

# Working from the same page

## consistent messages for CDEM

### PART B: Hazard-specific information



Banda Aceh: Debris from the 2004 Boxing Day tsunami

# Tsunami

- ▶ Learn whether tsunamis have previously occurred in your area by contacting your local council or visiting the GNS Science website [www.gns.cri.nz](http://www.gns.cri.nz).
- ▶ Find out about tsunami risk in your area.
- ▶ Check the flooding elevation for your house.

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### **CORE ACTION MESSAGES IN THIS CHAPTER (pp8-11)**

- ▶ **If you are at the coast move quickly to higher ground, or if the surrounding area is flat, as far inland as possible**

**For general preparedness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household should take tsunami specific precautions and plan for and practice what to do if a tsunami occurs.**

- ▶ **Determine your risk**
- ▶ **Prepare members of your household**
- ▶ **Learn and practice evacuation routes**
- ▶ **Actively protect your home**
- ▶ **Stay informed and follow instructions**
- ▶ **Climb to higher ground**
- ▶ **Take care of yourself and help others**
- ▶ **Watch for hazards**

**Please note: Core Action Messages should be read in conjunction with the rest of the text in this chapter.**

## Awareness messages

### Why talk about tsunami?

On a world scale, New Zealand's exposure to tsunami hazards is considered high. The risk of damage and financial loss is becoming greater with increasing coastal development and use.

There is abundant evidence that large, destructive tsunami have affected the New Zealand coast in the past. In the last 6000 years, the geological record suggests that at least one very large tsunami with a run-up, i.e. vertical height that the tsunami reaches on land (see Fig. 1), of 30 metres or more has reached the New Zealand coast. In the last two hundred years, at least three tsunami with run-up heights of 10 metres or more have occurred.

In 1855, a large earthquake on the Wairarapa Fault generated a tsunami with run-up heights of up to 10 metres in eastern Palliser Bay. In 1947, a 10-metre run-up high tsunami reached the coast north of Gisborne following a local earthquake. In 1960, a massive magnitude 9.5 earthquake off the coast of Chile generated a Pacific-wide tsunami that caused thousands of deaths in Chile, and hundreds of deaths in Hawai'i, Japan and the Philippines. It also caused widespread damage on the east coast of New Zealand. Run-up heights of 4 metres occurred – even though the tsunami arrived at low tide. The tsunami would have been far more destructive if it had struck at high tide.

Even though more recent events like the Boxing Day Tsunami in 2004 or the Solomon Islands Tsunami in April 2007 didn't cause any damage in New Zealand, significant rises in water level were recorded. The largest wave height recorded in New Zealand from the Boxing Day tsunami was at Timaru where an individual wave reached nearly 1 m (peak to trough) and 1.10m in Charleston during the Solomon Islands tsunami. New Zealand can expect tsunami with similar, and greater, run-up heights in the future. Some coasts are more at risk from tsunami than others because of their proximity to local offshore areas of high seismic (earthquake) activity, or may be more exposed to tsunami arriving from distant sources. No part of the New Zealand coast is free from tsunami hazards, and some of our larger

