



The contribution of geologists in the management  
of natural and anthropogenic risks in Italy  
Speaker: Rudi Ruggeri



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*Todi, Italy, 25 August 2023*

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# CONSIGLIO NAZIONALE DEI GEOLOGI

Cerca ...

Istituzione - Professione - Comunicazioni - Aree tematiche - Commissioni - FEG - EFG - Amm. trasparente - Contatti

PRIMO PIANO Precedente Successivo 2 di 3



14 Luglio 2022 (Ultima modifica: 22 Agosto 2022)

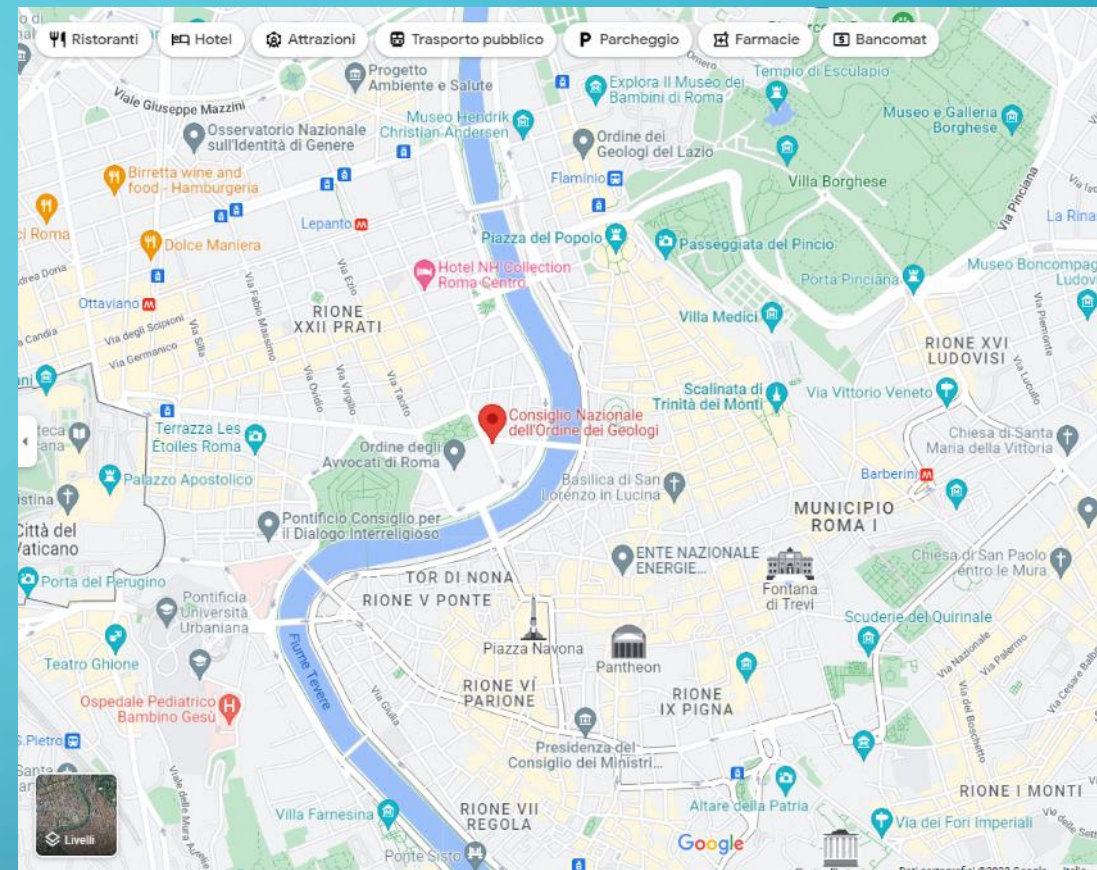
## SEMINARIO NAZIONALE "MONITORAGGI AMBIENTALI IN GROTTA NATURALI"

Il seminario nazionale "Monitoraggi ambientali in grotte naturali" organizzato dalla Società Speleologica Italiana, patrocinato dal Consiglio Nazionale dei Geologi e dall'Ordine dei Geologi della Sardegna, si svolgerà a Dorgali (NU) dal 29 ottobre al 1° novembre 2022.

COMUNICAZIONI > PROFESSIONE >





# CNG Introduction

The Italian National Council of Geologists, established in 1963, is the institutional representative body of the professional category of geologists. The task of the Council is to protect the profession, guarantee the quality of the activities carried out and encourage constant training. Alongside the institutional activities, the CNG is active in the training sector, constantly promoting and organizing conferences and seminars for updating and deepening on current issues related to the exercise of the profession. Very active also in terms of communication with its members, through constantly updated magazines, newsletters and press releases.



# INSEDIATO IL CONSIGLIO NAZIONALE DEI GEOLOGI 2020-2025: IL NUOVO PRESIDENTE È ARCANGELO FRANCESCO VIOLO





# Some facts

- Members registered **11.283**, EuroGeol **71**, in the last two years so many webinars performed with over 23.000 attendees in total and many F2F events performed with over 10.000 attendees in total
- CNG is a member of EFG (European Federation of Geologists) supporting the execution of various EFG Projects (**CROWD THERMAL, ENGIE, REFLECT, ROBOMINERS, CRM GEOTHERMAL, CEEGS**)
- Webinar/awareness workshop **PERC: “Mineral Standard Reporting”** role of the “Competent Person” into the Minerary Sector, Future Sustainable Development and Standardization of the Mineral Industry in Europe - June 2021
- Italian (CNG team) and Spanish delegations (ICOG – Carlos García Royo) under the EFG umbrella/sponsorships represented by its secretary G. Ponzoni made a **visit in La Palma and on the Montana Vieja volcano** aiming to share with the local Authorities technical knowledge and aid procedures and offer aid to humanitarian in need for better facing the tragic situation on the island – from 5 to 9 November 2021



**PERC**  
Mineral Standard Reporting and the Role of Mining Competent Persons for the Necessary Future Sustainable Development and Standardization of the Mining Sector in EU  
ON-LINE AWARENESS WORKSHOP  
(Italy, 24<sup>th</sup> June 2021 / 9.30-13.30)  
Diventa in corso di aggiornamento per l'aggiornamento Professionale Continuo (PCP)



**venerdì  
16 giugno 2023**



GIORNATA MONDIALE DELL'ACQUA 2022  
**LE ACQUE SOTTERRANEE: salvaguardia e gestione adattiva della risorsa**  
CONVEGNO / WEBINAR  
1 APRILE 2022 DALLE 14.30 ALLE 19.00  
Avvenuta di Roma (C) Unival - Centro Congressi Ada Magagnoli "Beniamino Invernizzi"  
APC e partner per il corso saranno sostenitori e i suoi relatori



