Identifying Challenges in Disaster Risk Reduction - Flood Risk

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29 June 2017 – Varese, Italy
Outline

- Flood risk in Europe: where we are
- Open challenges in flood risk assessment
- Methods and tools for flood risk assessment at JRC
The EU Floods Directive


2. By Dec 2013: Risk Assessment: produce flood hazard and risk maps for three risk scenarios (high, medium and low probability).

3. By Dec 2015: Flood Risk Management Plans to indicate the nature of the risk and the measures proposed to manage these risks

4. Next cycle of updates foreseen by 2018
What has been done (as of 2016)

- **Flood Hazard Maps:** 26 out of 28 MS
- **Flood Risk Maps:** 26 out of 28 MS
  - number of people potentially affected: 25 MS
  - adverse consequences on economic activity: 27 MS
  - consequences on the environment: 25 MS
  - adverse consequences on cultural heritage: 13 MS
  - but... map of potential adverse consequences

- **Risk for future climate and socioeconomic scenarios**
  - not a strict requirement of the Directive, but considered by 16 MS
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Are there still open challenges? How to progress further?
Open challenges: hazard modelling

- Heterogeneity of methods
  - Different methodologies, flood scenarios, data sources...
Open challenges: hazard modelling

- **Heterogeneity of methods**
  - Different methodologies, flood scenarios, data sources...

- **Multiple sources of hazard**
  - Pluvial flooding taken into account only by 14 Member states in their risk plans
  - Flood risk related to minor drainage network often not considered
  - Interaction of multiple processes (e.g. riverine and pluvial flooding) often not considered

- **Interaction of floods and other natural hazards**
  - E.g. Landslides + debris flows + flash floods in mountain areas
Open challenges: vulnerability

- **Vulnerability data**
  - crucial to design and evaluate risk models, but often not available
  - e.g. flood protection standards
  - e.g. emergency plans

- **Vulnerability models**
  - flood damage (to buildings, infrastructures...) is complex to model
  - e.g. damage curves of structures
Open challenges: data

- **Data application**
  - Increasing availability of exposure data still not exploited

- **Loss data collection**
  - Crucial to design and evaluate risk models, but still in early phases

- **Data access**
  - Methodologies not reported with sufficient detail
  - Data produced not available in the right format (e.g. GIS or WMS data)
Activity of the Joint Research Centre: European and Global flood modelling

- Develop research tools to support flood risk policy in Member States
- Disseminating flood information to help emergency response and management in Europe (and outside)
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Examples:

- Operational systems for flood forecasting (EFAS, GloFAS)
- European and global flood hazard maps
- Experimental tools for rapid flood mapping and risk assessment
European Flood Awareness System (EFAS)

- Operational flood predictions for the major European rivers
- Flash flood warnings
- Early warning information to EFAS partners: National/Regional Hydrological Services, ERCC
- Based on hydrological modelling and weather forecasts
- In 2017 extension to European neighbour countries (Ukraine, Belarus), Middle East (Turkey) and Mediterranean coastal areas in Middle East and Africa

www.efas.eu
European flood hazard map database

- Provide **consistent and comparable** flood hazard information across Europe
- Catalogue of flood hazard maps at 100m resolution, for return periods from 10 to 500 years
- Based on JRC data and methods (e.g. EFAS climatology)
- **Freely available for download at** the JRC Data Catalogue:

  http://data.jrc.cec.eu.int/collection/FLOODS
EFAS Rapid Risk Assessment

Objective: integrate EFAS flood forecast with inundation mapping and impact assessment

Locate and evaluate magnitude for flood events predicted by EFAS

Flood map library and flood protection maps to derive event-based hazard maps

Combine flood maps with exposure and vulnerability to assess potential impacts
Linking EFAS and Copernicus EMS satellite mapping

Objective: improve accuracy and timeliness of satellite flood maps

Rapid risk mapping in EFAS is used to identify areas with high potential impact

The information is used to pre-task and prioritize acquisition and processing of satellite images for monitoring flood events
Coastal flood hazard and risk

- Characterization of storm surges and wave run up in Europe
- Flood impact assessment for present and future climate scenarios
- Ongoing integration of coastal flood risk in EFAS
- Ongoing applications at global scale
How to progress?

- Use of local information to evaluate and improve JRC tools
  - National/local flood hazard maps to validate (or replace!) JRC maps
  - National/local risk information to improve EFAS Rapid Risk Assessment

- Use JRC tools to develop and improve local systems
  - EFAS conceptual framework applied to develop flood early warning system in Albania
  - Rapid risk assessment framework applied to evaluate flash flood risk in Catalonia