

Some comments on our emergency planning

by Jacqueline Windh, PhD

This article is Part 1 of a 2-part series commenting upon our west coast emergency preparedness programs. I am writing this critique both as a concerned local citizen, and as a PhD scientist in the field of Structural Geology (the study of folding and faulting in the Earth's crust).

I appreciate and acknowledge the efforts of all of the volunteers who have put together our local emergency preparedness programs and information brochures. However, I do not believe that all of the information and advice that they have put together is appropriate for our region or for the magnitude of the expected events. These two articles provide background information as well as my own recommendations. My criticisms are intended in the most positive sense – to help individuals to prepare for these events, and to work for the continuing improvement of our local emergency plans.

This week's article focuses upon the nature of the events: the scale and magnitude of the expected earthquake and tsunami, and what this means for evacuation routes. Next week I will focus more on personal preparedness and emergency kits.

About the earthquake

It concerns me that so little of our emergency planning focusses upon the actual earthquake. A tsunami will only affect low-lying areas near the coast, but the megathrust earthquake will affect this entire region.

Thinking about what this earthquake will actually be like is unpleasant. However, I believe that we can only prepare properly if we actually know what to expect. We should not live in fear. Rather, we should use this knowledge in order to prepare as best we can.

Using the available data, I calculate a 10% chance of a megathrust earthquake coming within the next 40 years. When it comes, though, it will be one of the strongest earthquakes ever measured on our planet, at magnitude 9 or more. The ground will shake intensely for 3 to 4 minutes – and by “intensely” I mean that each “shake” back and forth will be about 2 or 3 metres. Just take a moment to imagine that. You will not be able to walk or even stand, furniture will be slamming back and forth from wall to wall, and many buildings will be severely damaged.

To get an idea of what this is like, you can watch the Kobe earthquake (Japan, 1995) on YouTube, shot on security surveillance video: http://www.youtube.com/watch?v=dE5tv_OomDM The Kobe earthquake was only magnitude 6.9, and the Richter scale is logarithmic, so remember as you are watching it that *our earthquake will be one hundred times stronger.*

Once you understand the actual *scale* of this expected earthquake, it is easy to see that its effects have serious implications for our own personal emergency planning. Some points I draw attention to are:

1. During an earthquake, we are being told to “Drop, cover and hold”. This advice is appropriate for the cities, where buildings are larger and harder to exit quickly, where there are office buildings that might be shedding brickwork or shattered glass from above, and where there is more solid furniture like office desks to shelter under.

I do not think that this information is generally appropriate for Tofino and Ucluelet. Other than our schools, most buildings here are houses our house-sized, and we can exit them quickly. Few homes have furniture sturdy enough or large enough to provide much shelter – and that furniture will be moving around violently. My suggestion is for each person to think in advance the “what if” for the buildings you spend most of your time in, e.g. home and work. If there is no sturdy furniture to shelter under (like a desk bolted to the floor), and if you can get outside quickly to a place where trees and power lines will not fall on you, I suggest you consider getting out.

An experienced American rescuer who has entered hundreds of collapsed buildings states that ducking under furniture is actually the most dangerous place to be, and that it is safest to shelter *beside* rather than *under* the furniture: http://www.amerrescue.org/arti_survivalarticle.htm

2. There will be serious structural damage to buildings, and some may be completely destroyed. This means that we have to think carefully about where we store our emergency supplies. Storing emergency kits in your shed, if you have one, might make them easier to dig out after the quake.
3. It is likely that many people will be injured or killed by this quake. For people in tsunami risk zones, this will affect if and how they are able to evacuate once the shaking stops.
4. Trees will have fallen on our roads and possibly on cars, so evacuation by vehicle will probably not be possible. (More on this below).

About the tsunami

Wave height. The “safe” level for the height of the tsunami wave has been calculated as 10 metres by expert geoscientists from the Provincial Emergency Program. This height *includes* a 50% safety factor and is valid for the open coast. It does *not* apply for narrow inlets like Port Alberni, Hot Springs Cove, and possibly even Ucluelet Harbour (I am not sure if there is more detailed information there)– but it does apply for Long Beach, Tofino and Clayoquot. (In 1964, the tsunami waves were 2.5 times higher in Port Alberni than they were in Tofino).

Our local emergency personnel have added an *additional* safety factor, to come up with the 15 metre level that they show on all of the maps that they have distributed. This concerns me, because I fear that people may be endangered passing by safe spots that are

above 10 m while trying to get to a higher location. I would like to see the 10 m contour added to maps so that we all have the necessary information to choose our routes.

Recommended evacuation routes. As most people know, we have two different tsunami scenarios here: a tsunami generated by an earthquake far away, or a tsunami generated by our own earthquake. These two scenarios are extremely different, and this has not been addressed in our emergency planning.

For a tsunami generated far away, we will not feel the earthquake. We will receive notification from emergency officials (warning tones, radio broadcasts, door-knocking, etc.) of a tsunami warning, and will have several hours to evacuate to higher ground. In this scenario, I think that the evacuation route information that we have been given works well.

However, the tsunami generated by our own earthquake calls for a completely different evacuation procedure. After the intense earthquake I have described above, the first tsunami wave will arrive in between five and forty five minutes – but without any information, we will just have to assume that it's coming in five minutes. There is a 50% chance that it will be night, and around here there seems to be about a 50% chance that it will be raining. Trees will be down on the roads so we will not be able to drive. We, or our family members, may be injured. We will have to carry what we can, quickly, and get to the nearest high ground.

In this scenario, trying to get to official centres like the airport or the schools is *absolutely inappropriate*. People who do not live within running distance of an official centre should have a carefully thought-out Grab'n'Go kit ready and should have a preplanned location on nearby high ground that they can run to. In many cases, this will be private property. The tsunami itself will consist of a series of waves that will hit over the next 6 to 12 hours, so you should be prepared to stay in that location for at least 12 hours. Once the tsunami danger passes, you can choose whether to try to head home or to go to the official emergency centre.

Next week I'll look at what we each can do to prepare ourselves and our homes.