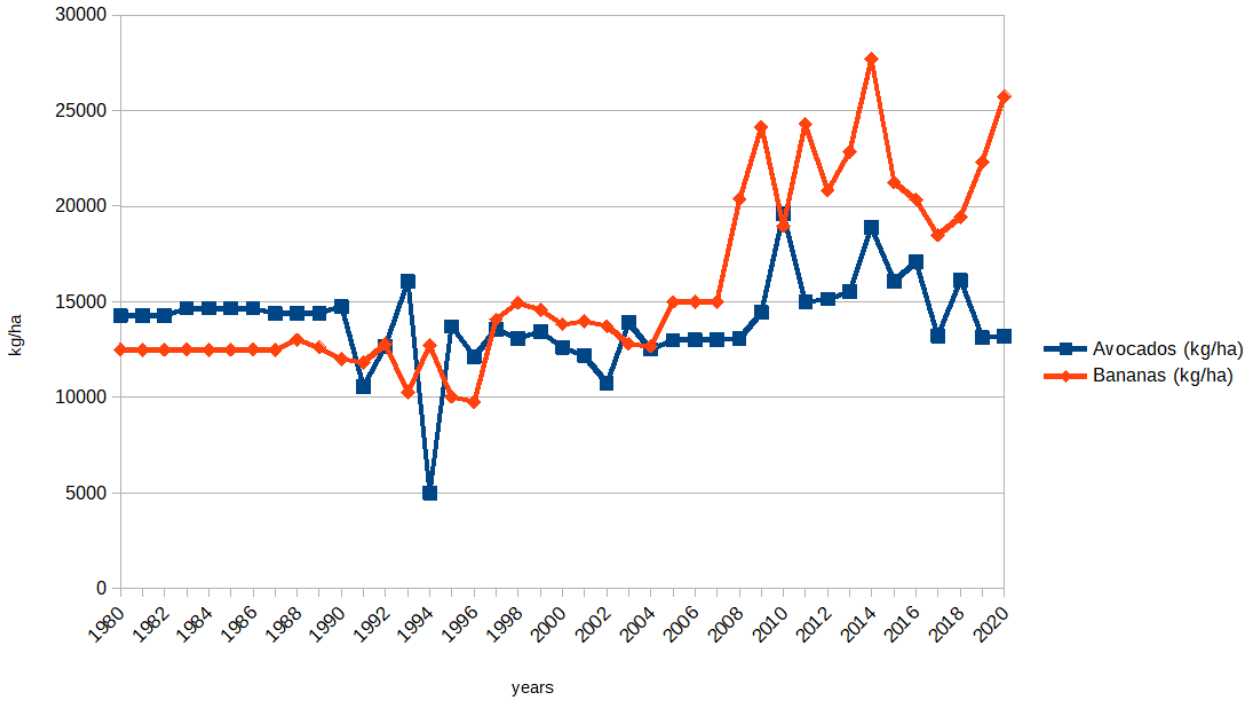


Figure 13. Avocado and Banana yield trends in Kenya. Source: FAOSTAT (2022)[57].

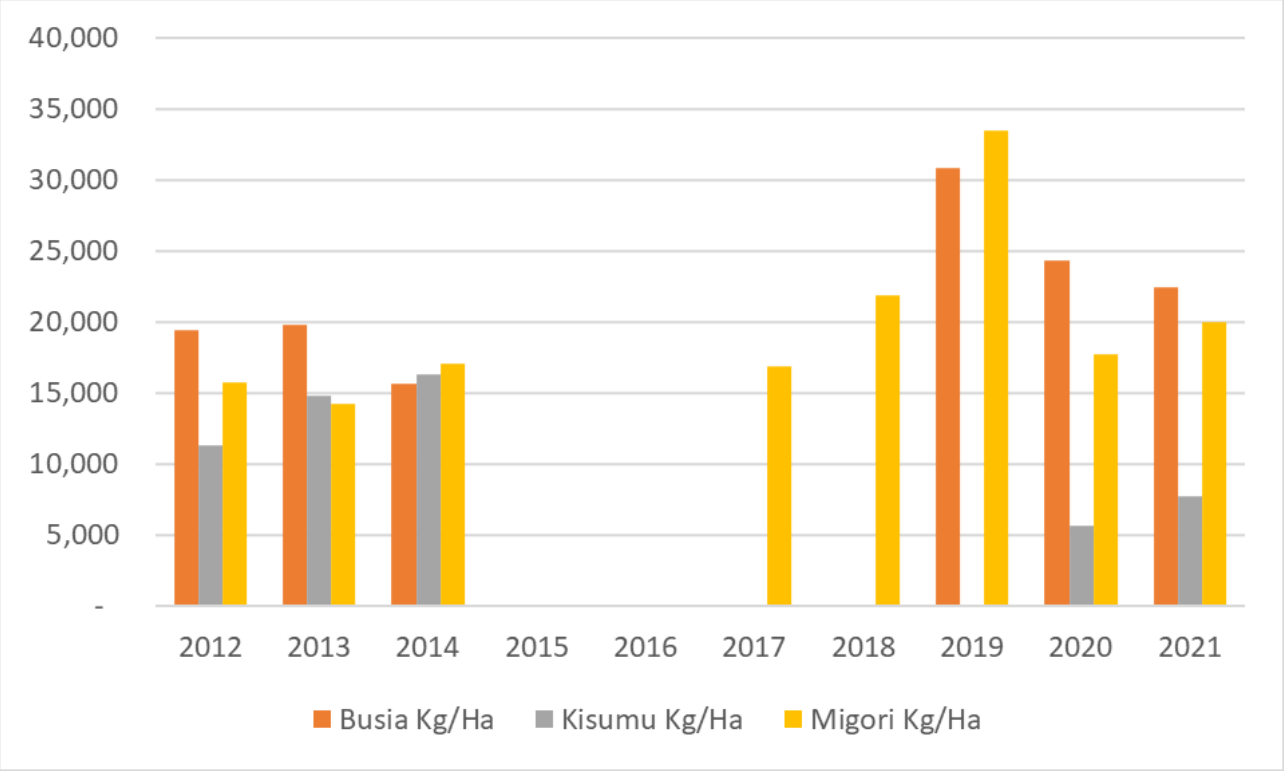


Figure 14. Banana yield per county. Source: Kenya National Bureau of Statistics (2023).

80. As seen in Table 10 below, the fruit tree[159] value chain is complex as the crop is not a single species, but a variety of fruiting trees. Some fruit trees, for example banana, have little to no processing and go directly to market after harvesting. Others, such as avocado[160], must undergo processing before being sold at market. Smallholder farmers grow 70 % of avocados while medium and large farms grow 20 and 10 %, respectively.

[159] While there are a variety of fruit trees that are cultivated, the project focuses on bananas and avocados as these value chains within the fruit tree value chain most closely fit the four criteria and nine sub-criteria (explained in the PFS) for value chain selection. To give an idea of scale, In 2020, Kenya produced 1.86 million tons of bananas, netting $25 billion USD. Siaya, Kericho, Bomet, Kisii, and Nandi are the primary banana production centers. In 2020, Kenya produced 500,274 tons of avocados, netting $9.4 billion USD in revenue. Kisii, Bomet, Kisumu, and Nandi are the primary avocado production centers. Both of these value chains outperform passion fruit, citrus, and mango; which are the other members of the fruit tree value chain.

[160]

TABLE 10: FRUIT TREE VALUE CHAIN ACTORS AND MODEL; SOURCE: FAO, 2022

Value Chain Node	Value Chain Actor	Activity
1. Input	Agro-dealers	• Sell producers production inputs, such as fertilizer and equipment
	Researchers	• Develop disease and pest-resistant varietals
	Nurseries	• Cultivate seedlings
2. Production	Smallholder Farmers Large scale farmers	• Fruit establishment, management, and harvesting
3. Traders	Agents	• Buy fruit to sell to wholesalers/market
	Brokers	
	Wholesalers	• Transport and sell fruit
4. Processing	Processor	• Weigh, inspect, and sort fruit
5. Retail	Supermarkets, kiosk owners, hawkers, green grocers	• Sells fruit
6. Consumption	Foreign Markets	• Consumes fruit via buying and selling in local markets
	Domestic Consumer	• Consumes fruit for nutritional value

81. Node 1: Input supply. The fruit tree value chain begins before production, as varietals of fruit trees that can be disease and pest resistant are researched to help reduce costs. Nurseries help cultivate new seedlings which can then be cultivated into trees. Agro-dealers distribute seedlings, equipment, fertilizer, and pesticides to farmers via sales.
82. Node 2: Production: Smallholder farmers are the majority of fruit tree producers, comprising 70 to 80 % of the workforce. After harvest, assemblies outside the farms are set up where agents and brokers, and sometimes wholesalers, buy the fruit from the smallholder farmers direct at the farm[161].
83. Node 3: Wholesaling and Trading. This node is dominated by brokers and village assemblers. Wholesalers will transport and sell fruit, and depending on the fruit, may or may not undergo processing, instead the wholesaler may sell to node 5 directly.
84. Node 4: Processing. Most of the fruit is sold directly at retail without further processing. A %age of mangoes, citrus and passion fruit is processed into pulp and juices. The main processors in the country include Delmonte, Milly, Sunny Mango, Coca-cola and Kevian. Kisii County has established a banana processing plant at a cost of Kes 170M with funding from the EU and the County government.
85. Node 5: Retail: Retailers buy fruit, which is then sold direct to customers mainly in open markets. Due a growing middle class that is increasingly becoming conscious of food safety concerns, major

[161] There is evidence that there can be up to four intermediaries between producer and consumer, which causes prices to go up and depress the revenue the smallholder farmer receives from selling fruit.

supermarket chains are increasingly retailing fruits. Export retail is dominated by major supermarket chains in Europe who buy from Kenyan exporters. The major exporters of fruits in Kenya are Kevitt, Mackay, Kankma exporters, zenith global and Vegmon International among others. The total value of production was estimated at over 61 million KSH in 2021 (467,167 USD).

Crop	2020		
	Area (Ha)	Volume (MT)	Value (KES)
Banana	72,486	1,871,521	29,028,891,206
Mango	56,437	809,857	15,379,435,988
Orange	12,604	145,445	3,522,833,425
Lime	2,380,839,822	82,110	2,161,375,000
Lemon	2,050	16,486	476,850,000
Tangerine	1,377	16,434	418,054,690
Grapefruit	193	2,468	36,100,045
passion	1,313	16,479	578,400,400
Avocado	26,481	500,274	9,438,124,806

86. Node 6: Consumption: Most of the fruit is consumed domestically.

African Leafy Vegetables (ALV)

African Leafy Vegetables

87. In the LREB key African Leafy Vegetables include [58],[59],[60]:

- Cowpeas - Vigna Unguiculata (locally named Kunde) (30% of grown, consumed, and traded ALVs in the LREB), a suitable leguminous crop due to its resistance to low water and nutrient intake, as well as trade and consumption due to the long shelf life of the product. Cowpeas can also be produced as fodder crops and provide year-round nutrition using both fresh and dried leaves during the dry season. Cowpea production is particularly suited for areas with mild temperatures (21-22°C) and consistent rainfall year-round from 1000 mm to 1600 mm/year. Its production requires almost no fertilizer and minimal labour.
- Leaf Amaranthus - *Amaranthus spp.* (locally named dodo) (21% of grown, consumed, and traded ALVs in the LREB), a vegetable with rationing abilities and annual cropping characteristics in warm sub-humid environments. The plant is well adapted to drought conditions in Africa, having leaves with a waxy cuticle which protects it from rapid moisture loss as well as efficient stomatal conductance. It is also used in milling facilities to increase the nutritional value of flours. Optimal temperature conditions oscillate between 15°C and 25°C.
- African nightshades - *Solanum nigrum* (locally named Litsutsa or Managu) (12% of grown, consumed, and traded ALVs in the LREB) is resilient to extreme rainfall.
- Jute mallow - *Corchorus olitorius* (locally named mrenda) (11% of grown, consumed, and traded ALVs in the LREB) mainly grown in Migori and Vihiga, it is suitable to hot and humid climates with temperatures between 25-30°C and annual rainfall between 600-2000m

- Spider plant - G*ynandropsis gynandra* (locally named tsisaka) (7% of grown, consumed, and traded ALVs in the LREB) increasingly grown within the counties, it tolerates water stress and high temperatures, ideally above 15°C.
- Slender leaf - *Croatalaria brevidens* (locally named mitoo) (7% of grown, consumed, and traded ALVs in the LREB) is resilient to prolonged dry periods.
- African kale *Brassica oleracea* (locally sukumawiki) (7% of grown, consumed, and traded ALVs in the LREB), which is favoured by small-scale farmers although the quality and quantity of yields are frequently affected by pests and diseases attacks and has higher water requirements.
- Pumpkin leaves - *Cucurbita spp.* (5% of grown, consumed, and traded ALVs in the LREB), are drought- and heat-tolerant varieties.

88. ALVs are important food crops across the selected counties. Vegetables are produced both at small-scale subsistence intercropping systems, as well as for local and small-scale commercialization and supermarkets particularly within the major urban areas. In fact, they provide diversified income particularly during the dry periods due to their resilience to harsh conditions and low-input requirements. Production occurs along riverbanks and swamps or in home gardens. Youth and women are often the main players from on-farm production and harvest to post-harvest value-addition activities and marketing. While in the past, vegetable production was subsistence based grown under intercropping systems, it has nowadays grown to meet market needs, thus increasing the farmer's revenues. Farmers, in turn, started dedicating a higher %age of their lands, by planting along riverbanks and increasing irrigation through supplementary watering during the dry seasons[61].

89. Overall, there are many constraints to the development of underutilized ALVs such as lack of information on tailored climate-smart agricultural practices and technologies, poor information on market opportunities, limited public and private investments and credits, limited access to agronomic packages, and low communication between agricultural extension services and farmers/value chain actors. At the same time, the production of local vegetables already consists of an adaptation strategy. They have great potential to be further used as drought-resistant crops, to enhance food security by providing high nutrients to low-income households' diets, to provide environmental sustainability through their ability to grow in drier and hostile areas with high salinity and contribute to land rehabilitation and soil erosion control. In addition, they can contribute to eliminating poverty by allowing farmers to diversify products sold to market [62],[63].

90. Vegetables are the simplest value chain as most production goes directly to local markets with little exported. Indigenous vegetables high potential for upscaling due to their moderate to high levels of vulnerability and continued levels of agricultural suitability. Cowpeas, leaf amaranth and African nightshade are leading in varieties produced in the LREB.

91. Indigenous vegetables withstand and tolerate many climate-related stresses such as pests and droughts, erratic rainfall and other unpredictable weather. Their promotion will not only provide coping mechanisms to climatic shocks but will also maintain crop diversity at individual farms and the overall food system levels, hence de-risking the aggregate risks of crop failure, in the event of climate change, climatic events or the incidence of pests and diseases.

TABLE 11 INDIGENOUS VEGETABLES; SOURCE : FAO, 2022

Value Chain Node	Value Chain Actor	Activities/Role Played

1. Inputs	Agro-dealers	• Inputs and seed distribution
	Seed companies	
	Distributors	
	Research Organizations	
2. Production	Smallholder Farmers (individuals or organized in producer groups)	• Land preparation, crop establishment, crop husbandry, harvesting
3. Processing	Processors	• Washing, drying
	Producers	• Washing, drying
	Wholesalers	• Grading, packaging
	Retailers	• Packaging and sorting
4. Marketing and Distribution	Producer organizations and farmer groups	• Aggregation and market linkages
	Wholesalers	• Bulk buying and transportation • Repackaging and packaging
	Retailers	
	Brokers	
	Processors	
5. Consumption	Households	• Preparation for consumption[162]
	Institutions such as hotels, prisons, schools, hospitals, etc.	

92. Production of indigenous vegetables is primarily on a subsistence level (on less than one-acre farm unit[163)] with minimal commercialization. Typical cropping of indigenous vegetables is around the house, typically in conjunction with other crops such as maize.

93. Land under production increased from 45,508 ha 2018 to 54,235 Ha in 2019 (19%). Volumes increased by 26%[164] in the same year. This increase is attributed to increasing consumer awareness about their health and nutritional benefits. Current estimate of indigenous vegetables market value is USD 1.5 million. Despite the low market value, this does mean indigenous vegetables are a low-quality value chain, rather, the market of indigenous vegetables is underdeveloped as demand for indigenous vegetables is increasing domestically and internationally[165].

94. While the value chain model shown in Table 11 suggests a well-developed value chain, in practice, the majority of traders sell indigenous vegetables in local markets as they lack access to bigger markets, such as Nairobi. There is evidence of collective selling of indigenous vegetables, however, it appears

[162] Cutting, boiling, frying, etc.

[163] County specific value chain analysis: production and market systems analysis for African vegetables funded by USAID via RTI in 2020.

[164] AFA Horticulture Validated Report 2019-2020 & AFA Horticulture Validated Report 2018-2019

[165] Domestically, demand for indigenous vegetables is being driven by growing social awareness of the nutritional value of indigenous vegetables. Internationally, demand is being driven by the growing African diaspora overseas.

that supplies are intermittent and there is no dedicated cooperative. Interestingly, this is the only value chain that is dominated by women smallholder farmers (80%).

95. Value addition is low but can be enhanced by cleaner energy options/ climate-proofed technologies such as solar energy, cold chains, timed transport logistics, etc. resulting in low carbon and reduced climate change and vulnerability.

Poultry

Poultry production for meat and eggs in Kenya is a fundamental source of food security among rural communities for its high protein content, and is produced under traditional, semi-intensive, and commercial systems. For example, in Bomet County, most of the population is involved in the local chicken value chain for meat and eggs production, including the supply of feed and vaccines, and the supply of chicks by local breeders and agro-dealers. Chicken production at small-scale for subsistence is through mixed farming systems, with limited use of agricultural inputs[68], for meat and egg consumption (Figure 17). Indigenous poultry in Kenya comprises nine ecotypes and several phenotypes including: the frizzled, naked neck, dwarf, and feathered shanks. For commercial broilers the optimal temperature range is generally 18-21°C. Indigenous poultry instead is robust and resilient to harsh environmental conditions such as heat stress. For example, the dwarf, frizzle, and naked neck phenotypes are thermo-tolerant and can be cross-bred with other species to enhance poultry's thermo-tolerance characteristics, although with the risk of genetic erosion and extinction of indigenous breeds[69].

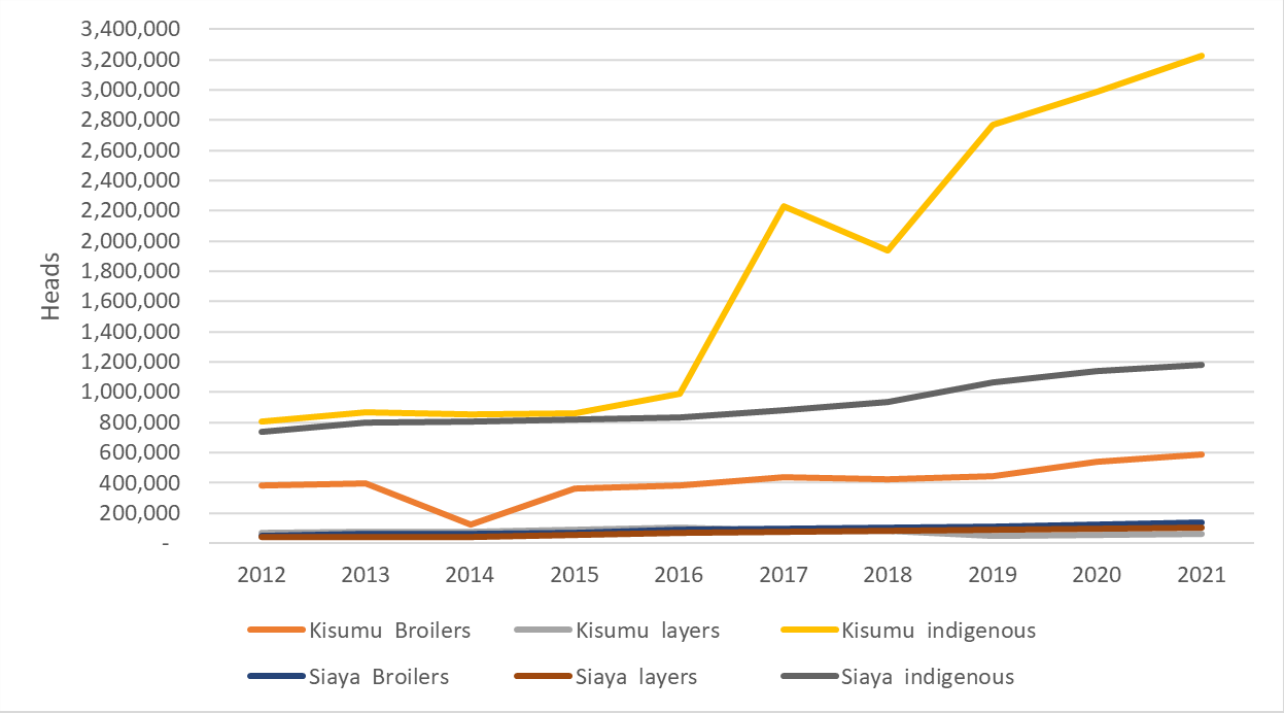


Figure 17. Poultry types per county. Source: Kenya National Bureau of Statistics (2023).

TABLE 12: POULTRY VALUE CHAIN MODEL WITH ROLES OF VC

Value chain Actors	Value chain actor	Activities / Role played
Inputs	Hatcheries	• Importing parent stock (DOCs or hatching eggs • Hatching and distribution of DOCs
	Equipment fabricators/suppliers	• Importing incubators or fabricating locally
	Vaccines and drugs manufacture	• Manufacture and supply of vaccines and drugs to agro-dealers/farmers
	Feed millers	• Manufacturing of poultry feeds • Supply of feed ingredients
	Agro-dealers	• Stocking and provision of drugs, vaccines, feeds, and equipment to farmers • Source of technical information to farmers
Production	Individual producers	• Housing of poultry • Feeding through feeds production and supplementation • Disease control and management
	Producer groups	• Aggregation of eggs and live birds • Collective procurement of inputs (feeds, vaccines, and drugs)
	Small scale producer companies	• Contracting out grower farmers • Provision of inputs to out grower farmers
Trade	Brokers	• Source of market information to farmers • Aggregation of live birds and eggs • Link between buyers and farmers* • Transportation the birds/eggs • Paying market fees
	Whole sellers	• Source of market information to farmers • Aggregation of live birds and eggs • Transportation
	Retailers	• Source of information to farmers • Value addition e.g., slaughter, cold storage, packaging
	Exporters	• Source of information to farmers • Value addition e.g., slaughter, cold storage, packaging, branding
	Slaughters	• Slaughtering • Scalding • Defeathering • Packaging • labelling
Consumption	Hotels and restaurants	• Value addition e.g., slaughter, cooking
	Institutional consumers	• Consumption
	Individual consumers	• Consumption

96. Poultry production for meat and eggs in Kenya is a fundamental source of food security among rural communities for its high protein content, and is produced under traditional, semi-intensive, and commercial systems. For example, in Bomet County, most of the population is involved in the local chicken value chain for meat and eggs production, including the supply of feed and vaccines, and the supply of chicks by local breeders and agro-dealers. Chicken production at small-scale for subsistence is through mixed farming systems, with limited use of agricultural inputs[68], for meat and egg consumption (Figure 17). Indigenous poultry in Kenya comprises nine ecotypes and several phenotypes including: the frizzled, naked neck, dwarf, and feathered shanks. For commercial broilers the optimal temperature range is generally 18-21°C. Indigenous poultry instead is robust and resilient to harsh environmental conditions such as heat stress. For example, the dwarf, frizzle, and naked neck phenotypes are thermo-tolerant and can be cross-bred with other species to enhance poultry's thermo-tolerance characteristics, although with the risk of genetic erosion and extinction of indigenous breeds[69].

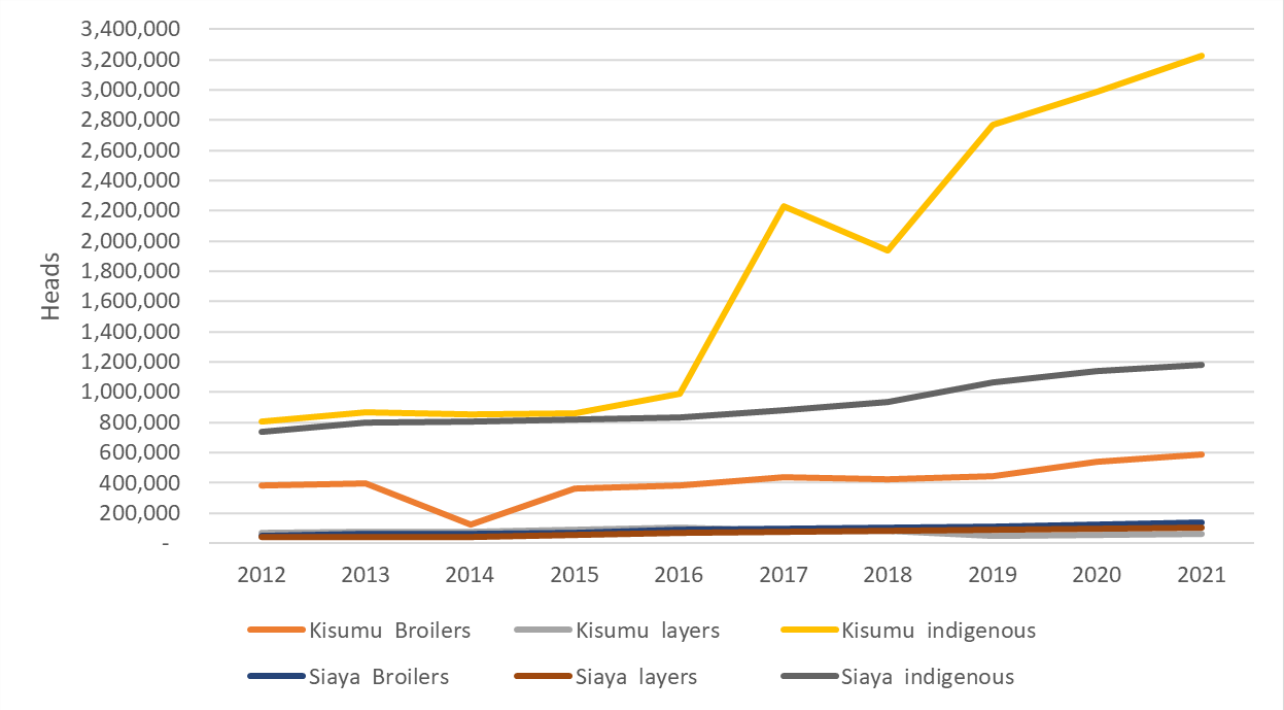


Figure 17. Poultry types per county. Source: Kenya National Bureau of Statistics (2023).

97. Poultry value chain hosts many people across the nodes and exhibits moderate to high levels of vulnerability. Poultry produce lower carbon dioxide, methane, and nitrous oxide emissions- 17 kg and 4 kgs of CO_2 eq. per bird/year for intensive and extensive systems, respectively.

98. Promoting the indigenous (improved) poultry value chain which has a higher adaptability to the environment, presents various advantages including the conservation of native breeds which is an

important component of poultry biodiversity[166], improves protein diversity[167], improves poultry resilience and promotes sustainable (increasing market demand for poultry and poultry products) and low input farming systems.

99. As seen in Table 12, Kenya's poultry VC is comparatively simple and straightforward, with little processing between the first node of breeding of day-old-chicks (DOCs) to the last node of the market. Kenya's poultry production mirrors the global growth[168] increased from 44 million heads in 2016 to about 57 million heads in 2020[169], and contributes around 8 % of agricultural GDP.

100. Kenya's annual poultry production is 88 million metric tons (MT), valued at KES 48.6 billion. Currently, poultry consumption is 76,135 MT based on a per capita consumption of 2.58 kg, lower than the WHO-recommended annual per capita consumption of 12 kg.

101. Node 1 is comprised of inputs hatcheries, equipment suppliers, vaccine and drug manufacturers, feed millers, and agro-dealers. Hatcheries produce DOCs that are sold to producers with the initial DOC stock source locally or internationally to produce DOCs; indigenous Kenyan breeds are preferred but high demand is causing hatcheries to face long wait times between stock replenishment. Sales agents act as equipment suppliers, helping to link distant farmers to drug stores and equipment, as well as, serving as a collector on behalf of both hatcheries and agro-dealers. Feed millers are mostly small and medium scale, serving regions or counties, and sell directly to farmers which reduces poultry farmers' costs.

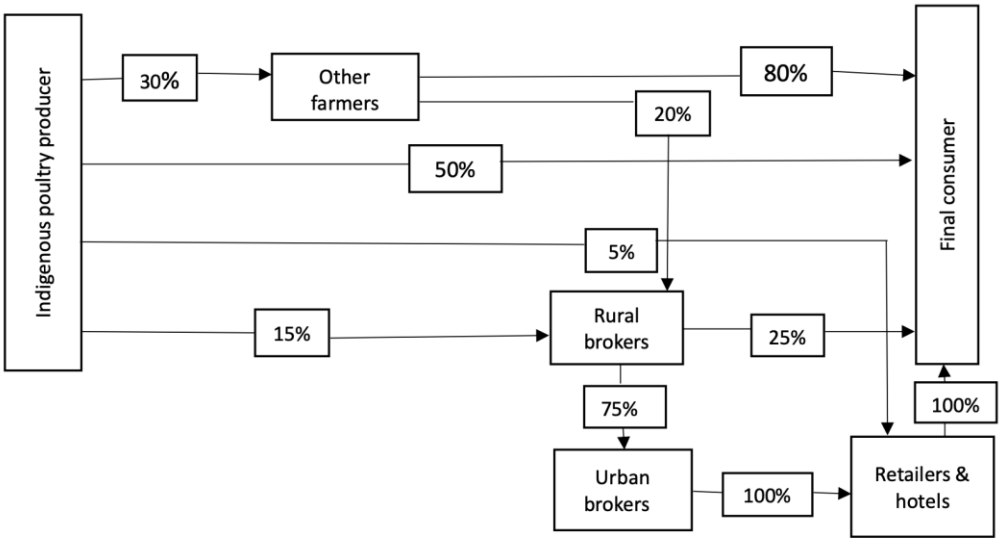
102. Node 2 is dominated by smallholder farmers and production is typically comprised of bird scavenging for feed on smallholder farmers' land and sometimes leftover feed provided by the smallholder farmer. In Bomet, Bungoma, Busia, Homa Bay, Kisii, Kisumu, Migori, Nandi, Siaya, and Vihiga, poultry cooperatives exist with 11,152 active members. Within this node, there are also commercial farms (300 to 3000 birds), and large commercial producers who typically outsource to local producers in exchange for a quota. Large commercial producers are attractive to smallholder farmers as large commercial producers can absorb costs and access to markets that may not be accessible to the smallholder farmer, in exchange for the smallholder farmer's labour.

103. Node 3 is the trade of poultry with traders helping to link smallholder farmers to the market, and typically either deal in eggs or live meat, rural or urban markets. Indigenous poultry meat and eggs are mainly marketed through direct and retail selling systems; accounting for 15% of total birds and eggs traded.

104. Node 4, consumption, is very direct. While broilers exist, where poultry is slaughtered and then undergoes broiling for healthy consumption, most poultry is directly slaughtered by the customer on their own premises, household, or business. The consumer purchases the products either in their raw form (live bird or a piece of raw meat) or processed (piece of cooked meat) from retailers or hotels. 30% of the birds are sold at the farm gate to fellow farmers in their neighborhood for rearing, these

[166] Fiorilla, Edoardo, et al. "Poultry biodiversity for alternative farming systems development, 2022.
[167] Melesse, A. (2014). Significance of scavenging chicken production in the rural community of Africa for enhanced food security. *World's Poultry Science Journal*, *70*(3), 593-606.
[168] Poultry is the fast growing agricultural industry.
[169] FAOSTAT. 2022. Available online at: https://www.fao.org/faostat/en/#data/QCL (accessed November 2022).

farmers later sell 20% to rural brokers and 80% to final consumers. Rural indigenous chicken producers sell 50% directly to final consumers. The figure below outlines the volume share handled by different channels of indigenous chicken value chain.



Tea

105. Tea is a major cash crop and source of income for smallholder farmers in Kenya, with 3-5 million people involved and contributing 30% of the value of food-related exports[47]. Kericho County is the highest tea producer in Kenya (Figure 9). Tea production in Kenya is managed by both smallholders, which reach 500,000 producers with plantations of 10-12 has, selling products through 67 tea processing facilities managed by the Kenya Tea Development Agency (KTDA), and large-scale plantations owned by multinational corporations.

106. The tea plant *Camellia sinensis* includes 82 species, most of which originate from the *assamica* strain which has been primarily used in Kenya and adapted to its climatic conditions by the Tea Research Foundation of Kenya. Overall, farmers do not use all the varieties due to their long gestation period which extends from three to five years, as well as high costs of planting tea until reaching maturity without any return on investments during the first years[48]. Black tea is the main type grown in Kenya, followed by green, white, and "orthodox" tea, which differs from other tea varieties picked through the cut-tear-curl method, since it is handpicked, hand-rolled, and dried without the bud.

107. Suitable agro-climatic characteristics include deep, well drained, fertile-rich-acidic volcanic soils, mean temperatures below 23.5°C and maximum temperatures up to 30°C, 1200-1400 mm of annual rainfall, well distributed, and altitudes from 1500 to up to 2700masl,[49] making Kericho, Bomet, Nyamira, Kisii, Kakamega, Bungoma, Vihiga, Nandi, and Trans-Nzoia in LREB suitable areas for tea production.

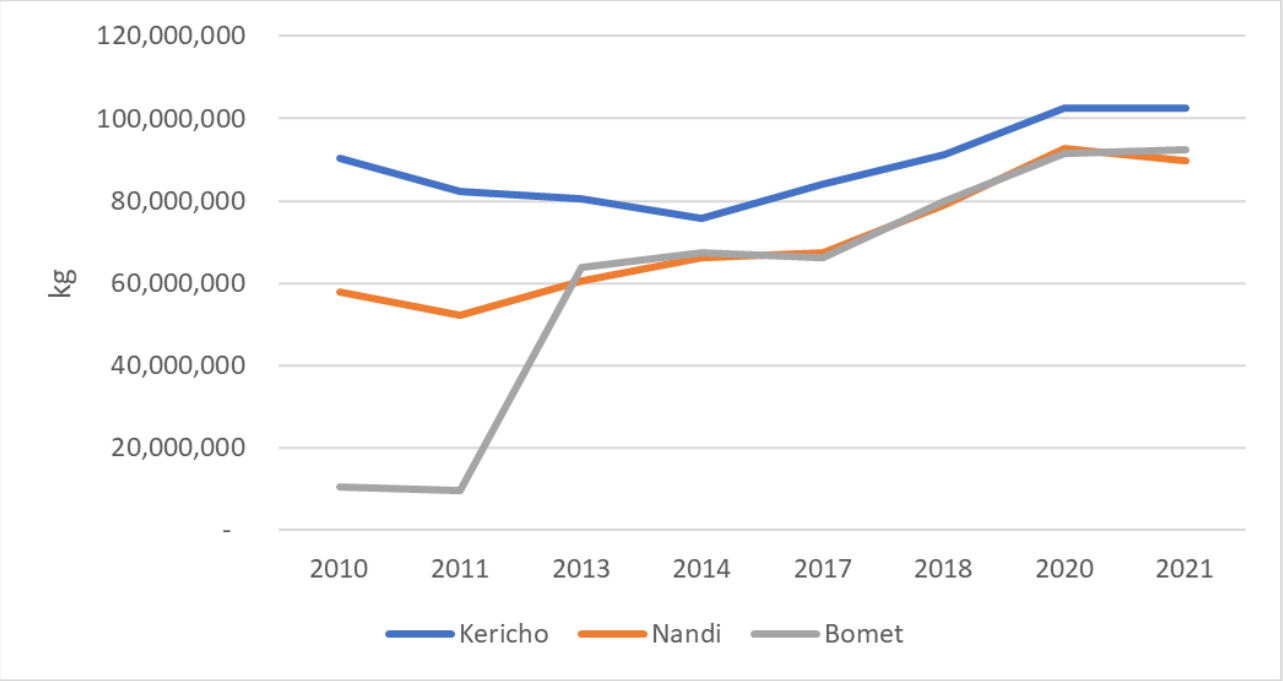


Figure 9. Tea yearly production by county. Source: Kenya National Bureau of Statistics (2023).

108. Though hurdled by low productivity due to impacts of climate change (pest and diseases, droughts, famine, floods, hailstones and frosts), tea carries economic and ecological importance. Improvement of the value chain will increase LREB's (and Kenya's) competitiveness in new international markets, increasing foreign exchange earnings and income and/jobs to producers, exporters, processors, and other value chain actors[170]. As seen in Table 13, the tea value chain is complex. Most (>90%) of Kenya's annual 450 million kgs of tea production is sold internationally, with 6.7 % of tea production being consumed locally; however, local consumption is increasing. Smallholder farmers make up 71% of all tea producers.

TABLE 13 TEA VALUE CHAIN MODEL; SOURCE: FAO, 2022

Value Chain Node	Value Chain Actor	Activity
1. Production	Smallholder farmers	• Land preparation for planting • Planting tea • Harvesting tea
	Plantations	
	Multinational Corporations	
	Cooperatives	• Provide fertilizer, tea seeds, and planting inputs • Provide extension services to farmers

[170] Ngumo, D.M.; My experience in the tea sector

2. Collection	Loaders	• Load transports with harvested tea
	Transporters	• Transport harvested tea to buying centres
	Off loaders	• Weigh and package tea in preparation of transportation to factories
3. Processing	Factories	• Withering • Cut, tea, and curling (CTC) • Drying • Fermentation
4. Transportation & Warehousing	Transporters	• Transport processed tea to warehouses
	Warehouse operators	• Unload and store processed tea in preparation for auction
5. Trading	Smallholder farmers	• Sell directly to brokers and processors
	Tea Auctions	• KTDA supervised auction where tea is sold to buyers[171]
	Multinational Corporations	• Purchase tea to be sold in foreign or domestic markets
	Factories	
	Brokers/Intermediaries/Exporters	
6. Certification	Kenya Tea Development Agency (KTDA)	• KTDA supports farmers to adopt certification standards172 via field schools and partnerships with multinationals
	International certifiers (e.g. Fairtrade International, Rainforest Alliance, etc.)	• Develop, regulate, and certify sustainability and fair-trade certification of certified and non-certified tea producers
7. Consumption	Domestic customers	• Kenyan consumers
	Foreign markets[173]	• Pakistan, Egypt, the UK, UAE, Afghanistan, Sudan, Russia, Yemen, and other markets

109. Kenya's tea production is overseen and regulated by the Kenya Tea Development Agency (KTDA). While smallholder farmers can sell directly to brokers and processors, the sales are regulated by the

[171] While the KTDA sets the price at which tea will be sold, other influencing factors on price that tea is sold at is: taste, equality grade, sustainability certifications, and carbon offset labels

172 Rainforest Alliance certification addresses whole-farm sustainability, which means that once farmers meet the certification standards, they can sell all eligible crops as Rainforest Alliance Certified.

[173] Pakistan, Egypt, and the UK buy over 65 % of Kenya tea with Pakistan importing (in 2020) $495 million USD worth of Tea, Egypt at $148 million USD, and the United Kingdom at $141 million USD.

KTDA. Also, the KTDA sets the price for tea, smallholder farmers have no control over the prices for their tea production.

110. Node 1, Input, is dominated by smallholder farmers who produce 71 % of the tea. While plantations owned by Kenyan or multinational corporations are also found in this node, the next stages are different for smallholder farmers and corporations. Multinational corporations transport harvested tea directly oversees to be processed, while Kenya corporations process their tea entirely in-house. Smallholder farmers are reliant on cooperatives, brokers, and processors to help with linking them to markets.

111. Node 2 is the transportation of harvested tea[174]. In node 3, tea is processed from its harvested form to consumable form[175]. After processing in node 3, tea is transported to warehouses in preparation of being sold in the Mombasa tea auction, which operates daily[176]. Throughout the value chain, certification is occurring where the KTDA and international certifiers (for example, Fairtrade International) are ensuring that certified tea producers are getting higher prices for their tea produced, adhering to the better wages, and working conditions stipulated by certification schemes, and access to markets for certified tea. Consumption is the end point of the value chain with Pakistan, Egypt, and the United Kingdom accounting for 70 % of the international market.

2. Ongoing baseline investments, programs and projects

112. This project is intended as a complementary intervention to all relevant baseline initiatives in the agriculture, forest, climate natural resources sectors, and to build on ongoing development interventions in line with the Government of Kenya's Vision 2030. The tables below provide details on **ongoing and pipelined investments, programs and projects** in the region with which synergies will be actively sought. Lessons from projects that have closed in 2022 were integrated into this design.

113. The tables below provide details on ongoing investments as well as planned programs and projects in the region with which synergies will be actively sought. Several projects financed by IFAD, World Bank, GEF, and EU member governments offer interesting complementarities to this initiative. Below is a description of key pathways for synergies and coordination.

[174] No matter if the tea is produced on smallholder farm or on a corporate farm, tea is plucked in line with quality standards set by the KTDA

[175] Tea leaves are first left to wilt for 14 – 20 hours before reaching a moisture content of 71 %. Leaves are then macerated in the CTC process, and then, dried on fluidized bed dryers that blow a stream of hot air on the leaves for a period of 15 – 20 minutes, until the leaf moisture content is reduced from 69 to 67 %. Leaves are then passed into fermentation units for 110 to 150 minutes. Leaves are then cooled and mechanically sorted, while a fibre extractor cleans leaves. Leaves are then packaged.

[176] The Mombasa auction house serves international markets, while tea sold domestically is through wholesale and retail channels.

2.1 Projects implemented with FAO support.

114. **Enhancing capacity for planning and effective implementation of climate change adaptation in Kenya (GCF NAP Readiness)**: This NAP Readiness grant was implemented from 2018 to 2022 with FAO as a Delivery Partner. The project enhanced technical and institutional capacities for adaptation planning, built the National Adaptation Plan (NAP) knowledge base, improved evidence base for climate change adaptation, and promoted private sector investment in the adaptation process. In particular, the Readiness project conducted a ten-cohort training that reached 338 climate change units across all departments and ministries in the agricultural sector. The NAP readiness also delivered training to build the capacity of technical staff at county level to integrate climate change risks and opportunities in planning and budgeting, and delivered data analysis and information management systems in six national institutions that were linked across all the 47 counties and with national planning processes. The activities under Outcome 1 are therefore designed to take these processes and capacities to the next stage, for example by broadening the trainings and technical assistance to the departments of cooperatives in each county, and refining the data collection processes, as well as collecting decentralized data, that will feed into the systems established under the NAP project.

115. FAO is also supporting the Government of Kenya in the implementation of initiatives that bear direct relevance and synergies with this proposed project.

116. Institutionalization and Scale-up of the Kenya Integrated Agriculture Management Information System (2023-2026, USD 4,932,408). KIAMIS is an integrated, module-based, digital platform solution that supports farmer registration and e-voucher redemption in line with the GoK digitization agenda. It was first developed and piloted in Kenya with FAO support and now forms the basis of the national system for farmer registration and e-subsidy management in the country. The platform leverages the information in the farmer registry to provide services, such as e-extension, credit management, mechanization services, food security statistics and M&E. Among other benefits, the system enhances transparency and better targeting of inputs, thus increasing effectiveness of subsidy programs. Over the period 2023-2026, the project will upscale and institutionalize the use KIAMIS, including devolution to counties. Additional digital services will also be introduced into the KIAMIS platform, for use at national and county levels such as: E-extension; Monitoring and Evaluation, enhanced dashboards and data mining tools, link to the Land Information Management System (LIMS), Social Protection Register, and repository for routine data monitoring module (production and yield values.

117. **Agricultural Climate Resilience Enhancement Initiative (ACREI) (USD 4,636,793,2022-2024).** This project is supported by the Adaptation Fund and WMO in the Horn of Africa region and it focuses on arid and semi-arid lands. The project includes the development of methods for community-based adaptation planning and participatory extension service delivery, integrating climate information into Farmer Field Schools. It also includes provision of localized down-scaled climate services and climate forecasts, analysis of historical climate information and assessments of local risks and vulnerabilities. These approaches will also be used in this initiative, under Outcome 1. Furthermore, the FAO is also working with the national hydrometeorological department to “climate-proof” agricultural advisory services nationally. Therefore, the project will build on nationally developed methodologies, climate information services and analytical capacities to deliver similar work at county level aligned with the needs of the 6 value chains. Coordination takes places through the FAO-Kenya Office as well as by linking county administrations with national counterparts.

118. **Integrated Landscape Management for conservation and restoration of the Mt. Elgon in Western Kenya (FSP) (USD 5,354,587, 2022-2027).** This project, which is financed by the GEF under the Food Systems, Land Use and Restoration (FOLUR) Impact Program,will provide significant synergies with this proposed initiative. The ILM project works in the coffee and maize value chains and promotes integrated landscape management for the conservation and restoration of the Mount Elgon ecosystem. This proposed initiative integrates many of the approaches used in the GEF project to support its work, in particular a similar methodology will be proposed to county administrations for the development and implementation of integrated landscape management strategies (under Outcome 2.1, learning from the experience of the two early adopting counties in the GEF project – Bungoma and Trans Nzoia). Trainings and capacity development provided to coffee farmers under the GEF project will also be deployed using farmer field schools and coffee cooperatives and similar methodologies as this project, and technologies identified in this project for adapting the coffee value chain to the impacts of climate change will also be promoted in the GEF project. Coordination will take place through the FAO-Kenya Office and the concerned county level departments.

119. *Table 14* lists other relevant FAO-supported projects that will be operational during this project's implementation. Lessons from past projects have been taken into consideration in this project's design.

Table 14 Other Projects supported by FAO-Kenya

Title	Total Budget	Dates	Potential for synergies
Support for the preparation of the development of a National Livestock Master Plan	USD$ 255,000	2022 - 2023	The outcome of this project and the national livestock master plan will be used to inform county-level support to the dairy and poultry value chains.
EU-FAO Digital Land Governance Program (DLGP)	USD$ 22,522,523	2022-2027	Although it is not proposed to work on land titling formally, the proposed project will benefit from any progress in formalizing and negotiating land rights, land titles and land mapping. Coordination will take place through the FAO-Kenya and EU delegations.
Strengthening institutional and human capacities to design, implement and generate evidence for nutrition sensitive programming including policy and investments in livestock programming in Kenya.	USD$ 481,000	2020 - 2023	The project may benefit from nutrition monitoring that has taken place in Kenya under this initiative.
Safeguarding livelihoods and increasing immediate food access for vulnerable rural households affected by drought	USD$ 500,000	2022 – 2023	Although this project takes places in a different region, synergies will be made by considering lessons learned in relation to drought response, drought early warning and preparedness.
Restoration of arid and semi-arid lands (ASAL) of Kenya through bio-enterprise development and other	USD$ 4,157,341	2018 - 2023	Lessons from this project have been integrated into this design, namely the effectiveness of restoration approaches, the factors of success

incentives under The Restoration Initiative			required to develop integrated and climate responsive landscape management strategies.
Global Low Carbon Initiatives for Food and Agriculture: Global Low Carbon Tea - Triangular Cooperation in Tea Value Chain in Kenya (GLI-TEA Kenya)	USD$ 1,165,954	2022 - 2024	Synergies with this project were built by integrating all technical knowledge, supporting evidence and data on the impacts of climate change on the tea value chain, as well as developing the list of potential climate solutions offered to tea cooperatives in this project.
Improving Measurements for Payments to Reduce Emissions and Strengthen Sinks (IMPRESS)	USD$ 1,000,000	2021-2023	The IMPRESS project seeks to strengthen the National Forest Monitoring System, hence enabling Kenya to access climate finance. Lessons learned and outputs from this project, particularly the Forest Carbon Calculation Database can guide the estimation of emissions and removals from forest and agricultural lands in the LREB.

2.2 Projects implemented through Agriterra

120. In Kenya, Agriterra has been actively supporting cooperatives in various value chains, including coffee, tea and dairy. Agriterra also contributes to the implementation of the following projects that have provided lessons and approaches for use in this design:

121. **Climate Resilient Agriculture for Tomorrow (CRAFT).** The CRAFT project (June 2018 – May 2023), funded by the Netherlands Ministry of Foreign Affairs, is designed to increase the availability of climate smart food for the population in Kenya, Tanzania and Uganda. The project is implemented by SNV (lead) in partnership with Wageningen University and Research (WUR), CGIAR's Research Program on Climate Change, Agriculture and Food Security (CCAFS), Agriterra and Rabo Partnerships. The main role for Agriterra is institutionalizing the climate interventions at cooperative level. This includes:

- Profiling, scoping and assessing cooperatives
- Strengthening the institutional framework for cooperatives in governance and financial management
- Support in developing Climate Smart Business plans and their implementation
- Develop financing strategies for the cooperatives for possible co-investments
- Institutionalizing the Climate Smart Agriculture (CSA) interventions at cooperative level to ensure sustainability.

122. **Developing a Low-Carbon Coffee Value-Chain in Kericho, Kenya.** The project is supported by the Netherlands Enterprise Agency (RVO) and run by a consortium consisting of Moyee Coffee, The Fairchain Foundation, Agriterra, the Kipkelion District Cooperative Union and the Kenya Agriculture

Livestock and Research Organization (KALRO). It is implemented in the context of the Sustainable Development Goals Partnership. This project centres around the development and implementation of a regenerative coffee farming system designed for maximum carbon uptake in biomass and soil.

2.3 Other ongoing or pipelined projects

123. **NDA Strengthening and Country Programming support for Kenya through the National Treasury** (GCF Readiness). This project, which also ended in 2022, focused on strengthening the National Designated Authority (NDA), as a follow-up to earlier readiness projects focusing on national adaptation planning. It focuses on creating institutional capacity within the office of the NDA to coordinate, track and monitor climate change portfolios, development of procedures and processes including no-objection processes, as well as the development of country programming and pipeline. The initiative included the delivery of training at national level for ministries of environment, energy and agriculture on climate finance, proposal development, monitoring and evaluation of climate projects. While this initiative strengthened institutional capacity at a high central level, this project benefits from the results of this Readiness project and builds on the capacity of both the national treasury and the NDA to deliver its intended activities. This proposal is developed in close collaboration with the NDA and national level ministries.

124. **Government Financing of Locally Led Climate Action (G-FLLOCA)** is jointly financed by the Government of Kenya through the National Treasury and Planning ministry and the World Bank (2020-2030). It works in all 47 counties and builds on the devolution process to strengthen the enabling environment for local climate action aligned to the National Climate Change Action Plan. The CRLCSA project works closely with the FLLOCA-supported county administrations in the LREB and builds on the advanced baseline of capacity supported by G-FLLOCA including: the creation and operationalization of climate change units and climate change coordinating committees in all counties; the county climate readiness assessment, which was also used to inform the needs and gaps analysis used in this design; and, of course, the actual financing of county budgets and county-led climate initiatives that will serve as cofinancing to this project.

125. Under G-FLLOCA, the Government of Kenya would operate County Climate Change Funds that provides support to county administrations to strengthen the climate finance enabling environment at county level, supports awareness raising, finances the delivery of climate information (including with Maarifa centre and Kenya Climate Change Knowledge Portal). The second pillar of the program consists in the creation of a Performance for Results (PforR) window under which Low-emission climate resilience actions will be financed through a conditional County Climate Resilience Investment (CCRI) Grant, following a facilitated participatory process.

