UNCCD COP16 Riyadh | 2024

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United Nations Convention to Combat Desertification

Side Event: Potential of Dryland silvopastoral systems for global decarbonization action

Potential of silvo-pastoralism for adaptation and mitigation in the context of drylands

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Thursday 5th December, 15:00-16:30

Event Room at the Food and Agriculture Pavilion

Alliance Bioversity & CIAT

ICARDA

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

Quick facts about drylands

- Drylands cover approximately **41% of Earth's land surface**, spanning over **100 countries**.
- Drylands are home to around **38% of the global population**, support **44% of the world's agriculture.**
- Drylands contribute significantly to livestock grazing, hosting **50% of the world's livestock population**.
- They are home to some of the most unique ecosystems and provide habitats for **50% of all known plant species**.
- About **10–20% of drylands** are already degraded, with millions of hectares at risk of desertification annually.

Did you know that drylands are estimated to store about 27% of the total soil organic carbon (SOC) stocks.

Photo: Louhaichi /ICARDA

Photo: Louhaichi /ICARDA

Quick facts about silvopastoral systems

- Silvopastoral systems in dryland sequester between **1 to 4 tons** of CO_2 per hectare annually (Murgueitio et al., 2019 Tanwaret al., 2022).
- **68-204 tons** of CO_2 per hectare are stored in global silvopastoral systems.
- Silvopastoral systems are an important component of extensive goat production in the Mediterranean region. They **provide up to 80% of diet** requirements of grazing animals in mountainous areas.
- Silvopastoral systems and forest remnants store **27–163% more carbon** compared to open pasturelands (Aryal et al., 2022)

Despite their importance, silvopastoral systems continue to be characterized by chronic underinvestment and high degradation.

Photo: Louhaichi /ICARDA

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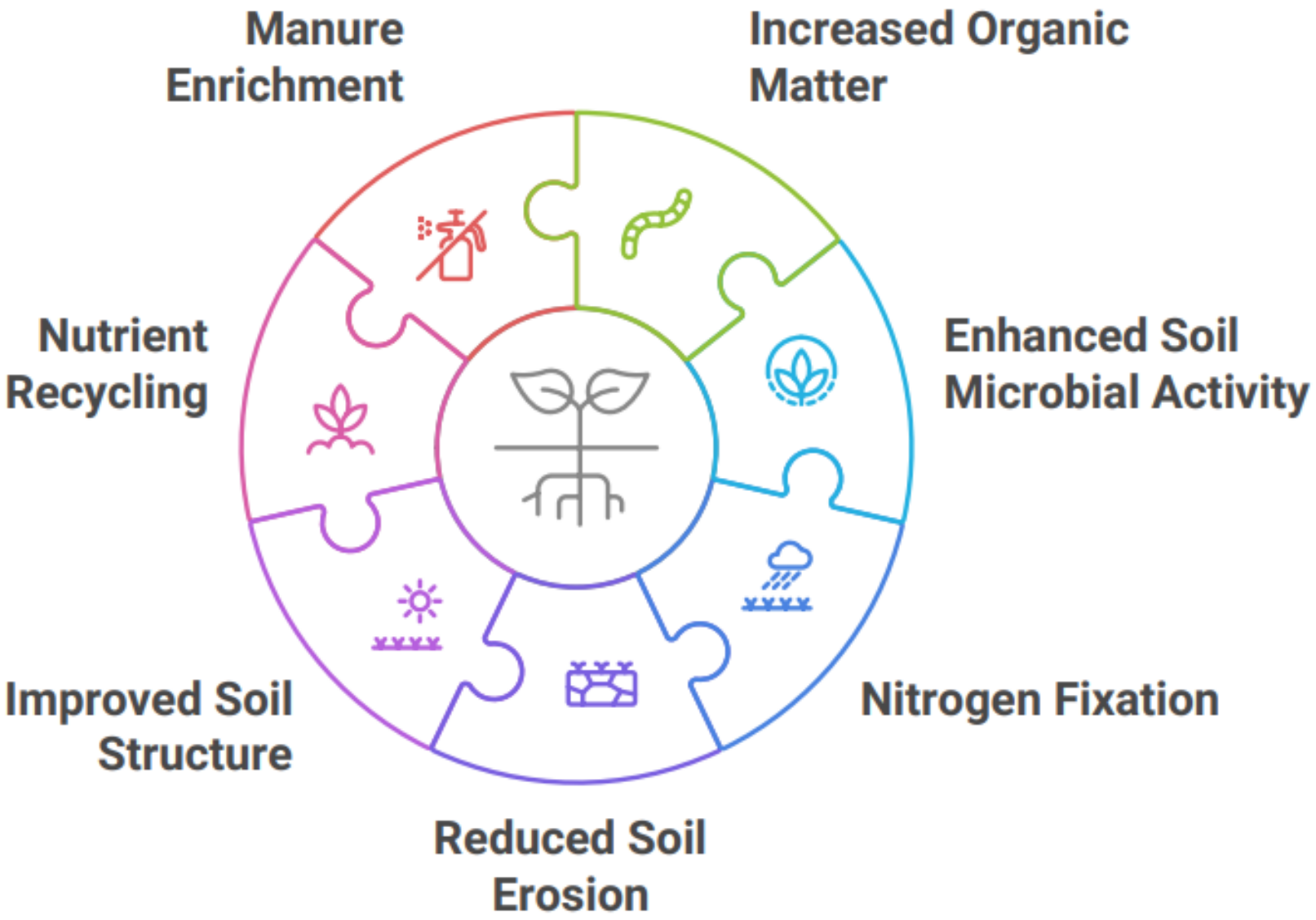
Why Sylvo-Pastoralism is Relevant

