Opportunities for coppice management at the landscape level: the Italian experience

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«ancient woodlands»
Coppice woodlands in Italy (INFC 2005)

Beech 14.4
Deciduous Quercus sp 19.4
Evergreen Quercus sp 5.5
Hornbeam 11.6
Other sp. 21.9
Coppices with conifers 2.9

3,663,143 hectares
(500,000 hectares Sweet chestnut)

Frequency of N2k forest habitat types

Number of N2k sites (log10)
Different modes of stump cutting, pollarding and pruning associated with coppice
Historical multifunctional silvo-pastoral systems for animal husbandry and production of timber, firewood, charcoal, NWP
Current management approaches...
Uprooting of beech stools in a coppice under conversion following snow (Urbinati et al ForestPas 2000)

Uprooting of sweet chestnut overstood stool following heavy rain (Bischetti et al Pro.Ce.D.I 2013)
Innovative silvicultural systems for coppice woodlands.

Selection of standards to be retained can be challenging. This not only includes the number of trees selected to grow to larger sizes than the shoots, but also concerns setting the density and the spatial arrangement as well as the age/size distribution of standards within the stand, guided by informed silvicultural choices.

- **Group of standards retention**

- **Single tree silviculture**

- **New silvicultural system for sweet chestnut coppices**

**CHESUD Project (Contract ERBIC 15 CT 98 0149)**

**Summacop - Sustainable and multifunctional management of Umbria coppices**

**LIFE99 ENV/IT/000003**

**P.Pro.SPO.T. - Policy and Protection of Sporadic tree species in Tuscany forest**

**LIFE09 ENV/IT/000087**

**ManFor C.BD. - Managing forests for multiple purposes: carbon, biodiversity and socio-economic wellbeing**

**LIFE09 ENV/IT/000078**
Group of standards retention
Frattegiani et al 2000
Grohman et al 2002
Savini et al 2015

- 100 m² ±; 25-30 individuals bounded by the more mechanically stable ones; possibly including sporadic tree species
- Average distance 15-20 m within the coupe (10-15% of coupe extent)
- Density and spatial arrangement according to terrain/site and stand conditions
✓ individual tree and stand mechanical stability protection of soil from erosion
✓ sufficient light for shoots growth
✓ tree species diversity
✓ within-coupe heterogeneity (creation of microhabitats)
✓ more commercially valuable timber
✓ easing of timber and firewood extraction
✓ aesthetics (mitigation of the visual impact of coppicing

Group of standards retention
Frattegiani et al 2000
Grohman et al 2002
Savini et al 2015
Single tree silviculture (for sporadic species) in ageing coppices

Pelleri et al 2000
Mori and Pelleri 2014

détourage
(mutuated from
Bastien and Wilhelm 2000
Wilhelm and Rieger 2013)
Main characteristics of the single tree silvicultural models for coppices (Marone et al 2014)

<table>
<thead>
<tr>
<th>Silvicultural model</th>
<th>Target trees number n ha(^{-1})</th>
<th>Target trees DBH cm</th>
<th>Sporadic target trees yield m(^3)</th>
<th>Return period yrs</th>
<th>Coppice rotation period yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Oak coppice</td>
<td>20</td>
<td>48-68</td>
<td>0.9-1.2</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>B-Oak coppice</td>
<td>20</td>
<td>48-68</td>
<td>0.9-1.2</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>C-Aged oak coppice</td>
<td>60</td>
<td>48-68</td>
<td>0.8-1.9</td>
<td>8</td>
<td>--</td>
</tr>
<tr>
<td>D-Aged chestnut coppice</td>
<td>96</td>
<td>48-68</td>
<td>0.5-1.1</td>
<td>8</td>
<td>48</td>
</tr>
</tbody>
</table>

- Different combinations of thinning regimes according to different tree species / stand initial conditions (e.g., reaction in terms of growth and competition/stand dynamics)
- Suitable to different woodlands (mixed oak, chestnut and beech) of coppice origin (including aged/converted to high forests stands)
Lengthening of rotation time (to 30 or 50 years)
Selection and tending of stems
Early (starting at 10th year) frequent (every 6-7 years) thinnings from below-mixed/medium-high intensity

Successful in the recovery of neglected woods with overstood stools and in maintaining a balanced dominant cohort, functionally responding to the biological characteristics of this species and coppice dynamics (i.e. shade-intolerant, fast growing, active social organisation, tendency to create even-aged structures)
## Main characteristics of the medium and long rotation models for chestnut coppices

