

Warwick J. S. Smith, Sarah A. Bekessy, Michelle Ward, Brendan A. Wintle, 2024, Dealing with the risk of fire in carbon sequestration strategies: Diverse forests or plantation monocultures? *Conservation Science and Practice*, 2024;e13201. <https://doi.org/10.1111/csp2.13201>.

Abstract Climate and land-use change pose unprecedented threats to ecosystems, economies, and communities worldwide. To help mitigate the climate crisis, restoration is a rapidly growing industry used to offset carbon emissions. The most common approach is to plant fast-growing monocultures with the aim of sequestering as much carbon as possible in the shortest time. However, there has been little economic analysis of planting options that explicitly address short and long-term ecological risks such as fire, disease, and environmental change. Here we develop a method for quantifying ecological risks from fire to sequestration investments and show how these risks can be factored into an analysis of long-term financial returns relative to opportunity costs. In the case study presented, we find that the apparent advantage of fast-growing monoculture plantations is likely to be outweighed by the long-term fire risks to the carbon stored in them. Our analytical framework provides a widely applicable approach to comparing planting options against each other and other land uses, considering key uncertainties. With climate change already manifesting through extreme weather events, rising sea levels, and shifting wildlife populations, our framework can be used to make informed decisions about the best solutions to increase carbon sequestration, reduce ecological risks, and reduce climate impacts with greater certainty.

From the text:

“This paper illustrates how investment decisions may be influenced when the inherent fire risks facing carbon biosequestration projects are taken into account. We do this by including indicative estimates of fire costs (FC) and by utilizing info-gap uncertainty analysis (Ben-Haim, 2010) to examine; (i) how robust published assumptions about sequestration rates are to uncertainty, and (ii) how consideration of uncertainty in carbon investment decisions may prompt a switch in investment strategy from planting monocultures to planting biodiverse forests.” (pp.2–3)

Keywords biodiversity conservation, biosequestration, carbon price, carbon sequestration, climate change, ecosystem services, forestry, info-gap, risk analysis, uncertainty