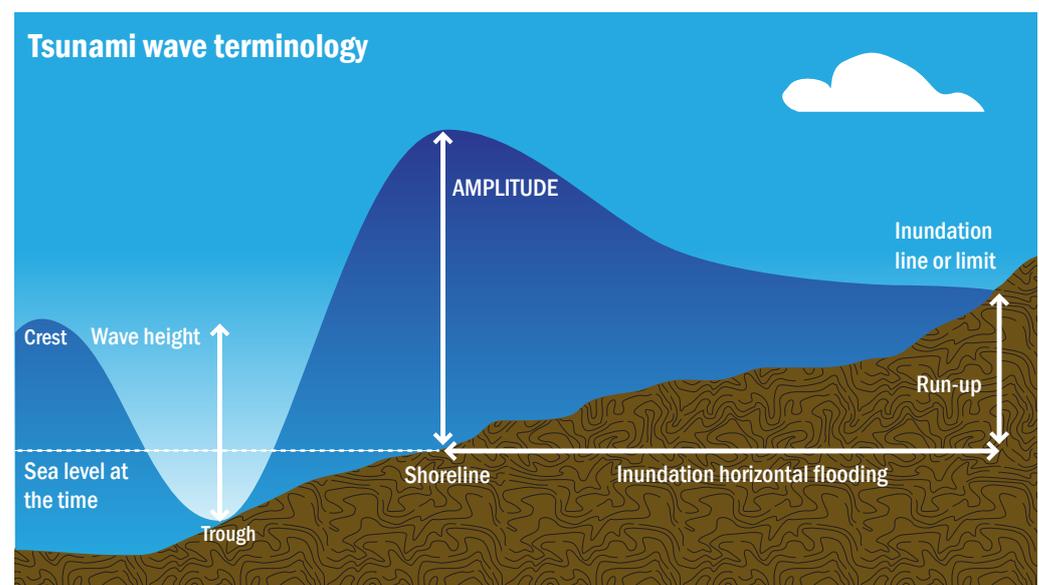


Fig. 1 Schematic diagram of a tsunami wave approaching the coast (Reese et al, 2007)

**Why talk about tsunami?  
(continued)**

lakes may also be at risk from tsunami – for instance, caused by landslides.

Tsunami waves are described by both their height and their run-up (**see** Fig. 1 on the previous page). Tsunami height is a measure of the vertical trough-to-crest height of a tsunami wave. Tsunami height is not constant – it increases substantially as the waves approach the shore and it depends on the near shore sea bottom configuration.

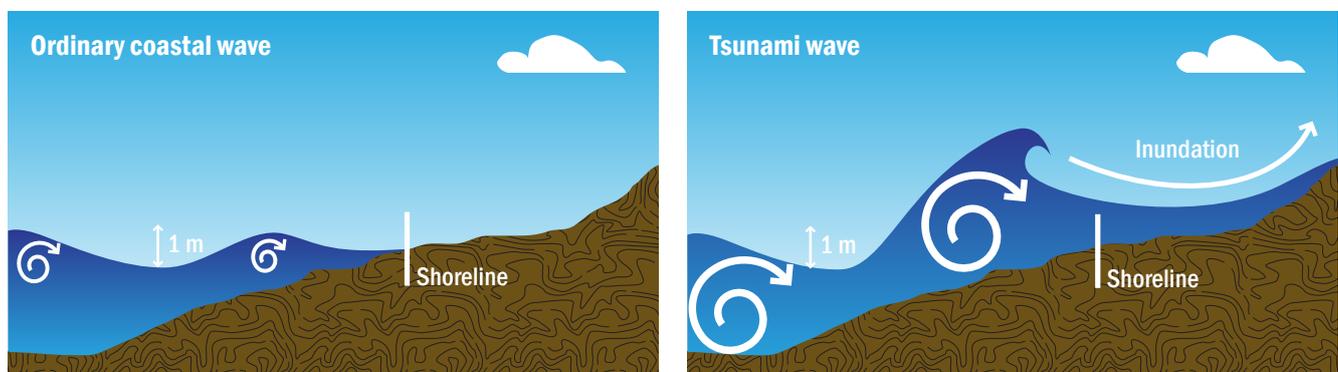
Tsunami run-up is the maximum vertical height that the tsunami reaches on land above normal sea level at the time. Run-up is dependent on the type and size of the tsunami, as well as coastal topography and land use. Tsunami run-up is a more useful measure than tsunami height as it relates more closely to the onshore effects of a tsunami.

**What is a tsunami?**

A tsunami is a natural phenomenon consisting of a series of waves generated when a large volume of water in the sea, or in a lake, is rapidly displaced. Tsunami are known for their capacity to violently flood coastlines, causing devastating property damage, injuries, and loss of life. The principal sources of tsunami are:

- Large submarine or coastal earthquakes, in which there is significant displacement of the seafloor or coast;
- Underwater landslides (which may be triggered by an earthquake or volcanic activity);
- Large coastal cliff or lakeside landslides;
- Underwater volcanic eruptions.

Tsunami waves differ from ordinary coastal waves (**see** Fig. 2) in that the entire column of water, from the ocean floor to the surface is affected. Tsunami waves contain considerable energy. This means tsunami waves travel much further, both in coastal surges and retreats, compared to ordinary coastal waves. Tsunami also create phenomena not characteristic of ordinary waves such as strong currents.



