Balancing fire risk precautions and income in forest management

**Reducing forest fire risk** within a tight budget can be successfully achieved, according to researchers. The study simulated the economic and fire risk effects of five management plans and found that a combination of removing low level trees and selective positioning of woodland produced the most economic and least destructive results.

**Low economic returns** on timber in Mediterranean forests and a high incidence of forest fire mean that forest managers can find themselves trapped in a difficult situation. Poor income from timber reduces resources for forest management, which in turn leads to higher risk of fire and even lower income from timber. There are several management techniques that can reduce fire risk, such as removing trees at the lower canopy levels to break the “fuel ladder”, making it difficult for fire to spread vertically. However, this technique is rarely profitable in slow-growing forests due to the cost of removing young trees. Selective thinning at different ages and levels produces a more constant flow of logs, but does not significantly improve fire resistance.

The study, conducted under the EU MOTIVE¹ project, investigated the best balance of income and fire risk management using a model to simulate the spread of fire in a forest-dominated landscape in Spain of 11,214 hectares. Five different strategies of forest management were considered:

1. Maximising income
2. Maximising income, while considering economic losses from fire
3. Maximising the proportion of surviving trees from fire without considering costs
4. Simultaneously maximising proportion of surviving trees and income, while considering economic losses from fire
5. Simultaneously maximising income, proportion of surviving trees and fuel-breaks (gaps in vegetation to halt fire spread), while considering economic losses from fire

The results indicated that forest managers who invest in fire reduction strategies as well as income maximisation strategies, stand to make the most profit overall, i.e. Plans 2, 4 and 5. Plan 1 used mainly selective felling to increase income, and produced the highest initial income of €7.23 million, for a 30 year planning period (2010-2050). However, it did not invest in fire risk protection and became more vulnerable to fire, so this income was reduced to just €1.01 million when losses from fire were considered and it was estimated that 2901 hectares would be burned during this period.

At the other extreme, the Plan 3 focused mainly on reducing fire risk and proposed mainly removing low-level trees in areas that were not always near roads. But this lead to high logging costs (due to transport) and produced a low income of €2.81 million. Although it was estimated that this plan would have the lowest burned area at 2445 hectares between 2010-2040, there was an overall economic loss of €2.58 million when the inevitable fire damage was considered.

Plans 2, 4 and 5 all aimed for a balance between fire risk and increasing income. Plans 2 and 5 proposed removing low-level trees and some selective felling. In both plans, most fellings were near roads, reducing harvesting costs. In addition, Plan 5 managed those areas most at risk of fire by ensuring fuel breaks between areas. Plans 2 and 5 had similar incomes at about €6.75 million (reduced to about €2.85 million when considering losses from fire). They also suffered a similar amount of burning between 2010-2040, at about 2690 hectares.

The additional fire risk management in Plan 5 had a greater effect in the long-term and from 2040 to 2050 it was expected to suffer a burned area of 665 hectares compared to 793 hectares for Plan 2. Plan 4 resulted in a moderately fire resistant landscape and an economically viable solution, with a net profit of €2.47 million once fire damage costs are taken into account. It relied mostly on removing low-level trees with a small amount of selective felling.

¹ MOTIVE (MÖdels for AdapTIVE forest Management) is supported by the European Commission under the Seventh Framework Programme. See: www.motive-project.net


Contact: jr.gonzalez@ctfc.es

Theme(s): Forests, Natural hazards