



## **Economic assessment of individual flood damage mitigation measures**

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Individual flood damage mitigation measures are implemented at the building level and aimed at reducing its vulnerability to floods. Slot-in barriers and the use of water resistant materials for the floors, walls, ceilings, or openings are examples of such measures. Residents of flood-prone areas are often incited to implement these kind of measures. For instance, in France, zoning policies can demand water-resistant material to be used for building components that are below a defined level. However, the economic efficiency of such measures is not well-known.

Hence, we numerically modelled their implementation in different types of dwellings: a single-storey house, a two-storey house, and an apartment. We then used a computer tool which can build the flood damage function of a dwelling by aggregating the elementary damage functions of its components to assess the efficacy of the measures to reduce economic damage. The efficacy of a measure is defined as the difference between the damage functions obtained with and without the measure. We also estimated the cost of each measure, which depends on the geometry of the dwelling and sometimes on the implementation context (prevention or repair). Eventually, we evaluated their maximum efficiency in order to identify the conditions in which they are never efficient. These analyses were conducted for several packages of measures: one comprises all the measures that have to be implemented to prevent the water from coming into the dwelling up to a certain water level (50~cm or 100~cm), the others consist of measures that require adapting the materials used for different components of the building (the floors, the ceilings, the openings, the walls, or all of the aforementioned elements).

We found that the maximum efficiency of the packages that require adapting the building materials depends mostly on the materials that are originally present, and not much on the type of dwelling considered. These packages of measures are never economically efficient when they are not implemented to repair components that were destroyed. Our results also suggest that the measures implemented to prevent the water from coming into a dwelling are never efficient for dwellings that are exposed to floods with a return period greater than a hundred years.