Agricultural land abandonment: trends, trajectories and the implications for soil health

3rd Natura 2000 seminar for the Mediterranean biogeographical region

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Objectives and scope

EU land-uses and abandonment trends
- LUISA territorial modelling platform
- Driving factors
- EU risk map
- Agricultural land abandonment in 2030

EU land-use trajectories and soil health
- Land management options
- Policy and environmental implications
- Soil carbon sequestration (case study)

Collaborative work: JRC and UAB
- Impacts of abandonment on soils
LUISA Territorial Modelling Platform

**PRIMARY OUTPUTS**

LUISA is a spatial-explicit (land use) model conceived to contribute to **Territorial Impact assessment** and **Analysis** of trends and policies.

- Coverage/spatial resolution: EU 27, 100x100m
- Thematic detail: 17 simulated land use/function classes
- Temporal resolution: 2020->2050, 5-years time step
- Base-map: CORINE Land Cover ‘refined’ + population map
- Territorial thematic indicators

**EU FUTURE TRENDS OF AGGREGATED LAND-USE CLASSES**

<table>
<thead>
<tr>
<th>Land Use Category</th>
<th>2015-2030 Change (%)</th>
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</thead>
<tbody>
<tr>
<td>Built-up areas</td>
<td>3.2%</td>
</tr>
<tr>
<td>Forested lands and natural areas</td>
<td>-2%</td>
</tr>
<tr>
<td>Agricultural land</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Other land uses</td>
<td>(*)</td>
</tr>
</tbody>
</table>

**Legend**

- **Urban**
- **Industrial**
- **Agricultural**
- **Forested lands and natural areas**
- **Other land uses**

**Color Key**

- **Lowest**
- **Medium**
- **Highest**
Driving factors of land abandonment

**FACTORS**

<table>
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<tr>
<th>Unfavourable climate and soil conditions</th>
<th>Economic and farm characteristics</th>
<th>Remoteness and population density</th>
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- Unfavourable climate and soil conditions
- Economic and farm characteristics
- Remoteness and population density

Main data sources:
- SINFO project (European Commission)
- EFSA (European Commission)
- IIASA/FAO
- Shuttle Radar Topographic

Main data sources:
- Farm Structure Survey (Eurostat)
- Farm Accountancy Data Network and DG AGRI RICA

Image descriptions:
- Maps illustrating driving factors such as unfavourable climate and soil conditions, economic and farm characteristics, and remoteness and population density.
Agro-economic and farm structural factors

- Share of farmers older than 65 years old
- Share of farmers with only practical experience
- Share of farms under 50% of average size region
- Rental price (Euro/ha)
- Share of rented UAA
- Farm income normalized by GDP
- Net farm investment (Euro/ha)
- Total subsidies (Euro/ha)
More than ¼ of agricultural land (50 million ha) is estimated to be under **moderate**, **high** and **very high risk** of abandonment.


Future projections of land abandonment, 2030

Agricultural land abandonment will reach roughly **5.6 million ha**, which account for **3%** of the total UAA in 2030 in EU28.

Almost a quarter (1,377 thousands ha) of all EU abandoned land will occur in mountainous areas where, in particular, **arable land** is the most affected agriculture system (974,240 ha abandoned) in 2030.
Post-abandonment land management options

What is the primary desired function?

- Do you want to intervene in natural processes?
  - Active management: Restoration
  - Passive management: Rewilding

- Do you want to re-establish agriculture?
  - Low-intensity Agriculture
  - Sustainable Intensive Agriculture

- Do you want to promote social and cultural value?
  - Agritourism & Hobby Farming

- Do you want to produce energy?
  - Bioenergy & Renewables

Implications of abandonment on soil health

• Agricultural soils are often degraded at the time of abandonment.

• Abandonment can result in positive, negative, and variable impacts.

• Direction and intensity of the impacts depends on multiple factors:
  • Land use history
  • Local environmental conditions
  • Management post-abandonment

• Mediterranean abandoned agricultural soils can be both poorly and highly suited for natural recovery.

• A rebound in soil organic matter and improved soil carbon sequestration is expected, but not guaranteed...
Potential for soil carbon sequestration

Looking deeper: Catalonia, Spain

(a) active cropland
(b) early-stage forest
(c) mid-stage forest
(d) late-stage forest

Looking broader: Peninsular Spain

Looking even broader: EU27

LUISA derived maps of historical and future abandonment

New database of abandonment chronosequences and paired-plots

Modelling soil carbon sequestration according to:
- Pre-abandonment management
- Post-abandonment management
- Biogeographical influences on sequestration rates

Assessing role of abandonment on improving EU soil health and increasing carbon stocks
Thank you

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