

Flood Emergencies in Catalonia

Ramon Toldrà
Generalitat de Catalunya

Types of floods: flash floods

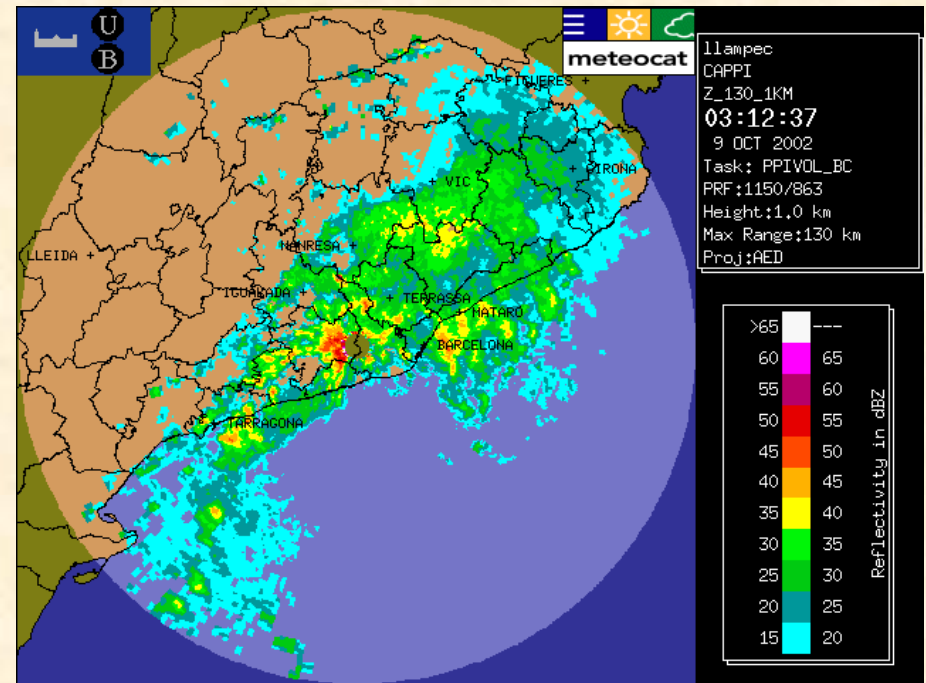
- Mediterranean coast and Pyrenees.
- Aggravated by a deficient urban spatial planning, mainly in the mid XX century.



Premià de Mar, on the coast, after heavy rain

Types of floods: flash floods

- Caused by heavy rain, falling in a short time over steep terrain
- Ephemeral water courses and torrents (Cat: *rambles, rieres*)
- When? All year, but most probable in autumn



Other types of floods

- “Slow” flooding in the main river basins: Ebre, Ter, Llobregat...
 - To some extent controlled by dams
- Floods in coastal areas
 - Caused by sea storms, high pressure phenomena
 - Low frequency events
- Breakdown of dams
 - No significant accidents so far!

Emergency planning

- The state government provides planning **guidelines**, but the actual planning is made by the regional governments
- Planning at regional level
 - Catalonia: **INUNCAT** [INUNdació = flood] + CATalunya
 - All **municipalities** with very high, high and medium risk must have as well an emergency plan
- Plans include risk mapping, organization and response.

Risk mapping: hazard



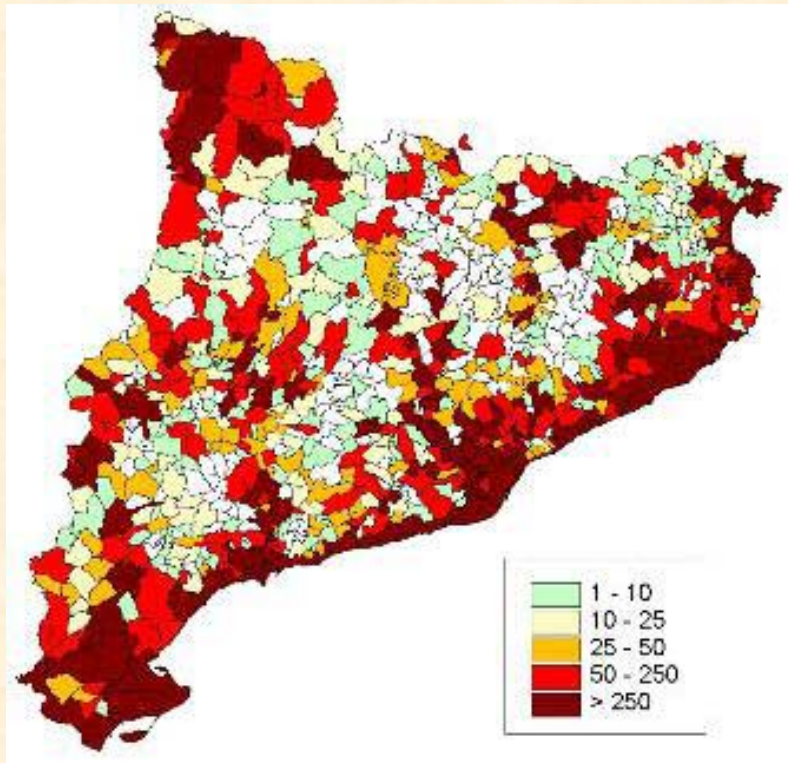
Shaded:
Areas with potential
significant flood risk

