

Mark Sinclair is the general manager of Tenix LADS Corp. and president of Tenix LADS Inc. He has been involved in airborne light detection and ranging hydrographic surveys since 1994, prior to which he was involved in shipborne acoustic surveys. He previously served as a commander in the Royal Australian Navy Hydrographic Service.



A few years ago, while conducting hydrographic survey operations from Kodiak, Alaska, I stumbled across a marker by the side of a road overlooking the town, indicating the height the water had reached during the great Alaskan earthquake on March 28, 1964. A 10-meter tsunami generated by this event struck the waterfront, resulting in loss of life and the destruction of homes and businesses, including a significant part of the fishing fleet. It seemed incredible that the sea had completely inundated this area and encroached to the place where I was standing.

Across the strait in Prince William Sound, which was closer to the epicenter, local tsunamis were generated, resonating within the enclosed sound where the wave energy was less easily dissipated. Reaching maximum amplitude in Shoup Bay, Valdez Inlet, a tsunami flooded areas up to 67 meters above the low-tide level. This is almost seven times higher than the roadside marker above the Kodiak waterfront.

In all, approximately 131 people lost their lives in Alaska, Oregon and California, with the major loss of life coinciding with the maximum tsunami amplitudes in Prince William Sound. In response to this disaster, a West Coast and Alaska Tsunami Warning Center was established in Palmer, Alaska.

More recently, on December 26, 2004, the Great Sumatra-Andaman earthquake occurred off the west coast of Sumatra, Indonesia, in the northeast Indian Ocean, generating the Asian tsunami (also known as the Boxing Day Tsunami) that pounded coastlines around the Indian Ocean. Approximately 225,000 lives were

lost in 14 countries as a result of this catastrophe. Indonesia, Sri Lanka, India and Thailand were hardest hit, and in parts of Sumatra, areas more than 30 meters above sea level were under water. Loss of life due to this event occurred as far away as in the Middle East and West Africa.

In response, an interim tsunami advisory information system has been established by the Oceanographic Committee of the U.N. Educational, Scientific and Cultural Organization to provide warnings from the U.S. Pacific Tsunami Warning Center and the Japan Meteorological Agency to all participating countries.

Coastal communities are not only threatened by inundation from tsunamis, but also from surges in sea level created by storms—in particular hurricanes (tropical cyclones). On August 29, 2005, Hurricane Katrina destroyed a large part of New Orleans, Louisiana, and other parts of the Gulf Coast in the southern U.S., taking more than 1,800 lives. A number of my colleagues who live on the Mississippi Gulf Coast were among those who lost their homes and possessions, and our business offices were also flooded.

The impact of storm surge on human life, however, can be far worse. In 1970, the remnants of Tropical Storm Nora, which originated in the South China Sea, moved into the Indian Ocean and intensified into a severe cyclonic storm. On the evening of November 12, the storm system, now called cyclone Bhola, made landfall in the Ganges Delta at high tide, creating a 10-meter storm surge that inundated the low lying islands of the delta. Approximately half a million lives were lost, making this the deadliest natural disaster of modern times.

The slow but steady rise in sea levels from climate change, although less noticeable, is also a significant risk to coastal communities. If sea levels continue to rise at the current rate, by the end of this century many coastal areas, particularly some island communities in the southwest Pacific and Indian oceans, will face inundation. An increase in the severity and frequency of extreme events such as surges and tsunamis is thought likely, as is the land area deemed at risk.

Two things seem to be important. First, steps to reduce our impact on

climate change need to be considered in order to slow or reverse the rate of rising sea levels. This is such an important and complex topic in itself that I will leave it for other Soapboxes. Second, the increased risk to coastal communities needs to be accurately determined to enable correct policies to be developed and suitable management decisions to be made.

Currently, I am involved in a project for the Victorian State Government in southern Australia to identify the most vulnerable areas in order to improve future decision-making processes for that coastline. The Climate Change Adaptation Program has been established, part of which is the “Future Coasts” project, which aims to assess the physical vulnerability of the state’s coast to climate change and to aid the development of policies and planning decisions.

This project involves extensive topographic and bathymetric surveys of the entire coastal area of Victoria, a distance of more than 1,000 kilometers, including all major inlets and bays and extending up to four kilometers offshore to the 20-meter isobath.

The data collected will be used to produce models to assess the impact of sea level rise, storm surges, inundation and erosion and to identify how the coastline is likely to change over time to allow for preemptive work where needed. The results will be used for the development of policies and in planning decisions.

Coastal communities are becoming increasingly vulnerable due to rising sea levels as well as extreme events. There will be continuing requirements for surveys being driven by the potential impacts of tsunami modeling, inundation mapping and climate change.

Those of us considering a “sea change” by retiring to the coast may be wise to invest some time in exploring these results before buying that quaint cottage by the sea. ■

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