**Il governo sostenibile dell'acqua nel tempo dei cambiamenti climatici**  
Hotel Nazionale - Sala Capranichetta  
Piazza Montecitorio, 131 - Roma  
[www.evafoundation.org](http://www.evafoundation.org)  
Organizzato da



MITE-NEWSLETTER N.13/2022: STATI GENERALI DELLA GEOTERMIA E LE OPPORTUNITA' PER L'ITALIA DI OTTENERE LITIO DA BRINE GEOTERMICHE  
MINISTERO DELLA TRANSIZIONE ECOLOGICA  
Stati Generali della Geotermia  
Roberto CINCOLANI  
Il 28 giugno 2022 il Ministero della Transizione Ecologica ha organizzato, in collaborazione con il Consiglio Nazionale dei Geologi, la Fondazione Enrico Sestini, il CNIG e la Commissione Nazionale Geologica



**Stati Generali della Geotermia**  
ISCRIVITI AL WEBINAR  
Giovedì 16 Giugno 2022 DALLE 09.00 ALLE 18.00  
Hotel Nazionale - Sala Capranichetta - Piazza Montecitorio, 131 - Roma



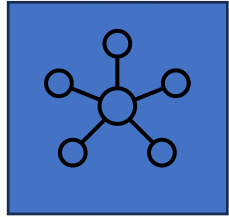
**GEOLOGIA TECNICA & AMBIENTALE**  
Pubblicazione on-line




CONVEGNO/WEBINAR GRATUITO: CARTOGRAFIA GEOLOGICA E GEOMORFOLOGICA - APPLICAZIONI NELLA PIANIFICAZIONE TERRITORIALE E NELLA GESTIONE DEI RISCHI  
1 Luglio 2022 ore 15:00 - 19:30  
Partecipa al Convegno!



CONVEGNO ED ESCURSIONE GRATUITA: "ATTIVITÀ ESTRATTIVE ESPERIENZE E PROSPETTIVE SOSTENIBILI"  
26 LUGLIO  
Partecipa al Convegno!



## NATURAL HAZARD RISK MANAGEMENT PLANNING

Based on the recent publication : Science for Disaster Risk Management 2020: acting today, protecting tomorrow, EUR 30183 EN A. Casajus Valles, Marin Ferrer, M., Poljanšek, K., Clark, I. ed. Publications Office of the European Union 2020 , DOI: 0.2760/438998, that the EFG Panel of Experts on Natural Hazards and Climate Change has contributed.

Definitions

Assessment

Management  
Planning

Policy  
instruments and  
products for  
disaster risk  
management  
planning





# DEFINITIONS

## Understanding Risk

risk is defined as “a measure of the probability and severity of an adverse effect to health, property of the environment”

### Risks & vulnerabilities



image source: <https://www.ochaopt.org/content/emergency-response-preparedness-erp-and-disaster-risk-management-drm>

**Hazard**, is the process, phenomenon or human activity that carries the potential to cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

**Hazards** can be natural (e.g. earthquakes, droughts, floods) or anthropogenic (e.g. oil spills, terrorist attacks) in origin and can be characterised by their location, likelihood of occurrence, intensity or magnitude, duration, and extent.

**Hazards** can be sudden onset events (e.g. flash floods, storms, mudflows, landslides, earthquakes) or creeping processes (e.g. droughts, salinisation) (IPCC, 2014; UNDRR, 2016).

**Exposure**, i.e. the presence of people, infrastructure, housing, production capacities, species or ecosystems, and other tangible human assets in places and settings that could be adversely affected by one or multiple hazards (IPCC, 2014; UNDRR, 2016).

Hagenlocher, M., Thieken, A., Schneider P., Donovan, A., Morsut, C., Paris, N., Ped Assessment', in: Casajus Valles, A., Mar (eds.), Science for Disaster Risk Management, protecting tomorrow, EUR 30183 European Union, Luxembourg, 2020, ISBN doi:10.2760/571085, JRC114026.

## HAZARD

Nature derived Hazards: some examples

Volcanic activity    Storms (floods)    Earthquakes



Droughts and tsunamis are also events with hazard potential

Prezi

**Vulnerability**, i.e. the propensity or predisposition of an individual, a community, infrastructure, assets or systems (incl. ecosystems) to be adversely affected (UNDRR, 2016). Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (Birkmann et al., 2013; IPCC, 2014).

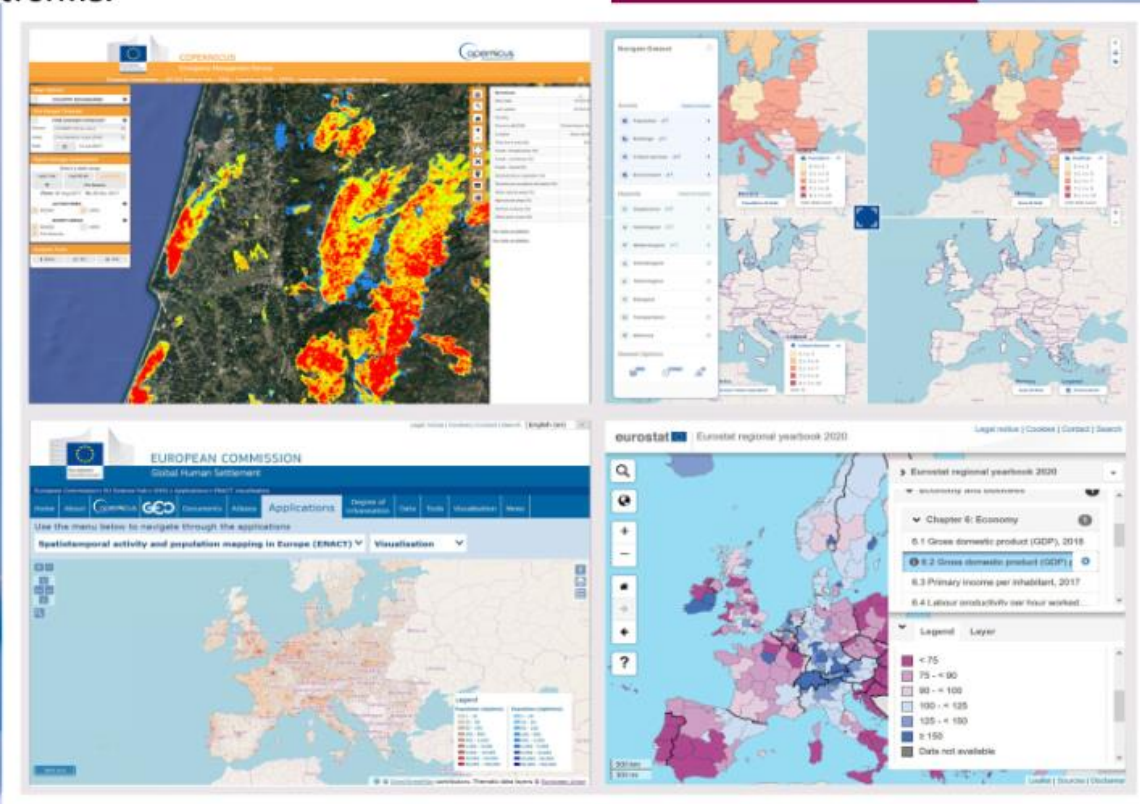
Disaster risk management and adaptation to climate change is multidisciplinary and requires cooperation and input from:



