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Restore more: enclosures, dryland productivity and the food security nexus

Enclosures as land management tools is increasingly used in the African drylands. This expansion of enclosure systems has been termed a "default development with increasing human pressure on land." The extent of this expansion is the starting point for this policy brief, where we look at its use as a sustainable production and management tool and elaborate on its implications on food security in Eastern African drylands.

Improving productivity of drylands is integral for sustainable development

Drylands cover about 40% of the earth's surface and inhabits at least 30% of the human population. In the East African drylands, the main economic activity is livestock production under pastoralism and agro-pastoralism systems, and about 70% of East Africa's livestock population is found here. Dryland communities are facing challenges posed by a combination of environmental and socio-economic factors. This includes, unreliable rainfall (which undermines sustainable fodder production), land degradation, population pressure and resource conflicts. Adaptive capacities and climate resilience of dryland communities is also denatured by the intensity of these factors. Efforts by state and non-state agencies rely on dryland experts and researchers to provide viable options. With little or no livelihood alternatives, these challenges trap people into destitution and food insecurity. Compared to other areas in Eastern Africa, the drylands record the lowest indices of food security.

Key messages

- Livestock production under pastoralism and agro-pastoralism systems is the main livelihood activity in most East African Drylands. However, there has been a notable transition from open grazing to a more sedentary form of agro-pastoralism. Still, livestock remains very central to livelihoods in the region.
- The pursuit of alternative livelihood options in the wake of climate change, population increase and declining grazing land calls for new knowledge and practical guidance in managing resources in the drylands.
- Enclosures are an important tool in restoring degraded land and in improving its productivity. This ensures there is adequate livestock and human feed for improved food security. Households also are more able to connect to markets through their increased and diversified productivity.
- Since there is a clear divide between natural and social science research on enclosures, this synthesis suggests multidisciplinary approaches in future studies, that can quantify and analyse social, economic and biophysical aspects together.

To attain inclusive and sustainable development in the drylands, strategies to overcome poverty and

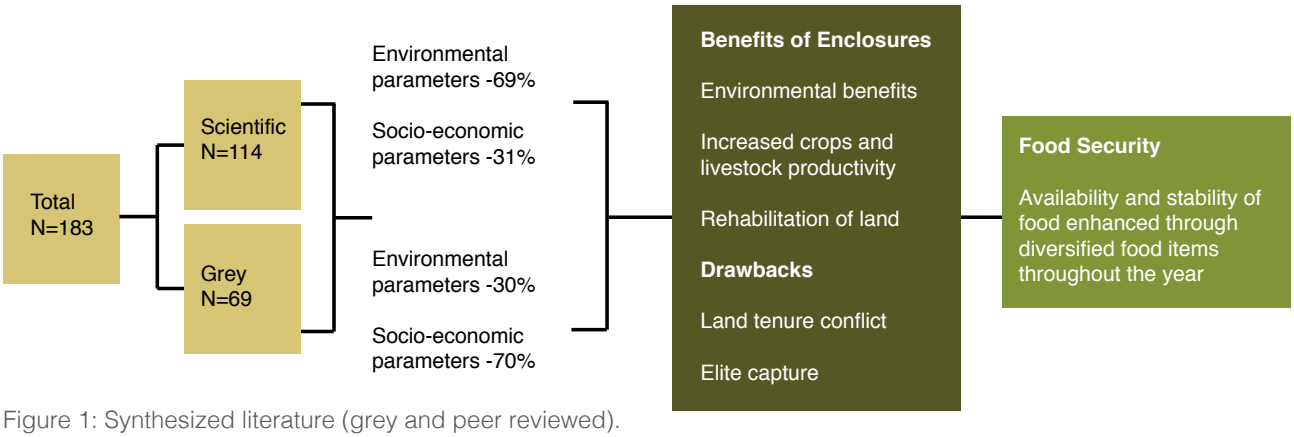

Figure 1: Synthesized literature (grey and peer reviewed).

food insecurity are needed. By improving the productive capacity, dryland resources will have positive and direct impacts on pastoralists livestock production and in turn improve the livelihoods of pastoralists.

