Green corridors in managed agro-silvo-pastoral landscapes as a way to reconcile resources exploitation and conservation principles

Alcobia, S., Gonçalves, P., Mendes, T., Santos-Reis, M

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alcobiasandra@gmail.com

Companhia das Lezírias

centre for ecology, evolution and environmental changes

FACULDADE DE CIÊNCIAS
Intervened systems managed by man to provide many services:

**Provisioning:** eg. wood, cattle and agriculture products

**Regulation:** eg. carbon sequestration

**Cultural:** eg. hunting, ecotourism
One of the oldest agro-silvo-pastoril systems of Europe is the Montado, (Spanish dehesa):

Is a savannah-like agro-forestry pastoral ecosystem human shaped with a sparse cover of evergreen oaks - cork oak (*Quercus suber* L) and/or holm oak (*Quercus rotundifolia* L).

In Portugal, the *montado* occupies about 34% of the forest area.

The traditional use was characterized by the exploitation of cork and holm oaks stands, together with the production of mixed small livestock raised at low stocking densities.

However the change to cattle breeding and the intensification in livestock production in the recent past resulted in a significant reduction of habitat quality, fragmentation and landscape homogenization.

Cork is the raw material of industrial activity and accounts for about 70% of the total cork industry global production.
The Portuguese Montado

Multifunctional ecosystem that supports high levels of biodiversity

The conservation value of this ecosystem depends on the maintenance of the shrub-grassland matrix through human management.
Objectives

Investigate practical solutions for the reconciliation of the exploitation of resources with conservation principles
The case study area

20000 ha State owned agro-forestry

Two distinct cores geographically separated:

**Lezíria de Vila Franca - 8.500 ha.**
Alluvium soils kept by dikes and drainage systems – pastures and rice fields

**Charneca do Infantado - 11.500 ha**
Heathland - poor, sandy or sandy loam soils, with deficient drainage and a predominance of shrubby vegetation, mainly occupied by forest (74%)

Natura 2000 site, Special Protection Area for birds. Long Term Ecological Research

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The case study area – Charneca do Infantado

3,500 heads of beef cattle (in 2008 the value was 4,500)

**Transhumance:**
- Autumn-winter - *Charneca*
- Spring-Summer – *Lezíria*

Free range in *montado* understory

Rotating grazing blocks 70 to 400ha

Some grazing blocks with high grazing pressure
Previous studies (multi-taxa strategy)

Small mammals
Live trapping

Carnivores, Lagomorphs and artiodactyls

Signs surveys
Track-plates and scent stations
Photo-trapping

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Species richness

87.5% of potential mammal diversity in Southern Portugal

Species of conservation interest:

**Cabrera vole** (*Microtus cabrerae*) – Iberian endemism, Vulnerable (Red List), B-II and B-IV annexes of Habitats Directive

**Wild cat** (*Felis silvestris*) – Vulnerable (Red List); B-IV annex of Habitats Directive

**Polecat** (*Mustela putorius*) – Data deficient (Red List);

**Otter** (*Lutra lutra*) – Near threatened at European level.

Most of these species showed positive relationships with the proximity of water courses and with spatial metrics measuring landscape heterogeneity.
Identification of three areas with less mammal diversity and abundance

Absence of quality water lines to ensure the connectivity

Promoting connectivity between areas with higher diversity

Ecological restoration of water courses - fencing to avoid cattle access and riparian vegetation plantation.

Create live-fences between patches with high diversity and without water courses
**Water courses** - Riparian vegetation plantation (willows, ashes, hawthorns, etc.)

**Life fences** - Plantation of native species that are annually monitored and recovered every year.
Monitoring the green corridor – 2009/2015

The use of this corridor by the mammal community has been yearly monitored using a combination of methodologies:

i) transect sampling, twice a year, along all the corridor extension to detect signs of presence (e.g., scats and footprints);

ii) permanent photo-trapping with cameras located each kilometer;

iii) small mammal live-trapping once per year, in a total of 22 sampling stations.

For comparative purposes, similar sampling has been conducted in the surrounding matrix.
Results: Small mammals

Vale Zebro Water course

Significant differences between years and relatively to the surrounding matrix

Life fence and Alila water course

Lentisqueira Water course
Results – Other mammals

Vale Zebro Water course

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<td>IKA</td>
<td>258</td>
<td>162</td>
<td>305</td>
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</tbody>
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Indice Olfométrico de Abundancia

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Life fence and *Alila* water course

Índice Quilométrico de Abundância

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Lentisqueira water course

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FC
SS
HI
LL
MM
MF
VV
LG

L1
L2
L3

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Cabrera vole

The map shows the distribution of Cabrera voles from 2008 to 2015. The locations are marked as A, B, and C.

Key:
- 2008: Light pink
- 2009: Light blue
- 2010: Light green
- 2011: Light orange
- 2012: Light red
- 2013: White
- 2014: Green
- 2015: Dark blue

Legend:
- Kilometers

The map indicates a trend of vole movement over the years, with some areas showing a higher concentration of sightings.
In short

*Montado* system, holds high diversity of mammals, including species of conservation interest, however healthy populations depend on management.

Establishing the green corridor proved, therefore, to be a valuable measure for mammal conservation by increasing connectivity and mitigating the negative effects of human activities, mostly the effect of grazing.

Lessons learned suggest that adequate land management strategies can incorporate conservation principles and contribute to the overall biodiversity inhabiting the area.

*Thank you*

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