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ABSTRACT

Objectives

Climate changes are now recognized as one of the main issue of the societies and are expected to bring disturbances in many fields including floods. However, as future is unknown, and climate models projections still own a wide range of uncertainties, adaptation measures are confronted to large uncertainties, that can lead decision-makers to inaction due to the high risk to mistake when designing. Furthermore, adaptation measures usually yield from deterministic, or top-down climate change impact studies, which restricts them to only few potential climate scenarios. The position of this study is to follow an alternative approach to assess the potential impacts of climate change on floods in the Ourthe catchment, Belgium. Grelier et al (2016) elaborated a transfer function method to assess long-term climate risk from mesoscale atmospheric circulation using a paleoclimate reconstruction and many climate models projections. They produced more than 2000 monthly anomalies with which they perturbed a baseline series to run a hydrological model. Based on these results we propose to use the hydraulic modelling to assess the impact of climate change on floods.

Methods

In a first step, a statistical sampling aims at selecting climate change reference scenarios (and corresponding hydrological scenarios) considered as representative of different atmospheric conditions. A 1D bin hydraulic model is calibrated and used to simulate the hydrological scenarios (of 30 years each) on a reach of the Ourthe river in order to detect sequences of overflowing at each bin. Two parameters have been retained: the first discharge and the duration of the overflowing sequences, which are then examined via a frequency analysis procedure to assess the impacts of climate change on floods.

Finally, a simple planning measure is tested with the hydraulic model: implementation of hedge in the flood plain. Results will provide information of the flood resilient nature of such a “soft” measure.

Conclusions

To summarize, our approach can contribute to consider the unexpected in the flood assessment and management: as climate change uncertainties still remains large, the resilience concept represents a promising way to better consider the potential climate change impacts on flood risk. Our work fits into this frame of resilience and besides testing a simple river planning measure, it may serve for example the elaboration of climate security margins or impulse the integration of a climate change component in the flood risk management documents and plans.

REFERENCES

Grelier B., Drogue G., Pirotton M. and Archambeau P. (2016). An alternate approach for assessing impacts of climate change on water resources: combining hazard likelihood and catchment sensitivity. Presented at 4th IAHR Europe congress, Liège Belgium, 2016. London, UK: CRC Press/Balkema.