

## IMPROVED MANAGEMENT OF SMALL SCALE COPPICE/DEGRADED FORESTS IN PRIVATE OWNERSHIP

The project was implemented in 2019 in North Macedonia. The objective was to demonstrate new ways of coppice forest management which allows to produce more valuable wood products on longer terms and at the same time to advocate with institutions such as Ministry (forest and rural development sector) to invest more in supporting forest management that transforms coppice forests into high forest.

Not so many forest owners are eager to change current forest management, from coppice forests to longer rotations in wood harvest. As stated, reasons for that are administrative costs and procedures of the conversion, poor protection of private forests from illegal activities and lack of knowledge among forest owners about potential of their forests to produce more valuable wood products.

Subsidies for the change in management would be critical for having more forest owners willing to change the way of management in the future, as stated by forest owners.

Nine private forest sites were visited and three forest stands were identified in private ownership where forest owners were positive to participate in demonstration of change in forest management practices from coppice into high forests.

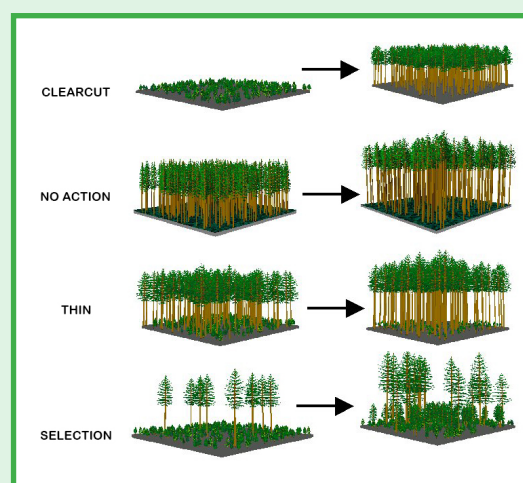
Forest site conditions	Site 1	Site 2	Site 3
Area	5071 m <sup>2</sup>	3600 m <sup>2</sup>	5350 m <sup>2</sup>
Altitude	800 m	550-600 m	850 m
Exposition	Northwest – west	West - northwest	East - southeast
Slope	40-60°	60-75°	60°
Depth of fertile soil layer	3-4 cm	1-2 cm	4 cm
Forest stand description	Dominantly coppice, one age stand of 50 years (first thinning 8 years ago)	Coppice, age of 30 years	Dominantly coppice, one age stand of 30 years
Canopy cover	80-90%	60-70%	90%
Ground flora	Young trees, mainly <i>Quercus spp</i> (oak) and <i>Sorbus spp</i> , thick leave cover, grass ( <i>Poaceae</i> ) and wild strawberry ( <i>Fragaria vesca</i> ).	<i>Crataegus monogyna</i> , grass and wild strawberry.	Young trees, mainly <i>Quercus spp</i> and <i>Castanea sativa</i> (chestnut), thick leave cover and all second floor covered by <i>Corylus avellana</i> (hazelnut).
Tree species	<i>Quercus frainetto</i> , <i>Q. cerris</i> , <i>Carpinus orientalis</i> (hornbeam), <i>Sorbus torminalis</i> , <i>Sorbus aucuparia</i> , <i>Fraxinus ornus</i> (ash).	<i>Quercus pubescens</i> , <i>Carpinus orientalis</i> , <i>Fraxinus ornus</i> .	<i>Quercus petraea</i> , <i>Q. cerris</i> , <i>Q. frainetto</i> . <i>Abies alba</i> (fir), <i>Castanea sativa</i> , <i>Prunus avium</i> (wild cherry), <i>Tilia argentea</i> (lime tree), <i>Acer obtusatum</i> (maple).
Average height	8 meter	5 meter	7 meter
Average diameter	12 centimeter	8 centimeter	7 centimeter
Growing stock	70 m <sup>3</sup> /ha	30 m <sup>3</sup> /ha	80 m <sup>3</sup> /ha

### General findings

Successful change of coppice into high forests highly depends on site conditions. On lower altitudes there is less natural potential due to climate conditions mainly. Small differences in exposition, slope, depth of soil and moisture are influencing on future potential of forest stand and choice of silviculture measures. Therefore, every forest site has its specific conditions and shall be analyzed to propose the most appropriate silviculture measures.

