Hazard Resilience Strategies

Earthquakes, Tsunamis, and Volcanoes

Earthquakes
Tsunamis
Volcano-Ash Falls, Projectiles and Lateral Blasts, Pyroclastic Flows and Lava Flows

In order to avoid repetition, resiliency factors which only apply to human-caused hazards are in italics.

Since many of the specific earthquake hazards have similar mitigation strategies, they have also been combined.

Earthquakes – General, Ground Failure, Surface Faulting, Tectonic Deformation – Natural and Human-Caused

- Ensure community-based earthquake exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).
- *Ensure dam operators carefully monitor water levels in large dams*.
- *Ensure quarry operators carefully monitor large scale excavations*.
- *Ensure legislation regulates and monitors deep fluid injection (fracking) in oil and gas drilling sites and disposal of nuclear waste injections into the soil.*
- Ensure businesses have secured to the wall all office furniture that might fall onto individuals and have established earthquake evacuation and preparedness plans.
- Ensure most residences in the community are typical stick-frame buildings with vertical shear walls and are anchored to a proper foundation.
- Ensure most residents have placed large or heavy objects on lower shelves and store breakable items in low or closed cupboards with latches.
- Ensure residents have secured to the wall all furniture that might fall onto individuals and have established home-based earthquake evacuation and preparedness plans.
- Ensure the community actively promotes businesses, residents and school children to take part annually in “The Shake-Out Earthquake Exercise” or other similar exercise.
- Ensure the community has a retrofit regulation that requires all buildings that are being significantly retrofitted to be seismically upgraded if they do not meet current earthquake standards.

- Ensure the community has access to municipal and regional earthquake hazard (including fault lines) and soil zonation maps (where they do not exist, plans to create these maps have been made).
- Ensure the community has an inventory of public structures and buildings that do not meet current seismic codes that is regularly updated.
- Ensure the community has designated seismically safe buildings with access to resources like potable water and back-up electricity, and large enough to act as emergency shelters.
- Ensure the community has educated residents and school children regarding earthquake risks in the community through public awareness campaigns.
- Ensure the community has regulations in place to prevent construction across known fault lines (areas of earthquake vulnerability).
- Ensure the community has regulations in place to prevent building on soils subject to loss of soil strength and stiffness (e.g., reclaimed land and old river beds) without having adequate engineering plans in place to address the deficiency.
- Ensure the community has seismically upgraded all schools and other public buildings that do not meet current earthquake standards.
- Ensure there is an earthquake response plan in place that directs emergency response personnel, as well as Search and Rescue (SAR) volunteers, to those areas most likely to suffer major structural damage post-earthquake.
- Ensure the community has in place a means to discuss earthquakes with Traditional Knowledge holders and subject matter experts about warning systems and effective responses.

Tsunamis

- Ensure community-based tsunami exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).
- Ensure plans are in place to develop and preserve coastal forests which act as protection against tsunamis.
- Ensure the community has access to tsunami hazard zonation maps or plans to have them created and has shared/will share them with the community.
- Ensure the community has clearly marked tsunami risk areas and evacuation routes with visible signage.
- Ensure the community has designated tsunami safe buildings as temporary evacuation facilities and plans/partnerships to enable the evacuation to more shelters when appropriate after the tsunami.
- Ensure the community has educated residents and school children regarding tsunami risks and evacuation routes in the community through public awareness campaigns.
- Ensure the community has regulations in place to prohibit new construction or rebuilding in tsunami hazard areas.
- Ensure the community has coastal tsunami defenses, such as dykes, built and regularly maintained.
- Ensure there is a warning system in place to notify emergency response personnel of a potential tsunami.

- Ensure there is a warning system in place to notify residents of a potential tsunami, including a zoned alarm system to notify people on the streets.
- Ensure there is a warning system in place to notify transient, migrant, homeless and visiting people of a potential tsunami.
- Ensure the community has in place a means to discuss earthquakes with Traditional Knowledge holders and subject matter experts about warning systems and effective responses.
- Ensure that the community has limited new developments in tsunami hazard zones.
- Ensure that the community has built tsunami evacuation structures.
- Ensure that the community has protected and strengthened existing structure and infrastructure that, if damaged, would negatively affect response and recovery efforts.
- Ensure that the community has moved important community assets and vulnerable populations out of tsunami hazard zones.

Volcanoes – Ash Falls, Lava Flows, Mud Flows, Projectiles and Lateral Blasts, and Pyroclastic Blasts

- Ensure community-based volcano exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).
- Ensure the community has access to volcanic hazard zonation maps, or plans to make them, and share them with the community.
- Ensure the community has built engineering measure such as dykes, catch basins and dams to control flows and/or divert flows away from the community.
- Ensure the community has clearly marked volcanic evacuation routes with visible signage.
- Ensure the community has designated seismically safe buildings with access to resources like potable water and back-up electricity and large enough to act as emergency shelters.
- Ensure the community has educated residents and school children regarding volcanic risks and appropriate responses in the community through public awareness campaigns.
- Ensure the community has in place or has access to a volcanic monitoring system in place with rain gauges (it's easier to predict debris flow if you have information about rainfall and storm build-up), trip wires (set off by debris flow) and flow sensors (to record the nature of lava flows) to detect volcanic flows.
- Ensure the community regularly performs activities to divert lava flow (i.e., channel deepening, widening, dredging and removal of silt) to help direct volcanic materials to safe, uninhabited areas and/or to control movement of sediment.
- Ensure the community has plans to have people at watchtowers in safe locations during times of high volcanic eruption risk.
- Ensure the community has land use and zoning regulations in place to prohibit new construction or rebuilding in volcano hazard areas.
- Ensure there is a warning system in place to notify emergency response personnel of a potential volcano.
- Ensure there is a warning system in place to notify residents of a potential volcano.
- Ensure there is a warning system in place to notify transient, migrant, homeless and visiting people of a potential volcano.

- Ensure the community has in place a means to consult Traditional Knowledge holders and subject matter experts about volcanic eruptions, effective responses and warning systems.

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