Applicazione del LCA alle filiere agro-alimentari

Dipartimento di Scienze e Politiche Ambientali dell'Università degli Studi di Milano – 20 gennaio 2026

ASSOCIAZIONE RETE ITALIANA LCA

Gruppo di lavoro

ALIMENTARE E AGROINDUSTRIALE

Analisi degli impatti socioeconomici dei sistemi zootecnici estensivi con l'approccio Social-LCA. Opportunità e sfide metodologiche

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FEDERAZIONE REGIONALE ORDINI DEI DOTTORI AGRONOMI E DEI DOTTORI FORESTALI DELLA LOMBARDIA

Ministero della Giustizia

Why Social Life Cycle Assessment?

Social dimension of agrosilvopastoral systems is frequently neglected in sustainability assessments despite its critical importance

Extensive livestock systems

- Context: economic vulnerability, land access constraints, limited services, market uncertainty, farm abandonment
- Multifunctional production systems
- Strong territorial embeddedness and context-sensitive
- Complex stakeholder networks

S-LCA Advantages

- Life cycle perspective
- Quantifiable metrics
- **Stakeholder-focused**
- **Context-sensitive**
- Decision support tool

The challenge

Unveils hidden risks and benefits along the entire value chain

Support development strategies & knowledge-transfer chain

Overall aim

To develop a conceptual framework for S-LCA on extensive agrosilvopastoral systems in the Mediterranean area

PASTINNOVA

Define

Goal and scope for future applications

Identify

Material social topics and stakeholders

Select

Context-based indicators

Key challenge addressed

To ensure context-specificity for the socio-economic, political, and cultural features of Mediterranean pastoral systems

Methodology implemented

Literature review

- S-LCA livestock studies
- Scopus database search
- Google Scholar
- 2015-2024 period

ORIENTING Framework

- ISO 14075:2024 alignment
- Social topics list
- Risk & performance assessment
- Reference Scale Approach

Stakeholder Engagement

- Webinar (25 participants)
- Survey (18 responses)
- Expert consultation
- Interactive sessions

1 Information collection

2 ORIENTING alignment

3 Stakeholder validation

Stakeholder mapping

Stakeholder category	Subcategories (ISO 14075 / UNEP)
Workers	H&S, fair salary, working hours, discrimination
Farmers (smallholders)	Labour management, training, technology access
Local community	Cultural heritage, community engagement, living conditions
Value chain actors	Supplier relationships, fair competition
Consumers	Health & safety, responsible communication
Society	Economic development, public commitment to sustainability
Animals*	Welfare (health, space allowance, transport)

*Animals included following Tallentire et al. (2019) and Rivera-Huerta et al. (2025)

Stakeholder insights, system functions

Webinar results (March 13, 2025)

25 participants from PASTINNOVA project and Mediterranean pastoral community

Environmental functions

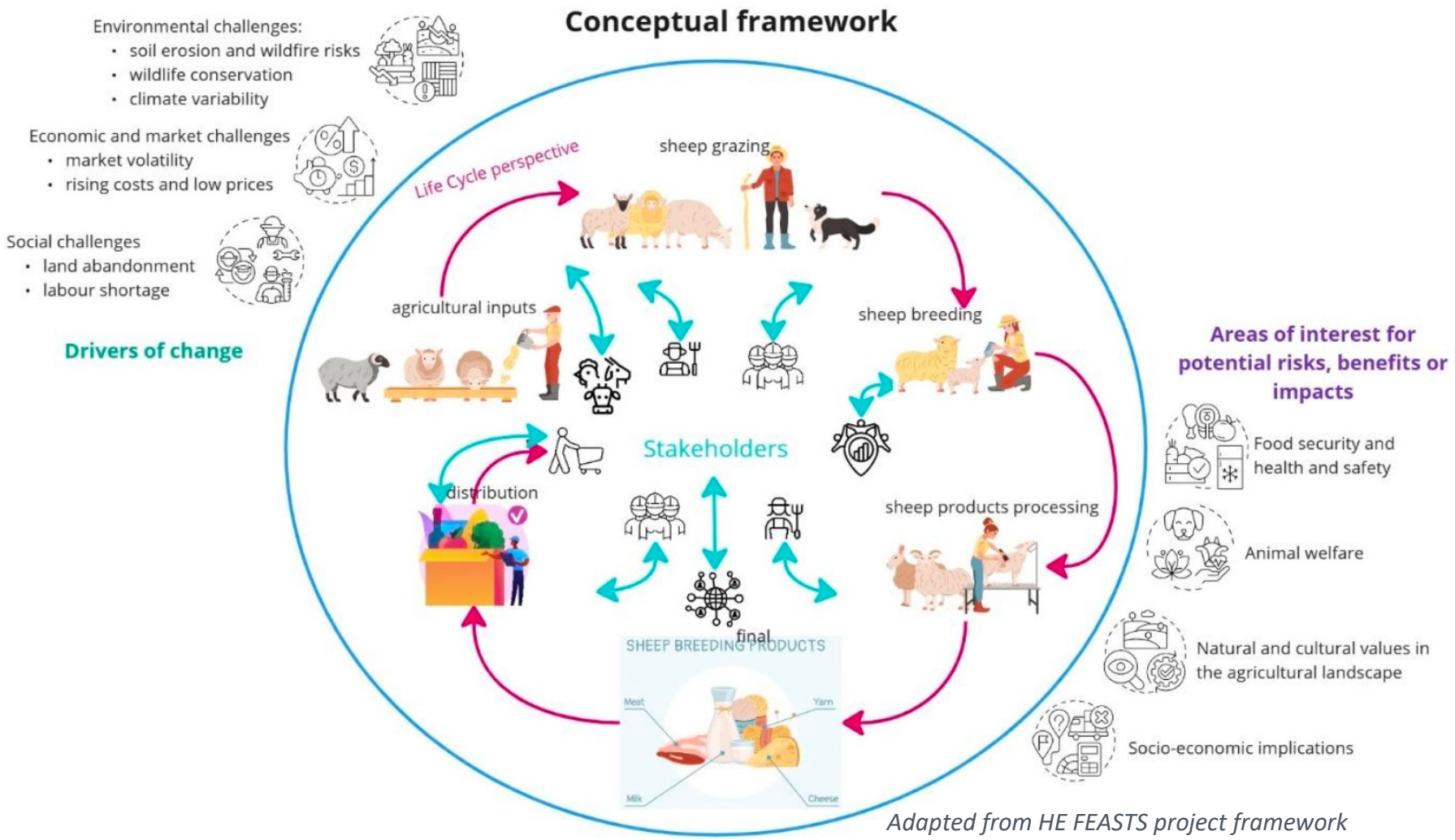
- **Biodiversity conservation**
- Landscape maintenance
- Soil protection
- Fire prevention
- Other ecosystem services

