Sustainably mitigating the effects and impacts of Geohazards

Note: The thoughts and hearts of EasySustainability's members are with the families and victims affected by the Earthquake in Turkey and Syria last week.

Introduction

Earth is a dynamic environment where Geohazards such as earthquakes, volcano eruptions, tsunamis, landslides and others occur[1]. Some of these, and the ones considered the most devastating, mainly occur in tectonic plate boundaries[1].

The earthquake that occurred in Turkey and Syria on the past 6th of February had its epicentre at the East Anatolian Fault and had a magnitude of 7.8[2]. This fault is located between four tectonic plates (Eurasian Plate, Arabian Plate, African Plate and the Anatolian Plate) and is considered one of the most active seismic areas in the world[3].

Much has been discussed, since the event of last week, about how we could mitigate and prevent the devastating effects of these hazards. The sustainable development of cities and countries, and a better understanding of our planet are essential for this purpose, since earthquakes are not predictable. The study and analysis of previous events are the best way to know what the chances for seismic activity in a determined area are[4]. By combining this data and geological studies, it is possible to draw risk maps, which are informed to building codes around the world[4] (example in figure 1).

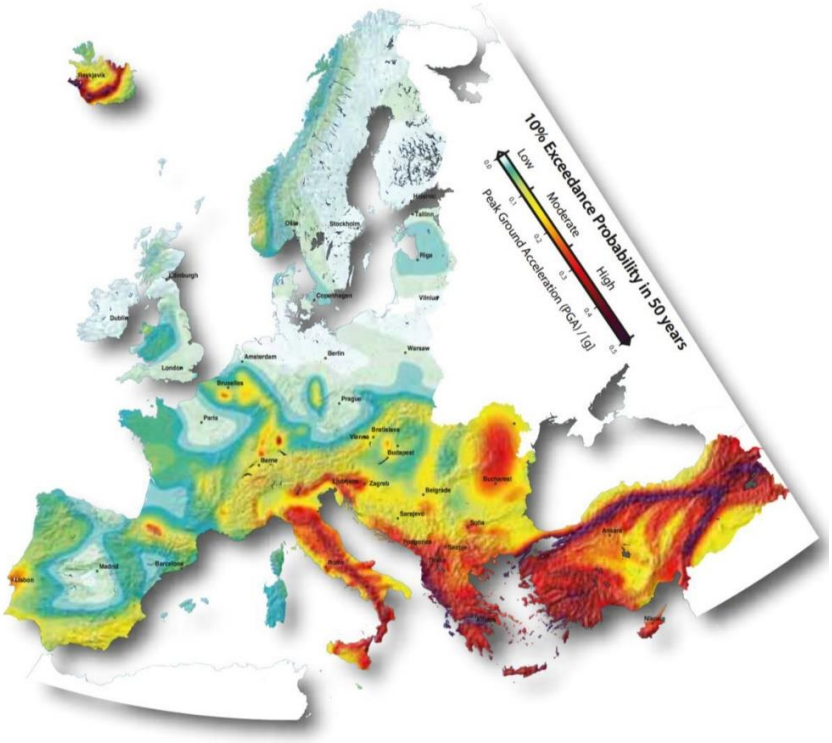

Figure 1. "SHARE European Seismic Hazard Map", from: Wiemer et al. (2016).[5]

According to the United Nations' Sustainable Development Goals 9 (industry, innovation, and infrastructure)[6] and 11 (sustainable cities and communities)[7], there has been an increase in local disaster risk reduction strategies by several countries. Here we briefly discuss several ways in which sustainability may be applied in the prevention and mitigation of geohazards.

Sustainability in the prevention and mitigation of Geohazards

There are several ways that sustainability can be used to mitigate geohazards like earthquakes (figure 2):

Figure 2. Sustainable construction.[8]

1. Sustainable construction methods:

Buildings can be built more sustainably and with improved seismic resistance, which will lessen damage[9]. This entails the use of earthquake-resistant materials, the incorporation of earthquake-resistant features, and the design of flexible buildings that can better absorb shock[9]. Examples of these techniques are base isolation, flexible diaphragms, dual systems, environmentally friendly building components (such as green walls and roofs), passive seismic energy dissipation, and sustainable materials like bamboo, rammed earth and recycled materials[9].

2. Land-use planning:

By avoiding construction in high-risk regions and ensuring that new structures are built in a way that reduces risk, sustainable land-use planning can lower the risk of

damage from earthquakes - compact construction; embracing green space; promoting sustainable materials and transportation; and encouraging seismic retrofits[10]. These will reduce effects of earthquakes while simultaneously fostering sustainability and enhancing the standard of living for their citizens[10].

3. Disaster risk reduction:

By including disaster risk reduction techniques in development planning, communities may be less negatively affected by earthquakes[11]. This can involve actions like public education campaigns, emergency response planning, community-led evacuation planning, early warning systems, and modifying already-built structures[11].

4. Increasing building regulations and standards:

Strong building norms and standards should be followed throughout construction to minimize damage risks and increase community safety during earthquakes[11]. This can include specifications for accessibility, fire resistance, and seismic resistance[11]. Building regulations and standards for these fields include the International Building Code (IBC), seismic regulations, ASCE-7, the International Code Council (ICC), and Eurocodes[11].

Final Remarks

The ability of populations, structures, and infrastructure to survive seismic events and recover after them makes sustainability essential for reducing the effects and repercussions of this type of event. We can build more resilient and sustainable communities better prepared for natural catastrophes by combining sustainable design concepts, such as hazard-resistant buildings, resilient energy and water systems, and green spaces. In addition to being morally required, investing in sustainability is also a crucial first step in ensuring that everyone has a more secure and resilient future.

References:

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[8]https://www.alchemia-nova.net/sustainable-construction/

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