

The effect of pests and pathogens on forest harvesting regimes: a bioeconomic model

Ewan McTaggart

University of Strathclyde

Pests and diseases are an existential threat to trees and forests in woodlands. There is a pressing need to use ecological and bioeconomic models to inform forest managers on control and mitigation strategies. For example, the incidence of *Dothistroma* needle blight in the UK has increased rapidly since the 1990s, and it is a significant threat to the productivity of commercial forestry. Control of the disease in the UK primarily focuses on good stand management through thinning; similar practices are used in commercial forests worldwide. Forest managers would benefit from evidence of the effectiveness of different harvesting strategies to reduce disease impacts and increase the value extracted from timber in this context. In this talk, I will present a paper where we developed a bioeconomic model to find economically optimal harvesting regimes - in terms of thinning and rotation - of even-aged plantations under the risk of an invading pest. In our approach, forest managers decide whether and when to thin and must balance i) harvesting before infection destroys the timber's value and ii) exploiting the forest's density-dependent growth. We use a sensitivity analysis with respect to the disease spread and impact on the tree dynamics to demonstrate that, in the presence of disease, thinning can significantly improve economic outcomes if applied correctly. Our study provides a framework to help design appropriate forest management strategies in the presence of disease.