<http://aca-web.gencat.cat/aca>

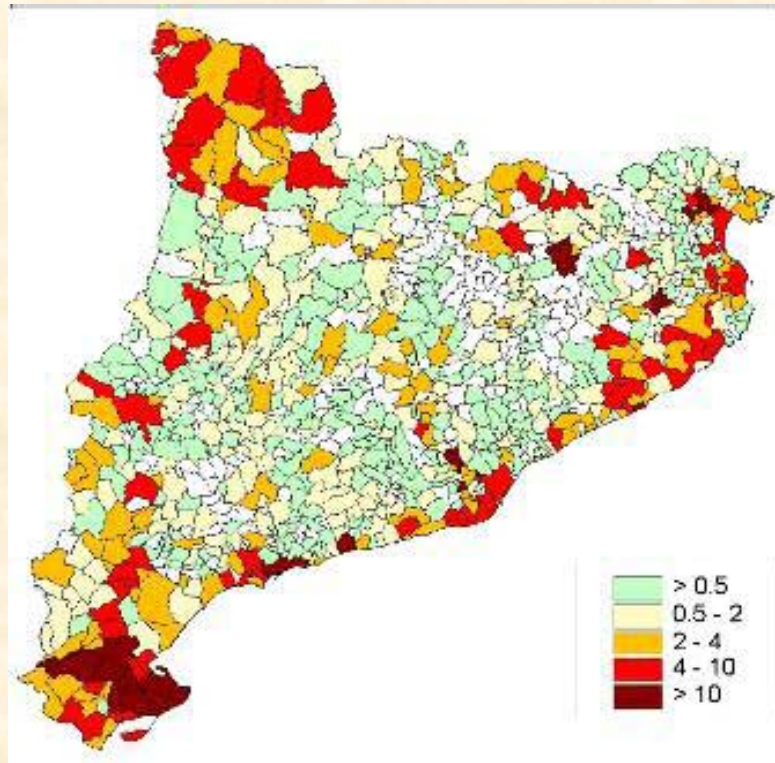
Terrassa

Risk mapping: people

People living in areas with potential significant flood risk



Risk mapping: roads



Length of roads that
can be potentially
flooded (water deeper
than 0.3 m)

