



Grazing with Trees: upscaling silvopastoralism for improved dryland management

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Abstract

This presentation describes the first results of the Grazing with Trees (GWT) initiative, promoted by FAO as a response to the Committee on Forestry (COFO) 26th session request to “promote greater and inclusive policy coherence between the agriculture and forestry sectors, including through integrated land use planning, landscape approaches”. The main target of the initiative is to promote enabling environments for dryland Silvopastoral Systems (SPSs). These agroforestry schemes provide multiple benefits and ecosystem services in dryland regions as evidenced by the recent FAO publication *Grazing with Trees*, which seeded the initiative. Being uniquely adapted to landscapes with water scarcity and climatic variability, SPSs can evidently improve the resilience of landscapes and communities to the impacts of climate change, combat desertification, improve watershed management and provide diverse food sources and livelihood opportunities for dryland communities.

The GWT initiative aims to strengthen, at country level, the capacity to mobilize resources and investment tools to incorporate SPSs into Land Degradation Neutrality commitments and Intended Nationally Determined Contributions under the Paris Agreement. GWT seeks to improve effective policy, legislation and institutional arrangements supporting climate-resilient silvopastoralism, especially those adopted by pastoralist and forester communities. The presented outcomes include participation-based silvopastoral policies, strategies and land-use management plans developed and adopted by communities in target landscapes and additional outcomes related to improved governance, participatory institutions and enhanced investment options identified through multistakeholder consultations and application of FAO assessment tools and knowledge products.

Introducing the Grazing with Trees initiative

Drylands and presumed drylands account for approximately 48% of the Earth’s land surface and are home to 25% of the human population. They support 50% of the world’s forests, 50% of global livestock and 44% of global cultivated systems. Furthermore, they harbour 46% of global carbon reserves and 36% of the earth’s biodiversity hotspots.

Woody vegetation and trees provide essential ecosystem services in dry areas, including animal feed, timber, fruits, shade and regulation of soil and water cycles. Equally, livestock production, in particular pastoralism, is critical for livelihoods and food security and supports the resilience of about one billion people throughout the Earth’s dryland ecosystems.

Forests and livestock have been widely considered as antagonists; the latter considered a driver for the degradation of forests. Regardless whether it is important to address the real environmental footprint of pastoralism and encourage an adequate responsibility-sharing with other production systems, the impact of livestock also needs urgent action. Between 2000 and 2018, 68 Mha of dryland forests were cleared in South America and 49 Mha of dryland forests were cleared in Africa (FAO 2019). Cropland expansion was the highest driver of deforestation, accounting for almost 50% (many of them fodder-oriented), but it was closely followed by livestock production, accounting for 38.5% of the deforestation. Livestock is also considered a major source of greenhouse gas (GHG) emissions, accounting for almost 14.5% of the total.

Accordingly, there is an urgent need to adopt improved livestock management practices to both improve efficiency of natural resource use and decrease environmental impacts. FAO estimates that improved management practices alone could reduce net emissions from livestock systems by about 30% (FAO 2016). Halting deforestation and maintaining forests could avoid emitting 3.6 +/- 2 gigatons of carbon dioxide equivalent (GtCO₂e) per year between 2020 and 2050, including approximately 14% of what is needed before 2030 to keep planetary warming below 1.5 °C, while safeguarding more than half the Earth's terrestrial biodiversity (FAO 2022b).

Integrating livestock with trees and other woody vegetation results in a complementarity of agroforestry systems – a silvopastoral system (SPS) – that can boost the local ecosystem, representing a positive transition towards an integrated perspective of livestock and forest production. SPSs support high-value food sources for livestock that can increase productivity, especially milk production, while acting as a primary pathway for forest restoration in dryland areas.

Being uniquely adapted to landscapes with water scarcity and climatic variability, SPSs can improve the resilience of landscapes and communities to the impacts of climate change, combat desertification, improve watershed management and provide diverse food sources and livelihood opportunities for dryland communities.

This paper describes the first results of the Grazing with Trees (GWT) initiative, started by FAO to develop enabling environments for mainstreaming dryland SPSs. This initiative is seeded by the FAO publication: *Grazing with Trees* (FAO 2022a) aimed to support silvopastoral approaches and develop enabling environments for dryland SPSs.

This initiative specifically responds to the Committee on Forestry (COFO) 26th session request to “promote greater and inclusive policy coherence between the agriculture and forestry sectors, including through integrated land use planning, landscape approaches” The initiative also answer the request of the country members of the COFO Working Group (WG) on Dryland Forests and Agrosilvopastoral Systems to generate evidence on how SPSs could contribute to the restoration of woody ecosystems in drylands, mitigating desertification and drought. Accordingly, the GWT initiative will strengthen countries' capacity to design on-the-ground drought-resilient SPS investment proposals and to mobilize resources to achieve their Intended Nationally Determined Contributions under the Paris Agreement. In doing so, it will enhance pastoral agrifood systems in dryland areas and improve communities' resilience to climate change and other crises. By building partnerships with communities, development actors and governments, the initiative will also facilitate South–South dialogue and investment fora so that communities can share challenges, opportunities and lessons learned, encouraging collaboration to strengthen drought-resilient and gender-responsive silvopastoral value chains in selected countries.

Methodological approach: first steps for a multilevel strategy

GWT focuses on creating enabling environments for developing SPSs in dryland areas. Its methodology intends to gather together country members to coordinate action. To this end, successful implementation requires well-designed, integrated cross-sectoral strategies with effective policies, governance and land management. Several

pilot countries will implement those strategies at different levels: country, state and local and report to the project for analysis and discussion.

