# Resource allocation planning for natural disaster mitigation. A multistage stochastic model with endogenous uncertainty


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A preparedness resource allocation model and an algorithmic approach is presented for a three-stage stochastic problem to manage natural disaster's mitigation. That preparedness consists of warehouse location and capacity assignment as well as commodities' procurement on one side and refurnishing the rescue network infrastructure on the other side. The exogenous uncertainty is due to the lack of full knowledge about the probability and intensity of the disaster for each focal point in a given network. The endogenous uncertainty is based on the decision-maker's investment for getting a better accuracy on the disaster's occurrence and the one for reinforcing the network infrastructure. A stochastic mixed 0-1 bilinear model is presented. Additionally, a expected conditional stochastic dominance (ECSD)-based risk averse measure for a set of profiles on a multifunction setting is presented. It is proven that ECSD belongs the set of time-consistent Expected Conditional Risk Averse Measures introduced in [3], among others. Both types of elements imply large-sized dimensions of the problem, see [1]. So, two decomposition algorithms are considered: a specialization of the recently introduced Cluster Progressive Hedging algorithm for getting strong lower bounds and feasible solutions, see [2], as well as our new matheuristic so-called Cluster Dual Descent Algorithm for getting feasible solutions. Computational results are reported for a well-known real-life pilot case by comparing the performance of the models based on the alternatives given by the risk neutral and risk averse versions jointly with the exogenous and endogenous types of uncertainty for a MIP solver plain use and the chosen decomposition algorithms.


## References


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