

Restoring grasslands in Kenya's drylands

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“Much emphasis has been place on afforestation, but grassland restoration is equally important.”

Introduction

Grasslands are a prerequisite for rearing livestock, and livestock is the mainstay of people's existence in drylands. As one Kenyan woman put it, “without grass there is no livestock, without livestock there is no life.” Based in the lowlands of Baringo County in Kenya's rift valley, RAE (Rehabilitating Arid Environments) Ltd. has worked for 38 years to develop a successful socio-ecological model that benefits people and dryland environments. RAE adapts its rain-fed land restoration techniques to each site, while continually revising its activities and strategies to the changing environmental and social dynamics of different areas and communities.

Today, RAE's tried and tested methods are being widely replicated by government and non-government organizations, and most importantly, by agropastoralists and pastoralists, who profit directly from their restored and well-managed pastures. RAE's long term efforts demonstrate that sustainable pasture restoration is not only possible, but that it improves the environment, livelihoods and food security and reduces conflicts.

Approach and methods

The Baringo lowlands illustrate both the problems and the potential of dryland areas. Approximately 70% of Baringo County is unproductive arid or semi-arid land, denuded of vegetative cover and biodiversity. Erratic rainfall and intense storms, worsened by the deforestation of watersheds and intense grazing, have increased erosion, runoff and flash floods. Poverty and food insecurity are now common amongst Baringo's growing population of around 667,000, most of whom are agropastoralists who directly depend on their land and livestock for survival.

Since 1982, RAE has been committed to a participatory grassroots approach of listening and

learning. Stakeholders are consulted and involved in every stage of the land rehabilitation process, and have played an integral part in the organization's development and changes. Although traditional nomadic pastoralism is no longer tenable in Baringo or in many other areas of Kenya, people and societies are resilient, continually adapting to changes to meet altered (and more modern) needs. RAE has persevered, despite minimal funding and a small staff, by adjusting and expanding its programme to meet the ever-changing challenges and needs of people and dryland environments.

RAE is a constant local presence. It facilitates participatory restoration in response to community requests on a cost-sharing basis, providing training and advice so farmers can maximize diverse benefits from their land. And with adequate rainfall, restored areas can become productive and profitable in three months. Successful restoration is not seen as an end in itself; sustainable management is essential. However, restored areas will be sustainably managed only when local people benefit directly from them.

After years of field trials, RAE has identified five fundamental components of sustainable land restoration:

1. Assessments – environmental and social.
2. Training – interactive and practical.
3. Land rehabilitation – site-specific land preparation and water harvesting techniques that maximize rainwater harvesting (developed by RAE Founder and Director Murray Roberts).
4. Sustainable management and follow-up – collaborative monitoring and evaluation.
5. High-quality grass seed – site-specific indigenous dryland species, tested for yield and germination.





Pokot RAE field prepared for planting, June 2019 (above) and rehabilitated, October 2019 (below). Photo: © RAE

Although RAE offers all five services to its growing clientele, most organizations only want grass seed. But without appropriate land rehabilitation methods grass will not germinate. And without follow-up training and monitoring, grass fields will not be sustained and benefits will not be realized.

The preferred grass for Baringo farmers is the highly drought resistant native *Cenchrus ciliaris*, with its strong, fibrous deeply penetrating roots. RAE also supplies seed from other indigenous grasses, including *Cymbopogon pospischilli*, *Enteropogon macrostachyus*, *Eragrostis superba* and *Sehima nervosum*, recommending a mix of species for best results.

Direct benefits

RAE's on-the-ground results are clearly visible, with indigenous grass and tree species flourishing. Community uptake continues to increase, because people generate substantial income from their productive plots through the innovative strategies they've developed, such as leasing fields for grazing, breeding and selling improved livestock, and selling livestock fattened on fields, as well as milk, baled hay, thatching grass and

grass seed. Additionally, people can now sustain their livestock throughout the year, including during droughts.

RAE has directly rehabilitated more than 2,400 hectares, comprising 924 private fields (each 0.5–16 ha) demarcated and fenced by long-term residents and managed by individual families, and 75 community fields (0.5–200 ha) managed by communities or groups, including shareholders' and women's groups. In addition, thousands more hectares have been rehabilitated with RAE grass seed. Many families in Baringo are changing their maize fields into pasture, based on their experience that grass is a more viable and profitable crop due to the effects of climate change. Maize is not successful every year and cultivation is costly, whereas once grass is established, well-managed pastures require minimal inputs.

