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Handling uncertainties in planning of retention facilities

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Effectiveness of technical flood control measures depends strongly on multivariate characteristics of flood events. Under consideration of remaining risks, flood hydrology becomes more important for the planning process. Critical situations which result from interactions of hydrological conditions with the limited load-bearing capacities of flood control facilities have to be identified and specified by probabilities. Especially the planning process of flood retention systems becomes more complex. For extensions of flood control systems the risks of failures of existing structures have to be analysed and combined with assessments of the effectiveness of new components. Often scenarios are applied for this purpose. Such scenarios can be derived easily from simulations with coupled meteorological and hydrological models. However the probabilities of failures have to be estimated also. As multiple flood characteristics have to be considered, multivariate statistics is needed to characterise critical loads. However the result will be biased by many uncertainties. With regard to these "known unknowns" the bias of simulated scenarios can be considered by imprecise probabilities. Their application in a Multi Criteria Decision Making framework which was developed for flood retention planning in a large river basin in Germany is demonstrated here with a case study.