Flood damage modeling based on expert knowledge: Insights from French damage model for agricultural sector

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In France, since 2011, it is mandatory for local communities to conduct cost-benefit analysis (CBA) of their flood management projects, to make them eligible for financial support from the State. Meanwhile, as a support, the French Ministry in charge of Environment proposed a methodology to fulfill CBA. Like for many other countries, this methodology is based on the estimation of flood damage. Howerver, existing models to estimate flood damage were judged not convenient for a national-wide use. As a consequence, the French Ministry in charge of Environment launched studies to develop damage models for different sectors, such as: residential sector, public infrastructures, agricultural sector, and commercial and industrial sector. In this presentation, we aim at presenting and discussing methodological choices of those damage models. They all share the same principle: no sufficient data from past events were available to build damage models on a statistical analysis, so modeling was based on expert knowledge.

We will focus on the model built for agricultural activities and more precisely for agricultural lands. This model was based on feedback from 30 agricultural experts who experienced floods in their geographical areas. They were selected to have a representative experience of crops and flood conditions in France. The model is composed of: (i) damaging functions, which reveal physiological vulnerability of crops, (ii) action functions, which correspond to farmers' decision rules for carrying on crops after a flood, and (iii) economic agricultural data, which correspond to featured characteristics of crops in the geographical area where the flood management project studied takes place. The two first components are generic and the third one is specific to the area studied. It is, thus, possible to produce flood damage functions adapted to different agronomic and geographical contexts. In the end, the model was applied to obtain a pool of damage functions giving damage in euros by hectare for 14 agricultural lands categories.

As a conclusion, we will discuss the validation step of the model. Although the model was validated by experts, we analyse how it could gain insight from comparison with past events.