Socio-economic functions

- **High-quality food production**
- Economic sustainability
- Rural livelihoods
- Cultural heritage (critical)
- Marginal area management

Key insight on MULTIFUNCTIONALITY

The cultural value of landscape was addressed as critical for preservation - connected to cultural traditions, identity, and emotional well-being (sentimental value)



Adapted from HE FEASTS project framework

Social topics selection

Materiality assessment (aligned with ORIENTIG topics) **through stakeholder engagement (n=18 experts)**

Process: Literature review → Expert consultation → Webinar (25 participants) → Survey validation (18 experts)

Material social topics identified

Social topic	Stakeholder	Relevance (% yes)
Health and safety conditions	Workers/Farmers	100%
Safe and healthy living conditions	Local community	100%
Consumer health and safety	Consumers	100%
Promoting social responsibility	Value chain/Society	100%
Ethical treatment of animals	Society	94%
Contribution to economic development	Society/Local community	94%

Social topic	Indicator
Rural depopulation dynamics and generational change	N. young people taking up pastoral activity, the average age of farmers N. farms closed in relation to newly established ones Agricultural area subject to progressive abandonment or conversion to non-agricultural uses Presence of rural tourism Number of educational farms
Contribution to social innovation and new forms of cooperation	Support to small-scale producers Promotion of innovative models
Socio-economic status of farmers	Fair price of products
Access to information for farmers	Knowledge on regulatory requirements for certifications, including geographical indications Compliance with intellectual property rights
Cultural heritage conservation	N. of initiatives promoting the use of traditional products and craftsmanship N. initiatives raising awareness among consumers and society to valorise the outcomes of extensive agrosilvopastoral systems

Inventory indicators and data availability

Data availability assessment (survey, n=18):

Indicator	Data type available	Availability level
Employees' wage level	Quantitative + Qualitative	High (14/18)
Compliance with animal welfare standards	Quantitative + Qualitative	Very high (15/18)
Number of local employees	Quantitative + Qualitative	High (13/18)
Financial support to community projects	Quantitative + Qualitative	Very high (16/18)
Cooperative affiliation	Quantitative + Qualitative	High (12/18)
Grievance mechanisms for discrimination	None	**Very low (1/18)**
Women's empowerment measures	None	**Very low (3/18)**

Data collection strategy: Mixed-methods (primary + secondary), participatory approaches recommended

Key methodological challenges

- Multifunctionality: how to capture and allocate non-market social benefits to products Proposed approach: consequential thinking (no dairy production → no system → no functions)
- Materiality and topic selection: avoiding 'cherry-picking' while remaining context-sensitive
- Integration of qualitative dimensions (identity, heritage, well-being) into life cycle-based evidence Multidisciplinarity & DPSIR approach
- Comparability across Mediterranean regions with heterogeneous socio-political contexts
- Combining risk-based databases (e.g., PSILCA) with site-specific performance data
  RSA approach: ordinal scales (-2 to +2) for performance
  Risk assessment: medium-risk hours (mrh) as characterised unit

