# BUILDING A GLOBAL AGENDA OF ACTION

## IN SUPPORT OF SUSTAINABLE LIVESTOCK SECTOR DEVELOPMENT

**Global Agenda of Action – Thematic Area**
**Grassland soil carbon restoration: supporting soil carbon, ecosystem health and productivity restoration with climate finance**

**Issue.** Grassland degradation is a source of $CO_2$ emissions and biodiversity loss. It also reduces long term productivity and economic returns, and reduces the capacity of land holders to adapt to climate change. Grassland restoration and enhancement has the potential to address each of these issues and thus deliver mitigation, adaptation and producer livelihood benefits. Further, given that grassland restoration and enhancement has similar capacity as croplands and forestry to sequester carbon, there is great potential to support these actions with mitigation finance accessed through carbon markets. Presently, this vast potential remains untapped, mainly due to the absence of i) carbon accounting methodology that is affordable but sufficiently accurate to support credit creation and trade in carbon markets, and ii) an international program (e.g. as forestry has in UN REDD) to overcome these and other barriers, coordinate R&D and implementation.

**Definition.** Grassland soil carbon restoration includes any practices which increase soil carbon uptake or reduce carbon losses.

**Basic facts/description of the issue.** Grazing lands occupy 3.4 billion hectares (26% of the earth's ice free terrestrial surface) and are estimated to contain 343 billion tonnes of carbon, nearly 50% more than is stored in forests worldwide (FAO, 2010). Moreover, the total global potential to sequester carbon, by improving grassland practices or rehabilitating degraded grasslands is substantial – of the same order as that of cropland and forest carbon sequestration. Practices that sequester carbon in grasslands also tend to enhance resilience to climatic variability, and are thus likely to enhance longer-term adaptation to changing climates.

Institutional realities often lead to management practices that promote overgrazing, consequently a large share of grazing lands are suffering from degradation. Overgrazing reduces vegetation cover, exposing soils to water and wind erosion, which decreases their capacity to retain moisture and thus contributes to declining vegetation yields. This process of degradation oxidizes soil carbon, contributing to atmospheric $CO_2$ emissions.

Good grassland management can potentially reverse (historical) soil carbon losses and sequester substantial amounts of carbon in soils. The restoration and prevention of further degradation through the management of grazing intensities is the most widely applicable approach to enhancing grassland carbon stocks. In grasslands with sufficient productive potential, pasture intensification measures such as the sowing of improved and deeper rooted pasture species, fertilization and irrigation can also enhance soil carbon stocks. However, the intensification of grasslands is often infeasible and/or uneconomical in the arid and semi-arid rangelands that comprise much of the world's grasslands. Interventions to enhance soil carbon stocks generally improve soil moisture and nutrient retention in soils which can increase primary productivity, net economic returns and resilience to climate change. Practices that sequester carbon in grassland soils tend to maximize vegetative cover, reducing wind and water-induced erosion. Reducing sediment load increases water quality while reducing airborne particulate matter improves air quality. Sequestered carbon can also biodiversity conservation co-benefits.

Conant et al. (2001) estimate that improved grazing management leads to an increase of soil carbon stocks by an average of 1.3 $tCO_2$-e $ha^{-1}$ $yr^{-1}$. In the IPCC's Fourth Assessment Report, Smith et al. (2007) report slightly lower estimates of 0.81 and 0.13 $tCO_2$-e $ha^{-1}$ $yr^{-1}$ for moist and dry grasslands, respectively. Globally, the technical mitigation potential from these measures are estimated to 1.5 $GtCO_2$-eq or 84% of the livestock sectors' total mitigation potential. At a carbon price of 100 $/$tCO_2$-

eq this quantity falls to 0.81 $GtCO_2$-eq, which is around 30% of what can be achieved in the forestry sector at the same carbon price. The biophysical potential for soil carbon sequestration in grasslands is generally higher in the presence of moderate to heavy grassland degradation and sufficiently moist climatic conditions. Regions with the greatest total sequestration potentials include East Africa, South America, East and Central Asia.
Investments in soil carbon sequestration can also be partially or completely remunerated through the creation and sale of carbon credits to carbon markets. This can help to diversify, augment and stabilize pastoralist incomes. However developing policies to encourage the adoption of practices that sequester carbon has several significant challenges, such as demonstrating additionality, addressing the potential for losses of sequestered carbon, and engaging smallholders and pastoralists with uncertain land tenure.

