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EDITORIALE

LEADER

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CASCADING EFFECTS

On 15 January 2022, when finalising the preparation of this issue of our journal, striking images and videos from the eruption of the Hunga Tonga submarine volcano reached our homes, offices, and laboratories, so that, all over the world, we could witness a gigantic geological event. In a matter of eight minutes, the eruption literally wiped out the Hunga Tonga-Hunga Ha'apai islands, sitting on the rim of a submerged caldera, which had been joined into a single landmass by another eruption, of much lower intensity, in 2014. NASA researchers estimated that the explosive force of the eruption was around 10 megatons of TNT equivalent, 500 times more powerful than the nuclear bomb dropped on Hiroshima.

Experts defined it as the "worst volcanic eruption in the past 30 years" on the entire planet; its energy was comparable to that of the Pinatubo volcano (Philippines) in 1991, which claimed the lives of 1450 people, and higher than that of the Krakatau volcano (Indonesia) in 1883, which caused thousands of casualties.

The eruption covered nearby islands with ash, had a heavy impact on the water supply to about 100,000 people, and triggered a tsunami whose effects were felt as far away as on the other side of the Pacific Ocean. The tsunami induced an oil spill off the coast of Peru, polluting some of its beaches and, again in Peru, a rogue wave killed two women.

Once again, all of this confronts us with two major issues. The first is the high likelihood that natural events of high intensity can cause cascade effects, multiplying the impacts on and the damage to human communities and activities, even thousands of kilometers away from the triggering event. Many studies and projects have been undertaken by researchers in this field. However, there is still much to be done in terms of multi-hazard assessments and cascading events.

The second issue concerns NaTech accidents. Fortunately, the eruption of the Hunga Tonga volcano and the consequent tsunami caused relatively moderate damage, despite reaching the other shore of the Pacific Ocean, thousands of kilometers away. Nevertheless, just eleven years ago, the Tohoku earthquake in Japan and the consequent tsunami triggered the most severe NaTech accident in history, i.e. the reactor core meltdown of Fukushima I nuclear power plant.

All this boils down to a single conclusion: it is increasingly necessary to give a strong impetus to investigating, predicting, and preventing the effects of these events and to mitigating the risk of so-called "natural disasters". This is all the more challenging if we bear in mind the targets and priorities for action of the Chart of the Sendai Framework for Disaster Risk Reduction of 2015, which aimed to substantially decrease the consequences and impact of the risk of natural disasters on populations by 2030. There are still eight years to go before this deadline: how much have we done and how much do we still need to do with respect to the then established roadmap?