- Sylvo-pastoralism is increasingly recognized as a **key strategy** for climate **adaptation and mitigation** in **vulnerable ecosystems**, especially in the face of the growing climate crisis.
- By blending **traditional knowledge** with **modern ecological practices**, this approach can empower **local communities**, providing both ecological benefits and economic opportunities.

Benefits of silvopastoral systems

- Increased CO_2 sequestration
- Beneficial microclimatic effect
- Reduced heat stress
- Enhanced water quality
- Lower soil temperature in the summer
- Soil moisture control
- Improved soil quality
- Potentially higher pasture production under difficult conditions
- Increased biodiversity
- Reduced wind speed
- Improved wildlife habitat

Silvopastoral systems improve soil quality



Silvopastoral systems play a crucial role in carbon sequestration in both soils and woody biomass

The carbon sequestration potential of silvopastoral systems in drylands varies widely depending on:

- soil type,
- climate conditions,
- vegetation species,
- management practices, and
- land-use history

Estimates of carbon storage

- Total carbon storage potential in Southeast Asian agroforestry systems was in the range of **46.8 – 209 Mg C ha $^{-1}$** (Gupta et al., 2023).
- Improved grazing management can lead to an increase in soil carbon stocks by an average of **0.35 tonnes C ha $^{-1}$ yr $^{-1}$** but under good climate and soil conditions improved pasture and silvopastoral systems can sequester **1–3 tonnes C ha $^{-1}$yr $^{-1}$** (Conant, R. 2010).
- In Sub-Saharan Africa, AFS and integrated land use could sequester about **0.50 – 3.9 Mg C ha $^{-1}$ year $^{-1}$ C** in the biomass and the total carbon stock in agroforestry systems averaged **15.7 – 77.9 Mg C ha^{-1}** (Gupta et al., 2023).
- Ten-year-old *Acacia tortilis* silvopastoral systems in the arid Kachchh region sequestered **4.91–6.15 Mg C ha^{-1}** in biomass and improved SOC stock by **27.1–70.8%** over sole pasture (Mangalassery et al., 2014).

Methods of Adaptation and Mitigation

- Having **multiple layers of vegetation** (SVPS) increases overall biomass and above-ground carbon storage.
- **Leguminous-based systems offset emissions** from fertilizers (forage breeding).
- **Higher feed conversion** significantly reduces greenhouse gas emissions per unit of animal product (animal breeding).
- Animal husbandry including improved **manure management**
- Land rehabilitation/restoration is **site specific**
- **Proper grazing management (**managing grazing intensity and timing)
- **Others**: adoption of **alternative energy technologies** that replace use of shrubs and dung as fuel as a management practice

Livestock grazing is an effective management tool

The condition of silvopastoral systems rely on **frequent herbivore, animal movement, and rotational grazing**.

