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## Flood impacts on Agriculture: The case study of Nonantola 2020 Flood event.

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Globally, about a third of all losses related to natural hazards are due to flooding. Many studies focused their attention on the estimation of flood damages to buildings and infrastructures. However, floods cause significant losses to the agricultural sector too and negatively affect rural economies due to their impacts on agricultural productivity.

Several tools to quantify flooding economic impacts on the agricultural sector have been proposed, such as the AGRIDE-c conceptual model, and the Joint Research Centre (JRC) depth-damage functions. However, the tools have rarely been validated against data collected from surveys.

The aim of this study is the comparison between the flood economic impacts on agriculture computed using both AGRIDE-c and the JRC tool and the ones retrieved from surveys.

A questionnaire for estimating flood economic impacts on agriculture was prepared and submitted to farmers shortly after the flooding event. The selected case study area was the town of Nonantola (near the city of Modena, Northern Italy), where a flooding event occurred on 6<sup>th</sup> December 2020. The flood was caused by the collapse of about 80m levee portion along the right bank of Panaro River resulting in an inundated area around 2000 hectares. The flood involved the Nonantola town where residential buildings and an active industrial area are located, although the dominant land use is agricultural land. The main local crops are represented by forage, wheat, vineyards, fruits (pears and plums) and sugar beet.

The questionnaire is divided into four main sections: The first section is related to the generic information on the farm, the second section to the data on the inundation and damage to crops, the third section to the information on past flood events and risk mitigation strategies eventually adopted during past and present events, the fourth section data to the insurance coverage.

Two existing crop damage models (AGRIDE-c and the JRC) were calibrated using three types of data: crop yields, crop selling prices and crop cost of production. Crop yields were obtained from the Italian National Statistical Institute (ISTAT), crop selling prices and costs of production were instead available from official sources such as ISMEA and Coldiretti (Italian association of farmers).

Finally, the proposed approach will allow the comparison between the damages experienced by farmers evaluated from questionnaires and the damages estimated by the two models in order to evaluate how the models simulate data directly collected from the field surveys.