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 *International Conference „Safeguarding cultural heritage from natural and man-made disasters!”
Krems, January 23, 2018*

 **European Initiatives and recommendations for the Safeguarding of CH - Flood-Landslides-Storm Risk**

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Disaster Risk Reduction in Europe

The new European Union **Civil Protection Mechanism** legislation adopted by the European Parliament on 10 December 2013 presented a **breakthrough in disaster risk reduction in Europe**.

The legislation includes a strong emphasis on building a **culture of disaster prevention**, with particular focus on **risk assessment** and **risk management planning**.

National data clearly show that **risk management policy** has been adopted in most EU countries on **various levels** and to a **limited extent**.

There exists an **improved political will** and support to **protect cultural heritage** – however we experience more proclamations than real and effective measures. Building the resilience of cultural heritage to natural disasters is a **declared research priority** of the **G7 academies of sciences**.



Natural Hazard Mapping – a risk management tool

EU supported Copernicus Emergency Management Service (EMS) - Mapping provides all actors involved in the management of natural disasters, man-made emergency situations and humanitarian crises, with timely and accurate geospatial information derived from satellite remote sensing and completed by available in situ or open data sources.

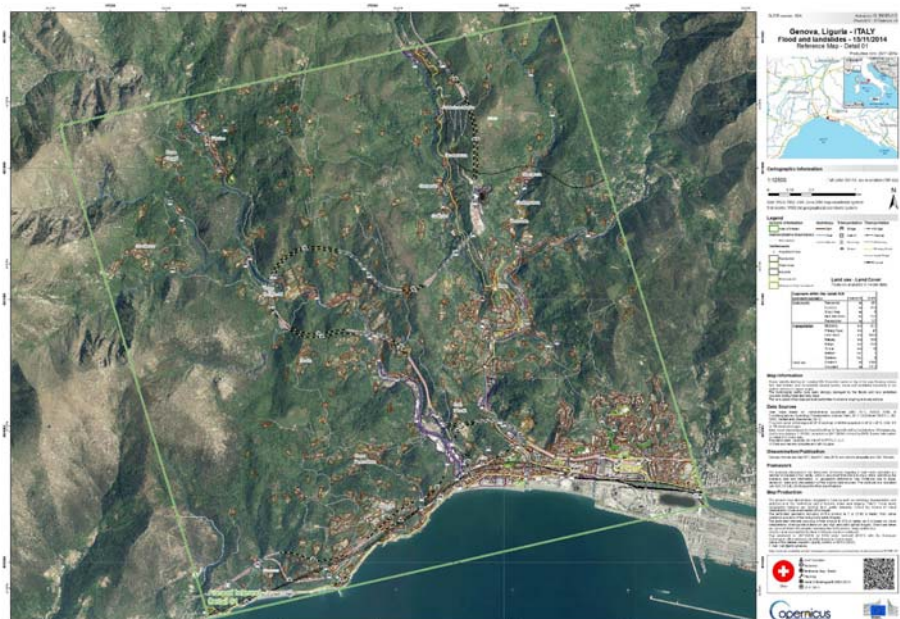
Reference maps
Delineation maps
Grading maps

Risk management maps



Reference maps provide a quick updated knowledge on the territory and assets using data prior to the disaster. The content consists of selected topographic features on the affected area, in particular exposed assets and other available information that can assist the users in their specific crisis management tasks. A reference map is normally based on a pre-event image captured as close as possible prior to the event.

Flood and landslide
Map of Genova



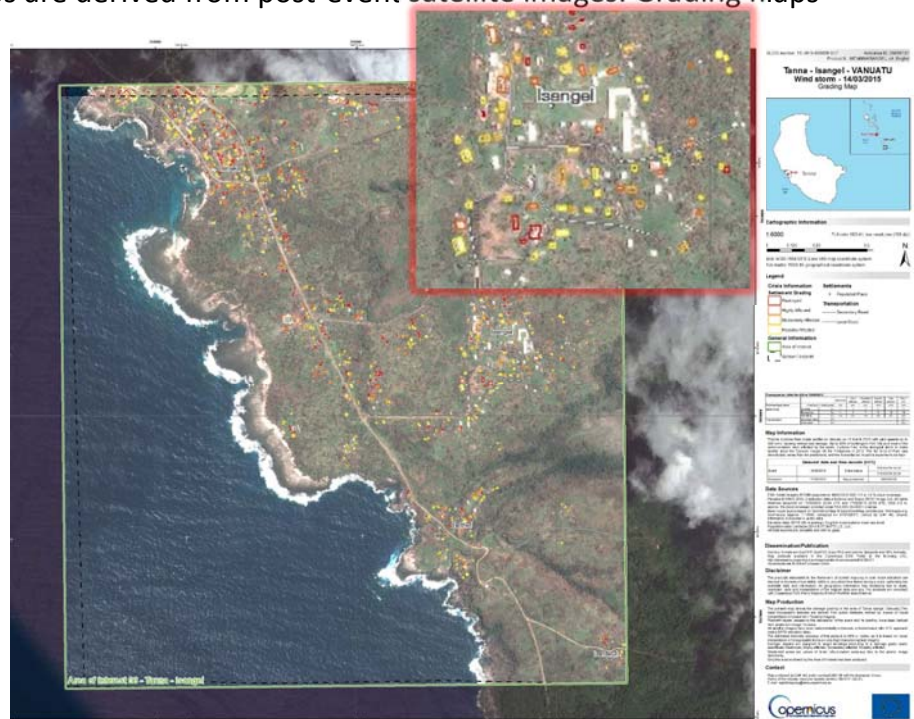
Example
Delineation map of the December 2017 flood in Germany – Hannover area

Delineation maps provide an assessment of the event extent (and of its evolution if requested). Delineation maps are derived from satellite post-disaster images. They vary depending on the disaster type and the delineation of the areas impacted by the disaster.