A recent development in most parts of the East African drylands has been the adoption of enclosures as a dryland management tool. Enclosures consist of live thorny fences that close off grazing for a given duration of time in order to allow vegetation to regenerate. This allows degraded landscapes to recover and the productive capacity to be restored (see figure 3). This brief is based on Nyberg et al. (2019) that synthesized scientific and grey literature on the implications of enclosures and its relation to food security. The literature reviewed and conclusions are summarized in Fig 1.

Transitions in East African drylands

Our synthesis confirms a rapid and dynamic transition process towards intensified as well as diversified, agro-pastoralist production systems in most parts of the East African drylands. This transition is brought about by population growth and land fragmentation within drylands, and external changes such as urbanization, and global economic integration. This transition is characterized by a trajectory from nomadic to sedentary lifestyles and production systems, subsistence to intensified commercial production and from collective to private land tenure. There is also a change of grazing patterns from a purely nomadic to a more settled agro-pastoral, enclosure dominated, lifestyle that still has its economic base in livestock and its cultural identity in pastoralism, as conceptualized in Figure 2.

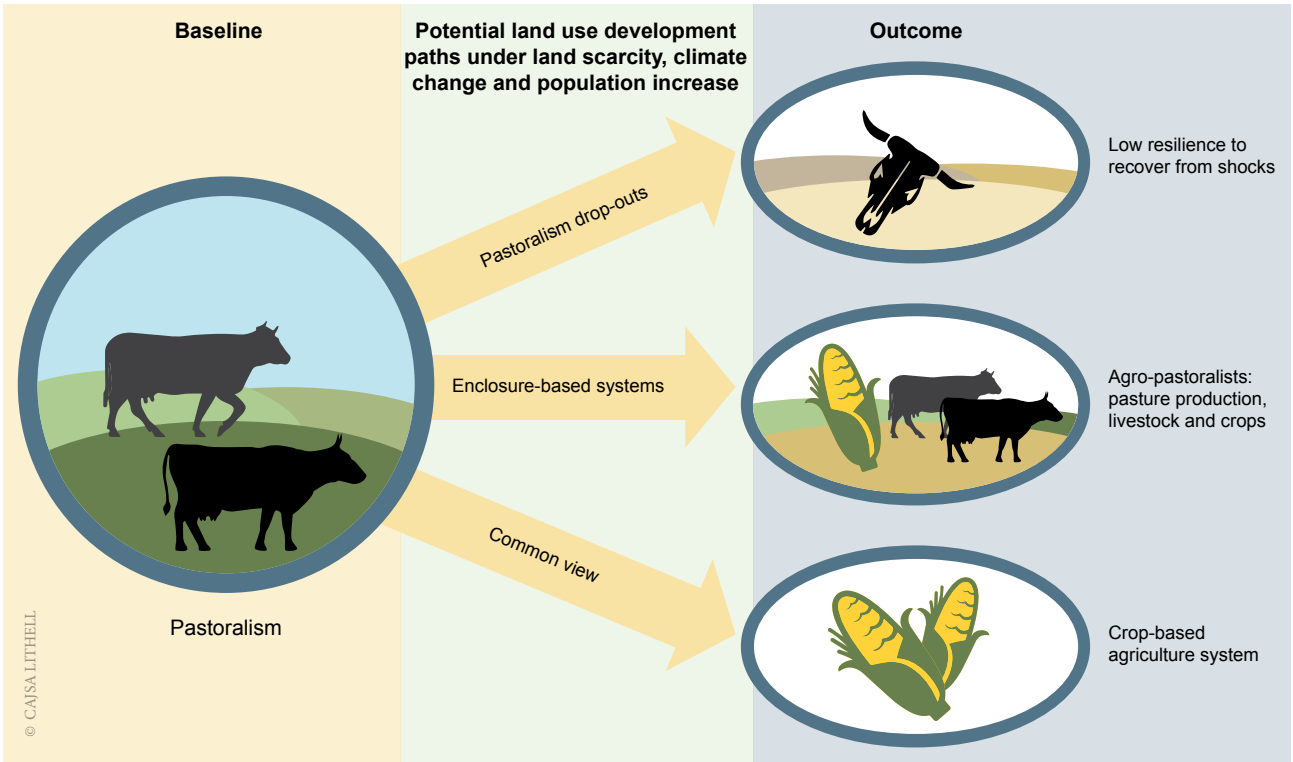

Figure 2: A conceptual model of enclosures as an important tool in new land development.

