Kenya Agricultural & Livestock Research Organization

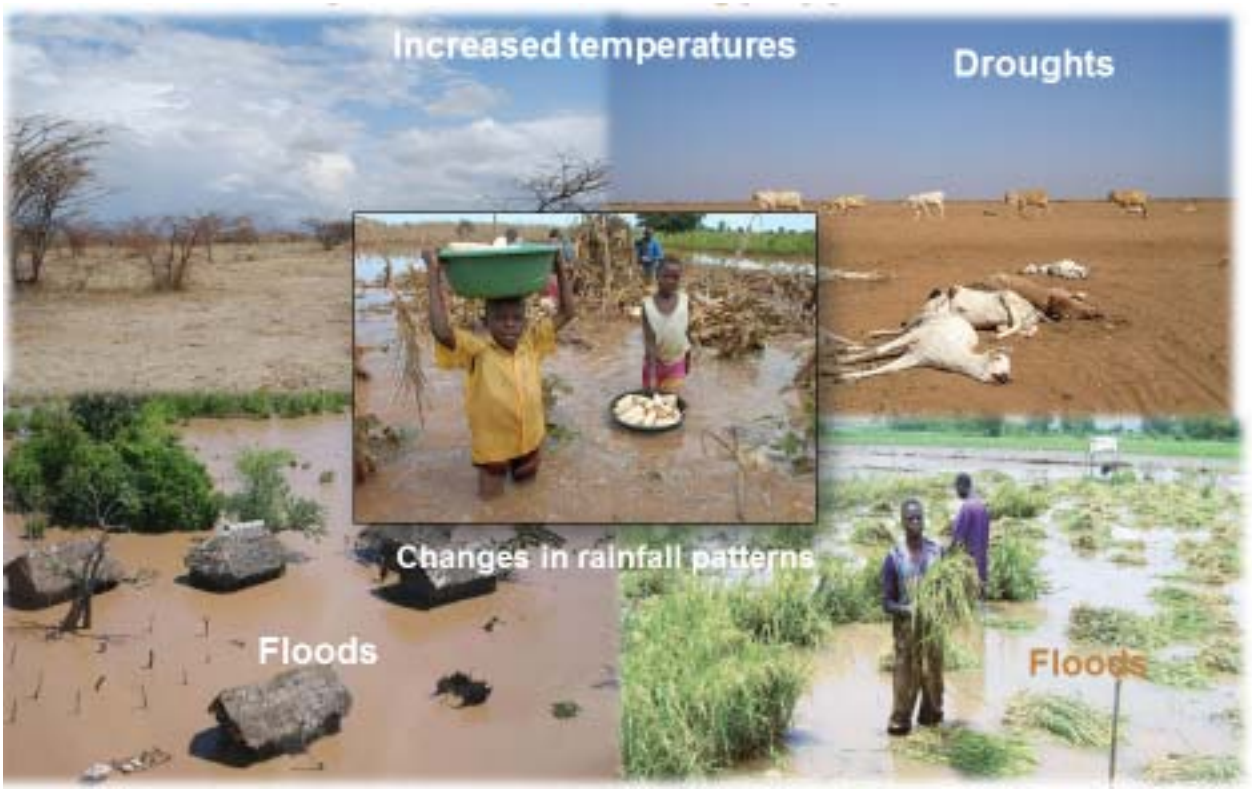
By

ENVIRONMENT AND NATURAL RESOURCE SYSTEMS

The Kenya Agricultural and Livestock Research Organization (KALRO) is the premier agricultural and livestock research organization in Kenya mandated to provide leadership and demand-driven solutions to agricultural challenges both locally and internationally. The vision of the KALRO is to be a globally competitive Agricultural and Livestock Research Organization. The mission is to generate and disseminate agricultural and livestock knowledge, innovative technologies and services that respond to clientele demands, for sustainable livelihoods. In order to discharge this mission, the Organization considers sustainable development as a very important aspect of its operations and has a duty to ensure that the environment is well managed and conserved. The organization has research Centres distributed throughout the country. KALRO aligns its activities to the national and county priorities as detailed in various policy documents including the Vision 2030; the County Integrated Development Plans; National Climate Change Adaptation Plan; the National Climate Change Response Strategy; Agricultural Sector Development Strategy 2010–2020; the Comprehensive African Agricultural Development Programme (CAADP) Kenya Compact; National Environment Policy and the Kenya's Constitution (2010).

Climate is changing; Food and agriculture must too: Challenges faced at the farming level

Agriculture is a major source of livelihood and employment in the country, including the hardly drought hit counties like Kilifi. Majority of the people in this county are employed in the sector working on farm and off farm activities as traders, processor and transporters. The sector is also a source of food and nutrition for the county. The main food crops grown are maize, cowpeas, green grams and cassava, while cash crops include coconut, cashew nuts, pineapples, sisal, and mangoes. Livestock farming is also an important economic providing income and food especially in the hinterlands of Ganze, Langobaya and Magarini. The main types of livestock include cattle, sheep, goats and poultry. Most of these livestock are indigenous breeds. Besides, fishing is an important livelihood activity to many families.



