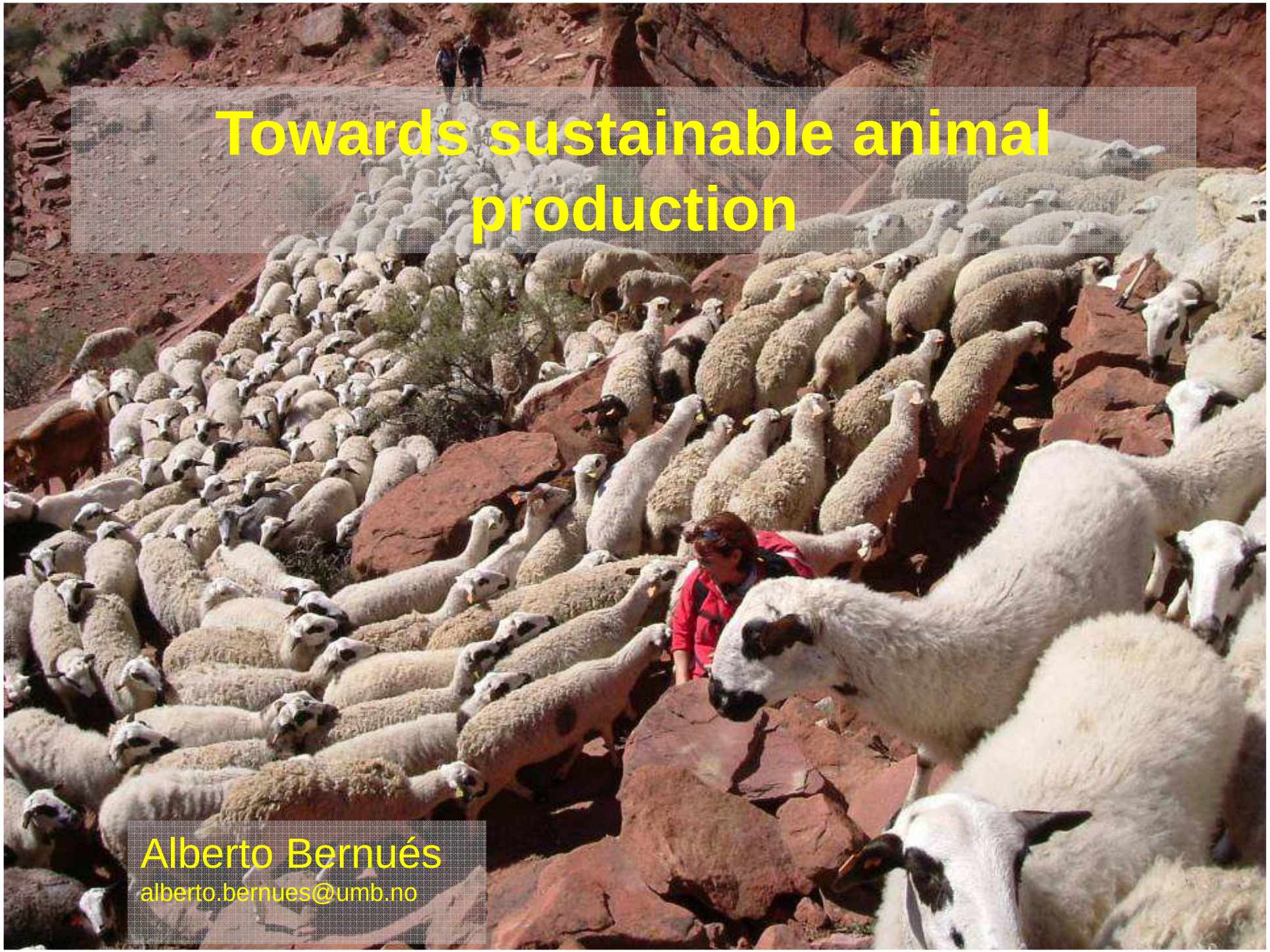

Towards sustainable animal production

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Outline

- LFS commission: history and vision
- Sustainability
  - Understandings of sustainability (implications for innovation)
  - Efficiency, what efficiency?
  - Responsible and responsive LFS