Foremost practical methods to measure sequestered carbon, which are affordable, but also sufficiently accurate for carbon markets, need to be developed. Presently, trade in agricultural soil carbon credits is in its infancy, and they are currently only eligible for trade on voluntary carbon markets, which offer much lower carbon prices relative to Kyoto-compliant markets. Until affordable methods that can measure soil carbon with sufficient accuracy for Kyoto-compliant markets, low carbon revenues will limit the uptake of soil carbon enhancing activities. This raises the issue of whether an alternative mechanism is needed for large scale uptake of these activities.
For example, in the forestry sector, which has the potential to supply a larger but still comparable amount of mitigation, the UN-REDD programme for Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries, was launched in 2008 to implement national REDD+ strategies and create value for carbon stored in forests. It is predicted that financial flows (donations by Annex I countries) for mitigation from REDD+ could reach up to US$30 billion a year. Given that grasslands have the potential to sequester almost one third of what can be achieved in forestry, one could argue that there is an urgent need for the development of a similar programme to manage financial support and coordinate the implementation of grassland restoration measures, globally.

**Proposition.** We expect that a significant share of grasslands' mitigation potential could be realised at current/expected carbon market prices, particularly in high potential grasslands of East Africa, South America, East and Central Asia.
Perhaps the approaches can be used to achieve this goal. First is to facilitate access to growing carbon markets by supporting the development to practical and affordable carbon accounting methodologies that are sufficiently accurate for carbon markets, and the development of institutional capacity for coordination, monitoring, enforcement required to support carbon credit creation and trading. The second approach, while still reliant on practical/affordable accounting methodologies, recognises the limitations of carbon markets and would involve developing an international programme/initiative to promote soil C sequestration in grasslands by overcoming these and other barriers, and by generating alternative financial resources.
Is this a reasonable summary of the approaches needed? Are they achievable and if so on what scale? Are there additional elements that need to be added to these broad approaches, or should would be focussing on a different approach altogether.

**Scope/boundaries/scale.** Because soil C sequestration potential in grazing lands is largely a function of recovery from overgrazing, we propose to focus primarily on interventions in grasslands with medium to heavy degradation, in regions where is sufficient moisture and large mitigation potentials (e.g. East Africa, South America, East and Central Asia).
While soil C would be the main environmental good that is targeted, a broad range of environmental goods and services that are closely linked with soil C sequestration (e.g. biodiversity, erosion control & sediment/nutrient runoff, water quality etc.) will also be considered.
Socioeconomic and food security impacts will also be investigated. In particular, direct income benefits to landholders and other groups involved in supporting soil C interventions (e.g. contractors, labourers, scientists, technical advisors). Given that many livestock producers consume much of their output, non-cash benefits in the form of own consumption will be also be explored. Further, we will

also focus on community mechanisms and other institutional innovation, used in grassland restoration actions, required to strengthen communities' capacities to implement and monitor sustainable development in the long-term.

**Moving towards an objective statement.** On the basis of additional research to ascertain the economic, environmental and social costs and benefits, of range restoration and improvement, we propose to set global and regional targets. For example, a global target may be: fulfil 25% of grasslands global annual soil C sequestration potential, from restoring degraded grasslands, by 2025. Is this a reasonable target? How much further research is needed to determine appropriate targets and to what extent would targets need to be regionally differentiated?

**Problem statement.** Grasslands are estimated to contain 343 billion tonnes of carbon, nearly 50% more than is stored in forests worldwide (FAO, 2010), and their global potential to sequester carbon is of the same order as that of croplands and forests. To-date very little has been done or planned to realize this massive potential. As outlined, This largely due to the absence of i) carbon accounting methodology that is affordable but sufficiently accurate to support credit creation and trade in carbon markets, and ii) an international program/initiative to overcome these and other barriers, and to coordinate R&D and implementation