Emerging challenges of climate change

The average annual rainfall ranges from 300mm in the hinterland to 1,300mm at the coastal belt. The coastal belt receives an average annual rainfall of about 900mm to 1,100mm with marked decrease in intensity to the hinterland. Areas with highest rainfall include Mtwapa and to the north of the coastal strip around the Arabuko Sokoke Forest. The annual temperatures in the county range between 21ºC and 30ºC in the coastal belt and between 30ºC and 34ºC in the hinterland. The county experiences relatively low wind speeds ranging between 4.8 km/hr and 12 Km/hr. Evaporation ranges from 1800mm along the coastal strip to 2200mm in the Nyika plateau in the interior. The highest evaporation rate is experienced during the months of January to March in all parts of the county. Some of the major challenges to agricultural production in the county include drought; soil degradation and deforestation; low agricultural and livestock productivity; high cost of production; low use of certified seed, manures, fertilizers and agro-chemicals; outdated methods of land preparation; high post-harvest loses due to incidences of pests e.g. weevils; old low productive cash crop trees like coconut and cashew nuts; poor prices and fluctuation; poor roads which become impassable during wet seasons leading to loss in horticultural produce; poor and low yielding planting seeds; over dependency on rain-fed production leading to general overproduction/supply during rainy season and insufficient production during dry season. All these factors lead to low crop yields and sometimes complete crop failures.

Climate change presents one of the greatest challenges to the socio-economic development of the county. Indeed climate change threatens not only agricultural sustainability, but also food. The impact of climate change is

manifested in the form of floods and droughts, and gradual degradation of the environment. This impacts translate to decline in farm production and quality; uncertainty in start of seasons hence affecting farming activities calendar; crop failures; reduced farm income; crop and livestock pests and diseases; shortage of fodder; loss of livelihoods and increased cost of production. Other challenges facing the county and affecting agricultural production include: - decreasing arable land holdings caused by population pressure and changing land uses; progressive depletion of soil nutrients even in formerly fertile areas resulting in yield decline and food insecurity. Nutrient depletion is due to continuous cropping; land fragmentation in response to population pressure (though majority of households have relatively large farms compared to other parts of the Country at 3.4Ha) and inappropriate land management practices; climatic changes. At the household level, limited capacity in good agricultural management skills and socio-economic limitations e.g. poverty, has affected agricultural productivity and natural resource management in the county.

KALRO interventions

To deal with the above challenges, KALRO has been working in partnership with other stakeholders to avail technologies and information for natural resource management geared towards increasing agricultural productivity and resilience of the ecosystem. The focus has been on generation of technologies and information that will enhance productivity and competitiveness in the agricultural sector to meet the local demand for food and agro-products for industries.

Crops swept by floods

KALRO has been a key driver for increasing productivity, commercialization and competiveness of the agricultural sector while paying attention to effects of climate change and sustainable agro-ecological ecosystems. With the increased challenges posed by climatic changes and land use changes, researchers are advocating for investments in other resilient crops other than maize. KALRO is promoting drought resilient and fast-maturing crops, which include finger millet, sorghum, cassava, and sweet potatoes. This crops also have high economic and nutritional value. Drought resilient crops being promoted include Cassava varieties like Kibandameno and Guzo. KALRO in partnership with other research development stakeholders in sweet potato research, helped increase farmers' yields in commercial trials by an average of more than 60% and significantly reduce postharvest losses. Sweet potato varieties for commercial and domestic use with good yields include Mwavuli, SPK 004, Mtwapa8 and Ex Shimba hills. Apart from being a source of food and income to the households, the sweet potatoes are also used for soil conservation and as livestock feed for increased milk production. For increased maize crop production, KALRO advocates for intercropping with legumes. Seedlings of high yielding Mango and Cashew nut varieties adaptable to the coastal region are also supplied to farmers. Livestock research has focused on promotion of superior livestock breeds; adaptable and high yielding fodder varieties; development livestock feed formulations e.g. the maize/cowpea gruel and vaccines.

Sustainable management of natural resources is accorded high priority by the Organization for better ecosystem health. This is because future growth and development of the agricultural sector relies on prudent sustainable intensification of land use, taking into account the limited water resources available in the county. KALRO recognizes that the management of the dryland fragile ecosystem poses a unique challenge and water is still a constraint in agriculture. To address the challenge of water for agricultural production, the Organization promotes technologies that enhance water use efficiency and reduction of losses. This includes conservation agriculture, agroforestry practices, green house technologies, small scale irrigation practices, land conservation measures, integrated soil fertility management and good agronomic practices. Unlike other research areas where technology benefits can accrue over a short period of time, benefits from adoption of technologies on natural resources management, for example conservation agriculture, take long to be realized while some are very labour intensive although they are very important in land restoration. Consequently, adoption of technologies that increase resource use efficiency still remains a challenge.

KALRO also undertakes capacity building of farmers through farmer field schools, field days, and informal platforms geared towards strengthening the household's adaptive capacity and agricultural systems resilience. Areas covered under capacity building include post-harvest management.

The diversity of plant genetic resources (PGR), like diversities of other life forms in Kenya has since the recent past been on the decline due to genetic erosion being brought about by droughts, desertification, population pressure on land, changes in land use and in eating habits and overexploitation. The

region has in recent years suffered severe droughts that have impacted negatively on the survival of our plant genetic resources. KALRO is in the process of establishing mechanisms of working with the county government in the implementation of measures such as ecosystem restoration campaigns, proper agricultural practices, introduction of crop varieties and conservation of the wild species; and to trace and collect the disappeared varieties, and conserve in the National Genebank.