

The evaluation of forest crop damages due to climate change.

An application of the Dempster-Shafer method

Prof. Iacopo Bernetti*, Dott. Claudio Fagarazzi**, Dott. Christian Ciampi*, Dott. Sandro Sacchelli*

(*) *Department of Agriculture and Land Economics – University of Florence, P.le delle Cascine 18, 50144 Florence, Italy*

(**) *Department of Urban and Country Planning – University of Florence, via Micheli 2, 50121 Florence, Italy*

Abstract. In order to assess climate change risk of damage in forestry areas, Dempster-Shafer theory of evidence and fuzzy measures were applied to develop a framework for the assessment of economic forest damage. Following the definition of risk supported by the Intergovernmental Panel on Climate Change risk, it has been defined a function of hazard and vulnerability/resilience lines of evidence. The results of the hazard and vulnerability assessment were used to develop an economic framework based on Faustmann studies. The model of analysis has been implemented through a spatial analysis procedure applied to raster maps. Faustmann method has been implemented together with the maps of the hazard and of the vulnerability/resilience degree, in order to quantify in monetary terms two possible costs to be supported: the first one expressed as the expected damage to the forest crop on the basis of the current timber assortments obtained and the second one referred to the possible expenses to be supported in order to mitigate the risk. The framework was then tested on Tuscany forestry crops.

Keywords: Dempster-Shafer theory of evidence; Climate change; Forestry; Fuzzy sets; Spatial analysis; Risk.