

Identification of potential areas to introduce agroforestry systems as a practice to mitigate wildfires risk in Europe

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Abstract

In recent years, the frequency and intensity of wildfires have increased due to climate change, land-use changes, and other factors. Agroforestry systems have been identified as a potential solution to reduce the risk of wildfires while promoting environmental sustainability. Agroforestry is a land-use system that combines trees and crops or livestock on the same land, providing multiple benefits such as soil conservation, biodiversity conservation, and carbon sequestration. The aim of this analysis is to identify potential areas in Europe where the introduction of agroforestry systems can reduce the risk of wildfires while providing environmental benefits and increasing resilience to climate change. The selection of these target areas is based on a spatial approach which consists of four steps: selection of suitable potential areas from the total agricultural area in Europe, excluding nature conservation sites; analysis of environmental risks in the potential areas; evaluation of woody landscape features in the areas under risk and, finally, definition of target areas. The total agricultural area for the EU-27, the United Kingdom and Switzerland was 1,725,041 km². Land use categories included croplands (61.8%), permanent crops (6.1%), pastures and natural grasslands (32.1%). Once nature conservation sites were subtracted from the total agricultural area, potential areas for introducing agroforestry systems amounted to a total of 1,539,185 km². A total of 11 environmental indicators were used to determine risks related to soils, biodiversity, water, and climate change. Datasets of these indicators were gathered from cartographic products developed at European or national scales. In order to evaluate the effects of those risks, threshold values were defined for each indicator, identifying the limits above or below which sustainability is compromised in potential areas. After combining the environmental indicators, heat maps were produced to highlight the intensity of environmental risks. Data were analyzed considering the different biogeographical regions present in Europe: Alpine, Atlantic, Black Sea, Boreal, Continental, Mediterranean, Pannonian and Steppe. Areas with a high concentration of risks were determined as target areas to introduce agroforestry systems. In conclusion, the

identification of potential areas to introduce agroforestry systems as a practice to reduce wildfires risk in Europe is a crucial step towards promoting environmental sustainability and reducing the risk of wildfires. The spatial approach used in this analysis provides a useful tool for policymakers, land managers, and other stakeholders to identify areas where agroforestry can be implemented as a sustainable land use option.

Keywords: land use dynamics, agroforestry systems, risks, Europe

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