FOREST MANAGEMENT AND CLIMATE CHANGE

A NEW APPROACH TO THE FRENCH MITIGATION STRATEGY

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Context: climate change and « ecological » transition

GESTION → What resilience? (ecosystems) + What mitigation? (climate)

STUDY = Litterature > Wood extraction scenarios > Mitigation potential
Storage: in Ecosystem (Bv, Bm, Ss) = biophysical laws

in Wood Products (building) = political decisions, human behaviour

Substitution = emissions avoided by substituting wood for other materials and energy
Substitution Benefit = $DF^* \times m^3$ replacing the other source (material, energy)

$DF = \text{Displacement Factor (from non-wood to wood use)}$

**Important!**

- Littérature = DF can be negative.
- Available DF do not integrate all variables … e.g. impact of cutting modalities on sink.
Global strategy for 2020-2050

1) Preserve and increase stocks in ecosystems

2) Preserve and increase stocks in wood products

3) Substitute emitting sources for wood while limiting emissions of the wood sector

+ 3 Hypothesis (S = , P = , M)

→ VAR = % Stem – Branches - Dead

(details in the Study)
Studied scenarios = variations in managed forests

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Ecosystem Priority</th>
<th>Compromise</th>
<th>Sector Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECOS: Branches:</td>
<td>20%</td>
<td>50% ($\approx$ current?)</td>
<td>75% (max)</td>
</tr>
<tr>
<td>Dead trees:</td>
<td>10%</td>
<td>20% (&lt; current)</td>
<td>75% (max)</td>
</tr>
<tr>
<td>Wood extraction:</td>
<td>40 Mm$^3$/year (30 by M2)</td>
<td>60 Mm$^3$/year</td>
<td>95 Mm$^3$/year</td>
</tr>
</tbody>
</table>

Deadlock areas: Branches and Dead trees = 75% to allow plantation work
Result #1: Stocks 2020-50 with harvest increase

Areas without wood extraction

2050 = 60 Mm$^3$
(all managed areas)

2050 = 95 Mm$^3$
(all managed areas)

Gain in Wood Products *does not* compensate losses in Ecosystems
Result #2: Stocks 2020/50 in CCF and replacement

Deadlock = Clear-cut and plantation

CCF = harvest without clear-cut
Result #3: Sink 2020/50 with harvest increase

Gain in Wood Products does not compensate decrease in Ecosystem sink.

Areas without wood extraction
- 2050 = 60 Mm³ (all managed areas)
- 2050 = 95 Mm³ (all managed areas)

Total sink - 37%
Substitution reduces differences... without reversing climatic effects

But this result uses (at least two) classical but very unstable hypotheses...
IF: 50% of extracted wood replaces other sources + $DF_{\text{wood}}$ decreases by 50%:

Résult #5 - Substitution modulation

Total mitigation potential 2020-2050 (Mt-eqCO$_2$)

- 9 / 12%
### Result #6 – Soil fertility and Biodiversity

<table>
<thead>
<tr>
<th>2050 goal</th>
<th>60 Mm$^3$/y</th>
<th>95 Mm$^3$/y (&lt; SNBC)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dead wood</strong></td>
<td>+ 87% with significant large diameters</td>
<td>- 27% with few large diameters</td>
</tr>
<tr>
<td><strong>Branches</strong></td>
<td>50% returns to soil</td>
<td>25% to soil</td>
</tr>
<tr>
<td><strong>Impact on biodiversity</strong> (bibliography)</td>
<td><em>Possible improvement</em></td>
<td><em>Significant degradation</em></td>
</tr>
<tr>
<td><strong>Impact on fertility</strong> (bibliography)</td>
<td><em>Possible improvement</em></td>
<td><em>Highly probable degradation</em></td>
</tr>
</tbody>
</table>

95 Mm$^3$/y in 2050 = high risk of ecosystem degradation
Outlook 2100 with the assumption M=2050 (RCP 2.6)

Managed forests with 95 Mm³/y harvest from 2050

Scenation R95-M1: Biomass and SW storage (m³/ha) + soil storage (tCO₂eq/ha)

Forestry sector = source of GHGs

Fall in standing volume

HSW > 100% to maintain 95 Mm³/year

SNBC:
2050 goal = over 100 Mm³/y!
Some key take-away messages

**CLIMATE TOOLS : Ecosystem Storage >> Products > Substitution**  
(Mat > En.)

**Increasing wood harvest (even in CCF) will:**

1) **Force** strong investments (road equipments, owner grouping) while decreasing substitution benefits per m³

2) **Decrease** stocks and sink of the forest-wood system, loss which cannot be compensate by Substitution, regardless of mortality evolution

3) **Threaten** forest sustainability: fertility, biodiversity and stand stability

**→ We advice to maintain current harvest levels in France with:**

1) **Combining** 25% area without wood extraction + 3 à 7% replacement + rest in CCF

2) **Increasing** forest health local monitoring, to base sylviculture on resilience focused on local species and genetics

3) **Limit** Branches and Dead trees harvest, with no root extraction

4) **Increasing** carbon efficiency of the forestry sector at all levels + increase "wood use hierarchy" and exclude "energy-dedicated forestry".
France still has large and magnificent forests…

Thanks for your attention!

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