

The role of forest management practices to increase the provision of forest ecosystem services: the experiences of two LIFE projects in Central Italy

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The Life projects FoResMit (LIFE14 CCM/IT/00090 - Recovery of degraded coniferous Forests for environmental sustainability Restoration and climate change Mitigation) and SelPiBio (LIFE13 BIO/IT/000282 - Innovative silvicultural treatments to enhance soil Biodiversity in artificial black Pine stands) are respectively under the umbrella Climate Change Mitigation and Biodiversity.

The main aim of these two projects is monitoring the effectiveness of forest management options on black pine (*Pinus nigra* J.F.Arnold) stands of Central Italy to increase the functionality of various ecosystem services.

The two projects are focused on testing an innovative silvicultural treatment (selective thinning) based on the selection of the more productive trees (candidates) and the regulation of light penetration through the forest cover and. This treatment firstly improves the stands stability and the growth rates. Furthermore, the application of innovative silvicultural practices is effective in increasing soil biodiversity and improving the ecological equilibrium and climate change mitigation potential of the stands.

SILVICULTURAL OPTIONS

Control (no thinning)

Traditional thinning (thinning from below)



Innovative selective thinning
Best trees (according to vigour and stability) are identified and their growth and development are actively promoted by removing all direct competitors.

IMPLEMENTATION SITES IN ITALY (Tuscany):

Monte Morello, Amiata and Pratomagno

STUDY AREA

The first study area is **Monte Morello** peri-urban forest, located immediately North-West of the urban area of Florence. The forest - established in the sixties for protection purpose but largely abandoned - covers a surface of around 1,035 ha. Currently, the forest is degraded and characterized by poor regeneration, marked susceptibility to adversities, huge quantity of deadwood and a high degree of flammability. The main tree species are Austrian black pine (*Pinus nigra* J.F.Arnold) Brutia pine (*Pinus brutia* Ten. subsp. brutia), cypress (*Cupressus* spp.), flowering ash (*Fraxinus ornus* L.), Turkey oak (*Quercus cerris* L.) and Downey oak (*Quercus pubescens* L.).

The second study area is **Pratomagno**, a reforestation located in north-west of the Arezzo province. Forest area covers 95% of total area (3,300 ha) and the current surface is the result of a gradual increase in forest area since 1936. The main tree species are: Calabrian pine (*Pinus brutia* Ten. subsp. brutia), Austrian black pine (*Pinus nigra* J.F.Arnold) and some broadleaved species such as Turkey oak (*Quercus cerris* L.), European beech (*Fagus sylvatica* L.), Downey oak (*Quercus pubescens* L.) and flowering ash (*Fraxinus ornus* L.).

The last study area is the reforestation of **Monte Amiata** located in the Castiglione d'Orcia municipality, Siena province. The forest area covers 1,930 ha (87% of total land area) and the main tree species are Austrian black pine (*Pinus nigra* J.F.Arnold) and Turkey oak (*Quercus cerris* L.), followed by Downey oak (*Quercus pubescens* L.), hedge maple (*Acer campestre* L.), and silver fir (*Abies alba* Mill.).

The innovative selective treatment applied in the stands firstly improves growth rates and stands stability. Furthermore, the two projects are finalized at reaching diverse objectives.

FoResMit project focuses on carbon cycling: it aims to determine the effect of thinnings on carbon pools and green-house gas (GHG) emissions.

SelPiBio project focused on the biodiversity: it aims to determine the effect of thinnings on the level of biodiversity of the various soil components.