126. As agreed with the LREB county administrations, the CRLCSA project will also tie into this process by supporting county participatory processes in the design of investments, particularly those that are targeted towards improved landscape management. G-FLLOCA projects and activities related to the CRLCSA landscape management strategies (outcomes 2.1 and 2.2) will be implemented by leveraging county budgets and G-FLLOCA grants as cofinance. Please refer to section 5.3 for further detail.

127. Synergies are also actively sought with IFAD, who is implementing and developing various projects of interest.

128. The **IFAD-supported Livestock Commercialization Project (KeLCoP)** – KeLCoP focuses on improving accessibility to market and assisting women, youth, and marginalized people in developing commercially viable livestock value chains[177]. The USD 93.5 million runs from 2020 – 2027. KeLCoP operates in six of the CRLCSA targeted counties: Trans-Nzoia, Bungoma, Busia, Kakamega, and Siaya. Working closely with KeLCoP, the CRLCSA project will build on KeLCoP's achievements by expanding the project reach to cooperatives. In particular, the CRLCSA project can incorporate KeLCoP's experience with market development as part of the technical training and market development in Outcomes 1 and 3. Technical collaboration related to the dairy and poultry value chains will also be pursued, to ensure that best practices are disseminated to cooperatives in the area. Other areas of collaboration may include supporting KELCOP beneficiaries in becoming members of cooperatives, or in accessing finance and certification schemes.

129. **The Rural Kenya Financial Inclusion Facility (**RK-FINFA, IFAD**)** is being developed to meet the increasing demand for rural and agricultural finance. Its objective is "Increased rural financial inclusion and green investments by agriculture value chain stakeholders, leading to equitable employment opportunities, innovative and resilient production systems, and increased incomes for smallholders, poor and marginalized rural households, women and youth[178]." While nationwide, FInFA will operate in seven of the CRLCSA counties: Trans Nzoia, Bungoma, Busia, Kakamega, Siaya, Nandi, and Kisii[179]. The FINFA project will support the CRLCSA project objectives by developing financial literacy and business development skills to smallholders and MSMEs. These beneficiaries could then be integrated into cooperatives. Of particular relevance, the FINFA project intends to provide financial guarantees to non-bank financial institutions through a green financing facility. This will allow access to finance to a class of beneficiaries not targeted under the CRLCSA project.[180] Finally, the CRLCSA project also stands to benefit from work done with the directorate of financial planning to assist in the development of supporting rural finance policies at national level.

130. **Africa Rural Climate Adaptation Finance Mechanism (ARCAFIM)** - ARCAFIM is a proposed climate adaptation finance institution, blending IFAD and donor finance (including a request to GCF) to provide loans and climate adaptation innovation investing. The total budget is $300 million and ARCAFIM will work with private financial institutions, including the Equity Bank of Kenya. Using a host bank, direct investments and wholesale lending would be made via two components. Component 1: Effective financing to rural adaptation would provide risk-management solutions for: A) smallholder farmers for seasonal/short-term CCA expenditure, B) rural MSMEs capital expenditures, and C) medium- to long-term asset capital expenditures for cost-effective adaptation technologies. Component 2: Innovations and capacity to advance adaptation investments would generate A) continentally agreed taxonomy of rural CCA finance, B) CCA finance systems and product development for FISFIs, C) local large-scale support to stimulate demand for CCA finance, and D) strengthen CCA investment implementation

[177] https://www.ifad.org/en/web/operations/-/project/2000002339

[178] https://www.ifad.org/documents/38711624/39485424/Kenya+2000003431+RK-FINFA+Project+Design+Report+October+2021.pdf/39736bc4-281c-2b65-636a-0dc9114f1fcc?t=1636715245360

[179] https://www.ifad.org/documents/38711624/39485424/Kenya+2000003431+RK-FINFA+Project+Design+Report+October+2021.pdf/39736bc4-281c-2b65-636a-0dc9114f1fcc?t=1636715245360, pg 2

[180] https://www.ifad.org/documents/38711624/39485424/Kenya+2000003431+RK-FINFA+Project+Design+Report+October+2021.pdf/39736bc4-281c-2b65-636a-0dc9114f1fcc?t=1636715245360

capacity by smallholders and rural MSMEs. This program is a regional initiative, which expects to dedicate approximately 50 Million USD to Kenya. Once operational, the beneficiaries of the CRLCSA project may also benefit from accessing finance delivered through this facility, since the CRLCSA project may deliver pre-loan TA and business planning skills.

131. IFAD is also developing a **Global Net Zero Dairy project**, which is at early stages of design, and which is likely to also be submitted to the GCF for financing. The IFAD project component 1 contains activities that can be useful to this project, particularly when strengthening veterinary services and livestock GHG MRV expertise. The IFAD project also proposes to work with processors on traceability and raising awareness of consumers of pasteurization and its benefits, activities that will not be pursued in this initiative but which will bring value to the Dairy value chain. Both proposed initiatives are using a similar methodology for accounting GHG emissions from the dairy value chain namely the GLEAM, which has been developed by FAO. Discussions are under way to determine scope of intervention of the IFAD project, as well as whether IFAD could leverage the technology transfer model proposed in this initiative to deliver extension and veterinary support through cooperatives. Discussions are also under way to determine whether cooperative beneficiaries under this initiative may also access IFAD grants once they reach a certain level of maturity.

132. Synergies and coordination will also be sought with the few relevant GEF-supported projects (pipelined or under way). (Table 15)

TABLE 15: ONGOING OR PIPELINED RELEVANT GEF PROJECTS AND SYNERGIES

Name	Budget (US$)	Summary of Objective	Synergies
Lake Naivasha Basin Ecosystem Based Management (2024-)	10.02 million	To restore forest ecosystems and reduce land degradation in the LNB catchment for increased protection of Lake Naivasha's water resources, biodiversity, and associated ecosystem services to support the local and national economy.	Although not in the same region, this proposed project (currently at PIF stage) could benefit from approaches developed under this project, specifically those under Component 1 for decentralized carbon monitoring and those under Component 2 for landscape management strategy development and implementation.
Strengthening forest management for improved biodiversity conservation and climate resilience in the Southern	15,080,000	to support a functioning and resilient dryland forest landscape that supports a sustainable economic/food production through integrated natural management	This project takes place in drylands. However linkages could be established between the two initiatives where climate resilience is considered, particularly when it comes to working in the livestock subsector.

rangelands of Kenya (2023-2026)			
Enhancing Integrated Natural Resource Management to Arrest and Reverse Current Trends in Biodiversity loss and Land Degradation for Increased Ecosystem Services in the Tana Delta, Kenya (2018-2023).	39,872,080	The objective of this project was to strengthen integrated natural resource management and restoration of degraded landscapes in the Tana Delta, and systemically scale up best practices and lessons learned to other priority landscapes in Kenya. The strategy included improving the enabling environment for sustainable land management and restoration ; Supporting local governments and communities to develop and implement plans; Building local capacity to carry out restoration plans and access finance.	This project, which ends in 2023, will provide useful lessons and avenues that can be extended into this current initiative, including best practice for landscape and forest restoration and implementation of the landscape management strategies foreseen under Component 2.

133. Other ongoing or pipelined projects supported by GCF are as follows:

Name	**Budget**	**Summary of Objective**	**Synergies**
Support to Reducing Emissions from Deforestation and Forest Degradation (REDD+) Investments in Africa[181]	US$ 8.8 million	The project objective is to strengthen the capacity and accelerate the efforts of African countries to mobilize resources for projects reducing emissions from deforestation and forest degradation, and conserve and manage the continent's forest resources.	CRCLSA can help its beneficiaries mobilize funding from this project. Agroforestry is one of the strategies that the CRLCSA project will be assisting its beneficiaries incorporate and the ADB project can help with further funding of activities after the CRCLSA project is implemented. Under outcome 3 of the CRLCSA, targeted cooperatives or farmers will be selected for potential participation in carbon-conservation-related projects.

[181] https://www.greenclimate.fund/document/support-reducing-emissions-deforestation-and-forest-degradation-redd-investments-africa

Program to Build Resilience and Food Security in the Horn of Africa[182]	US$ 150 million	improving agropastoral production and agribusinesses climate change resilience	Coordination and synergies will be developed during feasibility assessment based on site selection and beneficiary targeting. While the CRLCSA does not focus on agro-pastoral activities, sharing of knowledge, technologies and best practices will be pursued to ensure consistency of approaches.
Leveraging Energy Access Finance (LEAF) Framework[183] FP-168	US$ 959.9 million	The LEAF framework will provide decentralized renewable energy solutions to tackle the energy shortfall, while also reducing CO2 emissions and simultaneously boosting local economies and businesses.	CRLCSA beneficiaries could benefit from increased access to decentralize renewable energy (DRE). However LEAF beneficiaries (energy providers) may not be present in the Lake region.
GeoFutures Facility[184]	Information not available	The GeoFutures Facility is an insurance-based risk finance fund that will crowd in international and national private sector investment into the geothermal power sector in East Africa (the "GeoFutures Facility"), with an initial focus on Kenya and Ethiopia.	While the GeoFutures Facility appears at first to offer little insight for the CRLCSA project, technical investment lessons can be learned. The CRLCSA project does not conduct investing, however, the cooperatives that will be assisted may provide funding for their members. Lessons in 'smart investment' strategies may be taken from the GeoFutures Facility to inform cooperative beneficiaries financing activities.
Enhanced Access to Financing for Green Water and Sanitation Technologies in Kenya	US 150 million	This project will pave the way to achieve intended outputs and outcomes related to relevant national and international policies, by enhancing access to innovative financing	If this project moves forward, it will create much needed baseline financing for water and sanitation in the region, which the CRLCSA project will build upon.

[182] https://www.greenclimate.fund/sites/default/files/document/27270-program-build-resilience-and-food-security-horn-africa.pdf

[183] https://www.greenclimate.fund/document/leveraging-energy-access-finance-leaf-framework

[184] https://geofutures-greeninvest.com/

		and private sector participation towards implementation of green water and sanitation technologies.	
Transforming Financial Systems for Climate (TFSC)[185]	US$ 689.5 million	Providing loans and technical assistance in 17 developing countries across Africa and Latin America and the Caribbean to create self-sustaining markets in energy efficiency, renewable energy, and climate resilience.	The scope of investment in Kenya is unknown. However, the project will provide technical assistance to Kenyan Banks to access derisking financing so they can support climate smart cooperatives. Lessons from the TFSC experience can be incorporated into CRLCSA cooperative technical advising.

[185] https://www.greenclimate.fund/project/fp095

2.4 Mechanisms for cooperation and synergies

134. Given that Kenya is a country where multiple donors are present that the LREB counties are also benefitting from significant national and international support, mechanisms are in place to ensure adequate coordination among all partners, to leverage synergies and to avoid duplication.

135. At the **national** level, the project will benefit from coordination under the aegis of the NDA, and various multi-stakeholder groups that bring together the development partners and key ministries. The project will also rely on the Maarifa centre, the Council of Governors and the Ministry of Agriculture for assistance in identifying partners and partnership opportunities.

136. At the LREB **regional** level, coordination will take place through the project's coordinating unit (refer section 8), which will periodically bring together stakeholders and partners, including other projects, to discuss approaches, technical aspects, methodologies and lessons learned (refer to Outcome 1 and the Monitoring, Evaluation and Learning Plan, Annex 11.). Regular events will also be organized through the project's steering committee which will ensure to invite and represent all relevant project partners.

137. At the **county** level, coordination will take place through the county administration and county government. This will include intersectoral coordination but also the deployment of regular project-related awareness raising events to ensure non-governmental partners, local communities, ward authorities and other stakeholders are aware of programming and synergy opportunities.

3. Institutional and Policy Frameworks

3.1 Legal and policy conformity

138. The project is consistent with all relevant national laws, policies, and plans, and contributes to the achievement of development and climate change goals of the Government of Kenya.

139. Institutions that develop, oversee, and implement laws, policies, and plans, differ at the national and county level. At the national level, coordination and implementation of climate change adaptation policy and action plans is overseen by the National Climate Change Council (NCCC), headed by the President, the Cabinet Secretary of Climate Affairs, and the Climate Change Directorate186. County level coordination and implementation of climate change adaptation policy and action plans are overseen by the county governor and the climate change unit (CCU).

140. The project supports institutions developing and implementing climate change adaptation policy by working closely with the county government and CCUs. Applicable laws and regulations are as illustrated in Table 16:

TABLE 16: RELEVANT NATIONAL LAWS

National Laws	Project Alignment
The Constitution of Kenya (2010)	The project aligns with the Constitution of Kenya, specifically the preamble that includes a paragraph on the importance of preserving the natural environment of Kenya[187] and Chapter 5: Land and Environment. The project implements practices that are intended to preserve and sustainably management agricultural landscapes and to reduce the impacts of agriculture on the ecosystems. Outcome 3 aligns with Chapter 5, Part 1 Land and Part 2: Environmental and Natural Resources, Sections 69 and 70, as the training smallholder farms in the FFS and CRLCSA technology knowledge dissemination has been socially mainstreamed to ensure that no discrimination of sex, ethnicity, age, disability, and/or sexual identity occur.
The National Climate Change Act of 2016[188]	Paragraph 2 of Section 3[189] (specifically lays out how the Act will affect Kenya's climate change response), mandates the formulation of programs and projects to enhance resilience that are intergenerational and gender equity mainstreamed, while also contributing to disaster risk reduction. This paragraph also stipulates the need to promote low-carbon technologies. All points are supported by the project's activities. The Act of 2016 also follows the decentralization framework. The Act establishes the Climate Change Directorate, which coordinates and facilitates climate change

[186] Kenya National Adaptation Plan 2015.

[187] Quoted from the 2010 Constitution: "We, the people of Kenya … Respectful of the environment, which is our heritage and determined to sustain it for the benefit of future generations." Retrieved from: https://www.constituteproject.org/constitution/Kenya_2010.pdf

[188] Retrieved from: https://faolex.fao.org/docs/pdf/ken160982.pdf

[189] Section 3 of the Climate Change Act of 2016, Paragraph 1 states "This Act shall be applied for the development, management, implementation and regulation of mechanism to enhance climate change resilience and low carbon development for the sustainable development of Kenya."

	adaptation policies and action plans between government agencies and county level climate change units. The project interacts with the climate change units within the county governments of all the 14 targeted counties.
The National Gender and Equality Commission Act, 2011	The National Gender and Equality Commission Act of 2011 established a Gender and Equality Commission to monitor and facilitate gender and equality mainstreaming in national development, including legislation. The project's Gender Action Plan supports the implementation of the National Gender policies and laws.
Cooperative Societies Act, Chapter 490, Revised 2005	Cooperative Societies Act, Chapter 490, revised 2005 relates to the "…Constitution, registration, and regulation of cooperative societies and for purposes incidental thereto[190]." Cooperatives are a central pillar of this project's technology transfer strategy.
The Water Act, 2016	The Water Act of 2016 establishes the Water Cabinet Secretary as the overseer of Kenya's water resources. In addition to establishing the secretariat, the Act designates that all Kenyans have the right to water resources. The project promotes the techniques to conserve and sustainably use water on smallholder farms in the target 6 value chains.
Energy Act, 2019[191]	Kenya's 2019 energy act lays out the reporting and institutional framework for developing Kenya's electrical infrastructure. The Energy Act commits provision of electricity is the national government's responsibility and must be provided in an equitable manner. The Act stipulates in paragraphs 73 – 93 that renewable energy inventories and maps to help identify areas where renewables can be fully exploited are to be prepared. Activities in this project will support increasing access to renewable energy technologies inasmuch as they enable reducing emissions or emissions intensity in each of the value chains.
Forest Conservation and Management Act (FCMA), 2016[192]	The FCMA mandates that 10 % of Kenya's land must be forested, as well as the functional responsibility for management of Kenya's forest reserves by national and county governments. The project supports the FCMA objectives through the agroforestry strategies that will be transferred to farmers as well as the development and implementation of decentralized landscape management strategies to be implemented by counties.
National Drought Management Authority Act (NDMAA), 2016[193]	The NDMAA establishes the National Drought Management Authority, which facilitates coordination of national and county levels of government on drought management policy and ensures that "…all stakeholders in response to drought and climate change risks are timely, harmonized, and effective[194]." The project supports the NDMAA through its work with the county climate information service providers, which will

[190] Retrieved from: https://coops4dev.coop/sites/default/files/2021-02/Kenya%20Legal%20Framework%20Analysis.pdf

[191] https://www.epra.go.ke/download/the-energy-act-2019/

[192] https://faolex.fao.org/docs/pdf/ken160882.pdf

[193] Retrieved from: http://kenyalaw.org:8181/exist/rest//db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/N/National%20Drought%20Management%20Authority%20Act%20-%20No.%204%20of%202016/docs/NationalDroughtManagementAuthorityAct4of2016.pdf

[194] Retrieved from: http://kenyalaw.org:8181/exist/rest//db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/N/National%20Drought%20Management%20Authority%20Act%20-%20No.%204%20of%202016/docs/NationalDroughtManagementAuthorityAct4of2016.pdf

	include the delivery of drought early warnings to last mile users. Furthermore the development and implementation of landscape management strategies can also create a buffering response to drought and climate change risks that the NDMAA mandates.
Land Act, 2012[195]	The Land Act provides the Kenyan Parliament the ability to administer and manage land and land-based resources. Moreover, the Act provides three classifications of land as public land, private land, and community land. All activities are implemented in conformity with provisions of the Land Act. Efforts to clarify land use mapping will be included in the project under Outcome 2.
Land Registration Act, 2012[196]	The Land Registration Act establishes the registering of land, giving national and county level governments the ability to designate land areas that will require registration. Activities 2.1.1 and 2.1.2 which will see the development of CRLCSA embedded land management and action plans, will reference county land registers. Identifying land titling and land register will be a core component of these activities.
The Protected Areas Act, 1949[197]	The Protected Areas Act provides the Minister to declare in the interest of public safety or order, areas in which access will be limited to authorized persons. Designated Protected Areas will be reflected in the landscape management strategies (Outcome 2), and all land use will be subject to conformity with the protected areas act. The environmental management framework in Annex 6 specifies how the project will monitor risks to protected or marginal and fragile areas.
Community Land Act (2016)	The Community Land act provides provisions for the recognition, protection and registration of community land rights, and sets out the roles and responsibilities of county governments in upholding tenure rights for communities, including the responsibility of holding in trust all unregistered community land on behalf of the communities. The project will ensure that activities implemented under outcome 2 will adhere to the community land rights in force and will also ensure that no appropriation is made.
Forest Conservation and Management Act (2005)	The Act provides for the need to set and periodically revise a forest policy, establishes the Kenya Forestry Service, and establishes that forests may be classified as public, community or private forests, with management regimes attached to each. Any forest-related work included in this project, particularly under Outcome 2, Wil be placed under the authority of the county government who is responsible for upholding national laws.
Environmental management and Coordination Act (1999)	This law reiterates the right to a healthy environment under the constitutions, establishes the National Environmental Management Agency (NEMA) and set objectives related to the protection of the environment. The Act also sets out requirements for environmental impact assessment, environmental audit requirements, and other environmental quality standards and requirements. NEMA will be involved in project activities under Outcomes 2 and 3 in particular.

[195] http://www.parliament.go.ke/sites/default/files/2017-05/LandAct2012.pdf

[196] https://leap.unep.org/countries/ke/national-legislation/land-registration-act-2012-cap-300#:~:text=An%20Act%20of%20Parliament%20to,registration%2C%20and%20for%20connected%20purposes.&text=This%20Act%20entered%20into%20force%20on%202%20May%202012.

[197] https://www.ecolex.org/details/legislation/protected-areas-act-cap-204-lex-faoc106269/

3.2 National Climate Policy Framework

141. The Ministry of Environment and Forestry (MEF) is the leading institution for Kenya's environment and climate change strategies. Kenya has a strong history of climate governance beginning with the passing of the National Climate Change Response Strategy (NCCRS) in 2010. The NCCRS established goals to mainstream climate mitigation and adaptation into national planning and budgeting and outlined priority projects in key sectors, including agriculture, tourism, energy, infrastructure, health, water, and urban development. This strategy was further reflected in Kenya's National Planning Document, Vision 2030, which established medium-term planning processes for planning and budgeting, particularly relating to climate change[236]. The 2015–2030 Kenyan National Adaptation Plan (NAP) was finalized in 2015 and was one of the first NAPs to be launched in Africa, and globally, by a developing nation. The NAP supports the 2010 Constitution of Kenya and the Kenyan Vision 2030 for a sustainable future and features important aspirations for agriculture in national development[237]. It was submitted to UNFCCC in 2017 and provides a climate hazard and vulnerability assessment as well as setting out priority adaptation actions[238].

142. Building on these foundational documents, Kenya developed its first five-year National Climate Change Action Plan (NCCAP) in 2013 (covering the period 2013-2017) to mainstream climate change across all government functions and processes. This was followed by the elaboration of the country's Intended Nationally Determined Contribution (INDC) in 2015[239]. To better coordinate and effectively implement the Nationally Determined Contribution (NDC) and the National Adaptation Plan (NAP), Kenya updated the NCCAP, covering the period 2018-2022. NCCAP 2018-2022 sets out seven priority climate action areas with adaptation and mitigation actions. These are disaster risk management, food and nutrition security, water and the blue economy, forestry wildlife and tourism, health, sanitation and human settlements, manufacturing and energy and transport. The NDCs were further revised and updated in 2020 to ensure a climate resilient society through mainstreaming climate change adaptation into development plans and implementing the following adaptation actions:

- Enhancing the adaptive capacity and climate resilience both at national and local levels and across all the sectors of the economy: disaster risk reduction, agriculture, environment, energy and infrastructure, water and sanitation, health, population and urbanization, gender, youth and other vulnerable groups, tourism, private sector.
- Enhancing climate resilience of local communities through financing of locally led climate change actions: enhance uptake of adaptation technology especially of women, youth, and other vulnerable groups, incorporating scientific and indigenous knowledge; enhancing investment in ocean and blue economy.

143. Such plans and policies provide the foundation for Kenya's flagship climate change legislative framework (a full-scale national climate policy is yet to be developed), the so-called National Climate Change Act (CCA), which was signed into law in 2016. The framework was created for governing climate change in the country [240],[241].

144. In addition to Kenya Vision 2030 and the aforementioned climate-change policies, the country has also put in place several other key policies to support implementation of climate change adaptation and mitigation actions. Some of the key policies are The National Policy on Climate Finance, which highlights how climate investment can support adaptation and mitigation measures such as reduction of

deforestation, livelihoods diversification, and research and innovation. Furthermore, the Climate Risk Management Framework intends to harmonize its climate change and disaster risk policies[242].

145. Regarding the key policies specifically focused on agriculture, The National Livestock Policy of 2015 identifies high frequency and increased severity of droughts as one of the effects of climate change. The policy identifies measures to enable the livestock subsector to enhance its contribution to food and nutritional security, provide raw materials for agro-based industries and contribute to improved livelihoods in the country. It emphasizes the improvement of the livestock management systems for sustainable development of the livestock industry. Due to frequent droughts affecting livelihoods that are dependent on livestock, the policy proposes to establish a livestock insurance scheme that will be operated in a public-private-partnership model[243]. The Agricultural Sector Transformation and Growth Strategy (ASTGS) (2019-2029) and the Kenya Climate Smart Agriculture Strategy (KCSAS) (2017-2028) further underline these efforts and put an emphasis on the impact of climate change on agriculture. KCAS Strategy highlights adaptation and resilience as one of four broad strategic areas. Adaptation and building resilience should encompass addressing vulnerability due to changes in rainfall and temperature, extreme weather events and unsustainable land/water management and utilization[244].

TABLE 17: POLICY CONFORMITY

National Policies	Project Alignment
Kenya's **Vision 2030** development plan	Vision 2030 is Kenya's development plan that has been implemented since 2008 by a series of 4-year medium term plans. The **Fourth Medium Term Plan (MTP IV) 2023 – 2027** will be made public in the fall of 2023. MTP IV focuses on five core 'pillars'[198] to achieve development: 1) Agriculture; 2) MSME [199] economy; 3) Housing and settlement; 4) Healthcare; and 5) Digital Superhighway and Creative Economy. Pillar 1 is the most relevant to the project. MTP IV programming won't be known until fall 2023 when budgets are submitted but MTP IV will build on MTP III's work on addressing negative impacts of climate change by: • Promoting low carbon climate resilient and green growth development • Strengthening climate change governance and coordination • Strengthening climate change monitoring, reporting and verification, capacity building and public awareness • Implementing the Green Economy Strategy and Implementation Plan (2016-2030) • Implementing the National Climate Change Action Plan (2018-2022) The project operates within Pillars 1 and 2 of MTP IV. While not the primary concern of the project, economic development is baked into outcomes 3 and 4, where the financial support for mainstreaming CRLCSA is actuated.
Kenya's Updated NDC[200]	Kenya's 2020 **Updated Nationally Determined Contribution (NDC)** sets an abatement target of 32% of the business-as-usual (BAU) scenario. Under the BAU scenario, Kenya's projected emissions are projected to increase to approximately 143 $MtCO_2$

[198] https://www.treasury.go.ke/wp-content/uploads/2022/11/PRESENTATION-BY-PS-STATE-DEPARTMENT-FOR-ECONOMIC-PLANNING-ON-KEY-HIGHLIGHTS-OF-MTP-IV-DURING-MTEF-BUDGET-LAUNCH..pdf

[199] Micro-small and medium enterprise

[200] And the developing Third National Communication

	by 2030, which the NDC wants to limit to 32% relative to the BAU. Over the course of the project lifespan, the project would tentatively mitigate a projected 4.32MtCO_2[201].
Kenya's National Adaptation Plan 2015 – 2030[202]	The **National Action Plan 2015 – 2030**, coordinates climate change adaptation at the national level while also contributing to economic development to boost resilience. Moreover, the NAP advocates for specific benchmarks: 1. Continuing devolution of adaptation, which allows county governments to adapt the NAP to their needs 2. Improving the mix of renewable energy in the national grid 3. Developing and adopting innovation technologies that promote climate change resilience 4. Mainstream climate change adaptation into all departments of the public sector 5. Enhance the adaptive capacity and resilience of Kenyan society through climate proof infrastructure, mainstreaming climate change in land management, primary and secondary education, the private sector, the informal sector. 6. And gender, generation streaming climate change adaptation policy, actions plans, reforms, and regulations Outcome 1 of the project supports the mainstreaming of climate change adaptation into all public sector offices with the trainings provided. Land management reforms that will be carried out in Outcome 2 support the land management reforms of the NAP. Outcome 3 further develops the bullet point #5 via the farmer field schools, cooperatives development, and gender-, generation-mainstreamed climate change adaptation policies and actions plans that the cooperatives will develop.
National Climate Change Action Plan 2018 - 2022[203]	The **National Climate Change Action Plan** (NCCAP) 2018-2022 sets out several priorities and actions that need to be accomplished: • Link climate change adaptation with development • Improve water conservation by reversing main water towers degradation and rehabilitating all catchments • Increase urban and rural domestic water supplies and sewerage services • Prioritize improving irrigation, agroforestry, and conservation tillage Activities the project will undertake in outcomes 1, 2 and 3 will contribute to implementing the NCCAP. Specifically, the transfer of technologies to farmers, the development and implementation of landscape management strategies, the dissemination of climate information services (CIS), will support the NCCAP priorities.
National Climate Change Response Strategy (NCCRS), 2010[204]	The NCCRS is the action plan that Kenya adopted in 2010 to guide the country's response to climate change. It is the result of a year-long process that defined climate change as a 'threat to national development[205]' and outlines how Kenya is going to respond. The strategy makes policy, legislative and institutional adjustments, recommendations on communicating climate change awareness, including educating the public on climate change risks, as well as the technology development and

[201] To be confirmed.

[202] /https://www4.unfccc.int/sites/NAPC/Documents%20NAP/Kenya_NAP_Final.pdf

[203] https://napglobalnetwork.org/wp-content/uploads/2022/01/napgn-en-2022-kenya-NCCAP-2018-2022-Implemantation-Status-Report.pdf

[204] https://cdkn.org/sites/default/files/files/National_Climate_Change_Response_Strategy_Executive_Brief.pdf

[205] Retrieved from: https://cdkn.org/sites/default/files/files/National_Climate_Change_Response_Strategy_Executive_Brief.pdf

	transfer needed to aid Kenya's climate change resilience and adaptation to climate change. The project aids the Response Strategy by assisting in development of effective CIS strategies and campaigns, providing equal opportunity trainings for smallholder farmers on CRCLSA strategies, assisting with establishing cooperatives to aid CRLCSA technology dispersal, and the financing support needed to ensure equitable access to CRLCSA technologies.
The Kenya Climate Smart Agriculture Strategy (CSAS)[206], 2017-2026	Kenya's Climate Smart Agriculture Strategy is the national government's reaction to agriculture contributing a third of national GHG emissions. The CSAS sets out four objectives to strengthen the agriculture sector's resilience and decarbonization: i) Addressing vulnerability due to changes in rainfall and temperature, extreme weather events and unsustainable land/water management and utilization ii) Mitigation of GHG's emissions from key and minor sources in the agriculture sector iii) Establishment of an enabling policy, legal and institutional framework for effective implementation of CSA iv) Minimizing effects of underlying cross-cutting issues such as human resource capacity and finance which would potentially constrain realization of CSA objectives. The project is thematically and structurally supportive of the CSAS objectives. Technology transfer and training activities in outcomes 1 and 3, and the support to financial, financial management and mobilization of finance through Banks in Outcome 4, all support objectives of the CSAS. The development of landscape management strategies in Outcome 2 support objective ii. and iii. while objective IV is supported by staff training activities in Outcome 1 and the financial tools made available in Outcome 4.
National Disaster Risk Management Policy (NDRMP)[207], 2017	The NDRMP establishes the framework for development of legislation at the national and county level, and development of risk management action plans, for mitigating human- and nature-induced disaster. In Section 1.6 of the NDRMP policy objectives, objective d) is "Enhance resilience at the County and National levels to the impacts of disaster risks and climate change." The NDRMP also suggests that strategies, climate change risk maps and assessments be developed, which this project will deliver in the 14 counties. The project supports the NDRMP and the objectives of disaster risk reduction including for example the enhanced dissemination of climate information services and early warnings, the upgrade and rehabilitation of assets in response to higher disaster risks, the transfer of technologies to reduce the impacts of severe weather events such as droughts, floods, and extreme heat, as well as the development of methodologies for local rapid climate risk assessments.

[206] https://www.adaptation-undp.org/resources/plans-and-policies-relevance-naps-least-developed-countries-ldcs/kenya-climate-smart

[207] https://repository.kippra.or.ke/xmlui/bitstream/handle/123456789/559/NATIONAL%20Disaster%20Risk%20Mannagement%20POLICY%20APPROVED.pdf?sequence=1&isAllowed=y

National Environmental Policy (NEP) [208] , 2013	Kenya's 2013 NEP lays out the framework that guides legal and institutional frameworks that promote, establish, and management sustainable usage of natural resources and ensure environmental integrity. The 2013 NEP also lays out that every Kenyan has a right to a clean and healthy environment, development must be conducted with consideration to ensuring environmental sustainability, and that equal access to resources and environment must be equitable. The project supports the NEP via Outcome 2, and the farmer field schools which will teach agroforestry along with other sustainable land management practices in the CRLCSA strategies training.

146. Please also refer to Annex 6, Environmental and Social Management Framework (ESMF) for legal and institutional frameworks related to the project's environmental and social risks.

3.3 County climate change institutional frameworks and capacity

147. An assessment of the county governments of the 14 targeted counties was conducted in March 2022 to inform development of the full project proposal. Knowledge on the state of CRLCSA policymaking at the national and county level was collected. Gaps in government capacity and coordination of CRLCSA activities were also assessed. To obtain data, the assessment was conducted via a questionnaire. 82 county government officials, 27 % female, 73 % male, were interviewed in four broad categories:

a. Human resource capacity
b. Policy and regulatory frameworks
c. Climate information services (CIS)
d. Finance and resource mobilization

3.2.1 County Climate Change Legal and Policy Frameworks

148. All county governments have some form of climate change policy or plan (see Table 18). Regarding cooperatives, seven counties, however, have mainstreamed climate change issues into cooperative policies: Bungoma, Siaya, Kakamega, Nandi, Kisumu, Kericho, and Bomet (see Table 19)[209]. For further detail on county integrated development plans and how they address climate change issues,

[208] https://storage.googleapis.com/cclow-staging/ag199ci3atqwp92rm7vemvs3cw5k?GoogleAccessId=laws-and-pathways-staging%40soy-truth-247515.iam.gserviceaccount.com&Expires=1675118684&Signature=sYjEqcME%2Bv0LCAc6IdZe7UHDd%2Fk83LIZ4figZpW4gpSdp52TmTJ2A4Ngeus6xFMXcdZrtixkCizNYWWuvGAZxFqwXXmEOVUHksWJXSpgxGWsejbDkRuDftbXtKdWeNnNWO6gEnx8v6Ygs89FFR2qrPhmazmLsryUfuc48DfK%2F84lK7KIlOB%2Fcf3RRjOiSaBmBnVqr6Z8E9M0fNW2P4iROM3kxkQMESDgDnLBSfszVD7q3Nvdl5yGFdBqq7QKPJpIJSjSCE0FIAlp3NDNXEuoGBU%2B6KZLraVGZLzRYHiYrZPjdmiB3oCvtk5O1V9CyK44fbtI3EzrvZFEbNnRkltTBg%3D%3D&response-content-disposition=inline%3B+filename%3D"f"%3B+filename%2A%3DUTF-8%27%27f&response-content-type=application%2Fpdf

[209] Sources : G-FLLOCA technical Assessment report, 2018; County Capacity Assessment (FAO), 2022; Maarifa Centers

TABLE 18 SUMMARY OF COUNTY GOVERNMENTS' CLIMATE POLICIES AND STRATEGIES

	County Climate Change Policy	County Climate Change Act	County Climate Change Fund Regulations	Established Climate Change Unit	County Climate Action Plan	County Climate Information Services Plan (CISP)
Bungoma	X	X		X	X	-
Kakamega	X	-	X	X	X	X
Kericho	X	X	X	X	-	X
Kisumu	X	X	X	X	X	X
Nandi	X	X	-	-	X	-
Nyamira	X	X	-	X	X	X
Siaya	X	X	X	X	X	X
Trans Nzoia	X	-	X	X	X	X
Vihiga	X	-	X	-	X	X
Kisii	-	X	X	-	X	X
Busia	-	X	X	X	X	-
Homabay	-	-	-	X	-	-
Migori	-	-	-	X	-	X
Bomet	-	-	X	X	X	-
Total	**9**	**8**	**9**	**11**	**11**	**9**

TABLE 19 EXISTENCE OF COUNTY COOPERATIVE POLICY, CSA ACTION PLAN, AND MAINSTREAMING OF CLIMATE CHANGE IN COOPERATIVE POLICY

	County Cooperative policy	CC issues integrated in the cooperative policy	County CSA Action plan
Bungoma	X	-	-
Kakamega	X	X	-
Kericho	X	X	-
Kisumu	X	-	X
Nandi	X	-	-
Nyamira	-	-	-
Siaya	X	-	-
Trans Nzoia	-	-	X
Vihiga	-	-	-
Kisii	-	-	-
Busia	-	-	-
Homabay	-	-	-
Migori	-	-	-
Bomet	-	-	X
Total	**6**	2	2

3.2.2 Institutional Capacity

149. Results from the county capacity assessment undertaken for this project in 2022 showed that most county government officials felt there were too few technical staff to carry out CRLCSA efforts. Except for agriculture, staff at the county governments only work at the county level, and not at the ward

level. Only Bungoma, Busia, Kericho, Nandi, Migori, and Vihiga staff report staff capacity as being adequate or more than adequate.

150. In terms of knowledge of climate change risks, adaptation strategies, vulnerabilities, and resilience, no response was lower than 'good' (see Figure 18). This is attributed to training in environment and climate change departments, short trainings for non-climate change and environment department staff, and staff exposure and/or gained experience on implementing climate change-related projects, such as National Agricultural irrigation program (NARIGP) and the Kenya Climate Smart Agriculture Program (KCSAP).

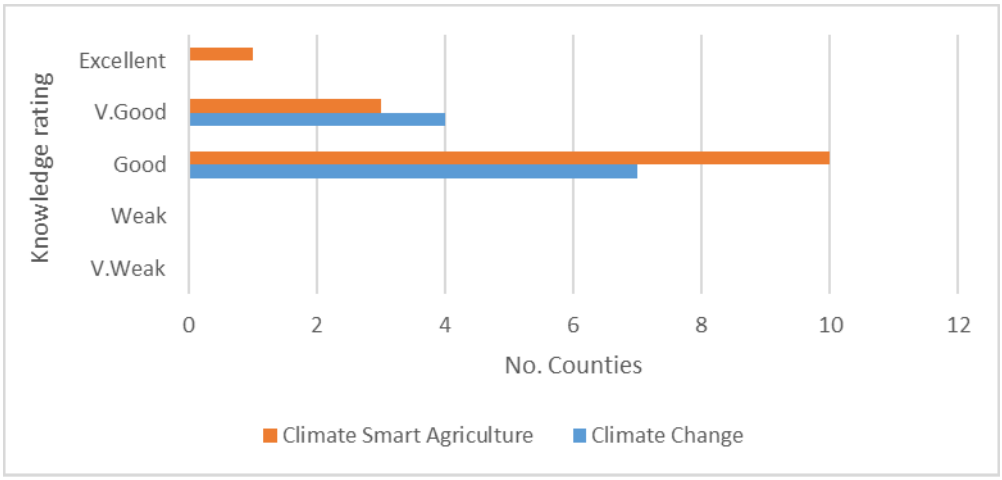


FIGURE 18:KNOWLEDGE OF TECHNICAL STAFF ON CLIMATE CHANGE AND CLIMATE SMART AGRICULTURE

151. In the past five years, over 90% of technical staff have received some training on climate change issues. In particular, the GCF NAP Readiness[210] project has trained over 700 national and county level staff, including equipping Climate Change Units (CCUs) with IT/ICT equipment installed in all 47 counties and 6 targeted institutions for effective management of climate data. In addition, 338 CCU staff also completed training under the NAP Readiness project. Despite the overall success of the project, gaps remain as coordination between county and national level staff on funding for climate change adaptation projects; few mechanisms exist for capturing and reporting of GHG emissions (MRV) at the county level[211]. The project will fill in these gaps with the additional training for county level staff and

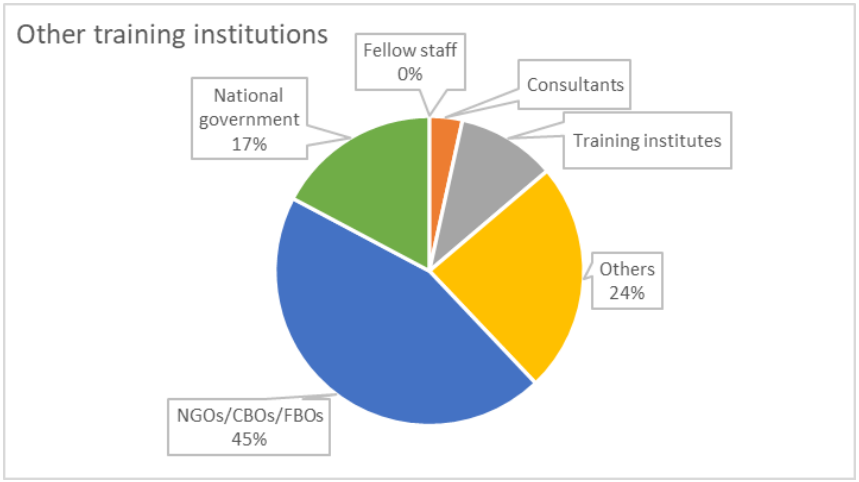
[210] Implemented from 2018 to 2022. USD $3 million and in addition to training 700 staff, also conducted sensitization of 43 counties' staffs on the National Adaptation Plan; trained 70 journalists on effectively reporting climate change issues; developed impact assessment framework for the agricultural sector to be used by government staff; conducted cost-benefit analysis of government programs; supported establishment of the Climate Business Information Network for Kenya (CBIN Kenya) to support private sector climate change adaptation; and supported development of seven concept notes.

[211] The Readiness Completion Report provided this information and was shared with the consulting team prior to publication.

technology transfer in Outcome 1 activities, and the cooperatives' improved climate change knowledge and coordination with county level officials in Outcome 2 activities.

152. County technical staff also conduct CRLCSA training for stakeholders in the field and usually in partnership with national government staff and non-state actors (see Figure 19) with NGOs, CBOs, and Farmer organizations (FO)[212] forming most partnerships. These existing networks have proven fruitful as networks have provided CRLCSA technical experts. However, these networks can benefit from upscaling, which the project can do through activities in Outcomes 1 and 3.

FIGURE 19 OTHER TRAINING INSTITUTES PROVIDING CLIMATE CHANGE TRAINING TO STAKEHOLDERS



153. All LREB counties have climate change units (CCUs) with allocated budgets or planned budgets in the next five years. This allows for implementation of climate change adaptation policies in counties without county climate change adaptation policies adapted from the national climate change adaptation framework. As seen in Table 20, Kakamega has the most staff, largest climate change budget allocation, and the second-largest CCU. Given that Kakamega has the largest population, this is unsurprising.

TABLE 20 NUMBER OF STAFF DEPLOYED IN COUNTY LEVEL CLIMATE CHANGE UNITS WITH BUDGET ALLOCATIONS

Name of County	Total No. of Technical staff	No. staff in the CCUs	Budget Allocation (KSH '000)
Bungoma County	8	6	5,000
Trans-Nzoia County	171	7	3,000
Busia County	168	3	8,000
Siaya County	118	6	-
Vihiga County	0	3	-

[212] NGOs = non-government organizations, CBOs = community-based organizations, and FBOs = faith-based organizations

Kakamega County	414	6	67,000
Nandi County	149	5	10,000
Kisii County	245	2	30,000
Migori County	176	4	-
Kisumu County	183	2	30,000
Nyamira County	158	1	11,000
Kericho County	183	2	11,200
Homa Bay County	66	4	9,000
Bomet County	53	2	56,000

154. All counties, except Homa Bay, have multi-stakeholder platforms to inform stakeholders of climate change risks to the agricultural sector. For example, the counties' meteorological departments lead development and dissemination of seasonal weather forecasting. Development of all LREB counties' integrated development planning involved public participatory activities to solicit stakeholder feedback. However, as noted in some of the integrated development plans, the activities have been uncoordinated and intermittent, with only some stakeholder groups, for example university forums, being consistently engaged.

155. In terms of financial resources available for implementing CRLCSA policies and climate change adaptation measures, no county spent more than 2 % of its annual budget on climate change-related policies and strategies (see Table 21). Given the cross-cutting nature of climate change Kakamega, Kisii, Migori, Nyamira, and Bomet have developed resource mobilization strategies to assist with climate change adaptation. Most county governments have limited or non-existent discretionary spending outside of the predetermined funding for agencies and programs in annual budgets.

TABLE 21 COUNTY BUDGET ALLOCATION AND PROPORTION EARMARKED FOR CLIMATE CHANGE

County	Annual Budget (KES B)	Allocation to Climate Change as per CCCF (%)	Allocation during 2021/2022 FY (KES M)
Bomet	6,691,099,118	2	56.5
Bungoma	10,659,435,192	-	5
Busia	7,172,162,009	2	8
Homa Bay	7,805,353,300	-	9
Kakamega	12,389,412,168	1	20
Kericho	6,430,664,924	1	11.2
Kisii	8,894,274,509	2	30
Kisumu	8,026,139,240	2	30
Migori	8,005,020,448	2	
Nandi	6,990,869,041	-	10
Nyamira	5,135,340,036	2	11
Siaya	6,966,507,531	-	0
Trans-Nzoia	7,186,157,670	5	3
Vihiga	5,067,356,827	2	30

Part C – Project Design

4. Rationale

4.1 Barriers addressed by this project.

156. The climate analysis shows that the anticipated changes in climate will make smallholder farmers more vulnerable by reducing production and productivity across the 6 value chains, and that these farmers are already experiencing vulnerability and climate risks from current variability. Together with the unsustainable natural resource use practises used by many smallholders, climate change can have dramatic effects on the entire economy of the LREB. Furthermore, the drive to increase production in response to increased demand and reduced productivity induced by climate risks could, under the business-as-usual scenario, lead to increased emissions from extensification and land use changes. These trends could culminate in less access to food and a significant impoverishment of local farmers.

157. The project proposes a set of practices designed to prevent economic losses and to increase productivity as a means of improving resilience to climate change, along with a set of practices designed to ensure that any gains are not made at the cost of increasing emissions. To widely order to disseminate these adaptation and mitigation practises and to promote rapid transformation across the selected value chains, the project sets up technology transfer support mechanism that leverages the strengths of the cooperative movement in Kenya as well as the devolution process and the increasing role of county governments.

158. Several mutually -reinforcing barriers have, however, prevented the deployment of proposed adaptation solutions, which this project must now address.

159. ***Barrier 1: The public services offered to farmers and cooperatives are insufficient to enable value chain transformation.*** *This is due to a series of interconnected factors, including:*

160. **Policy factors**: At national level there are adequate climate change and sector related policies and regulatory frameworks to guide climate action in all sectors. At County level there is also notable progress in mainstreaming of climate change in relevant laws and regulations: over 33 counties out of 47 have enacted a climate change Act and a significant number of counties have established their own county climate change funds. All counties have set up Climate Change Units. However, there is evidence that the County Integrated Development Plans (CIDPs) which are the principal county policy and development plans, are only beginning to mainstream climate change issues[213]. **Operational limitations**: Moreover, counties have yet to identify specific tools and methodologies that would enable operationalization of their CIDP's climate objectives into concrete action in support of farmers. A key example is the delivery of agro-meteorological advisory, climate information and extension, which still follows traditional, cost-heavy methods that have proven unsuccessful in reaching the full scope of last mile users. Given the dynamic nature of the agriculture sector in the LREB, there is scope

[213] FAO supported NAP Readiness, 2022, final report; GFLLOCA Technical assessment report; County Cpacity Assessment.

for introducing innovation in the way that county governments support farmers as private sector agents.

161. **Informational gaps**: The delivery of such improved, enabling services from government to private sector farmers would, however, requires much improved information systems. To enable a local understanding of climate risks and vulnerabilities, facilitate rapid climate response and support the socio-economic performance of LREB farmers, the data and information basis at county level needs to be improved. This includes the nature of data (e.g. climate-related crop data, or accurate price data) and information services, the efficiency and effectiveness of collection and dissemination methods, and the way in which the information and data are used and leveraged for climate resilient, low-carbon growth.

162. **Technical capacity gaps**: Technical capacity of county government staff and farmers to understand and address climate variability and climate change is gradually emerging. Many training programs have taken place that provide a baseline of understanding, knowledge, and capacity. However, the departments of extension and cooperatives typically have not yet been fully included in capacity development for climate change risk management. As a result, they are not fully able to deliver support programs, extension or to develop innovative guidelines that would facilitate adaptation and mitigation at the farm level.

163. ***Barrier 2: Limited integration of climate resilient and low carbon strategies into land use planning and landscape management at county level.***

164. Current environmental degradation trends show that, in a business-as-usual scenario, cropland will continue to expand at the expense of the natural ecosystems, which would lead to loss of ecosystem services, decreased adaptive capacity, and increased GHG emissions. These risks cannot yet be addressed due to several interrelated factors:

165. **Policy gap**: While much is currently being done to strengthen county government capacity in all aspects of climate change, policy gaps in land use management remain that prevent landscape restoration and conservation of ecosystem services. Integrated approaches tying together adaptation and mitigation priorities do not exist, and the territorial approach to managing natural resources is uncoordinated. Management of natural resources continues to be split between extractive and conservative approaches. As a result, natural parks and reserves remain disconnected from the broader productive landscape; and because enforcement is difficult, serious encroachment threats weigh onto fragile areas, including wetlands. There is a need for a more integrated territorial approach that would bring together all sectors under common goals of environmental management, natural resources conservation, climate adaptation and emissions reductions.

166. There are insufficient policy-based and market incentives for farmers to limit expansion and this is also compounded by sometimes unclear land tenure. Outdated land registries, limited access to land registries and information, poor dispute resolution, poor implementation of land reforms and overlapping mandates between governing institutions are some of the challenges associated with land governance in Kenya.[214] Weak land use planning and insecure land tenure have proven to be a major barrier to the adoption of practices and technologies (e.g. agroforestry, irrigation infrastructure and soil

214 IGAD, 2018. Kenya - Land Governance Country Profile. Available at: https://land.igad.int/index.php/documents-1/countries/kenya/profiles-3/785-land-governance-in-igad-region-kenya-country-profile/file

conservation) that can reduce vulnerability to climate change. It also discourages long-term planning in favour of maximizing short–term profits and complicates the implementation of effective climate change adaptation and mitigation plans.

167. **Informational gaps**: Data and information that would help inform the development of integrated landscape management strategies are missing at local level. While major efforts in mapping key environmental resources (including for example the Kenya atlas of biodiversity, the Atlas of wetlands) have been deployed, these are not regularly updated. These reports do not always inform county policies on land use, and counties may not be capable to integrate all the information into coherent, climate-informed, landscape management strategies and plans.

168. ***Barrier 3: Smallholders have limited capacity and access to productive assets and face risks in adopting climate resilient, low-carbon technologies.*** A number of issues contribute to making the transition risky for smallholders, including:

169. **Technical and material capacity gaps**: For farmers to change their habitual patterns of production towards climate resilient, low-carbon methods, they must first acquire the technical knowledge, know-how as well as the material assets required. While many of the farmers, as evidenced in the Climate Change Survey and Cooperative Census, have experienced and are aware of the impacts of climate variability and potential impacts of climate change on their livelihoods, few adopt the full suite of available options for adaptation or mitigation. Without proper support from governments and without a mechanism to support the dissemination and broader adoption of climate resilient, low-carbon technologies, farmers will continuously be left to make short-term choices. Traditional climate extension methods have not proven entirely effective in getting the knowledge to farmers, and in accelerating adoption of best practices. A public-private alliance is needed to foster farmer innovation and creativity, while supporting appropriate climate action through better rules, regulations , knowledge, and norms. Elsewhere, peer- to peer networks have proven to be more effective means through which farmers can self-identify climate risks and identify meaningful solutions that make economic as well as climate sense.

170. **Organizational challenges:** The adoption of climate resilient, low-carbon technologies is also hindered by the suboptimal organization of value chains and farmers in the LREB region, particularly for the non-traditional cash value chains. Too many smallholders work on very small, fragmented plots, in isolation from one another, or in informal groupings that bring little added value in terms of risk reduction. Existing cooperatives have a higher level of organization that enables them to act as vehicles for risk sharing when adopting climate resilient, low-carbon technologies, save costs and reduce transaction costs for farmers (in the acquisition of knowledge and assets). Yet even formed cooperatives face organizational challenges that prevent them from fully realizing their potential for members, in terms of economic and climate gains: organizational gaps (such as lack of adequate climate-oriented business planning) prevent cooperatives from leveraging finance that would enable scaling of climate resilient, low-carbon practises.

171. **Financial needs**: Low access to formal rural finance for adoption of climate resilient, low-carbon technologies prevents smallholders from accessing knowledge and assets they require. This low access is due not only to the organizational gaps listed above, but also due to risk aversion of financial institutions that do not themselves have the technical and operational capacity to deliver suitable products to their potential clients. Cooperatives also play a key role as intermediary here, as a

cooperative will always be more solvent than individual farmers. In addition, access to financial services that would enable climate resilient, low-carbon practises is unequal among men, women and vulnerable groups. As a result of these gaps, commodities produced using climate resilient, low-carbon technologies are not yet fully reaching the markets. Finally, farmers and farmer organizations are not tapping into emerging financial schemes such as carbon finance, biodiversity offsets or payment for ecosystem services because of low awareness, issues of scale and low capacity to meet the requirements.

