ADAPTATING FORESTS TO CLIMATE CHANGE SYMPOSIUM, 19-20 November 2019, Toulouse

Technical and economical evaluation of climate change adaptation silviculture in mixed forests in Mediterranean sub-humid conditions

LIFE15 CCA/ES/000060
2016-2021

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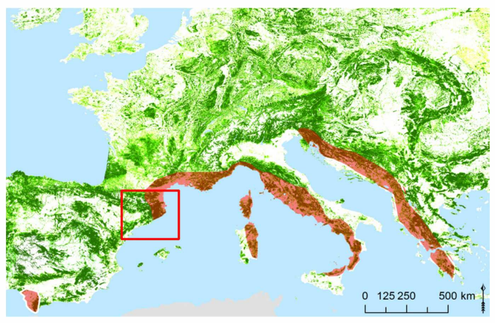
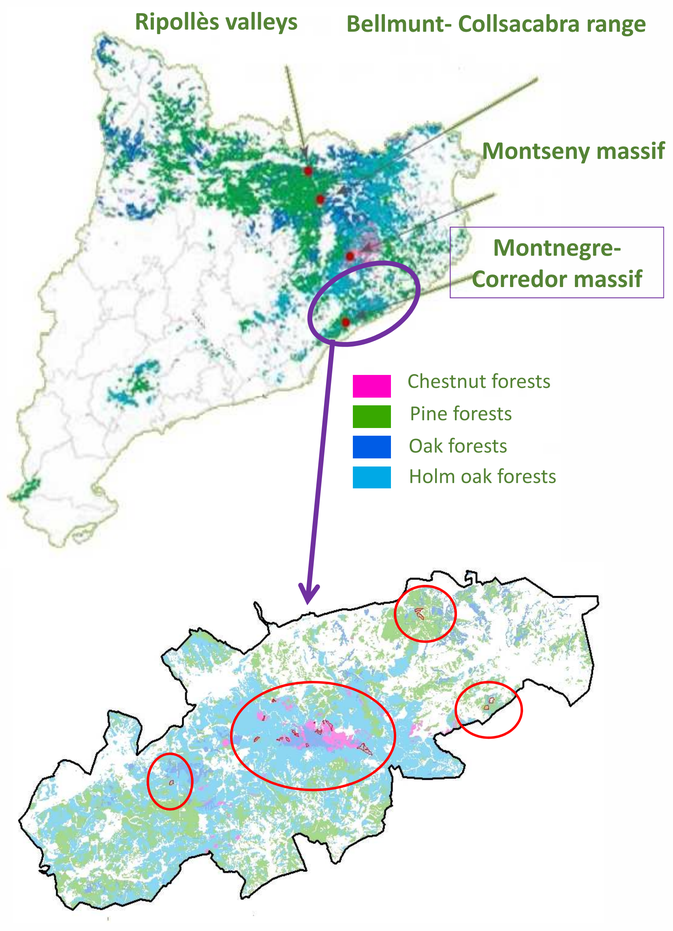
Scope of project: Mediterranean subhumid forests





Context

Main features of the pilot Mediterranean subhumid forests:

- Vulnerability to drought and wildfires
- Excessive density, stability and vitality problems
- Low added-value products
- Periurban sites, high social demands on ecosystem services

LIFE MixForChange project

The project (2016-2021) aims to increase the climate change adaptation capacity of these forests through the development, implementation and transfer of innovative forest management techniques (IFM).

We implement IFM in 164 ha in 4 areas in Catalonia, with 34 stands dominated by oaks, holm oak, chestnut and pine.

Innovative forest management (IFM)

The aims of IFM are:

i) Reducing competence and water stress
ii) Increasing forest complexity
iii) Biodiversity conservation
iv) Products diversification and enhancement of added value ones

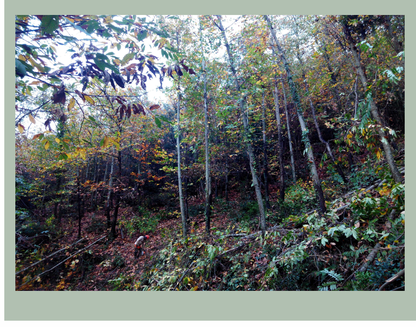
IFM is founded on "close-to-nature" and "continuous cover forestry" principles. We promote multi-stratified structures and sporadic broadleaves. We apply a coppice with standards treatment integrating tree-oriented silviculture criteria if possible: future crop trees are chosen based on their potential value and on their role for biodiversity conservation. We also apply selective shrub clearing to reduce stand vulnerability to forest fires and water stress. In simplified and understocked sites we do enrichment plantations.

Montnegre-Corredor massif

We present below the technical and socio-economic results obtained with the application of IFM in Montnegre i Corredor massif.