Enclosures stand out as a land management tool in land that is owned both individually and collectively. As a tool in new land developments, this synthesis of literature highlighted enclosure benefits on the ecology and land productivity as well as on changes in people's livelihoods and how this translates to improved food security.

Ecological benefits of enclosures

About 70% of the scientific and 30% of the grey articles showed the importance of enclosures in improving soil productivity and other ecosystem services. Enclosures enable the recovery of natural vegetation. This is seen both as increased ground cover and biomass production for grasses, herbs as well as increased plant biodiversity. Improved vegetation cover improves the soil structure and root canals leading to increased water holding and infiltration capacity, reducing surface run-offs which cause soil erosion. Reducing soil erosion and increasing revegetation and water conservation are important steps in restoring degraded drylands (Figure 3).

Increasing the vegetation cover also increases the levels of soil carbon and soil nutrients such as nitrogen and phosphorous. This nourishes crops that livestock feed on and other crops that can potentially be grown within the enclosures. This directly relates to increased food production and food security.

Seizing market opportunities and improving food security

In most arid and semi-arid drylands, livestock and livestock production remain the basis for cultural identity, and livelihoods are dominantly based on livestock and livestock products. Enclosures provide opportunities for intensification in livestock production to meet both household food needs and the market demand of livestock and livestock products.

Conventionally, pastoralists would move over long distances across the drylands to access pasture resources that are spatial and temporal, known as transhuman movement. However, as the population increases, there is human encroachment into the grazing resources leading to reduced mobility. Enclosures overcome this constraint. Livestock can periodically graze within the enclosures, or the grass is harvested and brought to the livestock. Different enclosures also serve as grazing reserves that are used during different times of the year. This smoothens pasture availability to livestock all year round. In the face of climate change, enclosures help pastoral and agro-pastoral communities cope through the provision of grazing reserves within a shorter walking distance. Reducing walking distances means that the livestock can gain marketable weight fast. By reducing walking distances to pasture sources, livestock are at a lower risk of contracting diseases and thus a reduction in mortality rates. Livestock well-being thus improves as a result of increased pastures within enclosures. This means that households get more milk and can sell livestock of higher quality, earning more income.

Although the direct impact of enclosures on food security was not directly quantified, the improved ecosystem services, e.g. soil water, carbon and nutrients, show that enclosures can provide an opportunity for sustainable livestock production which subsequently enhances food security. Improved soil productivity within enclosures

Figure 3: Enclosures reclaiming denuded landscapes.

provides an opportunity to grow potentially viable crops and thus diversify households' food consumption. Through extra income earned from the sale of surplus products such as milk and fodder, households can buy food commodities that are not produced on farm, which further improves their food security status.

As enclosures become dominant, landscapes are fragmented, and this disables the free movement of livestock. This, together with commercialization of land, results in a push towards individualization and commercialization of land rights, which may erode the customary traditions and institutions of land governance. As the expansion of enclosure systems evolve, there is often elite capture, meaning that the rich and well-connected in the local society are the first to claim land. Conflicts between pastoralists and agro-pastoralists, as well as with crop farmers, evolve.

Implications for policy

Improving land productivity has been a policy concern for most African governments. Our synthesis has shown that indeed enclosures are an important tool in improving drylands productivity. This directly impacts crop and livestock productivity, which in turn improves food security status. The agricultural and livelihood transition from nomadic pastoralism towards livestock based agro-pastoralism calls for new support in resource management. Whereas enclosures may not be a panacea for dryland development, with decreasing land areas for grazing and transhuman migration, the importance of enclosures as a land management tool should be recognized. There is a need, however, for further evidence on sustainable and productive management methods for enclosures under different land tenure regimes.

Land tenure is important in sustainable land management. Thus, more context-specific solutions are needed in addressing land issues. One way forward is by recognizing the role of the customary tenure systems in administering user rights to access and use of land. This will require a multi-stakeholder inclusion in the process of addressing land use planning, but will go a long way in enhancing sustainable land management. Especially the need for policies, incentives and regulations for ongoing agricultural and land use transitions are needed, such as the transition to livestock based agro-pastoralism. These need to be developed, anchored and understood in a local and traditional context, among local leaders and village elders who play an important role as to who should establish enclosures, where, when and how much of the land should be enclosed.

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