172. ***Barrier 4: There is a mismatch between supply and demand of finance to support smallholders and their organizations in the transition towards climate resilience/low carbon pathways.*** This is due to a convergence of gaps, including:

173. **Information gaps**: On the demand side, there are clear information gaps that prevent climate resilient, low-carbon commodities in reaching markets, and reaching full profitability. In the more organized value chains such as coffee, tea and dairy, market exchanges and buyers are not yet aware of the potential value added of such products. Finance institutions are also not fully informed of the potential profitability of climate resilient, low-carbon value chains. Other than the conventional fair trade and organic standards, there are no certification standards for climate resilient, low-carbon products, and because they are not identified, they do not necessarily get a better price unless their comparatively better quality can be demonstrated. Existing standards, such as Fair Trade or EcoCert, are difficult to obtain and may not give suitable place to climate risk management and decarbonization practices. Even end-consumers lack the awareness of how their food choices might impact the environment and climate change, or if they are, lack clearly identifiable options for making more sustainable consumption choices.

174. This fuels the risk aversion of farmers, who face costs for adoption of technologies but no guarantee of increased profits, and of financial institutions, who do not see the profitability and market demand as clearly as they should. Awareness and knowledge of buyers is not yet sufficient to allow them to compare products, partly due to the policy gaps above (national and county level), that are not yet driving markets towards climate resilient, low-carbon products. This is also compounded, on the supply side, by the fact that farmers do not receive the appropriate incentives (e.g. prices) for the adoption of CRLC practices.

175. **Organizational weaknesses**: In the less organized value chains links to markets are not fully developed because farmers operate in a less aggregated manner. Individual farmers or small groups must contend with prices, supply, and quality on their own, and this creates risks and costs, which are compounded by the inefficiencies in public service delivery mentioned above. Cooperatives, big and small alike, must be empowered to certify their products through various labelling schemes and to reach buyers and customers and to accurately market their climate resilient, low-carbon products for the transition to be financially viable. Furthermore, financial institutions also face barriers in reaching potential smallholder clients: high transaction costs and the difficulties in identifying suitable business cases also compound accessibility barriers (such as the requirements for collateral and high interest rates). Financial institutions need to be strengthened so they can identify potentially successful business organization and farmers and support them with accessible finance in order to satisfy market demand.

176. Taken together, these barriers and gaps require a coordinated approach where governments and private sector re-learn to work together, each according to their comparative advantage, towards climate resilient, low-carbon value chains and ultimately, a transformation of the local economy.

4.2 Theory of Change

177. This project is premised on the following theory of change:

1. Smallholder farmers in the LREB are currently vulnerable to the impacts of climate variability and will be vulnerable to the impacts of climate change, regardless of the climate scenario that materializes. This vulnerability is due to (i) over-reliance on rain-fed agriculture (ii) land and ecosystem degradation that undermines agricultural productivity (iii) limited access to climate-appropriate production and processing technologies, practices, information and services, and (iv) underlying multidimensional poverty.
2. However, the same vulnerable farmers have at their disposal a set of adaptive mechanisms that, if used properly and disseminated at scale, could deliver significant resilience-building benefits. Chief among these, cooperatives provide a risk sharing, risk reduction and knowledge transfer mechanism to members, and farmers also have access to growing county government capacity in dealing with climate risks.
3. In addition to this, agricultural development in the region can become a significant source of greenhouse gas emissions given the current pressures towards expansion of cropland at the expense of forests, the degradation of existing agricultural landscapes and marginal areas due to unsustainable land use practises, and inefficient practises in key emitting sectors such as livestock.
4. To adequately steer the agriculture sector and development pathway towards a climate resilient, low carbon trajectory, leveraging the existing strengths of the cooperative movement will be key – while filling the remaining capacity gaps and barriers, at individual, institutional and ecosystem levels.

178. Therefore, **IF** vulnerable smallholders and value chain actors have access to technologies, markets and financial resources to support transformation of production, processing and marketing of targeted VCs, and are supported by improved climate information, extension services and climate-resilient landscapes, **THEN** they will become more resilient to the impacts of climate change and greenhouse gas emissions from the AFOLU sector will be reduced **BECAUSE** the priority value chains will be reoriented towards climate-resilient and low-carbon pathways, and farmer-led adaptation and mitigation actions will be supported by adequate gender-responsive public agro-climate services and public and private investment.

179. In this project, resilience is defined as the ability to withstand and recover from the impacts of a given climate hazard or risk (IPCC AR6). It will be measured using a project-specific Resilience Index based on the FAO-developed Resilience Index Measurement and Analysis Framework (RIMA-II)[215]) and the IPCC AR 6 Climate Risk and Vulnerability framework, both adapted to this project. (Refer to section 6.3 for more.)

180. The objective of the project is to foster the emergence of climate-resilient, low-carbon, environmentally sustainable, and financially viable agriculture value chains by accelerating the transfer

[215] https://www.fao.org/3/i5298e/i5298e.pdf

of technology, knowledge, assets and services with a focus on agri-food cooperatives as key agents to leverage rural change.

181. The key benefits that this project expects to deliver are stabilized and improved productivity, increased access to food, and reduced economic losses due to climate change through the implementation of climate resilient and low carbon practises in the six value chains. Another adaptation benefit is the improved resilience of agricultural landscapes, which will continue to provide ecosystem services to the agriculture sector and local communities. These benefits improve the resilience of farmers by reducing their sensitivity to current and projected climate risks and simultaneously improving their adaptive and coping capacity. Through the implementation of emissions-reducing measures in the crop, land use and livestock subsectors, the project also expects to reduce overall emissions from the Agriculture, Forestry and Land use sectors in the LREB.

182. This project applies the following key principles and concepts:

1. *Locally-led adaptation*: This project will invest in vulnerable smallholder farmers through involving local communities in a participatory seasonal planning process and in identifying effective climate solutions and enhancing their access to technologies, market and finance. The project will enhance the local government's capacities in serving the targeting communities including provide weather information and agro-climate services. The project aims at increasing their adaptive capacity and strengthening public agro-climate services, which would support locally-led adaptation action.

2. *Financial viability for sustainability*: This project considers that farming is primarily a business and that farmers, be they smallholders, will seek profit from their activities. The aim is to ensure that value chains are resilient, do not generate greenhouse gas emissions increases, and remain financially profitable. Financial viability and sustainability will be key to ensuring the continuation of promoted practices, and to accelerating the pathway to broader adoption and upscaling.

3. *Technology transfer*: A key pillar of this project is the opportunity to accelerate the transition towards CRLCSA through technology transfer, leveraging the knowledge, know-how, tools, and expertise of the various members of the Cooperative Partnership and deploying farmer-to-farmer peer support systems. The project will include a mechanism through which farmers located in other parts of Kenya, Cooperative Partnership countries or elsewhere, will be able to transfer their knowledge and technology on adaptation and mitigation to local farmers in the targeted value chains.

4. *Value chain integration*: Leveraging cooperatives, FOs, and their members, will help accelerate the spread of suitable practices at all stages of the value chain. This can be accomplished by building on existing networks and using data-driven, evidence-based tools and approaches. This project aims to create the conditions for complete transformation of key value chains. This includes working with value chain actors and stakeholders such as processors and buyers and addressing the barriers to adaptation and emissions reductions at all stages. The project will implement an inclusive and participatory approach to all activities.

5. *Sustainable intensification*: At the heart of the climate problem in the LREB is the need to ensure a minimum level of ecological integrity and resilience, to allow for continued ecological service

provision to the agriculture sector and beyond. This project will pay particular attention to trade-offs between the various dimensions of agriculture. The project will promote *sustainable intensification*, balancing the demands of the growing agri-food sector in terms of water, energy, and land, with the need to sustain ecosystem services for future generations throughout the broader landscape. This project will promote practices that increase production and productivity without further land expansion, while restoring or rehabilitating ecosystem services in the current agricultural land. Sustainable intensification offers the opportunity to increase net carbon sinks in soils and agricultural landscapes, and to reduce the emissions intensity per output produced.

183. The project is structured around four connected outcomes.

184. Outcome 1 improves the institutional context that will support climate resilient, low carbon, and environmentally sustainable value chains. The purpose of this outcome is to support local stakeholders, in particular county administrations, in becoming facilitators for the upscaling of CRLCSA value chains. This will require strengthening the capacity of county government stakeholders in the extension and cooperatives departments, adding to climate information flows and knowledge systems to assist decision-making, and filling the remaining capacity gaps in technical capacity in line with devolution and the climate change priorities. Activities under Outcome 1 support the upscaling and broader adoption of activities under Outcome 2 and Outcome 3 by ensuring that local communities, farmers and other value chain actors have sufficient knowledge and adoption capacities, climate resilient practices and awareness of the needs for climate change measures.

185. Outcome 2 supports direct emission reductions through the restoration and protection of off-farm agricultural landscapes and their provided services in the face of multiple threats, including climate variability and climate change impacts, population pressure and farmland expansion. Under this outcome, which is implemented by the county administrations themselves, a vision for resilient, low carbon agriculture landscapes will be formulated to inform future land use planning and land allocation based on climate change impact and risk assessments. This strategy will then be implemented and monitored in targeted areas.

186. Outcome 3 delivers adaptation and mitigation benefits from the agri-food sector by disseminating and upscaling technologies, assets, knowledge, practices, and services related to climate-resilient, low-carbon, sustainable practices (CRLCSA) in the six value chains. This outcome reaches smallholder farmers through organizations and cooperatives.

187. Outcome 4 supports the reorientation of the target value chains and market practises for the value chain level adoption of climate resilience and low carbon model and creates conditions for long-term sustainability of the project by supporting cooperatives and farmer organizations in becoming financially viable, autonomous and profitable climate resilient and low-carbon businesses.

188. In acknowledging the challenges and necessity of addressing existing gender and social inequalities in Kenya, all project outcomes and activities have corresponding gender outcomes and activities, presented in the gender action plan (GAP) in Appendix 8. To achieve the project's impact, outcomes, and co-benefits, the GAP proposes activities that are gender-responsive within a broad gender-transformative approach (GTA). Gender-responsive activities are those which include specific actions to recognize, respond, and reduce gender and social inequalities (e.g., strategies, technologies, practices that reduce gender gaps in agriculture related to decision-making, labour burden, and access to

agricultural information, finance, inputs). In the context of CRLCSA, adopting a broader gender-transformative approach means that those gender-responsive activities are designed around the fundamental aim of addressing the root causes of these gender gaps and social inequalities to ensure long-term project and social sustainability.

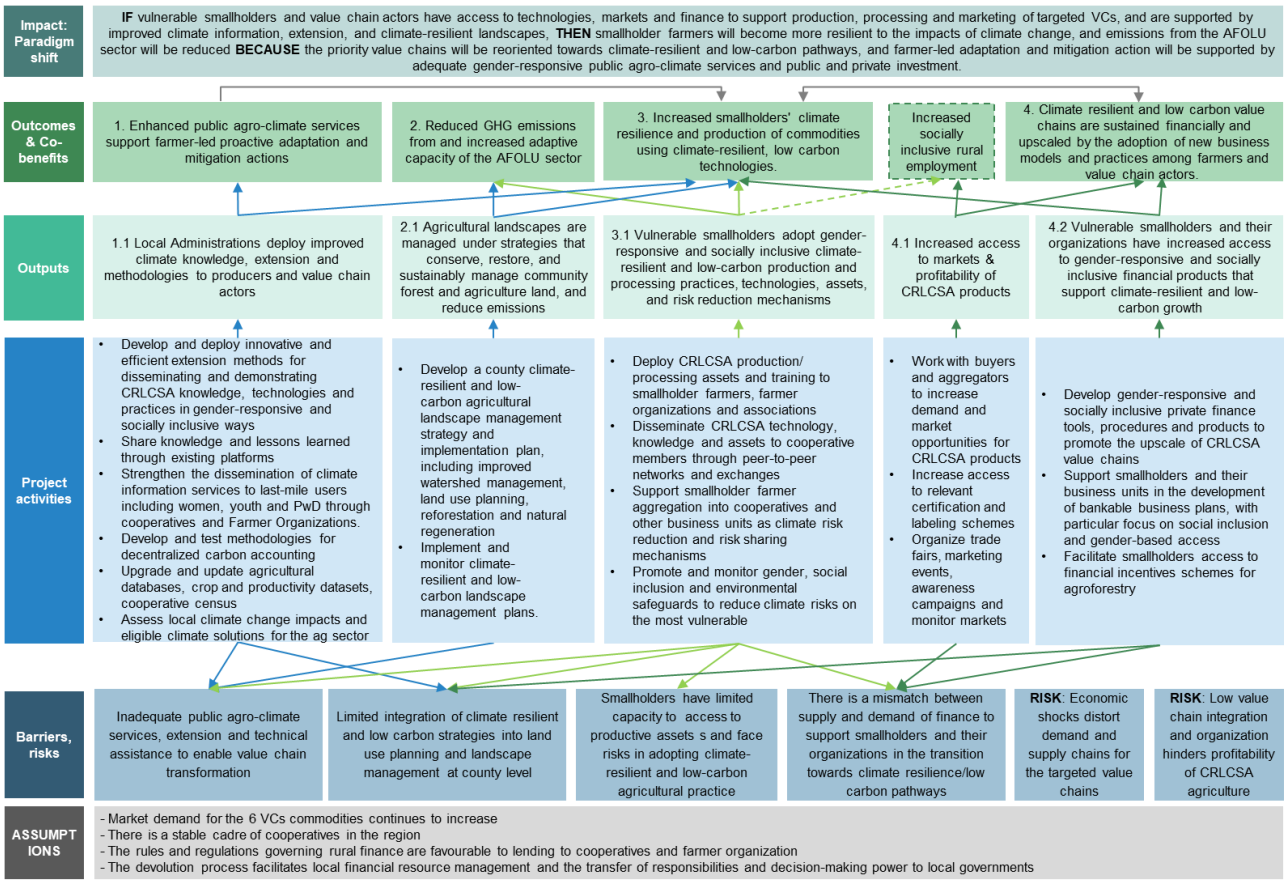


Figure 4: Theory of Change

5. Description of activities

Component 1 – Enabling local government support for adaptation and mitigation

5.1. Outcome 1 - Enhanced public agro-climate services support farmer-led proactive adaptation and mitigation actions.

5.1.1 Output 1.1

189. Local administrations deploy improved climate knowledge, extension, and methodologies to support producers and value chain actors.

190. The purpose of activities under this output is to help county governments serve farmers, farmer organizations and cooperatives in a manner that contributes to the transformation of the agriculture sector from current pathways to climate resilient, low-carbon trajectories.

191. All activities in this output build on a significant baseline of existing capacity, resources, information and networks, and they are therefore carefully targeted to filling identified gaps. Gaps and needs were identified through consultation with county departments (December 2021), an assessment of county government capacity (March 2022), and by analyzing the recommendations contained in the Global Outlook on Climate Services in Agriculture (FAO 2021), which includes a case study on Kenya. The six activities proposed here are based on existing county capacities, opportunities such as the availability of digital extension channels, and lessons learned from other projects with similar objectives (such as GCF NAP Readiness, the ACREI project, Refer section 2). The expectation is that the approaches deployed here for the 6 targeted value chains will be scalable to all other value chains, regions, and sectors as well, transforming the way in which county governments interact with the private sector to address climate change in Kenya.

192. Outcome 1 addresses capacity gaps in public agro-climate service providers to support women, men, youth farmers and indigenous people in proactive adaptation and mitigation actions. The expected gender and inclusion outcome of Outcome 1 is that women, PLWD, and youth farmers can access and benefit from gender-responsive and socially inclusive public agro-climate services for CRLCSA. This means building capacity on both the local administration side (e.g., county governments and agricultural institutions, extension workers, cooperative leadership), and on the side of women, men, and youth farmers/cooperative members themselves to achieve gender equality and social inclusivity. These activities will ensure women, PLWD, youth and indigenous communities have strengthened capacities on climate-resilient agriculture and mitigation actions, facilitate leadership and entrepreneurship, and leverage gender equality advancements in Kenya while addressing specific gender issues in the LREB.

193. GAP activities for 1.1.1, - 1.1.6 are under the umbrella of GAP Output 1.1.: Women, PLWD, and youth's participation, leadership, and decision-making in cooperative societies and value chains are strengthened via enhanced gender-responsive and socially inclusive local administrations.

194. The project will also ensure that gender and social inclusion issues are integrated and/or strengthened within extension programs and within any support provided to cooperatives using a gender transformative approach A gender transformative approach (GTA) is required to address the underlying discriminatory socio-cultural and gender norms that currently perpetuate inequality and

constrain women's capabilities within the six value chains targeted. A GTA approach requires a culturally sensitive, multi-level approach that includes women and men at across the project - at farm, cooperative, private sector and governmental partners, and project management levels. A GTA approach was chosen as a social safeguard 'backstop' to ensure that women can concretely benefit from the project and existing inequalities are not exacerbated so that no one is left behind from efforts to address climate change.

195. Specific activities will draw upon tested GTA methodologies, for example, Gender Action Learning Systems (GALS), to engage in capacity building and training exercises among beneficiaries and project facilitators to discuss the root causes of gender inequalities at intrahousehold, core and extended value chain, and enabling environment levels, and how these can be addressed within the project. This will include designing and delivering specific modules within and in addition to agronomic training, which will include guidance on service provision to marginalized groups and the adaptation of services to persons living with disabilities. Ongoing stakeholder engagement process will be carried, additionally, a Free Prior and Inform Consent (FPIC) process will be implemented to promote full and meaningful partcipation of indigenous people, ensuring that planning processes at local level have the same chance to benefit indigenous and non-indigenous stakeholders, and voice their concern if their rights, livelihoods or culture are affected by the project.

Output 1.1 Baseline

196. Agriculture is a devolved function in Kenya. The county governments are responsible to deliver agriculture extension services to farmers. In the baseline scenario, the county governments deliver extension services through the decentralized extension department of the ministry of agriculture. The County Institutional Capacity Assessment determined that basic knowledge of climate resilient, low-carbon agriculture was high among the county-level climate change, agriculture and environment staff, and that over 90% of existing staff had benefitted from training over the past 5 years on topics such as adaptation, resilience building and mitigation; climate smart agriculture; climate change policy, planning and budgeting; climate change measurement, reporting and verification; climate finance; action planning and green technologies. Extension services are typically delivered on an on-demand basis from the government to individual farmers and farmer groups, requiring extensive travel and operational budgets, and without the guarantee of reaching all users with the advice they need. Each county has full-time extension officers on staff, all the counties have staff decentralized all the way to the sub-county and ward levels. Innovative approaches are increasingly being adopted, but not yet widespread; only Busia and Migori counties have tested the use of e-extension, radio and bulk SMS. As seen during the county consultations, there is a need to accelerate the dissemination of knowledge that is currently held by county officers: more innovative extension methods and tools to reach the last mile.

197. There are also some value chain specific services, such as for instance those provided by the Coffee Research Institute, which provides advisory services to farmers through publications such as the Coffee Production Recommendation Handbook, The Coffee Growers Handbook, The Mapendekezo ya Ukuzaji wa Kahawa among others. It also organizes field days, field visits, Open Days, agricultural shows, radio programs, and demonstration plots. While similar services exist for tea and dairy, the other value chains do not yet benefit from the same. Furthermore, although there is considerable interest in strengthening climate resilience and sustainability within the more established value chains (e.g. coffee,

sugar, tea), the services received most often are tailored for increased quality and sales, not climate-oriented.

198. In parallel to this, farmers can also obtain extension support through private mechanisms, some of which offer paid services[216]. For instance, Brookside, a leading milk company, delivers extension focused on basic training on husbandry practises and milk production along with artificial insemination and access to drugs and feed. The company keeps trained agricultural personnel on staff. However, some of these goods and services are provided to dairy farmers on credit, which is then deducted from their milk earnings[217].

199. In addition, agricultural input suppliers and traders also offer extension services in Kenya. However, these extension officers are not neutral in their advice and have sales targets to be achieved, which is not always aligned with the best interests of the farmers. Furthermore, climate-resilient and low-carbon agricultural practices such as producing bio-compost and bio-fertilizer are rarely promoted by input suppliers. Finally, there are a growing number of digital tools and online/mobile farming applications[218] offering partial services and data (agronomic advisories and market pricing). However, their use is not yet popular among low resource endowed smallholders, and they sometimes offer inconsistent advice.

200. The multiplicity of mechanisms for extension and the fact that farmers increasingly demonstrate a willingness to pay for this service attests to the demand for appropriate, climate-goal oriented extension services. Moreover, the fact that farmers are increasingly turning to private providers also indicates that government-funded extension services could benefit from increased reach and from improvements in delivery methods, particularly when it comes to climate-related extension services and supporting a transition towards climate resilient, low-carbon pathways. Private extension provision is generally oriented to high-value crops, and highly endowed farmers with higher resilience. Remote areas and lowly endowed producers are inadequately served[219]. To ensure that government continues to deliver its mandate and can act as a normative force in the reorientation of markets, then a rethink of traditional extension methods is needed.

201. There is also a need to improve the type of advisories received through mainstream extension channels, and to adapt the dissemination to suit gendered access preferences. The climate risk and value chain consultation surveys deployed for this project clearly illustrated that women do not have equal access to climate information services. (Please refer to the Gender Assessment Annex 8 for further detail.)

202. According to our cooperative census, the main types of advisories received by farmers in the 6 value chains include broad-range advice provided at longer intervals (e.g. seasonal). Rapid-onset climate extremes and climate risks are not yet fully part of the suite of advisories received by most

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[216] https://www.3r-kenya.org/wp-content/uploads/2020/06/Emerging-private-extension-and-advisory-service-models-in-Kenya-transforming-agrifood-sectors.pdf

[217] https://gro-intelligence.com/insights/agricultural-extension-services-in-africa

[218] For example, Ulima Farming (market and weather information), Digicow (production and profit data for dairy farmers), Digital Farmers Kenya (discussion and exchange), Twiga Foods (sales platform), Agrobase (pests and diseases), etc.

[219] See for example Muyanga, Milu & Jayne, Thomas. (2006). Agricultural Extension in Kenya: Practice and Policy Lessons.

farmers. Processes for early action or anticipatory action based on risk assessment or impact assessment are also not yet present at county level. Most cited advisories are:

- Storage advisory (12.6%)
- Land management (11%)
- Planting dates (10.5%)
- Water Management (10.4%)
- Herbicide and pesticide management (9.8%)[220]

203. Among other services that counties are providing farmers and their business organizations, data services are nascent in most counties. Many development agencies and private sector entrepreneurs routinely collect data. However such data is collected mostly at small scale and designed to meet the immediate interests of the service provider, neither documented nor publicly shared. Data that is currently compiled by the Agricultural Statistics Department of the Ministry of Agriculture include crop production on a quarterly basis[221] (maize, beans, wheat). This data is regionally aggregated and provides some analysis of climate factors (rainfall) as well as some projections for the next quarter. There is no systematic market data service offered by all counties (price, sales volumes, market share, demand), creating an information gap that could lead to maladapted choices as climate change materializes in the region. Therefore, the farmers and value chain actors are unable to make informed decisions on their production and other elements of the value chain such as aggregation and time for selling the products. Lacking this data and a centralized quality managed data sources (centre) makes it difficult for the extension service providers both in public and private sectors to design and provide suitable training programs to increase climate resilience and production among farmers and other value chain actors.

204. In 2018-2019, the Ministry of Agriculture and CIAT partnered to deliver county Climate risk profiles detailing potential climate changes and impacts on key commodities and agricultural activity. However, these are not popularized and farmers are not aware of them, and some counties do not yet have full decentralized portraits of the climate risks currently facing farmers and farmer organizations.

205. Recommendations for climate solutions are not systematized across extension services. For example, farmers may decide to plant too late, or plant crops for which the suitability will no longer be supported under a climate change scenario or miss market opportunities because of quality requirements or mismatch with demand. For more organized farmers, such as cooperatives, they are left making investment plans without a recognized, legitimate climate assessment – this results in business planning that has little or no climate sensitivity built-in.

206. As noted in the Cooperative Census and the Climate Change Survey undertaken for the development of this project, the number of farmers receiving and making use of climate information fluctuates between 50% (for farmers not in cooperatives) and 73% (for farmers in cooperatives), and the types of climate information services received also vary among counties, value chains and farmer organizations. The main products and information services received and used by farmers in the 6 value chains in LREB are:

[220] Cooperative Census

[221] https://kilimo.go.ke/wp-content/uploads/2021/07/Kenya-Crop-Conditions-Bulletin-June-2021.pdf

- Dry spell warnings
- Pests and diseases forecasts
- Extreme heat advisory
- Storm/hailstorm/wind advisory
- Extreme rainfall and flooding advisory
- Soil moisture reports
- Onset/offset of rainy season
- Water availability reports

207. Only one cooperative reported using data such as UV light exposure (in the coffee value chain). Beyond access to information, however, issues of understanding and use of climate information are common in Kenya: as noted in the Global Outlook on Climate Services[222], there is a need to develop tailored actionable advisories that farmers can use and to develop the capacity of farmers to understand (and see the benefit of) climate information.

208. The climate information services are developed by the Kenya Meteorological Department and relayed through the decentralized offices in each county or through media. Most farmers report using these more often on a weekly and seasonal basis. Means of transmission include Kenya Meteorological Department (staff and website), online applications (Kenya Agriculture and Livestock Research Organization (KALRO), KAOP, YARA farm weather), SMS and WhatsApp, television and radio, and most farmers use more than one[223]. Sector experts also work with Climate Information Services (CIS) providers (i.e., KMD) to develop sector specific advisories considering the forecast through Participatory Scenario Planning (PSP). The resulting information is then channelled to users through various channels by extension staff[224].

[222] See Kenya case study in FAO, Global Outlook for Climate Services in Africa, https://www.fao.org/3/cb6941en/cb6941en.pdf

[223] Cooperative Census, Climate Change Survey, and County Capacity Assessment.

[224] County capacity assessment, FAO-Kenya, 2021

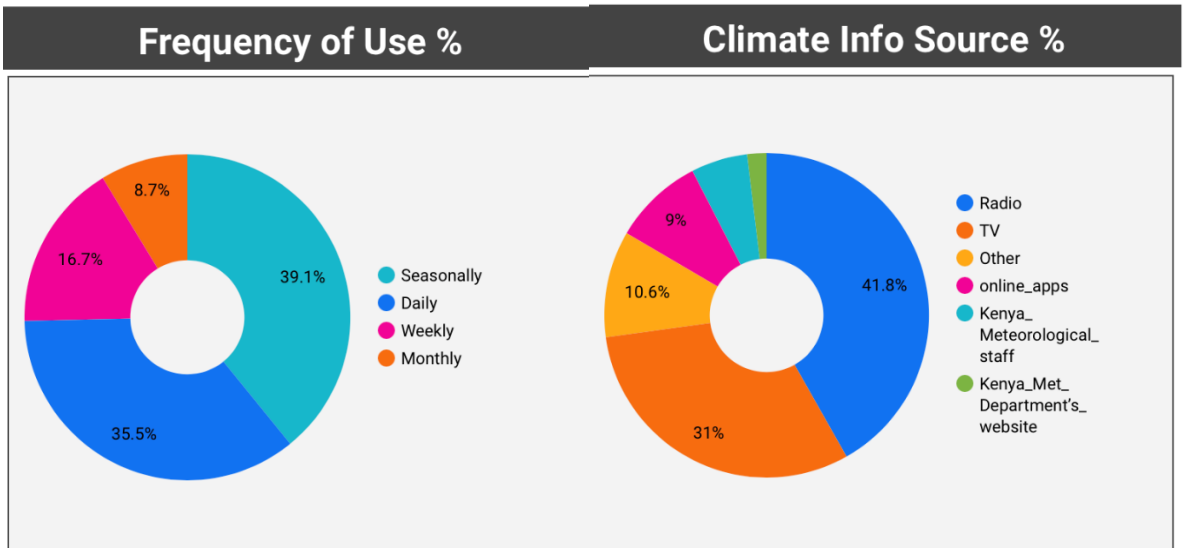

FIGURE 20: FREQUENCY OF USE OF CLIMATE INFORMATION SERVICES AND MOST FREQUENTLY USED SOURCES[225]

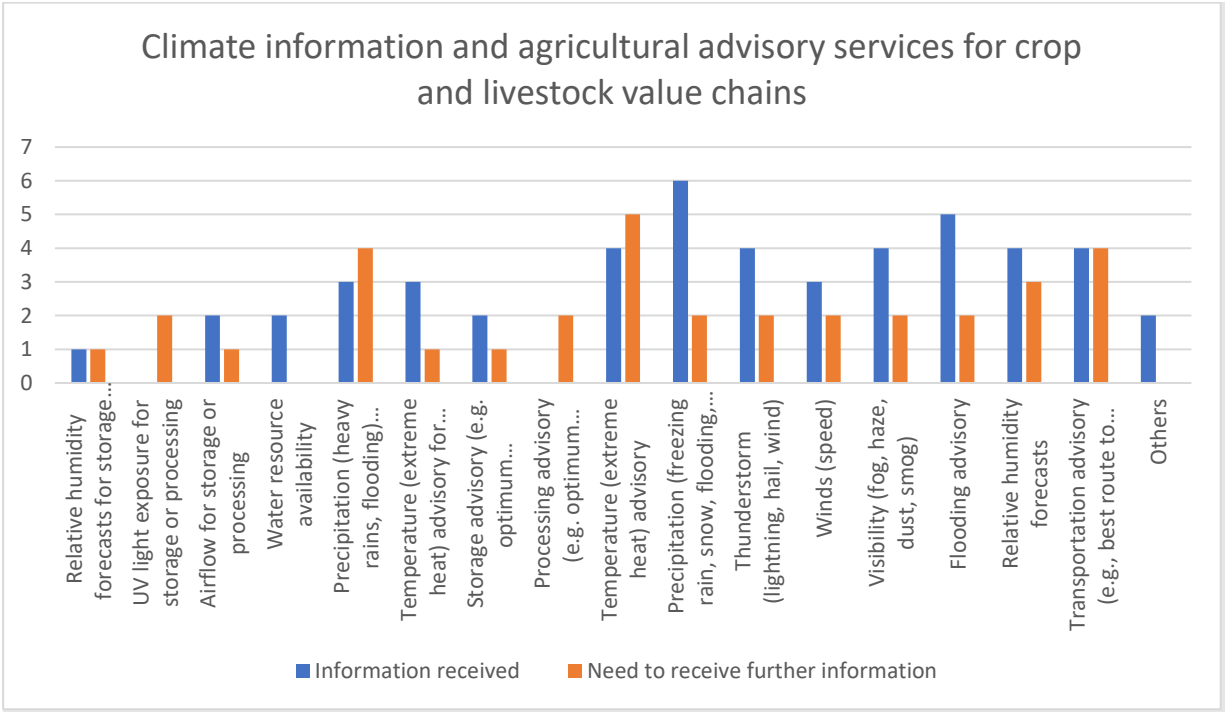

FIGURE 21 : LEVEL OF USE AND INTEREST IN CLIMATE INFORMATION SERVICES[226]

[225] Cooperative Census, Agriterra-FAO, 2022.
[226] Source : CRLCSA Climate Survey, 2022 (FAO)

209. Regarding extreme and rapid onset events, a few services are becoming available. For example, Forecasting African Storms Application (FASTA) is an online/mobile application[227] that uses nowcasting to provide smallholder farmers with storm and rainfall warnings. FASTA was launched in partnership with the Kenya Meteorological Department by the UK National Centre for Atmospheric Science and the University of Leeds[228]. There does not exist a nationally generated system for nowcasting in all parameters (like extreme heat), let alone one that can be delivered at county level.

210. In the same vein, while there exists national level capacity and data for carbon accounting and emissions reporting, namely through Kenya Meteorological Department, Climate Change Directorate and National Environmental Management Authority (NEMA), this capacity is not devolved or decentralized[229]. This leaves county governments to rely on national-level data and summaries, and a missed opportunity to develop disaggregated, regionally specific carbon emissions profiles and a lack of understanding, on the part of counties, of the sources and drivers of emissions in their areas.

211. Climate change units exist in all counties and are fully staffed[230]. The CCU in most counties have received training on climate change, climate risk assessment and were also made operational through the G-FLLOCA program[231] and the GCF NAP Readiness project implemented by FAO[232]. To date, however, no decentralized carbon accounting methodologies have been developed in the LREB, and there is no county-level reports tracking emissions from AFOLU or other sectors. The need for strengthening MRV of emissions including in the AFOLU sector was already noted in the National Climate Change Adaptation Plan (NCCAP, 2019-2022).[233]

212. Given the relatively recent creation of devolved climate change units, and the recent adoption of the climate change laws in most counties, most counties have relied on national or regional level climate impacts and vulnerability assessments for their planning. A number of projects and programs have produced partial[234] (e.g. sectoral) assessments serving their own purposes. For example, the Ministry of Agriculture Livestock Fisheries and Cooperatives (MoALFC) produced climate risk county profiles for all counties, with assistance from the International Centre for Tropical Agriculture (CIAT), as part of the National Agricultural and Rural Inclusive Growth Project (NARIGP) and the Kenya Climate Smart Agriculture Program (KCSAP) supported by the World Bank (WB)[235]. However, while these contain recommendations on key value chains (including some that informed the selection of this project's VC), they do not provide a comprehensive picture of territorial vulnerability (i.e. vulnerability hotspots) or of emissions hotspots.

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[227] https://fastaweather.com/the-fasta-weather-nowcasting-app-is-now-live-for-kenya/

[228] https://fastaweather.com/the-fasta-weather-nowcasting-app-is-now-live-for-kenya/

[229] Further, at date of writing, a new State Department for Environment and Climate Change was just created within the Ministry of Environment and Forestry.

[230] GCF-NAP Readiness project

[231]G-FLLOCA, PCRA Guidance Manual, 2023

[232] GCF NAP Readiness Completion report, 2023.

[233] https://www.kccap.info/index_option_com_content_view_article_id_33_Itemid_73.html

[234] County capacity assessment, Dec 2021

[235] www.worldbank.org

213. In recent months, the county governments, with support from the G-FLLOCA program, have develoepd climate change action plans that highlight priority needed interventions, on the basis of the climate change risk assessments conducted in 2022. The Table 22 lists the key priorities for all counties that have completed a CCAP[236].

TABLE 22: KEY PRIORITIES LISTED IN COUNTY CLIMATE ACTION PLANS (2024)

County	Agriculture	Land, Landscape & Environmental Management	Infrastructure & Industry	Energy
Baringo	- Agriculture resilience in crop and animal husbandry	- Ecosystem protection and invasive species management	- Improve water infrastructure	- Investment in renewable energy technologies
Kakamega	- Promote low-carbon agricultural practices	- Increase forest cover and rehabilitate degraded lands	- Improve water storage and distribution infrastructure	- Promote clean cooking solutions and renewable energy adoption
Bomet	- Integrate climate-smart practices in agriculture	- Land restoration to address environmental degradation	- Infrastructure repair due to climate-related hazards	- No specific priorities listed
Kisii	- Address climate-related shifts in planting seasons and emerging pests	- Enhance water access and conservation	- Disaster risk reduction in urban areas	- No specific priorities listed
Kericho	- Promote climate-smart agriculture and agro-ecological farming practices	- Reforestation and wetland protection	- Climate-proof roads and drainage systems	- Promote renewable energy for cooking and lighting, biogas and solar adoption
Nyamira	- Strengthen climate-resilient agriculture and agroforestry	- Protect and conserve water catchment areas	- Improve rural infrastructure to support resilience	- Promote solar energy and efficient energy systems
Homa Bay	- Enhance climate-resilient agricultural practices	- Promote reforestation and protection of natural forests	- Develop water supply infrastructure	- Increase the use of clean energy for households
Siaya	- Promote climate-smart agricultural practices and water conservation	- Protection of wetlands and critical ecosystems	- Strengthen climate-resilient infrastructure	- No specific priorities listed

214. There is a need to strengthen the capacity of county governments to produce their own, rapid, data-based climate assessments to inform local planning, the improvement of CIDPs, and the determination of most appropriate climate solutions. Additionally, there is no single source of government-approved compendium of acceptable climate technologies: this leaves farmers and

[236] All CCAP may be found at the Maarifa website document repository, https://cog.go.ke/index.php?fcty=42&fsec=

cooperatives to their own devices when making choices about climate resilient, low-carbon practises, resulting in ad hoc, incoherent practices across the sector. This guidance is a service that could be provided at minimal cost by the government but would enable rapid transformation of the sector as a whole.

215. However, to promote coherence in approaches and to leverage this project's results for broader dissemination among the 14 counties and beyond, there is a need to share specific knowledge. For this, the project builds on a baseline of existing knowledge sharing and governance mechanisms such as the Kenya Climate-Smart Agriculture Multi-Stakeholder Platform (CSA-MSP), and the Council of Governors (CoG). The CSA-MSP[237] brings together the Government of Kenya (MoALFC), research partners such as CGIAR, farmer organizations, civil society organizations (CSO) and development partners, and is coordinated by the Climate Change Unit of the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC). Members participate in any one of 5 working groups (Knowledge sharing, reporting processes, networking and collaboration, policy development and implementation, and inclusivity). In addition, all the counties except Homa Bay have multi-stakeholder platforms used to reach stakeholders on a variety of issues including impacts of climate change on agriculture; Natural resource management; Water, Health and Sanitation; Decentralized energy resources; County Environmental Action Plans; Participatory Scenario Planning (PSPs) – the latter being led by the meteorological department for development and dissemination of advisories based on seasonal forecasts. Cooperatives are well represented in such platforms as most of them target farmers who also happen to be members of the cooperative unions/movement[238].

216. The Council of Governors (CoG) is a central government mechanism designed to promote exchange and coordination among the governors of all counties. The mandate of the CoG is to promote "visionary leadership; share best practices; offer a collective voice on policy issues; promote inter – county consultations; encourage and initiate information sharing on the performance of County Governments about the execution of their functions; facilitate collective consultation on matters of interest to County Governments. The CoG houses a national Maarifa Best Practice Center (Knowledge exchange)[239] to promote exchange on devolution solutions. The centre facilitates "physical and virtual peer-to-peer (P2P) learning activities among counties to promote cross-pollination of ideas and adoption of best practices and innovations with the goal that counties will improve service delivery to citizens." Climate change adaptation and mitigation is an area of particular interest to all governors, given their mandate to implement national priorities through devolution.

217. In conclusion, several gaps have been identified that this project proposes to address under Output 1.1. First, the information base and data that supports public and private sector decision-making is incomplete: local climate risk information, production, sales, and market datasets need to be made more readily available to support understanding of climate impacts and adaptation benefits among farmers and to support decision making; climate information services are not yet reaching the last mile, and there is a need for improvements in quality and type of services provided; the public extension system needs to find better ways to continue delivering its mandate, including normatively, while

[237] https://csa-msp.kilimo.go.ke
[238] County Capacity Assessment, April 2022, FAO
[239] https://maarifa.cog.go.ke/strategic-plan

opening opportunities for a better-regulated, well informed, financially sustainable system of private extension that truly works in the interest of smallholders.

Output 1.1 Additionality and description of activities

Activity 1.1.1 ***Develop and deploy innovative and efficient extension methods for disseminating and demonstrating CRLCSA knowledge, technologies and practices in gender-responsive and socially inclusive ways.***

218. The first step (sub-activity 1.1.1.1) will be to examine and analyze the state of extension services in the LREB agriculture sector and in the six value chains. This stocktaking exercise will analyze both public and private extension services, such as those provided by governments through the ministry of agriculture, but also the less formal services farmers rely on to conduct operations, including privately funded extension services (e.g. those provided through private buyers or aggregators). The purpose of this assessment is to determine gaps and challenges within and between counties and develop efficient and cost-effective solutions to respond to climate change to support transition towards climate resilient, low-carbon production and value chains. This assessment will be conducted in close collaboration with the agricultural extension departments in each county, engaging input by farmers, FO, and other value chain actors.

219. Based on this assessment, counties will come together to participate in the participatory design of new, innovative, and more efficient and inclusive CRLCSA extension methods (sub-activity 1.1.1.2). Each county will then receive training and capacity building, including material support, for the delivery and effective deployment of new extension methods. Extension methods or processes considered will include:

- Deployment of e-extension services using cell phones, social media, or internet-based services where accessibility allows.
- Public-private partnerships for the delivery of extension advice to last mile users.
- Government-supported farmer-to-farmer or peer networking and mentoring systems
- Government-supported Climate Farmer Field Schools
- Group-based learning (e.g., farmer field schools and community trainings)
- Fee-based systems (e.g., cost recovery, or sliding scale)
- New agro-meteorological advisory packets, technical guidance (print or video), trainings, manuals, or publications
- Value chain-based technical support, extension, and marketing support programs
- Feedback mechanism from the information recipients and service providers
- Productivity and quality monitoring systems, data access and sharing (climate and market data)
- Incorporate, when possible and with the consent of indigenous people, traditional knowledge[240] and practices with scientific knowlegde and technology.

[240] The UNHCR accent the importance on how traditional and indigenous knowledge is key to building resilience for vulnerable populations in the face of climate change, as most of their traditions and practices relies on nature-based solutions (UNHCR, 2020).

220. The project will also ensure that gender and social inclusion issues are integrated within extension programs and within any support provided to cooperatives. This will ensure that existing inequalities are not exacerbated (including inequalities related to decision-making, labour burden, and access to agricultural information, finance, inputs), so that no one is left behind from efforts to address climate change. This will include designing and delivering specific modules within and in addition to agronomic training, which will include guidance on service provision to marginalized and vulnerable groups (includes indigenous people) and the adaptation of services to persons living with disabilities.

221. The gender equality and social inclusion objective for Activity 1.1.1 is to develop and deploy gender-transformative and socially inclusive extension methods for disseminating and demonstrating CRLCSA knowledge, technologies, and practices. Detailed actions for achieving this objective are to ensure that indigenous and non-indigenous women - including female-headed households, young women, elderly women, and women living with disabilities - have access to both female and male extension agents that have been trained using Gender Action Learning Systems (GALS).[241] GALS is based on underlying principles of social and gender justice, inclusion and mutual respect, and has been tested as an effective extension method for engaging with women, youth, and PLWD in non-biased ways. A key focus within GALS is breaking through gender-based barriers at the individual level and changing gender inequalities within the family, as these are pervasive challenges that prevent both women and men from participating equally and benefitting equitably in agricultural value chains. The project will use GALS' inclusive extension methods, for example, training the family together as a whole, even on crop and livestock species and activities that are traditionally labelled as "men's" or "women's" activities. In alignment with this approach, the project will ensure that the technical aspects of training are gender-responsive, for example, by ensuring female and male extension agents can travel to remote and rural locations at times that are appropriate for women (e.g., after morning caretaking responsibilities).

222. Additional information on the GALS approach can be found in Annex 8. Gender action plan activities for output 1.1.1 will also build institutional capacity within local administrations and cooperative leadership to develop gender responsive and socially inclusive extension methods to address inequalities to ensure equity in accessing knowledge, technologies, and practices within their organizations. Capacity will also be built within county-level extension officers on gender-responsive and socially inclusive methods for disseminating and demonstrating CRLCSA knowledge, technologies, and practices. The project will capacitate county governments to prioritize policies and investments that increase women's digital literacy, access to smartphones, and internet connectivity as a pathway to increasing digital access to markets and information flow to women agricultural entrepreneurs.

223. Following the selection of methods or of improvements they wish to implement, each county will receive technical assistance for the development of operating procedures, manuals, and guidance (sub-activity 1.1.1.3). The deployment of selected methods of extension will be made in parallel with, and complementary to, the dissemination of climate resilient, low-carbon technologies to farmers under Output 3.1 and the counties' extension and cooperative departments will also receive training on the deployment of climate-sensitive extension services according to the choices made by county administrations (sub-activity 1.1.1.4) . In the final year of the project, an assessment of effectiveness and efficiency will inform the modalities for continuation by the county government using national

241 FAO,IFAD, and WFP. 2020. Good Practice: Gender Action Learning System. https://www.fao.org/3/cb1331en/cb1331en-01.pdf

budgets based on both independent evaluation and feedback mechanisms between recipients and providers (sub-activity 1.1.1.5).

224. Activity 1.1.1 will be implemented by FAO using GCF and FAO cofinancing, in collaboration with county departments of agriculture, extension, climate change, environment, and cooperatives, with support from the project in the form of technical assistance and training.

Activity 1.1.2. Strengthen the dissemination of climate information services to last-mile users including women, youth and PLWD through cooperatives and Farmer Organizations.

225. A similar process will be followed under activity 1.1.2, focused on the delivery of climate information services. The baseline assessment undertaken through the Cooperative Survey in 2022 illustrated that men and women farmers are not yet receiving the full scope of necessary climate information services to enable adequate climate risk management and timely choices at both short (e.g., intra-seasonal) and long planning horizons (e.g., multi-year business planning).

226. Therefore, the project will, in line with improvements to extension services, seek to improve the quality, reach, usefulness and timeliness of climate information transmission to last mile users. This will include building the capacity of devolved climate change units and decentralized meteorological offices to develop and disseminate locally tailored, user-friendly and value chain specific climate information services such as[242]:

- Decadal bulletins
- Heat wave warnings
- Severe Rainfall warnings
- Seasonal forecasts
- Three-day weather reports including temperature, precipitation, wind, potential evapotranspiration (PET), UV and humidity.
- Value Chain specific Agro-climate advisory at short intervals, including climate-related disease and pest invasions.
- Daily bulletins, real-time weather forecasts and nowcasting for extreme events
- Weather-based pests and diseases forecasting
- Historical records,
- Crop parameters,
- Soil moisture and temperatures
- Drought predictions based on long-term weather patterns, such as ENSO.

227. Based on a detailed stocktake and gap analysis in each county for the 6 value chains (Sub-activity 1.1.2.1 undertaken in year 1), the project will provide technical assistance, data, consultancies and expertise towards the development or revision of existing climate information services (CIS) and for improvements in the quality and availability of real-time weather and climate information, in cooperation with national and county meteorological departments (Sub-activity 1.1.2.2). The stocktaking report will also identify the most effective and cost-efficient and inclusive method for

[242] Ngari FM et al. 2016. Climate information services providers in Kenya (worldbank.org). Agriculture global practice technical assistance paper. Washington, DC. World Bank.

dissemination in the 6 value chains, and the project will (under Outcome 3) ensure that last-mile users are enabled to access the CIS (materially, e.g., through the provision of cell phones data plans to lead farmers in cooperatives, Farmer Field School (FFS) facilitators, and intermediaries) and to understand the information. Training will be provided to agro-meteorological department staff on the development and delivery of climate information services to FO and Cooperatives using the extension methods developed under activity 1.1.1 (sub-activity 1.1.2.3). Particular attention will be paid to the use of participatory and co-design approaches in the production of climate advisories, including participatory scenario planning. The project will also build the capacity of local county administrations to establish durable partnerships with local media and information intermediaries.

228. To increase the use of the climate and weather information, the project will support seasonal planning at the ward level to develop locally relevant and tailored seasonal advisories in the targeted value chains and natural resources management (sub-activity 1.1.2.4). Climate information will be communicated through FOs and cooperatives, and by making use of digital agriculture solutions such as cell phone-based groups (e.g. WhatsApp distribution lists) or any extension services designed under activity 1.1.1 (sub-activity 1.1.2.5).

229. This dissemination will require the development of a list of intermediaries for transmission of CI (Sub-activity 1.1.2.6), which will also be linked to the update of the agricultural databases under activity 1.1.4, which will include regular updates of farmers and farmer organizations distribution lists and maintenance of the cooperative census. Monitoring of the dissemination of climate information services will be conducted by county meteorological departments and will include surveillance of indicators such as type of product disseminated, method of dissemination, number of people reached with particular emphasis on traditionally marginalized groups (women, youth/children, PLwD, elderly and indigenous people), and frequency of use (sub-activity 1.1.2.7).

230. The gender equality and social inclusion objective for Activity 1.1.2 is to strengthen the dissemination of climate services and information to women, youth, IPs and PLWD through cooperatives and farmer organizations. Detailed actions for achieving this objective are to liaise with county-level and cooperative gender specialists and leadership in selecting the climate information service dissemination strategies that are accessible to women, youth, IPs and PLWD (i.e., radio, videos, public campaigns, in-person demonstrations). This process will be based on consultations with women, youth, IPs, and PLWD on the types of climate services and information needed during scoping. Key among this will be to consider the digital gender divide in implementation, and whether indigenous and non-indigenous women (especially older women and women living with disabilities) have additional barriers to CIS that require additional support - for example, direct access to finance. Consultations with cooperative members from marginalized groups will ensure their differentiated needs, priorities, and preferences are accounted for in strengthening the appropriate methods for dissemination. The project will apply the principle of obtaining free, prior and informed consent (FPIC), information provided shall be disclosed in a culturally appropriate manner, with legitimate and representative community institutions fully involved.

231. Activity 1.1.2 will be implemented by FAO with supports from the Kenya meteorological Departments in each county, in collaboration with communities, smallholder farmers and their organizations.

Activity 1.1.3. Develop and test methodologies for decentralized carbon accounting.

232. In support of future upscaling and in direct relation to the implementation of the integrated landscape management strategies (Activities 2.1.1 and 2.2.2), the project will mobilize technical assistance to conduct training and demonstrations of carbon accounting methodologies at county level. It is expected that this activity will lead to the better integration of emissions reductions practices in future land use planning activities, green accounting, and may also support the creation of linkages between counties and carbon markets. As noted in the previous sections, locally specific data on emissions and emissions sources in the AFOLU sector are not readily available, and therefore cannot inform suitable mitigation strategies.

233. Among the methodologies being explored, the project will draw on IPCC guidance and any previous work undertaken in Kenya such as the System for Land based Emissions Estimation (SLEEK) platform under the National Communications processes, to downscale these at county level, with the supporting capacity building required. This will enable counties to undertake their own carbon balance accounting in line with the agricultural landscape management strategy to be developed under output 2.1. The project will explore the following methods to acquire specific emission factors and activity data:

- *Nested sampling design* – Measurement sites are nested in a spatially stratified hierarchical fashion across the landscapes. Sampling may include soil cores, biomass and tree parameters, as well as trace gas samples with chambers or tower-based approaches, among others [243] .

- *Farming Typology method* – farms within the research area are grouped by type and GHG output calculated [244] . This accounts for smallholder farm differences and allows for greater accuracy.

- *Remote sensing*[245] - Remote sensing methods using both active (LIDAR and RADAR) and passive (detect reflected radiation from a landscape or radiation emitted by landscape features) sensors are maturing for the estimation of above ground biomass stocks by measuring forest greenness, forest height, canopy attributes, or other biophysical parameters. Low (200 m) or moderate (30 m) resolution satellite data can be used to measure the fractional cover of large scale closed canopy forests and then correlated with ground measurements of forest carbon density to map carbon stocks across large area landscapes. Analysis of multiple date satellite data can then estimate GHG emissions or sequestration from land cover change.

234. A first step in this activity will be to conduct a participatory design workshop with the 14 counties (Meteorological, Environment, Agriculture, Forests, and Land departments and CCU) to select and develop a regionally specific and well adapted AFOLU carbon accounting methodology (sub-activity

[243] Eleanor Milne et al. 2013. *Environmental Research Letters 8*. Retrieved from: https://iopscience.iop.org/article/10.1088/1748-9326/8/1/015019

[244] Musafiri, C. M., Macharia, J. M., Ng'etich, O. K., Kiboi, M. N., Okeyo, J., Shisanya, C. A., ... & Ngetich, F. K. (2020). Farming systems' typologies analysis to inform agricultural greenhouse gas emissions potential from smallholder rain-fed farms in Kenya. *Scientific African, 8*. Retrieved from: https://www.sciencedirect.com/science/article/pii/S2468227620301964

[245] Eleanor Milne et al. 2013. *Environmental Research Letters 8*. Retrieved from: https://iopscience.iop.org/article/10.1088/1748-9326/8/1/015019

1.1.3.1). A process will then be established for accessing and collecting local data, including remote sensing data, and computation of calculations (sub-activity 1.1.3.2). This will leverage existing capacity in the climate change units, including such that was provided by the Readiness Project and G-FLLOCA. Operating manuals and guidance documents will also be produced to support county administrations and to ensure harmonized comparable reports across the 14 counties (sub-activity 1.1.3.3). The project will then support the deployment of two decentralized carbon accounting exercises, using a learning-by-doing approach (sub-activity 1.1.3.4): at year 2, which will establish a baseline, and another at year 5, which can begin to track changes that may have been induced by the project, including the changes resulting from the implementation of the landscape management strategies referred to below.

