Characterizing extensively grazed areas between forests and pastureland to better assess the resilience of Mediterranean livestock activities. Lessons learned from a study on the scale of the Provence Alpes Côte d'Azur region (France).

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Joint Meeting FAO-CIHEAM Networks on Sheep and Goats and Mediterranean Pastures

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STUDY CONTEXT

- Pastoral livestock is marked by a high seasonal mobility of between pastoral areas in PACA.
- Very variable appreciations of the size and location of grazed land at the regional scale;

1- Registre Parcellaire Graphique (RPG) : 553 505 hectares.
2- Pastoral Survey : 877,981 hectares.
3- Official Website of the PACA Region : 400,000 hectares.
4- Atlas PACA of the herbivore breeding : 983 000 hectares.

OBJECTIVES

- ❑ **Identify large-scale grazed areas from the two sources of data.**
- ❑ **Characterize the land use in 5 classes of land use: Forest, Closed moorland, Open Moorland, Meadow, Bare soil.**

USE OF PASTORAL AREAS ON THE EXPLOITATION SCALE

Our five land use classes reflect both past use patterns and the potential for future use of these areas for grazing: open moorland and meadows are the preferred areas for grazing, while closed moorland and forests remain more restricted in use due to limited access to the resource, which reinforces the tendency for closed-off areas.

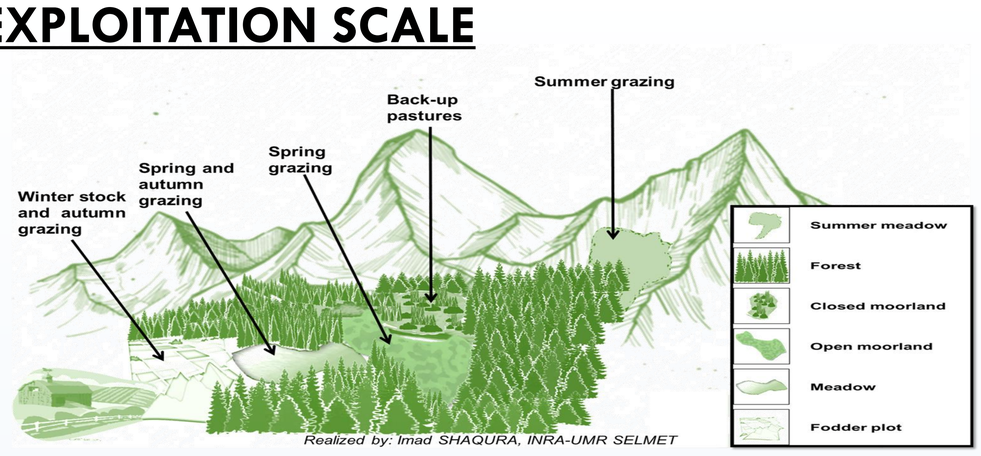

Figure: Diagram showing the spatial arrangement of grazing areas and their role in feeding herds.

MATERIALS AND METHOD

STUDY SITE

- Pastoral livestock use about 960 thousand hectares, one third of the total area of the PACA region.
- PACA is the 3rd French region of sheep production.

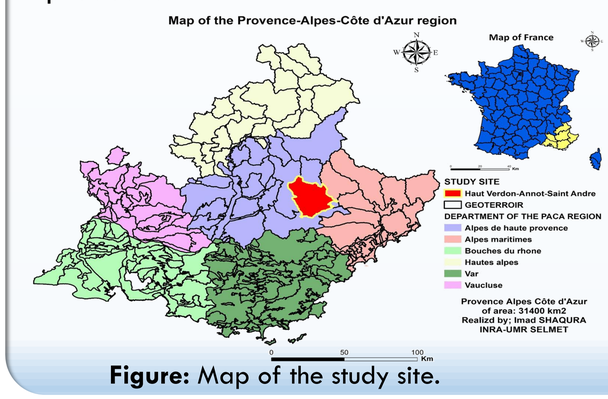

Figure: Map of the study site.

