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GOAL EDUCATIONAL RESOURCE

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TITLE OF THE CASE	Geoethics and geological risks
SHORT CASE DESCRIPTION	The development of a culture centred on preventive actions is a way to improve the resilience of societies to dangerous geological events. This needs firstly the development of the societal awareness on geological risks and their implications for human communities. Geoscientists are at the forefront of the defense against geological risks.
KEYWORDS	Disaster cycle; Geoethics; Geological risks; Hazard; Prevention; Resilience; Risk communication; Risk education; Risk perception; Risk scenarios; Social actors.
PRIOR KNOWLEDGE	Basic knowledge on earthquakes, floods, volcanoes, tsunamis, landslides, and other geological hazards.
AIM	Giving an overview on geoethical aspects and implications in georisk management.
OBJECTIVES	• To know the role of geoscientists in the defense against georisks. • To become aware on social actors involved in a risk scenario and their responsibilities. • To understand that prevention strategies require the engagement and partnership of all parts of society. • To understand the importance of concepts like “probability” and “uncertainty” in risk analyses. • To know some keywords used in georisks management.
CASE	Developing preventive strategies requires accurate geoscience communication, diffused geo-education, and access to reliable scientific information, as well as effective governance. It also depends on improving communities’ awareness on geological risks and the capacity to assess and establish reasonable and acceptable risk thresholds for society. This can help to facilitate the adoption of strategies to reduce the likelihood of potentially damaging geological events or processes occurring, or the transformation of such events into disasters. This educational resource is based on a video that provides an overview on the geoethical aspects and implications in georisk management, by

	introducing several key concepts: prevention, probably and uncertainty, risk scenario and its actors, geoscientists as social actors and their role, defense system, disaster cycle, operational protocols in emergency phase, science-society interface, citizen science. The video is formed by 5 blocks entitled: 1) Geological risks and prevention; 2) Prevention as a value; 3) The risk scenario; 4) Geoethics in georisk management; 5) How can geoscientists support society in the georisk defense? The video is conceived as a tool to set up further reflections and discussions aimed at raising students' awareness about individual, professional, social roles and responsibilities of geoscientists, and building a shared framework of concepts and values used in georisks studies and management.
QUESTIONS	**1.** Which is the difference between hazard, vulnerability, exposure, and risk? **2.** What are "probability" and "uncertainty"? **3.** Which are social actors involved in a risk scenario? **4.** What is the social role of geoscientists, as researchers and/or professionals, in the defense against georisks? Which are their ethical and social obligations? How they can help society to face georisks? **5.** Who should communicate hazards to society? Who should take decisions during an emergency phase? **6.** Which are the best strategies to educate people to defense against georisks? **7.** How people can have an active role in the defense against georisks?
PROCEDURE	**Preparation:**  **1.** Watch the video "Geoethics and geological risks" (https://youtu.be/rZSjzOxiGUk), without any preliminary introduction or comment. **2.** Elaborate questions (1 through 7). **3.** Watch the video again and stop it at the end of each block to start a more in-depth discussion and reflection about contents of the specific block. **4.** Read articles listed in the references. **Working Group (4-5 students):** **1.** Open a discussion on possible meaning and implications of key-concepts listed in the section "Case". Each group should report briefly results of the discussion to all other groups. **2.** 2. Each group should collect information through Internet, by visiting websites of scientific organizations, institutions, research institutes, universities, governmental agencies, about hazards and risks affecting the town in which the group is located. Results should be summarized and discussed the working groups, to define possible interventions and their priorities.

3. 3. Set a risk scenario (role-playing game): each working group assume the roles of different actors involved in a fictional risk scenario (related to an impending risk due to an earthquake, a flood, a tsunami, a possible volcanic eruption). Each working group takes responsibility for acting out these roles within a narrative (leaded by the teacher), in order to explore demands, expectations, responsibilities, possible decisions of each actor. Dialogue among actors should lead to take shared decisions on how to face one or more phases in a disaster cycle (Disaster mitigation: directly preventing future emergencies and/or minimizing their negative effects. Disaster preparedness: plans or preparations made in advance of an emergency that help individuals and communities get ready. Disaster response: any actions taken during or immediately following an emergency, including efforts to save lives and to prevent further property damage. Disaster recovery: happens after damages have been assessed and involves actions to return the affected community to its pre-disaster state or better – and ideally, to make it less vulnerable to future risk).
4. 4. Answer the questions raised.

REFERENCES

Main reference:

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Further references:

Di Capua, G. & Peppoloni, S. (2014). Geoethical Aspects in the Natural Hazards Management. In G. Lollino et al. (Eds.). *Engineering Geology for Society and Territory – Volume 7*, (pp. 59-62). Switzerland: Springer International Publishing. (https://f420cbad-ec08-4c39-902f-b0e5afecb44a.filesusr.com/ugd/5195a5_0440718081d340228edd071b5b20fa0a.pdf)

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Stewart I.S., Ickert J. & Lacassin R. (2017). Communicating Seismic Risk: the Geoethical Challenges of a People-Centred, Participatory Approach. *Annals of Geophysics, 60*(fast track 7), 1-17. doi: 10.4401/ag-7593. (http://www.annalsofgeophysics.eu/index.php/annals/article/download/7593/6842)

Sanz, F.S., Holocher-Ertl, T., Kieslinger, B., Sanz García, F. & Silva, C.G. (2014). *White Paper on Citizen Science for Europe*. Brussels: European Commission.

(https://ec.europa.eu/futurium/en/system/files/ged/socientize_white_paper_on_citizen_science.pdf)

Website:

- http://www.geoethics.org (IAPG – International Association for Promoting Geoethics)
- https://disasterphilanthropy.org/issue-insight/the-disaster-life-cycle/ (Disaster Life Cycle)
- https://www.citizenscience.org/ (Citizen Science)