235. The gender equality and social inclusion objective for activity 1.1.3 is to develop and test methodologies for decentralized carbon accounting in ways that are gender-responsive and socially inclusive for marginilized communities sucha as IPs. The participatory workshop with the 14 counties mentioned above will aim to have equal gender representation (50% women and 50% men) and youth representation and PLWD representation equivalent to their populations at national level (20% and 2%, respectively). In addition, the workshop will include a presentation and facilitated discussion session on the importance of integrating a gender equality and social inclusion lens to carbon accounting and project programming (e.g., enables inequalities in access to climate services, responses to climate change to be reduced).

Activity 1.1.4 Upgrade and update agricultural databases, crop and productivity datasets, cooperative census

236. As noted during the development of this project, reliable data on production, prices, sales, cooperatives, and climate, are scattered across departments and vary among value chains and counties. To further enable county governments to better serve the transition to climate resilient, low-carbon pathways within the targeted value chains and beyond, data systems need to be improved. Complete and updated price and sales data informs development of climate resilient business plans for cooperatives and FOs, investment at both farmer and private sector levels and county plans in infrastructure and market development; crop and livestock production data that can be effectively related to climate data on a regular basis can also inform local climate change risk assessment and management and help steer farmers decisions away from maladapted practices[246]. Finally, accurate and up-to-date data on farmers, land users, cooperatives and cooperative unions in the target value chains can help strengthen governance, government outreach to end users, and facilitate investment in the region.

237. Therefore, the project will first conduct a detailed systems analysis and needs assessment (sub-activity 1.1.4.1). This will review the type of available data, channels for sharing the dataset, usage for decision-making and barriers to access, determine data gaps (coverage, accuracy, storage). The project will make recommendations to county governments on the improvement of these data systems in support of climate resilient, low-carbon agriculture. Recommendations will include not only datasets

[246] For example, comparing the performance of a specific breed of cow, or variety of tree against another in the context of climate sensitivity would assist farmers in making more informed choices about breed and variety selection balancing long-term sustainability vs short-term gains.

that are of use to governments, but also the data services that would be useful to farmers and value chain actors, along with costings for all proposed improvements to make sure that the costs are included in county budgets. Recommendations may also include, as needed, institutional setups for climate-related data collection and sharing, such as responsibilities for collection, storage standards, quality norms, and archiving, etc. The next step will be to ensure that the database infrastructure is adequate to support its upgrading – this may require the development of technical guidelines and the deployment of training for relevant staff (sub-activity 1.1.4.2). The project will leverage FAO and Kenya Governments existing working relationship, through arrangements with the national and the county government, that sufficient resources for the operation and maintenance of servers/platforms, as well as internet access, have been allocated.

238. Starting in the second year and up to year 5, the project will support counties in collecting, compiling, synthesizing, and analyzing the following types of datasets for the 6 value chains (sub-activity 1.1.4.3). This initial demonstration will serve as an illustration of how better data services can contribute to the reorientation of value chains. It can be extended to other value chains and sectors after the project is over. At the end of the 5th year, the counties will undertake an effectiveness review of these datasets through inclusive consultation with stakeholders, and will continue supporting the priority data products using national budgets after the end of the project.

- Crop production, crop and post-harvest losses, crop and livestock productivity (kg/ha or L/head) in relation to climate parameters.
- Land use per crop/livestock linked to the decentralized carbon accounting exercise
- Productivity, processing, and value addition data (for example number of operational mills)
- Marketing, sales, and economic data including employment.

239. In addition to this, because the cooperative movement is crucial to this project and to the transformation of value chains, the project will support the county governments to update the cooperative census on a biennial basis by recruiting consultants to revise the interview protocols, sharing available data, and creating data infrastructure, including lists of contacts. The first time, the project will assist counties operationally to conduct the census to ensure accuracy of baseline and create linkages between counties and cooperatives. Following the initial data collection, the project will support the counties in developing an automated process for updating the census through an online surveying of cooperatives that is tied to the annual registration process (tied to the Kenyan Agriculture Information Management System). The cooperative census included a thorough list of indicators that covered membership and participation, social inclusion[247], sales and income, environmental and climate challenges and resilience, and access to assets and inputs (land, water, energy).

240. The gender equality and social inclusion objective for Activity 1.1.4 is to upgrade and update agricultural databases, crop and productivity datasets and cooperative census in ways that are gender-responsive and socially inclusive. The project will update databases with sex- and gender-disaggregated data and ensure that data on IPs and invisible groups (i.e., women respondents living in male-headed households, widows) are included in updating datasets. Furthermore, women, youth, IPs and PLWD will be trained on the technical aspects of data collection and management. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

[247] For example, information on whether farmers self-identify as Indigenous People, sex-disaggregated data, etc.

241. This activity will be delivered by FAO with the active participation of all county government departments (Meteorological, Environment, Forestry, Crop and Livestock, Marketing, Social Services and Employment, Youth and Gender, Energy, and IT).

Activity 1.1.5. Assess eligible climate solutions for the agriculture sector in relation to climate impacts.

242. There is uncertainty in the way climate impacts will materialize in the long term, and there will also be evolution in locally specific sensitivity to the impacts of climate change, given the dynamic and diverse nature of the LREB economy. The project creates, under Outcome 3, a continuous mechanism for technology transfer that facilitates adoption of adaptation and mitigation technologies by farmers. However, this mechanism requires sound knowledge on climate impacts and suitable climate responses, else farmers may be led into maladaptive practices, or to make ill-informed short-term choices. Therefore, the purpose of this activity is to enable county governments to provide services related to the screening, assessment and participatory selection of suitable climate technologies that respond to the way in which climate impacts and risks are materializing locally.

243. As a first step, the project will build on the results of the GCF NAP Readiness project and the G-FLLOCA program[248] and deliver training for county climate change units, meteorological and agriculture departments on the selection, screening, and prioritization of climate solutions (sub-activity 1.1.5.1) in light of available climate risk and vulnerability assessments, such as those conducted under G-FLLOCA. The project will support training in the identification of adaptation and mitigation climate solutions for the 6 value chains at county level, though it is expected that the process will be expanded to other value chains after the project.

244. Available Climate Risks and Vulnerability Assessments (CRVA) will then be used to inform a participatory screening of acceptable climate solutions for the targeted value chains, which will be conducted with the cooperation of the Departments of Agriculture and Extension, Kenya Agriculture, Livestock and Research Organization (KALRO), the Climate Smart Agriculture multi-stakeholder platform, and other research partners (e.g. CGIAR), with the participation of farmer organizations and cooperatives (including indigenous people, women, youth and PLWD representatives). The result of this will be a government-validated list of climate technologies (Climate Technology Green List) that either promote resilience or help reduce emissions in the agriculture sector (sub-activity 1.1.5.2) and that are adaptive to the local conditions. The list will include technologies, approaches, practices, processes, and knowledge, with costs, documentation of benefits and links to potential providers. Furthermore, the list should also include, with the consent of indigenous communities involved in the project, information of traditional knowledge and practices that have been implemented by IPs to cope with climate change and that could be relicated or scaped[249]. The list may be maintained and updated regularly; in the 5th year of the project, the list will be updated based on a review of available CRVA

[248] Under the FLLOCA program, counties will be supported in conducting county-wide risks and vulnerability assessments during the course of this foreseen project.

[249] In Africa, indigenous and local knowledge in planning and development is one important component to increase adaptation. Leal Filho, Matandirotya and Lütz et.al.(2021) sets example of how Endorois indigenous community adopted climate-smart agroecological production systems (e.g., cultivation of drought-tolerant cereals, tubers, and vegetables) led to more sustainable land management practices, minimized water usage, reduced human–wildlife conflict, and enhanced food security.

analyses that take into account any new incoming climate impacts, scenarios and projections for the region.

245. These "green lists" will be used under activities 3.1 and 3.2 by cooperatives and farmers to independently identify, and source climate solutions adapted to their own challenges, and (under activity 4.2) to guide decisions by financial institutions on lending towards climate resilient, low-carbon practises (reducing the risk of lending). Thus, the project helps build local capacity for autonomous adaptation, leveraging government technical capacity and private sector innovation and rapid pace of adaptation. These lists will also be shared across counties, and with the Council of Governors for broader uptake and replication (through activity 1.1.6). FPIC process will be requiered, seeking consent for the use and protection of traditional knowedge, and respecting and intellectual property right.

246. The gender equality and social inclusion objective for activity 1.1.5 is to assess eligible climate solutions for the agriculture sector in relation to climate impacts in ways that are gender-responsive and socially inclusive. The project will include women, youth, IPs, and PLWD in climate solution workshops for futures planning and mobilize women's and youth groups in generating climate solutions and county-level advocacy. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Activity 1.1.6. Share knowledge and lessons learned through existing platforms.

247. The purpose of this activity is to support the upscaling and broader adoption of project outputs and outcomes. In particular, the project will work with counties, cooperatives and smallholder farmers and other value chain actors to document and identify upscaling opportunities of lessons learned and factors of success that would enable the transfer of project approaches to other value chains, sectors, and regions.

248. To do this the project will leverage the already established Climate Change Multi-Sectoral Knowledge Platform (CCMKP), Climate Smart Agriculture Multi-stakeholder platform, the Maarifa centre and the Council of Governors, based on a Knowledge and Learning strategy that will be developed in the first year of the project (sub-activity 1.1.6.1). As lessons and results from implementation are identified (starting year 3), the project will produce lessons learned documents, information products, knowledge and outreach material, and other such products to be discussed and disseminated across the various platforms in gender-responsive and culturally appropriated manner. The lessons learned documents will include how the project created synergies with the National Adaptation Plan (NAP) and other national development plans, sectoral plans, and policies at both national and county level, where relevant. (Sub-activity 1.1.6.2.)

249. Knowledge sharing events will be organized biannually, bringing together project participants at county, regional and national levels as well as policy makers, experts in climate change, climate resilient agriculture and climate finance investors (Sub-activity 1.1.6.3). Meetings will be held at the county level during the first 5 years of the project, with regional and national level sharing events during the last two years to support upscaling. At the end of the project the activity will contribute synthesis reports and other documentation of lessons learned in support of a broader upscaling strategy. These knowledge sharing events will improve the regional coordination on responding to climate change impacts and management of agriculture landscape by facilitating dialogue and joint planning among the 14 county governments in the Lake Region Economic Bloc.

250. The gender equality and social inclusion objective for activity 1.1.6 is to share knowledge and lessons learned through existing platforms in ways that are gender-responsive and socially inclusive. The project will ensure existing platforms are accessible to women, youth, IPs, and PLWD through consultations with local women's and youth groups and make the necessary modifications to existing platforms to increase access to marginalized and invisible groups in knowledge sharing events, in existing platforms, and in the development of strategies, sectoral plans and lessons learned documents (ensure representation of marginalized groups). Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Component 2: Sustainable Resilient Agricultural Landscapes

5.2 Outcome 2.1 Reduced emissions from the AFOLU sector and Outcome 2.2 Increased ecosystem resilience to climate change

5.2.1 Output 2.1

Agricultural landscapes are managed under strategies that conserve, restore, and sustainably manage community forest and agriculture land, and reduce emissions.

251. Activities aims to reduce GHG emissions from the AFOLU sector through the development, implementation, and successful monitoring of climate resilient and low-carbon management plans. The expected gender outcome of Outcome 2.1 and 2,2 is to mainstream gender equality and social inclusion into planning content and process of co-developing, implementing, and monitoring gender-responsive and socially inclusive agricultural landscape management plans. This will be achieved through consultations and inclusion of women, PLWD, IPs and youth in the development of the landscape management strategy and implementation plan and building capacity among county-level, regional, and national officials on the importance of mainstreaming GESI content and creating monitoring mechanisms to support the successful implementation of GESI goals in landscape management. Furthermore, Free Prior and Inform Consent (FPIC) will be carried to ensure that existing tenure rights (formal and informal), as well as traditional and/or customary rights of the indigenous communities are taken into consideration, and that any involuntary restrictions on land use and access to natural resources is duly handle and/or compensated.

252. The expected gender outcome for output 2.1 is for agricultural landscape management strategies to have robust gender equality and social inclusivity content and commitments, and are co-developed, implemented, and monitored in ways that are gender-responsive and socially inclusive. As a cross-cutting project activity, capacity will be built among county-level officials on the importance of creating monitoring mechanisms to support GESI goals.

Output 2.1 Baseline

253. As seen in section 1.4 (environmental baseline) the state and rate of environmental degradation in the LREB and in the Lake Victoria Basin in general is well documented. Increasing demand for food production, insecure land tenure and land fragmentation create pressures to expand agricultural land, particularly given the undeniable productivity assets the region carries (fertile soils, water availability,

suitable climate). However, the pace of land extensification is becoming unsustainable and does not support increased productivity.

The use of woody biomass for energy and conversion of wetlands and forests remains for agricultural purposes some of the main drivers of forest and land use GHG emissions. Smallholder farming utilizes woody biomass for charcoal production thus resulting in deforestation, land degradation, biodiversity loss, and loss of soil organic matter. Unsustainable land management releases GHG emissions into the atmosphere, including for example total land use change and land clearing, deep tillage, fire, or inappropriate application of fertilizers and nutrient management. According to findings from the 2022 Cooperative Census, farmers use a semi-diversified energy basket that varies according to costs, accessibility, and needs of each value chain. Initial findings of the census indicate that only 41% have access to hydroelectricity, while the rest use a combination of hydroelectricity and other sources (solar, firewood, biogas, propane and kerosene)[250]. There is evidence in the region and among the interviewed cooperatives, that hydroelectricity supply varies when rainfall is lower or there is a drought[251], and that access to hydroelectricity is not constant, highlighting the need to ensure adequate access to energy under projected climate conditions.

254. Emissions from deforestation are likely to accelerate as demand for high-value commodities such as coffee, tea and dairy is also increasing rapidly, and under a business as usual (BAU) scenario, this demand would be met by expansion of agricultural land into forests. For the moment, the rate of forest loss is estimated at 6% since 2000[252]. As noted by Global Forest Watch, "between 2001 and 2021, forests in Kenya emitted 8.56 $MtCO_2e$/year and removed -13.7 $MtCO_2e$/. This represents a net carbon flux of -5.09 $MtCO_2e$/year." This is still a net sink but a significant proportion of forest emissions are originating from the western part of Kenya, towards Lake Victoria[253]. Local data on emissions from deforestation and land use change are not available, due to the lack of county capacity to conduct decentralized carbon accounting. Nevertheless, although Kenya's forests do not contribute to net GHG emission, there is a need to decouple agricultural growth from land expansion and deforestation and the Government of Kenya has recently implemented legal reforms to that effect, including a ban on charcoal.

255. Data on land productivity paints a more dire portrait of ecosystem health trends in the LREB region. The land productivity indicator is related to changes in the health and productive capacity of the land and reflects the net effects of changes in ecosystem functioning due to changes in plant phenology and biomass growth, where declining trends are often a defining characteristic of land degradation. Although the LREB region, particularly counties bordering on the Lake, continue to show some positive trends, increasingly significant areas of LREB are exhibiting early signs of decline, and there are pickets

[250] FAO Cooperative Census 2022, and see also Mohammed Takase, Rogers Kipkoech, Paul Kwame Essandoh, A comprehensive review of energy scenario and sustainable energy in Kenya, Fuel Communications, Volume 7, 2021,
[251] V. Ndayishimiye, G. Bakkabulindi and E. Miyingo, "Analysis of the Effects of Drought Conditions on Hydroelectric Power Generation in Uganda," *2022 IEEE PES/IAS PowerAfrica*, Kigali, Rwanda, 2022, pp. 1-5, doi: 10.1109/PowerAfrica53997.2022.9905257. Refer also to https://www.esi-africa.com/industry-sectors/generation/drought-affects-hydroelectricity-kenya/
[252] https://www.globalforestwatch.org
[253] https://www.globalforestwatch.org

of areas where land productivity is declining. Compared to the 2016 data, however, the trend is a positive one, highlighing the benefits of various reforestation and sustainable land management interventions. The figures below were extracted from earthmap.org and represent trends for 16 years prior to the date indicated. There is therefore some overlap between the two figures, but the change remains visible.

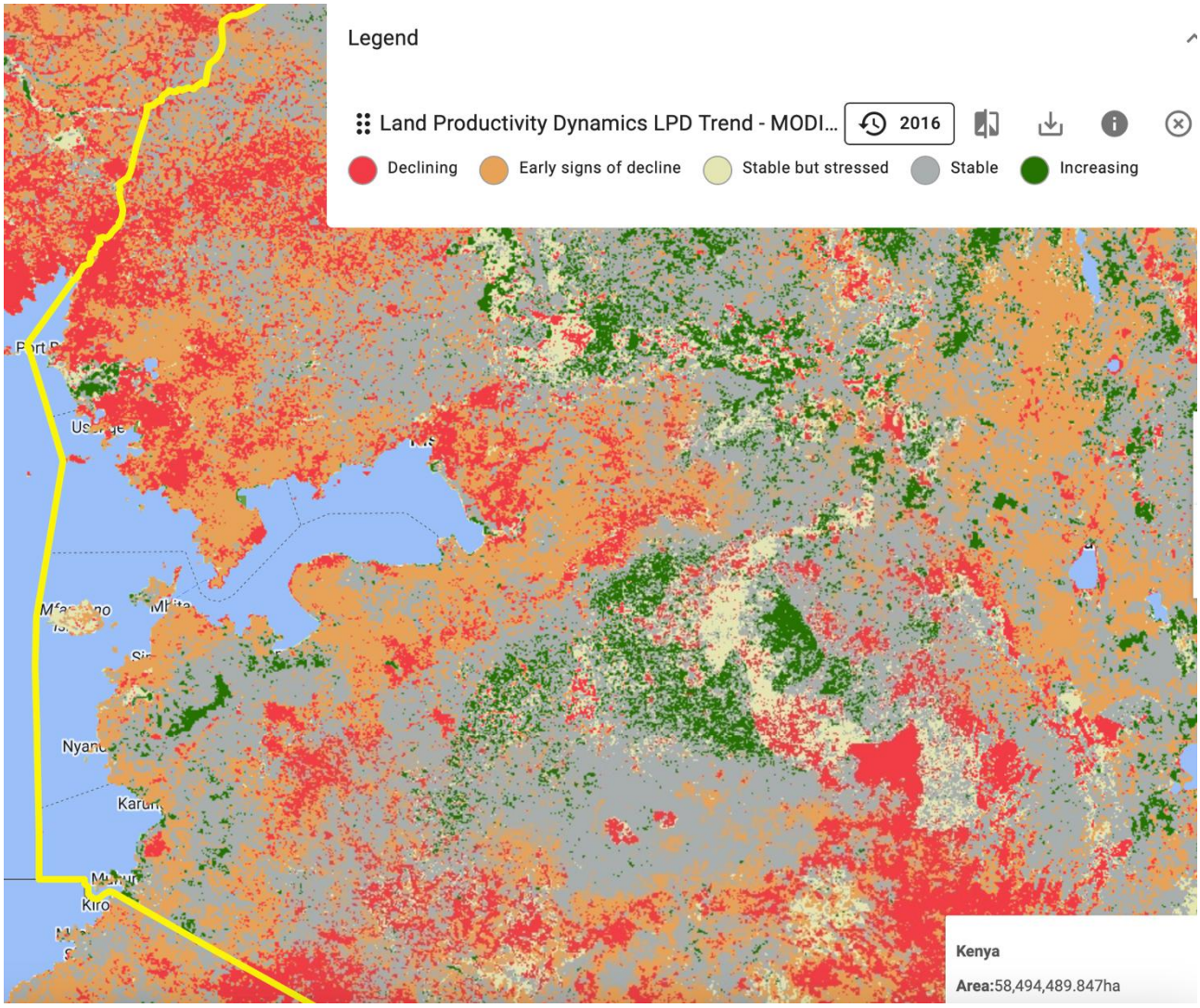

FIGURE 22: LAND PRODUCTIVITY DYNAMICS TRENDS, 2016[254]

[254] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

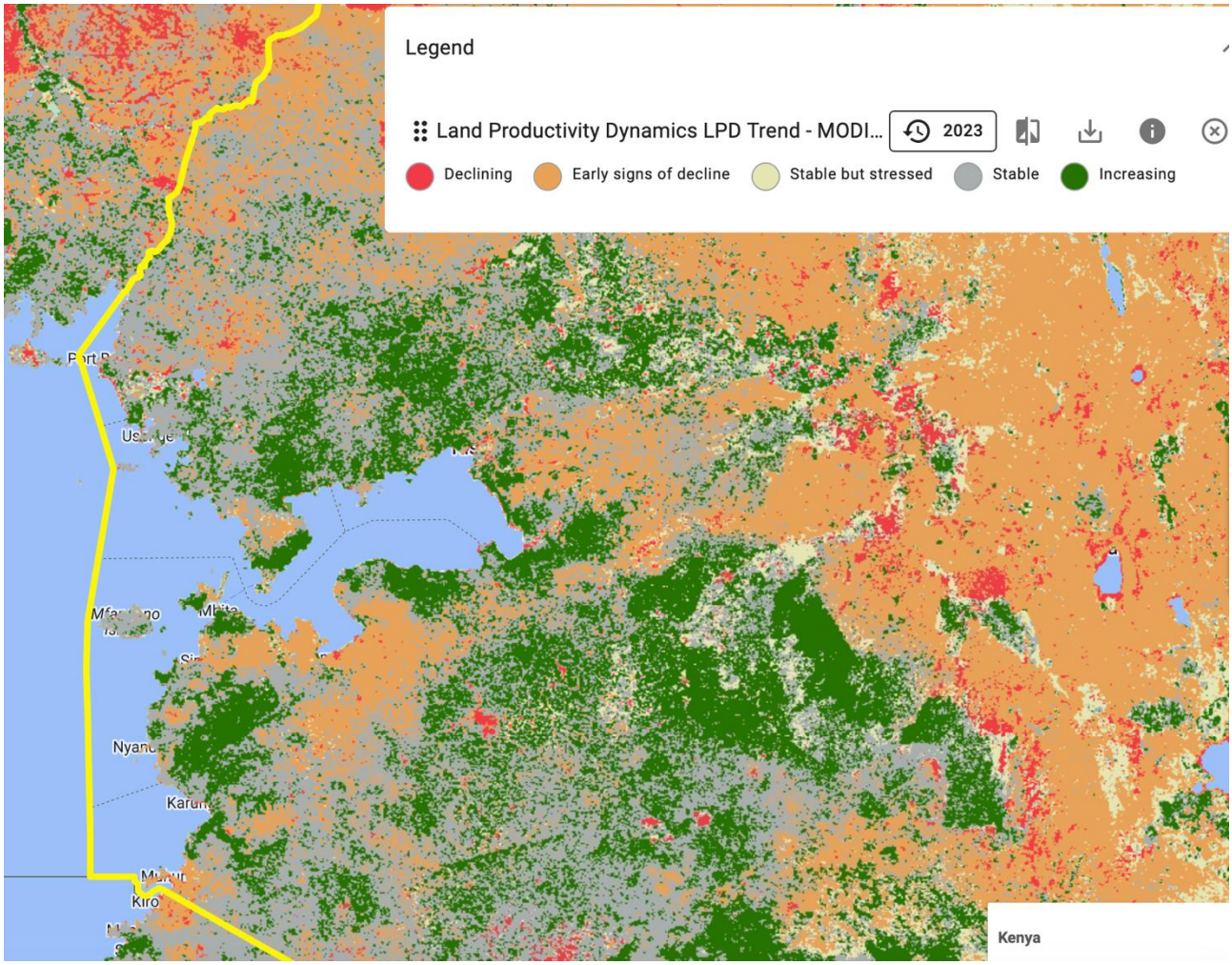

FIGURE 23: LAND PRODUCTIVITY DYNAMICS TRENDS, 2023[255]

[255] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

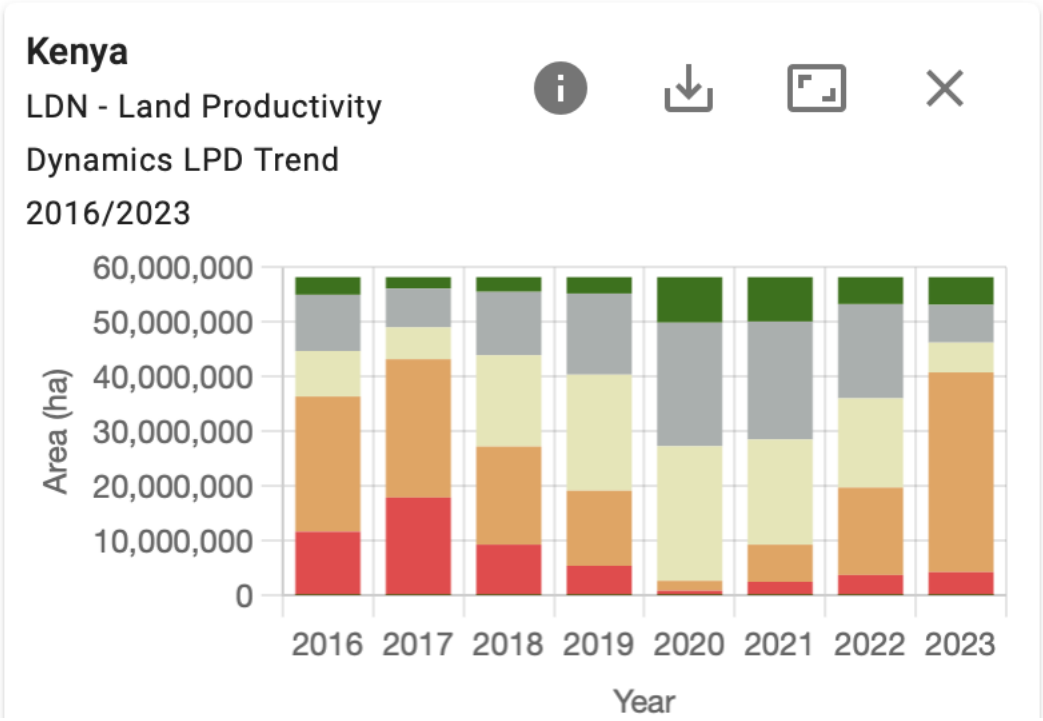

FIGURE 24: TRENDS IN LAND PRODUCTIVITY DYNAMICS, KENYA, 2016-2023

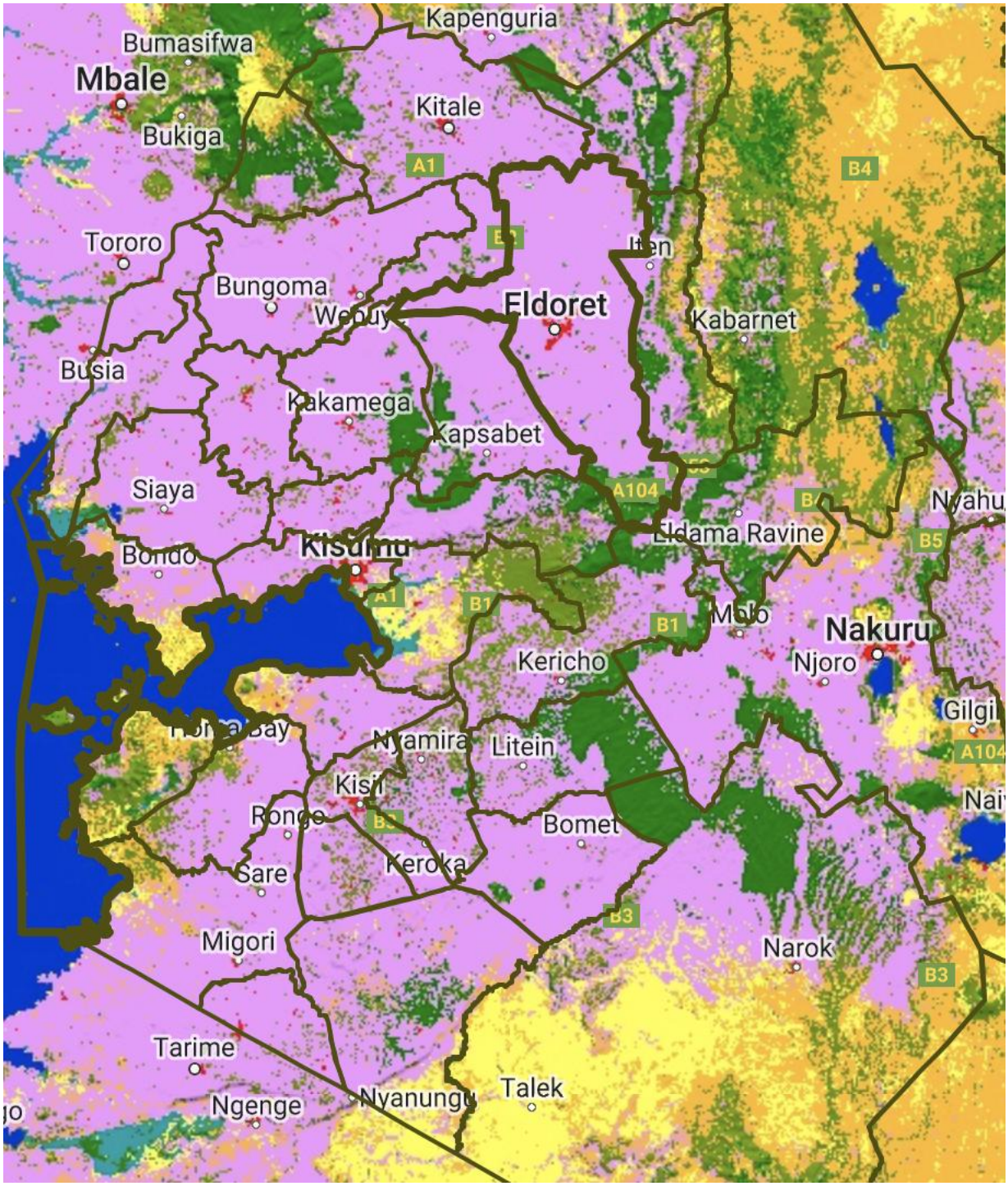

FIGURE 25: LAND COVER IN LREB IN 2019[256257]

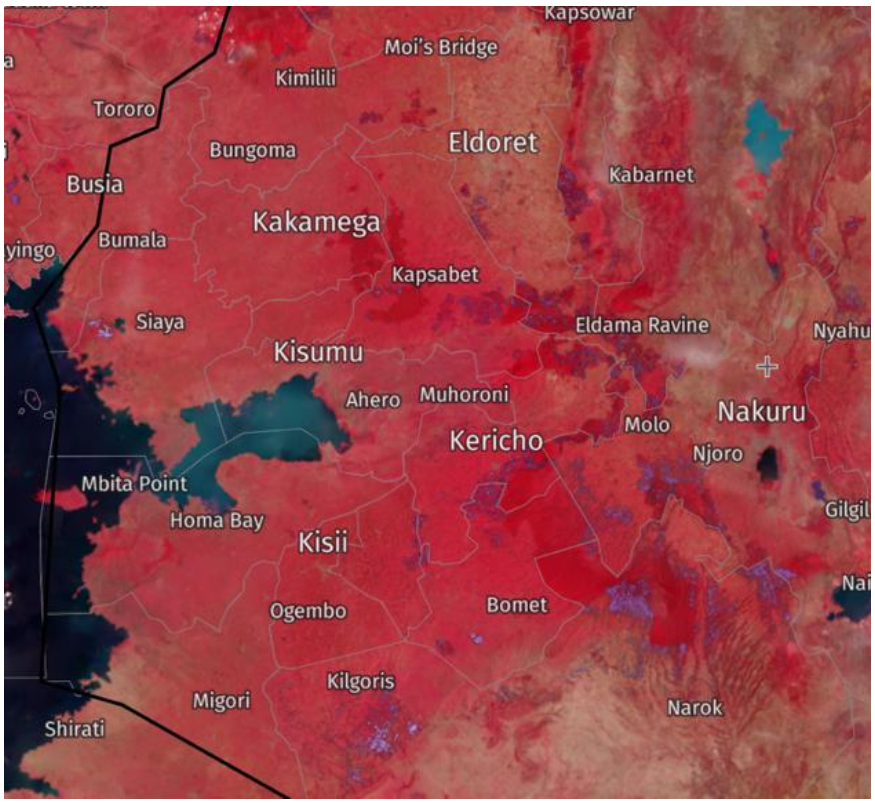

FIGURE 26: FOREST GHG EMISSIONS - 2001-2021 (GFW) (DARKER REDS SIGNIFY HIGHER EMISSIONS)[258]

256. The institutional context for land management is separated from the agricultural apparatus but is also following a devolution process. Many counties have adopted land use strategies, spatial plans, and water resource plans, for example. Kenya Forest Service (KFS) provides some decentralized services including some services to community forest associations, and operating decentralized forest stations, with foresters and rangers in the counties. However, these are tasked with monitoring and managing gazetted forests and providing some support to Community Forest associations (CFA). Community forests and agroforestry fall under the scope of the Transitional Implementation Plans[259], a devolution

[256] Extracted from earthmap.org. (CGLS-LC100 Land Cover (Proba-V). Dark Green: Closed Forest; Green: Open Forest; Orange: Shrubs; Yellow: Herbaceous vegetation; Pink: Cultivated and managed vegetation; Red: Urban or built up areas.

[257] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

[258] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

[259] Mbuvi, Musingo, Ndalilo Leila, Chboiwo, J. "challenges to actualization of decentralization forest management functions: experiences and lessons on devolving forestry management functions in Kenya", public policy and administration, November 2018.

framework adopted by the Kenya Forestry Service (KFS), which has not yet been fully implemented nationally. Some counties have not yet adopted or implemented the TIP, and where some functions have been decentralized, others have not.

257. County Integrated Development Plans (CIDPs) provide the framework for development and public investments at county level. These contain the priorities of each county government for the duration of their mandate (5 years), with most counties being focused on the delivery of their third plan (2023-2028) during the implementation of the project. An examination of the first CIDPs in the targeted counties[260] shows that while there is often mention of environmental and climate change challenges, with some priority actions listed, the approach taken remains rather generic with no demonstrated action plans, and still built along sectoral lines rather than territorial (e.g. water, energy). Forest landscapes are least mentioned due to the service not being developed. As a result, integrated approaches are not yet pursued as part of the CIDP priorities, despite bearing potential for achieving multiple government priorities at once.

258. Past and ongoing projects that have tested relevant approaches in the LREB include:

- Integrated Landscape Management for conservation and restoration of the Mt. Elgon Ecosystem in Western Kenya[261] (Bungoma and Trans-Nzoia counties) which is implementing ecological restoration, sustainable use of ecosystem services and good agricultural practices (Coffee and maize) in degraded natural and agricultural landscapes using an integrated landscape management (ILM) approach.
- The Initiative for Sustainable Landscapes (ISLA) project that aims to restore and conserve 60,000 hectares of the Mau Forest by the year 2030 by establishing financially viable public–private partnership governance models for sustainable land and water management in the vulnerable landscapes South-West of the Mau Forest. The project is funded by the sustainable trade initiative-IDH[262].
- The Forest and Farm Facility which provides financial and technical support to farm and forest associations and organizations in western Kenya through the Western Kenya Tree Growers' association. The purpose of the support is to encourage and incentivize tree planting through locally controlled forestry (LCF), including commercial tree planting, consolidate farmer organizations and cooperatives, and promote peer-to-peer-extension among tree growers and smallholders.

259. Approaches differ among counties in the LREB, creating disparities in results, and many of the efforts are partial and uncoordinated. Integrated landscape management as an ecosystem-based adaptation strategy has been tested before in other countries (ILM has been implemented elsewhere in Kenya as well)[263], and would – in a context of intensifying agricultural landscapes – bring significant added value. Improved landscape management can support improved productivity, conserve soil fertility, reduce erosion risk (particularly in a context where rainfall will become more intense)[264].

[260] https://cog.go.ke/20-the-council-of-governors/484-county-integrated-development-plans
[261] https://www.fao.org/in-action/forest-landscape-restoration-mechanism/our-work/countries/kenya/en/
[262] https://www.idhsustainabletrade.com/initiative/isla-kenya/
[263] https://www.adaptationcommunity.net/publications/integrating-eba-and-iwrm-for-climate-resilient-water-management/
[264]

Output 2.1 Additionality and activity description

Activity 2.1.1- Develop County and regional climate-resilient and low-carbon agricultural landscape management strategies, including improved watershed management, land use planning, reforestation, and natural regeneration

260. Under this activity, FAO will provide technical assistance support to each county government towards the development of a climate resilient, low-carbon landscape management strategy and action plan, which will then be brought together in a LREB-wide integrated landscape management strategy. This activity builds on the outcome of The Restoration Initiative[265], which supported the Kenya Forest Service in the development of the National Forest and Landscape Restoration Plan (FOLAREP), which sets the ambition to restore 5.1 million ha by 2030.

261. The project will begin by conducting an assessment and mapping of agricultural landscape degradation in each county, to obtain the latest portrait of the land in targeted areas (sub-activity 2.1.1.1). Stakeholders participating in this assessment and mapping will include government officials from the Forestry, Environment, Land, Agriculture and Water Departments, with the Environment Department taking the lead and ownership of the landscape strategy. Existing data will be correlated with physical observation and ground-truthing with communities will occur. This process will be closely tied to the Participatory Climate Risk Assessment and Action Planning (PCRA) process deployed under the G-FLLOCA program (see activity 2.1.2). Additional tools such as the City Region Food System (CRFS), which was developed by FAO[266], may also be used to assist in mapping the linkages between smallholder famers, farming landscapes, and cities that serve as market access and distribution points.

262. One of the methods used for characterizing landscapes will be the Land Degradation Surveillance Framework (LDSF)[267] method, which provides a biophysical baseline at landscape level and assesses processes that contribute to land degradation, including changes in land use and land cover. The LDSF framework also helps model and map changes in a variety of ecosystem indicators at different spatial scales. To make up for any shortcomings of the LDSF in terms of mapping soil carbon at smaller scales, and to determine options for restoration, the project will use the Restoration Opportunities Assessment Model (ROAM)[268]. The ROAM model is participatory and involves using existing infromation on landscape degradation along with other information on various land uses to generate maps of options and opportunities. It allows stakeholders to select the most appropriate restoration option for the optimal landscape allocation and land use. Options include: planting of trees on previously forested lands, natural regeneration or sylviculture, agroforestry, improved fallow, or watershed protection and erosion control. The ROAM methodology also allows for the delivery of an analysis of the costs and benefits associated with the identified restoration interventions and an analysis of the carbon sequestration potential and the associated co-benefits.

[265] Restoration of arid and semi-arid lands (ASAL) of Kenya through bio-enterprise development and other incentives under The Restoration Initiative, a GEF-supported initiative.
[266] https://www.fao.org/in-action/food-for-cities-programme/overview/crfs/en/
[267] https://samples.ccafs.cgiar.org/land-degradation-surveillance-framework-ldsf-field-guide/
[268] https://portals.iucn.org/library/sites/library/files/documents/2014-030.pdf

263. These assessments will be used to assist counties in prioritizing sites and types of interventions, to be implemented under activity 2.2.2.

264. In addition, the project will develop and deliver a stakeholder-tailored training on climate resilient, low-carbon landscape management to ensure harmonization of approaches (sub-activity 2.1.1.2). The training program will include aspects related to monitoring of landscape and ecosystem health, related to the carbon accounting methodologies developed under Output 1.1. This training will emphasize the benefits of integrated landscape management or integrated watershed management as both an ecosystem-based adaptation approach and as a method that helps reduce AFOLU emissions locally.

265. Based on the training and as a learning-by-doing undertaking, the project will support each county administration in the development of its own climate resilient, low-carbon landscape management strategy (LMS) (sub-activity 2.1.1.3). Each LMS will last 7 years and will include, at minimum:

- A state of agricultural landscapes, with mapping of land uses (public and private), soil cover intensity/density, erosion risk and land degradation hotspots.
- Identification of areas of high biodiversity value, critical habitats for endemic and endangered species, set aside areas, fragile areas (e.g. wetlands), and characterization of environmental degradation.
- Identification of existing tenure rights and right holders, including the identification of customary use of land and resources, such as cultural, ceremonial or spiritual use, and any ad hoc, seasonal or cyclical use of land and natural resources.
- A set of measurable objectives and prioritized, costed interventions to be implemented from county budgets.
- A process for allocating resources to community projects that support the objectives of the strategy (e.g. selection and review criteria, procedures and amounts).
- A monitoring and evaluation plan that will track specific indicators to measure the impact of the strategy on agricultural production. This M&E plan will be supported by the work done to improve agricultural databases under activity 1.1.1.4 and 1.1.1.3 on carbon accounting.

266. Strategies will be developed by the Environment Department of each county with the active support of other directorates, in particular agriculture. Participatory mechanisms will be built-in to the development and subsequent revisions of the LMS to make sure local populations, particularly smallholders who are currently using land for agriculture, have an opportunity to voice concerns. The LMS will include interventions on public or community land (executed by county administrations) or interventions on private land (executed by communities with funding from counties) and will focus on areas where such interventions can facilitate or leverage improved productivity through ecosystem services. Once developed, the LMS can form the basis of the county-level FOLAREP plans, that are intended to be rolled up in the national FOLAREP.

267. LMS will be submitted to County Governing Councils for approval, which will create a further opportunity to raise awareness among county administrations and elected officials on the benefits of improved ecosystem management for economic outlook in each county, as well as integration into the CIDPs and climate change policies. The project will also support community awareness raising of the benefits of ensuring restoration, conservation, and sustainable management of their agriculture landscape (sub-activity 2.1.1.4), which will feed into the capacity of communities to formulate proposals for financing under activity 2.1.2.

268. Once the county-specific LMS are approved and their implementation has begun, in year 3 the counties will come together to develop a LREB-wide landscape management strategy (Sub-activity 2.1.1.5). This strategy will give particular attention on upstream-downstream linkages, fragile ecosystems that straddle county borders, population movements and ecological trends nested within the broader Lake Victoria Basin. The purpose of this LREB strategy will be to harmonize action under a common objective and to pool resources for implementation later on. Counties will then be brought together at regular intervals (every 2 years) for lessons sharing. The Council of Governors will participate in these events to make sure the benefits from integrated planning are integrated into the best practices for devolution. During the last year, the project will support an evaluation and lessons learned initiative that will inform the development of the next iteration of the LMS.

269. The gender equality and social inclusion objective for activity 2.1.1 is to develop a country climate-resilience and low-carbon agricultural landscape management strategy and implementation plan in ways that are gender-responsive and socially inclusive. The project will ensure women, youth, and PLWD are consulted in the development of the landscape management strategy and implementation plan. The project will also train women, youth, and PLWD to implement and monitor landscape management plans. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Activity 2.1.2. ***Implement and monitor climate-resilient and low-carbon landscape management plans.***

270. This activity is financed with a combination of GCF funding and co-financing from the Government of Kenya and FAO , leveraging resources from the G-FLLOCA program and the GEF-7 Mount Elgon Project[269] and executed based on technical assistance received under activity 2.1.1 and 1.1.1. Under the G-FLLOCA process, each county collects, reviews, and prioritizes adaptation actions on the basis of a Participatory County Climate Risk Assessment (PCRA) and climate action planning process. The PCRA and the County Climate Change Action Plan (CCCAP) follow a staged approach that starts at the community and ward levels and culminates into a national climate change action plan (see Figure 27). Communities are expected to prioritize local climate actions based on their participation in the climate risk assessments, with facilitation and technical support from the county's Climate Change Unit and council sectoral departments, who will be trained for this purpose under G-FLLOCA (through the County climate and institutional support grant, CCIS)[270]. Key outputs of this process include county climate risk profiles, and resilience-building action plans that build on principles for locally led climate action, and explicitly address the climate resilience needs and priorities of women, youth, ethnic minorities, people living with disabilities and other marginalized and vulnerable groups[271].

271. The County Climate Change Plans are subsequently implemented through the performance-based County Climate Resilience Investment Grant (CCRI). The first round of grants is expected to be

[269] Integrated Landscape Management for conservation and restoration of the Mt. Elgon Ecosystem in Western Kenya – GEF ID 10598

[270] G-FLLOCA, The World Bank, Project Appraisal Document, 2021.

[271] GoK, World Bank, FLLoCA - PCRA guidelines - Draft – March 2023.

disbursed during 2024. Performance based grants are submitted to the National Treasury by Council governments and the National Treasury, after verification that grants adhere to the G-FLLOCA criteria (inclusion and exclusion) approves and channels the grants.

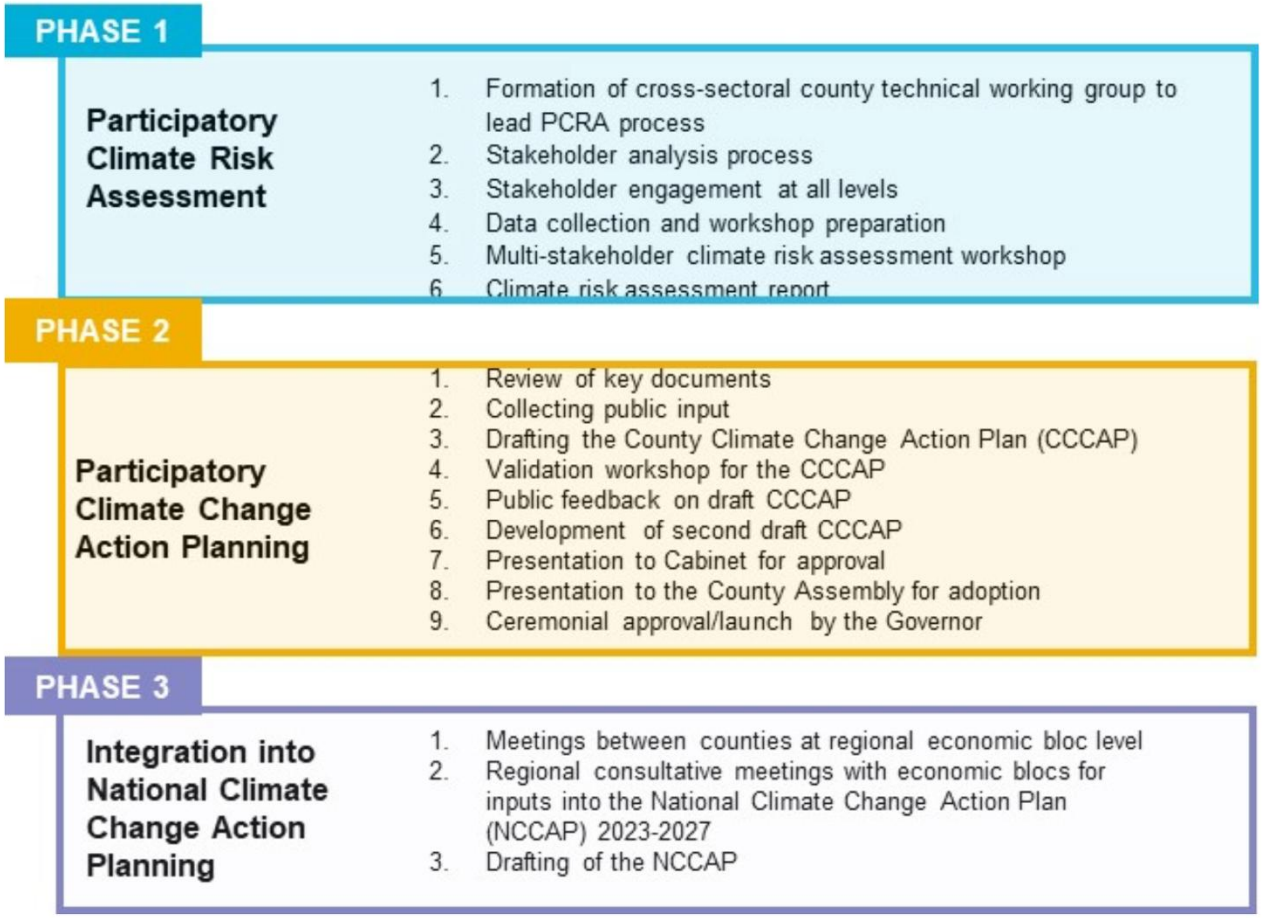

FIGURE 27: THREE STAGES OF THE G-FLLOCA PCRA PROCESS

272. County governments select and prioritize the implementation of activities in their CCAP using pre-established inclusion and exclusion criteria as detailed in the G-FLLOCA guidance manuals[272]. The prioritized actions are endorsed and budgeted by the WCCPC and approved by the County Assembly for transmission to the National Treasury (G-FLLOCA coordination unit). County governments can then request funding from the National Treasury under either the GCF CRLCSA project or the G-FLLOCA climate resilience performance grants. Activities prioritized under LMS will therefore be included in CCAPs and in county government funding requests under the CCRI. Continued convergence will be supported by sub-activity 2.1.1.4.

[272] Not publicly available at time of writing, a confidential copy was made available to the project design team.

273. The types of interventions eligible for inclusion in a LMS and in the CCAP include[273]:

- Reforestation at spring heads or in degraded sensitive areas
- Reforestation and creation of woodlots
- Restoration of water catchments and watershed management
- Community-Based Sustainable Land Management
- Forest Landscape Restoration
- Community-Based sustainable forestry
- Conservation and assisted natural regeneration
- Conversion to agroforestry or permaculture
- Construction or upgrade of anti-erosive structures
- Construction or upgrade of anti-erosive structures
- Afforestation, erosion control, gully healing in extremely degraded areas
- Construction or upgrade of water conservation, irrigation efficiency infrastructure
- Wetland conservation, reconstruction, or rehabilitation
- Restoration of riparian areas under cultivation (private land)
- Construction/repair of community water retention ponds, micro-catchments, weirs, dikes
- Setting aside land (public community) as micro-reserves e.g. smaller papyrus wetlands around LVB and other water bodies
- Removal of wastes, reduction of effluents and pollution
- Run-off management
- Land zoning
- Live-fencing, contouring, anti-erosive measures
- Protection of critical biodiversity habitats
- Rehabilitation of grasslands

274. The project will support the development of implementation plans and monitoring and evaluation plans for each LMS (sub-activity 2.1.2.1), which will serve as a basis for anchoring LMS with key county policies such as the CIDP and the G-FLLOCA investment plans. Local consultations will be deployed in each county to ensure local community buy-in and participation in the LMS implementation plan, highlighting the benefits of landscape management for agricultural productivity and allowing for the integration of local knowledge (sub-activity 2.1.2.2).

275. Using GCF funding channeled through the national Treasury, each county will then implement selected reforestation, conservation, restoration, afforestation, watershed management, forest landscape restoration and/or improved land management actions in degraded hotspots of 200 ha around the agricultural landscapes targeted by this project (sub-activity 2.1.2.3), and in gazetted forests and reserves (10,000 ha) over the 6 years of project implementation (sub-activity 2.1.2.4), for a total of 12800 ha[274]. Modalities for implementation will include community-based delivery and direct county-government execution. All reforestation and afforestation will be conducted using locally sourced

[273] This includes existing CCAPs (2024) that were available and analyzed during the project development phase.
[274] Sub-activity 2.1.2.2 is entirely financed by the county governments, whereas sub-activity 2.1.2.3 is financed by FAO through the GEF-7 Mount Elgon project.

seedlings of indigenous and/or exotic species where suitable and tried, for which there is documented evidence of climate resilience. The county goverments will lead the execution of this activity under the supervision of the National treasury, involving the communities targeted by the project, including the cooperatives, farmers groups and Community Forest Association (CFA). These activities will also involve Kenya Forest Service who will asssit the government to launch reforestation and afforestation campaigns, procuring inputs and recruiting consultants (e.g. surveyors, nursery managers, input and service providers). Local NGOs and associations, particularly the Community Forest Associations, will be called upon to participate in execution of activities.

