

Spain – Prades, Catalonia case study

Case study forest area: 2,460 ha

Ownership: 90% private and 10% public in the Prades mountain, 100% public in the Natural Site of National Interest

Forest goods and services:

Tourism, recreation, conservation, small scale forestry, mushroom picking

Special local conditions:

Large areas of the forest were coppiced for charcoal until the 1960s and now left unmanaged with high densities over 20,000 trees ha⁻¹.

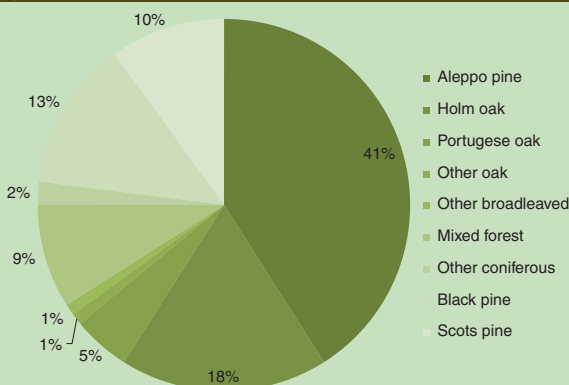
Stakeholders

Public forest managers, natural park management commission, cooperative of forest owners

Management and governance issues

Poblet Natural Site of National Interest (NSNI) is a protected natural area. The case study is situated within the NSNI. As in many other parts of the Mediterranean, forest management activities have been abandoned due to low profitability. Today, the main management motivation is to maintain forest health and forest regeneration. The conservation and management of the forest is executed by a professional team of forest managers of the regional government (Generalitat de Catalunya). Because it is a protected area, they are supported by a management commission of stakeholders and experts. There is a long tradition of forest research in the area, which has certain interaction and effect on the forest management.

Proportion of species of Prades

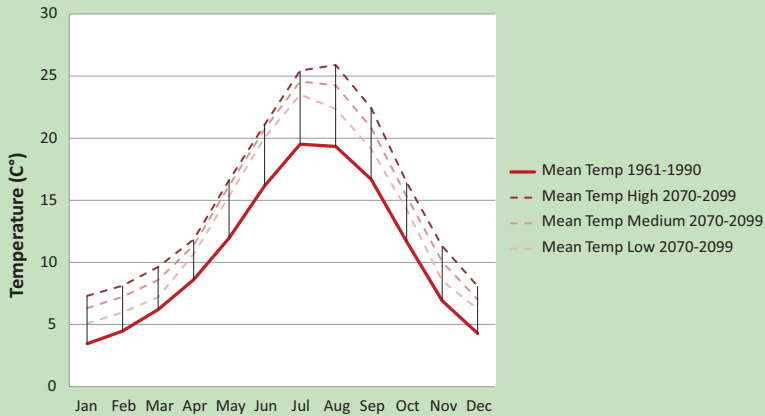




Climate change challenge

Climate change in the region is revealing itself by rapid increase in aridity, and more frequent extreme events such as droughts. Such changes will drastically impact forest dynamics and as well as biotic and abiotic risks (forest fires). The level of these impacts and the adaptive capacity of forest ecosystems will affect the provision of relevant forest ecosystem goods and services.

Mean Monthly Temperature



Mean Monthly Precipitation

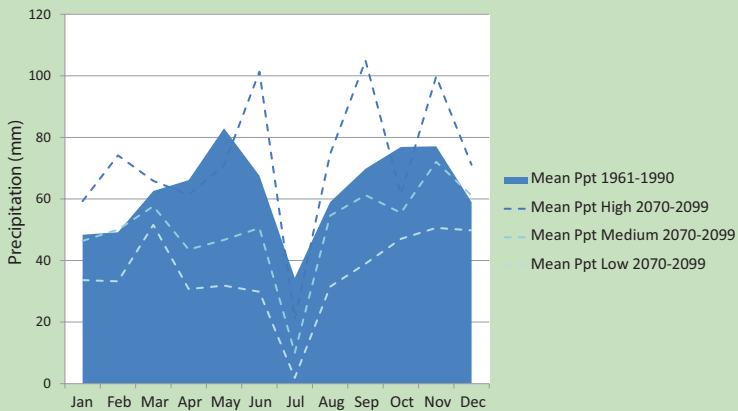




Photo: Michael Maroschek.

Even Mediterranean species can suffer carbon starvation due to dry spells, as they need to consume their mobile carbon reserves to overcome such periods. If too recurrent, mobile carbon reserves cannot be replenished in time, with vitality loss as a consequence. This may be the case for holm oak. EuroSiberian species like Scots pine, who find some of their southernmost distribution areas in these mountains are directly threatened by climate change. Scots pine has no possibility to migrate to higher elevations given that they occupy already the highest zone of this geographically isolated mountain.

Most tree species occurring in the area are typical Mediterranean tree species which are medium to extremely drought resistant. It means that they have low risk of cavitation due to drought.

The most relevant climate feature in Prades is the high variability in precipitation from month to month or year to year. Future projections show an increased probability of drought periods linked to this variability. The increased occurrence of long dry spells represent a serious threat to forests in the area.

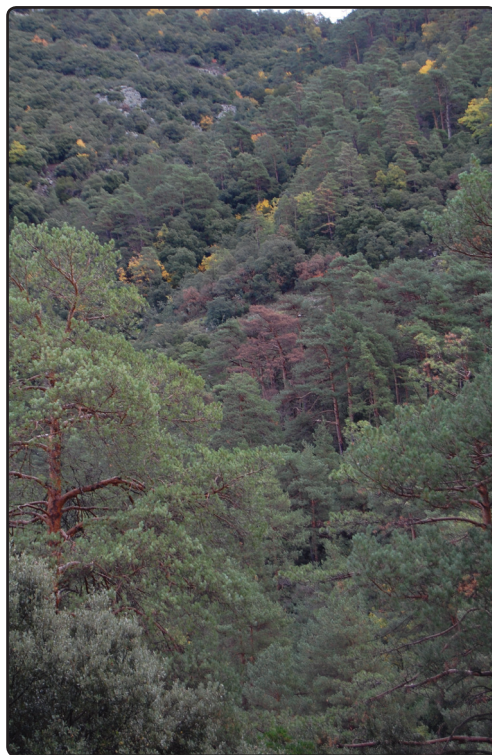


Photo: Joanne Fitzgerald.

Tree species like holm oak that were perfectly adapted to the area in former time show decrease in vitality and even mortality due to recent long drought periods, which probably causes carbon starvation in the trees. Other species that were already at the edge of their distribution range, like *Pinus sylvestris* increasingly suffer from dieback due to drought stress. The general risk profile of all species changes because of increased fire risk.

The circular area is a thinned plot in the forest. The photo below shows that several years later, the thinned plots withstood drought much better than unthinned plots.



Photos: Carlos Gracia.

Simulations show that under climate change the current low management intensity leads to a decrease in biomass production. The reason is that the high stand density under this management in combination with increased drought stress leads to increased competition and mortality.

In general, managers are recommended to follow a more intensive management which reduces canopy density. The effect of this is a decrease of competition between trees, which means more water available per tree, less mortality, and better overall growth performance.

Conclusion

The main limitation for adaptive forest management is the cost. Forest management operations are expensive, and income from the forest is very limited. Increasing wood prices would be beneficial, as would be increasing income from mushroom permits. In general, ways must be explored to finance adaptive management, considering the potential of payments for ecosystem services (PES) and other economic instruments to internalize forest ecosystem services and non-wood forest products.