1. LFS history

- Youngest Commission at EAAP
- Working Group till 2003
  - Organized every second year the: International Livestock Farming Systems Symposia
  - 6th in Benevento (2003) on Product quality based on local resources and its potential contribution to improved sustainability

1. LFS com. members

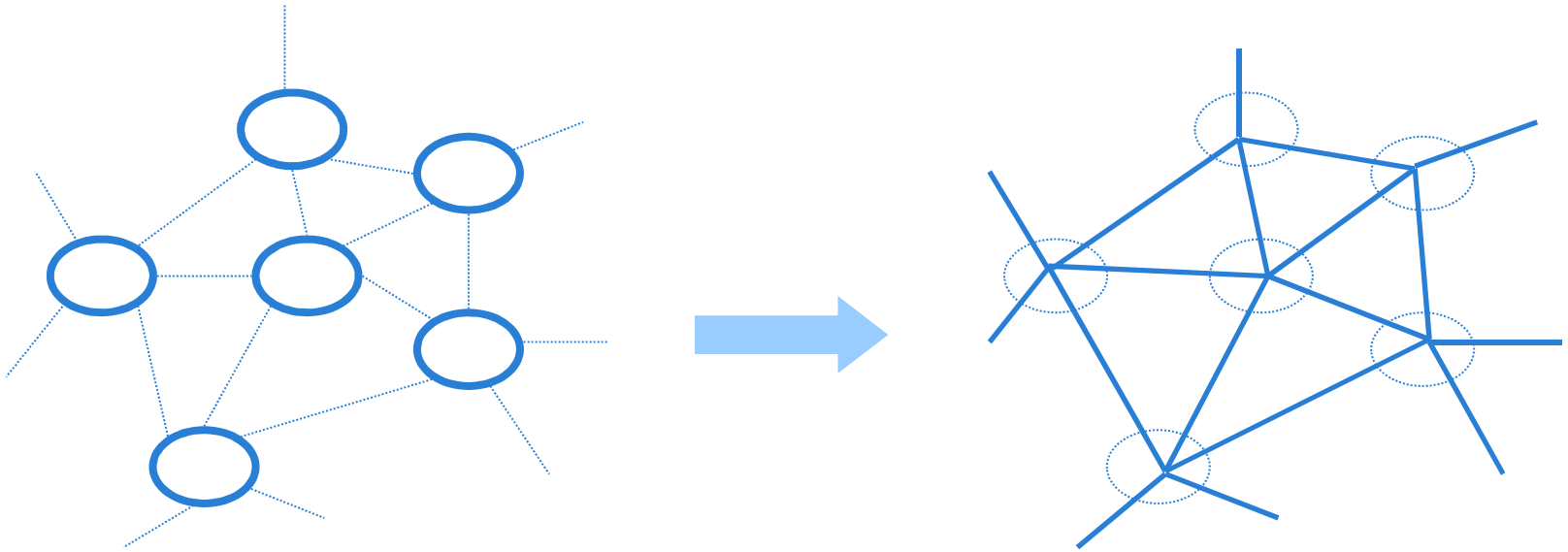
- Former presidents
  - Annick Gibon, Fr
  - George Zervas, Gr
- LFS com. members now
  - Alberto Bernués, Sp (President)
  - Stéphane Ingrand, Fr (Vice-Presid.)
  - Muriel Tichit, Fr (Vice-Presid.)
  - Karen Eilers, Nl (Secretary)
  - Monika Zehehetmeier, De (Secretary)