276. Counties will also deliver annual reporting on the implementation of their LMS (sub-activity 2.1.2.5), including on the number and type of projects under implementation and funds disbursed, social and environmental indicators such as the number of participating women and youth, area set aside for conservation, area under restoration, type of ecological system under improved management (e.g. wetland, forest). After 6 years, counties will undertake a new survey and assessment of the landscape to fully capture the results and inform the next iteration of the strategy.

277. GAP Output 2.1 aims for agricultural landscape management plans to have robus gender equality and social inclusivity content and commitments, and be co-developed, implemented, and monitored in ways that are gender-responsive and socially inclusive. GAP activity 2.1.2 will ensure women, youth, and PLWD are consulted in the development of the landscape management strategy and implementation plan so their specific needs are addressed. The project will also train women, youth, and PLWD to implement and monitor landscape management plans as per activity 2.1.2 and create monitoring/feedback mechanisms so if landscape management plans are not enhancing gender equality and social inclusion in their implementation, these inequalities can be prioritized. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Component 3 – Resilient Livelihoods

5.3 Outcome 3 Increased climate resilience of smallholders' livelihoods using climate-resilient, low carbon technologies.

278. The project has pre-identified a suite of adaptation and mitigation technologies that will be promoted for uptake by smallholder farmers in the 6 value chains. These technologies will be included in the curriculum of farmer field schools under activity 3.1.1, and transferred through cooperatives under activity 3.1.2. This initial “Green-List” of technologies, which is based on best available knowledge, consultations, and research, is to be updated by counties regularly throughout the project (under sub-activity 1.1.5.2), also leveraging consultations with smallholder farmers to ensure buy-in and increase adoption rates. Table 23 provides a list of adaptation and mitigation technologies that may be promoted by the project along with some feasibility considerations.

Technology Transfer Model

279. The technology transfer model foreseen by this project builds on a continuum of assistance being provided to smallholders using increasingly complex and mature farmer organizations, from farmer field schools to farmer associations and business units (Activity 3.1.1), and then to cooperatives

(Activity 3.1.2). The technology transfer model proposed by this project builds on decades of experience by Agriterra in Kenya and in other countries, supporting farmers and their organizations in accessing best available knowledge and technology and in building technical and business capacity. Our definition of technology encompasses **goods, services, and knowledge** that can be leveraged to support production, processing or marketing of CRLCSA agri-food commodities. The model uses training and technical advisory, as well as some support for purchasing production inputs and assets, as the direct means of transferring technology. Figure 28 illustrates the proposed technology transfer model.

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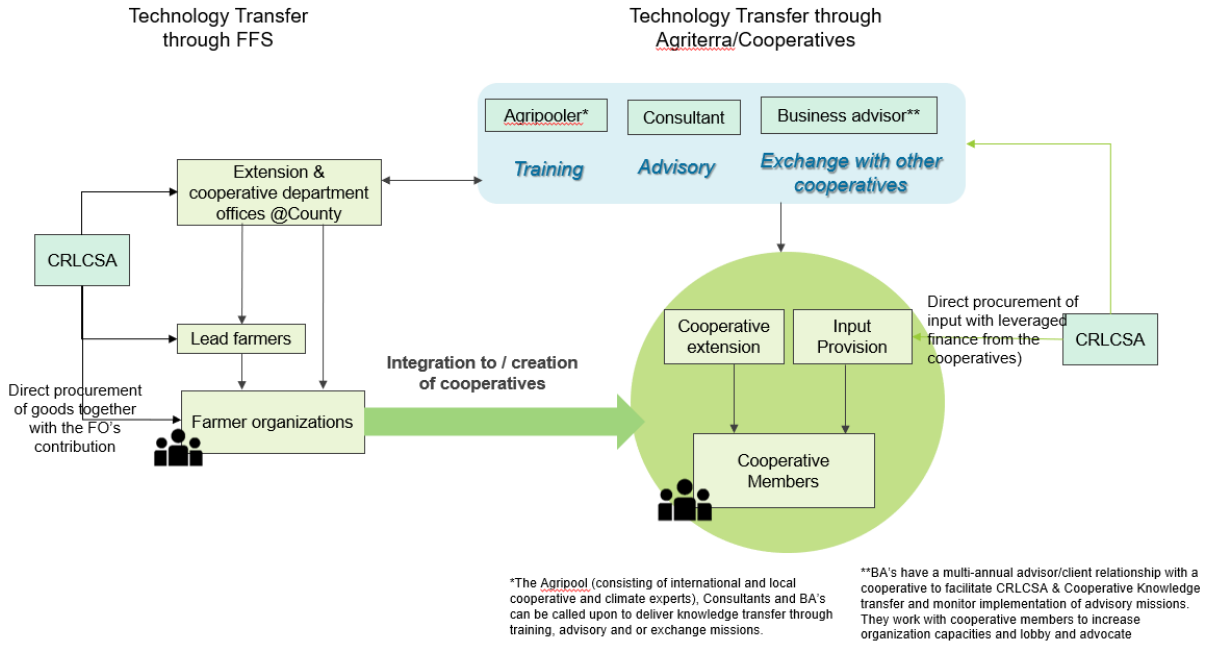

FIGURE 28: TECHNOLOGY TRANSFER MODEL

TABLE 23: INITIAL LIST OF CLIMATE TECHNOLOGIES

Climate technologies	A/M[275]	Value Chain[276]	Feasibility considerations	Expected benefits
Agroforestry, on-farm indigenous/fast-growing tree plantings.	A/M	T, C, FT, ALV, D	- Planting of fruit trees such as mango, papaya, avocado, banana, citrus - Planting of indigenous trees - Inclusion of leguminous, multipurpose species (e.g.: fodder, nitrogen fixation, shade provision) alley-cropped or around field boundaries - No timber trees - Species and variety to be subject to an initial resilience analysis by Kenya	- Additional income (up to 8,000 KES/yr/tree) - Additional sources of food and nutrients[277] - Additional and stable sources of fodder for - [278] - Increased milk production and quality from use of on-farm fodder tree[279] - Additional income stream if linked to carbon/biodiversity finance - Improved land productivity and soil health[280] - Increased nutrient cycling

[275] A= Adaptation Benefit and M= Mitigation Benefit

[276] T = Tea, C = Coffee, FT = Fruit Tree, ALV = African Leafy Vegetables, D = Dairy, P = Poultry

[277] See for example: https://www.kenyans.co.ke/news/58647-crops-highest-profit-acre-kenya , http://www.b4fn.org/case-studies/case-studies/indigenous-fruit-trees-and-nutrition-in-kenya/ , Omotayo, A.O, and Aremu, A.O, "Underutilized african indigenous druit trees and foo-nutrition security, challenges and prospects",in Food and Energy Security, 2020; and Whitney, et.al "Decision Analysis Tool reveal Benefits of Fruit Trees for Enhanced Nutrition Security in Kenya", Conference paper, ICRAF, 2018.

[278] Steven Franzel, Sammy Carsan, Ben Lukuyu, Judith Sinja, Charles Wambugu, Fodder trees for improving livestock productivity and smallholder livelihoods in Africa, Current Opinion in Environmental Sustainability, Volume 6, 2014.

[279] Steven Franzel, Sammy Carsan, Ben Lukuyu, Judith Sinja, Charles Wambugu, Fodder trees for improving livestock productivity and smallholder livelihoods in Africa, Current Opinion in Environmental Sustainability, Volume 6, 2014. The study mentions that "milk production increased by 0.6–0.75 kg milk kg^{1} dried calliandra" and that "the use of fodder tree in smallholder dairy had benefit cost ratios of 1.12-3.03".

[280] Castle, S. E., Miller, D. C., Ordonez, P. J., Baylis, K., & Hughes, K. The impacts of agroforestry interventions on agricultural productivity, ecosystem services, and human well-being in low- and middle-income countries: A systematic review. *Campbell Systematic Reviews*. 2021; 17:e1167.

			forest service and Kenya Forest Research Institute (KEFRI) during inception. - Link with ACORN and biodiversity offset mechanisms foreseeable	- Improved shading and quality of coffee beans[281] - Carbon sequestration
Conservation agriculture, (crop cover, mulching,);	A/M	T, C, FT, ALV	- Mulching, crop cover, double digging for tea and coffee - Intercropping with legumes and green manures	- Increased soil health through build up of soil organic matter (SOM) and enhanced nutrient use efficiency (nitrogen and phosphorus)[282] - Reduction in use of synthetic fertilizers - Improvement in soil organic content[283] - Soil Carbon sinks - Improved integrated pest management (IPM), reduced reliance on pesticides and increased biodiversity, including beneficial insects and pollinators.
Integrated production systems (permaculture, agroecology, agro-sylvo-pastoralism) double digging)	A/M	All	- Permaculture and agroecology in house gardens and small plots - Integration of crop, trees and livestock at the farm and cooperative level. - clonal gardens for seeds and seedlings	- Increased soil health through build up of soil organic matter (SOM) and enhanced nutrient use efficiency (nitrogen and phosphorus)[284] - Reduction in use of synthetic fertilizers - Increased value chain integration - Improved production and productivity - Reduced costs of labour

[281] Barkaoui, K., et.al, "Shade trees improve coffee health without reducing coffee potential yield in agroforestry system in Murang'a Kenya", World Congress on Agroforestry, 2019.

[282] Gebrewold, A.Z, "review on integrated nutrient management of tea", Cogent Food and Agriculgure, Vol 4. 2018;

[283] Wawire, A.W et.al, "Soil fertility management among smallholder farmers in Mount Kenya East Region"; Chepkorir, B.M, Sitienei, Ann: "Yield response of tea to integrated soil fertility management in Timbilil Tea Estate in Kericho, Kenya", I*nternational Journal of Environment Agriculture and Biotechnology(ISSN: 2456-1878*

[284] Gebrewold, A.Z, "review on integrated nutrient management of tea", Cogent Food and Agriculgure, Vol 4. 2018;

				- Improvement in soil organic content[285] -
Integrated soil fertility management; bio fertilization;	A/M	T, C, FT, ALV	- Biofertilizers for tea and coffee - Inoculants for legumes to enhance biological nitrogen fixation in intercropping with ALV - On-farm elaboration of organic fertilizers through composting or vermiculture	- soil organic matter (SOM) and enhanced nutrient use efficiency (nitrogen and phosphorus)[286] - Reduction in use of synthetic fertilizers - Improvement in soil organic content[287]

[285] Wawire, A.W et.al, "Soil fertility management among smallholder farmers in Mount Kenya East Region"; Chepkorir, B.M, Sitienei, Ann: "Yield response of tea to integrated soil fertility management in Timbilil Tea Estate in Kericho, Kenya", I*nternational Journal of Environment Agriculture and Biotechnology(ISSN: 2456-1878*

[286] Gebrewold, A.Z, "review on integrated nutrient management of tea", Cogent Food and Agriculgure, Vol 4. 2018;

[287] Wawire, A.W et.al, "Soil fertility management among smallholder farmers in Mount Kenya East Region"; Chepkorir, B.M, Sitienei, Ann: "Yield response of tea to integrated soil fertility management in Timbilil Tea Estate in Kericho, Kenya", I*nternational Journal of Environment Agriculture and Biotechnology(ISSN: 2456-1878)*

Integrated water management (water conservation, efficiency, and recycling, rainwater harvesting and micro-catchments, storage and conservation, canals, drip irrigation systems, pits);	A/M	All	Rainwater harvesting (RWH) to compensate for dry periods (external cistern, small earth dams, ponds, water pans, wells, 6-8 m-wide[288]). Other methods include contour bunds, pits, strip catchment, contour farming. The project will also work with counties to regularly update guidelines for construction of adequate RWH structures for the 6 VC in line with climate scenarios under output 1.1. Water for livestock (poultry and dairy) to be provided separately. Water recycling for example using eco-pulpers, running on hydro-elecrivity or biogas in coffee value chain Drip or precision irrigation for tea, coffee, fruit trees or ALV. Construction or repairs of irrigation systems for improved conservation, reduced evaporation, siltation, higher water content and flow, diversion of run-off Construction or repairs of drainage around storage and processing infrastructure	- Complementary irrigation for crops during dry periods - Yield increase or maintenance during dry periods[289] - Stable water supply for livestock - Emissions reductions[290] - Reduced crop and livestock losses - Improved water use efficiency (up to 50% savings in tea compared to flood irrigation) [291] (up to 90% using eco-pulping for coffee[292]) - Reduced flooding incidents from improved drainage

[288] Current design of smallholder ponds are shallow earth ponds or pans ranging from 3-5 m wide. This project would increase the size to 50-75m^3 (approx. 8m wide), and raise embankments using designs developed by Kenya's Rainwater Harvesting Association. https://kenyarainwaterke.org/AgroPastrolist%20Projects.html

[289] Kigaly, JM et al, "Drip irrigation of tea : Yield and crop water productivity responses to irrigation », 2008 ; Emilio Sakai, et.al, « Coffee productivity and root systems in cultivation schemes with different population arrangements and with and without drip irrigation, Agricultural Water Management, 2015 which cites a near doubling of yield;

[290] See Odhiambo, K.O et.al "Optimization of rainwater harvesting sustem design for smallholder irrigation farmers in kenya: a review", Journal of Water supply 2021. https://iwaponline.com/aqua/article/70/4/483/81472/Optimization-of-rainwater-harvesting-system-design

[291] Kigaly, JM et al, "Drip irrigation of tea : Yield and crop water productivity responses to irrigation », 2008

[292] https://royalcoffee.com/hybrid-processing-methods/

			Water use efficiency on the farm and in processing plants (e.g. wet mills) by improving processing methods, reusing water, coffee processing wastewater management. Mirco-water catchments for restoration of degrated lands	
Protected cultivation: shaded nets and greenhouse production;	A	T, C, FL (seedlings), ALV	Shading nets to prevent pests and provide shade in ALV, seedlings for coffee, tea and fruit trees. Percentage of shade would vary according to the crop; material will be rot and mildew resistant. Colour of netting will also vary according to the value chain. Greenhouse and nurseries (small or medium) for grouped production of ALV to be placed on communal land or	- Improved production and quality of produce (ALV)[294], tea[295] - Reduced crop losses during extreme heat, storms or severe rainfall

[294] Daniel, Kengere Atambo and Muti, Simon and Muindi, Esther M. and Gogo, Elisha Otieno (2022) *Effects of Black Shade Net on Yield of Brassica rapa and Brassica oleracea Cabbages in Kilifi County.* Journal of Agriculture and Ecology Research International, 23 (4). Also Y. Shahak, E. Gal, Y. Offir, D. Ben-Yakir, Photoselective shade netting integrated with greenhouse technologies for improved performance of vegetables and ornamental crops, in International Workshop on Greenhouse environmental control and crop production in Seni-Arid regions, international Society for Horticultural Science, 2008.; see also pp. 12-21. ISSN 2394-1073. And also *Abukutsa-Onyango, M*
"Seed production and support systems for African leafy vegetables in three communities in Western Kenya", in Bioversity - Developing African leafy Vegetables for improved nutrition, Workshop proceedings, 2005.
https://www.bioversityinternational.org/fileadmin/_migrated/uploads/tx_news/Developing_African_leafy_vegetables_for_improved_nutrition_1513.pdf#page=116

[295] Zhang, Qianwen, et.al, « Color Shade Nets affect plan growth and seasonal leaf quality of Camellia Sinensis grown in Mississipi, the United States, Frontiers in Nutrition, 2022 « When compared to no-shade control, black, blue, and red shade nets increased plant growth index (PGI), net photosynthetic rate (P_N), and stomatal conductance (g_S), decreased air and leaf surface temperatures in summer, and reduced cold damage in winter. Red shade was considered helpful for improving green tea quality by increasing the content of L-theanine and free amino acids in tea leaves collected in spring and fall when compared to no-shade control". See also E. A. Ripley (1967) Effects of Shade and Shelter on The Microclimate of Tea, East African Agricultural and Forestry Journal, 33:1, 67-80,DOI: 10.1080/00128325.1967.11662179, and Kolrir, K.M and Kamunya, S.M (KALRO) et.al, evaluation of shading on tea yield and phenolics in aerated and unaerated products, in Advances in Phytochemistry, Textile and Renewable Energy Research for Industrial Growth – Nzila et al. (Eds)

			cooperative land, or individual settings. Greenhouses will be of small size (less than 130m^2)[293] and comprised of metal framing with shade nets; low cover nets and agro-nets or row covers may also be used.	- Reduced incidences of pests and viral diseases, such as coffee berry disease[296] - Reduced crop water demand and evapotranspiration
Solar air drying and heating technologies, use of climate controlled ripening chambers;	A/M	T,C	Solar air drying for coffee and tea including optimal timing. Solar drying for coffee would involve insulating a room within the processing facility and using solar collectors (concentrating or flat plate according to airflow needs; flat plate recommended for tea) to either inject heated air or eject hot air[297]. Concentrators can be locally fabricated. Solar drying facilities may also be combined with other energy sources (e.g. LPG, Biogas). Designs use small drying racks and temperatures of between 40-60^{o}C. Hybrid drying methods offer up to twice faster drying times. Ripening chambers for Coffee and tea (air temperatures and relative humidity regulation systems and energy-efficient heat recovery and recirculation systems for withering, fermentation, and processing)	- Reduced energy use (up to 66%) and cost, reduced emissions from energy use[298] - Reduced costs of processing (coffee, tea) and reduced time of processing. - Improved product quality (coffee bean, tea leaf)

[293] https://kenyarainwaterke.org/AgroPastrolist%20Projects.html

[296] Kebati, R., Nyangeri, J., Omondi, C. O., & Kubochi, J. (2016). Effect of Artificial Shading on Severity of Coffee Berry Disease in Kiambu County, Kenya. Annual Research & Review in Biology, 9(2), 1-11. https://doi.org/10.9734/ARRB/2016/23326

[297] Koneswaramoorthy, S., Mohamed, M. T., & Galahitiyawa, G. (2004). Developing and evaluating solar energy techniques for tea drying. *Journal of the National Science Foundation of Sri Lanka*, *32*(1-2).

[298] Suherman, Suherman & Widuri, Hasri & Patricia, Shelyn & Susanto, Evan & Sutrisna, Raafi. (2020). Energy Analysis of a Hybrid Solar Dryer for Drying Coffee Beans. International Journal of Renewable Energy Development. 9. 131; see also Phillips, Allan, Drying coffee with Solar Heated Air, in Solar Energy, 1965;

Solar refrigeration, insulation, and cold chain improvements	A/M	ALV, D, FT	The project will promote solar powered refrigerators (within cooperative buildings) or solar milk chillers and ice makers (at farm level) to conserve produce (e.g. eggs, milk, vegetables or fruits). Linked to a solar power with electricity grid connection as a backup. Milk chillers at farm level enable dairy farmers to boost incomes by selling chilled evening milk which would otherwise not be sold to dairy processors the next morning due to overnight spoilage. The project will also promote insulation in post harvest and processing facilities, insulated containers (e.g. milk and eggs), vacuum packing or preserves (e.g. for transformed fruit or vegetables) to increase value addition and price obtained while reducing food losses.	- Reduced emissions from food losses[299] - Increased prices and sales (30% from inclusion of evening milk[300]) - Increased access to markets and less sensitivity to market shocks - Reduced post harvest losses[301] - Improved produce quality
Improved ventilation and climate control of post harvest and processing facilities	A/M	All	Solar powered fans/AC strategically placed, and used at the right time; but also upgrade and repair of windows and window coverings when necessary to prevent water infiltration during severe rainfall events or extreme heat. Could also include humid air extractors to ensure dryness in coffee, tea VCs. Application of good agricultural practices in harvest, including appropriate harvest times, harvesting in right climatic conditions, and low-cost equipment and techniques to minimize to sun exposure post-harvest.	- Reduced waste and losses during extreme heat and rain - Improved produce quality (ALV retain nutrient content under appropriate post-harvest handling. Economic losses from inappropriate methods are reported between 12% and 34%).[302] - Reduced emissions from renewable energy use

[299] Gillian L. Galford, Olivia Peña, Amanda K. Sullivan, Julie Nash, Noel Gurwick, Gillian Pirolli, Meryl Richards, Julianna White, Eva Wollenberg, Agricultural development addresses food loss and waste while reducing greenhouse gas emissions, Science of The Total Environment, Volume 699, 2020.
[300] Foster, Robert, et.al, Direct Drive Photovoltaic Milk Chilling: two years of field experience in Kenya, presented at Solar World Congress, 2017. And Foster, Robert, et al. "Solar Milk Cooling: Smallholder Dairy Farmer Experience in Kenya." *ISES Solar World Congress*. 2015.
[301] Ndaka, Daniel et.al, "Post harvest losses in Africa – nalytical review and synthesis: the case of Kenya", 2012.
[302] E.O. Gogo, A.M. Opiyo, Ch. Ulrichs, S. Huyskens-Keil, Nutritional and economic postharvest loss analysis of African indigenous leafy vegetables along the supply chain in Kenya, Postharvest Biology and Technology, Volume 130, 2017,

			Improved timing and management of storage facilities through tracking of produce parcels (incoming and outgoing) or automation, including installation of climate sensors in storage and processing facilities.	
Mechanized and early land preparation	A/M	ALV	Improved soil preparation practises to reduce soil erosion, increase retention of organic matter and prepare more uniform seed beds. Ensuring that land preparation is completed well before the start of the rains ensures producers can take full advantage of the growing season. Mechanization can include practices compatible with conservation agriculture where appropriate, such as use of subsoil rippers, rolling crimpers and knife rollers (including animal traction).	Reductions in soil erosion and increases of SOM (reduction of losses due to run-off) Labour-saving and income-generating opportunities, especially for youth
Integrated Pest Management and chemical pesticide phase out	A	T,C,ALV, FT	The project will include development of VC specific guidance on IPM, to reduce use of non-organic pesticides, fungicides, and herbicides. In cooperation with KALRO and the CGIAR centres, data will be obtained regarding best practice applicable in the 6 VC, particularly coffee, tea, fruit tree. May include introduction or reintroduction of natural predators and crop associations to reduce occurrence of pests, as well as use of sticky traps and botanical preparations. All work will be conducted in line with standards related to organic agriculture with a view to promoting phase out of non-organic pesticides.	- Increased productivity and reduced losses due to appearance of climate-related pests and diseases (fruit tree, coffee[304], tea and ALV).[305] - Reduced costs of production (reduced cost of chemical pesticide and fertilizers) - Increased access to new markets (organic agriculture) - Improved health and safety of farm workers

[304] Nyambo, B.T., Masaba, D.M. & Hakiza, G.J. Integrated pest management of coffee for small-scale farmers in East Africa: needs and limitations. *Integr Pest Manag Rev* **1**, 125–132 (1996)

[305] Midingoyi, S.-k.G., Kassie, M., Muriithi, B., Diiro, G. and Ekesi, S. (2019), Do Farmers and the Environment Benefit from Adopting Integrated Pest Management Practices? Evidence from Kenya. J Agric Econ, 70: 452-470. https://doi.org/10.1111/1477-9552.12306

			Manure production will be encouraged within the dairy value chain for commercialization among the other value chains as needed. In addition, poultry manure can be used as a source of rumen degradable protein in cow nutrition [303], as a supplement to brain-based diets. Compost production from crop residue and food waste will be encouraged at cooperative/FO level on shared land for distribution among members.	- Added revenue stream for the dairy value chain from manure sales.[306] - Increased soil fertility and environmental sustainability - Reduced leachate in water sources
Waste to Energy loops	M	All	In all VCs, collection of waste (Crop and animal) and residues will be promoted for conversion to energy. Coffee husks may be used for roasting to avoid use of fuelwood. Animal waste can be collected in biodigesters for production of energy for processing. Biodigesters may be installed at farm level or at coop level.	- Emissions reduced[307] - Waste pollution reduced - Deforestation reduced.
Introduction of drought/heat/ flood/pest tolerant, high yielding and early-maturing varieties of crops and pasture;	A/M	All	Climate resilient varieties of tea, coffee, fruit trees and ALV will be sourced locally based on guidance from KALRO. The KALRO has conducted research on 100s of tea and coffee varieties and selects the cultivars that are most appropriate for production[308]. Varieties of drought-tolerant tea and coffee are readily available. The project will identify suppliers of climate resilient materials, varieties and species within Kenya or neighbouring countries	- Improved and increased production and productivity - Reduced losses of crop and livestock - Improved quality and sales

[303]Lanyasunya, T. P., et al. "Factors limiting use of poultry manure as protein supplement for dairy cattle on smallholder farms in Kenya." *Int. J. Poult. Sci* 5.1 (2006): 75-80.

[306]

[307]

[308] Muoki, Chalo R. et.al, Combatinf Climate Change in the Kenyan tea Industry, Frontiers in Plant Sience, 2020.

			and will, when necessary, procure inputs for farmers who cannot access. If needed, the project will broker partnership with input providers.	
Construction of feed storage facilities, use of fresh or dried fodder according to season, diversification of feed;	A/M	D, P	Separate feed storage facilities may be built on or near farming groups to facilitate timely access to feed by dairy and poultry producers. In all cases the feed and fodder storage will be developed according to the highest climate standards including aeration, humidity control and temperature control to avoid losses. Wherever possible feed and fodder will be sourced from neighbouring farms and participating cooperatives to reduce transport and ensure local supply. For the poultry value chain the diversification of feed will also be explored, including maize, wheat, soybean, and supplementation with insects. The project will work with local farmers and input suppliers to strengthen parallel value chains, or will promote intra-value chain integration. (e.g. dairy farmers also producing fodder)	- Increased and stable access to inputs including during climate emergencies such as floods and droughts - Reduced losses in the livestock subsector - Reduced cost of production[309] - Increased production and improved quality of cattle, milk, poultry, and eggs - Reduced appearance of feed-related diseases (mycotoxins)[310]
Improved drainage systems and anti-erosion systems;	A	All	This will include contouring, terracing, implementation of anti-erosive ecological design, such as using live-fencing or stone dikes, using locally sourced material. The project will support the design and analysis, sourcing of materials, and the execution of the activity (e.g. labour costs) will be taken on by Farmer organizations.	- Improved resilience of buildings - Reduced soil losses from erosion and severe rainfall events - Reduced crop loss - Improved yields[311]

[309] Njoroge, S.C, et.al, Impact of poultry feed price and price variability on commercial poultry production in Murang'a county, Kenya, Journal of Economics and Finance, 2015.

[310] Kibugu, J., Mburu, D., Munga, L., Lusweti, F., Grace, D. and Lindahl, J. 2022. Mycotoxin hazards in the Kenyan food and feed market: A retrospective study. African Journal of Food, Agriculture, Nutrition and Development 22(1): 19306–19325.

[311] S.N. Guto, P. Pypers, B. Vanlauwe, N. de Ridder, K.E. Giller, Tillage and vegetative barrier effects on soil conservation and short-term economic benefits in the Central Kenya highlands, Field Crops Research, Volume 122, Issue 2, 2011.

			The project will also include the installation of drainage systems in processing facilities, storage houses and markets to ensure continued access even during severe rainfall events. Siting and design will be done by the Farmer organizations with TA support from the project with support from County government and in compliance with environmental norms and regulations. This will also be linked to the agricultural landscape management strategies that will be developed under Activity 2.1.	
Animal disease control and prevention (vaccines) for weather related pathologies	A	D,P	In cooperation with the County veterinary services, the project will assist cooperatives and FO in monitoring animal health and to transmit this information to county governments under the agricultural databases that will be upgraded in activity 1.1.4. This will enable early warning for animal diseases and trend watching in relation to the evolution of climate parameters. The project will assist FO and cooperatives in obtaining the necessary vaccines and to obtain training on appropriate disease prevention and hygiene methods.	- Improved animal health leading to improved productivity and quality of product - Reduced animal morbidity and loss

280. Outcome 3 aims to increase smallholders' (including women, PLWD, and youth) climate resilience and production of commodities using climate-resilient, low-carbon technologies. Across the 6 value chains targeted in the LREB, the key barriers and constraints facing women, PLWD, and youth in using climate-resilient, low-carbon technologies, include: cultural dynamics that undermine women, PLWD, and youth's business aspirations, low levels of formal education and limited technical skills, limited access to productive assets and resources, limited access to finance, and limited access to networks and information.

281. The expected gender outcome of Output 3.1 is for women, PLWD, and youth's adoption of CRLCSA production and processing practices to be enhanced by closing gender gaps and social inequities in productive resources and assets, networks and information, technologies and technical skills, and risk reduction mechanisms. As a cross-cutting project activity, gender focal points will be assigned in project coordination and implementation mechanisms.

Output 3.1

Vulnerable smallholders adopt gender-responsive and socially inclusive climate resilient and low carbon production and processing practices, technologies, assets, and risk reduction mechanisms.

Output 3.1 Baseline

282. As noted in the Cooperative Census and the Climate Change Survey, while farmers are aware that climate variability and climate change pose risks to production and post-production activities, the application of climate resilient, low-carbon practises is far from widespread in the 6 value chains. For example, of the 340 cooperatives surveyed:

- Only 39 cooperatives reported using land management and plant production practises such as agroforestry, use of planting material issued from nurseries, land preparation, or mulching;
- 22 cooperatives reported actively implementing "drought management" practices such as irrigation, water conservation or harvesting, early planting or harvesting, or using drought adapted crops; but only 8 reported using crop rotation or diversification;
- In the dairy and poultry value chains, 21 cooperatives reported using techniques such as planting feed, feed management and good feeding practices, zero grazing, storage of milk, hatching, weather-controlled hatchery or barns; or using of adapted/"modern" breeds.
- Finally, 64 cooperatives reported they did not use any production or processing technologies to address climate change challenges, while only 2 cooperatives reported using techniques related to energy use, energy efficiency or renewable energy.

283. These data show that, while knowledge on climate risks is increasingly available, farmers are far from fully adopting the array of possible adaptation and mitigation solutions currently available. Most of the techniques currently applied may have been transferred to farmers not as a response to climate change, but as a previous response to desertification, land degradation and the need to ensure sustainability and productivity. Some farmers may be applying various techniques but not with a climate change perspective in mind. The reasons for this lack of adoption are multiple: unavailability of climate-sensitive extension services, isolation of farmers, inaccessible technologies (or perceived as such), unavailability of finance to support investment in changes, or uncertainty on the results and risk aversion can all be quoted. Almost all interviewed farmers reported being

affected by climate variability and changes in the past five years and expressed interest in implementing or learning more about climate resilient, low-carbon techniques. This indicates interest and buy-in and some awareness and understanding of the impacts of climate on the value chain.

284. At the government level, extension services are constrained operationally. When consulted during the County Institutional Capacity Assessment (2022), most counties felt that the number of technical staff was generally inadequate to allow them to carry out their core duties effectively. Except for agriculture, many departments only have staff at the county headquarters and to a lesser extent at the sub-county level. Only in a few cases staff have been deployed to ward level which is the lowest planning unit and where services are needed most. The reasons given for this situation include the high number of staff exiting county public service through retirement coupled with a slow rate of replacement and limited training on climate change issues. Many extension officers are among the aged population, and reaching out to farmers may pose more difficulty. Those with the lowest number of staff and technical capacity to handle climate change issues included departments of cooperatives and agriculture extension sections of agriculture department[312].

Experience With Farmer Field Schools

285. FAO has developed a significant area of expertise in the setting up and delivery of Farmer Field Schools (FFS) throughout the world. In Kenya, FAO supported implementation of FFS to deliver agricultural extension, and to create an existing network of trainers and experienced facilitators in the region. Conditions for successful FFS as noted by FAO[313] include the clear definition of the problem, the availability of well-trained facilitators, a well-organized community and local buy-in, support and goodwill of the authorities, availability of appropriate technologies as well as of adequate resources, government policy and logistical support.

286. Farmer field schools have been deployed successfully in the context of climate change adaptation and sustainable agriculture for many years. Farmers Field School are a very widely used means of extension service that will be instrumental for the project to build farmers' knowledge and skills for climate resilient, low-carbon agriculture. Because they lead to immediate visible benefits for farmers, FFS methods ensure long-term adoption of these practices by targeted farmers, and generate a spillover to other members in the broader community. The FFS is different from traditional extension methods by empowering decision-making, by making farmers the 'experts' in their own fields, rather than the recipients of pre-constructed extension packages.

287. Studies have measured and illustrated the effectiveness of the FFS model as a means of transferring climate technology to farmers since the early 2000s. The effectiveness of FFS is often attributed to the fact that they promote a learning by doing approach and a farmer-to-farmer sharing of experience, enabling a "discovery-based learning method to improve the farmer's agricultural knowledge and their capacity to make on- farm and off-farm decisions"[314]. Studies show that FFS- members fare better than non-FFS members in learning and adopting climate adaptation

[312] County Institutional Capacity Asssessment 2022

[313] FAO, Farmer Field School Implementation Guide, Farm Forestry and Livelihood Development, 2011

[314] Thiele G, Nelson R, Ortiz O, Sherwood S (2001). Participatory research and training: ten lessons from the Farmer Field Schools (FFS) in the Andes. Currents 27:4-11.

technologies[315]. One study provides an analysis of factors of FFS effectiveness in the coffee value chain[316], citing the credibility of the facilitator and interpersonal trust as key determinants of success in FFS, noting that non-FFS members performed less well in the acquisition of knowledge, the changing of attitudes and practices than FFS members. This is also reinforced by a study that shows the effectiveness of farmer-to-farmer extension and spillover effects from farmer trainings in Tanzania, which highlights that "ordinary farmers who were a relative or residential neighbour of a key or intermediate farmer were more likely to adopt new technologies than those who were not. As a result, while the key farmers' technology adoption rates rose immediately after the training, those of the non-trained ordinary farmers caught up belatedly … the effectiveness and practical potential of farmer-to-farmer extension programs for smallholders" would be a cost-effective alternative to conventional extension approaches[317].

288. Regarding the effectiveness of the FFS model in changing livelihoods for farmers, another study by Paul Ngeba et al. from Njala University in Sierra Leone in 2015 concluded that FFS "made food affordable (77.4%), encouraged food hygiene (57.3%), promoted food processing (77.6%), food storage (92.2%)"318 . Another study concludes that farmers participating in FFS are more resilient through diversification and have more adaptive capacity arising from social networks319. In terms of cost effectiveness, FFS are also found to be more cost-efficient to reach farmers and promote learning than traditional extension methods. A 2021 study found that "field days are both cost-effective and have a greater impact on poorer farmers"[320].

Experience With Cooperatives

289. Agriterra has also developed a significant knowledge base and experience working with agriculture cooperatives in Kenya (including 12 cooperatives and 3 unions in the region, representing 188,057 farmers) and in other countries. This has included, for the past 5 years, the implementation of the Climate Resilient Agriculture and Food for Tomorrow project (CRAFT). The CRAFT project has supported the development of climate smart business cases and business plans for cooperatives, to mobilize investment in climate smart solutions in various value chains. This work has included support to cooperatives to undertake climate risk assessments (Climate Clever Checks), co-design of climate solutions and identification of climate-related business opportunities. Assistance deployed to cooperatives covers the entire lifecycle of production to sales, including brokering deals with buyers for climate smart products, and matching cooperatives with finance suppliers.

290. Agritterra has also implemented the Sustainable Development Goal Partnership Project: Developing a Low-Carbon Coffee Value-Chain, which has piloted and demonstrated many of the

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[315] See for example: Mfitumukiza , D. et al, "Assessing the farmer field school's diffusion of knowledge and adaptation to climate change by smallholder farmers in Kiboga District, Uganda", Journal of Agricultural Extension and Rural Development, 2017;

[316] Damtie, B et al, Effectiveness Of Farmer Field School: Farmer Field School Model, 2011

[317] Yuko Nakano, Takuji W. Tsusaka, Takeshi Aida, Valerien O. Pede, Is farmer-to-farmer extension effective? The impact of training on technology adoption and rice farming productivity in Tanzania, World Development, Volume 105, 2018,

[318] The effectiveness of Farmer Field Schools in attaining household food security in Sierra Leone, available here

[319] Rhiney and Tomlinson, 2017, Assessing the role of farmer field schools in promoting pro-adaptive behaviour towards climate change among Jamaican farmers, Journal of Environmental Studies

[320] Kyle Emerick, Manzoor H. Dar, Farmer Field Days and Demonstrator Selection for Increasing Technology Adoption, *The Review of Economics and Statistics* (2021) 103 (4): 680–693

approaches taken on by this proposed project, including the establishment of bio-compost facilities, combined with regenerative practices tested for results on soil fertility, and agroforestry. The Agriterra global network comprises a large number of experts, Agripoolers, consultants and cooperative advisors who can be leveraged to support cooperatives on a wide array of production issues.

291. The Agri-Pool roster is a network of preapproved farmers and agriculture experts actively working in the Dutch, Danish, Finnish and Kenyan cooperative sector and who are willing to transfer their knowledge and expertise to farmers in developing countries through peer-to-peer learning. The Agri-pool roster is managed by Agriterra and currently contains over 750 experts (20% of whom are women), including 400 with direct expertise in the 6 value chains.

Output 3.1 Additionality and Activity Description

Activity 3.1.1. *Deploy CRLCSA production/ processing assets and training to smallholder farmers, farmer organizations and associations.*

292. Farmers will receive support to experiment with and uptake climate-resilient practices, technologies and farming systems in Farmer Field Schools over a period of 4 seasons (2 years). As a follow up, monthly visits from the FFS facilitators will be held throughout the duration of the project to ensure that knowledge acquired by farmers is consolidated that practices and technologies adopted by farmers are suitable to address climate variability and climate risks, and that other specific conditions such as availability of inputs are fulfilled. All aspects of the FFS will be climate oriented, meaning that the farmers will be called upon to evaluate their productivity results against assumptions related to climate conditions, as well as against productivity and income results.

293. A key aspect of Farmer Field Schools is to ensure the sustainability of the approaches promoted in current as well as future conditions. The FFS interventions are anticipated to enhance farmers' adaptive capacity and contribute towards the development of more resilient farming systems. In this regard, the services provided by the government through Output 1 will be crucial in helping farmers define what technologies each FFS group will adopt at a given time.

294. To rapidly scale technologies, deliver FFS effectively and increase the potential for replication and broader adoption, FAO will enter into partnerships with non-governmental and community-based organizations to deliver the FFS trainings.

295. In the first year, FAO will undertake, along with activity 1.1.5 and the Resilience Survey (see M&E Plan), a survey of participating smallholder farmers to provide a detailed understanding of climate resilient, low-carbon practices currently being implemented, and to assess technology and capacity needs (sub-activity 3.1.1.1, linked to sub-activity 2.1.1.2). All survey data will be disaggregated by respondent's sex, age, and household typology to provide insights on the gender and social dimensions of resilience and low-carbon practices. Also in the first year a targeting and group formation exercise will be initiated, along with awareness raising and Free, Prior Informed Consent[321] processes to ensure participating farmers do so willingly and in full understanding of their rights and responsibilities under the project (sub-activity 3.1.1.2). This exercise will also serve as an opportunity to identify partner NGOs and CBOs for FFS deployment.

[321] Refer ESMF, Annex 7.

296. Participating farmers will be selected from the areas in each county that are considered as "vulnerability hotspots", following activity 1.1.1 and the rapid CRA, which will be completed with the collaboration of counties. Within these areas, the selection of participating farmers and the formation of FFS groups will be carried out with the following criteria in mind, under the guidance of county and ward extension officers, and in a fully participatory manner.

- Presence of both male and female market-oriented smallholder farmers
- Potential for integration of smallholders in targeted value chains
- The farmer must demonstrate secure access to his/her land for the duration of the project
- Only one member per household can formally join a FFS, but specific trainings could be extended to multiple family members to ensure equitable access to information.
- Small emergent cooperatives in one of the 6 VC (less than 500 members) can form FFS
- There should be at least 40% of women in the FFS as a whole.
- Women-led small enterprises, self-help groups and associations may be prioritized.
- Young farmers and beginning farmers should comprise 30% of the farmer group.
- The household's main income sources must be generated from producing at least one of the 6 commodities supported by the project.

297. Existing FFS groups may also be selected for inclusion in this project (e.g. FFS groups who have already benefitted from basic farming training under other projects).

298. During Year 1, FAO will also complete the development of the value chain specific FFS curriculum and programs, manuals and procedures of the FFS (sub-activity 3.1.1.3), in close collaboration with the county extension department. This will include detailed information and guidance on climate risks and climate change scenarios, information on the recommended technologies (linked to activities 1.1.1 to 1.1.5) and how to implement them in the field, guidance on how to train smallholders, particularly those more vulnerable to exclusion such as women, PLWD and people with low levels of literacy. Documentary support, visual illustrations, posters, video clips and other teaching aides will also be produced in local language to support adoption and dissemination.

299. FAO will also deliver a 4-week Training of Master Trainers (3 people) during which FFS master trainers will learn about the climate resilient, low-carbon sustainable agricultural practices promoted in this project; understand local climate change risks, impacts and vulnerability; as well as Farm Business School Modules including leadership skills and entrepreneurship such as book-keeping or contract farming. Gender modules aiming at achieving gender-transformative outcomes will also be included, to ensure that all trainings develop the skills and improve the position of women smallholders (and other marginalized groups) within the value chain (not for agriculture production). FAO will then deliver a 4-week training of FFS facilitators (two cohorts, total 640 facilitators)) with the support of the Master Trainers.

300. At the end of year 1, partnerships with the local NGOs and CBOs who will deploy the FFS will be concluded on the basis of detailed terms of reference. The partnership agreements will include requirements to manage FFS facilitators, ensure delivery of the curriculum as developed in 3.1.1.3, facilitate field travel and demonstration activities, and report on participation, quality, and achievement of FFS teaching objectives, as well as financial reporting. During the roll-out of FFS, the three Master trainers will provide continuous technical backstopping to FFS facilitators through the NGOs and CBOs, and will also play a role in monitoring and supervision of FFS. . Master Trainers and facilitators will be subject to performance evaluation and will receive a refresher training

annually (1 week). Master Trainers will be selected among county government staff (extension), seasoned sectoral or value chains experienced experts, retired extension officers or farmers with a long experience in farming and farming education, and may be recruited from existing FFS programs in Kenya or elsewhere.

301. Partner NGOs and CBOs will be responsible for the day-to-day facilitation of groups through the FFS facilitators. FFS facilitators normally reside within the targeted area or community and have benefitted previously from some training in agriculture. They may be lead farmers, young farmers, or graduates from agricultural education programs. The partner NGOs and CBOs will be responsible for collecting data and evidence on attendance, learning outcomes, and sales/ expenditures and transmitting the information to their assigned MT and the FAO local office (project FFS Officer).

Selection criteria for the master trainers

- National Experts or current government extension worker in selected area of the FFS topics: climate change, agronomy, the targeted value chain development and agribusiness
- Experience in training, mentoring and managing agriculture extension officers and lead farmers
- Experience in the development and implementation of a field agriculture training program as part of a county or national government initiative

Selection criteria for the facilitators

- have some kind of formal or informal training in agriculture or have a level of advanced skills, knowledge and experience in agriculture/livestock;
- be technically competent for the agroecosystem;
- be available to facilitate the FFS process;
- be able to share experiences and connect well with other community members;
- have good people skills and an aptitude for informal and participatory ways of working;
- have the required reading and writing skills to fulfill the assigned tasks;
- speak the local language;
- live in the local community or nearby towns;
- have a dynamic and confident personality

Selection criteria for partner NGOs/CBO to deliver farmer field schools

- Be in existence for at least 3 years and be formally registered with the appropriate authorities.
- Be located in, and have experience in working with farmers in the targeted region;
- Have no outstanding fiscal or legal obligations, and demonstrate adherence to local environmental, labour and relevant legal requirements;
- Have dedicated staff (including women) with experience and expertise in agriculture extension, landscape restoration and working with farmers.
- Familiarity with climate risks and vulnerability, local agriculture practices in the targeted value chains, and knowledge of market challenges and opportunities.
- Demonstrate established relationships with local communities and stakeholders.
- Demonstrate the ability to channel resources, such as agricultural inputs and equipment to users, and to facilitate travel for FFS participants.
  Demonstrate ability to report technically and financially.

302. FFS roll-out will begin in year 2 of the project (sub-activity 3.1.1.5). During the first year of the FFS training, farmers participate in field observation, analysis of the climate impacts in the communities, and identify solutions through learning and discussions led by the facilitators. During the second year, the facilitators conduct supervisory checks and visits, and organize field days and farm visits among members to accelerate learning and dissemination. The FFS will use a participatory action-research approach for the adoption of climate resilient and low-carbon practises.

303. The project will support FFS for the value chains selected by each county over 5 years. Each FFS will comprise around 25 participants, though in some VC it may be possible to find groups made up of only men or only women. FFS will be sequenced in three cohorts of 21,000 people each (2520 FFS), hence the targeting and group formation will also be repeated at the end of year 2 and at the end of year 4 for farmers beginning the following year.

304. In order to ensure a secure supply of inputs (e.g. seeds, seedlings, saplings), the project will work with existing nurseries, such as those that have been set up by other projects (e.g. ACREI project), and will also set up additional nurseries for the crop and tree value chains. For example, the Kenyan government has been providing free avocado seedlings to encourage the value chains. Supply of dairy cows, chicken, and related fodder, feed and semen inputs will be ensured from local and national markets by relying on established market linkages[322].

TABLE 24 FFS DELIVERY PLAN BY YEAR AND KEY ACTORS

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Training needs assessment and curriculum development	X					
Targeting and group formation	X	X	X	X		
Recruitment Master Trainers and FFS Facilitators	X					
Training of Master Trainers and FFS Facilitators (or retraining)	X		X			
FFS training roll-out Cohort 1		X	X			
FFS training roll-out Cohort 2			X	X		
FFS training roll-out Cohort 3				X	X	
Technical Backstopping	X	X	X	X	X	
Monitoring, evaluation and learning		X	X	X	X	

305. The project office will channel materials, such as educational materials, inputs and tools required to implement the new technologies in the FFS (as needed), as well as facilitator stipend and travel costs for facilitators and FFS. Facilitator stipend will be associated to performance-based evaluations. Annual procurement plans for support to implementation of the FFS will be developed, and may include the following (sub-activity 3.1.1.6).

- High quality climate resilient seeds and seedlings of crop varieties adapted to the needs of the farmers, the environment and climate conditions,

[322] Please refer to Annex 23 for value chain analysis and Market study.

- Adapted breeds of livestock[323]
- Fencing material, sustainable construction material for shelters, barns, hatcheries, post-harvest storage,
- Equipment for packaging, refrigeration, processing and storage materials
- Scales and climate sensors (thermometers, hygrometers)
- Irrigation kits, pumps, faucets, valves, filters and hose/pipes
- Biodigesters, solar panels and renewable energy equipment (e.g. solar milk chillers)

306. FAO will monitor the performance and results of each FFS and deliver an annual FFS report indicating rate of participation, rate of adoption (visits to closed cohorts after the 2 years), gender and social inclusion, annual sales of the targeted value chains and other learning outcomes. Participating farmers will be randomly sampled to participate in the Resilience Survey at inception, mid-point and end of the project (refer to M&E Plan, Annex 11).

307. At the end of a cohort, farmers whose organizations (farmer associations, farming groups, community forest farming associations, or others) are in a position to do so (e.g. to pay membership fees and abide by the cooperative requirements) will then be supported to become members of existing cooperatives (activity 3.1.3). Field visits and awareness-raising events will be organized under activity 3.1.3 to highlight the benefits of cooperative membership, by documenting specific advantages for participating farmers. It is expected that the better performance in production and increased income by members of cooperatives will serve as a powerful incentive for other individual farmers who work in isolation. Knowledge sharing mechanisms such as those leveraged under Output 1.1 (Maarifa Centers, multistakeholder platforms, Lake Region Economic Bloc, Lake Victoria Basin Authority) and other awareness raising mechanisms will be used to raise awareness of documented best practices within and outside cooperatives.

308. In order to ensure that the technologies, approaches and practices are disseminated in accordance with current national and international standards and laws, such as the national phytosanitary and environmental regulations, the project will work with MALF and its relevant divisions to identify the most suitable seed materials and varieties, taking into consideration the need to avoid the introduction of non-native species or potentially invasive species. Farmer Field Schools will include materials to raise awareness on the threats posed by non-native or invasive alien species (IAS), b) guidance on the identification of main IAS; c) and the dissemination of suitable technologies for pest management (e.g. integrated pest management - IPM), sanitary and phytosanitary measures.

309. Activity 3.1.1 will be executed by FAO using GCF funds, with the support of the county extension department and in close collaboration with Agriterra.

310. The gender equality and social inclusion objective for activity 3.1.1 is to deploy CRLCSA production/processing assets and training to smallholder farmers, farmer organizations, and associations in ways that are gender-responsive and socially inclusive. Efforts will be made to ensure that trainings provided to farmers also achieve gender-transformative aspects. The project will capacitate cooperatives in adopting GESI strategies to address the disproportionate access to productive resources and assets such as land, inputs, labour, mechanized equipment, and tools, and to prioritize women and youth-led cooperatives by building capacity, providing special support in preparing CRLCSA investment plans and mobilization of resources, and facilitating loan applications.

[323] Improved seeds and genetic material will be primarily sourced from local or national markets where available, giving a priority to certified or registered inputs as per Kenya's Seeds and Plant Varieties Act (2012).

The project will ensure women, PLWD, and youth have access to assets and training through the FFS Approach, and that each cooperative has a trained gender and youth focal point to document ongoing challenges in reaching, benefitting, and empowering women, youth, and PLWD, and that there are appropriate mechanisms within the cooperative to prioritize addressing these challenges. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Activity 3.1.2. Disseminate CRLCSA technology, knowledge and assets to cooperative members through peer-to-peer networks and exchanges.

311. Activity 3.1.2 is designed to transfer technology to farmers through cooperatives and will be by Agriterra, using GCF and Danish funds. The process of technology transfer has already been successfully piloted in Kenya by Agriterra, and involves multi-year support to cooperatives based on their needs and business plans, through a milestone-based action plan. This technology transfer through cooperatives will rely on Agriterra's peer to peer platform where cooperatives staff learns from farmers and or cooperative experts from the Netherlands, Denmark, Finland and Kenya. This will be facilitated by Agriterra's global network of national and international agricultural experts (the Agripool).

312. The project will begin, in year 1, by identifying and on-boarding participating cooperatives (sub-activity 3.1.2.1, funded by the Danish Ministry of Foreign Affairs). This will build on the results of the cooperative census undertaken in 2022, but will also include comprehensive screening and assessment of capacity to participate in the project.

313. Basic screening criteria for selecting cooperatives will include:

- Membership of between 500 and 10.000 active members
- Must be growth-oriented cooperatives with realistic business goals
- Must have three years audited financial statements.
- Must have held an annual general assembly over the past 12 months.
- Must have approved by-laws and governance documents, including legal registration with Kenyan government authorities (and absence of legal recourse, lawsuits, or penalties).
- Preferably have a gender and social inclusion policy or be open to having one within two years of support
- Must be a primary cooperative, focused on production and processing

314. Cooperative unions will be excluded because they do not work directly with the farmers. Details on the types of cooperatives targeted and their typical needs are included in Chapter 6.2 Beneficiaries.