**Fig. 2** Wave energy in ordinary coastal waves is limited to the surface of the ocean. This energy rapidly dissipates as the wave breaks on the shoreline (left). Energy in tsunami waves however, affects the entire column of water from the ocean floor to the surface (right). This energy does not readily dissipate. Instead, as the ocean floor rises, water is pushed upwards and much further inland releasing considerable energy and resulting in coastal inundation. A one metre tsunami wave cannot be likened to a one metre ordinary coastal wave.

### **What is a tsunami? (continued)**

A tsunami can occur at any season of the year and at any time, day or night. On the open ocean tsunami waves are small and barely noticeable but when the waves enter shallow water they will rise in height. Some tsunami can be very large and can rapidly and violently inundate coastlines, causing loss of life and property damage. Others can be small but still dangerous to those near or in the coastal water.

It is important to remember that not all earthquakes will generate a tsunami, and that earthquakes are not the only sign of an impending tsunami so it is critical to know what to do as a precaution if you are in a vulnerable area.

### **What are our tsunami risks?**

New Zealand's entire coast is at risk of tsunami.

- The biggest tsunami in New Zealand are likely to be caused by events close to our shore and can arrive within just a few minutes.
- People on the beach or in low coastal areas need to be aware that a tsunami could arrive within minutes after a severe earthquake, without an official warning being issued.
- In some cases, a relatively weak, rolling earthquake with a long duration can be followed by a large tsunami.
- The tsunami danger period can continue for many hours after a major earthquake.
- Tsunami also may be generated by very large earthquakes far away. Tsunami waves can travel thousands of kilometres and still be big enough when they arrive here to cause loss of life and damage.
- A tsunami consists of a series of waves, and the first wave may not be the largest.
- There may be many waves separated by up to an hour, or more.
- Tsunami can travel around corners and inundate what appear to be sheltered areas.
- All areas of the coastline will not be impacted equally. There can be a large variation in run-up and impact over short distances along the coast.
- Tsunami waves can travel up streams and rivers with damaging waves extending farther inland than the immediate coast.
- Once they travel over land, tsunami pick up debris, can knock down buildings and have enormous destructive force.
- Harbours, bays and inlets often amplify tsunami waves.

### **Distant-, regional- and local- source tsunami**

Prior to and particularly since 2005 it has become practice to distinguish between distant-, regional-, and local-source tsunami. These terms were defined in the scientific reports developed principally for emergency management purposes, to reflect the availability of time for warning notifications to be issued at the national level by the Ministry of Civil Defence & Emergency Management and the appropriate response to be initiated and implemented at the regional level.

Definitions for the different sources of tsunami are:

**NZ local sources:** less than 1 hour tsunami travel time to the nearest New Zealand coastline, noting that many travel times are less than 30 minutes and some travel times are as short as a few minutes.

**NZ regional sources:** 1–3 hours tsunami travel time to the nearest New Zealand coastline.

**NZ distant sources:** more than 3 hours of tsunami travel time to the nearest New Zealand coastline.

Civil Defence Emergency Management Groups, their member local authorities and partner agencies are now using similar terms preceded by a district or place name to refer to response times specific to their district or place. For example, a “Mercury Bay area regional source tsunami” refers to those events that are 1–3 hours tsunami travel time from the Mercury Bay area. These may be local source events somewhere else, e.g. a local source tsunami as far as Gisborne is concerned and as far as response at national level is concerned. Prefixes should be used consistently to prevent confusion.

### Tsunami warning messages and signals

In the case of an impending tsunami, warning messages and signals to the public can come from several sources – **natural, official** or **unofficial**.

#### Natural warnings

Natural warning signals are of key importance in response to local source tsunami and they may be the *only* warnings possible for local or regional source tsunami.

- Strong earthquake shaking (i.e. it is hard to stand up)
- Weak, rolling earthquake shaking of unusually long duration (i.e. a minute or more)
- Out of ordinary sea behaviour, such as unusual and sudden sea level fall or rise
- The sea making loud and unusual noises, especially roaring like a jet engine

When experiencing any of the above **go immediately to high ground or, if the surrounding area is flat, go as far inland as possible**, evacuating all coastal areas or, where present, all evacuation zones. The first wave may arrive within minutes. **Once away from the water, listen to a radio station for information from local civil defence about further action you should take.**

Even if you do not feel shaking, if you learn that an area has experienced a large earthquake that could send a tsunami in your direction, listen to a radio or television station for information from local civil defence about action you should take. Depending on the location of the earthquake, you may have a number of hours in which to take appropriate action.

