

The geological risk: the educational projects in schools for prevention.

El riesgo geológico: proyectos educativos en escuelas para evitar que.

C. D'Arpa¹ C. Di Patti²

- 1 Museo Geologico G.G. Gemmellaro, Dpto. Scienze Della Terra e del Mare, Università Degli Studi Di Palermo, Corso Tukory, 131. 90134 Palermo. carolina.darpa@unipa.it
- 2 Museo Geologico G.G. Gemmellaro, Dpto. Scienze Della Terra e del Mare, Università Degli Studi Di Palermo, Corso Tukory, 131. 90134 Palermo. carolina.dipatti@unipa.it

Abstract: In Sicily the 80% of the region is under seismic, volcanic, hydrogeological and geomorphological risks. All the 390 sicilian municipalities have been defined seismic and, among these, 29 are considered within the category 1 of the risk. Hydrogeological risk is the most common in Sicily, as evidenced by the high density of landslides about 1 every 50 km². Earthquakes, volcanic eruptions, tsunami and floods are the expressions of the energy of the planet Earth. The man is unable to live in harmony with the Planet and he is often the reason of the huge disasters and the victim at the same time. To save the planet Earth the man has to take a responsible behaviour. Local territory knowledge is essential in order to protect themselves from it. For this reason is necessary to develop the attention to environmental protection with educational activity that guide people to conduct awareness. The "G.G. Gemmellaro" Museum has conducted two experimental courses to explain the geological risk in the region. The first was carried out with the teachers of primary school and the second with the pupils of the primary school. To understand the dynamics of the earth and the geological phenomena, the course was structured in three teaching units.

Key words: geological risk, knowledge, schools, risk prevention

Resumen: En Sicilia el 80% de la región se encuentra bajo riesgo sísmico, volcánico, hidrogeológico o geomorfológico. La totalidad de los 390 municipios existentes en la isla han sido definidas como potencialmente sísmicas y entre ellas, 29 están clasificadas en la categoría 1 de riesgo sísmico. El riesgo hidrogeológico es el más frecuente en Sicilia tal como queda demostrado por la frecuencia de deslizamientos de ladera, que alcanza valores de uno cada 50 Km². Tanto los terremotos como las erupciones volcánicas, los tsunamis y las inundaciones son expresiones normales de la energía del planeta Tierra. El hombre se muestra incapaz de vivir en armonía con su entorno y con el planeta. Como consecuencia es frecuentemente al mismo tiempo el origen y la víctima de numerosos desastres naturales. Para salvar al planeta Tierra, el hombre debe adoptar un comportamiento responsable. El conocimiento del propio territorio es esencial a la hora de protegerse de ellos. Por estos motivos resulta de primera importancia desarrollar la atención hacia la protección del medio ambiente a través de actividades que lleven a la población hacia una adquisición de una conciencia sobre el medio ambiente. El Museo Geológico G.G. Gemmellaro ha desarrollado un conjunto de dos cursos experimentales para explicar la naturaleza de los riesgos geológicos en la región. El primero se desarrolló sobre profesores de escuela primaria mientras que el segundo es centró en los alumnos de escuela primaria. Con objeto de facilitar una mayor comprensión de la dinámica terrestre y de los procesos geológicos el curso se estructuró en tres unidades didácticas sucesivas.

Palabras clave: riesgo geológico, conocimiento, escuelas, prevención.

INTROCUATION

Museums have evolved over time, shifting from collections containers in institutions for storage and dissemination of the civil society identity. "The museums, thanks to their role as stores of knowledge and values, can educate, improve or promote a social engagement in a different and broader way than other educational institutions" (Burgio and Carta, 1997).

For this reason, the museum has developed many activities for different sorts of public, besides the

institutional activities of preservation, study, research and higher education. Guided tours, exhibitions, thematic tours, field trip, workshops, meetings, seminars and refresher courses are the most common activities offered by the Gemmellaro Geological museum (Museo Geologico G.G. Gemmellaro). All activities aim to value the sicilian region and claim the close relationship between the geo-paleontological Sicilian heritage, preserved in the Museum, and the territory. Different sorts of laboratories have been set up to offer to the pupils the opportunity to manipulate fossils of all

systematic groups and rocks. At the end of the eighties, between the workshop activities, the museum has launched an intense activity on the geological risks consisting of seminars, video screenings, and distribution of informative leaflets; this activity was stopped some years after.



FIGURE 1. A volume of the "Quaderni del Museo Geologico G.G. Gemmellaro" dedicated to the landslides occurred in Sicily between 1886 and 1987.