315. Following the initial screening and selection, each cooperative will undergo a comprehensive Cooperative Assessment and Climate Clever Check (CA-CCC) which will include the following elements (sub-activity 3.1.2.1, financed from Danish MFA contribution to the project):

A) <u>Cooperative Assessment (CA):</u> The assessment is based on international cooperative best practices and assists Agriterra in understanding the cooperative from all the angles including governance, financial management, extension services, and the business model in a bid to understand the real business case and to ensure the financial viability of any technology change or any new practice, and to ensure the cooperative has the capacity to continue maintaining the change. This assessment includes an analysis of financial data, production, sales, and employment data, governance and transparency, benefit sharing,

and will also include an analysis of processes used to transfer knowledge, services, and technology to individual members, with a focus on vulnerable groups. The assessment will also consider practices and barriers to social inclusion and gender sensitivity. The result of the CA is a report advising Agriterra on what areas to support the cooperatives on and how the proposed activities will be prioritized in the multi-year action plan.

B) Climate Clever Check (CCC): The CCC is based on the climate smart agriculture definition by FAO and customized to the farmers' organization framework. The CCC will provide an assessment of climate risks on production and processing as experienced by each cooperative, and to evaluate the soundness of any climate response plans, if any. It includes an analysis of the climate change challenges from both adaptation and mitigation perspectives along the entire value chain, from input supply to consumption.

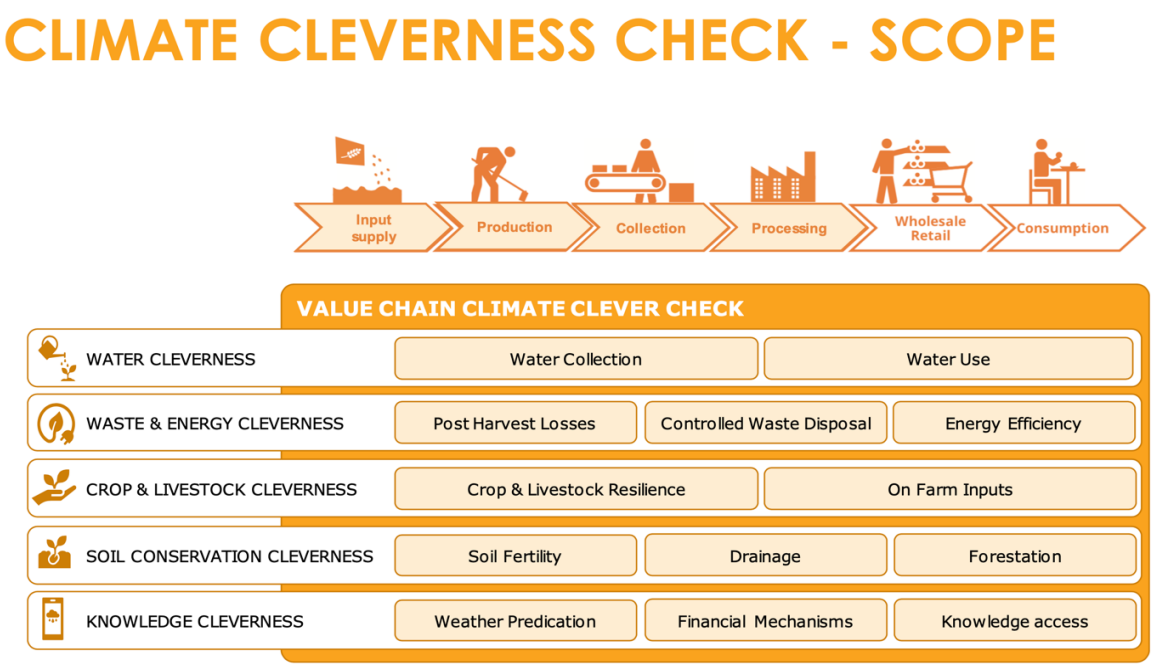

FIGURE 29: CLIMATE CLEVERNESS ELEMENTS (SOURCE AGRITERRA-KENYA)

316. Before each CCC, an Agriterra advisor studies the applicable climate challenges and risks posed to the value chain. In this project, Agriterra will benefit from the climate risk assessments conducted by counties under Activity 1.1.5. Challenges and the solutions applied by the cooperative are ranked and compared according to a point system. The impact of challenges and solutions on the business case of the cooperative is also reviewed (intensity of challenge and appropriateness of response). Support will be provided to address challenges that also have a financial sustainability angle. Rankings are compiled for the following criteria:

1. Water Cleverness: includes water collection, harvesting, conservation, and use efficiency (in production and processing).

2. Waste/Energy Cleverness: includes post-harvest losses and storage, use of chemicals, controlled waste disposal and pollution created by production and processing, harvest wastes and practices for waste reuptake (into energy, fertilizers, or upcycling), energy efficiency and use of renewable energy.

3. Crop and Livestock Cleverness:

a. Crop Cleverness: use of varieties and genetic material, application of crop practises that are adapted to climate challenges (e.g. diversification, planting, fertilizers, nature-based solutions and harvest calendars, planting methods, land preparation and (no-tilling methods); integration of farming systems (e.g. agroforestry, agro-pastoralism); practice protected cultivation (e.g. greenhouses, shading); management of pests, weeds, and diseases such as (e.g. smart use of pesticides and herbicides, use of organic materials and adoption of Integrated Pest Management).

b. Livestock Cleverness: includes the use of improved breeds and species, integrated farming systems, climate appropriate nutrition (grazing management, rotational grazing, grassland restoration, agro-silvo-pastoral management, chemical / mechanical treatment, improved quality crop residue, supplemental feeding, improved crop varieties, feed storage), and disease prevention/management.

4. Soil Conservation Cleverness: includes an assessment of practices to maintain or restore soil fertility and increase soil organic matter (fallow, intercropping, agroforestry, rotation, mulching, reduced or no tillage, irrigation, terracing, nature-based solutions, etc.); bio-fertilization use and practices; drainage, run-off, and erosion control; and landscape management (planting new forests, agroforestry, reducing forest encroachment).

5. Knowledge Cleverness: this criterion measures the effectiveness of decision-making mechanisms for climate resilient, low-carbon agriculture, including use of ICT as decision support, insurance, access to and dissemination of knowledge among members and with external networks, record keeping, and access to climate finance.

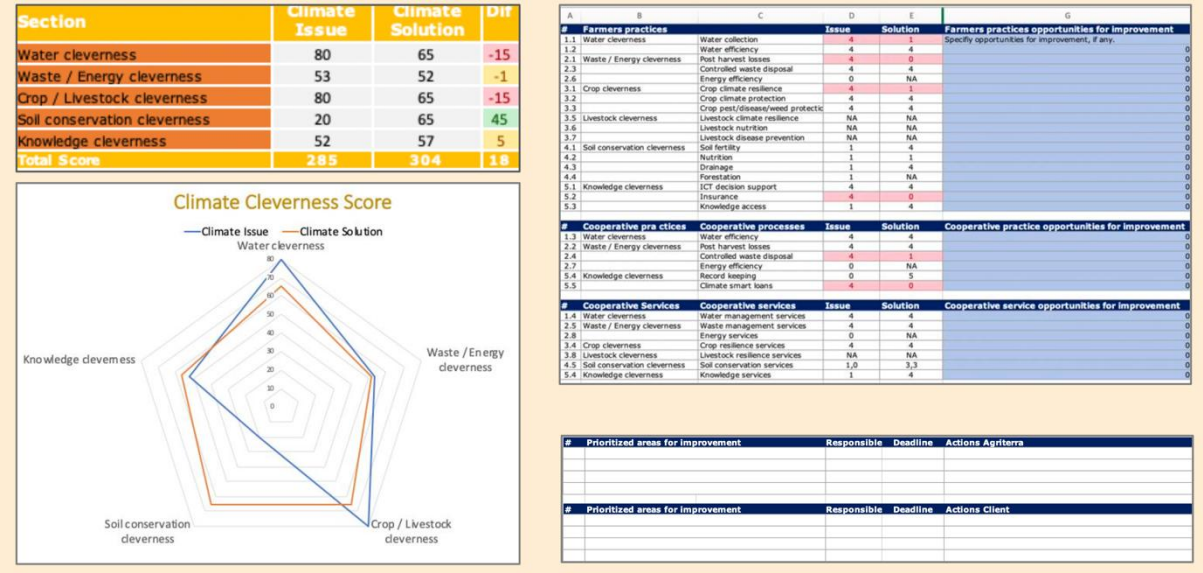

FIGURE 30: TYPICAL CCC ASSESSMENT RESULT

317. Each cooperative receives a "mark" or scoring against the different criteria at the end of the initial assessment; the assessment is then repeated once the project support to the cooperative ends, to measure progress objectively and in a participatory manner. The process is illustrated in Figure 29 and the Figure 30 illustrates a typical CCC assessment result.

318. An assessment and climate clever check will take on average, depending on the size of the cooperative, 3.5 days: 2.5 days for assessment and 1 day for the Climate Clever Check. CA and CCC are conducted with a cooperative business advisor and an agripooler on site (both of which can be either national or international consultants according to the need). Data is stored confidentially on Agriterra's data Cloud. Data on any individual cooperative cannot be shared without the cooperative's consent, however aggregate data will be available for sharing with government and other stakeholders. Assessments are mainly executed together with the executive board and management; however, members and other stakeholders, such as their bank, and off takers, are also interviewed to check the reputation and track record of the organization.

319. The CA/CCC serves as a basis for recommending solutions to the members across the full spectrum of cooperative activities, focused primarily on climate interventions, extension services, governance, management, and finance interventions if they help to sustainably implement the climate interventions. Recommendations may be targeted to cooperative management/executive, individual members, or service providers. The solutions are expected to be taken from the list of adaptation and climate solutions proposed in each county under activity 1.1.5.

320. The recommendations will then be submitted to the cooperative executive board for agreement and participation in project activities will be discussed at the next general assembly of members, to ensure free, prior informed concent procedure for cooperative members. A multi-year support work-plan will be agreed between Agriterra and the cooperative, which may include:

- Support the identification and implementation of selected climate resilient, low-carbon technology, including hiring and training cooperative extension officers, consultants and agri-poolers, training, and technical backstopping (sub-activity 3.1.2.2) mobilization of materials, equipment, supplies (sub-activity 3.1.2.3, funded by Danish Ministry of Foreign Affairs).
- Support the development of business plans and business cases for low-carbon and climate resilient agriculture and mobilization of capital to put them into practice (under output 4.1).
- Support the improvement of governance and management particularly for meeting climate-related requirements, on-boarding new members, disseminating information and benefit sharing, social and gender inclusion.

321. The number of interventions for any cooperative will depend on the implementing capacity of the cooperative and will be prioritized based on financial implications and climate impact in the Cooperative Assessment. Agriterra works with a milestone-based approach in supporting cooperatives and the support ends once these milestones are met, or earlier if an annual evaluation recommends that support is no longer needed. For the cooperatives under this proposal, milestones will relate to the climate resilient, low-carbon practices the project sets out to promote.

322. The targeted number of cooperatives is 130 cooperatives, to be onboarded in the first 4 years of the project following this schedule:

Year	1	2	3	4	5	6
New Coops Supported	20	40	40	30	0	0
Cumulative Coops supported	20	60	100	130	130	130

323. To support the implementation of multi-year support work plans, the project will deploy service providers or holders of technologies, knowledge, processes and goods or services that respond to specific needs identified. These partners will be identified using the Agri-Pool roster of experts or through open procurement.

324. Agri-Poolers are individuals who will be invited to express interest in participating based on an extensive Terms of Reference drafted by the cooperative business advisor based on the Cooperative Assessment recommendations. Screening criteria for inclusion in the Agri-pool roster for this project include the following, and efforts will be made to include women and young farmers in the Agri-Pool:

- Possession of a degree attesting to topic-related Professional Education (bachelors degree at minimum)
- Must have at least 5 years (sometimes less for youth farmers) of experience in agriculture sector in one of the 6 value chains
- Must be a member of a cooperative or other membership-based farming organization
- Must have relevant demonstrable knowledge on climate change impacts on the value chain and on the different interventions and technologies promoted by the project
- Must not have a conflict of interest (e.g. representatives of companies selling specific agricultural technologies or individuals with stakes in private enterprises providing technologies, inputs or knowledge, will not be allowed to participate). A declaration of conflict of interest will be required by all.

325. The experts are accountable to Agriterra and will be sourced from the roster using terms of reference that will describe specific mandates, roles and responsibilities and performance expectations. These typically include functions such as:

- Conduct research and desk-based studies in line with specific terms of reference and cooperative requirements
- Travel to cooperative site
- Deliver advice to and inspire cooperative management, extension officers, lead farmers, or member groups
- Prepare and deliver training
- Develop action plan and advisory report at the end of the missionThe cooperative business advisor will perform mentoring, coaching, implementation , monitoring and evaluation of processes and techniques recommended by the Agripooler.

326. If the required expertise cannot be sourced within the Agripool, or if it is insufficient, Agriterra will recruit (through open competitive processes) national and/or international consultants, service providers and goods to support the cooperatives in their efforts.

327. Other support received by cooperatives may also include material and equipment (sub-activity 3.1.2.3, funded by the Danish Ministry of Foreign Affairs). For example, the project may assist a cooperative in acquiring renewable energy technology and processing or packaging material provided it will benefit the entire membership of the cooperative. The equipment that may be purchased by the project (using open competitive bidding) at the behest of a cooperative includes:

- Refrigerators & cold storage (particularly solar powered) (Dairy, vegetables)
- Milk filtration and pasteurization systems (dairy)

- Milling/crushing/processing machines (coffee, tea, fruits, vegetables)
- Packaging machines (eggs/poultry)
- Solar panels (all)
- Motorcycles for cooperative extension officers
- Agricultural mechanization and implements
- Small vehicles for waste material collection and bio solution distribution
- Choppers, barrels, and shade sheds for bio-solution production
- Acquisition and transport for collection of waste materials for bio-solution production such as bio-compost, bio-fertilizer, bio-pesticide and bio-char.
- Materials for improved agroforestry nurseries, greenhouses, and net shading
- Recruitment and training of youth extension officers that can share relevant knowledge to all beneficiaries[324]

328. The project may also support the full cost of the rehabilitation or upgrade of cooperative infrastructure such as water reservoirs, storage facilities, shelters, barns, and hatcheries, particularly when those are assessed as maladapted to the impacts of climate variability and climate change. In such cases, the project will launch a redesign process with the support of climate change infrastructure experts, and ensure that environmental impacts of upgrade, reconstruction or repair are mitigated. Access to this support would be prioritized, demand driven and based on the support action plan and milestones.

329. Because the demand for support is likely to exceed the available resources of the project, and to ensure equitable access to project support among beneficiaries, the support work plans will include a measure of prioritization. In this regard, a part of the project's upscaling and exit strategy will also rely on the increased ability of cooperatives to access loans and finance services by financial institutions under output 4.2.

330. In addition to leveraging expertise, goods and services, the project will ensure that the technologies are suitably disseminated to the entire cooperative membership (sub-activity 3.1.2.4, funded by the Danish Ministry of Foreign Affairs). When training is delivered by Agri-poolers or service providers to sub-groups of cooperative members, or to the executive or lead farmers, requirements will be in place to ensure that these then transfer all knowledge, processes, information, and capacity to other cooperative members. For example, as part of on-boarding into the project, each cooperative will identify lead farmers or extension agents from among their members, whose role will be to disseminate the technologies and deliver the trainings to all farmer members. Registries of farmers receiving internal extension support, or training, will be maintained by each cooperative for the duration of the project, and Agriterra will conduct regular supervision to ensure beneficiaries are adequately reached. Additional dissemination will be organized through knowledge sharing and training events within each cooperative and between cooperatives operating in the same value chain in the LREB region.

331. To track benefits from output 3.1, all smallholder participants will participate in the Resilience Survey. The project will also track specific indicators for cooperatives as business units, including repeating the cooperative census with support from the county governments under output 1.1. Agriterra will also ensure, on an annual basis, that cooperatives benefitting from project support do not lapse in any of their legal or financial obligations under the Cooperative Societies Act (payment

[324] Agriterra hires extension officers for 2 or 3 years and decrease the salary support each year: year 1: 75% , year 2: 50% and year 3: 25% year 4, 0%. After three years EO have proved their worth in terms of increased membership, increased production, member satisfaction and coops tend to retain them.

of dues, duties or taxes, registration fees, declarations, and fines or lawsuits). Indicators that will be monitored will include:

- Number of trainings received by cooperative and members
- Number of participating farmers (men/women)
- Number and type of equipment and infrastructure upgraded/repaired/acquired
- Production and sales, profits
- Losses incurred
- Membership (active) and membership income
- Any change in governance structure
- Level of debt, finance mobilized
- Gender and social inclusion

332. The gender equality and social inclusion objective for activity 3.1.2 is to disseminate CRLCSA technology, knowledge, and assets to cooperative members through peer-to-peer networks and exchanges in ways that are gender-responsive and socially inclusive. The project will ensure peer-to-peer networks and exchanges include women, PLWD, and youth. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Activity 3.1.3. Support smallholder farmer aggregation into cooperatives and other business units as climate risk reduction and risk-sharing mechanisms

333. Activity 3.1.3 represents the point where the two activities above come together and will be funded by the Danish Ministry of Foreign Affairs. The purpose of this activity is to nourish the cooperative movement as a key mechanism to share and reduce risks among farmers, particularly climate risks and the financial risks farmers shoulder when adopting climate resilient, low-carbon technologies.

334. Training and capacity development will be provided to farmer organizations with a focus on the management and governance of FO and cooperatives (sub-activity 3.1.3.1). This will help increase smallholders' business capacity, a key requirement to ensure market access regardless of the form the FO takes.

335. The project will encourage farmers to become members of existing cooperatives (sub-activity 3.1.3.2). At the end of an FFS cohort training, based on an evaluation of performance, and an analysis of capacity, smallholders who meet the minimum requirements for cooperative membership will be invited to join. Furthermore, farmer groups that meet the minimum threshold of organization, such as membership, ambition, organization, and services will be invited to set up a cooperative. The project aims to support 6,300 farmers to join existing cooperatives. In order to build awareness of the advantages of cooperatives, the project will highlight the types of services received by members, the financial and technical benefits of membership through field visits, exchanges venues, trade fairs, and other knowledge events.

336. To support integration of new members and the efficient management of cooperatives (sub-activity 3.1.3.3), Agriterra will use the My.Coop [325]tool. It was developed using International Labour Organisation's (ILO) Materials and Techniques for Cooperative Management (MATCOM) Program (1978 to 1990s) that developed over 40 training tools and its purpose is to strengthen the

[325] https://www.ilo.org/global/topics/cooperatives/publications/WCMS_644824/lang--en/index.htm

management of newly formed agricultural cooperatives so they can offer high quality, efficient and effective services to their members.

337. This activity will be executed by Agriterra.

338. The gender equality and social inclusion objective for activity 3.1.3 is to support smallholder farmer aggregation into cooperative and other business units as climate risk reduction and sharing mechanisms in ways that are gender-responsive and socially inclusive. The project will ensure cooperatives have gender equality and social inclusion strategies in place to reach women, PLWD, and youth. Additional detailed actions for achieving this objective are listed in the Gender Action Plan.

Activity 3.1.4 Support improvements in social inclusion and women's meaningful participation in climate resilient, low-carbon value chains

339. This activity is designed to ensure that project activities, technology transfer and support to cooperatives also contribute to the achievement of improvements in social inclusion and in the participation of women, youth and PLWD in the 6 value chains. As noted in the Gender Assessment and Gender action plan, ensuring equitable participation and inclusion requires a more subtle approach that goes beyond fixing “quotas” and considers barriers to participation at various stages. The activity therefore aims to influence change in the way in which women, youth and PLWD participate in agriculture (beyond the primary production stage), benefit from their work (ensuring they receive appropriate remuneration and socio-economic benefits), and influence decision-making in households, farmer organizations, cooperatives and community or county policies, where gender relations and women’s positions are improved, and women’s entrepreneurship is boosted, contributing to SDG 5. 1.

340. The project will ensure that Gender and Social Inclusion (GESI) principles are mainstreamed and integrated into all activities, trainings, materials, consultations, and processes. Gender focal points will be identified in counties, and in each EE, as well as within farmer organizations. At the start of the project, staff in the executing entities, project coordination unit, counties and financial institutions will receive mandatory training in the prevention and management of Sexual Exploitation, Abuse and harassment (SEAH), Gender-Based Violence (GBV) and in the application of the FAO Grievance and Redress Mechanism (GRM) to handle such incidents and ensure safe working conditions for women, PLWD, and vulnerable groups (sub-activity 3.1.4.1). This involves training of project and county officials on gender issues and increasing awareness of women, PLWD, and vulnerable groups on their rights.

341. When providing training and support to farmer organizations, the project will also ensure (under activity 3.1.1 and 3.1.2) that cooperatives and other business units have gender equality and social inclusion strategies in place to reach women, PLWD, and youth. In addition, the project will deliver targeted trainings for FFS and cooperatives, following the tested Agriterra and FAO approaches to develop leadership, participation and meaningful inclusion of women, youth and persons living with disabilities (sub activity 3.1.4.2). The approaches are the Women's Leadership-Youth leadership trainings developed by Agriterra as well as the Gender Action Learning System (GALS). These trainings will focus on all aspects of the value chain, accelerating the inclusion of vulnerable groups in production, processing and value addition, and trade.

342. During the Women's Leadership Workshops the role of women as members, entrepreneurs and leaders are discussed and together with male and female farmers an action plan is developed to

improve the participation of women in the cooperative. Previous Agriterra Women leadership workshops have led to the following solutions:

- Reduced legal barriers to women's participation in the cooperative and changed gender biased by-laws.
- Changed the minimum amount a potential leader has to deliver to the cooperative before he/she can be elected from 1000 KGs to 500 KGs. Women often own fewer coffee trees or have smaller plots than males, therefore the threshold of 1000 kgs is a larger barrier for them to get elected than for their male counterparts.
- Reduced barriers to transfer ownership and benefits of coffee trees to women within a family
- Plan workshops at more suitable times for women/mothers
- Enable extension officers to give advice equally to men and women.
- Reduced registration prices for women in the Primary Cooperative
- Discussed cultural and social norms
- Build the capacity of current and potential women leaders of cooperatives, equipping them with leadership and management knowledge skills.
- Create a women's council to improve the position of women and source talent for leadership positions.
- Hired more women for cooperative jobs, for instance as extension officers, nursery staff and bio-composting and bio-fertilizer staff

343. At the end of the project, the expected result of these efforts should be that at least 10,725 women, youth and PLWD accede to roles of meaningful participation in the targeted value chains. Please refer to the Gender Action Plan (Annex 8) for detail.

344. This activity will be executed by FAO with GCF funding, in close collaboration with Agriterra and the Government of Kenya.

Component 4 - Scaling through CRLCSA market and finance

5.4 Outcome 4. Enhanced public agro-climate services support farmer-led proactive adaptation and mitigation actions.

5.4 Output 4.1

Increased access to markets and profitability of climate smart, low carbon sustainable agricultural products

Output 4.1 Baseline

345. As noted in the Theory of Change, many smallholder farmers are using practices that are not well adapted to climate change, or that generate undue emissions, in particular in cases where agricultural land encroaches onto forests and marginal lands or inefficiently using energy in the agriculture production and processing. The project intends to support smallholders in producing more (and better) without resorting to land expansion, and to assist them in developing coping and risk reduction mechanisms in response to climate variability, climate change and climate shocks. However, at this stage the market incentives to sustain climate resilient, low-carbon production are insufficient – that is, farmers are not certain they will obtain price premiums or other adequate

market incentives for their commodities produced using climate resilient and low-carbon technologies and practices.

346. Currently, there is no data tracking the sales of commodities produced using a set of climate resilient, low-carbon practises or another. It is thus impossible for farmers to know if adopting climate resilient, low-carbon practises will lead to increased benefits. Very few cooperatives work with third-party certification such as Fair Trade and Rain Forest Alliance, and even though many follow Good Agricultural Practices (GAP), few are labelled as such. Knowledge on certification schemes – and the advantages thereof – and of GAP among smallholder farmers remains limited in the 6 value chains, more so in value chains that are less commercial such as poultry, vegetables, and fruit trees.

347. For the coffee, tea and dairy value chains, market access for climate resilient, low-carbon produce must contend with practices and norms among market intermediaries (e.g. Nairobi Coffee exchange), which may not be harmonized with the standards of climate resilience or climate smart agriculture. For example, the common grading system for coffee currently in force rates beans according to size and firmness and level of observable defects[326]. Among all actors in the coffee value chain, none is dedicated to ensuring environmental or climate sustainability of the produce. The Coffee Directorate (TCD), which is a government institution, is only responsible for promoting sales internationally while the county government extension staff promote the coffee sector by providing access to good practices in coffee production. The Coffee Directorate in collaboration with other relevant stakeholders also provides capacity building to the counties' agricultural staff and other coffee value chain players. The collaborating private agencies include Technoserve, Solidaridad, CMS, certification bodies (UTZ, 4C, Fairtrade) and management services providers.[327]

348. Data on certified farmers and cooperatives is scarce. Data from Fairtrade indicates that there are 25 and 23 Fairtrade certified coffee and tea cooperatives respectively. Most of these are found in the central region of Kenya, indicating that most tea and coffee cooperatives in the LREB region do not have Fairtrade certification, underlining the need for support. Despite this, market trends for the 6 value chains analyzed during this project preparation illustrate the continued demand for high quality, high-value products.

Output 4.1 Additionality and detailed activity description

Activity 4.1.1 ***Work with buyers and aggregators to increase demand and market opportunities for CRLCSA commodities***

349. With the above in mind, the project will work on the demand and market side of the value chains to increase uptake of CRLCSA commodities produced by project beneficiaries. Profitability of adopting climate resilient, low-carbon technologies will be key to encouraging continued sustainability, replication, and upscaling. Therefore, the project will work with county governments and cooperatives, as well as other actors along the value chain, to develop market opportunities for climate resilient, low-carbon products.

350. The project will begin by undertaking an assessment of markets and buyers potential demand for climate resilient, low-carbon products, including an analysis of the quantity and quality of the

[326] Coffee Value Chain Analysis, 2022, see Annex 23.
[327] Coffee Value Chain Analysis, 2022, see Annex 23.

products and the buyer's ability (or willingness) to pay a premium for products with some form of climate resilient, low-carbon certification or labelling (sub-activity 4.1.1.1). This will feed into a set of recommendation in each value chain on how to increase the market share of climate resilient, low-carbon products. The analysis will also help identify buyers who are willing to initiate purchase of products supported by the project during project execution. It is expected that at least 2 buyers will be identified for each value chain.

351. This process will also be supported by the development of information products, knowledge events, and awareness campaigns to increase aggregators,' market intermediaries,' and buyers' awareness of the existence of climate resilient, low-carbon and sustainable commodities. There currently exists no "climate resilience, low carbon" standard in Kenya. Therefore, research and comparative analysis of quality, grading and pricing of products supported under the project will be conducted, to benchmark climate resilient, low-carbon produce against existing quality standards (e.g., the coffee grading system) and non-climate smart products (sub-activity 4.1.1.2). This analysis will feed into the development of norms, standards and information products and into the development of the marketing campaigns for each value chain.

352. To create further market opportunities for targeted commodities, starting year 3, the project will team up with relevant value chain actors (aggregators, intermediaries, and farmer organizations) as well as county governments, to develop and deliver a targeted marketing campaign for each of the 6 value chains, highlighting the benefits and attractiveness of the products under climate resilient, low-carbon technologies.(sub-activity 4.1.1.3). This will include developing technical briefs for corporate buyers and market exchange (e.g. The Coffee Exchange), and consumer-oriented marketing products, video and print profile of producers and cooperatives. The project will also work with county governments to develop their own ongoing marketing services in support of climate resilient, low-carbon value chains. Participation in trade fairs, trade missions, and funding to support buyers visits to beneficiary farms and facilities will also be supported.

353. Throughout its duration, the project will provide technical assistance and business mentoring to the most mature cooperatives (e.g., those who rank higher on the Cooperative Assessment and Climate Cleverness Check) to negotiate sales agreements and contracts with identified buyers (sub-activity 4.1.1.4), through Agriterra. This will include negotiation training, advice on marketing selected products, legal agreement review, price setting advice and branding. This service will be on demand only once the cooperative has sufficiently demonstrated that it has adopted the climate resilient, low-carbon practises promoted in the project, and just prior to being exited from Agriterra support. For example, Agriterra has successfully linked Moyee coffee (a Dutch specialty roaster) to 7 coffee cooperatives in Kenya who produce low-carbon coffee in Kericho. FAO has connected cooperatives who produced the African Leafy Vegetables (ALV) with Kenya local processors who contract these farmers to produce ALV.

354. The development and incubation of small agribusinesses among less mature farmer organizations (sub-activity 4.1.1.5) will also be supported through cofinancing from FAO by leveraging the GEF-7 Project, which deploys innovative business hubs to promote market access and services, including business incubators for smallholder farmers pursuing nature-based livelihoods. These business hubs are intended as one-stop service shops that facilitate structured engagements such as contracts with off-takers, access to quality and affordable inputs from suppliers, access to financial services, machinery and equipment leasing, capacity building and provision of technical advisories, access to timely and reliable market information among other services.

355. The counties will then use the updated agricultural databases (activity 1.1.4) to identify and invite participants to marketing events, which will include market fairs, awareness campaigns,

special trade shows, and showcases (sub-activity 4.1.1.6). Using the data collected in the agricultural databases, the counties will develop seasonal market insights for sharing with farmers and farmer organizations that will include sales trends, production trends (including qualitative and quantitative trends), and price evolution for each of the 6 value chains (sub-activity 4.1.1.7). After the end of the project, this service may be extended to other value chains. This sub-activity creates a bridge between the county government and Kenyan governmental institutions and the work of the project, ensuring that county services to cooperatives also encompass market-oriented activities.

356. The gender equality and social inclusion objective for activity 4.1.1 is to ensure women, PLWD, and youth have equal opportunities to organize and participate in trade fairs, marketing events, awareness campaigns, and monitoring markets. Additional detailed actions for achieving this objective are listed in the Gender Action Plan, Annex 8.

*Activity 4.1.2**. Increase access to various certification and labelling schemes***

357. This activity, which will be delivered jointly with the above, will provide technical assistance to farmer organizations and cooperatives in accessing and complying with relevant certification schemes on a voluntary basis. The activity is funded by the Danish Ministry of Foreign Affairs. First, the farmer organizations will be identified based on current market access, maturity, inclusiveness, and performance across the CA and CCC assessments, and the rate of adoption of CRLCSA practises among members.

358. A selection of 15-30 cooperatives and FO is expected during the project, starting at year 3. These organizations will be supported, leveraging the Agriterra Agripool network and other consultancies and technical expertise, in identifying the most suitable certification scheme– i.e., the one that would bring the most added value both economically and from a climate resilience or decarbonization point of view. For example, coffee and tea traders may be encouraged to participate in the Fairtrade certification process, or – if their product is destined for European Markets, to adhere to National or international organic agriculture standards (e.g. Encert Organic, Kenya Organic Agriculture Network or IFOAM, EcoCert, etc.). It is understood that some such certification schemes may take years to achieve, therefore only the cases where certification is realistically achievable within 3 years of project implementation will be taken on board. (Sub-activity 4.1.2.1.)

359. Each organization will then receive targeted technical assistance, training and expert advisory services (sub-activity 4.1.2.2) to understand and apply the requirements, to strengthen reporting and transparency mechanisms, and meet and document any legal or institutional requirements. The initial costs of meeting the certification requirements will be financed through project grants; the ongoing costs of certification will be borne by the farmer organization or cooperative, as part of the counterpart funding contributed by cooperatives and beneficiaries. As part of the support provided under activity 4.2, the project will assist in ensuring that these costs are also included in the price-setting and business planning processes of each cooperative to ensure sustainability and continued uptake.

360. The gender equality and social inclusion objective for Activity 4.1.2 is to increase access to various certification and labelling schemes such as FairTrade or GlobalGap in ways that are gender-responsive and socially inclusive. Additional detailed actions for achieving this objective are listed in the Gender Action Plan, Annex 8.

5.5 Output 4.2

Vulnerable smallholders and their organizations have increased access to gender-responsive and socially inclusive financial products that support climate resilient, low-carbon growth.

Output 4.2 Baseline

361. The project builds on a sound baseline of rural finance in all sectors including the agriculture sector. At the local, community level, membership in Savings and Credit Cooperatives (SACCOs) is widespread in Kenya. In fact, SACCOs are the most common form of cooperative in Kenya and they cumulate assets that account for over a quarter of domestic savings[328]. There are also 28 accredited microfinance institutions[329] in the country. Recently, the government expressed in its Vision 2030 the need to promote microfinance as a key mechanism to promote MSME creation.

362. Several financial institutions operate in the agriculture sector, although according to consultations undertaken during this project's development, there currently exists a mismatch between supply and demand of finance[330]. Nationally, only about 3.2 % of Kenyan farmers secure loans through formal FIs to finance their agriculture activities. Agriculture investments represent only 4% of the overall financial sector activity[331].

363. Examples of available financial products for agriculture include[332]:

TABLE 25: OVERVIEW OF AVAILABLE FINANCIAL PRODUCTS

Institution	Agricultural Lending Products
Family Bank[333]	Family Bank has several loan portfolios for farmers. Among their top loan programs are dairy financing, wheat, and barley loan, tea producer loans, Kilimo Biashara Loans (that helps farmers to meet costs related to land preparation and acquisition of farm inputs), cash cow that provides credit to fodder producers, grain trading finance, and input loans.
Cooperative Bank (CB)[334]	Maziwa Plus Loans target dairy equipment, animals, or other assets, loans for dairy production and value addition equipment including buying additional cows and chilling equipment. Societies or groups can borrow up to KESs10 million while individuals can borrow up to KES 1 million. Maziwa Plus Loan has a repayment period ranging from 12-60 months. Vuna Kilimo loans: Loans extended to farmer organizations to purchase farm equipment, and inputs as well as set up irrigation systems or greenhouses.

[328] https://amfikenya.com/wp-content/uploads/formidable/7/AMFI-K-SECTOR-REPORT-DECEMBER-2021-2.pdf
[329] https://amfikenya.com
[330] Consultations, December 2022.
[331] IFAD, RK-FINFA Project document, 2022. https://www.ifad.org/documents/38711624/39485424/Kenya+2000003431+RK-FINFA+Project+Design+Report+October+2021.pdf/39736bc4-281c-2b65-636a-0dc9114f1fcc?t=1636715245360
[332] https://farmwideskills.com/top-financial-institutions-offering-agribusiness-loans-to-farmers-in-kenya/
[333] https://familybank.co.ke
[334] https://www.co-opbank.co.ke/ccoperatives/

	Tegemeo loans: Targets farmers looking for short-term loans to finance the supply of accredited buyers and aggregators. Agro-processor/dealers loans: Loans offered to grain processors and traders, agribusiness dealers, and other processors stocking their businesses on a day-to-day basis. Large Scale Loans: A loan program available for farmers who operate large-scale agriculture. It is aimed to enable these farmers to access farm equipment, working capital, and farm inputs. Other products include input loans, loans for horticulture and horticulture producers, and asset finance loans. Coop Bank also offers Coop Consultancy and Insurance services through Bancassurance Intermediary (CCBI). Current lending volumes, as reported by Cooperative Bank during consultations, are as follows: The value of loans to agricultural cooperatives in 2022 was KES. 4.76 billion or 3.6 billion USD. Loans are distributed to coffee (60%), dairy (30%) and 10 % other value chains.
Equity Bank (EB)[335]	Commercial agriculture loans targeting construction, certified seed, fertilizer, and farm input acquisition. Funds can also be used to pay for the lease or purchase of land, sinking of bore holes, buying of hybrid livestock, construction of biogas plants and farm houses, and to support any other agribusiness or social development. Farming projects must be near a Bank branch and require evidence of ownership of a farm or a valid lease agreement. Collateral requirements are required. Equity Bank also supports smallholders through various programs run by the Equity Bank Foundation.
Kenya Commercial Bank[336]	Crop loans up to 250 M KSH with loan tenor pegged on crop cycles designed for crop farmers who do not have contracts with reputable off-takers. Contracted crop loans between 3 and 5 million KSH, fully secured and repayable in 12 months for farmers who have a valid offtake contract. Horticulture loans that are tied to a specific supplier for greenhouse and irrigation kits (up to 250 million KSH repayable in 36 months). KCB also offers crop insurance through KCB Insurance Farm development loans for tea farmers, of up to 36 months for expansion of farm business including land acquisition, farm assets and machinery. The Bank also offers the Mavuno Tea loan which provides farm inputs and working capital of up to 80% of the value of tea delivered, unsecured; reserved for farmers trading with Kenya Tea Development Authority, and certain companies.
Agricultural Finance Corporation[337]	AFC offers various types of loan products including loans for machinery, livestock and fishery development, crop and horticulture, and seasonal crop credit. Loans finance production or processing and operating costs. Security for the loan is usually evidence of land ownership or farm ownership. Typical loans are repayable in yearly instalments over 2-5 years.
Juhudi Kilimo[338]	Specializing in financing agricultural assets and equipment in dairy, livestock and fish. Their loan offers for farmers include Crop Farming Loans, Animal Farming Loans, Farm Equipment Loans, Working Capital Loans, Clean Energy Loans, and Micro Housing Loans.
Barclays Bank	Agricultural ventures through its four programs including Farming Matters, Landed Estates, Energy & Environment, and Agri-Tech.

[335] https://equitygroupholdings.com/ke/borrow
[336] https://ke.kcbgroup.com/for-your-biashara/get-a-loan/for-agri-business/agri-business-loans
[337] https://agrifinance.org/loanProduct/Q2FzaCBDcm9w#
[338] https://juhudikilimo.com

Stanbic Bank	Supports farmers through their Agricultural Production Loan (APL). This short-term credit solution is meant to enable farmers to modernize their agricultural equipment and machinery. APL is suitable for group or individual farmers. The loan is granted for terms ranging between 6 and 24 months. It also allows borrowers to acquire specific farm inputs such as herbicides and pesticides as well as seeds and fertilizers. With APL, farmers can meet the cost of repairing and maintaining their farm machinery as well as pay crop insurance premiums.
Sidian Bank	Sidian offers different types of loans to farmers for purposes such as purchasing farm inputs as well as acquiring farm equipment and machinery to increase agricultural production. Sidian Bank finances individual farmers and Chama groups through their agro loans also called Kilimo Plus Microloans.
Kenya Women Finance Trust	Their Kilimo Bora Loan consists of seven sub-loan options for farmers in different farming niches. The institution offers agribusiness loans to farmers in Kenya via their Dairy Farming Loans, Green House Farmers Kit, Aquaculture Farmers Loan, Mzinga Loans (designed for beekeepers), Input Finance Loans, Agro-dealer financing, and Poultry Farming Loans.

364. As can be seen in Table 25, loan offers are abundant, but not all institutions listed here are active in the LREB and the conditions for access are difficult. In some cases, interest rates are at 4% above the central bank rate, with a negotiation fee of 3% and taxes. Requirements for collateral and security are important and often above smallholder capacity.

365. Access to rural finance among smallholders is low. Across the country only 14.66% of the agricultural population had access to agricultural finance (both formal and informal sources). Of these, 9.61% accesses agricultural finance through formal prudential sources, and 5.3% access finance from "excluded sources," comprising social networks and individual arrangements, while 84.81% of the agricultural population does not use any form of agricultural finance. Women mainly source finance for agricultural operations from non-prudential sources and informal sources such as family and friends. This could be explained by lack of control over assets that could be used as collateral in accessing credit from formal sources.[339]. (Please refer to the Gender Assessment for further details on barriers faced by women and other vulnerable groups.)

366. Of the 340 cooperatives interviewed in the Cooperative Census in 2022, only 92 had succeeded in securing a loan or financial product[340]. Among those, only 53 were obtaining their financial products from formal banking institutions, and the rest was leveraging finance from NGOs and SACCOs. As evidenced by recent research conducted by ACELI Africa and IFAD, access to finance and financial inclusion is still not achieved in Kenya. Most of the lending goes to larger clients, and most smallholders are not yet accessing any finance due to high costs, complicated procedures or heavy collateral requirements. This is due to several barriers:

- Banking policies: the need to maintain high capital adequacy ratios, and inadequacies in the classification of at-risk loans (which adversely impacts agricultural borrowers especially given climate variability and climate risks).[341]

339 KIPPRA. 2021. Women's Access to Agricultural Finance in Kenya. Policy Brief No.03/2020-2021.

340 Cooperative Census, Agriterra-Fao, 2022

341 https://aceliafrica.ams3.digitaloceanspaces.com/wp-content/uploads/2022/07/25233036/AceliAfrica_LearningBrief_vFINAL.pdf

- Interest rates are high: ranging from 7% to 11%[342] depending on risk levels, a rate that is unaffordable for many, particularly given climate risks facing agriculture.
- The collateral requirements are often too onerous for individual borrowers: house or vehicle ownership is low in rural areas, and land titles sometimes unavailable. Often times requirements are up to 200% of loan values.
- Land holdings are small (or too small to warrant large debt).
- Borrowers and lenders are risk averse, given the impacts of climate variability and change

367. From the FI perspective, as seen during the consultations leading to this project, there is a lack of suitable business plans and business cases, which limits their ability to lend with reasonable risks. Despite guarantees and other mechanisms designed to reduce the cost of borrowing, funds are not reaching smallholders. One such guarantee is European Investment Bank Facility which is a EUR 50 million financing program for agriculture launched in 2019: while this facility would in theory be usable, it is only accessible by select financial institutions (KCB and Equity Bank) through internal processes. While we explored the possibility, for this project, of linking FI with such guarantees, this was in effect not feasible.

368. The ACELI facility provides credit incenvies to financial institutions in Kenya, including the Family Bank, Equity bank and Cooperative Bank. ACELI facility has developed an incentive of 2-6% that focuses on reducing the cost of small loans (between 25K and 1.75 million USD) including first loss guarantee. Currently ACELI is channelling over 10M USD in such credit incentives, supporting SMEs in the agriculture sector in obtaining loans whose average size is 155K$. The ACELI facility also includes climate criteria and gives priority to agri-SME who are taking on "climate smart agriculture." ACELI has recently signed agreements with Equity Bank and Cooperative Bank and has expressed interest in supporting the two institutions in delivering more concessional loans to project beneficiaries.

369. In addition to these initiatives, IFAD is currently developing a set of initiatives designed to strengthen the rural finance sector, including ARCAFIM and RK-FINFA (refer section 2.2), which will address overarching financial policy issues, increase the supply of finance and improve concessionality, while also targeting smallholders and SACCOs. Financial institutions participating in this project are also partnering with IFAD.

370. The global agriculture and food security program (GAFSP) has developed a methodology for financial inclusion, the Missing Middle initiative (MMI) that promotes improved access to finance (grants, concessional finance or commercial finance) and complementary services (extension, capacity building, technology or access to markets) by smallholder farmers through their organizations. In this approach, farmer organizations are trained to develop project concepts through pre-elected Supervising Entities (SE). The model encourages FOs to build business partnerships with agricultural value chain actors (such as off-takers, processors, and financial institutions) and crowd-in domestic private resources. This project proposes to follow a similar approach through the Agriterra model.[343]

Output 4.2 Additionality and Activity Description

[342] IFAD, RK-FINFA, 2022

[343] https://www.gafspfund.org/sites/default/files/inline-files/Report%20on%20the%20Oct%202019%20MMI%20Learning%20Workshop.pdf

Activity 4.2.1. **Develop gender-responsive and socially inclusive private finance tools, procedures, and products to promote the upscale of CRLCSA value chains.**

371. Under this activity, which will be implemented by FAO in cooperation with Kenya Commercial Bank (KCB), Cooperative Bank and Equity Bank, the project will support the development of capacity within financial institutions to support climate resilient, low-carbon value chains. This activity will help strengthen and increase the supply and accessibility of financial products available to support climate resilient, low-carbon agriculture in the region.

372. Working with participating FI, the project will support financial institutions, through consultancies and expert advice, in the development and roll out of new financial products or in the revision of existing products and services (sub-activity 4.2.1.1). The initial focus will be on the 6 value chains, and it is expected that products and services targeting the commercial VCs (coffee, tea, dairy) will differ from those offered to less formalized VC (poultry, fruit tree and vegetables). Most products currently on offer target cash crops and dairy but are less accessible for other value chains. The project will also explore the possibility of creating gender specific or youth specific products and services to make sure vulnerable groups have no barriers to access.

373. Each FI will benefit from support for the development of procedures, guidance material and other documentation, as well as for the development of data collection processes if these do not already exist, to enable reporting. This will include reporting on beneficiaries (e.g. borrowers by value chain, gender and age), technologies and investments supported, volume and typology of lending, and area of land covered by products. Training will also be deployed for the revision or updating of environmental and social safeguards policies in line with the project orientation.

374. Training will be developed for FI at headquarters as well as in decentralized branches in the LREB region, to ensure rapid operationalization of the products and services (sub-activity 4.2.1.2). Other technical assistance will include support for improving risk analysis methodologies for loans in the 6 value chains climate resilient, low-carbon pathways to ensure that climate risks do not compound financial risks; improving accessibility conditions such as collateral requirements, repayment terms, interest rates; and analyzing social barriers to access to any of the various products and developing internal ESG mitigation procedures. The project will also support financial institutions in accessing guarantees and risk reduction mechanisms, exploring various avenues such as as those offered by ACELI Africa Trust or EU supported financial guaranteesù, and to pass these risk reduction on to their client base through interest rate reductions or increased concessionality.

375. The features of the new or revised financial products will include the following:

- Target application of climate resilient, low-carbon technologies as identified in the project and the county green lists.
- Ease of access or revision of eligibility conditions, including size of lender, collateral requirements, to ensure FO and cooperatives, vulnerable groups have equitable access.
- Value chain specificity
- Increasing concessionality, including through the mobilization of guarantees (e.g., through ACELI or other facilities), interest rate buy-downs, first loss guarantees, modified repayment schedules, etc. These mechanisms will be identified during the project's first year and the project will support Banks in their negotiations or in leveraging agreement.
- Contain or propose risk reduction mechanisms (including insurance)
- Leverage digital technologies (e.g., digital payment; remote credit appraisal based on data analytics).

- Be complementary to the current Bank offer in support of climate resilient, low-carbon practises in the agriculture sector.

376. This technical assistance will be executed by FAO with funding from GCF.

Activity 4.2.2. Support smallholders and their business units in the development of bankable business plans, with particular focus on social inclusion and gender-based access

377. In parallel to activity 4.2.1, the project will also support farmer organizations and cooperatives in accessing the financial services offered by the partner financial institutions. This will take on two forms: first, the project will deliver training on financial literacy and financial management to farmers, farmer organizations and cooperatives (sub-activity 4.2.2.1).

378. Second, cooperatives who operate on the more "mature" end of the spectrum, whose performance in applying the climate resilient, low-carbon technologies is seen as good after yearly evaluation, will also benefit from assistance in the development of bankable business plans and finance requests that will be submitted to participating FI (sub-activity 4.2.2.2). This is done by using Agri-Pool members with specific finance expertise, such as staff from banks and financial institutions used to lending in the agricultural sector, review the financing proposals as part of the technical assistance.

379. The purpose of this assistance is to ensure that cooperatives have, in the long-term, the autonomous capacity to mobilize their own financing, through the development or revision of their own business plan, and through the articulation of solid, bankable financial proposals. This will bridge the gap or the mismatch between supply and demand of climate resilient, low-carbon finance in the 6 value chains. The outcome 3 will also serve as a de-risk mechanism to increase the borrowers' likelihood to pay back the loans.

380. Activity 4.2.2 will be funded by the Danish Ministry of Foreign Affairs, and executed by Agriterra and in continuity with activities under Output 3.2. The number of revised business plans, as well as the number of submitted funding requests and loan applications to banks will be documented as part of the M&E plan of the project.

381. The project leverages up to 10 million USD in Loans from the Equity Bank, the Cooperative Bank of Kenya and Kenya Commercial Bank (KCB) which will be channeled to farmers, cooperatives and value chain actors on the basis of bankable proposals and business plans developed under Outcome 4.

Activity 4.2.3 Facilitate smallholders access to financial incentives schemes for agroforestry

382. As part of the innovations introduced in this project, and to support continuous mobilization of finance and investment into CRLCSA value chains, the project will assist select cooperatives in the 6 value chains in accessing cooperatives in the 6 value chains in accessing carbon markets, payments for ecosystem services, biodiversity offsets or conservation finance. Cooperatives selected for this activity will be those who show the most success in implementing CRLCSA practices at farm level (a minimum of 15 cooperatives). In year 3, the project will begin by undertaking an analysis of the most promising avenues based on the rate of adoption and success of the technologies promoted in the project (sub-activity 4.2.3.1). Various options will be explored for applicability to the context of the 6 value chains and the LREB, including:

- ACORN: The ACORN system monetizes carbon removal credits to farmers using satellite data and local ground-truthing to monitor land cover. For the cooperatives that show ability and potential, the project will link them with the carbon accounting system such as ACORN system of payment for ecosystem services for smallholder farmers converting their land from monoculture to agroforestry.

- The Net Zero Adaptation Facility, which is established with GEF and FAO support as a pilot mechanism to channel private sector investment in net zero projects in the AFOLU sectors in LDCs towards resilience and vulnerability reduction. The NZAF is launching in 2023, and will be managed by Winrock International.

- Conservation Finance, Payments for Ecosystem Services or Biodiversity Offsets, such as those implemented in Kenya through the DBG Group, or in partnership with organizations such as IUCN, WWF, UNEP Finance Initiative and many others.

- Private sector impact investment funds such as the Trees of Lives Investment Fund[344], the Althelia Fund, Mirova Impact investment, the Land Degradation Investment Fund, and others.

383. Support provided to farmers and cooperatives will include raising awareness on the availability and opportunity for the various financial mechanisms (sub-activity 4.2.3.2) and developing training for participating cooperatives on the requirements of each selected mechanism (sub-activity 4.2.3.3). This may include training on conducting farm-level carbon accounting, implementing traceability requirements, monitoring of carbon stocks in plantations and forests and monitoring biodiversity at various scales, and managing reporting requirements for finance.

[344] https://treesoflives.com/en/ currently operational in Peru, the ToL Investment Fund promotes integrated landscape restoration in forest and productive areas using private sector financing to generate profitable deforestation-free agricultural value chains

6. Benefits and Beneficiaries

6.1 Targeting

6.1.1 Geographical targeting

384. The selection of the project location was conducted using climate change vulnerability assessments and aligned to Government of Kenya priorities for resilient agriculture. As noted in the vulnerability assessments undertaken for the concept note, **Farmers' vulnerability to climate change is primarily driven by low and poorly diversified incomes and precarious food security.** These are underpinned by climate and non-climate factors such as suboptimal crop and livestock productivity and climate variability impacts; limited purchasing power for agricultural inputs, technologies and assets; land fragmentation and land degradation from unsustainable agricultural expansion; and erratic access to water and energy.

385. The LERB region is a significant contributor t o the national agricultural economy. The LREB region contributes 12-15% of the national dairy production; 15% of the national meat output; 5-10% of coffee production, and 25% percent of national tea prodiction, not to mention the local food security significance of staple crop production[345]. Although data is scarce due to the lack of organiation of the ALV value chain, the LREB is estimated to contribute around **20-25%** of Kenya's national production of leafy vegetables, with counties like **Kisii, Kakamega, and Vihiga** leading the way in terms of volume. A decrease or failure in LREB agricultural production could result in higher import needs (as LREB provides the local market, including in other climate vulnerable regions), putting pressure on inflation, or increased rural to urban migration.

386. The number of vulnerable people per km^2 is higher in LREB than elsewherePopulation density in LREB region ranges from 300-1000 people/km^2 in some areas, whereas ASAL districts – which may register as highly vulnerable to climate change - show a population density of 10-50 people per km2.