### **Tsunami warning messages and signals (continued)**

#### **Official warnings**

Official warnings are normally disseminated via the Ministry of Civil Defence & Emergency Management National Warning System to the national media, local authorities and other key national organisations that might be involved in response. As a consequence of receiving a national warning message or independently, local authorities issue official warnings to the public.

At present, official warning messages are:

- expected for NZ distant source tsunami
- not expected for the nearest coast affected by NZ local source tsunami
- possible for NZ regional source tsunami and for areas 1-3 hours travel time from the source of local source tsunami

An official warning from your local authority (civil defence emergency management) may be issued through radio or television broadcasts and emergency services. Warning may also be through siren, telephone, txt, loud hailer or other local arrangements. Official warnings are currently expected to come for sources that are more than three hours of tsunami travel time away from you. You may receive warnings from one, or several sources. Respond to the first source; do not wait for more messages before you act.

#### **Unofficial/informal warnings**

There are several ways by which people may receive unofficial (which have also been called informal) warnings of an impending tsunami, for example:

- media coverage, following release of a watch/warning bulletin from the Pacific Tsunami Warning Center (PTWC). People may receive unofficial warnings either directly through local or international media, or from friends in New Zealand or overseas that have heard their broadcasts;
- from people (e.g. by phone) who have already experienced the arrival of the tsunami on coastline closer to the source, or observed a natural warning sign.

Warnings from friends, other members of the public, international media, internet, etc. may be correct; informal communication may be your only warning, especially for tsunami sourced from less than three hours tsunami travel time away from you.

#### **Note:**

- If you are in an evacuation zone and you feel the threat is imminent, evacuate to high ground and/or inland immediately, or as directed by officials.
- Verify the warning only if you can do so quickly (via New Zealand radio or television broadcasts, internet, Civil Defence Emergency Management, or Emergency Services).
- The first or largest wave may not arrive for many hours after the forecast arrival time.
- If New Zealand Civil Defence Emergency Management warnings are available, trust their message over informal warnings.

## Action messages

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### CORE ACTION MESSAGES

- ▶ **Move quickly to higher ground, or if the surrounding area is flat, as far inland as possible.**

**For general preparedness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household should take tsunami specific precautions and plan for and practice what to do if a tsunami occurs.**

#### **What to do if you feel a strong coastal earthquake or observe unusual coastal water phenomena (natural warnings)**

1. Drop, cover, and hold on during the shaking. You should first protect yourself from the earthquake.
2. When the shaking stops, gather members of your household and move quickly to higher ground away from the coast, or inland. A tsunami may arrive within minutes.
3. While evacuating, avoid hazards caused by earthquake damage, especially fallen power lines.
4. Never go to the shore to watch for a tsunami. Remember, you cannot outrun a tsunami, it moves faster than a person can run.

### CORE ACTION MESSAGES

- ▶ **Stay informed and follow instructions.**
- ▶ **Climb to higher ground.**

If you receive an official warning respond to the first message; do not wait for more messages before you act.

#### **What to do when an official tsunami warning is issued**

5. Official warnings are currently expected to come for sources that are more than three hours of tsunami travel time away from you.
6. Listen carefully to official instructions and follow them.
7. Evacuate from the areas or zone(s) stated in the warning.
8. Stay out until the official 'all-clear' is given.
9. Take your Getaway Kit with you if possible (but do not travel into the evacuation zone to collect your kit or other belongings).
10. Continue listening for further messages while you respond.
11. Get to higher ground or as far inland as possible. Officials cannot reliably predict either the height or local effects of the impending tsunami. Watching a tsunami from the beach or cliffs could put you in grave danger. If you can see the wave, you may be too close to escape it.
12. Do not assume that after one wave the danger is over. The next wave may

be larger than the first one. In several cases, people survived the first wave and returned to homes and businesses only to be trapped and killed by later waves in the series which were sometimes larger than the first wave.

