Medium term strategies to improve the quality of Mediterranean forests: Valtiberina case in Tuscany

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The Tuscany Forest problem

In several countries of the Mediterranean Europe, forest productions are scarcely competitive on the markets. The survival of the enterprises of the sector depends, mainly, from a public aid that in the future will decrease progressively. Thus, it becomes necessary to revitalize the sector which, otherwise, will run into a quick decline. The problem is mostly linked to the typologies of forest resources, that, for the case of Central Italy, are mainly represented by aged coppices, and sporadic tree species (mesophile species like: mountain maple, linden tree, ash tree and yew tree, etc.).
The forestry problem:

- Low value Forest (aged coppices)
- Small forest enterprises (no much equipment)
Aim of the study

- Define the strategy useful to gain three mutually objectives:
  - **Maintain forest activities** in defense of the Tuscan wood
  - **Increase the profitability** of forest activities
  - **Improve the quality of forests** in order to promote the production of valuable species

How is it possible?

- Through analysis of local resources
- Through the study of forestry enterprises operating within territory
- Through the study of local and external markets of timber industry and relationships they have with the territory
What is the territorial situation?
Site study: Valtiberina

- Area 660 km$^2$ across North Apennines
- The territory is almost completely covered by woodlands (wood index of 61%).
- Usable Agricultural Surface is 35%
- The most common silvicultural system is coppice (more than 80%).
Typical agricultural products

- Tabacco Kentuky 1.709 hectares (11% UAS) – from which it derives the most production of Tuscan cigars
- 212 farms with 11,000 head of Chianina (production costs twice than any other beef breed)
VALTIBERINA FOREST 1/2
Wood Components

The most common silvicultural system is coppice (more than 80%).
According to the Forest Inventory of Tuscany (IFR) within 1 million hectares of forest there are about 90 million of sporadic tree species. This means that there are on average more than 80 plants per hectare. It is an indicative value which may vary from area to area and from different Silvicultural system. In coppice is usually double.
Pine and Black pine
*Matsucoccus feytaudi* Ducasse (cochineal)

*Leptographium* sp transported by bark beetles
Strategic actions

- **Existing forests**
  Aged coppices with lower value (turkey-oak and hornbeam), and mediterranean coniferous forests

- **Transition forests**
  Coppice, with extensive groups of valuable species introduced by renewal groups and High Forest Cutting

- **Quality Forests**
  Mesophile hardwood species with mountain maple, linden, durmast, ash, etc..
How is it possible.. from economic point of view?

...Opportunities are related to energy sector

- In the short term, the development of forest-wood-energy chain, can certainly be an interesting opportunity for the economic improvement of forest resources of Valtiberina.
- This is a complementary chain to the traditional firewood chain, which uses raw materials from:
  - Wood thinning in conifers wood;
  - High forest cutting;
  - Clear cutting in coppice and high forest;
  - Cutting in riparian wood;
  - urban green pruning;
  - agricultural tree crops pruning (grapevine, olive).
Forest regulation point of view

Coppice
- Production of traditional timber assortments to which we associate the production of wood chips deriving from the residues of the forest harvesting.

Sporadic tree species
- Spreading of the tree technique, with gradual thinning round target plants

Tukey-oak coppice (fire wood+chips)

Mix Beech coppice with sporadic elms
Ex: TECHNICAL APPROACH TO SPORADIC TREE SPECIES

(SPREADING OF THE TREE)

- Identification of target plants and relative crown cover

- During coppice harvesting... Clear cutting, high forest conversion, thinning
Local development model

Existing forests (low quality)

- Transition forests (low quality)
  - RDP action in short-term
  - High forest cutting
  - Improve Road system
  - Species planting
- Forest enterprise
- Energetic products (profitability)
- Energetic services (profitability)

- RDP action in Long-term

Future forests (High quality)

- Forest enterprise
- Energetic Products and Services (profitability)
- High quality Wood stock (profitability)

Current production

- Fire wood (Low profitability)
- Energetic services (profitability)

Short-term production

- Promote request

Long term production

- Promote renewable energy technologies

Income

In Long-term

Improve
Road system

Energetic services (profitability)

Promote request

Promote renewable energy technologies

RDP action in short-term

High forest cutting

Species planting

RDP action in Long-term

Clear cutting

thinning
Methodology to define strategies and actions
Knowledge maps are used to highlight the present, mid-term and long-term scenario for three types of chains:

1. **Filiera 1**
   - Self-production and consumption of agro-forestry biomass

2. **Filiera 2**
   - Production and sale of agro-forestry biomass

3. **Filiera 3**
   - "Integrated" chain of energetic services.

