FAO E-Conference on Sustainable Grasslands:
Week Two Summary and Introduction to Week Three

Week Two Summary

In week two discussions were centered on the multiple ecological and socio-economic functions of grasslands. After week one focused on livestock production, the debate was extended to encompass a wider range of values associated with grasslands. The discussions were structured around three major agro-ecological regions: arid/semi-arid, tropical, and temperate/cold. For each region we chose to concentrate on ecological functions that have received less scientific attention, in particular, water storage, energy production/savings, erosion control, and climate regulation. Significant themes and debates to emerge are summarised below.

Arid and semi-arid grasslands

- Arid and semi-arid grasslands in India and Kenya face the constraints of extreme seasonal change. Low frequency but high intensity rainfall can result in high run-off losses of nutrients and water. Grassland ecosystems that have adapted to these conditions provide critical functions in water capture and storage, while helping to prevent nutrient and soil losses.
- Because they are rich in solar energy, arid and semi-arid grasslands have the potential to provide a clean source of renewable energy to meet local and urban energy demands.
- An interesting debate emerged contrasting the relative merits of native and improved grasses. In extreme climatic conditions, grassland biodiversity is associated with ecological resilience. Native species are well adapted to erratic water availability, high soil salinity and low nutrients. On the other hand, improved grasses and silvopasture techniques can increase productivity when well managed.

Tropical grasslands

- Tropical grasslands are characterised by high biodiversity.
- Complex biological/ecological structures and processes of tropical grasslands were highlighted, including competition between vegetation types and shading effects.
- Low levels of soil organic matter are a limiting factor. Increasing soil organic matter can contribute to improved nutrient recycling, water balance and soil structure. Promising management options include integrated management and those that ensure closed complete nutrient cycles from soil - plant - animal - soil.[1]

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[1] Recently published papers on this subject include:

Mauricio, R.M. (2012) "Comment to 'Pasture shade and farm management effects on cow productivity in the tropics' by Justin A.W. Ainsworth, Stein R. Moe, C. Skarpe [Agric. Ecosyst. Environ. 155 (2012) 105–110]", *Agriculture, Ecosystems & Environment*, 161, pp. 78-79.

Paciullo et al. (2011), "Performance of dairy heifers in a silvopastoral system", *Livestock Science*, 141 (2–3), pp. 166-172.

Reis et al. (2009). "Influence of trees on soil nutrient pools in a silvopastoral system in the Brazilian Savannah". *Plant and Soil*, 329: pp. 185-193.

Sousa et al. (2010), "Nutritional evaluation of 'Braquiarão' grass in association with 'Aroeira' trees in a silvopastoral system", *Agroforestry Systems*, 79, pp. 189-199.

Temperate and cold grasslands

- Climate limitations on decomposition builds large soil organic matter stocks in Steppe ecosystems. Intensively grazed areas tend to be a carbon source, while regenerating sites take up carbon again. It is unclear how climate change will affect these processes
- Wind erosion is significant but highly variable in Eurasia. Appropriate management is a key issue as wind erosion only affects heavily grazed areas.
- In the Netherlands, grasslands play a unique role, ensuring public safety through flood protection. A major challenge is to reduce the carbon emissions caused by decomposition of peat soils. This can be achieved by elevating ground and surface water levels but at the cost of other agronomical disadvantages.[2]

Socio-economic functions of grasslands

- Grasslands form the backbone supporting smallholder ruminant production in India and Ghana. 47.1% of people in the West African savannah directly rely on an extensive system of livestock production for their livelihoods. In the dry season, 41% of cattle are relocated to grasslands that can provide their requirements. In contrast, livestock left in villages to fend for themselves face serious problems in body condition.
- The multiple functions of grasslands can aid socio-economic resilience. In India, earnings from goat flocks are relatively high compared to sheep due to the added revenue stream from milk. In Italy, agro-tourism offers an additional source of income, aiding the economic viability of small farms and helping reduce pressure on the natural resource base.

Economic valuation of ecosystems services

- Contributors sited anthropogenic impacts such as population pressure as a continual threat to grasslands. In this context, it is important to recognise and draw attention to the multiple functions and values that grasslands provide. However, it is often unclear how this should be done. For example:
  - Alpine grasslands are increasingly underused because they do not compete economically with intensive production systems. The consequence is abandonment, encroachment and loss of ecosystems services (Florian Leiber).
  - Grasslands are a soft target for development processes. People see the conservation values associated with grasslands as a barrier to their development. I do not know how to link species conservation with economic valuation (Sujit Narwade).
  - We need support from government policies otherwise we cannot work alone to support sustainable animal production and environmental conservation through silvopastoral systems (Rogerio Mauricio).
- Biodiversity is a perfect example of the difficulties involved in ecosystems services (ES) valuation. Biodiversity provides a range of ES that are valuable to humankind. Examples include pollination services and genetic material of flora that may be useful for medicinal purposes. However these benefits do not always accrue to the local people that manage the environment. Benefits may be diffusely spread, as in the example of species conservation that Sujit Narwade described.

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[2] Novel drainage techniques to address this problem are being developed at Veenweide Innovatie Centrum (www.veenweiden.nl/services-view/beperking-bodemdaling).

Common themes across biomes

- As illustrated by a number of examples from each region, the multiple ecological and socio-economic functions of grasslands are inherently complex and inter-related. This is an important property for any prospective analytical framework to acknowledge.
- Many contributors from each biome have identified the impacts of climate change on grasslands as a critical research gap.
- Despite wide recognition of the importance of disturbance regimes in grasslands management, a better understanding of succession patterns remains an important research priority to enhance ecological knowledge, sustainable management practices and future modelling scenarios.
- Challenges associated with communal land management have been a recurring theme over the first two weeks. Echoing the parable of 'the tragedy of the commons', Raja Kishore Konka stated that, "grasslands are the 'common' lands of the community and are the responsibility of none."
- Payments for ecosystems services (PES) may be an option to acknowledge the multiple functions of grasslands, provide incentives for good stewardship and enhance local decision making on land-use issues. However, as Rogerio Mauricio argues, first we need a common definition of "sustainable grasslands".

Challenges, best-practices and policy options for sustainable grassland management

Looking ahead, the remainder of the E-Conference focuses on sustainable grassland management. In week three we will seek to identify important challenges, pillars and dimensions for grassland management. We have presented a graphical representation of FAO's Sustainability Assessment of Food and Agriculture systems (SAFA) as an example (included in E-Conference Documents). We want to know the potential elements that could contribute to a similar framework, focusing specifically on sustainable grasslands.