RESEARCH PROGRAM ON Livestock

CGIAR

Silvopastoral restoration to enhance ecosystem services and increase farmers' income

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ICARDA

Science for resilient livelihoods in dry areas

Outline

Causes of silvopasture degradation

Objective

Approach

Restoration techniques

Results

Recommendations

Causes of Silvopasture Degradation

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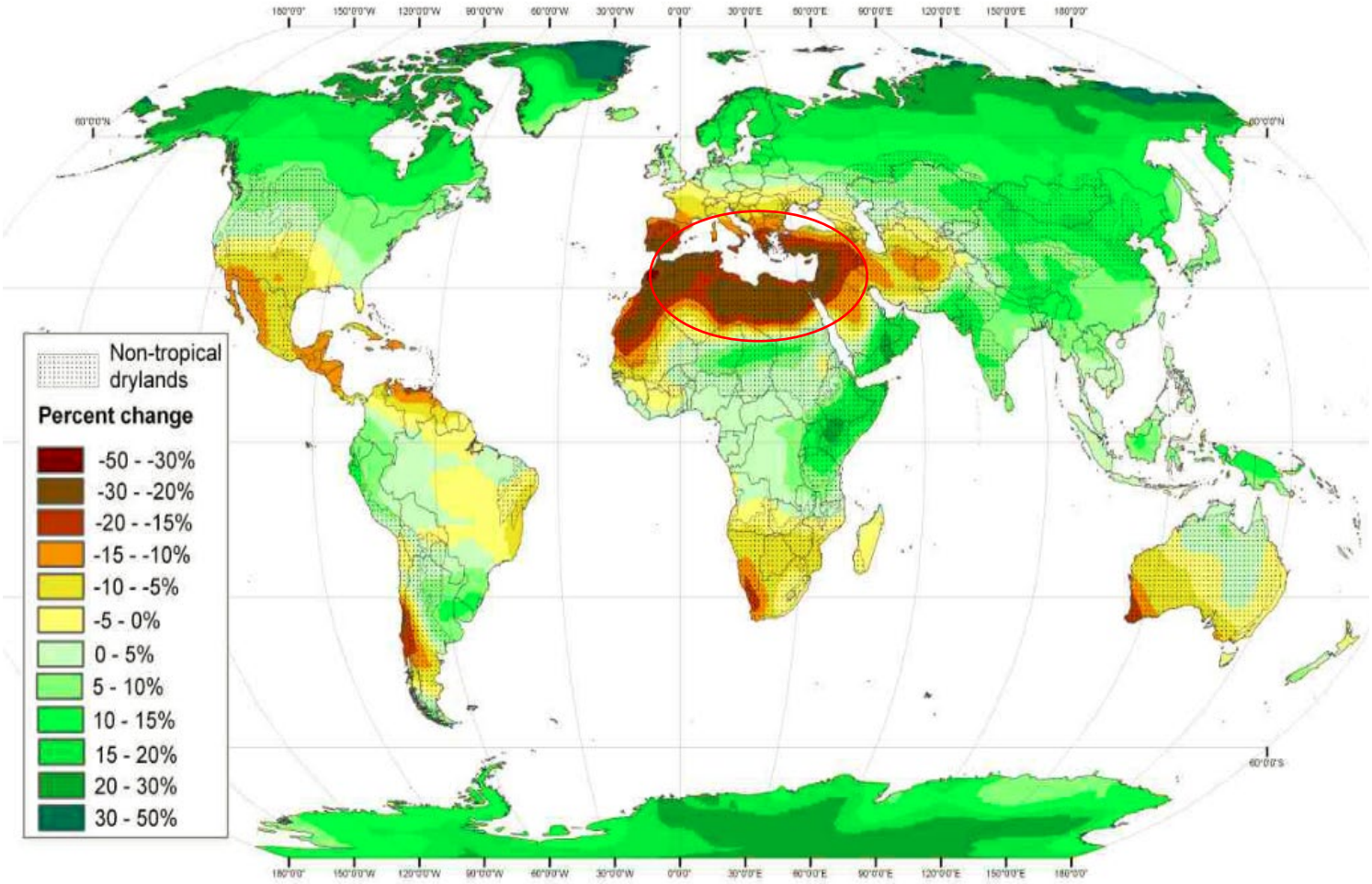
Climate change