The SWOT analysis is used to evaluate the positive and negative factors within the forest sector:

- **Strengths**
- **Weaknesses**
- **Opportunities**
- **Threats**

Collected information through focus groups and stakeholder concerning:

1. Political and regulatory factors
2. Economic factors
3. Social factors
4. Technological factors

From PEST analysis information.
SWOT

S.W.O.T.
(Strengths-Weaknesses-Opportunities-Threats)

Internal analysis
- Strengths
- Weaknesses

External analysis
- Opportunities
- Threats
The four points of view of SWOT will be now examined considering:

- the present conditions of the firms’ structures;
- the current typology of forest stands;
- the present market for the wood products (selling of firewood on the local market).
MEDIUM TERM SWOT

Now let us see the four points of view of the SWOT, hypothesizing the introduction of actions from RDP, with the aims of:

- Favoring the **diversification of the production**, stimulating the production of **wood chips** for energetic use.
- Improving the quality of forest elements through interventions regarding the **high forest cutting** (mainly in the beech coppices).
- Specific improvement of the hilly forest stands with **durmast**.
- Improvement of the forest stands with valuable broad-leaves (Mountain maple, lime tree, ash tree, yew tree).
- Improving of the **forest roads**;
- **Updating knowledge of the forest workers**;
- Favoring the **installation of heating plants** fed with wood chips in the public buildings;
- FAVORING THE **acquisition of technologies** for the forest-wood-energy chain.
The four points of view of SWOT are evaluated considering the effects that the actions of RDP may have in the long-term.

In this case the enterprises’ structures should have adequated themselves for a diversified production (such as lumbers from valuable species, energetic products and services – including cogeneration).
KNOWLEDGE MAPS

- The cognitive maps allow the visual evaluation of the strengths and weaknesses, opportunities and threats of a specific enterprise project.
- Through these maps it is possible to have a clear perception of the results, which derives from PEST and SWOT analysis and to have a clear evidence of the future sector dynamics.
- These maps are created evaluating the contribution that each factor gives to the definition of the degree of strength or weakness of the enterprise or the opportunities or threats from the external factors.
- The contribution of each parameter has been evaluated through a scale of linguistic quantifiers:
  - $5=$ very important, $4=$ important, $3=$ medium, $2=$ scarce, $1=$ not important
Dynamic S.W.O.T. Forest Enterprise Valtiberina

- Actual situation
- Medium-term scenario
- Long-term scenario

Threats vs. Opportunity

Weaknesses vs. Strengths
DINAMIC SWOT RESULTS
Action: (defined specific incentives for RDP)

For Harvest enterprise:
- Incentive to buy technologies for the development of the forest-wood-energy chain.
- Training of forest workers;

For forest enterprise
- Incentive to increase diffusion of mesophile species in the forest stand (Durmast, ash, linden, etc);
- Improving of the forest roads system.
- Incentive for high forest cutting (mainly in the beech coppices), and substitution conifers with specific re-naturalization
- Incentive for forest planting (mesophile species)

To increase chips demand
- Incentives to buy heating plants fuelled by biomass in public buildings, and private-public buildings
## Estimated Economic effect (Valtiberina)

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Gross Domestic Product</th>
<th>Thermal Power (Mwh/yr)</th>
<th>Volume Heated (mc)</th>
<th>Fuel Saved (i/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>only with Actual forest residues</td>
<td>3,168,000</td>
<td>39,600</td>
<td>264,000</td>
<td>4,666,667</td>
</tr>
<tr>
<td>With potential forest residues</td>
<td>4,732,032</td>
<td>59,150</td>
<td>394,336</td>
<td>6,970,586</td>
</tr>
<tr>
<td>Forest and agricultural residues</td>
<td>5,472,346</td>
<td>68,404</td>
<td>456,029</td>
<td>8,061,115</td>
</tr>
<tr>
<td>Chipping residues and fire-wood</td>
<td>14,400,000</td>
<td>180,000</td>
<td>1,200,000</td>
<td>21,212,121</td>
</tr>
</tbody>
</table>

* considering 3 Mw/t al netto perdite di sistema e vendita calore a 80 €/Mw t (prezzo corrente servizio)

** considering le sole utilizzazioni attualmente effettuate

### More than 1,400 tanker

Annual thermic consumption of the main city of the area: 320,000 Mw (Arezzo)
thanks for your attention

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Esempio: contracting – vendita calore

Modulo mobile (plug&play), con caldaia a cippato fino a 150 kW, particolarmente idoneo al contracting agroforestale 10% di iva

• Legge finanziaria 2006, comma 423 dell’art. 1
• Legge 11 marzo 2006 n°81 (Gazzetta Ufficiale n. 59 del 11 marzo 2006 - Supplemento Ordinario n. 58)
• Legge finanziaria 2007

Produrre energia elettrica e termica da fonti agroforestali da parte di imprenditori agricoli che utilizzano materie prime prodotte prevalentemente dalla proprie aziende agricole è riconosciuta attività agricola connessa ed assoggettata a reddito agrario.