



## **Holistic Multi-Hazard Analysis to improve resilience on the island of Santorini, Greece**

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Thira is an island in the southern Aegean Sea, about 200km southeast of Greece's mainland. It is the largest of the Santorini archipelago, a caldera rim situated around the active volcano. The Santorini volcanic complex is located on the Hellenic volcanic arc. The region is seismically active, with a history of earthquake activity and tsunami generation, in part from the potential for submarine landslides. Currently Santorini is experiencing significant population and tourist growth, which is increasing vulnerability and disaster potential.

A multi-hazard conceptual framework for natural hazard mitigation and adaptation has been applied to Santorini using geographic information systems (GIS). From this a systematic vulnerability analysis has been developed, taking into account the realistic damage scenarios, which can be used for the purposes of emergency planning and the development of resilience on the island. It looks at impacts to Santorini's infrastructure and population using previous hazard scenarios, including a series of historic volcanic eruptions (most recently in 1950) and the 1956 Amorgos earthquake and tsunami.

A series of multi-hazard building vulnerability surveys have been completed using rapid visual screening techniques, to allow the quick identification and inventory of over two thousand buildings across the island. Using GIS techniques and programmes it has been possible to identify and produce a series of likely hazard scenarios for the area.

Clear patterns of spatial vulnerability can be seen across the island as a result of seismic, volcanic and tsunamic threat. Many of the buildings are found to be vulnerable from seismic hazards, particularly around the caldera rim due to unstable ground conditions. Most of the islands permanent and tourist population inhabit the towns along the edge of the caldera, which also produces a high volcanic threat due to the proximity of the area to the active volcano. Buildings and infrastructures located in low-lying beach areas around the island are vulnerable to tsunamis.

Both the tangible and intangible losses from disasters/major incidents will continue to increase unless there is a paradigm shift in how risks are perceived and managed. Effective risk reduction is improved if all relevant threats are considered and analysed. A more fully integrated and holistic approach is now required in disaster reduction/mitigation. In the future, this holistic multi-hazard approach for resilience is to be developed at other vulnerable locations in Greece.