Integrating biodiversity in forest management: a french perspective

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European Forest Institute, InForMAr kick-off meeting
December, 7-8th 2017 – Bonn (Germany)
Integration in practice: France as a study case

Policy for state and community forests (~30% forest area)

« Instruction biodiversité ONF – 2009 »

- Pioneer trees species
- Ageing and old-growth islands: 3% of the surface area
  (2% ageing + 30 years, 1% old-growth)
- Strict forest reserves account for the 3% (the first 500ha)

- 1 dead / senescent tree/ha
- 2 habitat trees / ha (cavities, large, old…)
- Lying deadwood of every dimensions

…not much for private forests (70% left)

- Forest certification (FSC, PEFC)
- Voluntary based
- No state incentives
That said, a certain number of questions arise

What are the factors influencing structural heterogeneity / old-growth habitat characteristics?

What are the levels expected in reference areas?

Are “management” levels sufficient to maintain biodiversity?

Could we “mimic” nature in managed forests?
Biodiversity Differences between Managed and Unmanaged Forests: Meta-Analysis of Species Richness in Europe

Stric Forest Reserves: 0.3% of the forest area

No real “primeval” forests

French strict forest reserves are generally recent

No structure / biodiversity comparisons between reserves and managed forests
(Trying to) fill the gap since 2008

15 lowland and mountains beech dominated forests, 213 plots

Time since last harvesting
- MAN: 9 ± 12 years
- UNM: 46 ± 38 years

7 taxonomic groups incl. saprox beetles, birds and bats
Stand structure characterization

- Living wood DBH>7.5cm
- Snags DBH>7.5cm
- Logs D>5cm
Cracks
Bark pockets and losses
Woodpecker cavities
Conks
Epiphytes: bryophytes and ivy
Outgrowths
Tree level: Microhabitats (Vuidot et al. 2011)
Stand level: Old-growth elements (Paillet et al 2015, 2017)
Does it translate to biodiversity via microhabitats? (Paillet et al. submitted)

- Management abandonment
  - Volume of large snags
    - Basal area of large living trees
      - Microhabitat Diversity
        - Total Richness
          - Total Species Richness

\[
\begin{align*}
0.59^{***} & \quad \text{Management abandonment} \\
0.28^* & \quad \text{Basal area of large living trees} \\
0.25^{***} & \quad \text{Volume of large snags} \\
0.69^{***} & \quad \text{Microhabitat Diversity} \\
0.13^{***} & \quad \text{Total Richness} \\
0.17^* & \quad \text{Microhabitat Diversity}
\end{align*}
\]

\[0 \text{ - } 10 \times 1.58 \text{ (1.7 – 2.7 sp.)}\]
Does it translate to biodiversity via microhabitats? (Paillet et al. submitted)

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<thead>
<tr>
<th>Species richness</th>
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<tbody>
<tr>
<td><strong>Total</strong></td>
<td>Diversity 0.17*</td>
<td>Diversity 0.06*</td>
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<tr>
<td><strong>Forest specialists</strong></td>
<td>Diversity 0.21(*)</td>
<td>Diversity 0.08*</td>
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<td><strong>Shade-tolerant</strong></td>
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<td><strong>Cavity dwellers</strong></td>
<td>Diversity (snags) 0.35*</td>
<td>Diversity 0.13**</td>
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<td><strong>Fungi dwellers</strong></td>
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<td><strong>Conk density</strong></td>
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Take home message: Biodiversity of birds, bats, beetles

Deadwood as a main driver of bird and bat species richness
- Provides food, shelter, breeding sites
- Creates gaps for hunting

Mediation by microhabitats
- More “direct” indicator of forest biodiversity
- Less powerful for saproxylic beetles
The need for references... and standardization (Larrieu et al. 2018)

Tree related microhabitats in temperate and Mediterranean European forests: A hierarchical typology for inventory standardization

Laurent Larrieu\textsuperscript{a,b,*1}, Yoan Paillet\textsuperscript{c,1}, Susanne Winter\textsuperscript{d,1}, Rita Bütler\textsuperscript{e}, Daniel Kraus\textsuperscript{f}, Frank Krumm\textsuperscript{g}, Thibault Lachat\textsuperscript{g,h}, Alexa K. Michel\textsuperscript{i}, Baptiste Regnery\textsuperscript{j,k}, Kris Vandekerkhove\textsuperscript{l}
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Large structural elements are crucial
- Because they make the difference: diversity, abundance

Favoring structural heterogeneity has a positive effect on forest communities…

… but some extreme levels can only be attained in strict reserves
Questions and issues remain: some personal thoughts

Spatialisation
- Could we think about it?
- For which species?
- How do we prioritize?

Thresholds for practical management
- Only one, but defined / negotiated how?
- Or several idiosynchratic thresholds?

Implementation
- OK-(ish) with forest managers but lumberjacks? Machines?
- Trade-offs with “new” issues: rise of bioeconomy, woodfuel, recreation…

What place for science-based recommendations?
AT LAST, SASHA, YOUR SHOE REPORT.
RATHER SLIM FOR 8 MONTHS’ WORK!
SO, WHAT’S YOUR CONCLUSION?

THAT FURTHER RESEARCH IS NEEDED
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Merci de votre attention !