We are witnessing:

- Changing rainfall patterns (including flooding)
- More frequent & severe droughts
- Higher temperature

Higher risk of crop failure

Productivity of rainfed agriculture will decrease by 11% by 2080



Causes of Silvopasture Degradation

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Improper grazing practices (overgrazing and early grazing)

Overgrazing occurs:

- Too many animals (high SR) during critical time of plant growth
- Bad timing: early grazing or prolonged grazing period (no chance for the plant to recover)

Disruption of the traditional grazing system

Use of vehicles for transportation of water to the herds and of the animals to new pastures fosters prolonged grazing on rangelands and uncontrolled movement of the herds.

Causes of Silvopasture Degradation

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Encroachment of agricultural practices/afforestation

- 20% of the world's native rangelands (including grasslands) have been converted to crops
- Recently, many countries are planting billions of trees (afforestation)

Weak institutional support and policy

- Subsidized animal feed
- Unclear land tenure
- Lack of coordination among concerned institutions / developing agencies

Importance of silvopastoral production system

- Silvopastoral systems, a form of agroforestry, involve the interaction of woody perennials, forages, and livestock. The three components in the system are intentionally managed for optimal interactions aimed at augmenting agricultural production and environmental services (Sharrow, 1999).

What kind of landscape we want to have?

- **History**: How did we come to where we are? [What lead to the degradation?] past disturbances
- **Context**: What is the context within which the restoration or rehabilitation is going to take place? forage production, biodiversity, cultural, etc.
- **Risks and drivers of change**: What are the risks and drivers of change that we need to take into account? climate change, internal conflicts, etc.

Planning

- Understanding socio-cultural, land tenure, rights to access - rather than focusing only on biophysical and technical aspects.
- Identifying targeted groups (homogenous, less conflict) to start with.
- Setting restoration/rehabilitation priorities and targets.
- What type of intervention, where, how and for what use?

Overall Objective

Improve the livelihood of the silvopastoral communities through increasing resilience, income and capacity of the local population.

Participatory multidisciplinary approach

- Is the need for restoration community driven or driven by outsiders?
- How to mobilize and solicit community support for the management of the restored area?

Agree on a common goal

Set up a solid governance

Restoration techniques
Soil and water conservation

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Restore the physical environment

Benches

Gabion to prevent soil erosion

Choice of Species

- Favoring as much as possible the use of indigenous and well-adapted species.
- Selecting multi-purpose species based on a combination of socio-economic and environmental criteria
- Select species that require minimum care and protection:
  - Less capital and labor demand
  - Social fencing versus physical fencing

Acacia cyanophylla

Opuntia ficus-indica
Cactus pear

Ceratonia siliqua (Carob tree)

Medicago arborea (tree medic)

Rosa canina (dog rose)

Pistacia lentiscus L. (lentisque pistachier)

Hedysarum coronarium L.

Forage legume sulla
(biannual species – native to Mediterranean basin)

Restore the biota

Benefits:

- Drought resistant
- Improves soil fertility and erosion control
- Prefers slightly acid to alkaline soils
- Highly palatable, nutritious, and productive forage
- High-protein forage crop

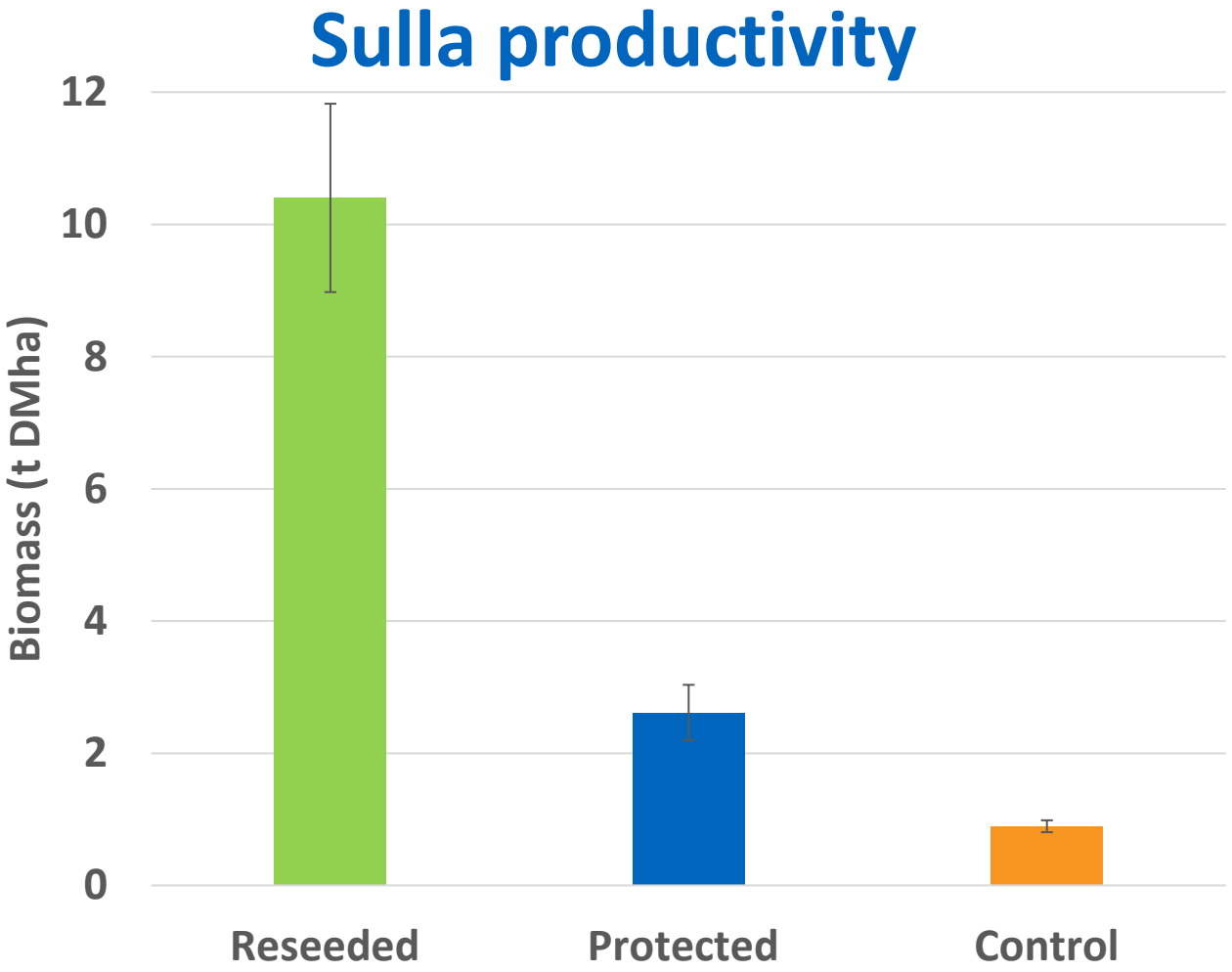
Opuntia ficus indica
(Cactus)

Benefits:

- Drought-tolerant
- Evergreen plant
- Easy to establish, maintain, and use
- Multipurpose species
- High fodder potential
- Resolves livestock watering in the dry areas
- High palatability
- High in soluble carbohydrates

Hedysarum coronarium L.

Forage legume sulla



Impact of *Hedysarum coronarium* L. (3 years after reseeding)