election 2014

1. LFS topics

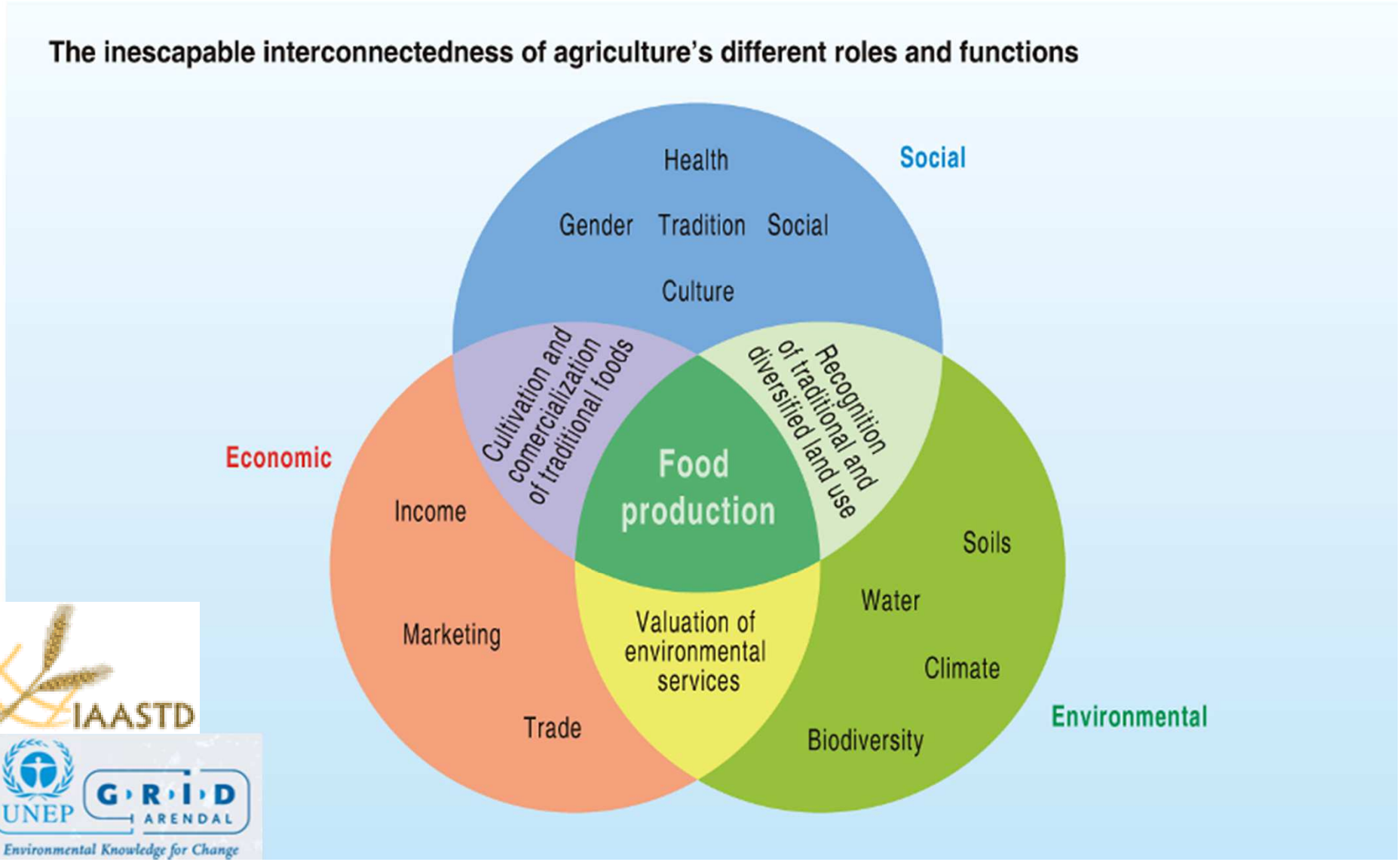
2013 Nantes	Symp.: Sustainable animal production in the tropics and high constraint areas
	Services provided by livestock farming systems: ecological, economic and social dimensions
	Robust and resilient livestock farming systems in a changing world
	LFS innovations for local/rural development
	Cattle production in a changing policy environment in Europe
2012 Bratislava	LFS in emerging and developing countries: trends, roles and goals
	Labour issues in LFS (gender, lifestyle, workload satisfaction, part-time agriculture, immigration)
	Modelling complexity in LFS to address trade-offs and synergies for efficiency
	Symp.: Livestock and climate change: options for mitigation and adaptation
2011 Stavanger	Life-cycle assessment of livestock production
	Ecological intensification and ecosystem services of LFS
	Social pillar of sustainability
	Challenges of rangeland farming systems (economics, grazing, reproduction, health and welfare)
2010 Crete	Opportunities and challenges for grassland-based systems
	Relationships between intensity of production and sustainability of LFS
	Symp.: Environmental impact of animal production
2009 Barcelona	The impact of competition between food, feed and fuel on livestock industry
	Local breeds: what future?
	Are organic farming systems sustainable?
	Methods to quantify uncertainty and changing socio-economic environment in livestock farming
	The role of livestock farming in rural development