## Visualise Risk

Risk Assessment:  
(1) risk identification, (2) risk analysis  
and (3) risk evaluation (ISO 31000:2009).

Development and use of risk data  
platforms.

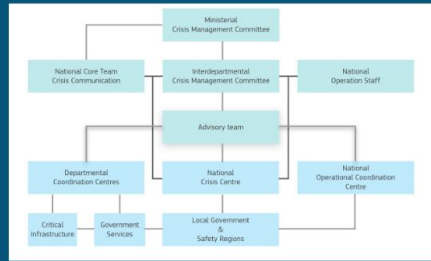


Hagenlocher, M., Thieken, A., Schneiderbauer, S., Aguirre Ayerbe, I., Dobes, P., Donovan, A., Marsut, C., Paris, N., Pedoth, L., Tonmoy, F., 'Risk Assessment', in: Casajus Valles, A., Marin Ferrar, M., Poljanšek, K., Clark, I. (eds.), Science for Disaster Risk Management 2020: acting today, protecting tomorrow, EUR 30183 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-18182-8, doi:10.2760/571085, JRC114026.

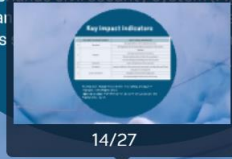


# MANAGEMENT PLANNING

The risks confronting European states and communities are highly diverse in nature, intensity, scale and extent. Therefore, DRMP necessarily involves the integration of risk management activities both vertically (i.e. between multiple actors from local to European and even through to global level via various international initiatives, e.g. UN agreements and frameworks) and horizontally (i.e. between actors working at similar levels).



The Netherlands civil security system (Figure) shows how vertical and horizontal integration of risk management activities and security and other bodies



Vertical and horizontal integration in disaster risk management planning

## Disaster risk management planning (DRMP)

DRMP refers to the application of processes developed and adopted by institutions to prepare for, and implement measures to reduce the risk of the impact of, disasters of various kinds.

The goal of DRMP is to ensure that societies and their communities are able to enhance their levels of resilience in relation to disasters with which they can reasonably expect to be confronted, within a specified time frame.

DRMP aims to develop clear procedures, protocols and capabilities to significantly reduce or eliminate risks through systematic, well-coordinated actions from public, private and civic groups and individuals.

Generation and analysis of alternatives

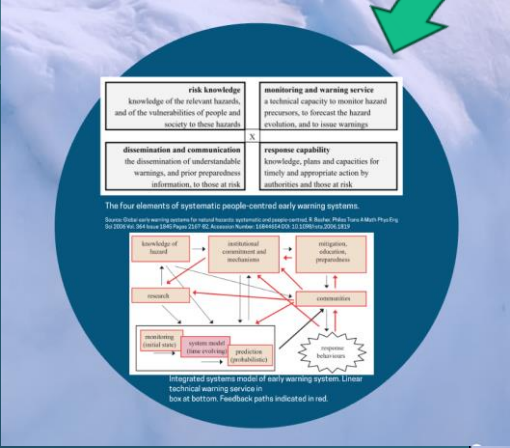
## Key impact indicators

VITAL SAFETY OR SECURITY INTEREST	IMPACT CRITERIA AND INDICATOR
1 Territorial	Encroachment on the national territory
	Infringement of the international position of the nation
2 Physical	Fatalities
	Seriously injured and chronically ill
	Physical suffering (lack of basic life necessities)
3 Economic	Loss and damage to buildings and infrastructures
	Costs of impairment of the economy
4 Ecological	Long-term effects on the environment and nature, including flora and fauna
5 Social and political	Disruption of everyday life
	Damage to the democratic legal order
	Social psychological impact and social unrest

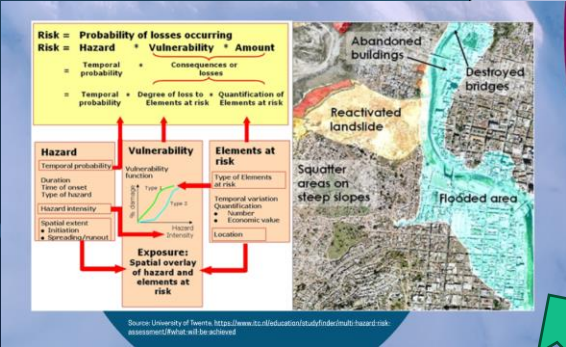
Examples of impact indicators for vital safety or security interests in the Netherlands. Source: adapted from Ministry of Security and Justice of the Netherlands, 2014.



# POLICY INSTRUMENTS AND PRODUCTS FOR DISASTER RISK MANAGEMENT PLANNING



**Early Warning Systems**



**Spatial plans**

Adopting a risk-informed planning approach can assist nations and their communities to increase their disaster resilience by reducing risk and being better prepared for response and recovery processes should a disaster occur.

**Stakeholders**

**Conclusions**

A particular need that must be met for adaptation at all spatial scales is the establishment of broad stakeholder (Knieling and Leal Filho, 2013).

Stakeholders are individuals, groups or organisations that may affect, be affected by or perceive themselves to be affected by a decision, activity or outcome of a project, programme or portfolio in which disaster risk is a core concern.

Stakeholder engagement is indispensable for the acceptability, but also the applicability, of adaptation measures. These are widely targeted to civil society (e.g. adaptation of buildings or agriculture activities). Moreover, political decisions based on uncertain knowledge need a broad mandate from all social groups (Draiving and Fleischhauer, 2012; Fleischhauer et al., 2012; Walker et al., 2014).