However,

- The **absence or disruption of livestock mobility**, whether due to settlement, sedentarization, or the obstruction of transhumance and migratory routes has, historically, led to rangeland degradation.
- **Unbalanced grazing** (overgrazing or undergrazing) should be avoided, as they can result in land degradation, shrub encroachment, invasive species invasion, and biodiversity loss.

Photo ICARDA/Mounir Louhaichi

Photo ICARDA/Mounir Louhaichi

Condition of the soil surface is the key

IT'S NOT THE COW, IT'S THE HOW[10]

The right management of grasslands and silvopastures boosts ecological health. The wrong management rapidly degrades it. In both cases, cows are the main agents.

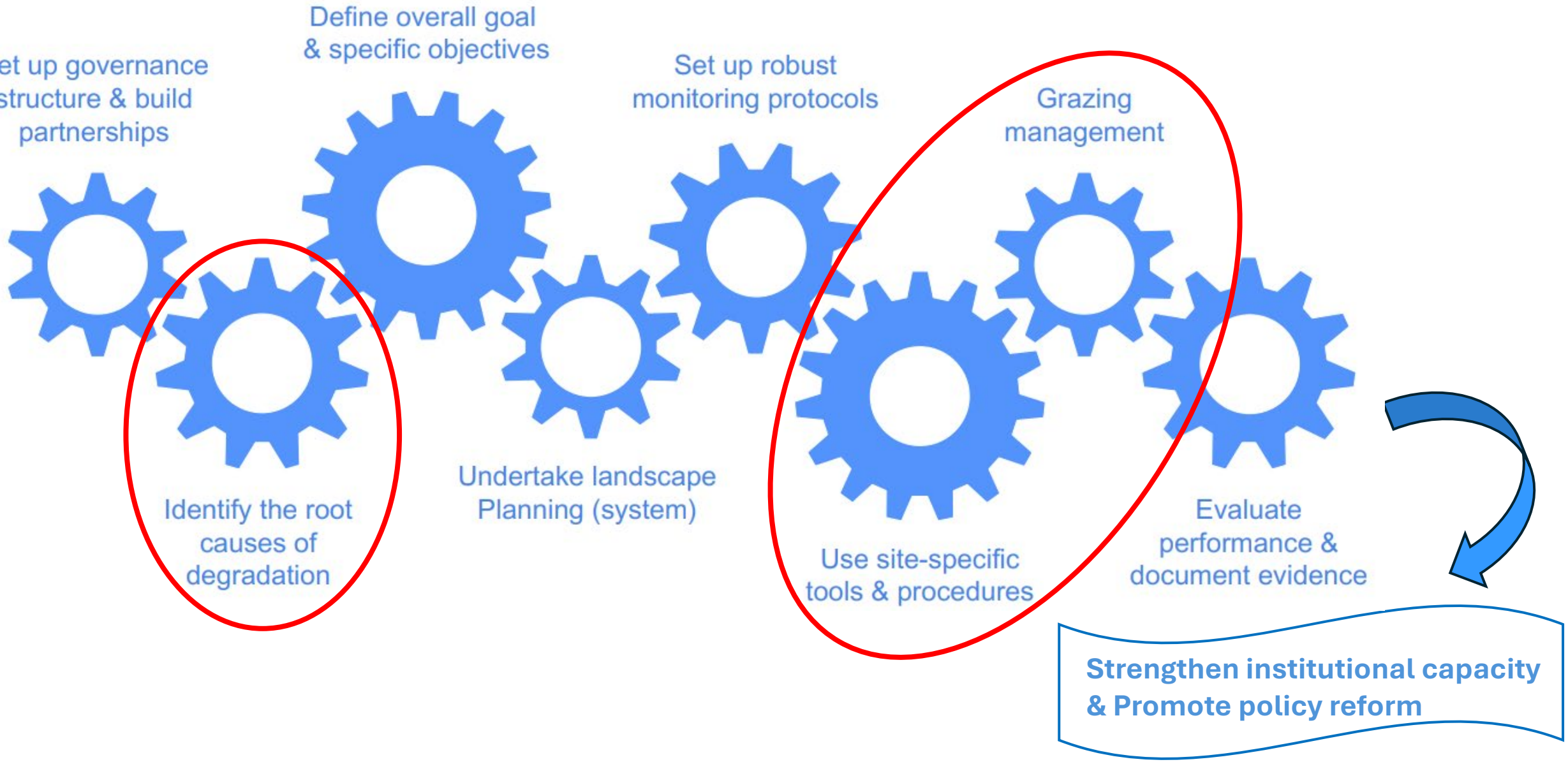
Sustainable “Rangeland” Management Toolkit

