

Questions?
Please see
Calum Baugh
in Gather.Town

Combining pan-European flood hazard forecasts with exposure information to enhance local decision making

Eleanor Hansford*, Calum Baugh, Christel Prudhomme

ECMWF, Forecast Department, Evaluation Section, Reading, United Kingdom (*eleanor.hansford@ecmwf.int)

TAMIR = “Advanced Tools for pro-Active Management of Impacts and Risks Induced by Convective Weather, Heavy Rain and Flash floods in Europe”

1. Introduction

The aim of the TAMIR project is to improve flash flood hazard forecasting over Europe, to support pro-active emergency management through providing improved forecasts with lead times from 0 to 120 hours.

This is being achieved through building on the work in the forerunning SMUFF project*. Alongside improving the flood hazard thresholds and newly accounting for the type of precipitation (i.e. rain or snow), a key part of this is upgrading the static exposure datasets that are combined with the flood hazard forecasts in a risk matrix to indicate areas most at risk.

2. Determining constituent exposure categories

Prior to TAMIR, only population data was considered when determining the level of exposure to flash flooding. In TAMIR, it is essential that the additional elements of exposure incorporated are suited to the needs of the end users.

Therefore, end users were asked a series of open-ended and ranked questions during a dedicated end-user workshop hosted in October 2020:

- For what purpose(s) would you use a flood impact product?
- What exposure data should be considered?
- At what spatial scale and temporal resolution would you like to see the product?

The results of these were summarised:

Table 7. Summary of answers for question 2: What exposure/vulnerability data should be considered? (ranked by rating)

Answer	Rating	Votes
Transport Infrastructure:	4.6	13
-Road		
-Rail		
-Bridges		
Infrastructure:	4.5	19
-Private sector		
-Critical infrastructure (e.g. education, health)		
-Energy		
-Housing		
-Sub-surface		
Population:	4.5	15
-Structure		
-Density (e.g. cities, towns, sprawling villages)		

and used to identify 5 high-priority exposure categories:

Population	Health Facilities	Energy Infrastructure	Transport Infrastructure	Educational Institutions

3. Exposure layer creation

Category	Source(s)
Population	Global Human Settlement Layer
Health Facilities	JRC via OpenStreetMap
Educational Institutions	JRC via OpenStreetMap
Energy Infrastructure	HARCI-EU & JRC
Transport Infrastructure	HARCI-EU, JRC & ECWMF

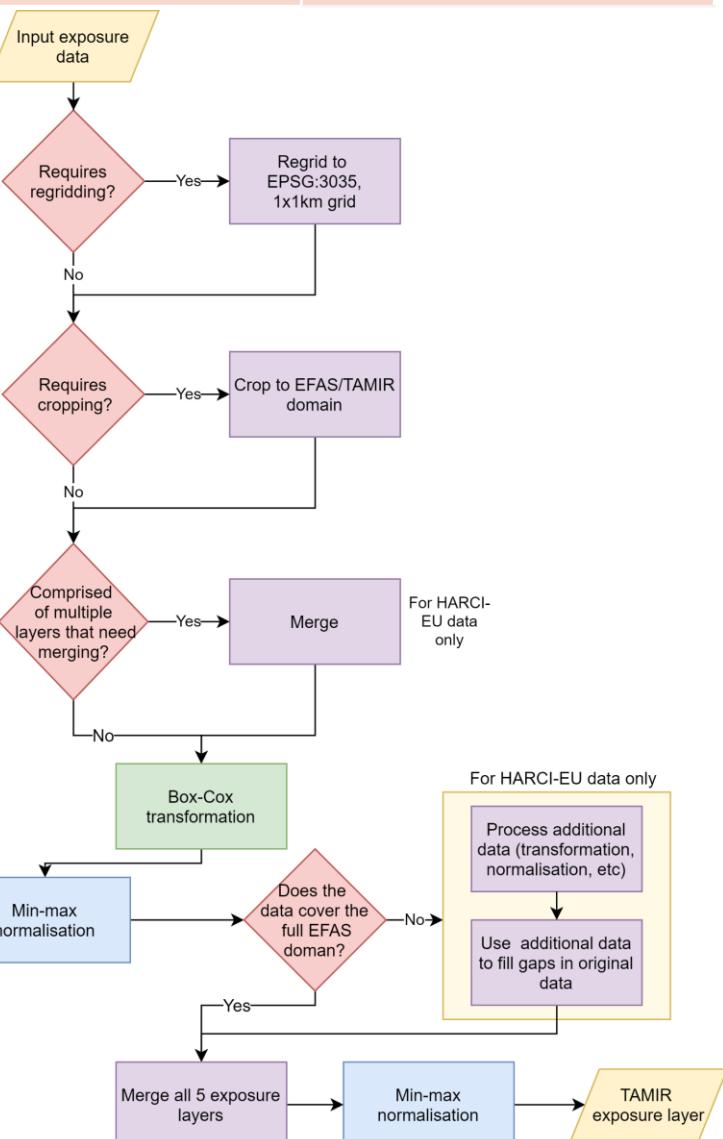


Figure 1: The workflow used to create the TAMIR exposure layer. It follows the usual steps to create vulnerability and exposure data, including those such as transformation (here in the form of a Box-Cox), normalisation, aggregation, and weighting.

4. Risk matrix

For the resulting exposure layer, thresholds were defined to provide 3 levels of severity for the risk matrix. This intersects with the flash flood hazard probability on the Y axis, to give four possible risk categories.

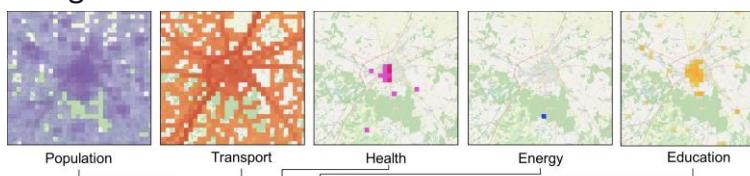
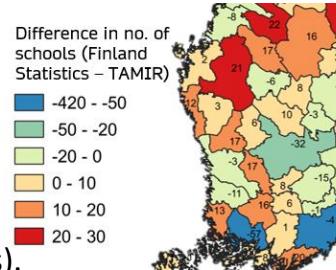


Figure 2: The merging of each exposure category into the final layer

Flash flood hazard forecasts	Low Exposure	Medium Exposure	High Exposure
	High Likelihood		
	Medium Likelihood		
	Low Likelihood		

5. Comparison with an exposure layer made with national data

By creating an exposure layer using the same workflow but with national level data, it is possible to compare it against the TAMIR layer both for overall exposure and individual categories. For this, Finland was chosen.



Ongoing evaluation of the findings will help determine whether it is necessary to experiment with applying a form of correction to any of the constituent (final) layer(s).

6. Next steps

- Look to assimilate national/regional exposure data
- Start incorporating key vulnerability indicators if available on a pan-European scale