Flood exposure and vulnerability estimation methods for residential and commercial assets in Europe

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https://saferplaces.co/

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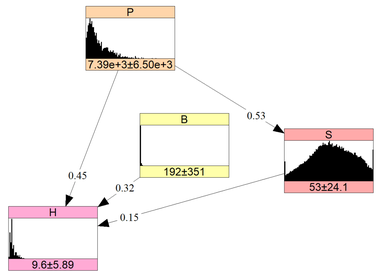
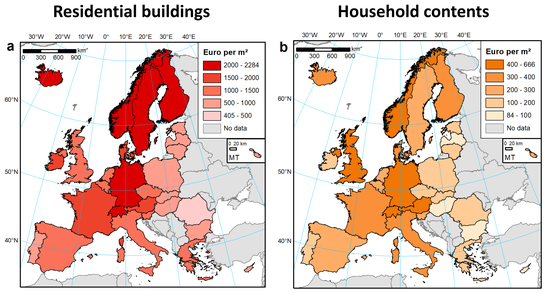
Residential sector

Exposure



- A model for estimating residential building height.
- It is a basis of obtaining useful floor space area, which is then used to estimate exposure.

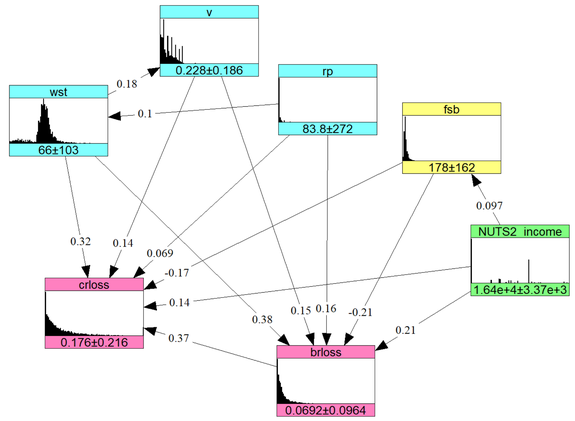
Standard exposure values per floor space area



Published paper: https://doi.org/10.5194/nhess-20-323-2020
Dataset: http://doi.org/10.5880/GFZ.4.4.2020.003

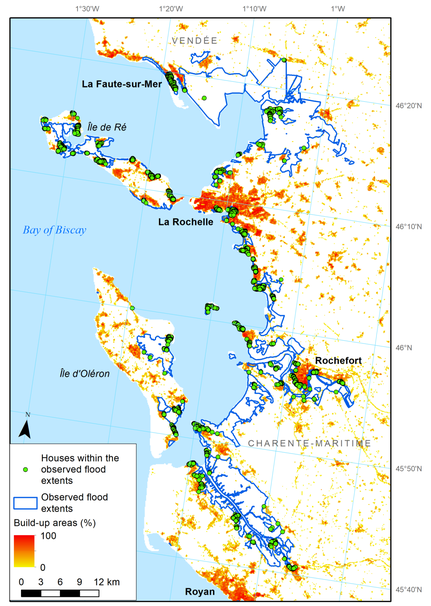
Vulnerability

- A Bayesian Network (BN)-based damage model based on post-disaster surveys from Germany, the Netherlands and Italy.
- Separate estimates for building structure (brloss) and contents (crloss)
- Five predictors: water depth (wst), velocity (v), return period (rp), floor space area of building (fsb), regional income level (NUTS2_income)

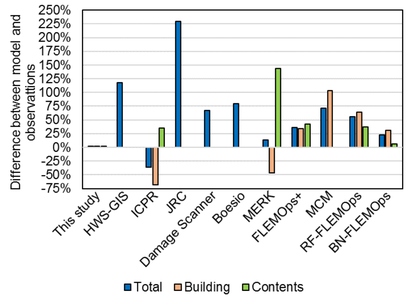


Damages

- Validated for case study of 2010 coastal flood in France (Xynthia)



- Compared with 10 alternative models.



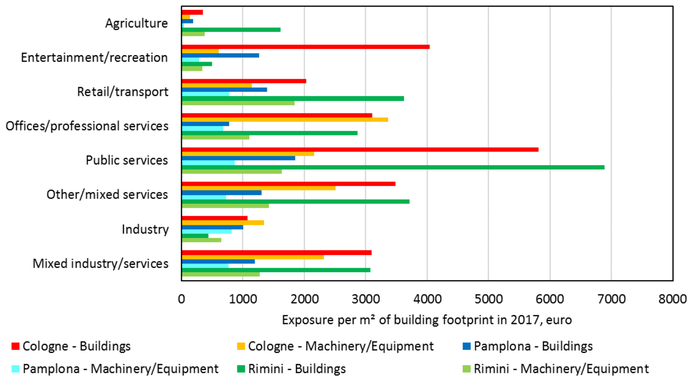
- Using our exposure estimates for both sectors resulted in better performance of most flood models than JRC exposure estimates

Commercial sector

Exposure

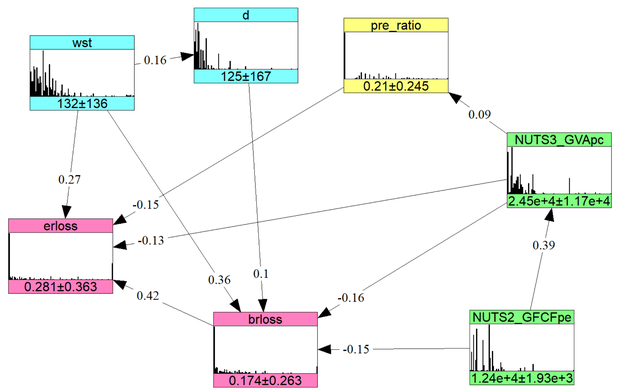
- Commercial assets in the country by sector are disaggregated by regional gross value added and footprint area of buildings with a particular function (based on OpenStreetMap)

Commercial exposure in SaferPlaces case studies



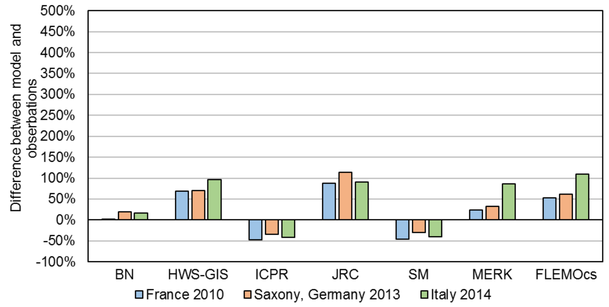
Vulnerability

- A BN-based damage model based on post-disaster surveys from Germany
- Separate estimates for building structure (brloss) and equipment/machinery (erloss)
- Five predictors: water depth (wst), inundation duration (d), precationary measures index (pre_ratio), regional GVA per capita (NUTS3_GVApc), regional GFCF per employee (NUTS2_GFCFpe)



Damages

- Validated for three case studies of past floods in France, Saxony (Germany) and Italy
- Compared with six alternative models.



- **Damage modeling and validation for both sectors for SaferPlaces case studies: Cologne, Pamplona & Rimini is in progress**

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