



EDITORIALE

LEADER

by

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20 YEARS AFTER THE 2004 INDIAN OCEAN EARTHQUAKE AND TSUNAMI

Twenty years have already passed since 26 December 2004, when one of the most devastating natural disasters of modern times killed about 230,000 people. I am referring to the Indian Ocean tsunami, which occurred in just a few hours, affecting a wide area of the Earth. The event resulted in a series of waves, reaching heights of several tens of metres in some places, and striking large coastal areas of Asia between fifteen minutes and ten hours after the earthquake that generated it. The tsunami ravaged the coastal regions of Indonesia, Sri Lanka, India, Thailand, Myanmar, Bangladesh, and the Maldives, as well as the African coasts of Somalia and Kenya, more than 4500 km away from the earthquake's epicentre.

The event was triggered by a strong earthquake, with a magnitude of 9.1 and its epicentre along the north-western coast of Sumatra (Indonesia). This was the third most powerful earthquake in the history of seismology (i.e. since earthquakes have been measured with rigorous scientific methods), after those in Chile (1960) and Alaska (1964), which had magnitudes of 9.5 and 9.2, respectively. This is why the event and its heavy death toll made such a strong impression on global public opinion.

The enormous release of energy and the large movement of masses, induced by the earthquake, are estimated to have caused a slight shift in the Earth's axis of rotation, ranging from 2 to 6 cm. However, this displacement is fairly small and practically insignificant compared to the natural nutation of the Earth's axis of 15 m per year. Based on various seismic models, some scientists assumed that the small islands south-west of Sumatra had moved by roughly 20 m, and the northern tip of the island by as much as 30 m. These assumptions still need to be scientifically validated through appropriate site surveys that cross-reference GPS data, InSAR data, and data provided by traditional geodetic survey techniques.

Apart from the terrible consequences of this disaster, there are two positive aspects that I would like to stress and that bode well for actions to mitigate the damage caused by these events.

The first aspect concerns the famous story of the British girl Tilly Smith. At the time, Tilly attended primary school, and a

few days before her departure for Thailand to spend the Christmas holidays with her family, she had learned about tsunamis and their warning signs in her geography class. On the morning of 26 December, Tilly was on the beach with her parents and her 7-year-old sister. When she saw the sea water receding, she immediately alerted her parents, who then helped spread the word to other beachgoers and to the personnel of their hotel. Thanks to her remarkable presence of mind, Mai Khao Beach was evacuated a few minutes before the tsunami hit the shore. As a result, this was one of the few places on the island with no victims. On 3 November 2005, Tilly visited the UN headquarters, where she met the former US President Bill Clinton, who at the time served as UN Special Envoy for Tsunami Recovery. In June 2006, the UN launched a school awareness campaign with a view to preventing losses of human lives during natural disasters. The campaign was presented during a conference held at UNESCO headquarters in Paris, attended by Tilly Smith and other children with particular knowledge of natural calamities.

With regard to the second positive aspect, following the tragic Indian Ocean tsunami, UNESCO-IOC (Intergovernmental Oceanographic Commission) was given the mandate to establish global tsunami warning services operating in different ocean basins, each coordinated by a regional ICG (Intergovernmental Coordination Group). These are comprised of Member States in their respective regions – represented by Tsunami National Contacts (TNCs) – and organise and coordinate regional mitigation activities, including monitoring, the issuance of timely warnings, and community response.

In addition, in June 2021, UNESCO-IOC launched the Ocean Decade Tsunami Programme (ODTP) as part of the Decade of Ocean Science for Sustainable Development, an effort to bolster the global tsunami warning system by reducing response times and enhancing community readiness. Its main objectives are to i) enhance systems' capacity to issue actionable and timely warnings for tsunamis from all identified sources to 100% of coasts at risk; ii) guarantee that 100% of communities at risk are



prepared and resilient to tsunamis by 2030 through efforts like the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP). As for the latter point, I am including a picture below, taken this summer in Thailand, with clear signs warning people that they are entering a tsunami hazard zone: a simple but effective way to communicate the risk to both residents and tourists.

Finally, as part of the 18th session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), held at UNESCO headquarters in

Paris in February 2024, Alessandro Amato, Research Director of the Italian Institute of Geophysics and Volcanology (INGV), was elected President (Chair). ICG/NEAMTWS is one of the four global Intergovernmental Groups under the coordination of UNESCO-IOC (the others are those of the Pacific Ocean, the Indian Ocean, and the Caribbean (Western Atlantic)). The election of Amato pays homage not only to his expertise and leadership in tsunami studies, but also to all Italian researchers investigating this type of natural events. These events, often neglected, can cause severe disasters, of which the tragic 2004 Indian Ocean tsunami is a stark reminder.



Courtesy of Stefano Rivellino