Forest types

Holm oak forests: 25 ha (5 stands) (*Quercus ilex subsp. ilex)*



Chestnut forests: 21 ha (12 stands) (*Castanea sativa)*

Oak forests: 11 ha (4 stands) (*Quercus pubescens, Q.petraea, Q. canariensis)*

Pine forests: 20 ha (4 stands) (*Pinus pinea)*

Technical results

Before IFM

- Simplified structure centred in intermediate size classes (20 cm)
- Horizontal & vertical fuel continuity
- Low vigour shoots
- Low presence sporadic broadleaves

After IFM

- Reduction of 15-30% basal area
- More stratified structure
- Horizontal & vertical fuel discontinuities
- Higher proportion of sporadic broadleaves
- Shrub cover below 65%, only 1.3 m height

Economic study: IFM vs. BAU

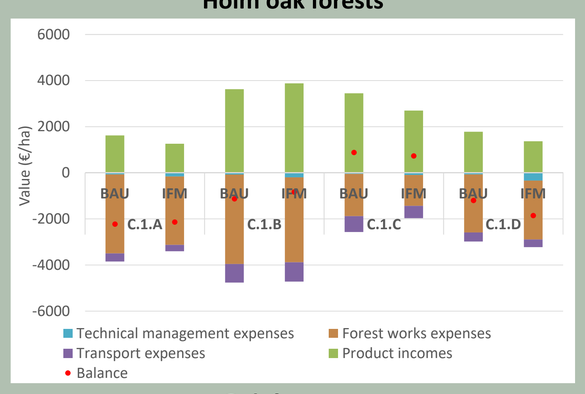
We compare IFM income and costs with those obtained with traditional forest management (*business as usual*, or BAU): intermediate harvesting intensity focused on fuelwood in a simplified coppice system.

This comparison is based on the study of dasometric variables and surveys to 43 workers and technicians involved in treatments implementation in 77 ha (25 stands, 10 estates, 4 municipalities, 6 companies)

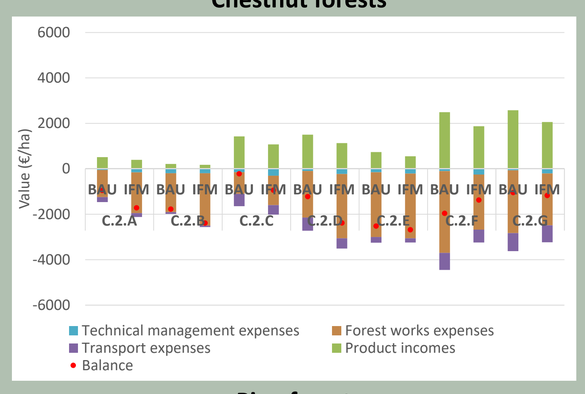
Economic results: IFM vs. BAU

We compare below the income and costs of BAU and IFM management, for each forest type. The different letters (A, B...) correspond to various stand conditions within each forest type.

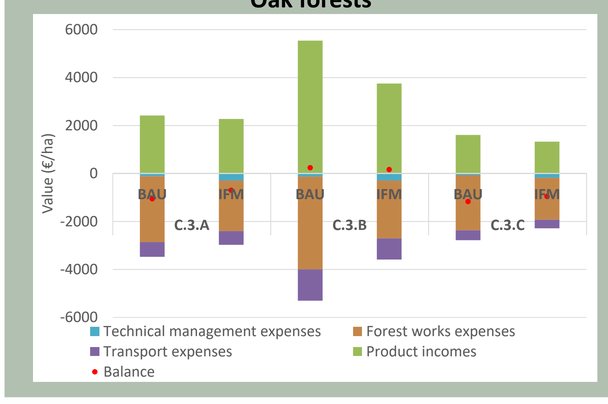
Holm oak forests



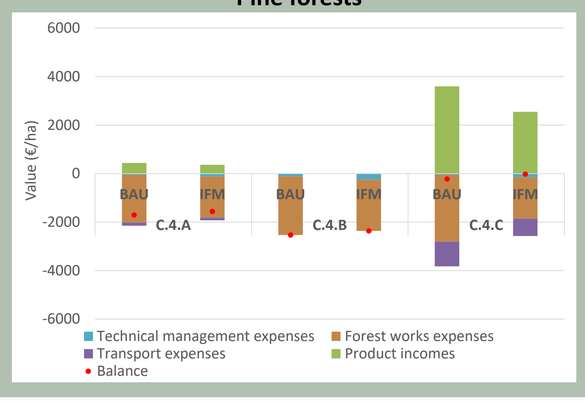
Chestnut forests



Oak forests



Pine forests



IFM vs. BAU - lessons learnt

	IFM	BAU
Forest products obtained	Diverse products	Mostly low-added value
	Lower volume	Higher volume
Technical management costs	Higher (marking, training)	Lower
Forest works costs	Similar (higher choose+classification cost)	Similar (higher felling cost)
Shrub clearing costs	Higher (selective)	Lower (sistematic;100% area)
Potential of added value products	High	Low

- IFM economic balance is more favourable when tree-oriented silviculture can be applied, with the extraction of codominant trees
- Chestnut stands economics are limited by the low value of chestnut products in our site

Conclusions

- IFM leads stands better adapted to climate change
- IFM management costs are not significantly higher than those of BAU
- The long-term economic sustainability of IFM should be increased with the generation of added-value products.

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