

Multifunctionality of extensive mountain livestock farming and its maintenance in the future

A case-study (Pyrenees National Park area, France)

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Extensive livestock farming in European mountain areas

- **a large set of functions**

- conservation of biodiversity hotspots (High Nature Value farmland)
- **delivery at the landscape level of crucial bundles of ecosystem services (ESs) for sustainable rural development**

- **a sustainability challenge**

- Continuous decline due to intensification and land abandonment
- Failure of public policies to safeguard them (economic viability)

- **a challenge for research**

- Improved understanding of place-specific social-ecological relationships between change in FSs and change in ES bundles to support effective policy and management decision-making

Beaufoy & Poux 2014; Morgan-Davies et al. 2014; Plieninger et al. 2015; Strohbach et al 2015

Farming and landscapes characteristics in the PNP area

- **Small-scale familial agriculture agropastoral system** based on extensive cattle & sheep production
- **Landscape shaped by a long-standing agropastoral tradition**
private land/ commons
individual/collective land management
- **Predominance of semi-natural vegetations in UAA**
95% grassland and wood-grassland
- **Changes in private land use and agricultural landscape** threatening biodiversity conservation and the delivery of social and cultural ESs of major importance for sustainable rural development



Study assumptions

- Change in the composition and configuration of mosaic of agroecosystem types and management
 - Currently best proxy of change in ESs bundles delivered at the landscape level (Burgi et al. 2015)
- Traditional management practices of agroecosystems at the parcel level
 - Ecologically intensive in the study area (Balent et al. 2015)

Study design

- **A spatially-explicit survey of every farm working the landscape**

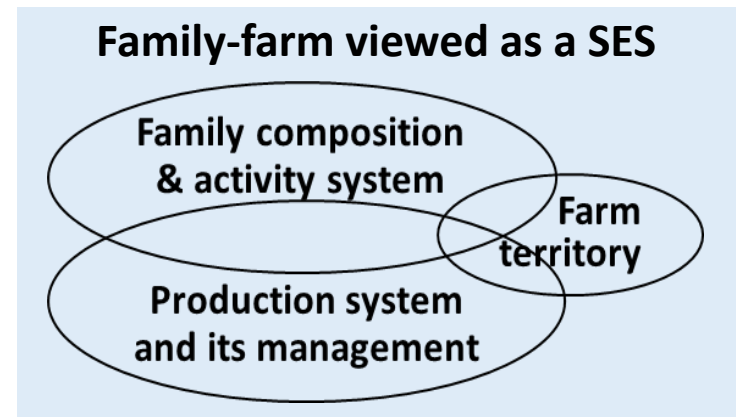
5 villages; agricultural landscape: 762 ha; 37 farms

- family-farm operation in 2010
- farm territory composition & management (**agroecosystems at parcel level**)
- History of family-farm over the **1950-2010 period**
- major events and rationales for changes over time in the system

- **Systemic modelling of individual family-farm dynamics**

- family-farm trajectories of change
- main factors explaining them

(modular analysis / Q and q data)



➤ **Archetypes of families' farm-development strategies and their social-ecological rationales**

Archetypes of family farm-development strategies over the 1950-2010 period

Main family motivations

Main objectives/farm-holding

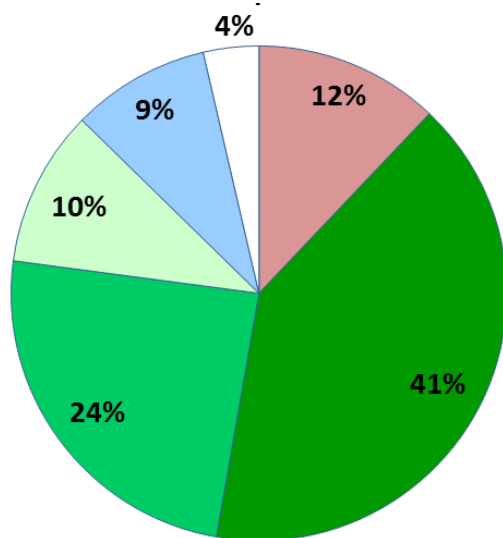
	Main family motivations	Main objectives/farm-holding
Entrepreneur	<ul style="list-style-type: none"> • Continuation of livestock farming 	<ul style="list-style-type: none"> • Farm economic performance
Patrimonial	<ul style="list-style-type: none"> • LT continuation of agropastoral lifestyle • 'passion' for livestock farming • land-resource LT maintenance & stewardship /family farm-holding & whole landscape 	<ul style="list-style-type: none"> • Family farm-holding enhancement
Conservative		<ul style="list-style-type: none"> • Family farm-holding maintenance
Phoenix		<ul style="list-style-type: none"> • Recovery after setbacks
Retreat		<ul style="list-style-type: none"> • Family farmland maintenance after cessation
Neo-rural	<ul style="list-style-type: none"> • Rural lifestyle for generation who installed 	<ul style="list-style-type: none"> • 'hobby' / commercial livestock farming