1. LF **SYSTEMS**



… from parts to the whole…
… from objects to relationships…

2. Sustainability



2. Sustainability, what is it?

Knowledge gaps for agricultural sustainability in the UK (Dicks et al, 2013)

1. How can we develop a sustainable **animal feed** strategy?
2. What are the **trade-offs** between delivering different **ecosystem services** (including biodiversity and crop production)?
3. How can **phosphorus** be **recycled** effectively for farming systems?
4. How can we develop '**multi-functional**' land management options to maximise both **agricultural productivity** and **environmental** benefits?
5. What is the smallest set of **metrics** to evaluate the sustainability (economic, social and environmental) of agricultural systems and interventions at farm and landscape **scales**?

2. Sustainability, what is it?

Indicators of sustainability for sheep farmers and technicians (Ripoll-Bosch et al., 2012)

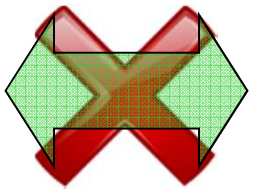
1. **Labour profitability** (Net Margin per Working Unit)
2. Farm **continuity** (15 years, scale)
3. **Diversification** in sources of income (# products)
4. **Salary level** (labour profitability against average salary)
5. Feed **self-sufficiency** (on-farm feed/ total feed)

2. Sustainability, what is it?

Importance of indicators
- 46% economics
- 35% social
- 19% environmental

Top 3 per attribute
- 60% economics
- 33% social
- 7% environmental

Policy makers' priorities (Env. sustainability)
- Climate change (GHG)
- Pollution
- Water
- Land use change
- Landscape
- Biodiversity



Farmers' priorities (Env. sustainabilty)
- Maximize grazing
- Energy efficiency
- Use of communals
- Stocking rate
- Local breeds
- Wildlife conflicts

2. Efficiency, what efficiency?

Input / Output = Resources / Purpose

Can be measured in many ways:

- Energy use (feed, fuel)
- Economic efficiency (profitability)
- Time efficiency (labour)

2. Efficiency, what inputs?

- Feed conversion in UK (Wilkinson, 2011)

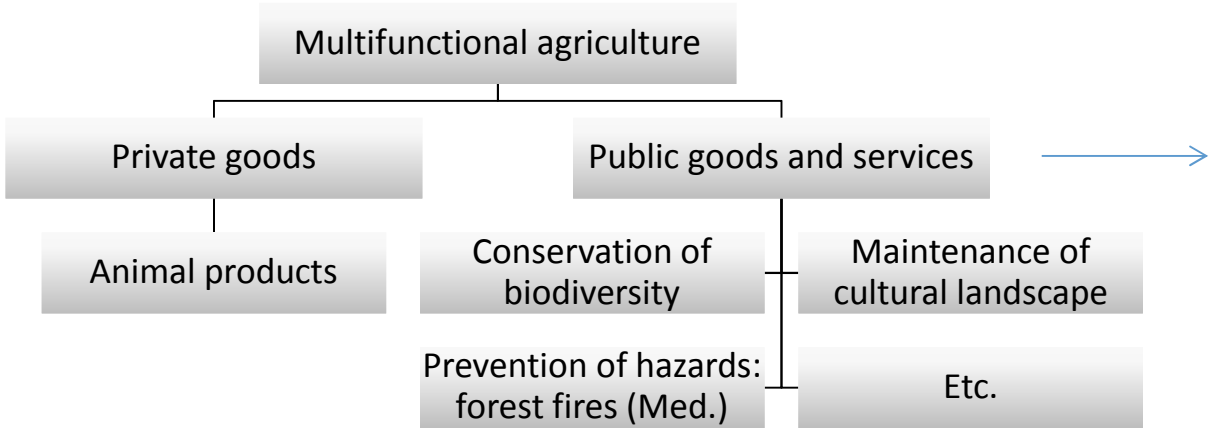
	Total	Edible
	Protein (kg/kg edible protein in animal product)	Protein (kg/kg edible protein in animal product)
Lowland lamb	30.3	1.1
Poultry meat	3.0	2.1

- Energy use in Spanish Agriculture

  (Carpintero & Naredo, 2006)

