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Limits to apply new scientific tools for flood design in practice

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Flood risk management became one of the focusing points of water policy in many countries. Any risk assessment has to be based on the assumption of hazards and their resulting consequences. Since more than 100 years, we apply the probabilistic concept of return period to specify the probability of floods. In the last two decades, our statistical tools were refined and reached a stage where it becomes more and more difficult to explain decision makers the results of their applications. Another problematic aspect of the large variety of new methodological developments consists in the need to make a choice between the results. Scientists stand here between two poles, at one side the risk-aversion of affected people and at the other side the economic pressure of decision makers to avoid expenditures with uncertain returns. Each extreme flood is a turning point in public discussions, where the society demands an improved flood protection to avoid similar harmful consequences in future. New flood protection systems are build and new design floods are needed. At the same time, such events are a challenge for science as it forces us to review our assumptions and draw new conclusions. Some of the problems of such new experience are old, e.g. the handling of outliers. Extreme events are changing the flood statistics, but often only temporarily. Some aspects of robustness in flood statistics will be discussed here. But we are challenged also by the need for a more holistic view. Risk management does not longer demand to specify a single design flood at one side of interest. Flood risk management claims now a holistic view on the whole flooding systems in an integrated way that accounts for all of the potential interventions that may alter flood risk. The effectivity (and efficiency) of these interventions depend strongly on the flood processes which are considered or neglected. It has to consider the different modes of failures as well expected and unexpected changes of the flood conditions. Often the holistic view on interventions into flooding systems does not exists and if it is provided, the practitioners cannot handled the large variety of possible results of their planning decisions. To solve these problems, the state of science has to be transferred into the state of technics. As this is difficult to reach for individuals IAHS is asked to play a prominent role in this process.