THE NEED FOR A COURSE ON THE GEOLOGICAL RISK PREVENTION

The dissemination work on geological risk prevention is now needed because 80% of the territory in Sicily is under geological risk. In fact all the 390 sicilian municipalities have been defined seismic by an Order of the President of the Italian Council in 2003 (DPCM n.3274, with 29) and, among these, 29 are considered within the category 1 of the risk.



FIGURE 2. A thematic map showing the seismicity in Sicily.

People dead in the geological disasters, recently occurred, have also confirmed the high landslide risk as evidenced by the statistical studies on landslides (one in 50 km²).

Seismic risk

Recent high magnitude earthquakes in Italy, for example Aquila in 2009, showed the non-compliance

of most Italian construction to seismic criteria, recently introduced in our legislation. For this reason, even modest magnitude earthquakes may still cause considerable damage and deaths.

Volcanic risks

The volcanic risk is high because of the presence of extended urbanized areas near active volcanic systems. The Etna and Stromboli eruptions, in 2002, did not cause serious damage, but they are the latest example of the dangerous phenomena associated to volcanic hazards such as lava flows, volcanic products fallout, gas emissions, mudslides, earthquakes and rogue waves (see the volcanic island Stromboli eruption in 2002).

Landslide risk

The hydraulic-geological risk is often associated to extreme weather events that cause disruptions of different types such as landslides and flooding. Economic and speculative interests are often the cause of little attention in the identification of sites suitable for new designs as evidenced by the disaster which occurred on 1 October 2009 in several municipalities in eastern Sicily, including Giampileri. A violent storm caused a mudslide that engulfed and destroyed numerous buildings, constructed along the bed of a river, and killing 37 people.

Geomorphological risk

The island of Sicily is geologically "young", and is still subject to intense morphogenetic processes that shape the landscape substantially. Therefore, the instability phenomena, linked to the geological risk-hydraulics, may manifest itself in various ways.

THE PROJECTS

The "G.G. Gemmellaro" Museum has developed two experimental courses to learn geology of Sicily and the natural event risks in the region. One was carried out with the teachers of primary school and the other with the Pupils of the primary school. To understand the dynamics of the Earth and the geological phenomena, the course was structured in three teaching units.

1° Teaching unit "Volcanic risk". The aim was to understand the origin, dynamics and evolution of volcanism, focusing particularly on the Italian territory. The methods of forecasting volcanic events and the possible preventive measures feasible have been shown.

2° Teaching unit "Seismic Risk". This teaching unit was aimed at understanding the causes and distribution of earthquakes and the risks associated to them, starting from the structures of the Earth and the "plate tectonics". Preventive measures and forecasts, which could reduce the flow of destructive phenomenon, have been exposed.

3° Teaching unit "Hydrogeological risk". Among the geological risk, this is the most dangerous for his high social-economical impact. This term refers to the

risk of the occurrence of extreme weather events that lead to different types of instability and are closely intertwined to landslides and flooding.

The courses were divided into a theoretical and a practical part. The theoretical part was held in the classrooms, the practical part in the fields. To achieve these objectives lectures were carried out with the help of multimedia products, case studies and guided tours.

In the course for teachers the tools of knowledge and expertise for future programming were provided.

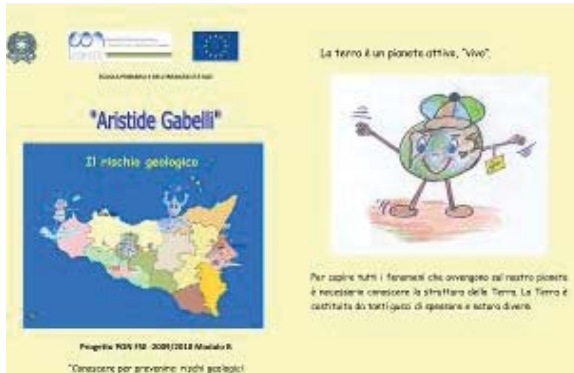


FIGURE 3. Example of an educational booklet "The geological risk" edited by teachers of a primary school.

In the pupils' course many laboratories have been made. A model of "plate tectonics" with movable magnetized continents show the continental drift occurred from Paleozoic Era to the present day. This model has allowed students to understand the theory postulated by Wagner. The pupils have realized a scale model of a volcano to learn his structure and his formation. After a volcanic eruption has been simulated in order to understand the risk associated with the urbanization of volcanic areas heavily populated. Through the creation of artifacts the pupils have

understood that the Earth is a living planet constantly changing, and that Nature takes its course and becomes destructive only when people are careless.



FIGURE 4. A model of a volcano made by pupils of a primary school to simulate a volcanic eruption.

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