Directly affected stakeholders should be involved throughout the DRMP process, including implementation of the adaptation measures.

Diagram adapted from the World Meteorological Organization depicts the elements that can produce an effective EWS. Source: <https://www.expertsweb.net/news/show-do-you-build-effective-early-warning-system>

Effective DRMP requires well-conceived and coordinated strategies and actions between a diverse range of actors, including citizens, at multiple levels and integrating a large number of disciplines in order to ensure that adequate capacity and capability exists to execute major crisis management functions (Tagarev et al., 2017) in a competent and efficient manner.

Thank you , for more information, visit: [https://europeannetwork/under Panel of Experts on Natural Hazards and Climate Change](https://europeannetwork/under%20Panel%20of%20Experts%20on%20Natural%20Hazards%20and%20Climate%20Change)

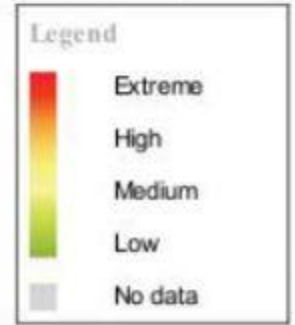
Environmental risk is defined as the probability that a certain natural phenomenon may harm to human lives and/or anthropic activities

According to the publication 'Natural Hazard Risk Atlas 2014' Italy is the eighth country in the world and first in Europe in terms of risk with regard to natural events



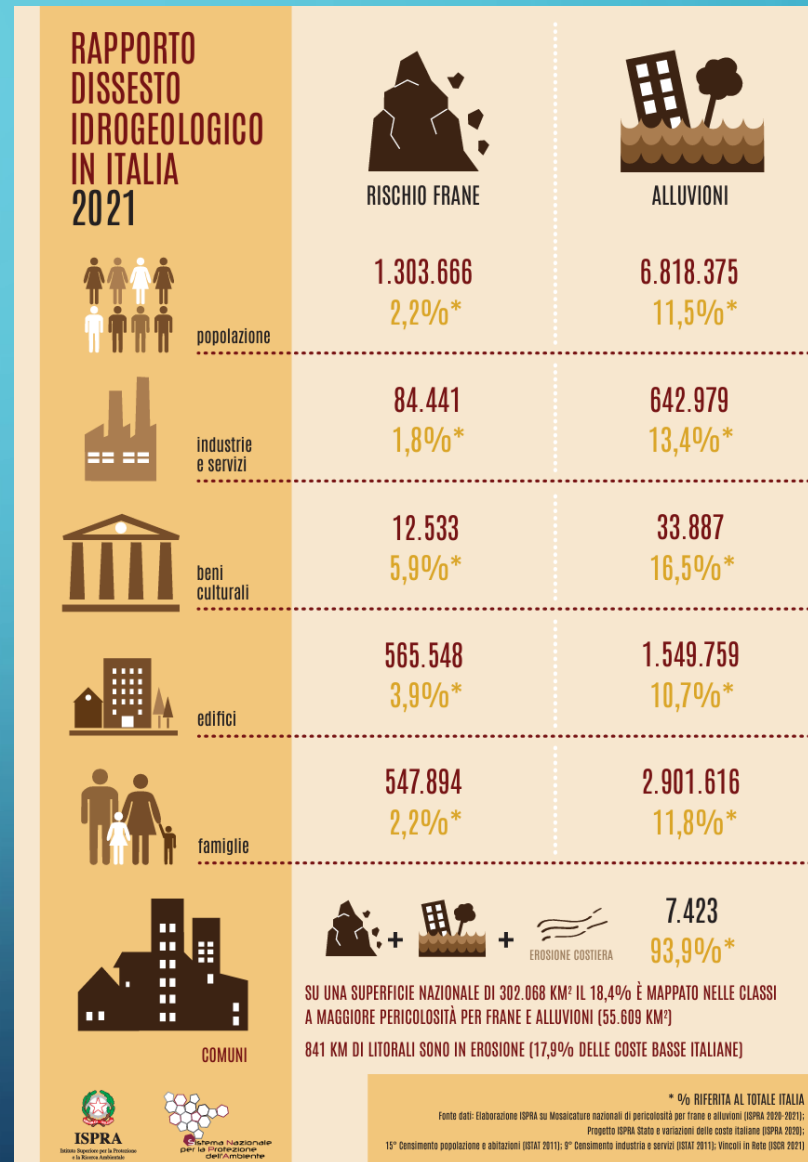
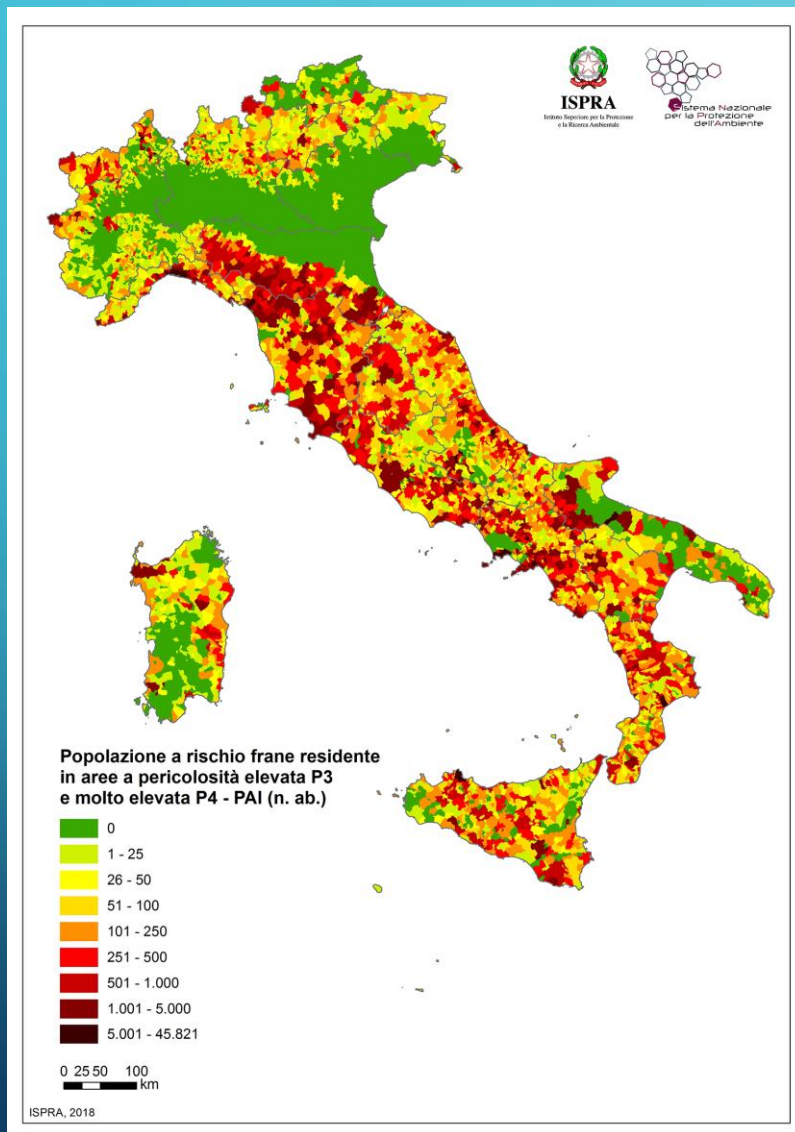
Rank	Country	Category
1	Japan	Extreme
2	USA	Extreme
3	Taiwan	Extreme
4	China	Extreme
5	India	Extreme