### **Tsunami evacuation**

13. If you evacuate, take your animals with you. Do not spend time looking for them and if you are not at home, do not return to get them.
14. Move quickly to higher ground, or if the surrounding area is flat, inland, as far from the coastline as possible.
15. Evacuate via the routes drawn on evacuation maps if maps are present.
16. Walk or bike quickly if possible, drive only if essential. If driving, keep going once you are well outside of all evacuation zones, to allow room for others behind you.
17. If you are farming along the coast or river estuary, evacuate your family and staff to higher ground first. If you have time, move livestock and domestic animals to higher ground.
18. Stay out of the evacuated area until given the official “all-clear”. Continue to listen to your radio.
19. Stay away from coastal water, tidal estuaries, rivers and streams for at least 24 hours after any tsunami warning, as even small waves create dangerous currents.
20. Boats are generally safer in water deeper than 20 metres than if they are close to the shore. It is not safe to try to move a boat if a tsunami is imminent.
21. Take your Getaway Kit with you.

### **CORE ACTION MESSAGES**

- ▶ **Determine your risk.**
- ▶ **Prepare members of your household.**
- ▶ **Learn and practice evacuation routes.**

### **Be prepared for a tsunami: protect yourself**

Be aware of natural signs that can mean that a tsunami may be approaching:

22. Strong earthquake shaking (i.e. it is hard to stand up);
23. Prolonged, weak earthquake shaking (i.e. a minute or more);
24. A noticeable rapid rise or fall in coastal waters;
25. Water making unusual noise.
26. If you live in, or are visiting, an area at risk from tsunami, be aware of tsunami evacuation zones and routes and warning methods and signage:
27. Find out if your home, farm, school, workplace or other frequently visited locations are in tsunami hazard areas.
28. If you are visiting an area at risk from tsunami, check with the hotel, motel

### **Be prepared for a tsunami: protect yourself (continued)**

- or campground operators for tsunami evacuation information and find out what the local warning system is for tsunami. It is important to know the designated escape routes before any warning is issued.
29. Know the tsunami evacuation zone, if present, for your area. Consider developing zone maps if they are not already present – contact local civil defence emergency management.
  30. Plan evacuation routes from your home, farm, school, workplace, or any other place you could be where tsunami present a risk. Go as high or as far inland as you can; every metre inland or upward may make a difference. You should be able to reach your safe location on foot as soon as possible.
  31. Plan to evacuate on foot or bike wherever possible to avoid congestion. After a disaster, roads may become impassable or blocked. Follow posted tsunami evacuation routes where present; these will lead to safety. Local emergency management officials can advise you on the best route to safety and likely shelter locations.
  32. If your children’s school is in an identified evacuation zone, find out what the school evacuation plan is. Find out if the plan requires you to pick up your children from a safe location after the “all-clear” is given. Work with your school to make sure arrangements are in place for the school to evacuate children. Telephone lines during a tsunami or other emergency may be overloaded, and routes to and from schools are likely to be jammed.
  33. Practice your evacuation routes. Familiarity may save your life. Be able to follow your escape route at night and during inclement weather. Practicing your plan makes the appropriate response more of a reaction, requiring less thinking during an actual emergency situation.
  34. Stay tuned to a radio station to keep informed of local warnings and instructions.
  35. Discuss tsunami with your family. Everyone should know what to do in a tsunami situation. Discussing tsunami ahead of time will help reduce fear and save precious time in an emergency.
  36. Be prepared to be on your own, without outside assistance, for at least three days. Prepare a three-day Emergency Survival Items.
  37. Assemble and make copies of important documents such as wills, insurance papers, medical records, etc. Keep original documents in a fireproof / waterproof container.
  38. Arrange an out-of-area contact person.

## CORE ACTION MESSAGES

### Actively protect your home.

#### Protect your property

If you are at risk from tsunami, you should:

39. Check with your Council about the level of risk a tsunami may pose.
40. Ideally you should avoid building or living in buildings close to the coastline, as these areas are more likely to experience damage from tsunami, strong winds, or coastal storms.
41. Take precautions to prevent flooding (**See:** 'Floods' and 'Coastal Storm Inundation').
42. Have an engineer check your home and advise about ways to make it more resistant to tsunami water.
43. If risks are high consider elevation of coastal homes. Elevating your house will help reduce damage to your property from most tsunami and other coastal hazards.
44. Ensure that any critical buildings such as milking sheds or packing houses, or stockyards are protected in the same way as your home. When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher ground in the event of a tsunami.

## CORE ACTION MESSAGES

- ▶ Stay informed.
- ▶ Take care of yourself and help others.
- ▶ Watch for hazards.