387. Selection of the LREB region was also motivated by the need to scale climate-resilience vuilding interventions in all geographical regions of Kenya. Many other partners, including GCF, are intervening in ASALs through interventions that reduce vulnerability of local communities. FP 175 addresses water-related vulnerability in Upper Athi Catchment area and FP 113 addresses vulnerability in the ASAL rangelands (a total of 44 million USD and 1.2 million direct beneficiaries)[346].

388. The Kenyan Government, including the NDA, explicitly requested the FAO and GCF focus its interventions on these districts, which had received less financial support in building climate resilience thus far.

389. **The vulnerability of local smalleholders in LREB is well documented. 30% of the LREB communities are facing food insecurity and climate change is expected to exacerbate this situation.** While data on every county is not available, there is data on five counties that paint a picture. Bomet's population has 36% facing food shortages, with estimated 36% of children stunted.[347] Busia has 54% of its county's population facing food poverty, with 34% of children stunted.[348] Homa Bay has 50% of its population facing food poverty, with 26% of children stunted,

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[345] Kenya National Bureau of Statistics, Economic Survey 2022 and Ministry of Agriculture, Livestock, and Fisheries report on Dairy and Livestock Production, 2021, and Kenya Tea Development Agency annual reports..
[346] Green Climate Fund website
347 https://ccafs.cgiar.org/resources/publications/climate-risk-profile-bomet-county-kenya-county-climate-risk-profile
348 https://cgspace.cgiar.org/handle/10568/80446

and 4% wasted.[349] Kericho County has 39% of its population facing food poverty and 31% of children stunted, with 7% wasted.[350] Kisumu has 61% of its population facing food shortages and 14% of its children are stunted.[351]

390. **The local adaptive capacity among smallholders is low**, as most are producing a limited number of crops and commodities on very small areas of land (average 0.2 ha) with limited means, and without access to risk reducing mechanisms (such as social safety nets, finance, and alternative coping mechanisms) to make more appropriate climate-informed production choices. Therefore, they are particularly vulnerable to interannual rainfall variability and oscillating crop yield and livestock production trends, resulting in unstable and unreliable incomes. Furthermore, increasing rainfall variability has led over a third of the LREB's population to suffer chronic food insecurity, requiring short-term emergency food relief and long-term development programs. Since the LREB is the main agricultural region in Kenya and the largest source of freshwater in a semi-arid region, it is critical for Kenya's agriculture sector as a whole. Therefore defining sustainable and climate resilient pathways for agriculture in the area is fundamental and beneficial for the entire country's economy.

6.1.2 Selection of Value Chains

391. Value chain prioritization was conducted through a stakeholder consultation involving all counties, where each county undertook its own prioritization exercise, based on best available knowledge[352]. The selection was also validated by FAO through climate risk analysis and by cross-referencing with available data and information on climate change impacts. The criteria, listed below, were based on this project's definition of resilience, which is measured through the RIMA index[353]. Participants in the consultation, which included agriculture experts from the crop and livestock departments in each county, were asked to list the value chains that were practiced by smallholders in their territory, and to rank these according to each of the criteria, on a scale of 1 to 5, 1 being the lowest potential and 5 being the highest. Rankings were based on best available evidence and expert judgement.

<u>Climate/Environment criteria</u>:

- Sensitivity to changes in temperature and/or water availability and quantity (e.g. plant growth is affected by increased temperature, lack of water or excess moisture)
- Potential for reduced water use and/or improved water use efficiency (responding to the climate problem of aridification, increased temperature and drought). (e.g. existence of adaptive solutions to water scarcity)
- Potential for GHG reductions at production or processing stages (e.g. potential for use of different cultivation methods that would yield increased production and reduce emissions)

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349 https://ccafs.cgiar.org/resources/publications/climate-risk-profile-homa-bay-county-kenya-county-climate-risk-profile

350 https://ccafs.cgiar.org/resources/publications/climate-risk-profile-kericho-county-kenya-county-climate-risk-profile

351 https://ccafs.cgiar.org/resources/publications/climate-risk-profile-kisumu-county-kenya-county-climate-risk-profile

352 Notes from the consultation are available in Annex 7.

353 The RIMA index uses 5 categories of indicators to measure aspects of resilience, including access to basic services, access to assets, adaptive capacity, social safety nets and sensitivity. Please refer to section 6.3 of this document for more detail.

- Vulnerability to loss of ecological services (e.g. animal or plants reduce producivity in contexts of land degradation, aridification, or drought)
- Potential for improvements in environmental sustainability (e.g. including reduced land degradation and deforestation for flooding and erosion control, reductions in non-organic pesticides/herbicides/fertilizers).
- Potential for reduced exposure to climate hazards (droughts and floods, storms)
- Potential for improved resilience of the value chain.

Economic Criteria

- Level of activity in the value chain (# of cooperatives, active producer groups, potential beneficiaries, frequency and level of trade)
- Potential for financial viability in medium-term (e.g. profitability of the value chain)
- Anticipated growth in demand for raw or processed commodities

Social Criteria

- Strength of the value chain organization (integration with processors, transporters, bulkers, buyers and finance institutions)
- Potential for Food Security gains from value chain (e.g filling a demand on the local market side and household consumption)
- Potential for social inclusion (women, youth, persons with disabilities, Indigenous people).

Feasibility

- Availability of technology and potential for technology transfer from within Kenya and from Cooperative Partnership member countries (Denmark, Netherlands, Finland) and/or others.

392. The total scores were then added, and scores for the groups of criteria were weighted as follows: climate/environment, economic and social criteria were allocated 60% of the score, and the last criteria on availability of technology was given 40%. The final score of the value chains was used to rank them by order of priority. The project focuses on the top 6 priority value chains, three of which have more of a market orientation (dairy, coffee and tea) and three that have more of a household food security orientation (african leafy vegetables, poultry and fruit tree).

393. The selection of value chains for this project is also reflected in the newly developed Climate Change Action Plans which were recently approved with G-FLLOCA support[354]. For example, each county lists priority actions and value chains of focus as follows:

TABLE 26: PRIORITY VALUE CHAINS LISTED IN COUNTY CLIMATE CHANGE ACTION PLANS

County	Priority Value Chains
Baringo	No specific value chains listed
Kakamega	- Dairy value chain - Formation of cooperatives for agricultural produce processing and marketing
Kericho	- Dairy (value addition: mursik, cheese, yogurt, ghee) - High-value fruits (pawpaw, mango, avocado, passion fruit)
Bomet	No specific value chains listed

[354] All CCAPs may be found on the maarifa center website: https://maarifa.cog.go.ke/resource-library?f%5B0%5D=resource_tags%3A29

Kisii	- Indigenous vegetables - Poultry
Kisumu	- Dairy value chain - Horticulture (indigenous vegetables) - Poultry
Nyamira	- Tea value chain - Poultry
Homa Bay	No specific value chains listed
Siaya	- Poultry - Horticulture (watermelon, passion fruits, indigenous vegetables)
Trans Nzoia	No specific value chains listed
Vihiga	- Dairy value chain - Poultry
Kajiado	- Beef value chain - Leather processing
Vihiga	- Dairy and poultry value chain

6.1.3 Targeting of beneficiaries

394. Smallholders are the principal beneficiaries of this project, and they will be reached through community associations, farmer organizations, business units and cooperatives. Smallholders in LREB are all considered vulnerable to climate variability and projected climate change. Small-scale farmers dominate Kenya's agriculture sector, especially in land holdings of 0.2 – 3 hectares in high-potential areas.[355] Small holder farmers' estimated market output and produce are 75% and 70%. Despite market dominance, adoption of improved technologies and practices - improved seed varieties, mechanization services, proper fertilizer, input use, and access to extension services - remain relatively low. Farmers' socio-economic vulnerability is exacerbated by climate impacts to each food value chain in the LREB as highlighted in Part A of this Feasibility Study and Table 27.

TABLE 27. FARMERS' VULNERABILITIES ALONG EACH SELECTED FOOD VALUE CHAIN IN THE LREB.

Value chain	Socio-economic Vulnerabilities
All value chains	• limited access to land and technologies, and capacity to adopt climate resilient practices along the value chains particularly among women and youth; • population growth, pressure and land and land fragmentation, reliance on erratic rainfall, weak farming methods leading to unsustainable land use (e.g., soil erosion through cultivation in riverbanks, deforestation, use of chemical inputs); • weak post-harvest and value-adding facilities/activities (roads, electricity, cold chain technologies, use of stable water resources), including limited access to climate, agricultural, and market information, advisory, and networks; • low incomes combined with expensive farming technologies (e.g., irrigation), limited financial resources to access climate resilient technologies; • limited support from climate policies, regulations, funds, and extension services to enhance the resilience of agricultural development for example through engagement in post-harvest activities.

[355] http://www.kenyagreece.com/sites/default/files/agricultural-sector-ds-2020.pdf

Dairy	• Weak fodder and water management practices for livestock nutrition, favouring free-range production systems, combined with limited natural resources dedicated to grassland and pastureland; • lack of climate-based insurance schemes and financial support such as subsidies; • limited infrastructure for feed storage and transportation as well as for milk cooling, processing, packaging and storage; • lack of regulations on fair market prices; • delays in veterinary services.
Poultry	• Limited access to adequate feed and water resources, high costs of production and prices of inputs (e.g., drugs, vaccines); • limited extension services or veterinary services for smallholder farmers to build capacities on climate resilient practices and technology adoption; • limited access to market information and financial support (e.g., subsidies); • weak post-harvest infrastructure; • primary interest for commercial poultry breeds rather than for the indigenous poultry; • disinvestments in poultry compared to other livestock breeds among farmers due to price volatility in food and inputs and the tendency of using poultry for liquid-to-smooth consumption purposes rather than marketing; • limited opportunities for value addition due to an overall preference for selling chicken meat rather than by-products; • farmers' exploitation by middlemen resulting in limited market opportunities for farmers; • limited farmers' engagement in markets contributing to post-harvest losses and low prices; • limited support by farmers' cooperatives for marketing and bargaining, and low farmers' participation in cooperatives; • limited access to affordable and profitable financial schemes such as credits and agricultural insurance to counteract climate-driven changes in yields and prices; • extension services lacking knowledge of key risks to agriculture, such as climate change, exacerbating the lack of support to farmers in accessing climate risk-based financial schemes; • limited post-harvest processing facilities and technologies as well as scarce quality certification schemes, and value-addition practises.
African Leafy Vegetables	• Lack of information on tailored climate-smart agricultural practices and technologies; • lack of information on market opportunities; • lack of public and private investments and credits; • limited access to agronomic packages; • low communication between agricultural extension services and farmers/value chain actors; • expensive agricultural inputs for production, increased prices at markets; • Limited access to extension services; • fragmented and untracked value chain, lacking a proper product classification and evaluation; informal markets due to several challenges to enter formal markets because of the poor value-addition capacities of vegetable products, the lack of research and forecasts on demand and supply trends; • reduced farmers' opportunities in setting fair prices and engagement in markets.
Tea	• Inconsistent use of fertilizers between and within regions per hectare, affecting the yields, income, as well as fertility of soils; • weak post-harvest infrastructure for tea transportation and processing and regulations on tea pricing; • low access to weather-informed agricultural advisory; • limited diversification practises; • incapacity to fully meet labour requirements due to labour-intensive activities required for tea growing and harvesting and limited time allocated to tea production; • lack of access to technologies and suitable management practices among smallholders compared to large-scale plantations, • disincentives in shifting to high-yielding clones due to long gestation periods, particularly without access to income safety nets; • increasing future need to use pesticides due to a risk of pests and disease outbreaks as a result of climate change; • reduced global tea products' prices.

Coffee	• Disincentives in effective application of fertilizers and control coffee diseases among farmers due to low, uncertain, and slow (up to six months after the coffee is sold) payments by traders combined with high costs for inputs and limited support from extension services, leading farmers to invest in other crops or dairy production to reduce risk of income losses. In some cases, coffee plants get uprooted; • limited availability of organic manure reducing soil quality; • use of inadequate picking techniques such as strip picking technique, reducing the overall quality of coffee cherries compared to selective picking methods; • approximative drying and processing methods applied by farmers after harvest reducing coffee quality.
Fruit trees (Avocado, Banana)	• Limited superior varieties or planting materials, pests and diseases (beetles and thrips for bananas) with a large proportion of harvest losses (e.g., in the case of avocado); • limited access to early warning systems; • weak infrastructure for post-harvest and off-farm activities leading to food losses and reduced prices (transportation, storage, packaging); • low access among women, youth, and poor farmers to financial resources and credit to invest in climate-proofed technologies (e.g., greenhouses and irrigation, post-harvest facilities, cold chain technologies).

Sources: [356], [357], [358], [359], [360], [361], [362], [363], [364], [365], [366], [367].

[356] CGIAR-CIAT. Ministry of Agriculture, Livestock, Fisheries and Cooperatives. 2022. Kenya County Climate Risk Profiles. https://ccafs.cgiar.org/resources/publications/kenya-county-climate-risk-profiles

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[366] United Nations Industrial Development Organization. 2017. Adaptation and mitigation in the Kenyan tea industry. https://open.unido.org/api/documents/5239228/download/2.Value%20chain%20vulnerability-Kenya%20country%20report.pdf

[367] International Coffee Organization. 2019. Country Coffee Profile: Kenya. https://www.ico.org/documents/cy2018-19/icc-124-7e-profile-kenya.pdf

395. Cooperatives are important building blocks of this project's strategy. Successful agricultural cooperatives improve members' position in the market chain, achieving economies of scale (reduced input and transactional costs), higher negotiation power for better selling price, and increased production.[368] Cooperatives, as argued by Johnstone Birchmall (2003), are a necessary element for reducing rural poverty. Through collective action, impoverished community members leverage their collective strength to increase individual participation in local and global markets.[369] Cooperatives help households diversify livelihoods and crops, boosting farmer resilience.[370] In addition, cooperatives leverage their collective strength to provide other support services, decreasing members' socio-economic vulnerability.

396. Agricultural cooperatives play a significant role in Kenya's agricultural development, accounting for 46% of all registered cooperatives with approximately 7 million members.[371] Playing various roles, agricultural cooperatives help access inputs, increase production and productivity of members, provide extension support services, and market access for small-scale farmers. In the financial sector, the cooperative movement through savings and credit cooperatives (SACCOs) has helped small scale farmers mobilize savings and provide credit to producers. The Government of Kenya has recognized the critical role played by cooperatives in economic development, emphasizing the need to revitalize the sector through improved governance and management capacity.

397. Cooperatives have been proven to foster agricultural productivity through specialization, support services, and providing market linkages for small holder farmers. By aggregating small holder farmers into a single economic entity, input cost and transaction costs are reduced by leveraging the collective buying power. Processors and other market offtakers are made accessible to individual farmers by having cooperatives mediate contracts. By aggregating their members' supply and demand, average prices for members' products are increased due to greater market access and market power.[372]

398. Other roles that cooperatives play, are:

A. *Lowering input and transaction costs*: Cooperatives aggregate their members' product demand and buy in bulk, enabling supply discounts. Discounts translate into lower input costs and by buying as an entity, the individual transaction costs are reduced.

B. *Access to information*: Cooperatives are vibrant rural enterprises, offering services to members and local communities that can strengthen climate resilience, adaptation, and mitigation capacities for small holder farmers.[373] They offer great platforms for training and knowledge sharing on climate-smart practices. Well organized cooperatives can hire consultants who can teach small holder farmers climate mitigation and adaptation knowledge.[374] Services can include: extension services,[375] collective bulking, post-harvest handling, processing, and marketing. By

[368] Jones, Smith, Willis 2012
[369] https://www.researchgate.net/publication/326380471_Cooperatives_and_Rural_Development_in_East_Africa
[370] JoAnn Jaffe and Terra Brockett, 2016)
[371] ASDS,2010-2020, p.47
[372] Bijman et al., 2012
[373] https://www.coffee-partners.org/the-role-of-cooperatives-in-climate-change-adaptation/
[374] https://www.coffee-partners.org/the-role-of-cooperatives-in-climate-change-adaptation/
[375] https://www.fao.org/news/story/en/item/93816/icode/

these services, farmers can increase profits and invest in climate smart practices.

C. *Financial inclusion*: Through joint savings and credit activities, cooperatives enable small holder farmers to mobilize capital for investment in the climate technologies required for their resilience, adaptation, and mitigation efforts. In Kenya, savings, and credit cooperatives control assets worth USD 2.7 billion, equivalent to 31% of the gross national savings. [376]

D. *Shared technologies and innovations*: Cooperative membership can allow access to innovative technologies and innovations for small holder farmers via joint ownership and use. For example, cooperatives have increased access to climate smart mechanization equipment, such as ripping, to their members.

E. *Social inclusion*: Open and voluntary membership is a keystone principle for cooperatives. All members who ascribe to the keystone principal can join. For women, youths, persons with disabilities, and social minorities, cooperatives offer social inclusion that otherwise may be closed.

F. *Scaling of proven technologies:* Cooperatives can help members in adopting new technologies and practices at scale. For example, livestock cooperatives have been successful in boosting the capacity of farmers towards efficient use of better genetic materials.[377] For smallholders in rural areas, farmers' cooperatives are essential for increasing their competitiveness and climate resilience by reducing rates of hunger and poverty.[378] This suggests that cooperatives and social progress are correlated.[379] Yet, most cooperatives do not operate efficiently due to lack of professionalism, which limits their service delivery and thus, impact on rural small holder farmers. In Kenya, cooperatives suffer from weak legislation support, poor financial management, leadership, governance, and political interference.[380]

399. Smallholder farmers participating in the project will be selected using the following process:

1) The project will hold consultations with the wards in which the cooperatives are located and county governments to understand vulnerabilities and needs for smallholders who are not members of cooperatives. Ward extension officers will be tasked with holding community meetings around the location of cooperatives, inviting farmers and smallholders to participate in the project and ensuring FPIC requirements are met. Participants will be required to sign letters of agreement to participate in the project that will highliht their rights and responsibilities, including grievance and redress mechansism . Lists of project participants will be completed and compiled to ensure representation and inclusiveness. For farmers who are not members of cooperatives, this exercise will be repeated after years 3 and 4 (intake of training cohorts 2 and 3).

2) A preselection of participating cooperatives will be undertaken by FAO and Agriterra in close collaboration with the county governments based. Their location will be mapped using the GPS coordinates obtained during the cooperative census. Cooperative executive and lead farmers will

[376] FAO, 2011
[377] https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---coop/documents/publication/wcms_723796.pdf
[378] World Bank, 2007; Herbel et al., 2012
[379] Dave Grace and Associates, 2014)
[380] https://core.ac.uk/download/pdf/234669041.pdf

be tasked with ensuring that all members are duly informed of the project and participate freely in project activities. This will be ensured through the FPIC process as well as through cooperative awareness-raising events. Lists of cooperative members and participating cooperatives will be compiled and compared to lists of other members to avoid double-counting. Participating cooperatives will present and discuss the project at their first Board after inception, and at the next earliest Annual General Meeting, where all members participate.

400. As seen in Figure 31, the targeting approach results in ensuring linkages between farmers, cooperatives and the overall agricultural landscapes. Linkages between cooperatives working in complementary value chains will also be pursued. In the graphic, farmers shown in blue are reached through cooperatives (output 3.2) and farmers shown in black are reached in groups, through FFS.

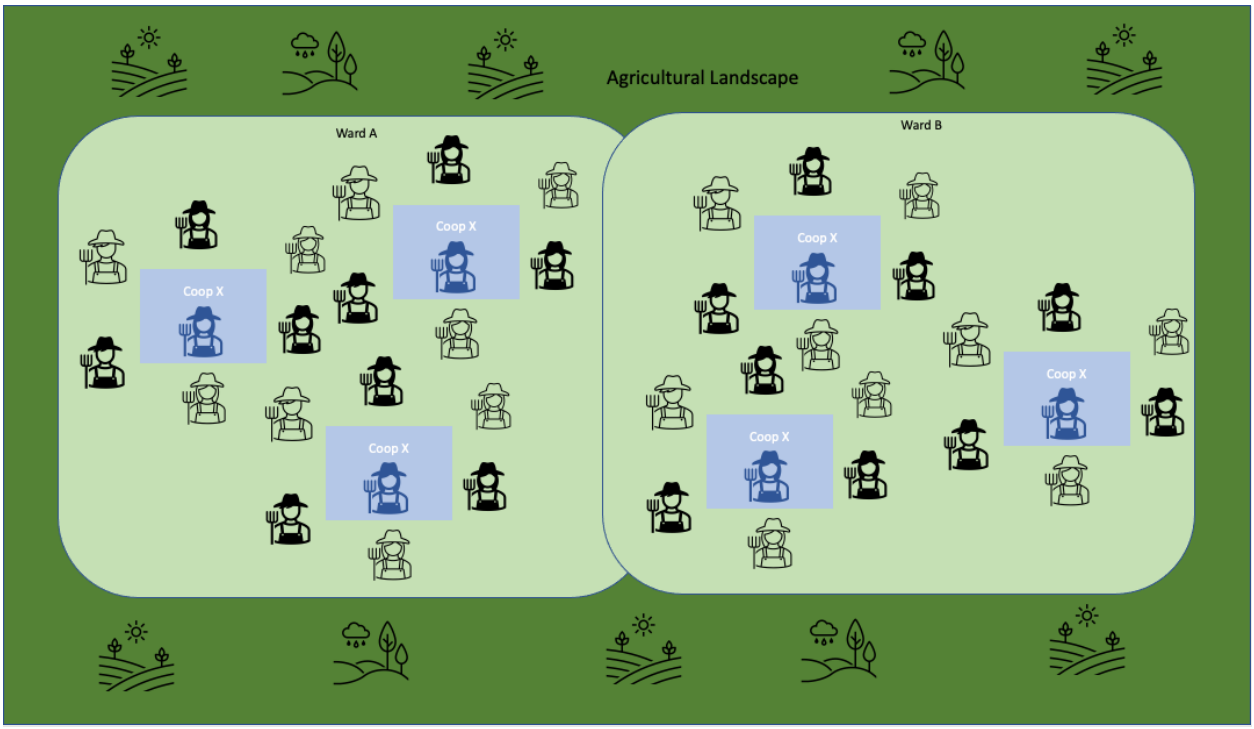

FIGURE 31: TARGETING OF BENEFICIARIES AROUND COOPERATIVES AND NESTED IN AGRICULTURAL LANDSCAPE

401. The project will pay particular attention to gender equity and social inclusion, two values that form the core of the cooperative movement. In particular, the project will identify the barriers met by women, the elderly, persons with disabilities and youth, as well as indigenous, ethnic or religious minorities in accessing knowledge, technology, assets or finance to support their meaningful participation in climate resilient, low carbon agriculture. This will be done according to the gender and social inclusion assessment and action plan that will be implemented and monitored by FAO, with the assistance of county governments, under Outcome 3 (refer to Annex 8).

6.1.4 Gender and Social Inclusion in Targeting

402. Gender: Gender data from the Cooperative census reveals the existing inequalities between women's and men's participation as cooperative members. Across the 14 target counties in LREB surveyed, men constituted 70.8% of members and women only 29.2%. This gender gap is also present among youth, with 13.2% of cooperative members being young men compared to only 5% of members being young women. In evaluating gendered membership rates by value chain, only poultry and indigenous vegetables had higher levels of female membership than male membership. In formal, high-value commodity chains, men made up 73.6% of coffee members, and 91.2% of tea members. Dairy value chains had a closer gender parity with 46.4% women members. Among the less commercialized value chains of (fruit trees, poultry, and indigenous vegetables), there were greater levels of female and male youth participation. However, gender gaps still existed between youth as young women were the least represented in membership across all six value chains.

TABLE 28:GENDERED MEMBERSHIP RATES BY VALUE CHAIN

Value Chains	Frequency and % of Cooperatives (n=321)	Male Members	Female Members	Male Youth	Female Youth	Total Members
Coffee	141 (43.9%)	229,284 (73.6%)	82,052 (26.4%)	40,179 (12.9%)	11,891 (3.8%)	311,336 (100%)
Dairy	117 (36.4%)	69,114 (53.6%)	59,815 (46.4%)	25,446 (19.7%	12,213 (9.5%)	128,929 (100%)
Fruit trees	23 (7.2%)	5,496 (56.3%)	4,274 (43.7%)	1,775 (18.2%	901 (9.2%)	9,770 (100%)
Poultry	18 (5.6%)	2,707 (46%)	3,175 (54%)	1,336 (22.7%)	838 (14.2%)	5,882 (100%)
Tea	13 (4%)	81,105 (91.2%)	7,846 (8.8%)	2,567 (2.9%)	631 (0.7%)	88,951 (100%)
Indigenous Vegetables	9 (2.8%)	2,558 (40.5%)	3,761 (59.5%)	1,588 (25.1%)	976 (15.4%)	6,319 (100%)

403. While not fully captured in the Cooperative census, the Gender Assessment also investigated how gender intersects with age, household headship status, and disability status to produce intersecting social inequalities that influence participation and benefit from engaging in agricultural value chains in the context of a changing climate. Thus, it is not enough to only target "women" in terms of project beneficiaries. From the Gender Assessment, female youth, female-headed households (including widows), and females living with disabilities, are the most under-represented and vulnerable groups in agricultural value chains, based on how their gender interacts with other axes of social differentiation and inequality. Thus, the project's gender mainstreaming strategy makes a concerted effort to consider intersecitng social factors into its targeting metrics, to ensure that female youth, female-headed households, and females living with disabilities are equitably represented in all project activities. Given this approach, gender data is expected to be collected beyond sex disaggregation (i.e., number and % of female farmers disaggregated by youth status, household headship status, and disability status vs. number and % of male farmers disaggregated by youth status, household headship status, and disability status).

404. The Gender Action Plan details how the goal of gender equality and social inclusivity will be mainstreamed in two ways: participation in activities and the content of activities. Women, female

youth, female-headed households, and females living with disabilities all have specific quotas that are required for each activity. Mainstreaming in terms of participation will be ensured by setting the target proportion of participants from each of these intersections to be roughly equal to the relative population sizes at the national level: 50% women (of which 33% are FHH), 1% for women LWD, and 25% female youth (aged 18-34 years). The male youth (aged 18-34) participation quota is 25% and 1% for men LWD. Mainstreaming in terms of content will be ensured by integrating gender transformative approaches, more particularly Gender Action Learning Systems (GALS) into project activities and training materials. These training materials also include the "gender- and youth-specific" trainings, such as the Specialized Agriterra Training Programmes in Women's Leadership and Youth Leadership,as well as more "general" training materials on agricultural production, markets, finance, etc.

405. Youth: Article 260 of Kenya's Constitution defines a Youth as a person between eighteen (18) years and thirty-four (34) years of age[381]. According to recent national level statistics, approximately 25% of the total population meet this criterion.[382] Despite their considerable numbers, youth are, and have been historically underrepresented in cooperatives and formal agricultural value chain market participation, and their contributions to domestic agricultural and livestock labour marginalized. This has been especially the case for young women, who have the lowest levels of cooperative participation across all six value chains evaluated in the LREB as per the 2022 cooperative baseline survey.

406. Young women also had the lowest levels of representation in cooperative governance and leadership as board members and had the lowest number of employment/staff positions within cooperatives. These low representation levels do not necessarily account for a youth disinterest in engaging in agricultural value chains, but are rather attributable to underlying gender and social norms – for example, norms that disincentivize young women from engaging in agricultural commodities traditionally controlled by men, or norms that largely exclude male and female youth from managing or owning individual plots of land where they would have agency in decision-making and profiting from their labour. Acknowledging youth's under-representation in cooperative societies and farmer organizations, the project seeks to build capacity in creating enabling environments where young women and men can realize their full potential in agricultural value chains. The inclusion of youth as beneficiaries is a core component of the project, with the target proportion of youth participants roughly equal to the relative population sizes at the national level, which is 25% for young men, and 25% for young women, respectively.[383]

407. Persons living with disabilities: At the national level, approximately 2% of Kenyans are persons living with disabilities, defined as "any person with any physical, sensory, mental, psychological or other impairment, condition or illness that has, or is perceived by significant sectors of the community to have a substantial or long-term effect on an individual's ability to carry out ordinary day-to-day activities."[384] People with disabilities tend to be overlooked for rural employment, either due to the physical nature of farming work, and/or due to cultural barriers. The project purposively mainstreams the inclusion of PLWD by setting the target proportion of PLWD participants to be roughly equal to the relative population sizes at the national level (1% women, 1% men). All gender equality and social inclusion (GESI) training and capacity development materials

[381] National Gender and Equality Commission of Kenya. 2023. https://www.ngeckenya.org/

[382] United Nations, Department of Economic and Social Affairs, Population Division. (2017). World Population Prospects, the 2017 Revision, United Nations, New York.

[383] ibid.

[384] National Gender and Equality Commission of Kenya. 2023. https://www.ngeckenya.org/

will include information on how gender intersects with other forms of social inequality and vulnerability, including disability status. All farmer organizations and cooperatives (100%) will receive GESI training and capacity development for inclusive hiring practices to better equip them with the skills to meaningfully include PLWD as cooperative members, employees, and leaders. In setting specific quotas for PLWD as beneficiaries, the project aims to double the baseline number of PLWD in meaningful employment in farmer organizations and cooperatives.

408. Furthermore, the project will also develop targeted trainings and services to support access by PLWD to climate information services (Activity 1.1.1), climate technologies that facilitate their integration into the farming business (Activities 3.1.1 and 3.1.2), and benefit from equitable access to finance to support active participation in the 6 value chains (activity 4.2.2).

6.2 Beneficiaries

6.2.1 Smallholder Farmers

409. Smallholders, whether they are included in cooperatives or not, are the primary intended beneficiaries of this project. Smallholders in LREB are characterized as follows:

- Working small land parcels, typically less than 2 acres
- Depending on a single commodity for livelihoods with limited diversification
- Limited access to off farm employment
- Dependent on low input, rain-fed agriculture
- A household of on average 5 persons
- Asset ownership is low

410. Below are the methods used for calculating the number of beneficiaries.

411. The project will be deploying farmer field schools to **smallholder farmers who are not part of cooperatives**, with each FFS grouping approximately 30 farmers. The project intends to deliver FFS in the targeted value chains in each of the 14 counties over 5 years, training three cohorts of 21,000 people for 2 years, therefore reaching 63,000 participating farmers (project participants), with direct benefits accruing to their household members (4 people per housefold in average) as well (a total of 252,000 people). The project expects to deploy 2100 FFS in total.

412. Additional beneficiaries are not included in the figure of direct beneficiaries above. These include government officials and county administration representatives, who would add a total of approximately 50 people per county (700 persons); buyers, who will be targeted under outcome 3 (12 buyers); and other value chain actors, whose number is undefined.

413. For the number of **direct beneficiaries in cooperatives**, we cross referenced data from various government sources (department of cooperatives) with our own field-based initial census of cooperatives. This census, which was undertaken by local consultants in the field, showed at least 321 cooperatives are currently active in the targeted value chains in the LREB region. According to active membership data in the census, average membership is 819 people per cooperative (smallholders), although some have much less (40), and some, have many more (10,000s+). For example, one coffee cooperative in Bungoma County has 54,000 active members, and one fruit tree cooperative has 40 members. The census showed that at least 70 cooperatives have more than

1000 active members, around 100 cooperatives have between 500 and 1000 members, and another 44 have fewer than 500 members.

414. All coop members are smallholders with typically less than half a hectare of land dedicated to the main value chain, given that most smallholders also cultivate other crops (e.g. maize) for household consumption. The size of the cooperative does not indicate a higher socio-economic status for its members, although active membership in a cooperative indicates an ability to pay membership fees. However, the larger the cooperative, the less expensive the membership fees. Hence it is natural to find that farmers will tend to aggregate in larger cooperatives, as it is more efficient for them and provides the same risk reduction benefit.

415. Based on the transaction costs involved in meeting onboarding requirements for cooperatives (conducting cooperative assessment and audits), the project expects to be able to integrate approximately 130 cooperatives of various sizes in the 6 value chains. Therefore, using a conservative estimate of 615[385] members per cooperative, the project expects to reach at least 80,000 individual cooperative members (project participants), with direct benefits accruing to their households (a total of 320,000 people based on the conservative estimate of 4 people per household).

Total project participants (100%)	Men (50%)	Women (50%)	Male Youth (25%)	Female Youth (25%)	PLWD (2%)
143,000	71,500	71,500	35,750	35,750	2,860

416. For ***indirect beneficiaries***, we have assumed that benefits would accrue to members on non-participating cooperatives in the 6 value chains (1,342,140.00[386]), and that participants in the FFS would also transfer indirect benefits to extended family members and households in surrounding villages (756,000 people)[387]. This brings the total of immediate indirect beneficiaries to 2,098,140 people, 50% of whom are women, and which represents nearly 15% of the Lake Victoria Economic Block population.

417. However, our estimate is that, in the long-term, thanks to the upscaling strategy and the efforts of the Banks to support cooperatives through loans, indirect benefits may be accrued by a much larger number of people in the Lake region.

418. To avoid double counting of beneficiaries, the project will keep registries of beneficiaries and affected agricultural plots through county administrations. As per current practice in Kenya, only one household member is a member of a given cooperative. This is mainly because each individual member must pay membership fees. For farmer field schools, the project will group together farmers who are not part of the same household and who do not operate on the same plot of land.

419. Please refer to Appendix 2 for calculations.

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[385] A rounded estimate of 75% of the average number of members from the cooperative census.

[386] As per Cooperative census

[387] https://link.springer.com/article/10.1007/s10457-006-9007-8 and also https://link.springer.com/article/10.1057/s41287-020-00323-7

6.2.2. Census and typology of Cooperatives

420. A census of cooperatives in the LREB was conducted during the feasibility assessment to identify beneficiaries and understand the dynamics of the cooperatives in the 6 value chains. The cooperatives were interviewed directly first on the phone and then in the field during 2021 and 2022. The census was also an opportunity to conduct a survey of climate change capacity among cooperatives, with questions focused on climate resilient, low-carbon practises implemented, knowledge systems, production, and processing data. Data collected from the assessments helped identify stakeholders and develop project activities.

421. The data was generated from a survey of thirty-four questions. Surveys consisted of guided group interviews, and focused discussions with Cooperative executive or organizational managers. The data that follows is extracted from the database of responses received to the questionnaires. The thirty-four questions were divided into six categories:

a. Background information
b. Membership data
c. Governance
d. Services offered to members
e. Economic information
f. Climate change

Membership

422. In total, 320 cooperatives were found in the six value chains with a total active membership of 286,850[388] members with 29 % being women. As seen in Figure 32[389], Kericho, Kisii, Bungoma, and Nyamira have the most active members with the coffee value chain having the most active members by far. Active membership cannot be explained by population alone as Nyamira is the second least populated county in the LREB and Kericho is the sixth least populated county. However, these counties also contain the most amount of coffee cooperatives, except for Kericho, where the tea value chain has the most active members. Active membership may be attributed to both value chains being well developed and regulated directly by the Kenyan government[390].

[388] Agriterra, 2022. For the purposes of this project, we used the number of active members only (meaning the members who have produced commodities and who have paid membership fees.
[389] Data from the cooperative census undertaken for the development of this project, 2022
[390] Both the tea and coffee value chains are overseen directly by the Kenyan government. Coffee sales are conducted by the Nairobi Coffee Exchange and tea sales are conducted through the Kenyan Tea Development Agency. Discussed more in Section 3.5.

FIGURE 32: NUMBER OF COOPERATIVE MEMBERS PER COUNTY IN THE 6 VALUE CHAINS

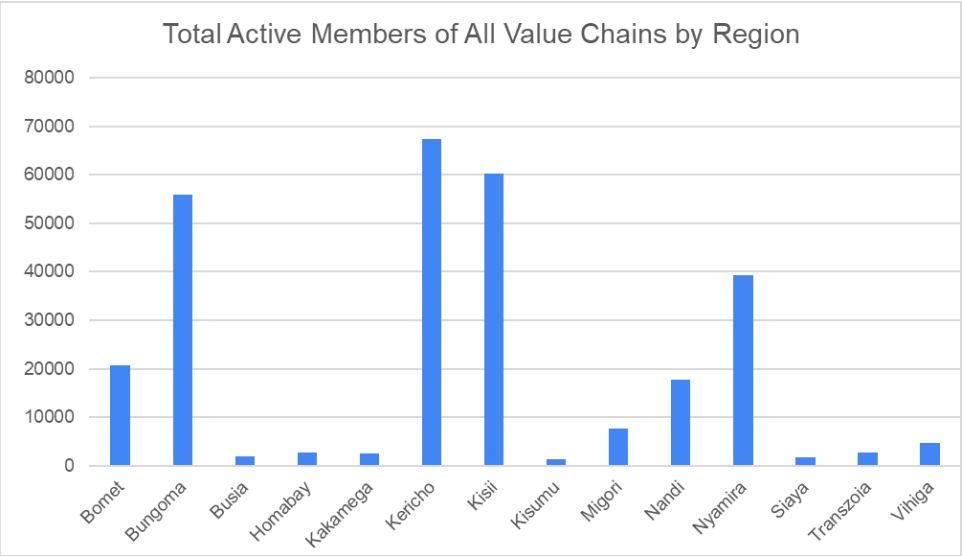


TABLE 29: ACTIVE MEMBERS IN COOPERATIVES IN THE 6 VALUE CHAINS

Counties	Total Active Members of the Six Targeted Value Chains
Bomet	20,697.00
Bungoma	55,970.00
Busia	1,883.00
Homa Bay	2,790.00
Kakamega	2,471.00
Kericho	67,284.00
Kisii	60,255.00
Kisumu	1,299.00
Migori	7,720.00
Nandi	17,818.00
Nyamira	39,190.00
Siaya	1,819.00
Trans-Nzoia	2,739.00
Vihiga	4,645.00
	286,580.00

423. Coffee is the most organized value chain, with the greatest number of active members (175,385) (see Figure 33) followed by dairy at 53,275 members and tea with 46,107 members. All the other value chains have fewer than 6000 active members[391].

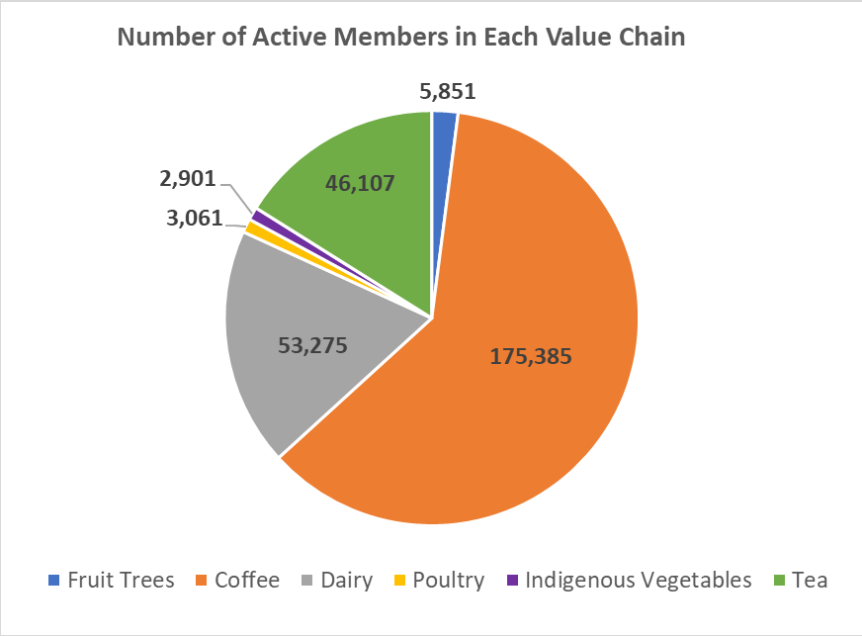


FIGURE 33: NUMBER OF ACTIVE MEMBERS IN EACH VALUE CHAIN

424. All cooperatives by boards and run annual General Assemblies for decision-making. Coffee has the most women and youth in active membership, and also the highest number of women included in governance structures, with 287 women Board members. There are 374 women board members in dairy cooperatives; Fruit tree and dairy cooperatives list 102 and 86 women board members, whereas tea only list 83 women board members. The most 'youthful' cooperatives are coffee cooperatives, in which 51,291 out of the 175,385 active members or 23.47% are youth[392].

Market Value and Assets

425. Of the cooperatives surveyed, coffee earned the most revenue in 2019 – 2021[393]. Second to coffee is the dairy value chain, which had revenues almost half of coffee's revenue[394] during the same period. In descending order, the value chains generating the most revenue are: tea, poultry,

[391] All data from the cooperative census undertaken for the development of this project, 2022
[392] Kenya National bureau of Statistics, Census Report 2019 defines as youth as being 35 years of age or younger
[393] In 2019, the coffee value chain revenue was estimated at $1,278,414,825 KES or $10,284,915 USD. In 2020, it was $1,643,639,851 KES or $14,2223,168 USD. In 2021, $2,288,274,586 KES or $18,409,288 USD
[394] In 2019, the dairy value chain earned $678,919,407 KES or $5,461,942 USD; in 2020, it was $905,800,883 KES or $7,287,215 USD; in 2021, it was $1,203,304,188 KES or $9,680,645 USD

fruit trees, and indigenous vegetables. Given the commercial nature the coffee, tea and dairy VC, it is unsurprising that these two chains have the greatest asset value[395].

TABLE 30: COOPERATIVES ASSET VALUE ACROSS THE 6 VALUE CHAINS

Value chain	Value in Kes	Value in USD
Coffee	2,670,497,838	21,475,655
Dairy	1,426,987,623	11,475,573
Tea	871,857,462	7,011,318
Poultry	62,301,509	501,017
Fruit trees	38,887,646	312,727
Indigenous vegetables	1,586,500	127,583

Climate Change Practises and Risk Management

426. In terms of climate change, cooperatives' members are aware of climate change and recognize climate change risks in their livelihoods. This was reflected in the number of cooperatives that practices CRLCSA strategies and/or implemented technologies. Roughly 64 out of the 320 (20 %) cooperatives *do not use technologies or practices to respond to climate change challanges*. Strategies implemented were extremely diverse with 27 cooperatives implementing water management and/or conservation measures, 39 cooperatives implementing land management and land preparation measures, 35 implementing agroforestry/agronomic practices, and six cooperatives implementing drought management measures[396].

427. While cooperatives show a great deal of diversity, they are uniform in the type of climate information accessed and used by their members. The type of climate information most consumed is related to onset/offset of precipitation, with precipitation-related storm events next.

428. By source of climate information, 123 cooperatives use TV/radio for climate information and 74 cooperatives rely on SMS messages. Another 5% use private apps and only 10% report using the Kenya Meteorological website or radio service.

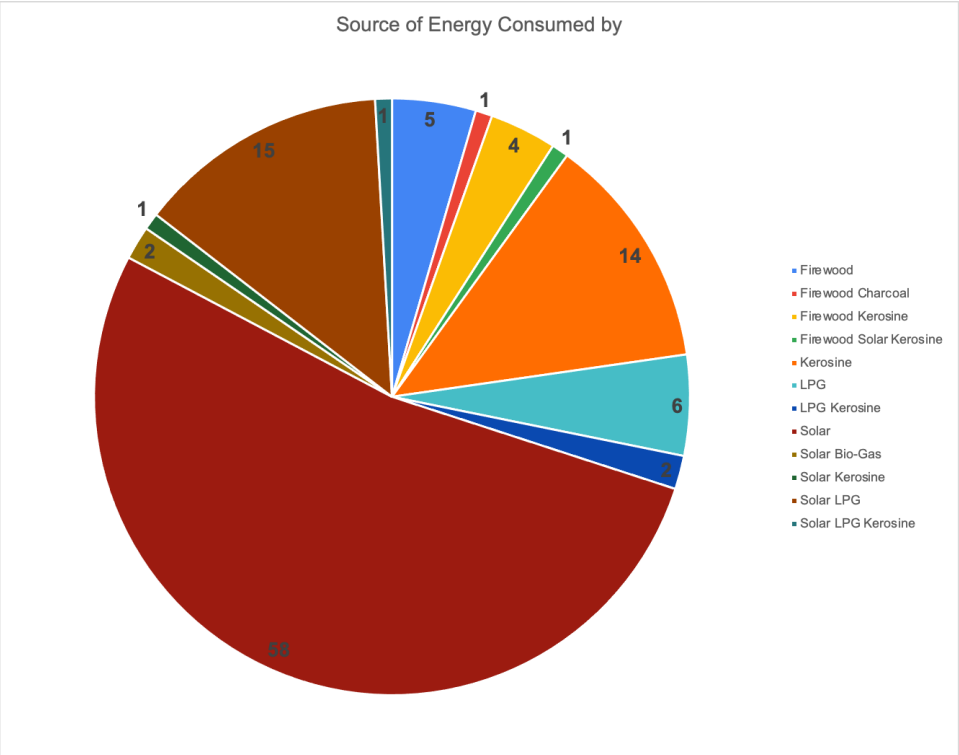
429. Another key aspect of addressing climate change within the regular business of cooperatives is energy use. A significant proportion of emissions across the 6 value chains (except for the dairy VC) comes from energy use and waste. 130 cooperatives report using on-grid hydroelectricity exclusively for processing, however, most also express concerns regarding access to energy, costs and reliability of electricity services, particularly during times of drought and/or rationing. Most cooperatives rely on a few additional sources of energy, including solar, LPG, kerosene, diesel, and charcoal. The off-grid energy sources used by cooperatives in LREB are shown in Figure 34 Source of off-grid Energy [397]. By expense, tea cooperatives spend the greatest amount on energy for the drying and fermentation processes.

[395] All data from the cooperative census undertaken for the development of this project, 2022

[396] All data from the cooperative census undertaken for the development of this project, 2022 and the Climate Change Survey

[397] All data from the cooperative census undertaken for the development of this project, 2022 and the Climate Change Survey

FIGURE 34 SOURCE OF OFF-GRID ENERGY



Typology of Cooperatives

430. To provide tailored support to cooperatives in different value chains and at different levels of development, Agriterra developed a segmentation and graduation framework outlining support needs. It is expected that cooperatives that are more developed would be required to provide more counterpart contributions for each grant dollar received from the project. Cooperatives on the latter part of the continuum would be assisted in accessing more financing from banks and financial institutions, leveraging more loans than those at the lower end of the spectrum. The tables below provide information on the levels of cooperatives and the typical needs they usually express. It is understood that the full list of needs may not be met by the project or by GCF funding alone. Support will be provided according to prioritized action plans to meet the cooperative's specific climate challenges (through the Climate Clever Check). Counterpart financing from cooperatives and other financing will be mobilized to meet some of the needs below, in particular those related to recurring HR costs, operations and maintenance, and some investment costs.

Level 1: Starting & Emerging Cooperatives and advanced self-help groups

Description - characteristics	Examples of Support needs	Expected impact
This segment is characterized by cooperatives/farmer organizations that are informal or in the early stages of development and formalization, like farmer groups, producer groups and starting cooperatives. Membership is mostly small **(0-250)**, comprised of smallholders practising basic subsistence agriculture, exhibiting high levels of climate		

vulnerability, no diversification, severely limited access to knowledge, inputs and assets, and fragile livelihoods with high seasonal variability and extreme susceptibility to climate shocks**.** Apart from basic aggregation, organizations in this segment extend some simple services, mostly on behalf of off takers, like input provision.			• Increased climate resilience and adoption of CRLCSA • Increased use of climate and weather information • Increased application of Sustainable Land Management Practices • Improved access to basic services • Increased access to (organic) inputs • Sustainable increase of production at farmer level • Preliminary inclusion in commercial value chains • Modest income improvement driven by sales of crops and increase of yield • Slight improvement in sourcing efficiency (larger volumes) and business performance
Climate Resilience & Low-Carbon Strategies	• No use of climate and weather information • Limited to no member advisory services about Climate Resilient farming practices • No supply of climate resilient and low carbon inputs to members • Member farmers vulnerable for droughts and other climate shocks	• Hiring Extension officers and training them on CRLCSA practises. • Mobilizing experts, agri-poolers, counselors, technical advisors on climate resilient, low-carbon technologies. • Support farmer outreach programs • Technical assistance and inputs related to land, water, crop/livestock, waste/energy, climate clever interventions at farmer level, • Support with demo farm development • Improved access to climate information and knowledge	
Farmer-Level	• Farmers use diesel and/or firewood as an energy source • Farmers burn waste materials • Farmers use limited sustainable land management practices • Rain-fed & sustenance agriculture	• Access to low-cost alternative energy sources such as clean cooking tech and repayment through cooperative • Trainings by Agriterra and cooperative extension officers on CRLCSA practises	
Service provision	• Aggregation and sales of small volumes • Service provision mostly driven by more upstream value chain partners basic market and production services are given	• Support Hiring Extension Officers • Outreach programs • Improve input supply • Improve aggregation services • Reduce post harvest losses	
Business Management	• Basic governance processes and bodies are in place • Operations are mostly run by the board or group members • Mostly no professional staff is	• Group strengthening and registration • Basic association rules & governance • Formalizing procedures and policies	

	recruited yet to run the business.	• Basic human resource development and strengthening	
Financial Management	• No access to finance for climate resilient and low carbon investment • Basic financial administration and record keeping • Weak planning and monitoring of financial resources • Low-cost price awareness	• Financial management and record keeping	
Operations	• Low or no access to own / rented storage and transport means • Basic aggregation capacity	• Investment in basic storage and/or transport means • Post harvest handling and storage management	
Stakeholder engagement	• Weak and/or few linkages with value chain actors and enablers	• Strengthen linkages with off takers and financial institutions	
Business performance	• Low volumes and profit margins • Low continuity in incoming volumes • No or little work capital and reserves available	• Cost price analyses • Access to work capital and markets	

Level 2: Emerging Cooperatives

Description - characteristics	**Example of support needs**	**Expected impact**
The emerging segment is characterized by cooperatives and farmer organizations that are registered and have more formalized processes and policies. Organizations in this segment start to establish a basic track record in service provision and aggregation. Membership can vary between **(251 to 1000)** members, smallholders operating at the lower end of the market (barely above subsistence level), and exhibiting high levels of climate vulnerability, limited diversification, low technical capacity, and climate-sensitive livelihoods and vulnerability to climate shocks. Organizations are mostly equipped by some basic professional staff allowing them to engage in more services and business processes. Business and financial management skills are developing, however financial and business information is shallow and reported on an ad hoc basis. Aggregation and services related to providing access to markets and market-driven production become more advanced.		• Increased climate resilience and adoption of CRLCSA • Increased use of climate and weather information • Increased application of Sustainable Land
Climate Resilience & Low-Carbon Strategies • Limited use of climate information • Some member advisory services about Climate Resilient farming practices	• Hiring Extension officers and training them on CRLCSA practises. • Mobilizing experts, agri-poolers, counselors, technical advisors on climate resilient, low-carbon technologies.	

