

Probabilistic Flood Maps to support decision-making: Mapping the Value of Information

Abstract

Floods are one of the most frequent and disruptive natural hazards that affect man. Annually, significant flood damage is documented worldwide. Flood mapping is a common preimpact flood hazard mitigation measure, for which advanced methods and tools (such as flood inundation models) are used to estimate potential flood extent maps that are used in spatial planning. However, these tools are affected, largely to an unknown degree, by both epistemic and aleatory uncertainty. Over the past few years, advances in uncertainty analysis with respect to flood inundation modeling show that it is appropriate to adopt Probabilistic Flood Maps (PFM) to account for uncertainty. However, the following question arises; how can probabilistic flood hazard information be incorporated into spatial planning? Thus, a consistent framework to incorporate PFMs into the decision-making is required. In this paper, a novel methodology based on Decision-Making under Uncertainty theories, in particular Value of Information (VOI) is proposed. Specifically, the methodology entails the use of a PFM to generate a VOI map, which highlights floodplain locations where additional information is valuable with respect to available floodplain management actions and their potential consequences. The methodology is illustrated with a simplified example and also applied to a real case study in the South of France, where a VOI map is analyzed on the basis of historical land use change decisions over a period of 26 years. Results show that uncertain flood hazard information encapsulated in PFMs can aid decision-making in floodplain planning.

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