#### What to do after a tsunami

After a tsunami, you should:

45. Stay tuned to a radio station for updated emergency information. The tsunami may have damaged roads, bridges, or other places that may be unsafe.
46. Check yourself for injuries and get first aid if necessary before helping injured or trapped persons.
47. If someone needs to be rescued, call professionals with the right equipment to help. Many people have been killed or injured trying to rescue others in flooded areas.
48. Help people who require special assistance – infants, elderly people, those without transportation, families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.

### What to do after a tsunami (continued)

49. Avoid areas impacted in a tsunami emergency. Your presence might hamper rescue and other emergency operations and put you at further risk from the residual effects of floods, such as contaminated water, crumbled roads, landslides, mudflows, and other hazards.
50. Use the telephone for emergency calls only. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls.
51. Stay out of a building if water remains around it. Tsunami water, like floodwater, can undermine foundations, causing buildings to sink, floors to crack, or walls to collapse.
52. When re-entering buildings or homes, use extreme caution. Tsunami-driven floodwater may have damaged buildings where you least expect it. Carefully watch every step you take.
53. Wear long pants, a long-sleeved shirt, and sturdy shoes. Sturdy shoes protect against injuries or cut feet.
54. Use a battery-powered torch when examining buildings. Battery-powered lighting is the safest and easiest to use. **DO NOT USE CANDLES.**
55. Examine walls, floors, doors, staircases, and windows to make sure that the building is not in danger of collapsing.
56. Inspect foundations for cracks or other damage. Cracks and damage to a foundation can render a building uninhabitable.
57. Look for fire hazards. There may be broken or leaking gas lines, flooded electrical circuits, or submerged furnaces or electrical appliances. Flammable or explosive materials may have come from upstream. Fire is the most frequent hazard following floods.
58. Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and get everyone outside quickly. Turn off the gas using the outside main valve if you can, and call the gas company from a neighbour's home. If you turn off the gas for any reason, it must be turned back on by a professional.
59. Look for electrical system damage. If you see sparks or broken or frayed wires, or if you smell burning insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice. Electrical equipment should be checked and dried before being returned to service.
60. Check for damage to sewage, effluent and water systems. If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap. You can obtain safe water from undamaged water heaters or by melting ice cubes that were made before the tsunami hit. Turn off the main water valve before draining water from these sources. Use tap water only if local health officials advise it is safe.
61. Watch for loose plaster and wall and ceiling linings that could fall.
62. Open the windows and doors to help dry the building.

### What to do after a tsunami (continued)

63. Shovel mud out before it solidifies.
64. Check food supplies. Any food that has come in contact with floodwater may be contaminated and should be thrown out.
65. Expect aftershocks if the earthquake was very large (magnitude 8 to 9+ on the Richter scale) and located nearby. Some aftershocks could be as large as magnitude 7+ and capable of generating another tsunami. The number of aftershocks will decrease over the course of several days, weeks, or months depending on how large the main shock was.
66. Keep all your animals under your direct control. Hazardous materials abound in flooded areas. Your pets may be able to escape from your home or through a broken fence. Pets may become disoriented, particularly because flooding usually affects scent markers that normally allow them to find their homes. The behaviour of pets may change dramatically after any disruption, becoming aggressive or defensive. Be aware of their well-being and take measures to protect them from hazards, and to ensure the safety of other people and animals.
67. The behaviour of livestock may change dramatically after a disruption. Be aware of their well-being and ensure they are secure, have food, water and are safe.

### Insurance

If your property sustains any damage:

68. Residential property damage caused by tsunami is covered by Earthquake Commission (EQC) insurance **providing** you already have house and/or contents insurance. If your property has been damaged, lodge a claim by calling 0800 326 243 or visit [www.eqc.govt.nz](http://www.eqc.govt.nz).
69. If the value of damage to your property exceeds the limit of EQC cover, ring your insurer as soon as possible. In almost all cases the insurance company will send an insurance assessor to look at your property. They will confirm what repairs and replacements are needed and covered by your policy.
70. Photograph or video record your damaged property.
71. List the damage to your property and belongings.
72. If your insurance policy covers you for loss of perishable goods, make a list of all the foods you throw away. Include anything in your fridge or freezer ruined by loss of power.

Ask the insurance company:

73. How long it will be before the assessor visits.
74. If they will provide you with temporary accommodation. This could be a nearby motel, bed and breakfast, a static caravan or a rented house.