Observations show that private pastures are better managed and at least ten times more productive and profitable than community fields. A single RAE private field can generate benefits for one family in cash and in kind of more than US\$ 16,500 per year through multiple, well timed activities. The most profitable cash earnings are from livestock



Rehabilitated private field, Il Chamus. Photo: © RAE

fattening (up to US\$ 4,825 per year from 2 ha) and grass seed harvesting (US\$ 2,200 per year from 16 ha). Today, RAE concentrates on fulfilling ever more requests to rehabilitate private pasture fields. In contrast, other organizations still insist on restoring community land even though many of these efforts fail due to poor management. Even when groups define their own management structures (electing leaders, writing bylaws, etc.), complex group dynamics and socio-political obligations can undermine implementation. However, RAE is fully aware that both community and private land rehabilitation is needed in Baringo and beyond, especially amongst more traditional pastoralist societies where land is less scarce and cohesive community structures encourage sustainable land and livestock management practices.

Youth and women

RAE pays special attention to youth and women, while respecting the cultural norms of pastoralist communities based on patriarchal and polygamous traditions. Youth from drylands are disadvantaged by poor education and few employment opportunities and often migrate to

urban areas. Unemployed youth are also primarily responsible for violent unrest between pastoralist groups. Today, however, more youth are restoring pastures, realizing that they can earn good income and gain the status and independence they aspire to.

Women now do vital work as dryland environmental managers and entrepreneurs and own or manage 82% of new private pastures in Baringo, earning new incomes from cutting thatching grass and harvesting grass seed. Most of this income goes directly towards meeting household needs, especially food and school fees, which improves their household's wealth and status. Pastures have also decreased women's overburdened workload. In Baringo and other pastoralist areas, men and youth often leave to seek employment, leaving women to care for livestock in addition to everyday domestic tasks. Also, new pastures near their homesteads help increase household nutrition through milk production. For example, an Ilchamus mother of four and sole family breadwinner began in 2015 by sowing a half-hectare pasture and another in 2017, earning US\$ 1,002 from grass seed, US\$ 580 from hiring out fields for grazing, and US\$ 2,234 from selling



Exchange tour to RAE during training of Samburu women. Photo: © RAE

milk from their two cows and dry-season grazing for 15 goats. She became a trainer of trainers for local women and visiting pastoralists on exchange tours, and she proudly explained how she bought one of her cows with proceeds from her grass fields, unusual for a pastoralist woman.

Broader benefits and impacts

Economic. The fact that men, women and youth can generate significant incomes from restored pasture has far-reaching social impacts for drylands. People now fatten smaller herds of quality livestock for sale rather than keeping large herds that further degrade the land, and have a secure source of fodder and hay to keep livestock alive during prolonged dry periods. People now value their semi-arid lands, which they previously considered useless wastelands, but now see as having value for sustaining their diverse natural resources and for providing income.

Reduced conflicts. The importance of pasture development as a means of conflict resolution is particularly pertinent in Kenya. Armed conflicts, on the rise due to the lack of grazing, are becoming more lethal with the availability of AK47s and with disadvantaged youths willing to take

up arms. Baringo is well known for armed raids, especially amongst the more traditional pastoralist Pokot people. RAE has worked in Tiaty Sub-County, East Pokot since 1998, planting 72 pasture fields; requests from Pokot have recently surged, with over 59 still to be fulfilled. One of RAE's most successful dryland farmers is an influential Pokot elder who recently requested assistance in planting another 60 hectares. He has laid down his arms and encourages other Pokot pastoralists to sow grass. In 2018, the Baringo Governor visited his successful pastures.

Policy. Influencing policy, legislative and social change is also a core activity. Examples include RAE's contribution to the development of the National Policy for the Sustainable Development of Northern Kenya and Other Semi-Arid Lands of Kenya (2005), the Wajir County Rangeland Management Bill (2017), and developing much-needed regulations for high-quality dryland grass seed with the Kenya Plant Health Inspectorate Service in alignment with those available for highland areas. RAE is also advocating that grass be recognized as a crop, with fines for illegally grazing pastures being considered and passed upwards through local governments.



RAE seed sale. Photo: © RAE

Carbon sequestration. The organic carbon in the top metre of soils worldwide is more than all that held in the atmosphere and vegetation combined (FAO 2017). Globally, in the top metre, dryland soils sequester 27% of all soil organic carbon, but this is lost when soils are degraded. After 20 to 30 years in Baringo, restored grasslands contained 45 tonnes of soil organic carbon per hectare, some 50% higher than in degraded grassland (32 t C ha^{-1}), compared to 50 t C ha^{-1} in pristine grasslands (Mbaabu et al. 2020). One restored field increased soil organic carbon by an average of 1.4% annually over 30 years to a depth of one metre. However, the roots of the main indigenous grass planted by RAE can extend to a depth of over 2 metres, much deeper than is usually evaluated in soil carbon sequestration studies. Therefore, scaling up grassland restoration would make a substantially greater contribution to sequestering carbon at the global level than generally realized to date.