	1950-1951	1977-1978	1993-1994	1999-2000
external inputs/ output (kcal)	0.16	0.81	0.72	0.79

2. Efficiency, what outputs?



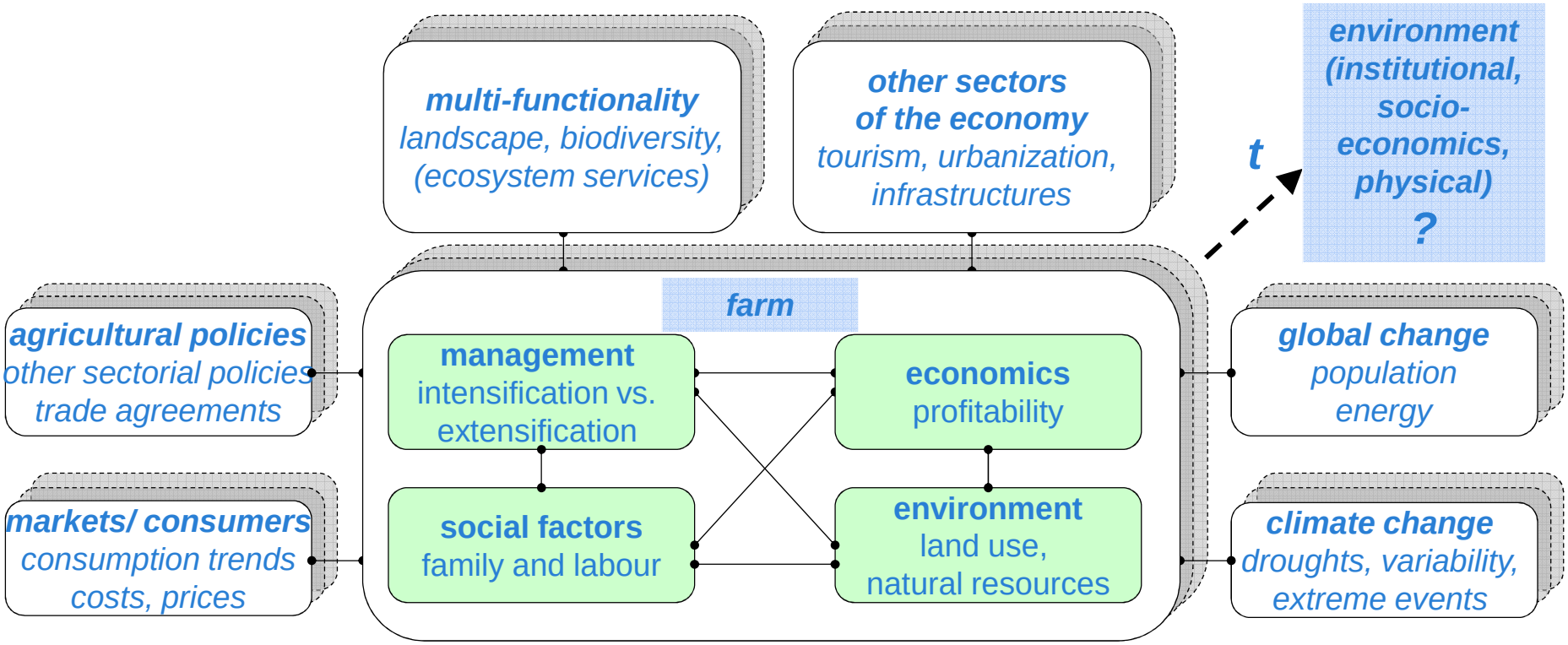
- Non-excludable
- Non-rival
- Non-marketable
- Inherently linked to extensive livestock farming systems
  IEEP (2009)

- Accounting for multifunctionality in carbon footprint of lamb meat (Ripoll-Bosch et al., 2013)

	No allocation kg CO_2-eq / kg LW	Allocation	Corrected kg CO_2-eq / kg LW
Grazing	28.4	53.6 %	15.2
Mixed	24.3	73.9 %	18.0
Zero grazing	19.5	100 %	19.5

3. Responsible and responsive LFS

Conceptual framework to study sustainability of LFS (Bernués et al., 2011)



Responsive LFS: scenarios