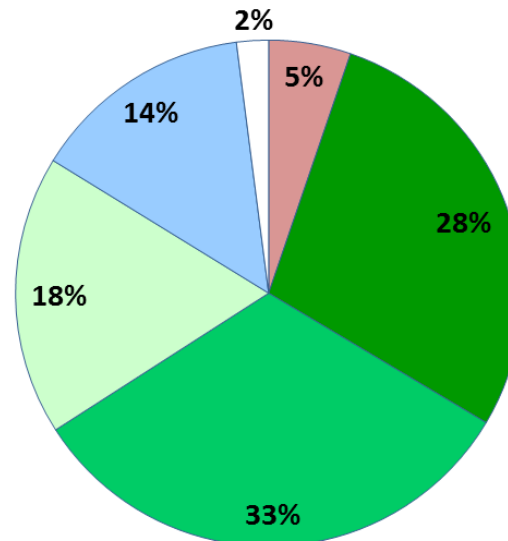
Strategies rooted in cultural values in local agropastoral tradition including an integral transfer of farm-holding to a unique successor

Respective contribution of farms to landscape management in 2010 according to strategy types

(wood)-grassland total area



Steep hay meadows*



* Slope $\geq 30\%$
Proxi for contribution to maintenance of agroecosystem types & management practices of importance / landscape social & cultural ESS

LFS

Farm size

Entrepreneur	3	Agropastoral	Large (average UAA: 52 ha)
Patrimonial - LS	8	Agropastoral	Large
Patrimonial - MS	8	Agropastoral	Medium (av. UAA: 25 ha)
Conservative	9	Agropastoral	Small (av. UAA: 10 ha) / medium
Phoenix	3	Agropast. & addit. livest. prod	Small /medium
Neo-rural	3	sedentary livestock	Small /medium

Factors and processes of 1950-2010 change in farm-territory management and size according to strategies

	Management of elementary agroecosystems (parcel level)	Territory change
Patrimonial	LT maintenance & stewardship of agroecosystem types at all the parcels	Take-over of entire ceasing farms
Conservative		No change
Entrepreneur	Change in AE types & parcel abandonment /consolidation	Selective purchase & hiring of good parcels

- **Main pressure for change**

↳ *agricultural W economic return (> 56 %)*

- **Main adaptive decisions to maintain the family-farm livelihood**

Tradition-based strategies: ↗ on-farm & off-farm workload of family members

Entrepreneur strategy: ↗ agricultural W productivity

NB: complex activity systems of all the farm-families

Prospects for regional change in the landscape mosaic and ES bundle

- **Reach of limits in adaptive capacities of tradition-based strategies**
 - **Patrimonial:** ∟ capacity to maintain all agroecosystem types in largest farms (↗ UAA per AWU)
 - **Conservative:** ∟ prospects for succession (ageing farmers, ∟ LFS gross margin)
 - **Retreat:** ∟ land-transfer opportunities to a family with a patrimonial strategy
- **Pressures of current economic environment**
 - ↗ farm-size/AWU: main way to maintain/increase farm economic viability under new CAP and environmental policies (Veysset et al., 2014)
- **Future prospects for family-farms according to strategies**
 - **Tradition-based strategies:** collapse or shift towards entrepreneur strategy
 - **Entrepreneur strategy:** gradual generalisation
- **Sustainability prospects / landscape mosaic and ES bundle**
 - Major short-term risk of farmland abandonment and detrimental change in landscape ESs (social & cultural ES, natural hazard mitigation)*

Conclusions & Perspectives

- Prospective assessment of change in HNV landscape and farming
 - Interest of dynamic case-studies of historical change (Bernues et al. 2011; Burgi et al. 2015)
- Close interlinkages between social and ecological rationales and values in **multilevel management of landscape ESs bundles in extensive livestock farming**
 - Local adaptive strategies / individual family-farms
 - Adaptive governance system of the agropastoral system (Brondizio et al. 2009)
- Improvement of efficiency of European policies / conservation of HNV farmland and associated extensive livestock farming
 - A need to account not only for farming systems at the farm level but also for **local agropastoral systems and their local governance system**

Thank you for your attention

ANR



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Local livestock farming systems in 2010

	Number	UAA (ha)	Land owned (% UAA)	Livestock (LU)	Cattle share (% LU)	On-farm employt (AWU)
Large agropastoral farm	10	52.6	40%	85	81%	1.78
Medium size (MS) agropastoral farm	10	24.8	64%	29,4	77%	1.42
Small agropastoral farm	8	9.6	88%	8,9	16%	1.26
End-of-life small agropastoral farm	3	10.1	100%	6	62%	0.75
MS agropastoral farm additional livestock production	3	27.3	47%	37,5	57%	2.3
Small to MS farm distinct livestock farming system	3	11.6	91%	8,6	0%	1.2

- *activities other than farming at all of the farms*
- *similar livestock production management in agropastoral farms*