



Dryland Pastoral Systems and Climate Change: Implications and Opportunities for Mitigation and Adaptation¹

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Our environmental crises are inter-related. Climate change, biodiversity loss, drought and desertification are inter-related and are symptoms of unsustainable land management. They result in loss of agricultural productivity, reduced capacity to sustain rural livelihoods and increased risk of, and vulnerability to, natural and human disasters. Refocusing efforts and investment on management for healthy productive land and improved security of tenure are a prerequisite to secure the lives and livelihoods of millions of people worldwide and to sustain the range of products and services provided by the environment in the short and long term.

Livestock are an irreplaceable source of livelihoods for the poor. Livestock is the fastest growing sector, and in some countries accounts for 80% of the GDP, in particular in drylands. Seventy percent of the 880 million rural poor people living on less than \$1 per day are at least partially dependent on livestock for their livelihoods and subsequent food security (World Bank, 2007). Grasslands - the basis for livestock production - cover some 70 % of the global land area.

Drylands occupy 41% of the earth's land area and their adapted management can sustain livelihoods of millions of people and both contribute to and mitigate climate change. Drylands are home to more than 2 billion people with some two thirds of the global dryland area used for livestock production (Clay, 2004). In Sub-Saharan Africa, 40 % of the land area is dedicated to pastoralism (IRIN). However, desertification and land degradation in the drylands are reducing the capacity of the land to sustain livelihoods. Moreover, it reduces the possibility to capture and retain water and to sequester (store) carbon and results in carbon being released into the atmosphere. World wide, some 12-18 billion tonnes of carbon have already been lost as a result of desertification. There is, however, a huge potential for sequestration of carbon in dryland ecosystems - appropriate management practices could continue to support millions of (agro-) pastoral peoples and achieve an estimated 1 billion tonnes C sequestered per year (Lal, 2004).

Because of the extensive nature of grasslands, they hold enormous potential to serve as one of the greatest terrestrial sinks for carbon. The restoration of grasslands and good grazing lands management globally can store between 100 and 800 Mt CO₂-eq per year for inputs ranging from 20 to 100 USD, respectively (IPCC 2007). Well managed grasslands can sequester up from 260 tonnes of carbon per hectare while providing important benefits for climate change adaptation (FAO 2007). Grasslands, both above and below ground, store 200-400 Pg carbon per hectare/ year, a significant part (71%) of which is below the soil surface. There is a global potential of some 231 Gt. C stored per year for grassland vegetation versus 579 Gt. C – some 2.5 times more - for grassland soils) (White *et al.*, 2000).

Grassland management can increase productivity and food security, provide development opportunities in resource-poor drylands and reduce impacts of drought and climate change. Well-managed grasslands provide other important benefits such as increased water infiltration and retention and improved nutrient cycling, associated with organic matter accumulation in the soil as well as increased

¹ Excerpt from Full Manuscript: *Neely, C. and S. Bunning. 2008. Review of Evidence on Dryland Pastoral Systems and Climate Change: Implications and opportunities for mitigation and adaptation. FAO – NRL Working Paper. Rome, Italy. Contacts: cneely@earthlink.net and Sally.Bunning@fao.org*

growth, biomass and diversity of species. Grassland management is thereby also an adaptation strategy for climate change as it reduces the risks associated with prolonged drought periods and unreliable rains.

Livestock play an important role in carbon sequestration through improved pasture and rangeland management (FAO/LEAD, 2006). Good grassland management includes managed grazing within equilibrium and non-equilibrium systems and requires: a) understanding of how to use grazing to stimulate grasses for vigorous growth and healthy root systems; b) using the grazing process to feed livestock and soil biota- through maintaining soil cover (plants and litter) and managing plant species composition to maintain feed quality; and c) providing adequate rest from grazing without over resting the plants (Jones 2006) and d) understanding impacts of and adapting to climate change, e.g. plant community changes. Grassland productivity is dependent on the mobility of livestock (Niamir-Fuller, 1999).

A globally coordinated effort is needed to overcome the socio-political and economic barriers to addressing climate change risks through effective grassland management. Grassland and livestock stewards have many socio-political and economic barriers to overcome to be able to manage the vast areas of grassland in such a way that they will be productive and sequester carbon. These barriers include, among others, land tenure/common property issues and privatization and competition from cropping and other land uses which limit grazing patterns and areas, absent livestock owners or issues related to hired herders, the lack of services for mobile pastoralists and subsequent low literacy and health (people and livestock), policies which focus on reducing livestock numbers instead of grazing management, and the competition of land use for crops, including biofuels.

Healthy grasslands, livestock and associated livelihoods constitute a win-win option for addressing climate change in fragile dryland areas where pastoralism remains the most rational strategy for the wellbeing of communities. Despite increasing vulnerability, pastoralism is unique in being able to simultaneously secure livelihoods, conserve ecosystem services, promote wildlife conservation and honour cultural values and traditions (ILRI 2006, UNDP 2006). It is a win-win scenario for sequestering carbon, reversing environmental degradation and improving the health, well-being and long term sustainability of livestock based livelihoods. Ruminants convert vast renewable resources from grasslands that are not otherwise consumed by humans into human edible food.

The Way Forward: Greater recognition and support is needed for sustainable pastoral and agropastoral systems in view of their contributions to climate change adaptation and mitigation, disaster risk management and sustainable agriculture and rural development. Targeted support by governments, civil society organizations, development agencies and donors to communities, (agro)-pastoral networks, development practitioners and researchers is needed to provide:

- *Incentives*, including payments for environmental services (PES) and other non-financial rewards, to enable a change in behaviour towards sustainable and adapted management of these fragile ecosystems. Aiming at achieving the synergies of increased C stocks, sustainable use of biodiversity, reversing land degradation and thereby enhancing livelihoods and reducing vulnerability of pastoral and agropastoral peoples.
- *Pro-poor livestock policies* that address the barriers and bottlenecks faced by (agro-)pastoral peoples, and a paradigm shift, to build local and policy level awareness and capacity for good grassland management and secure tenure at community and landscape levels.
- *Integrated processes – multi-sectoral, multi-stakeholder and multi-level* - that address the range of natural resources (land, water, rangelands, forests, livestock, energy, biodiversity) and social dimensions with active involvement by all concerned actors. These holistic approaches and partnership processes must identify win-win options among local, national and global goals.
- *Targeted research* in these undervalued natural grasslands ecosystems, especially in the tropics, to identify ways and means to optimise their potential and adapt to climate change.
- *Project and Programme Development* must take advantage of funding mechanisms and opportunities to implement multi-partner programmes on grass and rangeland management for addressing poverty alleviation, climate change, desertification, drought and loss of biodiversity (as with Global Environment Facility, Operational Programme #15 on Sustainable land management).