Rank	Country	Category
6	Mexico	High
7	Philippines	High
8	Italy	High
9	Australia	High
10	Indonesia	Medium





# ITALY: A COUNTRY HIGHLY DISASTERS PRONE



# DIPARTIMENTO DELLA PROTEZIONE CIVILE



In Italy, civil protection is a function attributed to an integrated system: the National Civil Protection Service, established in 1992 by Law no. 225 and reformed in 2018 by the Civil Protection Code.

It provides for implementing all activities to protect lives, property, settlements, animals and the environment from disasters and their damaging effects.

All levels of government are part of the National Civil Protection Service: the State, the Regions, the Autonomous Provinces, and the Local Authorities.

The operating structures working in coordination with such components are:

- the National Fire and Rescue Service
- the Armed Forces, the Police Forces
- the scientific community, the National Health Service
- the organised civil protection volunteer service
- the Italian Red Cross
- the National Corps of Alpine and Speleological Rescue
- the National System for Environmental Protection
- the structures responsible for meteorological services at national level.





# NATIONAL CIVIL PROTECTION SERVICE: how it works in Italy

## Integrated system

The Italian civil protection is a structure composed by various entities and public departments, scientific teams and volunteers that operate at various levels (state, regional, province and local) in a coordinated way.

## Coordination

## Main tasks



# Role of Geologists in the context of natural and anthropogenic risks management

- Initial disaster notification;
- First assessment of the impact, followed by mobilization of and coordination by the Civil Protection authorities;
- Civil Protection guidelines through emergency communications services;
- Search and rescue (SAR) operations, first-aid administration and medical care if trained for that purpose;
- Mobilization and contribution of volunteers;
- Set up of emergency shelters;
- Risks scenario evaluation and planning (PEC – Piano di Emergenza Comunale);
- Raising awareness and education for protective measures to successfully deal with the continuous aftershock sequence;
- Post-event hazard mitigation and building inspections/assessments;
- Immediate financial evaluation of the impact plus relief measures;
- Communication with Authorities, population and public middles.



# Role of Geologists in a context of municipal planning and specifically for setting the City Civil Protectionan Emergency Plan (PEC)



Multiple risks will be analyzed and identified in a PEC as:

- seismic risk
- hydrogeological risk
- volcanic risk
- environmental risk
- risk of landslides
- others.

Those risks are the base for the definition of the risk scenarios through the delimitation of the various areas subjected to different degrees of risk, starting from the detailed territorial analysis.

# Role of Geologists in a context of an emergency plan

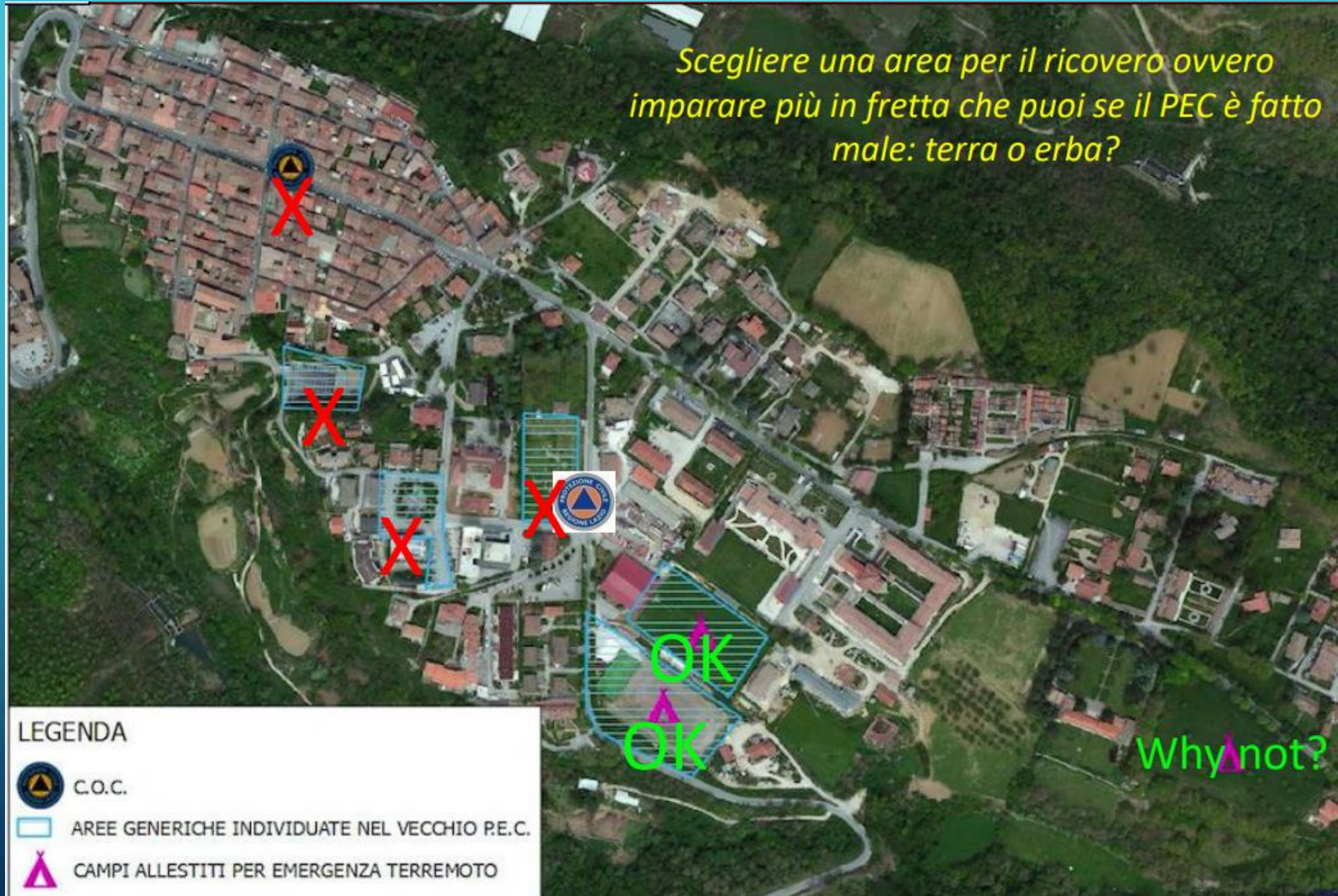
the waiting areas **must not** overlap with the reception or hospitalization areas