	• Limited provision of climate resilient and low carbon inputs to members • Member farmers vulnerable for droughts and other climate shocks • Cooperative uses diesel and/or firewood for processing activities	• Support farmer outreach programs • Technical assistance and inputs related to land, water, crop/livestock, waste/energy, climate clever interventions at farmer level, • Support with demo farm development • Improved access to climate information and knowledge	Management Practices • Sustainable increase in production • Decrease in post harvest losses • Stronger management and leadership • Collective member investments • Improved access to inputs, extension and market services and potentially financial services • Inclusion in commercial value chains • Modest income improvement driven by sales of crops and increase of yield • Improved sourcing efficiency due to improved quantity and quality of supply
Farmer-Level	• Farmers use diesel and/or firewood as an energy source • Farmers burn waste materials • Farmers use limited sustainable land management practices • Farmers use limited (organic) inputs • Rain-fed sustenance agriculture	• Access to alternative energy sources, such as bio-digesters, and affordable clean cooking tech and repayment through cooperative • Training by Agriterra and cooperative extension officers on CRLCSA • Access to irrigation systems through cooperative loans and repayment through produce deliveries	
Business Management	• Basic policies and government processes are in place. • Basic professional staff in place • Simple business planning and forecasting takes place	• Business management and governance • Business planning and strengthening commercial proposition	
Financial Management	• No access to finance for climate resilient and low carbon investment • Simple financial administration and financial planning skills in place • Basic financial reports are developed • No to low access to external credit	• Basic financial management • Linking to financial institutions for CRLCSA investments in renewable energy, sustainable input production, improved (cold) storage facilities	
Operations	• Access to storage rented or owned • Access to transport means is often insufficient and unreliable • Basic post harvest handling methods in place	• Co-investments in transport methods • Warehouse management and quality control •	

Service provision	• Aggregation of small – medium sized volumes and more diversified market services • Basic extension and / or input provision services provided by organizations or through off taker • First steps towards improved quality and post-harvest handling	• Basic market-driven production and service delivery • Optimize membership management	
Stakeholder engagement	• Business relations with value chain actors more advanced • Basic relations with value chain enablers	• Strengthen linkages with off takers and financial institutions • Diversify offtake relations • Broaden engagement with service providers (e.g. input provision, mechanization)	
Business performance	• Medium-sized volumes • Increased stability of quantity and quality of supply	• Access to work capital and capital for small infrastructure investment or transport means	

Level 3: Established Cooperatives, Farmer Organizations and Agribusiness

Description - characteristics	**Support needs**	**Expected impact**
Organizations in the advanced segment are increasingly becoming professional and more sizeable in terms of membership **(1001+)** and business volumes. Membership is typically comprised of smallholders producing reduced and inconsistent surpluses with limited technical means, whose incomes remain tied to climate variability, and exhibit low levels of resilience, due to some on farm or in-cooperative diversification, access to social safety nets and extension. The organization has qualified staff hired spearheading the business operations and service provision to members. Increasingly the organization is adding value to its products and can access to markets and finance. As the financial and business management practices and performance, are advancing, organizations become increasingly creditworthy and investable. Strong membership management translates into a growing active membership base. First steps towards agri-industrializations (e.g. processing factories, handling and cleaning facilities) are being made.		• Increased climate resilience and adoption of CRLCSA • Increased use of climate and weather information • Increased application of Sustainable Land Management Practices • Sustainable increase in production • Decrease in post harvest losses
Climate Resilience & Low-Carbon Strategies • Limited use of climate information • Some member advisory services about Climate Resilient farming practices • Limited provision of climate resilient and low carbon inputs to members • Member farmers vulnerable to droughts and other climate shocks • Cooperative uses diesel and/or firewood for processing activities	• Hiring Extension officer* and train them on CRLCSA • Support farmer outreach programs • Soil, crop/Livestock soil, waste/Energy, Knowledge clever interventions at cooperative level, such, renewable energy solutions, large scale bio-solution production, improved forage production, incl. hiring staff. • Support with demo farm development • Improved access to climate information and knowledge	

Farmer-Level	• Farmers use diesel and/or firewood as an energy source • Farmers burn waste materials • Farmers use limited sustainable land management practices • Farmers use limited (organic) inputs • Rain-fed sustenance agriculture	• Access to alternative energy sources, such as bio-digesters, and affordable clean cooking tech and repayment through cooperative • Trained by Agriterra and cooperative extension officers on CRLCSA • Access to irrigation systems through cooperative loans and repayment through produce deliveries	• Increased use of technical innovations to support farmers • Improved access to inputs, extension and market services and financial services • Efficient and strong suppliers integrated in commercial value chains • Stronger vertical integration in value chains • Increased employment • Decreased sourcing and service costs
Business Management	• Solid governance and decision-making processes • The organization is well staffed with quality professionals •	• Advanced business development and coaching • Value chain commercialization and competitiveness • Advisory and business planning for investment	
Financial Management	• Limited access to finance for climate resilient and low carbon investment • Solid financial administration and management • Strong financial staff in place • Clear understanding on cost-price and profit margins • Improved access to external credit and credit worthiness • Externally audited accounts	• Linking to financial institutions for CRLCSA investments in renewable energy, sustainable input production, improved (cold) storage facilities • Unlocking work capital and investments for sustainable agri- industrialization • Optimization of financial management • Digitalization and accountancy software	
Operations	• Organizations have access to well-managed storage and transport means. • Based on adequate management information, the organizations forecast incoming volumes and plans required infrastructure / transport • Increasingly the organization employs technologies and innovations	• Co-investment in transport methods • Introduction of new technologies •	
Service provision	• The organizations are generally able to provide quality and more specialized services (e.g.	• Optimization of service provision and professionalization of membership management	

	mechanization, access to finance). • Appropriate post-harvest handling, processing and quality control methods are in place to optimize compliance with market standards.		
Stakeholder engagement	• Strong relations with value chain actors enable and other stakeholders • Increased ability to unlock services from other stakeholders	• Broaden engagement with service providers (e.g. input provision, mechanization) • Establish service ecosystems	
Business performance	• Strong track record and stable quantity and quality of supply • Increased reserves		

Level 4: Mature Cooperatives**,** Farmer Organizations and Agribusiness

Description - characteristics	**Support needs**	**Expected impact**
The top performing segment is composed out of front-runner cooperatives and farmer organizations in their respective sector and country. Membership is typically comprised of smallholders producing small surpluses, whose productivity remains tied to climate variability, who are vulnerable to climate shocks and are exhibiting low to mid-levels of resilience thanks to some degree of diversification, an access to social safety nets and extension, and some access to climate information. Because of their strong business strategy, management and performance, organizations have a relatively stable market position and contribute significantly to job creation and/or agro-industrialization. The organization has adequate financial systems and management in place, allowing for insight in the key cost and revenue drivers. Governance and management processes are modernized and allow for responding to changing business needs and dynamics. Generally, organizations are able to attract proper human resources and capital. However HR and the capital base continue to be a risk factor.		• Increased climate resilience and adoption of CRLCSA • Increased use of climate and weather information • Increased application of Sustainable Land Management Practices • Sustainable increase in production • Decrease in post-harvest losses • Increased use of technical innovations to support farmers
Climate Resilience & Low-Carbon Strategies • Use of climate information • Some member advisory services about Climate Resilient farming practices • Provision of climate resilient and low carbon inputs to some members, but not to all • Member farmers susceptible for training • Member farmers vulnerable to droughts, climate variability and climate shocks • Cooperative uses diesel and/or firewood for processing activities	• Hiring Extension officer and train them on CRLCSA • Support farmer outreach programs • Soil, crop/Livestock soil, waste/Energy, Knowledge clever interventions at cooperative level, such, renewable energy solutions, large scale bio-solution production, improved forage production, incl. hiring staff. • Support with demo farm development • Improved access to climate information and knowledge	

Farmer-Level	• Farmers use diesel and/or firewood as an energy source • Farmers burn waste materials • Farmers use limited sustainable land management practices • Farmers use limited (organic, climate resilient, low-carbon) inputs • Rain-fed agriculture	• Access to alternative energy sources, such as bio-digesters, and affordable clean cooking tech and repayment through cooperative • Trained by Agriterra and cooperative extension officers on CRLCSA • Access to irrigation systems through cooperative loans and repayment through produce deliveries	• Improved access to inputs, extension and market services and financial services • Export readiness / import substitution • Increase in rural employment • More sustainable and climate resilient agricultural practices • Access to capital at company and farm level •
Business Management	• Modern and adaptive business management • Transparent and flexible governance processes and bodies • Strong HR base	• Intensive/highly specialized consultancy support on specific topics • Prepare for expansion, investments, growth and/or export • Document and show case best practices and success stories	
Financial Management	• Limited access to finance for climate resilient and low carbon investment • Advanced financial management systems in place • Based on financial strategy and business plan, capital is unlocked for further growth, value addition, etc.	• Linking to financial institutions for CRLCSA investments in renewable energy, sustainable input production, improved (cold) storage facilities • Unlocking work capital and investments for sustainable agri- industrialization • Investment and financial strategy •	
Operations	• Organizations have a strong asset base in terms of storage, logistics and processing equipment to run the operations and add value to the product. • Organizations employ digital systems and technologies to support the business operations	• Specialized advice to optimize operational efficiency and modernize processes • Introduction of new technologies/innovations	
Service provision	• Organizations are able to manage more complex service ecosystems allowing farmers access to holistic bundle of services	• Optimization of service delivery model and service ecosystem • Adoption and scaling of technology and innovations	

	• More specialized services are given or unlocked through third partners, like finance or mechanization		
Stakeholder engagement	• Strongly integrated upstream in commercial value chains • Strong stakeholder relations that	• Managing complex business and service ecosystems	
Business performance	• High quality and quantities of supply • Healthy financial ratios		

6.3 Measuring adaptation and resilience benefits

431. In this project the definition of **vulnerability** includes the *exposure* of people and agricultural landscapes to climate hazards and climate change trends, *sensitivity* to such changes, and *adaptive capacity*.

Exposure

432. *Exposure* refers to the overlap between the presence of potentially damaging hazards and the location of communities, assets, and resources. The exposure of project beneficiaries is a factor of the location, environmental and demographic characteristics of the LREB. It is explained in part A of the feasibility study.

Sensitivity

433. The degree to which a system is adversely or beneficially affected by a given climate change exposure is sensitivity. Natural and/or physical attributes can define sensitivity, e.g. topography, soil types resistant to erosion, land cover, etc. Human activities also fall under sensitivity, for example, tillage systems and water management. The sensitivity of a system or of a stakeholder can be affected by social factors, as well as recent and historic adaptation.

Adaptive Capacity

434. IPCC's AR6 definition is *the 'Ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.'* Building on the IPCC's definition and the RIMA2 framework, our measure of adaptive capacity is done through a set of a quantitative socio-economic, structural, institutional, and technological factors. The bottom line is that a successful adaptation measure is one that allows stakeholders to cope or even benefit from climate change impacts without jeopardizing future adaptive capacity (at individual, social or ecological levels – *maladaptation*).

435. **Resilience in this project is therefore a direct result of adaptive capacity and sensitivity.** To measure progress in resilience and to ensure the inclusion of all project-influenced variables, the project has created a Resilience Index that draws heavily on the Resilience Index Measurement and Analysis Framework (RIMA-II[398]) that was developed by FAO. Originally conceived as a tool to

[398] The RIMA framework was created using the following definition of resilience: "The capacity of a household to bounce back to a previous level of well-being (for instance food security) after a shock". While this definition (and the indicators that support it) do not exclude climate

measure socio-economic resilience to food-related shocks, the RIMA-II contains sub-indicators that also inform climate resilience. The RIMA II index classifies data according to 5 groups of elements of resilience. For this project, we have retained those indicators that are specifically impacted by climate change and that align with our theory of change and projected impact pathways.

436. Furthermore, we cross-referenced the RIMA framework with the IPCC 6 definitions of climate risk and resilience, to include measures of sensitivity and adaptive capacity specifically related to climate change (as opposed to strictly food-related). Given that this project works in the agri-food sector, there was considerable convergence between the two sets of indicators, however, our Resilience Index largely foregoes the non-climate drivers of resilience that are currently included in the RIMA-2 Framework. The project does not intend to act on all the sub-indicators listed here, even though they are necessary to render an accurate portrait of climate resilience. For example, the project will not directly act on access to basic services therefore, there is expected to be no major change in those conditions for the duration of the project. The sub-indicators include:

- Access to Basic Services (ABS): This includes access to water/sanitation, energy, markets and roads, and health services. The reason these indicators are included is because they facilitate or hinder access to agricultural assets (e.g. inputs) and therefore determine the ability to generate income in the face of climate change; they also facilitate or hinder access to public services and aid in the case of severe climate events, along with the transmission of climate information services.

- Access to Assets (AST): This includes assets directly related to the generation of income from agriculture (an indicator that the project will seek to influence) but also protective assets, meaning those that can serve as buffers to climate impacts. For this project we have retained the following production assets: access to land, access to crop and livestock for production, access to savings and finance and access to processing and value addition facilities, as well as the direct measure of income from the main VC commodity - and the following non-productive assets: access to climate resilient, low-carbon technology, access to post harvest storage and access to shelter. These are all sub-indicators the project intends to directly change.

- Adaptive Capacity: This category also includes sub-indicators that will be directly influenced by the project and are limited to adaptive capacity in relation to climate change. Though all the other indicators also contribute to adaptive capacity, we have retained the following three dedicated sub-indicators: Access to climate resilient, low-carbon technology, access to education and training, and access to climate information and early warning.

- Access to Social Safety Nets (SSN): In this category we included only one indicator which is related to membership in a farming group, business unit or cooperative (to be disaggregated). In conformity with the project theory of change, membership in a farming organization serves as a mechanism to reduce risk and accelerate knowledge and technology acquisition. This sub-indicator is not included in the RIMA framework but is added in for the purpose of this project as a means of sharing climate risk or reducing climate risk through social networks, public or private. Furthermore, the sub-indicator will help us understand differences in resilience scores among the different types of beneficiaries (members of FFS versus members of cooperatives).

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shocks, they do not consider slow-onset climate trends and indidual sensitivity/exposure to those, as a "shock". Furthermore, the RIMA II resilience index contains two parts: one direct, descriptive measure and the other indirect and inferential that looks at determinants of resilience.For the purposes of this project, it was felt that the second part would be superfluous since we are only considering the climate drivers of resilience and not the full spectrum of underlying causes. Please refer to https://www.fao.org/3/i5665e/I5665E.pdf for further reading on RIMA II.

- Sensitivity (S): In the context of the project sensitivity relates to exposure to climate risk as well as to the ability to resist to climate shocks, which may be facilitated or undermined by some underlying socio-economic factors. As noted earlier, overall "geographic" sensitivity and the climate risks and hazards to which beneficiaries are exposed, is established in section 2. In this category we have included socio-economic drivers of sensitivity, such as gender and age, disability, membership in an ethnic minority or indigenous people community[399], current level of food security or malnutrition, and the dependence on rain-fed agriculture, given that precipitation is one of the key factors to be influenced by climate variability and change.

437. Definitions for each criterion, along with data type, disaggregation, and measurement scale are detailed in Table 31. The measurement will be made at household level, through a Resilience Survey of a representative sample of project participants at inception, mid-term and final evaluation). To facilitate tracking of project indicators and deliverables, the survey will be designed at inception, and will also include additional questions related to other project indicators (e.g. income levels, production data, etc.) to minimize the reporting burden on farmers and the project. (See Monitoring and Evaluation Plan in Annex 11.)

438. To ensure that the specific barriers to resilience faced by women and other vulnerable groups are adequately represented in the Resilience index, where possible indicators will be reported in a disaggregated manner. At least half of the interviewed sample will be women (and within that, 30% will be women heading households); 20% will be youth, and 2% will be PLWD. Additional questions related to gender-differentiated, age- and disability-differentiated access to services, adaptive capacity and assets will also be inserted into the survey during its design.

439. The Resilience Index is measured against a total score ranked out of 49 points (49 points being highly resilient). The project is expected to directly influence change on a few of the indicators selected, as listed in the table.

440. An initial simulation using regional data and locally informed estimations was conducted to ground truth the conceptual framework and obtain an initial, pre-baseline measure of resilience. The test shows that all smallholder farmers in LREB rank relatively low on this resilience index scale. However smallholders who are members of business groups and cooperatives are approximately 15% more resilient than their peers who are not. This is mostly due to the ability to use cooperatives and business groups as social networks, risk reduction and risk-sharing mechanisms, and means for accessing assets and information.

[399] Respondents will be invited to self identify as a member of an ethnic minority or indigenous people.

TABLE 31:SUB-INDICATORS, DEFINITIONS AND MEASUREMENT SCALE OF THE RESILIENCE INDEX

Sub-indicator	Definition	Measure	Scoring	PROJECT INFLUENCED	Max score	TEST SCORE Non-group members	TEST Score Cooperative members
ACCESS TO BASIC SERVICES					7	3	3
Access to health services (RIMA ABS)	There is a doctor, clinic, dispensary less than 5 km away from household	Yes/No	1/0	No	1	0	0
Adequate access to energy (RIMA ABS)	Household has access to electricity (not including firewood); grid connection, LPG, Diesel, for household needs	Scaled	0 = no access; 1 = access with regular interruptions; 2 = year round secure access	No	2	1	1
Access to safe drinking water and sanitation facilities (RIMA ABS)	Household has access to a well, pump, river, within less than 1 km and sanitation in house or village	Scaled	0 = no access; 1 = Access to drinking water only; 2 = Access to water and sanitation	No	2	1	1
Access to Markets (RIMA ABS)	Market is located less than 8 km of house	Yes/No	1/0	No	1	0	0
Access to Roads (RIMA ABS)	Road (feeder road, rural road, paved road) is located within 2 km of house	Yes/No	1/0		1	1	1
ACCESS TO ASSETS					**18**	**9**	**13**

Access to savings and finance (RIMA AST)	A member of the household has access to savings and loans (SACCo, Bank, etc.)	Scaled	0= no access to savings and loans, 1 = access to family savings only, 2= access to SACCO, 3 = access to bank loan/savings	YES	3	1	2
Access to crop and livestock for production (AST)	A member of the household has access to crop and/or livestock for production (Seeds and animals, as well a required equipment to produce)	Scaled	0 = access to a single asset; 1 = access to 2 assets; 2 = ownership of 2-4 assets ; 3 = ownership of 4-10 assets; 4 = access to more than 10 assets	YES	4	2	3
Access to Land (RIMA AST)	A member of the household has ownership of land, formal tenure or lease of land	Scaled	0 = no access; 1 = informal occupancy; 2 = land lease or loan, 3 = land ownership	No	3	2	2
Access to Post-harvest storage(AST)	A member of the household can store goods on a farm or in a storage located within 2 km of farm	Yes/No	0 = no access, 1 = access	Yes	1	0	1
access to processing and value addition facilities (RIMA AST)	A household member has regular use of a value addition or processing facility	scaled	0 = no access; 1 = limited access; 2 = regular and secure access	Yes	2	1	2
Annual Income and Sales of main VC commodity (AST)	The monetary value of monthly income from sales of the main VC commodity	Scaled	0 = household consumption only; 1 = X KSH; 2 = between X and Y KSH; 3 = Between X and X KSH, 4 = between X and X KSH; 5 = More than X KSHè	Yes	5	3	3

ADAPTIVE CAPACITY					**13**	**4**	**5**
Access to CRLC technology (RIMA AC)	A member of the household has access to extension, technical support, knowledge of, or training in CRLC practises	Scaled	0 = no access; 1= less than once a year, 2 = 1=2 times a year; 3 = 2-4 times per year; 4 = on demand	yes	4	1	2
Access to education (RIMA AC)	A member of the household has the opportunity to attend training, formal education	Scaled	0 = no access; 1 = rarely; 2 = often, 3 = on demand	yes	3	1	1
access to climate information/EWS (RIMA AC)	A member of the household receives any of the following: agronomic advice, extension, last mile climate services; early warnings and seasonal warnings.	Scaled	0 = no access; 1= less than once a year, 2 = 1=2 times a year; 3 = 2-4 times per year; 4 = Monthly; 5 = weekly; 6 = daily/on demand	yes	6	2	2
SOCIAL SAFETY NETS					**3**	**1**	**3**
Membership in farmer organization (RIMA SSN)	A member of the household has access to shared resources, knowledge, assets, markets as part of a farming group or cooperative	Scaled	0 = not a group member; 1 = member of an informal group (FFS); 2 = member of a registered business unit; 3 = active member of a cooperative	yes	3	1	3
SENSITIVITY					**8**	**3**	**3**
Female heading the household (RIMA S)	households where the main source of income and food is derived from a woman's activity	Yes/No	1/0	No	1	0	0

Person living with disability in beneficiary household (RIMA S)	Includes sensory, physical or intellectual disability; includes any member of the household.	Yes/No	1/0	No	1	0	0
Household has experienced food insecurity, malnutrition or stunting in past 5 years (S)	The household has lacked regular access to enough safe and nutritious food for normal growth and development and an active and healthy life; or has benefitted from food aid or emergency assistance; or a child of the household is exhibiting signs of malnutrition or stunting.	Yes/No	1/0	No	1	1	1
% household income from rainfed crops (RIMA S)	The %age of household food and income that is derived from rainfed crops	Scaled	5 = 0-10%; 4 = 10-20%; 3 = 20-40%; 2 = 40-60; 1 = 60-80%; 0 = more than 80%	No	5	2	2
Resilience Score					49	20	27

6.4 Mitigation Benefits

441. The calculation of mitigation benefits for this project was made using two different methodologies. The FAO Ex-ACT methodology and model was used to calculate emissions from AFOLU activities (crop value chains), and the GLEAM model was used to calculate emissions reductions in the livestock value chains (dairy/poultry). Overall, the project reduces emissions by an anticipated 4,268,492 tons Co2eq over its lifetime (20 years).(please refer to Annex 22)

442. Mitigation benefits are expected from the following activities and technologies:

- Reforestation, regeneration, rehabilitation and conservation of land under the Landscape Management Strategies (Output 2.1)
- Integration of agroforestry in existing value chains (Output 3.1)
- Improvements in land preparation, tillage, soil cover (Output 3.1)
- Improvements in water and energy use efficiency (Output 3.1)
- Increased use of renewable energy, waste-to-energy and reduction of deforestation (Output 3.1)
- Improvements in emissions intensity per litre of milk, kg of meat and kg of egg through improved productivity and feed/management changes (Output 3.1)
- Reductions in emissions from food loss and wastage (Output 3.1)

443. Key assumptions for the calculation of mitigation are as follows and specific assumptions for each model are detailed next.

444. **Adoption rates**: for all promoted technologies we have assumed that, with project support, the adoption rate of all technologies proposed will be 60%. This figure is backed by experience from FAO and Agriterra through both cooperatives and farmer field schools. It is also a reasonable assumption that not all farmers will be applying all technologies by the end of the project, but rather will focus on the ones that provide them with the most economic and resilience benefit. Our assumption is that at least 60% of participating farmers will adopt at least 2 of the promoted climate resilient, low-carbon practises (in addition to any practices they are already implementing). We also assume that this uptake will continue well after the duration of the project, given the long-lasting nature of the technology transfer mechanisms created by the project.

445. **BAU scenario:** The emissions reduced should be compared not only to the baseline level of emissions, but also to what would be expected under the business-as-usual scenario in 20 years. The business-as-usual scenario for Kenya includes high rates of population growth and food demand growth, including changes to food consumption patterns (e.g. more milk and meat) related to socio-economic levels, all of which are driving pressure to produce more through extensification and deforestation[400]. This also drives the need for more energy consumption, not all of which will be sourced from hydroelectricity given the slow pace of grid connection and the climate risks to water supply in major dams.

446. In the *livestock* sector, the BAU scenario sees a near doubling of heads of cattle in Kenya and a push towards intensification in the livestock and dairy sector[401]. This may also exacerbate potential conflicts over land use and push the production towards feed crops over food crops.

447. It is understood that emissions in the livestock sector are likely to increase under the project scenario even with significant improvements in productivity, modifications in feed and breed, and

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401 FAOSTAT

other changes in land use. The proportion of emissions arising from enteric fermentation is 73% of all livestock emissions.[402] However, the project intends to achieve a marked improvement in *emissions intensity* in the livestock sector, and an overall reduction in emissions compared to the BAU scenario at 2040 horizon.

448. For poultry, increasing demand for meat and eggs will drive an increase in numbers of heads. Poultry meat consumption is expected to triple by 2030 as a combined effect of increasing per capita consumption and population growth. With a current estimated poultry population of 31 million birds nationally[403], this could mean a tripling of emissions related to poultry in less than 10 years. Other projections foresee an increase in chicken population 375 %[404.]

449. For the targeted *crop value chains*, under the BAU scenario, the current tendency to increase production through extensification will accelerate, feeding into deforestation and land degradation loops. Furthermore, delays in adopting sustainable natural resources use practices, or climate resilient, low carbon agriculture, will result in an intensification of emissions generated from land use, land use change and forestry.

450. Please refer to annex 22 for details on emissions reductions benefits for the project.

Summary of project emissions reductions

451. Emissions related to land use were calculated using EX-ACT v9. Assumptions and details are included in Annex 22a.

TCo2Eq	LIVESTOCK	AFOLU	TOTAL
TOTAL MITIGATED 2030 (in project)	(22,129.59)	(1,265,460.00)	(1,287,589.59)
TOTAL MITIGATED 2040	(50,294.04)	(4,218,198.00)	(4,268,492.04)

Emissions for the livestock related interventions were calculated using the GLEAM methodology (dairy and poultry). Data sources, assumptions and details are included in Annex 22b and 22c.

6.5 Co-benefits

6.5.1 Jobs

452. The types of indirect benefits and co-benefits expected from this project range wide. They include job creation in agro-processing industries, increased economic activity in the supply chains

[402] FAOSTAT

[403] https://zootecnicainternational.com/field-reports/poultry-sector-kenya/

[404]https://www.ilri.org/news/kenyan-livestock-sector-grow-‘exponentially’—kenya-national-bureau-statistics

for agricultural inputs and feed value chains, and increased employment in the transporting and bulking aspects of the value chain. Jobs may include:

- Cooperative extension officers: each cooperative can recruit extension officers to deploy the technologies acquired through this project to cooperative members.
- FFS Master Trainers and Facilitators: While the project expects to recruit and train 14 Master Trainers and Facilitators, once their project mandate is over, they will be able to join cooperatives or other farmer organization, join governments, or to work as private extension service providers.
- Farm labourers: jobs within cooperatives to monitor quality of produce, undertake increased processing activities, maintain machinery and infrastructure, negotiate trade agreements, package products. Other jobs outside of cooperatives may also include bulkers, off-takers, artisanal processors, collectors.
- Off-farm workers: transporters, packagers, maintenance workers, employment in the monitoring of water quality and quantity, work in reforestation, afforestation and environmental management, waste collectors and waste transformers.
- Increased employment in input supply chains (including feed, seeds, and agrochemicals providers, veterinary services), transport, infrastructure (related to the upgrade of post-harvest and irrigation), banking and finance.

453. The project will only track jobs that are directly created through project interventions and those that are created in beneficiary farmer organizations and cooperatives. The expected number is 2000 jobs created over the duration of the project. However, data from county government employment statistics will be consulted to confirm trends at large in the agriculture sector. Data on employment created will be disaggregated to also highlight the employment created for women and youth, as part of the project's overall GESI strategy.

454. Additionally, the project expects to generate benefits to the broader population of the LREB through the implementation of climate-sensitive landscape management strategies, and the overall improvement of the economic outlook in the region.

6.5.2 Environmental Co-Benefits

455. The project will also generate environmental co-benefits from various interventions and at various scales, though these will not be explicitly tracked by the project, due to the difficulty in conceptualizing attribution links to project activities, and also the sophisticated tracking system that would be required to measure them.

456.

457. At the farm level, environmental co-benefits may include improved land productivity and increased biomass production, improved soil fertility, soil moisture retention and micro-organism content, but also increases in agro-biodiversity at farm and landscape levels. These arise from the implementation of sustainable land management techniques, anti-erosion work, increase in soil cover and the combination of crops or crop rotation, as well as the judicious application of fertilizer, reductions in use of noxious agrochemicals and herbicides.

458. At the landscape level the project also expects to deliver, through the implementation of the landscape management strategies (output 2.1) combined with other, non-project interventions, improved forest cover and forest density, reductions in rates of run-off and erosion, improvements in biodiversity status, and improved water conservation and aquifers recharge.

6.5.3 Socio-economic Co-Benefits

459. Socio-economic benefits that can also be expected in this project arise indirectly from the increase in access to food and improved food security, and increased levels of income generated by the project. These will not be tracked, as attribution pathways will also be difficult to establish, as well as the time lag between the time of project intervention and the time these changes manifest. Potential co-benefits include:

- Improved access to education for children and especially girls (whose working tasks may be reduced, or through improved ability to pay school fees).
- Improved health through access to increased, more diverse and better quality food (either produced or purchased)
- Improved access to health services (increased ability to pay)
- Increased gender equality
- Reduced rates of gender-based violence and child labour
- Increased access to meaningful employment for youth, women, persons with disabilities
- Increased access to rural finance
- Reduced losses during climate extremes, meaning continued access to productive and protective assets

7. Costs and financing

7.1 Financing plan

460. Below is the overall financing plan for this project. Table 32 presents overall financing by Activity and contributor.

TABLE 32: FINANCING PER ACTIVITY

Component	Output	Indicative cost million USD ($)	GCF financing		Co-financing		
			Amount million USD ($)	Financial Instrument	Amount million USD ($)	Financial Instrument	Name of Institutions
Component 1 – Enabling local government support for adaptation and mitigation	Output 1.1 Local administrations deploy improved climate knowledge, extension, and methodologies to support producers and value chain actors	2.44	2.00	Grants	0.44	Grants	FAO
Component 2 – Sustainable Resilient Agricultural Landscapes	Output 2.1 Agricultural landscapes are managed under strategies that conserve, restore, and sustainably manage community forest and agriculture land, and reduce emissions	13.61	0.32	Grants	12.99	Grants Grants	Government of Kenya FAO
Component 3 – Resilient livelihoods	Output 3.1 Vulnerable smallholders adopt gender-responsive and socially inclusive climate resilient and low carbon production and processing practices, technologies, assets, and risk reduction mechanisms	25.64	22.04	Grants	3.60	Grants	Government of Denmark
Component 4 – Scaling through CRLCSA market and finance	Output 4.1 Increased access to markets and profitability of climate smart, low carbon sustainable agricultural products	1.32	1.07	Grants	0.25	Grants	FAO
	Output 4.2 Vulnerable smallholders and their organizations have increased access to gender-responsive and socially inclusive financial products that support climate resilient, low carbon growth	2.84	0.9	Grants	1.94	Grants	Government of Denmark
Monitoring and Evaluation		1.64	1.55	Grants	0.08	Grants	Government of Denmark

Project Management		2.50	1.33	Grants	1.17	Grants Grants	Government of Denmark Government of Kenya
Indicative total cost (USD)		49.99 million	29.22 million		20.78 million		

7.2 Cofinancing plan

461. Cofinancing is mobilized as follows:

462. *Government of Kenya cofinancing (14,000,000$)* is channelled directly from each county government in support of their executed activities. The supported activities fall under the scope of Output 2.1, specifically activity 2.1.2, which are also cofinanced by FAO. Funds from counties are sourced from multiple origins including tax income and funds transferred according to the G-FLLoCA program terms and conditions.

463. *Cofinancing from the Danish Ministry of Foreign Affairs*[405]: the financing will be in form of a grant of 40 million DKK (approximately 5.8 million USD) which will be used mainly in Outputs 3 and 4 for the technology transfer to cooperatives. This financing will be channelled through FAO as AE to support activities executed by Agriterra.

464. *Co-financing from FAO (981,510 USD) is deployed through Outcomes 1 and 4*[406]*. Financing from FAO comes from the implementation of the Mount Elgon Restoration project (Activity 2.1.1), and dedicated Technical Cooperation Project (TCP) facility (Activity 1.1.1).*

465. Funds will be disbursed through FAO as Accredited Entity, who will then transfer the funds annually to the appropriate executing entities according to the agreed activities.

466. The project also leverages up to 10 million USD in Loans from Cooperative Bank, Equity Bank and Kenya Commercial Bank (KCB) as leveraged financing in support of farmers, value chain actors and cooperatives.

[405] Refer Cofinancing Letters
[406] Refer letter of Cofinancing

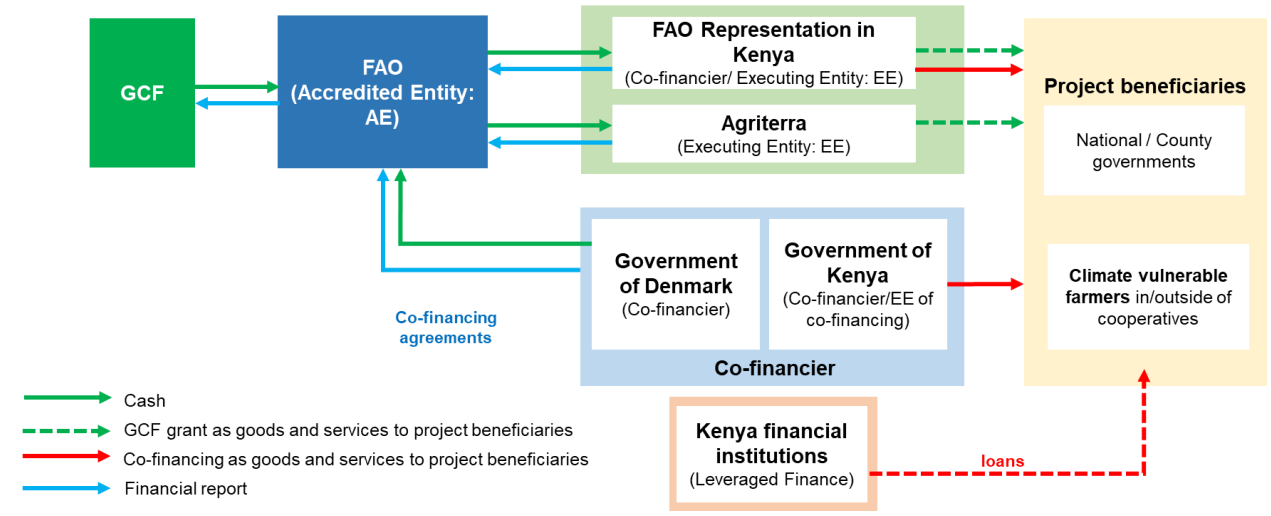

FIGURE 35: FLOW OF FUNDS

7.3 Operations and Maintenance (O&M) Plan

467. The project strengthens capacity, disseminates knowledge and assets to smallholder farmers and their organizations, county governments and financial institutions. Some of the project activities create requirements for in-project and post-project operations and maintenance which are detailed as follows:

468. Under Component 1, the county governments will continue to deliver and disseminate climate information services, extension, data and other support to farmers and cooperatives on the basis of improved capacity built by the project. The total costs of these services, which will be covered from county budgets after the project, are estimated at 2,288,069 per county per year.

469. **Under Component 2**, the counties implement their Landscape Management Strategies using their own budgets. The cost of maintenance of rehabilitated, restored, sustainably managed agricultural landscapes are estimated at a maximum of 5% of the costs of initial implementation, annually (225 USD per hectare per year). These costs include monitoring of land degradation and ecological trends, but also continued maintenance such as clearing paths, creating fire buffets, ensuring drainage and other regular land maintenance activities. Total costs of maintaining all project-supported lands (ie not counting any possible upscaling) are 45,000 USD per county per year. These costs are expected to be covered from annual county budgets.

470. Under **Component 3**, the project supports the delivery of technologies, knowledge, and assets to smallholder farmers through Farmer Field Schools and Cooperatives. Some maintenance costs may be incurred by farmer groups and farmer organizations for the project-supported assets that may include: greenhouses, irrigation kits, earth ponds and water cisterns, post-harvest storage, or processing machinery and equipment. Costs have been calculated based on 3% of project implementation costs, equivalent to 2,66 USD per participating farmer per year (total of 380,508 USD per year). These costs are to be met from cooperatives and/or farmers own resources after the project.

7.4 Exit and Sustainability Strategy

471. The project's exit and sustainability strategy is based on a few key elements that maximize the likelihoods that the results will be sustained beyond the project period and in the longer term.

- Institutionalizing the interventions by anchoring them on entrepreneurial cooperatives will ensure continuity beyond the project duration, particularly as cooperatives become more and more financially autonomous.
- Linkages between cooperatives and SMEs will ensure business continuity, hence securing long-term sustainability.
- Active demonstration of the profitability of climate resilient, low carbon practices at all stages of the value chain will lead to broader adoption locally and in other areas of the country.
- Development of long-lasting financial incentives and mechanisms will incentivize behaviour change
- Capacitated financial institutions will be able to extend their services in support of CRLCSA in other areas of the country and in other value chains.
- Sustainable management of natural resources in the service of productive value chains will ensure long-term productivity of land.
- The creation of data and evidence- based systems to inform governance and future climate change investments will allow for upscaling and learning
- Working with existing active cooperatives, processors and buyers in economically important value chains will generate a pull and push effect on the market.

472. The cornerstone of the project's approach to sustainability is the active participation of cooperatives as businesses with the support of financial institutions, to facilitate the continuation of project outcomes beyond the GCF financing period. This will happen in multiple manners: working with smallholders who are not currently part of cooperatives, the project will support increased – and increasingly elaborate – farmer organizations that are ran as aggregated business entities. This supports long term risk reduction as well as increased cost efficiencies. The cooperatives who successfully implement CRLCSA investments will see immediate financial returns, as those same CRLCSA investments will also be designed to deliver economic benefits. Mature cooperatives will be supported in demonstrating business cases for support by Banks and rural financing institutions (though Loans and various other products) and will be empowered to continue these processes after completion of the project. Once a cooperative is considered mature, it is also considered autonomous enough to continue mobilizing its own financing and other resources.

473. The project intends to use the GCF grant as a leverage to attract buyers and small and medium enterprises (SMEs) to increase their investment in cooperatives and their members to produce climate resilient and low carbon products such as coffee and tea that are certified under global standards, such as Rain Forest Alliance, organic production or fair trade. GCF grant financing will help to unlock significant private sector investment in the medium- and long-term. As there is increased and continuing demand of these certified commodities in the global market, the project will work with interested buyers to improve the quality and quantities of the commodities. Further, the project will facilitate a long-term business relationship between the farmers group and cooperatives with the buyers. Once a stable supply relationship is established, the cooperatives and groups have the potential to continue gaining income beyond the project period. This also includes for example, investment from the cooperatives themselves (cooperatives will be required to contribute in-kind and in cash leveraged co-financing for various activities supported by the project).

474. The GCF grant will be used to leverage private financing from Kenyan banks who can extend loans and other financial products to eligible project beneficiaries. Therefore, the project will use grant funding from the GCF to demonstrate financially viable CRLCSA models, but a private sector funded exit strategy is also foreseen for sustainability.

475. The project will adopt a participatory approach to ensure the full inclusion of all relevant stakeholders in ensuring sustainability throughout the project lifecycle. The project will provide technical assistance through which the cooperatives will develop a full understanding of operations and maintenance requirements for their businesses. As business cases are developed, provisions for ensuring that any ongoing O&M costs continue to be covered from cooperative revenues will be made.

8. Implementation Arrangements

8.1 Accredited Entity

476. FAO will serve as the Accredited Entity (AE) for the Project. FAO as the AE will be responsible for project implementation and administrative oversight and technical supervision, corporate management for GCF intervention, project reporting, and project completion and evaluation in accordance with the detailed provisions outlined in the GCF policies as well as Accreditation Master Agreement (AMA) and Funded Activity Agreement (FAA) to be entered into between FAO and the GCF should this funding proposal be approved by the GCF Board.

477. As such, FAO will be responsible for overall management of the Project, including: i) All project evaluation aspects; ii) Administrative, financial and technical supervision throughout implementation of the Project; iii) ensuring effective management of funds to achieve the results and objectives; iv) Quality control of Project monitoring and reporting to the GCF; v) Project closure and evaluation. FAO will assume these responsibilities in line with the detailed provisions listed in the Accreditation Master Agreement (AMA) between FAO and the GCF.

478. FAO's supervising role as AE will be attributed to the relevant offices and divisions in FAO Headquarters located in Rome, Italy, Sub-Regional Office for Eastern Africa located in Addis Ababa, Ethiopia and the Country Representation Office for Kenya (FAO-Kenya) with support by other technical divisions located FAO headquarters in Rome (HQ), as required. To perform the AE functions, FAO will set up a dedicated FAO-GCF Project Task Force (PTF) comprising relevant staff from the FAO Country Office in Kenya, the FAO Sub-Regional Office for Eastern-Africa, and FAO Headquarters, in line with FAO project cycle guidelines The PTF will remain independent from the Executing Entity functions also performed by FAO (see Executing Entities section below). In line with the GCF policy on fees adopted through GCF Board Decision B.19/09, the above-mentioned segregation of responsibilities within FAO will ensure that the Organization can independently and effectively perform the AE functions listed in the GCF General principles and indicative list of eligible costs covered under GCF fees and project management costs.

8.2 Executing Entities

479. The project will be executed by (I) FAO and (ii) Agriterra, in a co-execution modality to deliver the project activities funded by GCF proceeds. Additionally, the Government of Kenya (acting through the National Treasury will be responsible for executing their co-financed activities.

480. FAO will act as an Executing Entity (EE) in charge of the execution of selected activities funded by GCF proceeds based on its comparative advantages and will ensure strong country-driven

execution of project activities. FAO will ensure strong coordination of implementation of project activities with Agriterra and GoK through national and county level coordination. FAO will also execute the activities co-financed by the FAO.

481. Agriterra is another EE for GCF proceeds. As EE, Agriterra will implement selected activities in close collaboration with FAO-Kenya. Agriterra will set up an internal project coordination team comprised of part-time Regional Technical Officers, Monitoring and Evaluation officers, Financial analysts, Legal and Compliance Officers, and an Agripool recruiter seconded from Agriterra HQ to support the project.

482. As a member of the Cooperative Partnership for Climate Smart Food and Forestry, a consortium of Danish, Dutch, and Finnish agriculture development agencies and experts, Agriterra has on-the-ground capacities in Kenya and is able to leverage expertise of Dutch, Danish, and Finnish agriculture experts and specialists in building climate resilient agriculture cooperatives.

483. The Government of Kenya, represented by the National Treasury, will also act as EE for the activities cofinanced and implemented by county governments.

484. Execution responsibilities are divided by Activity as per Table 33:

TABLE 33: EXECUTION RESPONSIBILITIES PER ACTIVITY

Activity	Sub-activity	Executing Entity	Funding source
1.1.1 Develop and deploy innovative and efficient extension methods for disseminating and demonstrating CRLCSA knowledge, technologies, and practices in gender-responsive and socially inclusive ways	1.1.1.1	FAO	GCF
	1.1.1.2	FAO	GCF
	1.1.1.3	FAO	FAO
	1.1.1.4	FAO	FAO
	1.1.1.5	FAO	GCF
1.1.2 Strengthen the dissemination of climate information services to last-mile users including women, youth and PLWD through cooperatives and Farmer Organizations.	1.1.2.1	FAO	GCF
	1.1.2.2	FAO	GCF
	1.1.2.3	FAO	GCF
	1.1.2.4	FAO	GCF
	1.1.2.5	FAO	GCF
	1.1.2.6	FAO	GCF
	1.1.2.7	FAO	GCF
1.1.3 Develop and test methodologies for decentralized carbon accounting	1.1.3.1	FAO	FAO
	1.1.3.2	FAO	FAO
	1.1.3.3	FAO	FAO
	1.1.3.4	FAO	FAO
1.1.4 Upgrade and update agricultural databases, crop and productivity datasets, cooperative census	1.1.4.1	FAO	FAO
	1.1.4.2	FAO	FAO
	1.1.4.3	FAO	GCF
	1.1.4.4	FAO	GCF
1.1.5 Assess local climate change impacts and eligible climate solutions for the ag sector	1.1.5.1	FAO	FAO
	1.1.5.2	FAO	GCF
1.1.6 Share knowledge and lessons learned through existing platforms	1.1.6.1	FAO	GCF
	1.1.6.2	FAO	GCF
	1.1.6.3	FAO	GCF
	2.1.1.1	FAO	GCF

2.1.1 Develop a county climate-resilient and low-carbon agricultural landscape management strategy and implementation plan, including improved watershed management, land use planning, reforestation, and natural regeneration	2.1.1.2	FAO	GCF
	2.1.1.3	FAO	GCF
	2.1.1.4	FAO	GCF
	2.1.1.5	FAO	GCF
2.1.2 Implement and monitor climate-resilient and low-carbon landscape management plans.	2.1.2.1	GoK	GoK
	2.1.2.2	GoK	GoK
	2.1.2.3	GoK	GoK
	2.1.2.4	FAO	FAO
	2.1.2.5	GoK	GoK
3.1.1 Deploy CRLCSA production/ processing assets and training to smallholder farmers, farmer organizations and associations	3.1.1.1	FAO	GCF
	3.1.1.2	FAO	GCF
	3.1.1.3	FAO	GCF
	3.1.1.4	FAO	GCF
	3.1.1.4	FAO	GCF
	3.1.1.5	FAO	GCF
	3.1.1.6	FAO	GCF
3.1.2 Disseminate CRLCSA technology, knowledge, and assets to cooperative members through peer-to-peer networks and exchanges	3.1.2.1	AGT	DMFA
	3.1.2.2	AGT	GCF
	3.1.2.3	AGT	DMFA
	3.1.2.4	AGT	DMFA
3.1.3 Support smallholder farmer aggregation into cooperatives and other business units as climate risk reduction and risk sharing mechanisms	3.1.3.1	AGT	DMFA
	3.1.3.2	AGT	GCF
	3.1.3.3	AGT	DMFA
3.1.4 Support improvements in social inclusion and women's meaningful participation in CRLC value chains	3.1.4.1	FAO	GCF
	3.1.4.2	FAO	GCF
	3.1.4.3	FAO	GCF
4.1.1 Work with buyers and aggregators to increase demand and market opportunities for CRLCSA commodities	4.1.1.1	FAO	GCF
	4.1.1.2	FAO	GCF
	4.1.1.3	FAO	GCF
	4.1.1.4	FAO	GCF
	4.1.1.5	FAO	FAO
	4.1.1.6	FAO	GCF
	4.1.1.7	FAO	GCF
4.1.2 Increase access to various certification and labeling schemes	4.1.2.1	AGT	GCF
	4.1.2.2	AGT	GCF
4.2.1 Develop gender-responsive and socially inclusive private finance tools, procedures, and products to promote the upscale of CRLCSA value chains	4.2.1.1	FAO	GCF
	4.2.1.2	FAO	GCF
4.2.2 Support smallholders and their business units in the development of bankable business plans, with particular focus on social inclusion and gender-based access	4.2.2.1	AGT	DMFA
	4.2.2.2	AGT	DMFA
4.2.3 Facilitate smallholders access to financial incentives schemes for agroforestry	4.2.3.1	AGT	GCF
	4.2.3.2	AGT	DMFA
	4.2.3.3	AGT	GCF

8.3 Project Governance

485. A Project Steering Committee (PSC) will be established to provide strategic guidance for the project. The PSC will be co-chaired by the PS of the Treasury (NDA) and the the Principal Secretary of the MoA. Members will also include:

- The Chair of Agriculture Committee Council of Governors
- The Chair of Climate Change Committe Chair of the CoG
- The Representative of FAO in Kenya
- The Chair of Lake Region Economic Bloc counties
- The Chief Officer of the Council of Governors
- The Chief Executive of the Lake Region Economic Bloc and
- The Principal Secretary from the Ministry of Industry, Trade And Cooperatives,
- The Principal Secretary (Representative) of Ministry of Environment,

486. Members will also be invited from other key government departments and agencies, representative of private sector, representative of farmers' cooperatives farmers' organizations, representatives of indigenous peoples. Attention wil be paid to ensure meaningful participation of women representatives in the PSC.

487. The role of the PSC will be to: (i) provide overall guidance and direction to the project, ensuring it remains within any specified constraints; (ii) address project issues as raised by the national project coordinator; (iii) monitor project risks and the effectiveness of mitigation measures, and provide guidance on new project risks, and agree on possible countermeasures and management actions to address specific risks; (iv) review the project progress, and provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans; (v) review and agree with annual work plan and provide necessary strategic guidance for its implementation; (vi) appraise the annual project implementation report, including the quality assessment rating report; (vii) make recommendations for subsequent work plans to build on achievements and address any shortcomings; and (viii) provide ad hoc direction and advice for exceptional situations when the project coordinator's tolerances are exceeded.

488. The PSC will be expected to meet formally at least once every 12 months. Formal meetings will be scheduled and arranged by the National Project Coordinator in consultation with, and at the request of PSC members (with tentative dates for the following meeting being agreed under Any Other Business). Extraordinary meetings of the PSC can be requested by any of its members.

8.4 Project Management

489. The project will establish a Project Technical Coordination Committee (PTCC) that will be functional for the entire duration and be responsible for technical oversight of the project. The PTCC will be co-chaired by a Representative of MoA and NDA, coordinated by FAO Kenya and Agriterra, and supported by representatives from the Ministries of Environment and Agriculture, the NDA the Ministry of Cooperatives, and the Cooperative Partnership and representatives from civil society and private sector. A representative of indigenous peoples will also be invited to participate in the PTCC, and attention will be paid to ensuring equal gender participation in the Committee. Other stakeholders such as representatives from other projects and institutions active in the LREB (e.g. IFAD, World Bank), cofinancing partners, and others such as ACELI Africa Trust, Kenya National

Farmers' Federation, will also be invited to participate as observers in the meetings. The PTCC will meet every 6 months using in-person and online platforms and its function will be to conduct overall Monitoring, learning and reporting on project delivery, conduct regular risk management, and address any implementation issue prior to and in between high-level PSC meetings. The PTCC will report to the PSC.

490. A project Management Unit (PMU) will also be created that will be functional for the entire duration and be responsible for day-to-day delivery and supervision of the project. The main functions of the PMU, following the guidance of the PSC are to:

1. Consolidate the annual work plans and budgets submitted by the executing entities;

2. Be responsible for fiduciary matters, including financial management, procurement and project disbursements;

3. Ensure coordinated delivery of the agreed projects outputs and activities through the coordination of all Executive Entities, partners, stakeholders and suppliers involved in project delivery;

4. Conduct overall monitoring, evaluation, learning and application of knowledge products with the support of relevant experts involved in the project delivery;

5. Ensure that the safeguards framework is used throughout the project and raise any potential safeguards violations.

6. Ensure operational staff and technical consultants engagement, recruitment and retention, and supervise their work programs.

491. The PMU will serve as Rapporteur to the PSC and the PTCC. The PMU will be led and managed by a project-recruited National Project Coordinator (NPC). The NPC will be appointed by FAO and will be responsible for overall project management and coordination with project stakeholders. The PMU will also include (part-time) a finance officer, operation officer, human resources & administration officer and procurement & contracting officer. In addition, the project PMU will mobilize the following specialists to deliver project outputs and outcomes:

- A Gender and Social Inclusion Specialist
- M&E and knowledge management specialists;
- Regional project coordinators;
- Legal and contracting agents
- Program Assistants and Logistics Support
- Human Resources and recruitment specialists
- An ESMF specialist and ad hoc consultants
- Finance, administration and procurement officers

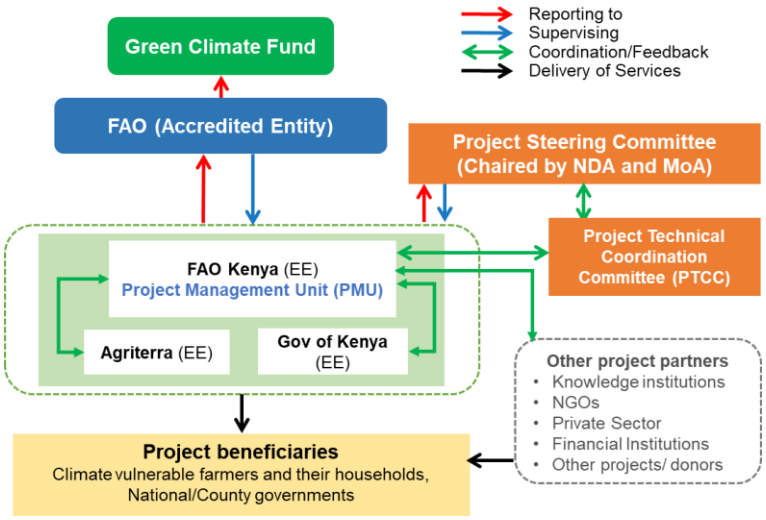

FIGURE 36: PROJECT ORGANIZATION