

# Hazard Resilience Index (HRI)

## *Earthquakes, Tsunamis, and Volcanoes*

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

### Earthquakes, Tsunamis and Volcanoes

Please refer to the *Hazard Resilience Index Instructions (HRI)* document for more information on using this document.

***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

Hazard Resilience Rating      High Resilience       Low Resilience       Need More Info       Not Applicable

Yes	No	Need More Info	Not Applicable	FACTORS	This is important to my community
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Community-based earthquake exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Dam operators carefully monitor water levels in large dams.</i>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Quarry operators carefully monitor large scale excavations.</i>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Legislation regulates and monitors deep fluid injection (fracking) in oil and gas drilling sites and the storage and disposal of nuclear wastes</i>	<input type="checkbox"/>

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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Businesses have secured to the wall all office furniture that might fall onto individuals and have established earthquake evacuation and preparedness plans.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Most residences in the community are typical stick-frame buildings with vertical shear walls and are anchored to a proper foundation.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Most residents have placed large or heavy objects on lower shelves and store breakable items in low or closed cupboards with latches.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Residents have secured to the wall all furniture that might fall onto individuals and have established home-based earthquake evacuation and preparedness plans.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community actively promotes businesses, residents and school children to take part annually in "The Shake-Out Earthquake Exercise" or other similar exercise.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has access to municipal and regional earthquake hazard (including fault lines) and soil zonation maps	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has an inventory of public structures and buildings that do not meet current seismic codes that is regularly updated.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has educated residents and school children regarding earthquake risks in the community through public awareness campaigns.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has regulations in place to prevent construction across known fault lines (areas of earthquake vulnerability).	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has seismically upgraded all schools and other public buildings that do not meet current earthquake standards.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has in place a means to discuss earthquakes with subject matter experts or Traditional Knowledge holders about warning systems and effective responses.	<input type="checkbox"/>

## Tsunamis

<b>Hazard Resilience Rating</b>	High Resilience <input type="checkbox"/>	Low Resilience <input type="checkbox"/>	Need More Info <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
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Yes	No	Need More Info	Not Applicable	FACTORS	This is important to my community
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Community-based tsunami exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plans are in place to develop and preserve coastal forests which act as protection against tsunamis.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has access to tsunami hazard zonation maps and shared them with the community.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has clearly marked tsunami risk areas and evacuation routes with visible signage.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has educated residents and school children regarding tsunamis risks and evacuation routes in the community through public awareness campaigns.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has regulations in place to prohibit new construction or rebuilding in tsunami hazard areas.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has coastal tsunami defenses, such as dykes, built and regularly maintained.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is a warning system in place to notify emergency response personnel of a potential tsunami.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is a warning system in place to notify transient, migrant, homeless and visiting people of a potential tsunami.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has in place a means to discuss earthquakes with subject matter experts or Traditional Knowledge holders about warning systems and effective responses	<input type="checkbox"/>

## Volcanoes – Ash falls, lava flows, mud flows, projectiles and lateral blasts, and pyroclastic blasts

<b>Hazard Resilience Rating</b>	High Resilience <input type="checkbox"/>	Low Resilience <input type="checkbox"/>	Need More Info <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
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Yes	No	Need More Info	Not Applicable	FACTORS	This is important to my community
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Community-based volcano exercises have taken place in the community-at-large (e.g., table-top or full-scale exercises).	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has access to volcanic hazard zonation maps and shared them with the community.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has built engineering measure such as dykes, catch basins and dams to control flows and/or divert flows away from the community.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has clearly marked volcanic evacuation routes with visible signage.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has educated residents and school children regarding volcanic risks and appropriate responses in the community through public awareness campaigns.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has plans to have people at watchtowers in safe locations during times of high volcanic eruption risk.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has land use and zoning regulations in place to prohibit new construction or rebuilding in hazard areas.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is a warning system in place to notify emergency response personnel of a potential volcano.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is a warning system in place to notify residents of a potential volcano.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is a warning system in place to notify transient, migrant, homeless and visiting people of a potential volcano.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The community has in place a means to consult with subject matter experts or Traditional Knowledge holders about volcanic eruptions, effective responses and warning systems.	<input type="checkbox"/>

## References

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