Table 1. Estimate of the carrying capacity (Tropical Livestock Units for 250 kg cattle) per day per grass species per hectare

Grass species	Biomass kg DM/ha/year	No. of TLU	Carrying capacity ha/TLU/year
CHROX	3173	254	1.44
CECI	2632	211	1.73
ERSU	3011	241	1.52
ENMA	1878	150	2.43

Based on 4 perennial range grasses: Eragrostis superba (ERSU), Cenchrus ciliaris (CECI), Enteropogon macrostachyus (ENMA) and Chloris roxyburghiania (CHROX) (Adapted from Manyeki et al, 2015)

Recommended Actions to Enhance Rangeland Rehabilitation

Revitalize and Enforce Key Policies and Legislations

- There is need to expand the scope of "agriculture" (to include livestock fodder) as implied in the Irrigation Act 2019, thus; "cultivation of land and the use of land (whether or not covered by water) for any purpose of husbandry, aquaculture and food production". This harmonization will give fodder production equal right in irrigation projects as food crops.
- Integrating forage production in irrigation schemes, currently confined to maize, banana and other food crops, can solve fodder problem in the ASALs.
- Domesticate national policies dealing with rehabilitation of degraded areas in the formulation of the respective CIDPs
- Develop a policy on reseeding in rangelands taking into consideration key features of pastoralism, namely; livestock mobility and the communal management of natural resources.
- Enforce rotational closed seasons to allow appropriate establishment of reseeded areas through enhanced zoning of the communal grazing areas.

Initiate and Operationalize Reseeding Business Enterprises

- Adopt and implement Public-Private Partnerships (PPPs) to promote business approach in the seed production and reseeding technology.
- Mass production of seeds and setting up seed banks is a necessary step for long-term implementation.
- Mainstream fodder and fodder seeds production into a structured value chain

Conduct Public Education, Training and Awareness

- Carry out training of common interest groups (CIGs) on reseeding techniques covering planting, conservation and management of the forage.
- Make deliberate efforts to enhance participation of Vulnerable and Marginalized Groups (VMGs) in the reseeding programmes
- Training on water conservation techniques for fodder production in the drylands is required e.g. Kiboko pits technology (see Figure 1) as well as improved indigenous technologies
- Intensify extension services by engaging local institutional setups and innovative Agricultural Advisory Services (AAS) including Farmer Field Schools (FFS) and National Agriculture and Livestock Extension Programme (NALEP) for upscaling
- Carry out regular monitoring and evaluation through the local institutional setups

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How this policy brief was produced

Various national legislations, strategies, policies, laws and recent research work relating to rangeland rehabilitation through reseeding were reviewed and analysed then validated through consultative stakeholder meetings involving county government officials, expert institutions and local communities.

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POLICY BRIEF

RANGELANDS RESEEDING

Rehabilitation of degraded rangelands through re-seeding to improve livestock productivity in Kenya

Background

Rangelands are critical ecosystems for survival of humans, livestock and wildlife. In Kenya, about 83% of land is classified as rangeland, supporting more than 70% and 90% of the national livestock and wildlife populations, respectively.However, rangeland degradation is a serious threat to human livelihoods in most parts of sub-Saharan Africa, especially the pastoralists living in the ASALs.

What is rangeland degradation?

This is the net loss of vegetation usually as a result of:-

- Heavy grazing without sufficient time to recover and reduction in palatable forage species
- Inappropriate land uses and agricultural practices, e.g. cutting vegetation and drought which lead to deterioration and
- Erosion of soil properties

With reference to Garissa, Kajiado, Isiolo and Marsabit Counties

NATIONAL MUSEUMS OF KENYA
WHERE HERITAGE LIVES ON

WORLD BANK GROUP

KALRO

General human population increase and high number of pastoralists in particular translate to larger number of livestock leading to range degradation. It can also be attributable to climate variability and unsustainable human activities (such as charcoal burning) exerting pressure on land resources. Consequently, the communities often face devastating environmental effects, diminished livelihoods and spiraling vulnerabilities such as insufficient livestock feeds, human-wildlife (and/or human-human) conflicts, increased levels of poverty and loss of biodiversity. A study conducted in Makueni, Kajaido and Taita-Taveta Counties estimated that more than 50% of rangelands transformed to bare patches as a result of degradation. A similar scenario is thought to prevail in other rangelands including Isiolo, Garissa, Kajiado and Marsabit Counties. The need to address this spiraling impact through innovative approaches such as reseeding to minimize animal losses during drought and facilitate faster socio-economic recovery among livestock producers (as articulated in the Draft National Livestock policy 2019) is urgent.
A number of technologies have been attempted by pastoralists to restore degraded rangelands. Some of these include deferred grazing, creating enclosures using thorns, terracing and reseeding. Other technologies for improving forage availability in semi-arid rangelands can be based on de-stocking, change of herd composition and bush management.

