Pastoralists – Playing a Critical Role in Managing Grasslands for Climate Change Mitigation and Adaptation

GRASSLANDS REPRESENT THE MAJORITY OF THE WORLD'S AGRICULTURAL AREA AND HOLD 20 PERCENT OF THE WORLD'S SOIL CARBON STOCK. Grasslands, including rangelands, shrub land, pasture land, and cropland sown with pasture, trees and fodder crops represent 70 percent of the world's agricultural area. The soils under grasslands contain about 20 percent of the world's soil carbon stocks.

GRASSLANDS ARE AN IRREPLACEABLE SOURCE OF LIVELIHOODS AND FOOD SECURITY FOR THE POOR. Poverty and economic marginalization often characterize the human communities managing grasslands. Livestock keeping is a source of income and basis for food security for more than 1 billion people – or one-third of the poor in rural areas. And, livestock keeping is the only potential source of income that can be derived from many grassland areas (see figure 2). In addition, grasslands are a source of goods and services such as wild food, energy and wildlife habitat. They also provide carbon and water storage, recreation , and watershed protection for many major river systems.

MUCH OF THE WORLD'S GRASSLANDS ARE IN A STATE OF DEGRADATION. Globally grassland degradation is estimated to be 20 – 35 percent. Because livestock is the fastest growing agricultural sector – making up over 50 percent of agricultural GDP in many developing countries - pressure on the land has increased in order to meet meat and milk demand. As a result of inappropriate grazing management practices, large parts of the world's grasslands have been degraded.

ACCORDING TO THE IPCC, IMPROVING GRASSLAND MANAGEMENT AND REVERSING DEGRADATION OFFER THE MOST IMPORTANT TECHNICAL MITIGATION SOLUTIONS IN AGRICULTURE. Previous research has documented that improved grazing management could lead to greater forage production, more efficient use of land resources, and enhanced profitability and rehabilitation of degraded lands and restoration of ecosystem services. Many management techniques intended to increase forage production have the potential to increase soil carbon stocks, thus sequestering atmospheric carbon in soils. Improved grazing management can lead to an increase in soil carbon stocks by an average of 0.35 t C ha^{1} yr^{-1} but under good climate and soil conditions improved pasture and silvopastoral systems can sequester 1-3 t C $ha^{-1}yr^{-1}$. It is estimated that 5-10 percent of global grazing lands could be placed under C sequestration management by 2020 (See figure1).

GRASSLAND MANAGEMENT PRACTICES THAT REDUCE EMISSIONS ALSO ENHANCE ADAPTATION. Well-managed grasslands provide multiple co-benefits that are critical to adaptation. Risks associated with prolonged drought periods and unreliable rains can be offset by the increased water infiltration and retention associated with organic matter accumulation in the soil. Moreover, this will improve nutrient cycling and plant productivity and, at the same time, enhance the conservation and sustainable use of habitat and species diversity. Grassland management is thereby a key adaptation and mitigation strategy for addressing climate change and variability.

GRASSLANDS CAN BECOME A BRIGHT SPOT THROUGH SYSTEMS MANAGEMENT. Grazing practices can be used to stimulate diverse grasses and the development of healthy root systems; feed both livestock and soil biota; maintain plant cover at all times, and promote natural soil forming processes. Grazing practices that ensure adequate plant recovery before re-grazing will enhance soil and biomass carbon, capitalize on animal based nutrients and offset ruminant methane emissions.

EFFORTS TO INCREASE THE RESILIENCE OF GRASSLAND MANAGEMENT SYSTEMS AND SUPPORT LIVESTOCK KEEPERS MUST BEGIN NOW. Because yield reductions under drought, heat stress, floods, and other extreme events will be the most consequential negative impacts of climate change, efforts to adapt to a changing climate should focus on increasing resilience of ecosystem processes through management systems and the policies that support these. This will also require addressing key political constraints including land tenure.

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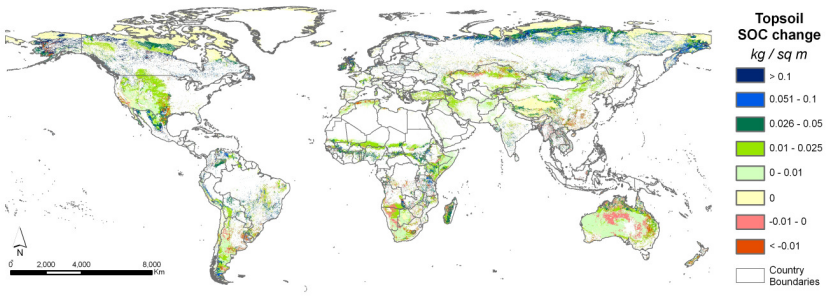
POST COPENHAGEN AGRICULTURAL PRIORITIES WILL REQUIRE INTEGRATED ADAPTATION AND MITIGATION EFFORTS FOCUSED ON LIVESTOCK KEEPERS, GRAZING MANAGEMENT AND FORAGE PRODUCTION PRACTICES. Critical components required, with or without Copenhagen agreements, include:

- awareness raising at the local level on the potential impacts of climate change;
- implementing grazing management systems that build soil carbon, enhance biological communities, re-establish effective water cycles, and manage livestock based nutrients, and;
- promoting soil cover of grasses, legumes and multipurpose trees to enhance livestock productivity.

Understanding and accounting for carbon and nitrogen flows will be instrumental in capitalizing on the full potential of grassland systems for adaptation and mitigation. Climate change will demand the sustainable stewardship of our natural resource base that has been called for over the last several decades.

Potential Soil Organic Carbon Sequestration in Grasslands



Geographic projection. 30 arc seconds resolution at the equator.
Source: Carbon status and carbon sequestration potential in the world's grasslands. Petri, Batello , Villani and Nachtergaele, 2009.

Figure 1

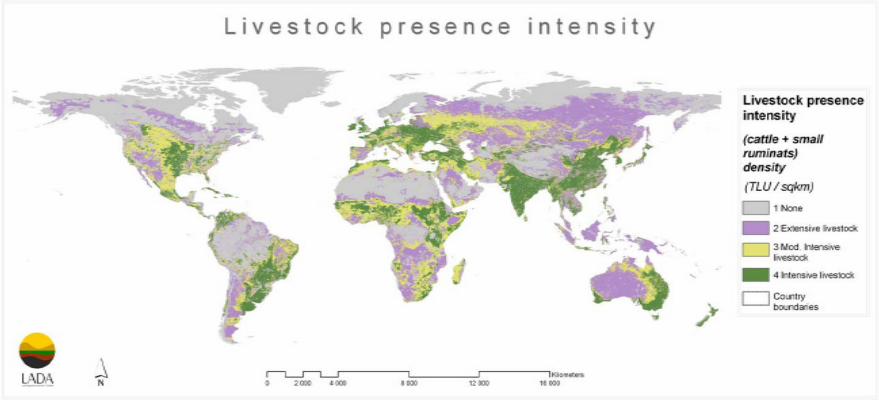


Figure 2

FAO LADA Mapping Land Use Systems at global and regional scales for Land Degradation Assessment Analysis, Nachtergaele and Petri, 2009

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These messages draw on the following FAO technical publications: *Challenges and opportunities for carbon sequestration in grassland systems: A Technical Report on Grassland Management and Climate Change Mitigation* by Richard Conant, Integrated Crop Management, Vol. 6, 2009 and *A Review of Evidence on Dryland Pastoral Systems and Climate Change: Implications and opportunities for mitigation and adaptation* Land and Water Discussion Paper No. 7, 2009. Photo credits: C. Neely, A. Savory, C. Leggett.