ICARDA

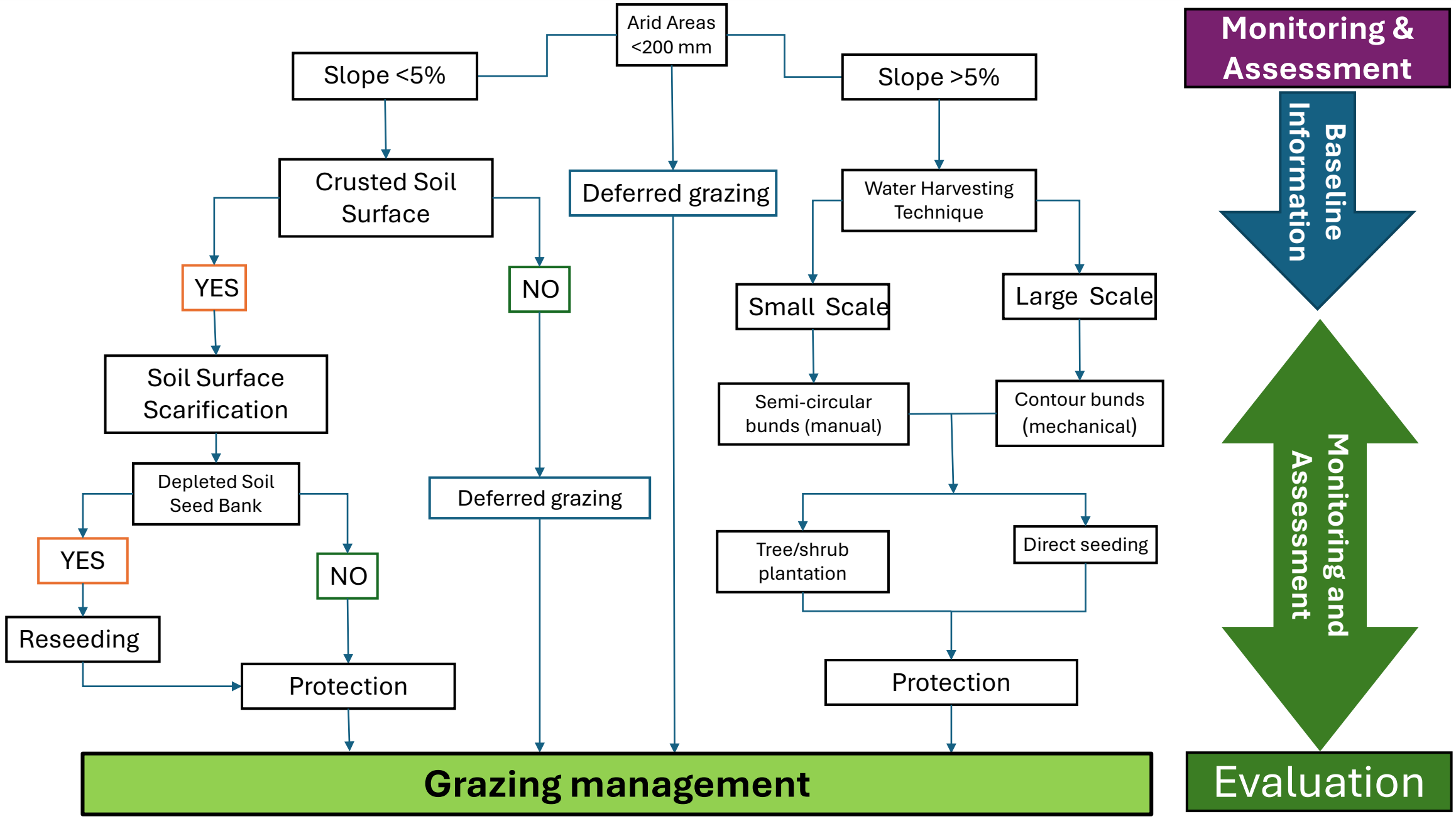
IUCN

https://hdl.handle.net/10568/125414

Sustainable Silvopastoral Management & Restoration



Participatory silvopastoral governance, management & restoration

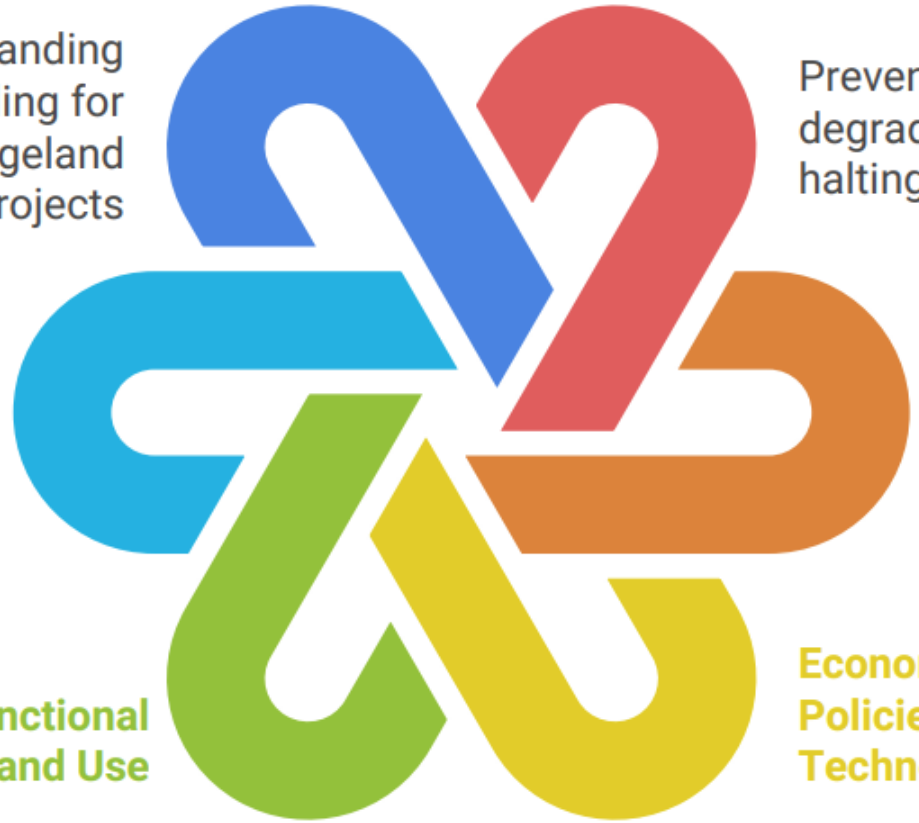


Global Actions for Sustainable Rangelands & Pastoralism to Achieve Land Degradation Neutrality

A POLICY BRIEF, WITH RECOMMENDATIONS FOR THE UNCCD CONFERENCE OF THE PARTIES

IYRP 2026 INTERNATIONAL YEAR OF RANGELANDS AND PASTORALISTS

Prepared by the IYRP Working Group Land Degradation Neutrality



Concluding remarks

- Silvopastoral systems offer a **unique solution** by providing sustainable alternatives to mitigate the impacts of climate change, supporting both **adaptation** to changing conditions and **mitigation** of climate impacts.
- Silvopastoral systems that **integrate trees and grasses** achieve more effective sequestration of atmospheric carbon compared to systems limited to either trees or pasture alone.
- There is a need for **change in behavior** through education, training, awareness campaign, etc.
  - Better integration (working together) using a system approach
  - Long term-protection or exclusion of livestock can be detrimental
  - Livestock is part of the solution (grazing is a tool)
- **COP16** offers an opportunities to raise global awareness about the potential of SVPS for global decarbonization

United Nations
Convention to Combat Desertification

Thank you for your attention

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