<table>
<thead>
<tr>
<th>Age yrs</th>
<th>DH m</th>
<th>Before thinning</th>
<th>Intensity</th>
<th>After thinning</th>
<th>M (%)</th>
<th>CAI m² ha⁻¹ yr⁻¹</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Ns n ha⁻¹</td>
<td>BA m² ha⁻¹</td>
<td>DBH cm</td>
<td>N (%)</td>
<td>BA (%)</td>
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<tr>
<td>10</td>
<td>&gt; 10</td>
<td>5500</td>
<td>26.9</td>
<td>7.9</td>
<td>50</td>
<td>35</td>
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<tr>
<td>15</td>
<td>13.5-15.5</td>
<td>2640</td>
<td>27.0</td>
<td>11.4</td>
<td>50</td>
<td>30</td>
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<tr>
<td>22</td>
<td>16.5-18.0</td>
<td>1294</td>
<td>30.1</td>
<td>17.2</td>
<td>40</td>
<td>30</td>
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<tr>
<td>30</td>
<td>19.0-20.0</td>
<td>786</td>
<td>32.3</td>
<td>23.1</td>
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<td>22</td>
<td>16.5-18.0</td>
<td>1892</td>
<td>31.7</td>
<td>14.6</td>
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<td>22</td>
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<tr>
<td>37</td>
<td>21.0-22.0</td>
<td>767</td>
<td>35.2</td>
<td>24.2</td>
<td>30</td>
<td>22</td>
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<tr>
<td>44</td>
<td>22.5-23.0</td>
<td>531</td>
<td>35.8</td>
<td>29.3</td>
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<td>25</td>
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<tr>
<td>50</td>
<td>23.5-24.0</td>
<td>370</td>
<td>32.9</td>
<td>33.6</td>
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Differeent options (including spontaneous development and conversion, and the application of innovative silvicultural models also in chestnut coppices) can be combined at the stand and sub-stand levels to:

✓ prevent homogeneity

✓ add a finer scale heterogeneity to the mosaic of traditional coppice developmental stages

✓ increase overall system resilience and scope for (management) adaptation to new conditions
SFM: ecological + economic concerns taken into account
Requirements...
The combination of different options at the stand and sub-stand level and compliant with the principles of SFM, is challenging and requires:

- Regionally consistent administrative procedures ensuring a logical hierarchy in forest planning (sensu Baskent & Keles 2005) (e.g., those in force in the Regione Umbria, Grohmann 2005)
- Novel forest management plans (e.g., those devised for CWS in Umbria and Tuscany, Terradura & Consoli 2011, Fantoni et al. 2012),

- The existence of specialized and qualified operators at all levels (forestry technicians, workers, controllers) (e.g. vocational courses offered by the Regione Piemonte)
- The development of scenarios simulating the potential forest dynamics at different levels (cf. Mladenoff and Scheller 2007, Mairota et al 2006)
Concluding remarks

- The proposed approach to coppice management responds to the need to consider the forest landscape as a whole, rather than an aggregation of discrete and disconnected individual forest stands and estates (Kohm & Franklin 1997);
- Goes in the direction of an ecological aesthetics (Gobster 1999) for forest landscape planning so as to reconciling scenic aesthetic/demands of urbanite communities with those of forest landscape functioning/biodiversity (cf. Hermy & Verheyen 2007) and of rural communities (cf. Ostrom 2009);
- Is applicable to Narura 2000 sites;
- Is in line with the so called “Options Forestry” (Bormann & Kiester 2004) strategy, that admits an uncertainty margin in connection with unpredictable changes that affect the system;
- Is compliant with the new Framework Program for the Forestry Sector – Horizon 2020 (CO₂ fixation + SFM) to ensure productive, socio-economic and environmental functions in the future;
- Represents the bottom up key that allows to respond to the socio-economic and environmental challenges affecting coppice silvicultural system.
Earlier stages of this work have been presented as posters at the COST Action 1301 EuroCoppice Event: People and Coppice, University of Greenwich, Medway, England 5th November, 2014 and at the Conference "Coppice forests: past, present and future", Mendel University in Brno, Czech Republic April 9th-11th, 2015

For the participation in both these events, and in this Conference, P. Mairota has received financial support by

**COST Action FP 1301 “EUROCOPPICE”**

Innovative management and multifunctional utilization of traditional coppice forests: an answer to future ecological, economic and social challenges in the European forestry sector

Working Group 4 - Services, protection, nature conservation

http://www.eurocoppice.uni-freiburg.de/

This work has been submitted to iForest-Biogeosciences and Forestry and is under review