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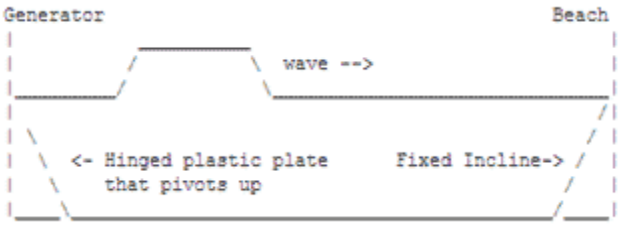
Create Your Own Tsunami

How can we make a homemade simulation of a tsunami?



Here's an idea that's very similar to laboratory models that are often used to study tsunamis.

The Generating Plate simulates the upward motion of the earth, creating a "bump" in the water. The resulting wave propagates away toward the beach, or impact area. The wave builds in height as the water gets shallower toward the beach (due to the Fixed Incline) and hits the shore.

This will probably work best if the Generating Plate is about a foot long and the water is relatively shallow. It can be moved up rapidly using a strong string attached to the side away from the pivot, which can be made with duck tape. The Fixed Incline should be a gentle slope.

The basic idea behind tsunami simulations is to show the three stages of tsunami waves:

1. **generation** usually results from the ocean bottom moved up or down, or a landslide hit the water;

2. **wave propagation** from the source region to the impact site (shallow water provides the best results); and

3. **run-up** on land usually with a sloping incline, possibly with a small model house for effect.

There is a trade-off in size between having the wave model large enough so people can see what's going on but small enough to be portable.

If the instructions for science projects allow, I'd make the model out of clear Lucite (perhaps coloring the water light blue), 24 inches long, 6 inches high and 3 inches wide. The model will work even better if it can be longer; say an additional 6 or 12 inches in length. I'd use clear aquarium glue to put the pieces together, so the seams will hold water.

Some science classes require the use of metric units, like centimeters, instead of English units. In this case, multiplying the values in inches by 2.5 will give a reasonable equivalent in centimeters.

The source end can be vertical if the source is a moving bottom or steeply sloping (one-to-one slope) for a landslide. For the sloping source-end, the end-piece would be 8.5 inches long. The moving bottom can be a 2 inch by 6 inch piece of Lucite that has strings attached to each corner (so it can be pulled upward quickly to start the tsunami wave).

There may need to be some thin spacers attached under the moving bottom to prevent it from forming a strong suction with the real bottom. You can use a strong plastic bag of sand or sugar sliding into the water to simulate a landslide.

The impact slope should be a foot long and glued at an angle from the top where the side walls end diagonally down to the bottom. This provides a slope of about 27 degree (one-to-two). You'll need to experiment with the amount of water in the model. I'll say it would be good to start with one inch (or 2.5 cm) of water to start. The shallower the water, the slower the waves will travel.

If the water is too deep or moving too fast when it hits the far impact end, it may splash out of the model. You can lay a short cover shield over the top of that end if this is a problem. Having paper towels around is not a bad idea, nor is having a funnel to use when pouring the water back into the carrying container.

It's a good idea when doing a tsunami demonstration to mention the way that the way water sloshes back and forth after the first wave hits the impact site is very much like real tsunamis behave. These tsunamis slosh back and forth in harbors, so the tsunami danger isn't over after the first wave.

(Source: Dr. Hal Mofjeld, National Oceanic & Atmospheric Association (NOAA) Center for Tsunami Research; Multidisciplinary Center for Earthquake Engineering Research (MCEER), http://mceer.buffalo.edu)