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Farmer managed natural regeneration (FMNR) for climate resilience and livelihood improvement in drylands of Kenya

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Abstract

Dryland ecosystems in Mandera, Kenya, are characterised by low and erratic rainfall (250–350 mm annually), severe land degradation, and unsustainable fuelwood extraction. Livestock rearing remains the primary livelihood but is highly vulnerable to climate extremes. To address these challenges, from 2014 to 2021, Adventist Development and Relief Agency and the Canadian Foodgrains Bank implemented a rangeland restoration project promoting Farmer Managed Natural Regeneration (FMNR) among 2,000 households.

FMNR, which encourages natural regrowth of trees through systematic pruning and management, was implemented through participatory, behaviour change-oriented approaches, including farmer champions, Pastoral Field Schools, FMNR learning sites, and peer exchange visits. The approach integrated FMNR with broader rangeland management practices, including enrichment planting, grazing planning, dry season fodder production, and herd management. Learning sites played a crucial role in demonstrating visible changes, promoting peer-to-peer uptake.

Results demonstrate substantial ecological and livelihood benefits. The area under FMNR expanded to over 11,000 acres, with improvements in fodder availability, particularly during the dry period. Participating households reported a twofold increase in milk production alongside increased herd sizes. A mixed-methods post-project assessment in 2025 confirmed continued adoption and spontaneous expansion of FMNR practices beyond initial participants. Among five soil health characteristics, soil organic matter was significantly higher in FMNR plots (0.95 %) compared to non-FMNR plots (0.56 %). However, no significant differences were observed in slake, hoe, and Solvita tests or bulk density. While plant diversity was not assessed and insect measurement was inconclusive, community observations consistently reported increased species and the return of small fauna, alongside emerging concerns over human–wildlife interactions.

Qualitative assessment showed that FMNR enhanced climate resilience through improved drought preparedness from fodder stockpiles, reduced soil erosion through vegetative cover, and better soil moisture retention. Livelihood diversification emerged through honey production, fodder and gum arabic sales, reduced reliance on purchased feed, and decreased seasonal livestock migration due to improved dry-season fodder availability. The approach also stimulated locally developed rules for managing regenerated areas and increased youth engagement in beekeeping. These findings highlight FMNR as a scalable, low-cost nature-based solution for restoring degraded drylands and strengthening agro-pastoral resilience in arid and semi-arid lands.

Keywords: Agro-pastoral resilience, arid and semi-arid lands, climate change adaptation, farmer managed natural regeneration, Kenya