The first step is sourced by the GWT publications and delivers the rationale for mainstreaming silvopastoralism, gathering and operationalizing the conclusions and recommendations of the report.

A second step consists in delivering a roadmap for willing countries to promote enabling environments by improving effective policy, legislation, institutional arrangements, multistakeholder platforms and pilot experiences supporting climate-resilient dryland SPSs, especially those adopted by pastoralist and forester communities. This way, silvopastoral management could be integrated and mainstreamed into national grazing and forest policies, legislation and institutional arrangements in target countries. Specifically, a clear line of action is sought regarding the potential of SPSs for climate action, addressing at the same time adaptation to and mitigation of climate change. This line of work was derived to a new initiative focused on potential of SPSs for decarbonization.

The third step targets actual implementation on the field. While dryland developing countries often have or are able to develop policies that can support SPSs, effective implementation is generally lacking, and investment is not a priority, often due to a lack of awareness and appropriate investment solutions, and limited capacity for implementation or sustaining communities' practices and traditional systems. Investment is a bottleneck for dryland projects and, accordingly, improving financial and investment tools will be a critical outcome of the project. SPS investment opportunities are identified through multistakeholder consultations on targeted and inclusive value chains, to be assessed against the financial needs of the silvopastoral projects.

In addition, this initiative also addresses critical cross-cutting issues, often by close collaboration with other ongoing FAO Drylands projects, including knowledge management, gender equality and governance. For example, knowledge management tries to build capacities of stakeholders and decision-makers, but also targets the co-construction of knowledge with farmers, pastoralists and local communities (including grassroots associations and indigenous groups) in effective, integrated and silvopastoral management for sustainable production and forest and agricultural biodiversity.

First results

SPSs can derive multiple benefits from the ecological relationships between animals and woody plants (Plieninger & Huntsinger 2018). These benefits combine improved food production and security with increased livelihood adaption and resilience, while acting as a primary pathway for forest restoration and sinking carbon in dryland landscapes by enhancing the above- and below-ground carbon capture through improved pasture management, tree planting and assisted natural regeneration. The integration of trees in SPSs – where trees are introduced into grazed pastures – can be very effective in capturing and temporarily storing carbon. It also enhances productivity and protects against the extreme weather conditions (Agethen et al. 2021).

Benefits evidenced from previous projects in dryland regions that introduced SPSs were documented in *Grazing with Trees* (FAO 2022b). For example, microclimate measurements show lower soil temperatures in pastures with trees (2.2–2.3°C at 5 cm from the surface). Economic analysis of various intensified SPSs in Latin America found that the income generated was far higher than the investment in all cases (Chara et al. 2017). In India, the Jhansi dryland areas have increased their production tenfold using a ten-year silvopastoral rotation plan (Yadav et al. 2019). In Senegal, hundreds of villages have protected their common grazing lands over the last 30 years, transforming degraded shrubs into savannah landscapes and increasing woody cover by up to 65% (Pasicznik & Reij 2020).

The scoping accompanying the production of the roadmap has also provided some results and key lines of work targeting the links between forests, agriculture and agroforestry systems. A first finding indicates that agroforestry systems constitute a clear asset for mitigation by sequestering atmospheric carbon dioxide both in roots and soil but also in aerial plant parts, (de Stefano & Jacobson 2018) in a way that crops and grasslands cannot. Agroforestry systems store more carbon in woody plant biomass, on average, 46.1 Mg/ha more than sole cropland or pasture-based land uses without trees, which shows a great potential to adopt mitigation measures while providing a wide span of options for increasing their capacity of adaptation (Zomer et al. 2016). This way, SPSs can enhance biomass as well as soil C storage in pasturelands through addition of woody components (Aryal et al. 2022). Precisely, increasing the complexity of crops and pasturelands by implementing agroforestry systems significantly increases soil organic carbon (SOC) (de Stefano & Jacobson 2018). Once this baseline is established, the incorporation of the role of domestic herbivores through agrosilvopastoral and silvopastoral approaches also has the potential to increase SOC stored in herbaceous plants roots, due to the effects of grazing on the plant communities.

The pathway to deliver those results was also established in the report and marks the key lines of action for adapting the project to a multi-country scale:

- 1) Monitoring, data gathering and assessment of the situation of targeted SPSs
- 2) Policy work, specifically the development of supportive and participatory policies and legal frameworks that allow the creation of enabling environments
- 3) Securing tenure rights and improving governance through upgrading and support of traditional governance systems and implementation of participatory and multistakeholder institutions
- 4) Co-creation of knowledge, capacity building, training and education to empower pastoralist communities and generate the conditions to allow their full participation in decision-making
- 5) Adopting a gender-sensitive approach to sustainable land planning and management, recognizing the role of people in risk of marginalization, women, youth, employees, elders...

Discussion and conclusion

Silvopastoralism emerges as an innovative solution for improving management and restoring dryland ecosystems. Both traditional and modern SPSs can contribute to increased productivity and income, while preventing erosion, protecting the soil from land degradation and improving other ecosystem services. Moreover, silvopastoralism has evolved in drylands and co-evolved with its ecosystems, as a climate-coping and risk-management system, to maintain production and natural resources even in the occurrence of drought periods and extreme weather conditions (Soni et al. 2016). The main lines of the project – policies, governance, capacity and planning – offer a roadmap for implementation at a country level. In parallel, as the project targeting the role of SPSs for decarbonization is advancing with the first results from a literature review and model-building, Grazing with trees has completed its rationale and global assessment so the project is ready for local implementation.

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