



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 mitigative strategies, they have also been combined.

Earthquakes – General, Ground Failure, surface faulting, tectonic deformation – Natural and Human-Caused 1 2 3 4 5 6

- 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 legislation regulates and monitors deep fluid injection (fracking) in oil and gas drilling sites and of disposal of nuclear waste injections into the soil.*
- Ensure most businesses have secured tall furniture, filing cabinets or book cases that might fall onto individuals to the wall.
- Ensure most residences in the community are typical light-frame buildings with vertical shear walls and are anchored to an adequate foundation. Vertical shear walls are “typically wood frame stud walls covered with structural sheathing material like plywood. When the sheathing is properly fastened to the stud wall framing, the shear wall can resist forces directed along the length of the wall” (Tim McCormick, 2005).
- Ensure most residents have placed large or heavy objects on lower shelves and store breakable items in low or closed cupboards with latches.
- Ensure most residents have secured tall furniture and/or furniture that might fall onto individuals to the wall and established home-based earthquake evacuation and preparedness plans.
- *Ensure quarry operators carefully monitor large scale excavations.*
- Ensure the community actively promotes businesses, residents and school children to take part annually in “Exercise Shake-Out.”



- 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 earthquake hazard and soil zonation maps and shared them with the community.
- Ensure the community has an inventory of public structures and buildings that do not meet current seismic codes.
- Ensure the community has designated seismically safe buildings with access to resources like potable water and back-up electricity 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 building 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 a earthquake response plan in place that directs police, fire and ambulance personnel as well as Search and Rescue (SAR) volunteers to those areas most likely to suffer major structural damage post-earthquake.

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- 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 and shared them with the community.
- Ensure the community has clearly marked tsunami evacuation routes with visible signage.
- Ensure the community has designated tsunami safe buildings as temporary evacuation facilities.
- Ensure the community has educated residents and school children regarding tsunamis risks 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 tsunami defenses such as dykes built.
- Ensure there is a warning system in place to notify police, fire and ambulance personnel of a potential tsunami.
- Ensure there is a warning system in place to notify residents of a potential tsunami.
- Ensure there is a warning system in place to notify transient, migrant and homeless people of a potential tsunami.

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 and shared them with the community.
- Ensure the community has built engineering measure such as dykes, catch basins and dams to control flows and/or divert them 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 as emergency shelters.
- Ensure the community has educated residents and school children regarding volcanic risks 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 has performed activities to divert lava flow (i.e. channel deepening, widening, dredging and removal of silt) to help direct volcanic materials to the sea and/or control movement of sediment.
- Ensure the community has plans to have people at watchtowers in safe locations during times of high risk.
- Ensure the community has regulations in place to prohibit new construction or rebuilding in volcano hazard areas.
- Ensure there is a warning system in place to notify police, fire and ambulance 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 and homeless people of a potential volcano.

References

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