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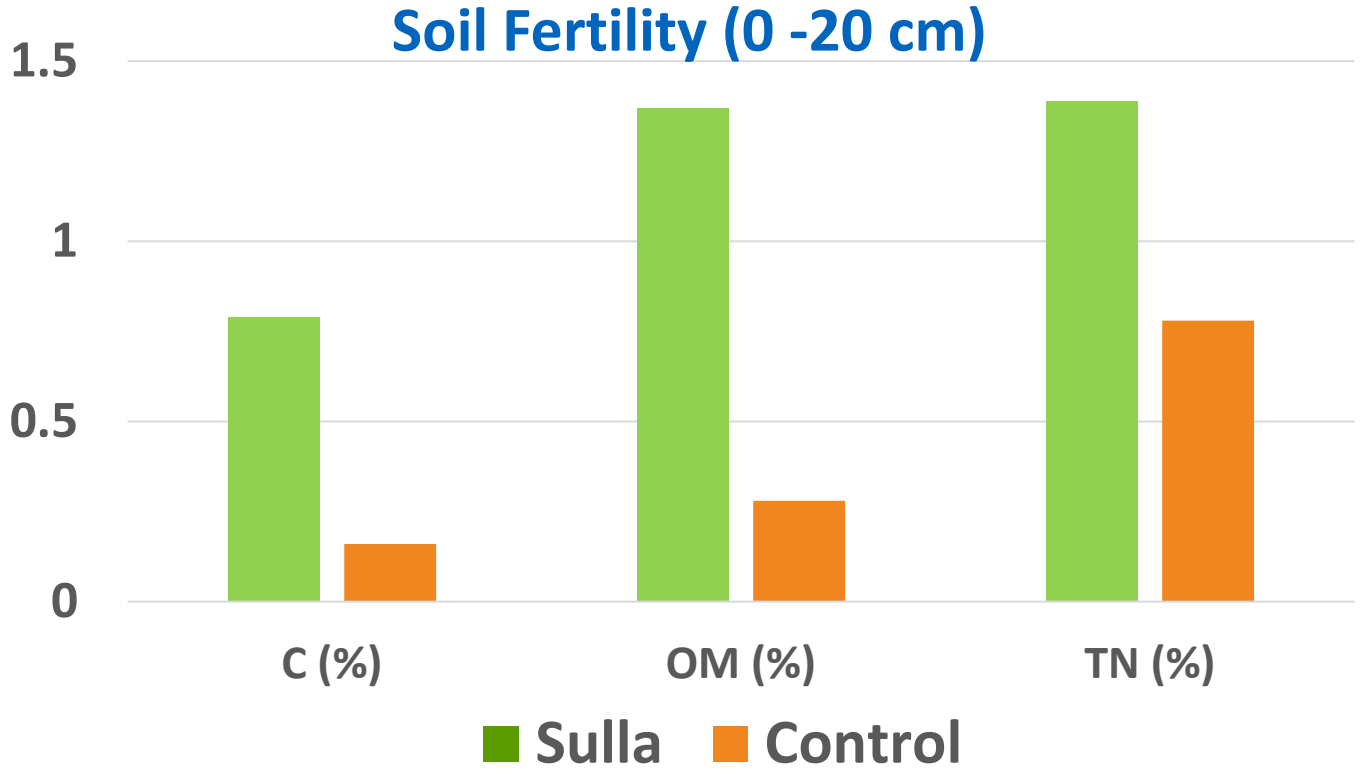

Soil erosion

- Reduced soil erosion ~ 5 T/km^2/year while storing at least 280 m^3 of water as well as reducing runoff water loss by approximately 800 m^3/ha.

Success story

Story 7

Sbaihia site sets a model for agrosilvopastoral practices

TUNISIA

Presenter: Mounir Louhaichi, *Research Team Leader of Rangeland Ecology and Forages, International Center for Agricultural Research in the Dry Areas (ICARDA)*

The state-owned Sbaihia Site in Zaghouan, Tunisia, spanning 4,700 hectares, hosts a mosaic of croplands, rangelands and patches of Aleppo pine and Thuja forests. The site is key for agrosilvopastoralism, supporting 70 households dependent on sheep and goats and olive farming. However, it provides only 60 percent of livestock feed requirements, prompting overgrazing.

Between 2017 and 2019, ICARDA, FAO, and the Direction Générale des Forêts de Tunisie collaborated to restore the agrosilvopastoral system. The project implemented practices like water harvesting, selection and transplant of highly nutritive and palatable shrub and tree species (carob

Success factors and key recommendations (1)

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- Multi-stakeholder engagement and institutional collaborations that leverage resources and knowledge and improve overall efficiency of the actions
- Favorable and supportive national and local policy processes
- Use of local practices and knowledge in the implementation scheme
- Empowerment of the community to own the process

Success factors and key recommendations (2)

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- Use of a particular intervention in the restoration of degraded silvopastoral systems is site specific – no one single rule to apply anywhere!!
- There is a need to organize community (CBO) and slowly hand over responsibility to an elected body
- Access to resources (grazing) should not be free (nominal fee per head per day)
- The more time is invested in the planning phase – more chance for success of the programme.

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Thank You

IYRP 2026 INTERNATIONAL YEAR OF RANGELANDS AND PASTORALISTS

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