The first of these issues is partly being addressed by the development of grassland carbon accounting methodologies, including the recent methodology submission to the Verified Carbon Standard (VCS) by FAO. Nevertheless, once approved the application of such a methodology to any particular region will involve the collection of substantial biophysical data and the development and implementation of grassland management plans. Moreover, there are significant monitoring and enforcement challenges associated with protecting and ensuring the permanence of soil C stocks. Consequently, interventions to sequester and measure soil C will only be affordable in grasslands with relatively large sequestration potential. Moreover, carbon markets are only likely to be able to fund a limited fraction of this potential; trade in the voluntary carbon market is still very thin, with a total transaction volume of 94 million $tCO_2$-eq in 2009, for all mitigation sources (of which grassland projects comprise a small fraction), which is tiny compared to grasslands total annual mitigation potential of 1,465 million $tCO_2$-eq. While carbon markets are expected to grow significantly over time, other avenues for financing including the World Bank Climate Investment Funds, as well as the financial mechanisms that are expected to evolve from the Green Climate Fund (GCF); which is being proposed by Parties to the UNFCCC as a mechanism for mobilizing the proposed $30 billion available immediately as "fast track" funds and the $100 billion by 2020, pledged by higher income countries in Copenhagen and Cancun. One possible way these finances can be accessed may be through the development of Nationally Appropriate Mitigation Actions (NAMAs).

Institutional and policy design issues in collectively managing natural resources are another key challenge, as the tenure systems in much of the worlds grazing lands fall between a continuum of open access and common property. Around 987 million or 70% of the world's 1.4 billion "extreme poor" depend on livestock. Of these around 301 million are in grazing only systems, many of which comprise pastoralists in poor countries (e.g. in the Horn of Africa and the Sahel) (FAO, 2010). While there is significant soil C sequestration potential in some of these regions (e.g. in the Ethiopian highlands), finding the right blend of policies and institutions to capitalize on this potential is a major challenge.

In the absence of effective collective action, individuals have incentives both to overexploit and to under-invest in pasture resources. While no doubt challenging, a well-designed carbon sequestration payment program can improve incentives to undertake collective action. This requires the development of a community-based management framework in which pastoralists are rewarded for their collective efforts to generate public goods in terms of soil C, increased biodiversity, reduced soil erosion, and increased biomass. These benefits depend on compliance mechanisms that ensure everyone abides by new limits, without incurring prohibitively high enforcement costs. Community-based monitoring mechanisms offer one avenue for minimizing these costs. Moreover, the development of communal tenure institutions to facilitate the transition from open access towards

more secure forms of land tenure, including common property regimes, will greatly improve the ease and efficiency with which carbon (and other environmental good and service) revenues can be generated and allocated among herders. Further, grassland restoration projects in traditional pastoralist regions must also be sensitive to the multi-functionality, from a livelihood perspective, of grazing systems. In these cases environmental goods and services may not only have to be traded off with livestock income, but also with production of fuel, draught power, fertilizer and building materials.

**ACTIVITIES**

**Analysis/assessments of technical/economic/institutions**

Develop a Capacity to conduct strategic analyses to:

- quantify the technical soil carbon sequestration potential, and associated environmental co-benefits in grasslands, globally.
- estimate the costs and potential benefits (e.g. carbon credit revenues, productivity gains) of carbon mitigation .
- identify technical, socio-economic, institutional and other barriers to adoption, and develop solutions to build capacity and overcome these barriers.

**Information generation and sharing**

From the above, region-specific investment strategies will be developed. This will include a proposal for a collaborative international programme to raise and coordinate financing for grassland mitigation actions (similar to the UN REDD programme developed for forestry).

**Outreach/advocacy & Policy support**

The programme will be promoted in future sessions of the UNFCCC conferences of the parties (COP), particularly sessions within the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA), which provides the official avenue for the inclusion of agricultural soil carbon measures in Kyoto-compliant market mechanisms.

**Piloting and Capacity building**

Along with building capacity of land holders to manage grasslands more sustainably, improving institutional capacity is critical, as the provision of carbon marketing infrastructure requires astute governance, coordination, monitoring, and enforcement. Developing strategies and links to sources of climate change mitigation finance that can be tailored to fit the needs of rangelands producers is also needed, with relatively little experience on the ground so far.

To enhance the evidence base on the mitigation potential and cost effectiveness of sustainable grassland practices, pilot projects will be established in each of the regions estimated to have the greatest potential, including East Africa, South America, East and Central Asia.

**Mainstreaming/Up-scaling**

An international program/initiative will be developed to promote the uptake of grassland restoration measures through marketing and advocacy, but also by coordinating research efforts to support the identification and implementation of grassland restoration in grassland areas with high and cost effective soil C sequestration potential. The initiative also will draw lessons from piloting activities and analysis, to provide guidance on the validation of project proposals, and it would also support the development of appropriate institutional arrangements which are fundamental for the successful upscaling and mainstreaming of grassland restoration. Some favourable institutional arrangements include effective extension services for the adoption of new practices and technologies; efficient coordination with government land use plans; and the provision of host country measurement monitoring and verification services.