Capercaillie: is it a meaningful indicator for French central Pyrenees forest biodiversity?

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Context:

- Many **endangered** species
- Priority protection areas
- Need **biodiversity indicators**

➢ **Umbrella species concept**: Protection of the umbrella species benefits to a lot of other species sharing the same habitat.

The Living Planet Index measures trends in the abundance of species for which data is available. This indicator has been adopted by the Convention on Biological Diversity to measure progress towards the 2010 target.

Global biodiversity decline

*Source: Loh and Goldfinger 2006*
Capercaillie (Tetrao urogullos):

Family: Grouse

Habitat: mountain forests

Distribution: northern Europe and Asia

Capercaillie distribution in Europe (based on IUCN Red List spatial data)

Female (Hen) © Flatruet, 2011

Male (Cock) © tigerfastimagery, 2013

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In France:

**Endemic** sub-species in Pyrenees:

*Tetrao urogallus aquitanicus*

Only 4000 individuals

➢ High interest for conservation

Capercaillie distribution in France

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Capercaillie is highly dependent on its environment:

3 vital habitats (200 ha/ind)

➢ Leks (mating)
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3 vital habitats (200 ha/ind)

- Leks (mating)

- Nesting sites (laying and offspring raising)
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3 vital habitats (200 ha/ind)

- **Leks** (mating)
- **Nesting sites** (laying and offspring raising)
- **Wintering sites** (protection against the cold)
Capercaillie is highly dependent on its environment:

3 vital habitats (200 ha/ind)

Indispensables variables:
- Clear woody cover
- Herbaceous layer

→ Mature mountain forest
Study hypothesis:

➢ Capercaillie vital habitats have a higher biodiversity than other forest environments

➢ Capercaillie: an umbrella species in Pyrenees
Material & methods
The Potential Biodiversity Index (PBI)

- Combination of **10 biodiversity key factors**
- Score from 0 to 5 per factor
- Quick and easy to use
- Standardized method
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3 context factors
(PBI_{context} : 0-15 points)

- Wet habitats
- Rocky habitats
- Forest age
7 management factors
(PBI management: 0-35 points)

- Structure of vegetation
- Diversity in tree species
- Standing dead trees
- Fallen dead trees
- Very large trees
- Microhabitats
- Open areas

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Structure of vegetation

Diversity in tree species

Standing dead trees

Fallen dead trees

Very large trees

Microhabitats

7 management factors
(PBI management: 0-35 points)

Total PBI score = \( PBI_{management} + PBI_{context} \)
Field phase:

- Luchon Valley (31)
- PBI evaluation on 30 capercaillie leks and 30 random control sites

Alongside PBI, two important variables are estimated:

- **Basal area** = Live trees density measured with Bitterlicht relascope (m²/ha)
- **Presence of three herbaceous layers** favorable to Capercaillie:
  
  0-30 cm ; 30-80 cm ; > 80 cm
- Results -
• **Management factors and total PBI:** Significant difference between PBI of lek sites and control sites.

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- **Management factors and total PBI**: Significant difference between PBI of lek sites and control sites.

- **All PBI factors of Capercaillie Lek Sites (LS) are higher** than PBI factors of Control Sites (CS), except for very large large trees.
• Number of vegetation layer is higher in Capercaillie Lek Site (LS) than in Control Site (CS)

• Not difference of basal area

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Negative correlation between basal area and number of vegetation layer for Capercaillie

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Positive correlation between PBI and vegetation layer for Capercaillie
- Discussion -
Hypothesis:
➢ Capercaillie vital habitats have a higher **biodiversity** than other forest environments
➢ Capercaillie: an **umbrella species** in Pyrenees

Higher total PBI scores for lek sites
No difference between context factors
Difference between stand scores
Settlement factors are more prevalent on lek sites

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More important role of settlement and management factors than contextual factors in differentiation of Capercaillie life habitats
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| Difference between stand scores | Settlement factors are more prevalent on lek sites |

| More important role of settlement and management factors than contextual factors in differentiation of Capercaillie life habitats |

Our samples all come from the same geographical area and from the same altitude range

- May possibly limit the variation of context related factors

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No difference between context factors
Difference between stand scores
Settlement factors are more prevalent on lek sites

➢ Reinforces the idea of greater potential biodiversity in these lek sites

➢ The scores of factors related to stand and forest management indirectly reflect the presence of numerous groups of species associated with the observed micro-habitats (Emberger, Larrieu, Gonin, 2013)

➢ PBI factors can be considered as a biodiversity-friendly pathway (Larrieu and Gonin, 2008)

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The PBI score of the capercaillie's vital sites is not excessively high (29.27 / 50)

Comparison of PBI of vital sites of Capercaillie to other French forest environments

Biodiversity may be limited by moutain climate and other historical factors?
The observations confirm the **umbrella status** of Capercaillie

Capercaillie vital habitats have a higher **biodiversity** than other forest environments in the same bioclimatic region
Thank you for your attention!
References:


