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How to reach a compromise solution on technical and non-structural flood control measures

P. Kovář, M. Pelikán, D. Heřmanovská, I. Vrana

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Harmful impacts of floods are the result of an interaction between extreme hydrological events and environmental, social, and economic processes. Flood management should consider many diverse aspects and influences and an integrated approach to flood management therefore plays an important role. In order to make an analysis and provide an adequate flood management, it is necessary to bring together a team comprising experts e.g. from the fields of hydrology and water resources, nature protection, risk management, human security, municipal administration, economics, and land use. Estimates by experts can serve finding solutions to given YES/NO problems, and estimating the value of specific attributes or parameters. It is not easy to adopt the solution which represents the best possible agreement among the participating experts, since experts and other participants can represent diverse standpoints. In particular, landowners and leaseholders upstream a catchment are often in a different position than the members of the municipal flood control committee downstream in a city with a high inhabitancy. In order to measure and evaluate the level of agreement between experts and landowners, a newly developed method for assessing the level of agreement and the τ -agreement value was applied. The aim of the present paper is to illustrate the use of a fuzzy-group-agreement decision-making procedure of this kind, involving a broad range of standpoints in a case study of the Zdravá Voda catchment, Žarošice, Czech Republic. This illustration has been made by comparison of hydrological model scenarios with the experts' decision. The method used in the paper applied towards aggregating expert proposals expressed as fuzzy quantities to propose a binary solution to estimate a decisive parameter numerical value. The decision achieved for the Zdravá Voda catchment was that the efficiency of structural measures (polder) was superior over the non-structural measures (replacement of the arable land by grassland).

Keywords:

agreement; averaging operator; consensus; environmental decision making; flood risk management; fuzzy uncertainty; multi-aspect decision

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