DATA

The methodology of this study is based on different sources of georeferenced data to better characterize pastoral areas in the PACA region:

1. **Vector data:**
   - I. **The Registre Parcellaire Graphique (RPG), For year 2014** *Provided by (ODR)*
   - II. **Pastoral Survey (PS), For year 2012-2014** *Provided by (CERPAM)*
2. **Raster data:**
   - I. **The SPOT6 images for the year 2014.** *Provided by (EQUIPEX GEOSUD)*
3. **Software and Tools:**
   - I. **Orfeo Tool Box** an open source toolkit for remote sensing, and the processing of satellite images with high spatial resolution, developed by (CNES).
   - II. **QGIS** is an open source GIS application.

PROCESSING CHAIN

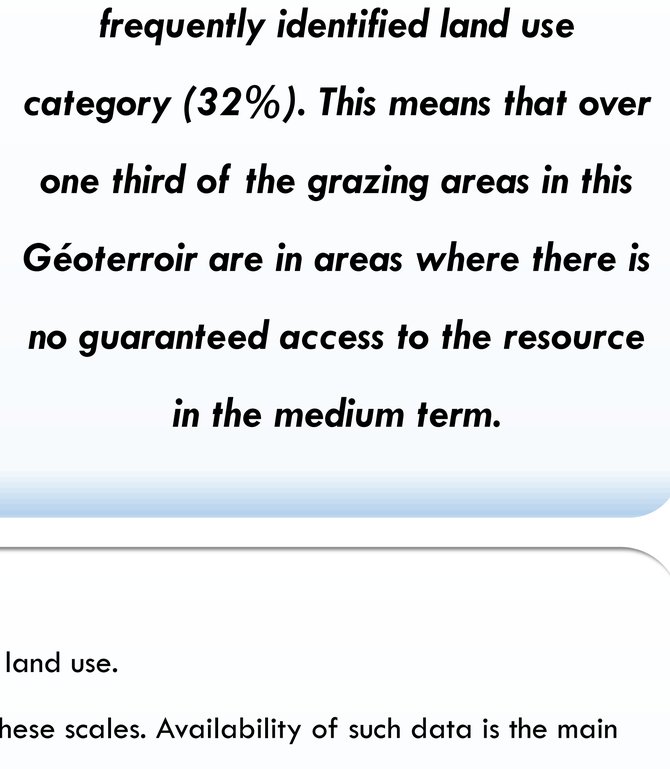

Figure: Conceptual diagram of the methodological approach.

RESULTS

The confusion matrix: Overall Accuracy of 86.8, and a Kappa index of 84.2%.

Figure: Land use map (Haut Verdon-Annot-St André).

Land use class	Category	Both the RPG and the Pastoral Survey		Pastoral Survey only		RPG only	
		(ha)	(%)	(ha)	(%)	(ha)	(%)
Forest		265.3	2.0	1149.2	5.0	418.71	2.8
Closed moorland		4225.7	32.0	8290.8	35.8	5141.47	33.8
Open moorland		3141.6	23.8	4541.8	19.6	3439.52	22.6
Meadow		1211.5	9.2	2057.1	8.9	1404.87	9.2
Bare soil		4341.8	32.9	7128.2	30.8	4799.73	31.6
Total		13186.1	100	23167.1	100	15204.3	100

Table 1: Percentage of each land use class by data source (Haut Verdon-Annot-St André).

Table 1 shows the distribution of grazing areas in the five land use classes according to the data sources used to identify these areas (either surfaces declared in one or the other of the databases, or in both).

Closed moorlands are the most frequently identified land use category (32%). This means that over one third of the grazing areas in this Géoterroir are in areas where there is no guaranteed access to the resource in the medium term.

CONCLUSION AND PERSPECTIVES

- Large-scale georeferenced databases are valuable when **characterizing** interactions between **grazing practices and trends** in grazed land use.
- Land cover may be easily informed thanks to new development in **remote sensing, land use practices are still poorly** documented at these scales. Availability of such data is the main limit to an extend of this research.
- **Resilience** of pastoral systems is weakened by **scrub encroachment and forest growth** in medium mountain of the French Mediterranean region.
- Although it would be very costly, these areas should therefore be mechanically cleared, to **strengthen the sustainability** of the systems. Considering low profitability of such invest this could only be considered with contribution of **public supports** and strongly integrated to **multiple use** for these areas (recreational, forestry, fire protection...).
- Alternatives for livestock systems include **reallocation of grazing** on other areas relying on greater mobility of herds, and/or adjusting **feed complementation** to reduce the share of pasture.