### **Insurance (continued)**

Things to help with your insurance claim:

75. Confirm the insurance company will pay for any service or equipment you need.
76. Make a note of all telephone calls. Record the date, name and what was agreed.
77. Keep copies of all letters, emails and faxes you send and receive.
78. Keep receipts.
79. Don't throw anything away until told (except ruined food).
80. Depending on your policy, the insurance company may only offer to clean and repair something, not replace it.
81. If you rent your property, contact your landlord and your contents insurance company as soon as possible.
82. If you do not have insurance, your local council should be able to provide information on hardship grants or charities that may be able to help you.

## Tsunami general information

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### Media and community education ideas

If your community is at risk, build tsunami evacuation routes and publicise their locations. Post signs directing people to higher ground away from the coast.

Review land use in tsunami hazard areas so no new critical facilities, such as hospitals and police stations; high-occupancy buildings, such as auditoriums or schools; or fuel storage tank farms are built where there is a tsunami hazard.

Consider relocating existing critical facilities outside the tsunami hazard area when opportunities arise, or at least explore ways to reinforce facilities and structures, such as critical bridges needed for evacuation. Tsunami damage can be minimised through land use planning, preparation, and evacuation.

Ask your local newspaper or radio or television station to:

83. Do a series on the dangers of tsunami, coastal inundation and floods.
84. Do a story featuring interviews with local officials about land use management and building codes in floodplains.
85. Highlight the importance of staying informed about local conditions.
86. Run public service ads about how to protect lives and property in a tsunami.
87. Work with officials of the local fire, police, and emergency medical services departments; utilities; hospitals; emergency management office to prepare and disseminate guidelines for people with mobility impairments about what to do if they have to evacuate.
88. Periodically inform your community about local public warning systems.
89. Interview local officials and insurance companies about the types of insurance that cover flood-related losses. Include information on the economic effects of tsunami impacts.

### Fiction and fact

**Fiction** Tsunami are giant walls of water.

**Fact** Tsunami normally have the appearance of a fast-rising and fast-receding flood. They can be similar to a tide cycle occurring over 10 to 60 minutes instead of 12 hours. Occasionally, tsunami can form walls of water, known as tsunami bores, when the waves are high enough and the shoreline configuration is appropriate.

**Fiction** A tsunami is a single wave.

**Fact** A tsunami is a series of waves. Often the initial wave is not the largest. The largest wave may occur several hours after the initial activity starts at a coastal location. There may also be more than one series of tsunami waves if a very large earthquake triggers local landslides.

**Fiction** A tsunami is the same thing as a tidal wave.

**Fact** Tidal waves are regular ocean waves, and are caused by the tides. These waves are caused by the interaction of the pull of the moon's gravity on the earth. A "tidal wave" is a term used in common folklore to mean the same thing as a tsunami, but is not the same thing.

## Tsunami general information

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### Fiction and fact (continued)

**Fiction** Boats should move to the protection of a bay or harbour during a tsunami.  
**Fact** Tsunami are often most destructive in bays and harbours, not just because of the waves but because of the violent currents they generate in local waterways. Tsunami are least destructive in deep, open ocean waters.

### Useful links

- [www.gns.cri.nz](http://www.gns.cri.nz)
- [www.geonet.org.nz](http://www.geonet.org.nz)
- [www.teara.govt.nz](http://www.teara.govt.nz) (search for 'tsunamis')
- [www.niwa.co.nz](http://www.niwa.co.nz)
- [www.rural-support.org.nz/](http://www.rural-support.org.nz/)
- [www.maf.govt.nz/mafnet/rural-nz/adverse-events/](http://www.maf.govt.nz/mafnet/rural-nz/adverse-events/)

### Useful numbers

Your important emergency household plan telephone numbers. Fill this out and keep this leaflet with your emergency items.

Contact	Details
Local authority emergency helpline	
Insurance company 24-hour	
Insurance number and policy number	
Local radio station (Frequency )	
School	
Family and neighbours	
Bank phone number and details	
Work phone numbers	
Medical Center/GP	
Local police station	
Vet/kennel/cattery	
Local hotel or B&B	
Gas supplier and meter number	
Electricity supplier and meter number	
Water supplier and meter number	
Electrician	
Plumber	
Builder	