emergency areas **must not** be included within perimeter areas of PAI (areas of hydrogeological risks)





# Role of Geologists in a context of an emergency plan





# Role of Geologists in a context of an emergency plan

A PEC (City Emergency Plan) well designed can really avoid a lot of problems

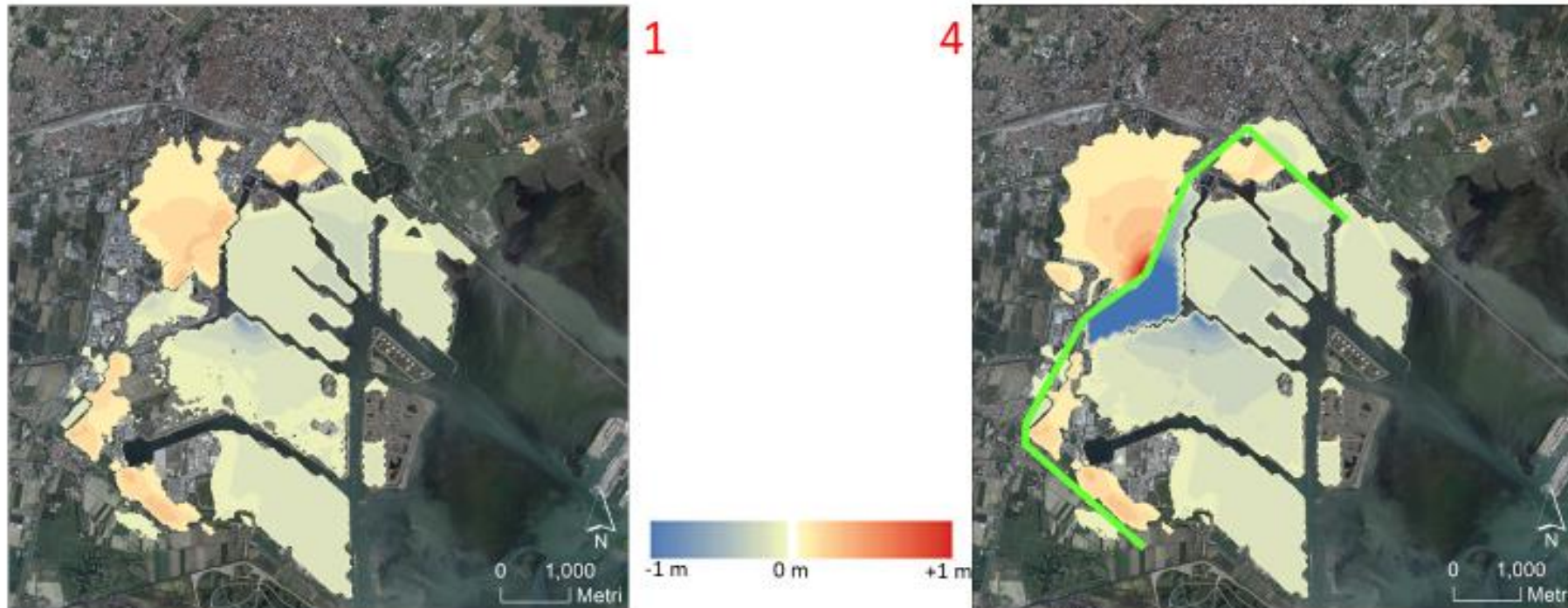




# Role of Geologists in a context of hydraulic contamination risk mitigation measures

- SCENARIO 0: Scenario attuale – marginamenti parzialmente completati
- **SCENARIO 1: Completamento della messa in sicurezza delle macroisole**
- SCENARIO 2: Realizzazione del retromarginamento dopo l'isolamento delle macroisole (fino al 7° layer – 12 m)
- SCENARIO 3: Realizzazione del retromarginamento dopo l'isolamento delle macroisole (fino al 8° layer – 16 m)
- **SCENARIO 4: Realizzazione del retromarginamento dopo l'isolamento delle macroisole (fino al 9° layer – 20 m)**
- SCENARIO 5: Scenario 4 e realizzazione dei drenaggi a tergo delle barriere di isolamento
- SCENARIO 6: Scenario 4 e realizzazione dei drenaggi a tergo delle barriere di isolamento e del retromarginamento