Grading maps provide an assessment of the damage grade (and of its evolution if requested). Grading maps are derived from post-event satellite images. Grading maps include the extent, magnitude or damage grades specific to each disaster type. They may also provide relevant and up-to-date information that is specific to affected population and assets, e.g. settlements, transport networks, industry and utilities.

Wind storm
Damage Vanuatu



Stock at risk maps – not complete

The **Copernicus EMS** is an useful **tool for risk management** during and after emergency situations for **flood** and **windstorm** as well as also for early warning especially in case of **landslides**.

However, the **cultural heritage asset coordinates** are **indispensable** for an effective application of the EMS. Further, **description** of the type and **condition** of the cultural heritage objects must complete the graphical representation. This should be added to the EU **Flood Directive**.

Even though the **EU Flood Directive (FD)** and adoption of the **Sendai Framework** for Disaster Risk Reduction among the EU matters give the **strongest political support** to the **protection of cultural heritage** against **flood disasters**. There is still a need to **develop maps of the European cultural heritage stock at risk** which must be **related to existing maps of natural and man-made hazards** and potential risks. Such information is **lacking over most of the territory of Europe**, though it is fundamental for establishing risk management strategies and activities.



Risk management maps – with appropriate risk management plans

The Emergency Management Service is **not sufficient** for development and materialization of **preventive measures** reducing disaster damage on cultural heritage. For such a purpose **risk management plans** containing **risk management maps** must be elaborated.

The **contents of maps** should include at least **geospatial data** on cultural heritage, **legal status** of the cultural heritage entity, description of the **nature** and **condition** of cultural heritage including **evacuation or protection possibilities**, **design** and **instructions for temporary or permanent structural measures**, **rules** for rescue and resilience **interventions**, data on experts' for possible **consultations**, **insurance** availabilities.

Important role of **regular inspections**, **early repair** and **maintenance** based on **maintenance plans** and **guidelines**.



Knowledge of risks is not enough Preventive Actions are needed

Recent major disasters show that **early rectification** of **identified deficiencies** on cultural heritage assets is the **most effective measure** reducing its **damage or loss**. **Risk preparedness** is a basic condition for successful resilience.

More attention should be paid to **non-structural measures** or rather **incentives** which may generate and **support structural interventions** along with a **mobilization of wider and distributed public resources**. Such measures include a wide variety of instruments from **guidelines, mobile applications, training** and **awareness raising** to **insurance** programmes.

In this context the **regular maintenance** represents the most **eco-efficient** structural measure reducing damage. It may to a large extent exploit **public participation** and create **jobs for craftsmen or SMEs**.



Preventive Actions are needed

Measures focused on **flood are developed** in the **majority of EU countries** while for **wind storm** or **landslide** in only **few of them**.

The **structural measures** require more **concentrated and substantial financial resources**. However, they have **important economic and social impact**.

In the case of **flood, protection barriers** (temporary or stable or combined) are capable to **protect large territories** with cultural heritage assets (historic settlements), however, with some negative implications concerning cultural heritage context, e. g. of a settlement and a river.

Landslides are mostly so devastating that **preventive measures** are either **extremely expensive** or **ineffective**, (usually both). **Early warning** – EMS supported – and **evacuation** or **strengthening** are recommended.



Preventive Actions are effective



Preventive Actions are needed

Protection against **strong winds** requires **modification of building standards**.

On one side the **EUROCODE EN 1991-1-4** prescribes

- **Very high loads** due to inclusion of advanced probabilistic background which generates
- **High renovation costs** as a result of stronger demands on the wind resistance – designer's "nightmare",

On the other side the **code does not support**

- adequate treatment of wind load especially for **historic structures and disastrous wind events**

Therefore

- The **wind tunnel tests** are often indispensable for the designers, because the current codes sometimes do not give adequate values with respect to some zones (building façade parts).



Preventive Actions are needed

Protection against **strong winds** requires **modification of building standards**.



Lack of awareness and knowledge – need for a fast and effective transfer of research into practice

Our study indicates that there is a **poor knowledge of research** in the field and its results **among the state administration** or **civil protection authorities**.

European Commission launched several research programmes – **Framework Programmes** - with numerous useful projects supported. Similarly, several **national projects** have been completed – namely on **earthquake, flood** and **landslide** threats.

However, several countries ask for **further research** focused on **protection of cultural heritage** against **natural** and **man-made disasters**.

Transfer of research results in practice as well as promotion of creation of **practical results** with direct applicability has been also **demanded**. It indicates that **FP results' dissemination** procedures **should be innovated and improved**.



Further potential for risk management

Safeguarding cultural heritage from natural and man-made disasters still suffers from the fact that **cultural heritage is not fully considered a priority for risk management in emergency situations**. Nevertheless, cultural heritage has **irreplaceable** role in **resilience of historic settlements**. Cultural heritage objects are **substantial elements** of **historic cities or villages** which are understood as **complex adaptive systems possessing resilience capacities**.

Here is a potential for a **better public participation** especially in the resilience phase after disastrous situation, which needs to be developed and enhanced.

Further, in Europe a **cooperation with insurance companies** has not been developed to an effective system which would help **to support risk preparedness and resilience**, namely under private insurance contribution. This should be substantially improved.