Opportunities and added value

- Integration of DPSIR framework for causal chain understanding
- Operationalisation of multifunctionality within S-LCA goal and scope
- Evidence base for rural development policies and agroecological transitions
- Valorisation of traditional products and quality schemes (e.g., PDO) through social performance narratives
- Identification of social hotspots along the value chain (e.g., fair salary as a structural concern)
- Improved stakeholder dialogue and transparency, supporting legitimacy and trust

Preliminary conclusions

Key findings:

- S-LCA provides a systematic framework for assessing social sustainability of pastoral systems
- ISO 14075:2024 alignment ensures methodological robustness
- Stakeholder engagement is critical for materiality assessment and data collection
- **Fair salary**, **animal welfare**, and **cultural heritage** emerge as priority topics

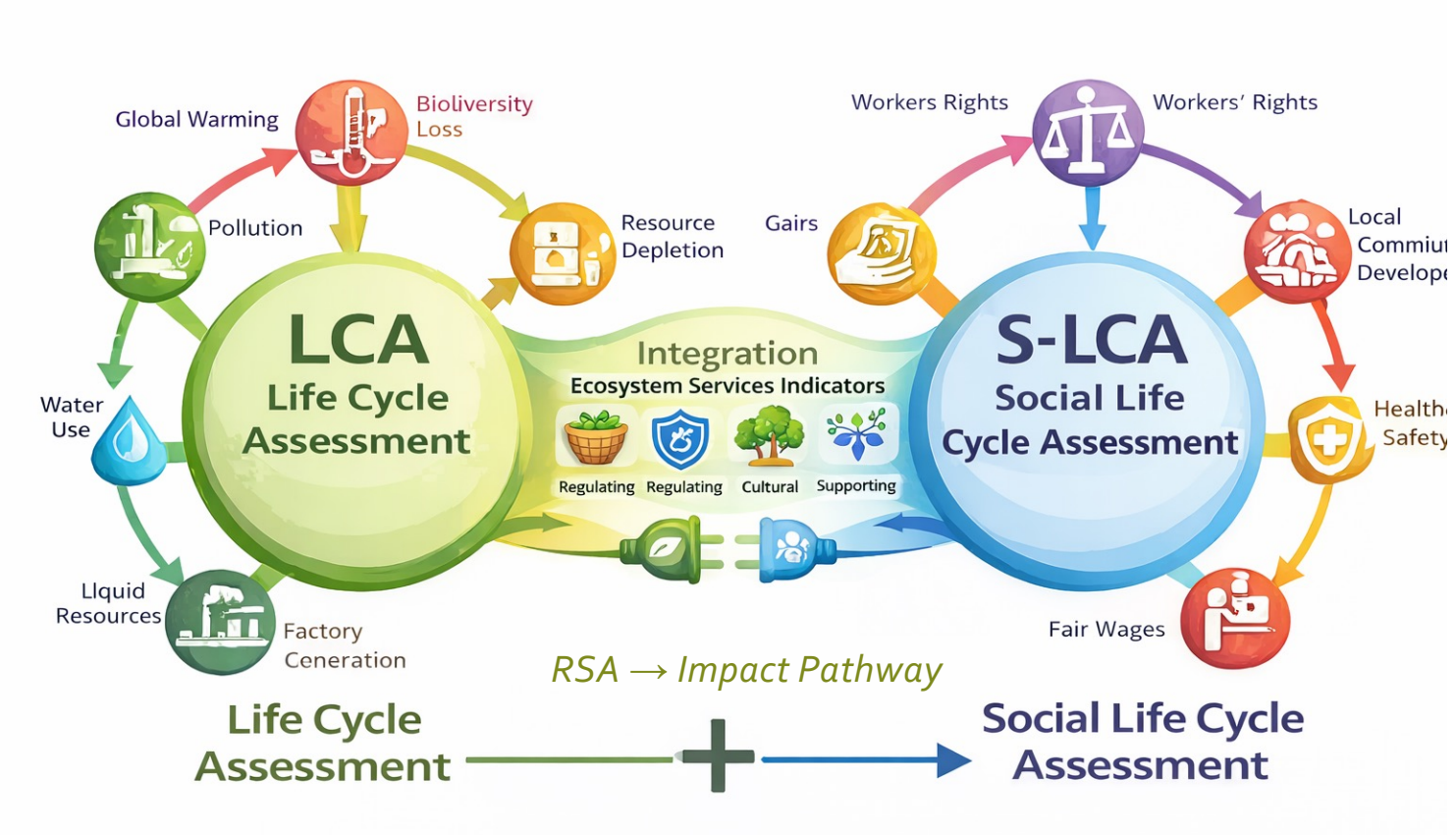
Limitations:

- Framework based on preliminary assumptions; requires validation with real-world data
- Generalisability across Mediterranean regions needs testing
- Qualitative social impacts difficult to capture quantitatively

Future work

- Complete LCI and LCIA phases with primary data from Sardinian case study
- Monte Carlo uncertainty analysis on social risk scores
- Integration with existing E-LCA for comprehensive LCSA
- Comparative assessment across Mediterranean pastoral systems (Italy, Morocco, Tunisia, Egypt)

A possible way to explore…



Grazie!

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