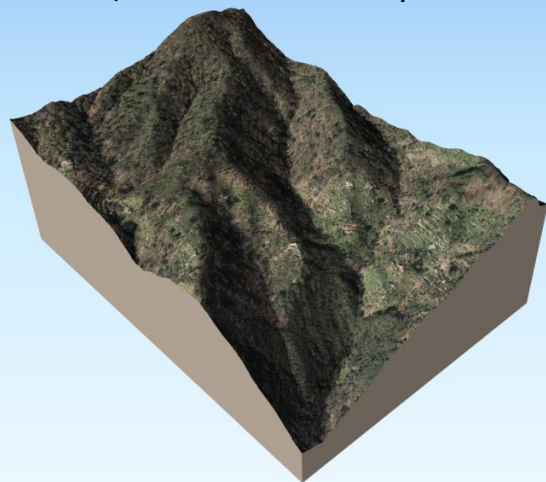
## SCENARI PREVISIONALI



# Role of Geologists in a context of landslide risks management

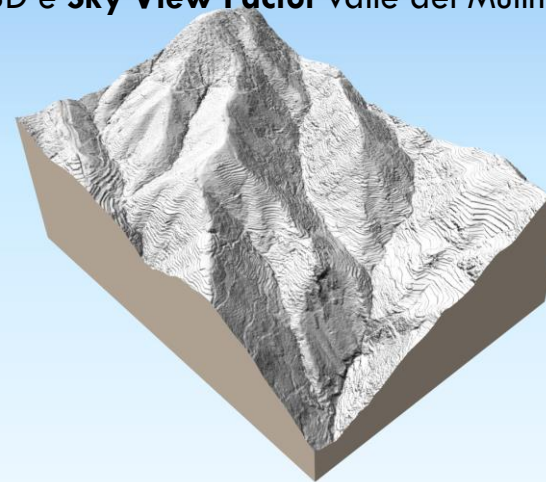
## Monitoraggio remote sensing

3D e ortofoto, valle dei Mulini – pilot area 3



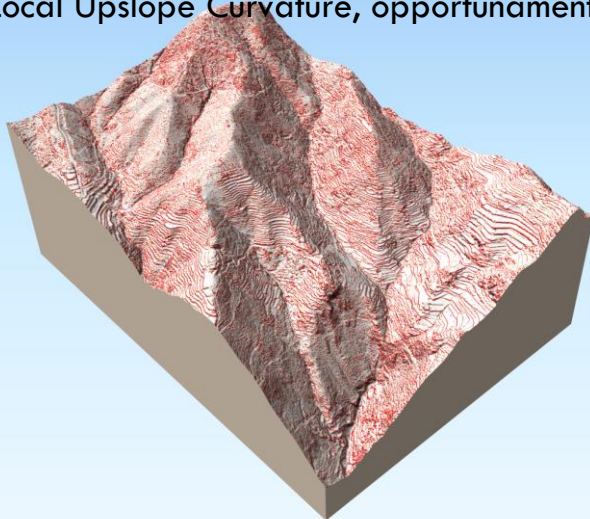
## Monitoraggio remote sensing

Vista 3D e Sky View Factor valle dei Mulini – pilot area 3



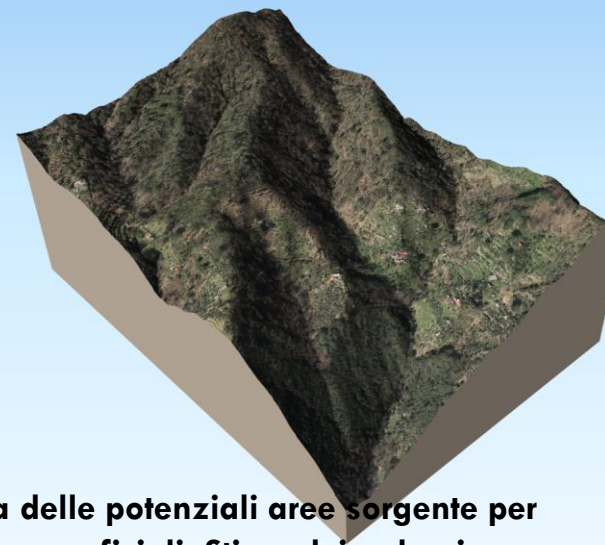
## Monitoraggio remote sensing

3D view, Sky View Factor e L.U.C. valle dei Mulini – pilot area 3  
L.U.C. Local Upslope Curvature, opportunamente filtrata



## Monitoraggio remote sensing

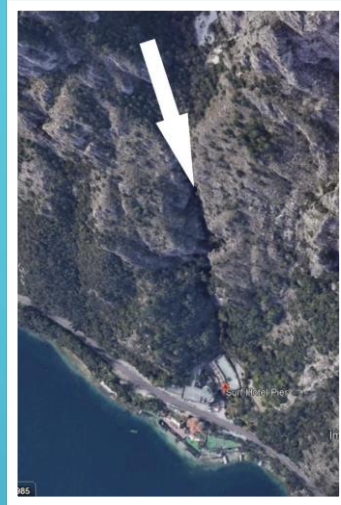
Identificazione dei terrazzamenti altrimenti non riconoscibili



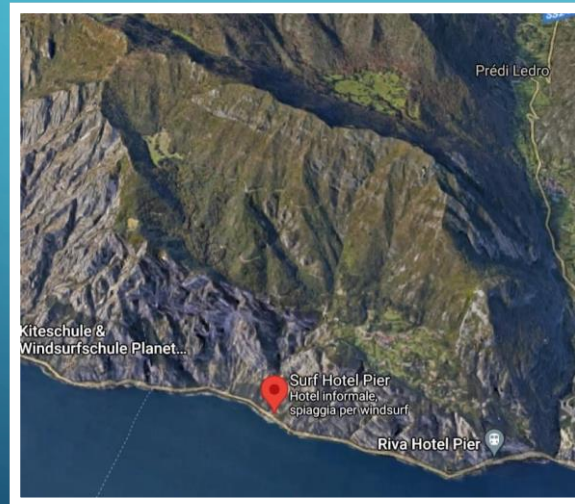
Stima delle potenziali aree sorgente per frane superficiali. Stima dei volumi



# Role of Geologists in a context of an extreme meteorological events risk management



Limone sul Garda (August 2021): a mudflow overwhelmed the Hotel Pier. The flow broke through the kitchen door, overwhelming all the equipment and then going on to hit the entire dining room, reception and hotel lobby, affecting approximately 500 square meters of structure produced by the heavy rains that fell in a short time ( $>100$  mm in a few hours) on a catchment area of approximately 3 sq km having the basin point (closing section) practically corresponding to the hotel. We need correct urban planning from a geological point of view and a design that takes into account rainfall regimes with return times of over a century. Rainfall simulations related to climate change.