Silviculture measures shall be applied regularly as appropriate, such as cleaning of unwanted species and selection of best sprouts for seed production, but administrative costs and procedures are not in favor of these interventions.

At nurseries there is limited choice of species for afforestation, especially species that are suitable at forest sites where most of coppice forests are found.



## Conducted measures at pilot sites

Site 1	Site 2	Site 3
Selection of future seed trees, thinning of the forest stand by intensity of around 30% to provide light on the ground and space to remaining trees, enrichment planting with 100 seedlings of Sweet chestnut.	Cleaning of Oriental hornbeam and thinning by intensity of 25% to provide light on the ground and space to remaining trees, enrichment planting with 180 seedlings of Black Pine, 70 seedlings of Black locust and 30 seedlings of White ash.	Cleaning Hazelnut from the lower storey of the stand with aim of providing light to Silver fir and sweet chestnut that appears at the ground floor, light thinning of 15% intensity to provide space to the crowns of remaining trees and light to the ground.

## Costs

### Price of seedlings

Sweet chestnut \_\_\_\_\_ 0.42 €/piece

Black pine \_\_\_\_\_ 0.19 €/piece

White ash \_\_\_\_\_ 0.35 €/piece

Black locust \_\_\_\_\_ 0.21 €/piece

### Price of labor costs

Field work (manual) \_\_\_\_\_ 15-20 €/day

Motor chainsaw operator \_\_\_\_\_ 25-50 €/day

### Administrative costs

Per transported wood \_\_\_\_\_ 6.20 €/m<sup>3</sup>

### Additional costs

Geodetic works \_\_\_ from 50 euro and up

About 2 man days for smallest to 6 man days for bigger forest plots were needed to execute operations on cleaning and thinning.

About 3 to 4 man days per forest plot were needed to execute afforestation on the field.

The costs for geodetic works for forest plot of 3,600 m<sup>2</sup> size were 120 euro.

Through cleaning and thinning operations quantities of 5 m<sup>3</sup> firewood were produced on site 2, to 10 m<sup>3</sup> firewood produced on site 3 and 14 m<sup>3</sup> firewood produced on site 1.

## General recommendations for improved management of private coppice forests

1. Thinning of forest stands with aim to provide space and light for growth of trees that have potential to produce valuable wood products in the future and at the same time will be able to produce seeds for regeneration of the forest stand.

2. Cleaning of the stand from tree species that does not have potential from economical point of view.

3. Enrichment planting with valuable wood species in order to improve economic viability:

- Seeding seeds of fir, beech, oak on sites with good soil conditions.
- On the sites of potential beech forest, enrichment planting with seedlings of *Abies alba*, *Picea abies*, *Pseudotsuga taxifolia*, *Pinus silvestris*, *Acer pseudo-platanus*, *Castanea sativa*, *Acer platanoides*.
- On the sites of potential oak forest on higher altitudes (600-900 masl) afforestation with seedlings of *Castanea sativa*, *Acer platanoides*, *Acer obtusatum*, *Juglans nigra*, *Prunus avium*, *Pinus nigra*.
- On the sites of potential oak forest on lower altitudes (400-700 masl) afforestation with seedlings of *Robinia pseudoacacia*, *Pinus nigra*, *Acer obtusatum*.

4. To provide support through subsidies and by technical advice to forest owners willing to shift from coppice to high forest with longer management cycles for production of wood products.

5. Launch of awareness campaign among forest owners as well organization of trainings for forest owners who want to change their management.