in km

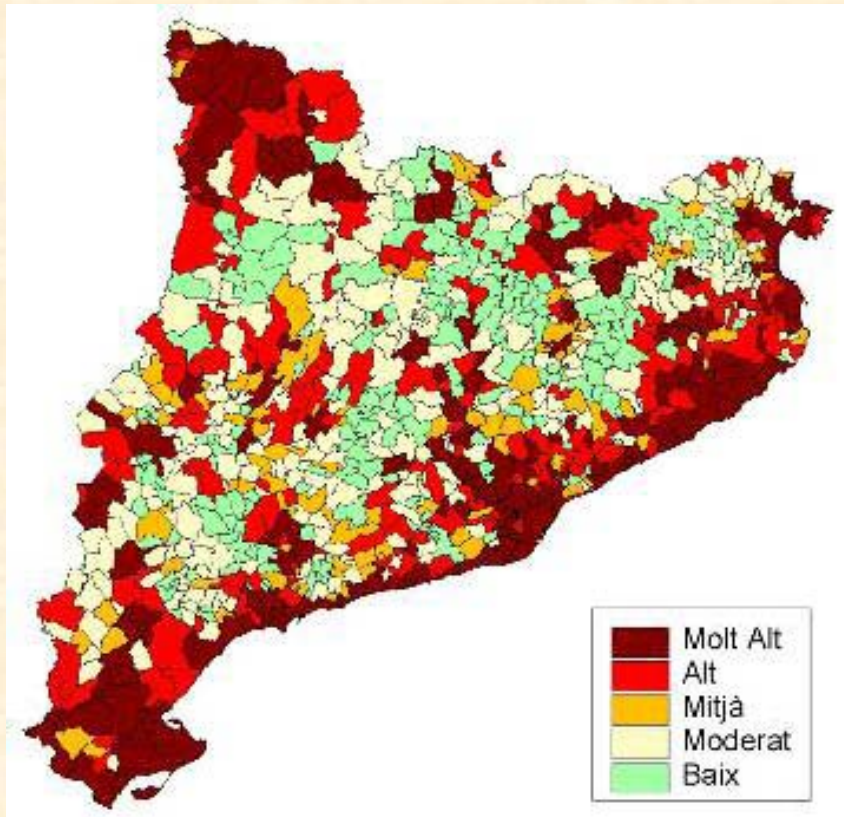
Risk mapping

Combine:

- **Hazard**: there are areas which are more likely to be flooded than others
- **Potential victims and level of damage**:
 - People
 - Roads
 - Housing, camping sites

Others not considered: industrial damage, cleanup, environment impact, blackouts...

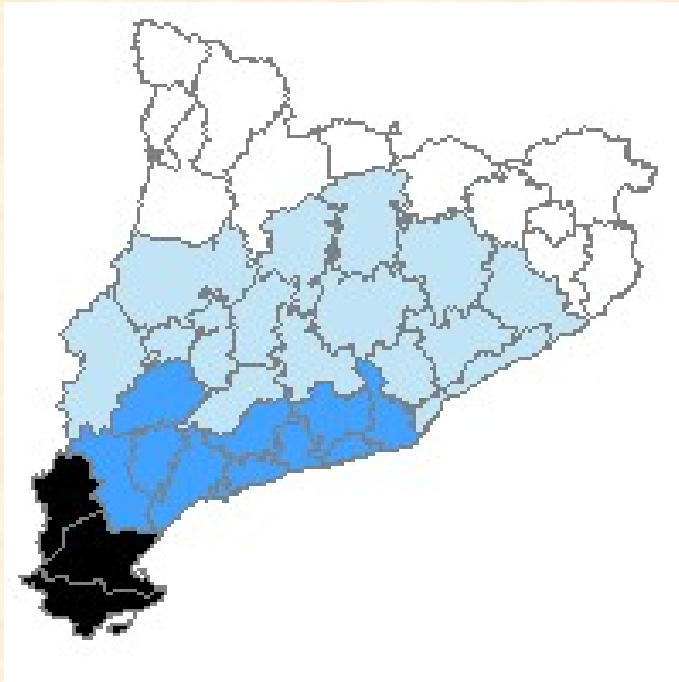
Risk mapping: final result



Classification of municipalities according to risk

Very high
High
Medium
Moderate
Low

Early warning system



No warning		
possible	Probability < 30 %	
probable	30 < Prob. < 70%	
very probable	Prob. > 70 %	

Weather forecast

Rain, snow, heat wave, wind storms...

www.meteo.cat

Early warning system

Warning thresholds for **rain** forecast:

	Level 1	Level 2
Intensity	20 mm in 30 minutes	40 mm in 30 minutes
Accumulation	100 mm in 24 hours	200 mm in 24 hours

Response (1)

- Emergency management. [Catalan government]
 - Emergency operation centre: receives requests for assistance, response coordination
 - Public information team: informs media and public
- First responders [Catalan government]
 - Fire brigade: rescue, water pumping, actions to stop or prevent further victims and damage
 - Police: traffic and security
 - Emergency medical system

Response (2)

- Other [Catalan government, private companies, Spanish government]
 - Logistics for the affected population and for first responders
 - Scientific and technical advisors:
 - Meteorological Service of Catalonia: weather forecast
 - Catalan Water Agency: dam and river control
 - Hydrographic Confederation of the Ebro: dam and river control in the Ebro basin
 - Etc.

Spatial planning

2006 decree (updates older ones)

- Return period 10 years
 - No buildings, except those required for water management
- Return period 100 years
 - No new buildings
 - Allowed: Farming, parks, recreational areas... as long as they do not block the river stream and do not include buildings (e.g. greenhouses)
- Return period 500 years
 - Allowed buildings: industrial use and warehouses

Thank you!