Range reseeding is considered one of the most appropriate methods especially where previously dominant forage plants had either severely declined or were totally lost. However, reseeding has remained underutilized or, in some cases, not been attempted at all in the management of rangeland ecosystems. This apparent failure is perhaps attributable to inappropriate land tenure, high labour costs, unavailability or poor quality seeds, drought, poor establishment, loss by wind and runoff, low persistence and lack of appropriate skills. Local perception is also considered a limiting factor in the uptake.

Research has demonstrated that grass reseeding technology has been used successfully as a means of rehabilitating degraded rangelands in East Africa with great success and economic feasibility. Successful reseeding, however, has been shown to be dependent upon aspects such as prevailing weather conditions, weed control, seedbed preparation, and sometimes, pretreatment of seeds to enhance germination.

Legal & Institutional Framework

There are a number of legal and institutional provisions geared towards environmental management in general and a focus on rangeland management in particular. These include both international and national instruments. Kenya has ratified various global Multilateral Environmental Agreements (MEAs) such as Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC) among others. As part of the implementation of UNFCCC, the country has drafted and adopted Intended Nationally Determined Contributions6 in response to decisions adopted at the 19th and 20th sessions of the Conference of the Parties to the UNFCCC. Similarly, various national legal instruments governing environmental conservation and management as well as sectoral laws for ASALs and livestock production are in place. For instance, the Constitution of Kenya 2010 provides a broad baseline for enhanced sectoral legislations. The development blueprint for Kenya, Vision 2030, implemented through five-year Medium Term Plans (MTPs) enables various sectors, including agriculture and livestock, to set priorities. Equally important laws are Lands Act 2012, Community Land Act 2016 and Environmental Management and Coordination Act (EMCA, 1999) among others.

Other policy and legislative frameworks that support rangelands management and ASAL development include Economic Recovery Strategy (ERS) - 2003-2007. Development Strategy for Northern Kenya and other Arid Lands (2012), County Integrated Development Plans (CIDPs), National Spatial Plan (2015 – 2045) and Kenya Climate Smart Agriculture Strategy (2017 – 2026). The Kenya Climate Smart Agriculture Strategy seeks to develop and implement Nationally Appropriate Mitigation Actions (NAMAs) to mainstream sustainable land management. Range reseeding as a mitigation measure in degraded rangelands is considered a key response towards this goal. While the policy and legislative framework for rangeland management is seemingly robust, the implementation and enforcement is notably weak.

The success of reseeding in the rangelands require a multi-stakeholder approach at the national as well as the county level. Kenya Plant Health Inspectorate Services (KEPHIS) is responsible for seed certification. Public-Private Partnerships (PPPs), coupled with extension service provision, may be key in the restoration of rangelands and livestock value chain in general.

The degradation of rangelands is severe, currently impacting 1.3million ASAL households and pastoralists in Kenya. Large proportions of rangeland in each of the four counties urgently require rehabilitation measures such as range reseeding.

Some studies have looked at the cost implications of reseeding or forage farming on the livestock production value chain. At Kasuswa farm in Eldoret the cost of production of silage was estimated at Ksh. 0.96 – 3.22/ kg and the production per acre ranged between 9.32 - 26.1 tons. It is however predicted that the cost in the ASALs would be much higher while production per acre would be lower where more inputs will be required based on soil and water constraints.

A commercial approach of fodder farming has been piloted in various ASAL counties. In Garissa, CARE-Kenya in collaboration with OFDA/ USAID worked with eight fodder farmers to build the resilience of the community against effects of drought. A total of 320 small scale farmers benefitted from the programme through provision of fodder seeds (Sudan grass and Boma Rodes) after technical training on fodder production, conservation and marketing.

Research has demonstrated that reseeded rangelands gain higher carrying capacity compared to non-reseeded rangelands. Using herbage allowance of 12.5 kg Dry Matter/250 kg Tropical Livestock Unit per day, safe stocking rate for studied areas in Kibwezi ranged from 1.44 to 2.43 ha/TLU/year7 (see Table 1). This was higher than the 3 - 7 ha per 250 kg TLU estimated carrying capacity of agro-climatic zones V and VI of Kajiado County8 (see Table 1). This demonstrates the economic viability of reseeding as a rehabilitation technique in degraded rangelands.

Figure 1: Kiboko pits technology to conserve soil and water to enhance range reseeding success