Soil erosion. It was estimated that soil erosion due to vegetation loss resulted in 5 million m^3 of sediment being deposited in Lake Baringo each year (Pencol Engineering Consultants 1981). This led to the raising of the lakebed and likely

exacerbated the severe flooding in 2013 and 2020. In July 2020 RAE documented the submergence of 496 homesteads, 47 shops, 4 schools and 3 health centres, and the displacement of 5,700 people. With severe flooding continuing through mid-October these figures are expected to triple. RAE's rehabilitation efforts have proven to reduce soil erosion and lake sedimentation, while dramatically increasing biodiversity completely lost to areas outside RAE fields. An investigation (Mganga et al 2010) into three indigenous dryland grasses shows that mature strands of the most popular grass planted by RAE can increase infiltration by nearly 80%, reduce runoff by almost 70%, and reduce sedimentation by some 98%.

Nyasi ni pesa

RAE began in 1982 as a donor-funded restoration initiative that concentrated on tree planting. When bilateral funding ended in 1994, the RAE Charitable Trust was formed on request from local Tugen, Ilchamus and Pokot agropastoralists, and it evolved in response to emerging challenges. The trust focused on grassland rehabilitation. Aware of the limitations of projects that offered only short-term funding, RAE Ltd. was

formed in 2015 to scale up a profitable business model that would benefit both communities and the company, working under the approach of *nyasi ni pesa* (grass is money). Committing to a truly participatory approach must accommodate the financial needs of local pastoralists, especially as increasing financial pressures mean they must spend more resources to find ways of securing an income (Lesorogol 2003).

RAE developed a social enterprise model to provide a secure income so people could continue to restore and maintain grasslands, and also made a pioneering effort in building a thriving local industry around high-quality dryland grass seed. Previously, grass was not cultivated as a crop in drylands, nor was dryland grass seed considered a profitable commodity by pastoralists. RAE provides subsidized inputs (primarily land rehabilitation, grass seed and training) to individuals and groups, buys the seed and sells in bulk to conservancies, ranches and government institutions, both in Kenya and internationally. Sales of quality seed handpicked by local women reached 12.4 tonnes by 2019, and the proceeds were reinvested in more restoration so the operation can continue to grow.

Financing social enterprises

There is huge potential for this model to be scaled up and expanded across the drylands of Kenya and other countries. But there is one major obstacle: financing. The traditional donor-based model is unsuited to financing effective, sustainable restoration initiatives. These efforts are usually not sustained once funding ends, and they provide no incentives for communities to be custodians of their own environment. Slow uptake of these traditional models is also due to a lack of market incentives, insecure land tenure and resource-use rights, high up-front costs and labour intensity (Obersteiner 2017). Uptake is further hampered by financial, legal and structural barriers that prevent organizations and local communities from restoring and maintaining degraded grasslands. It is crucial that financing institutions fund solutions that acknowledge and innovatively tackle these barriers.

RAE's success is due in part to its ability to understand the form and scale of the ecological, social and economic challenges facing the drylands where it works. Its success is the result of continual research and monitoring of the environment and community for nearly 40 years, which continue to inform activities and strategies. Long-term recording and analysis is generally not funded, however, and RAE struggles to compile, digitize and analyze its records due to limited resources. It is essential that funding for research be prioritized alongside funding for operational expansion.

Taking success to another level

If global leaders are to take their commitment to reducing land degradation seriously, best practices need to be rapidly scaled up into viable projects in other dryland regions. Every dryland environment has its own individual set of circumstances, challenges and cultural complexities. RAE's model works because it responds to the society, culture and environment of specific areas. The first principle of bottom-up, participatory restoration — working within pre-existing local networks — is what makes RAE's model effective. To achieve this, seamless collaboration between all actors is essential, and sustained commitment in terms of expertise and funding is needed.

RAE has demonstrated that scaling up land restoration is entirely feasible, given political will and resources. Local people can make good profits from restored grassland, which provides incentives for sustainable management and environmental benefits from reduced erosion and increasing soil organic carbon. Perhaps the much-needed long-term support will be forthcoming when there is international recognition that restored grasslands are profitable to the local and global economy, and that tropical grasslands are as important for carbon sequestration as the world's forests are, and therefore of fundamental concern to everyone.

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