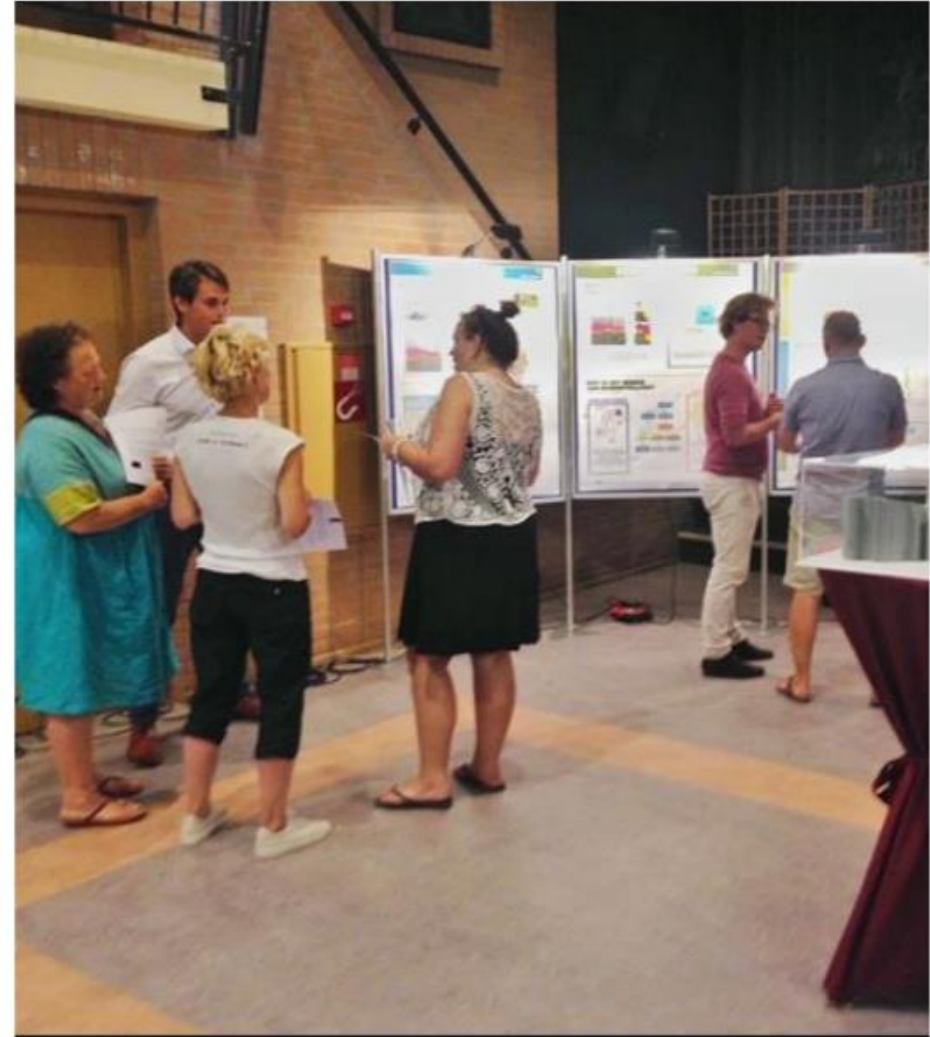


# Role of Geologists in this modern world

Traditional role

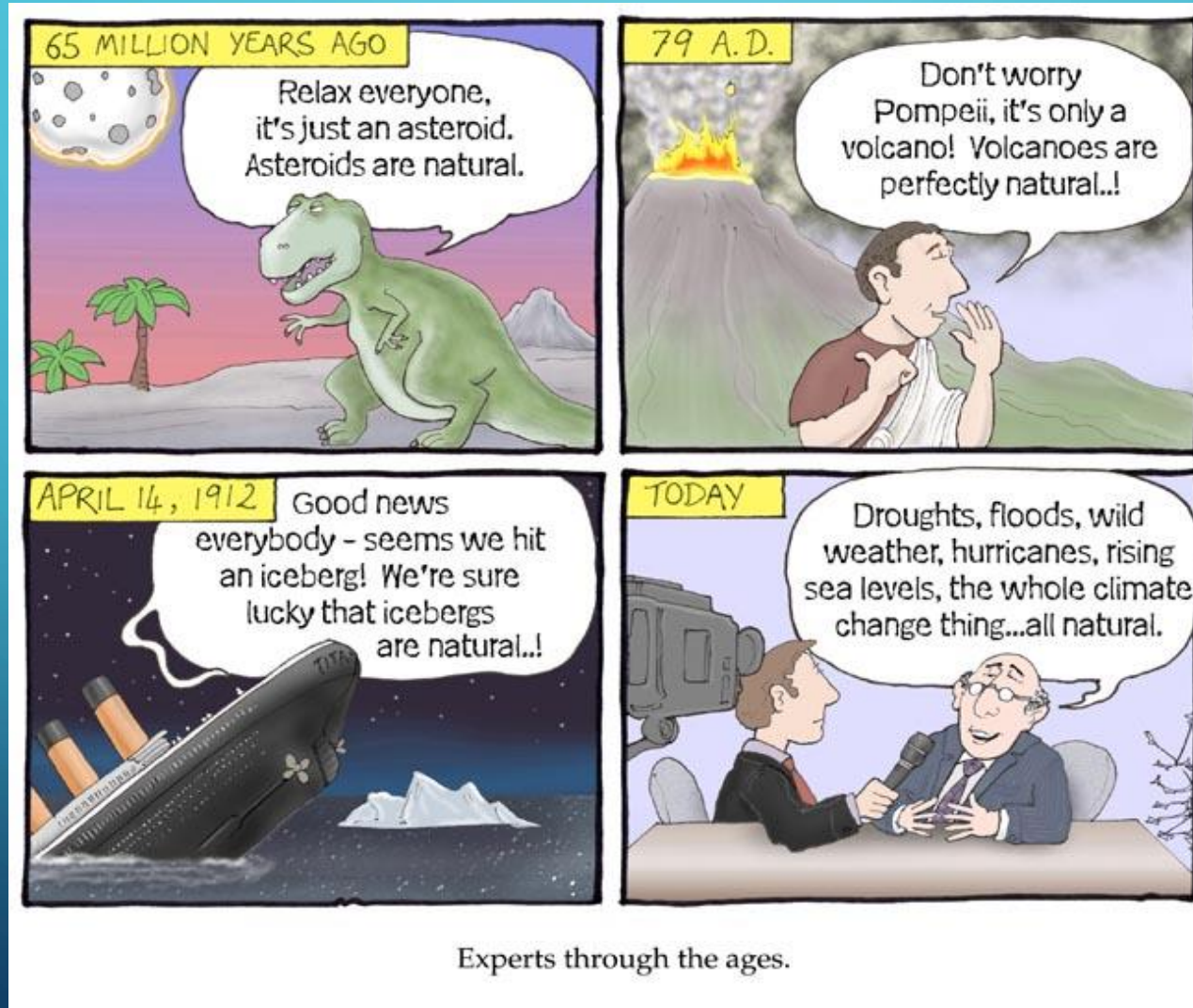


Future role





...and finally some “experts” opinion on Natural Hazards through time...





Speaker: Rudi Ruggeri



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**Thank you for your attention**

*Todi, Italy, 25 August 2023*