



# Estimating Flood Risk under Global Warming: An Approach from the Insurance Industry

Giulia Giani - 26<sup>th</sup> April 2024



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# Catastrophe modelling for insurance purposes

**Catastrophe modelling** is the process of using computer-assisted calculations to **estimate the losses** that could be sustained **due to a catastrophic event** such as a flood event.



- Our job is to evaluate the models and assess if they capture reasonably well hazard, vulnerability and losses.
- We often work with third-party models and we **don't have full access to all the details**.

## Frequent questions from clients on climate change

### Hazard

Stochastic  
precipitation/  
temperature



Hydrological  
modelling



Hydraulic  
modelling

### Near future

**Q:** Are models capturing the current climate change signals?

**A:** We analyse forcing data and we check if climate change trends are taken into account

### Regulatory requirements

**Q:** How would losses change under different scenarios and for different time horizons?

**A:** We produce a view of future losses by altering the hazard

We **focus on the hazard component** even though exposure and vulnerability of the portfolio might also change in the future.

# Climate Change Model adjustments

## Addressing regulatory requirements



### Challenges

- Often **regulatory requirements** are region specific and **do not correspond to the scenarios available from academic output**
- We **can't change the model forcing data** in the third-party models
- We **don't have the hazard intensity or return period for each event** in the stochastic catalogue for the current scenario



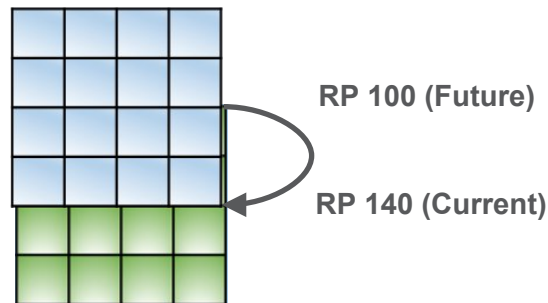
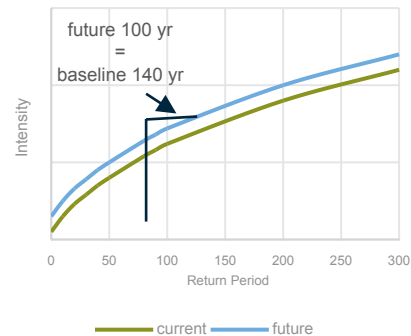
### Assumptions

- We find the academic output which best match the regulatory requirement scenarios
- We adjust the current hazard by increasing/decreasing the frequency of the events
- We assume that the return period of the loss is equal to the return period of the hazard

# How ISIMIP output are used to adjust flood catastrophe models

## The example of Aqueduct maps

1. For a given emission scenario and time horizon, estimate hazard return period shifts at catchment level from the maps
2. For each event compute the future return period as a function of different return period shifts in different catchments impacted
3. Add/remove events to match the future rate



Return period shift at catchment level is a valuable and practical output to build our climate change conditioned view of the losses.

# Gallagher Research Centre and collaborations with academic partners

## New project: Global climate change conditioning of flood catastrophe models

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- ✓ Multi-year research programmes with leading institutions
- ✓ Supporting **all** insurance products
- ✓ Client access to the latest research & innovation
- ✓ Collaborate across our global eco-system of research partners
- ✓ Independent peer review



### Research support:

- ✓ PhD
- ✓ Postdoctoral
- ✓ MSc
- ✓ Consultancy

Thank you!  
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