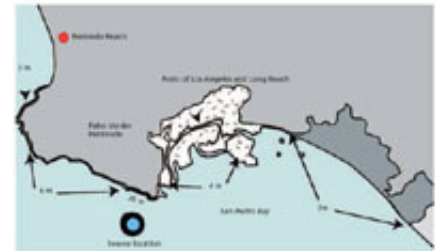


Southern California tsunami could cause \$42 billion damage

Long Beach hardest hit in economic scenario modeled at USC

A new University of Southern California study, which appears in the April edition of Civil Engineering magazine, finds that the potential damage from a tsunami in Southern California could range from \$7 billion to as much as \$42 billion.

The report is the first attempt to calculate possible losses from tsunamis, as opposed to earthquakes, in the Southern California area.



Click [here](#) for a high resolution photograph.

Table 3: Direct Loss and Annual Baseline Production in Inundated Areas

City	Baseline (\$ thousands)	Direct loss (\$ thousands)	Direct loss as percentage of baseline
Carson	6,591,962	85,736	1.30
Hawaiian Gardens	216,150	323	0.15
Long Beach	22,838,571	3,607,647	15.80
Palos Verdes Estates	416,315	32,338	7.74
Rancho Palos Verdes	510,586	26,903	5.27
Wilmington/San Pedro	5,675,587	314,931	5.55
Unincorporated			
LA County	17,623,822	2,565	0.01
Garden Grove	4,969,415	190	0.00
Huntington Beach	7,031,246	299,580	4.26
Los Alamitos	1,481,826	12,543	0.85
Rosemead (census designated place)	120,899	5,761	4.76
Seal Beach	1,398,293	103,892	7.43
Westminster	2,238,251	6,908	0.31
Unincorporated			
Orange County	3,401,272	3,051	0.09
Total	74,513,195	4,502,257	6.04

Click [here](#) for a high resolution photograph.

Entitled "Could It Happen Here?" the article builds on research by Jose Borrero, assistant research professor of civil engineering, and Costas Synolakis, professor of civil engineering, at the USC Viterbi School of Engineering regarding tsunamis caused by underwater landslides in unstable sediments off Palos Verdes peninsula. Synolakis is director of the USC Viterbi School Center for Tsunami Research.

A tsunami in this area could inundate Terminal Island and much of the ports of Los Angeles and Long Beach, as well as producing substantial run-up on Orange County beach cities, with maximum waves arriving only one minute after the slide. Municipalities potentially affected include Carson, Long Beach, Wilmington/San Pedro, Palos Verdes Estates and Rancho Palos Verdes, Seal Beach, Westminster, Garden Grove, Huntington Beach, Hawaiian Gardens, and unincorporated areas of Los Angeles and Orange Counties.

The study uses methodology co-created by one of the authors, Harry W. Richardson, who holds the James Irvine Chair in Urban and Regional Planning at the USC School of Policy, Planning and Development, with a PPD colleague, Professor Peter Gordon. This scheme breaks down Southern California into 308 zones, whose individual contribution to the area's economy is noted in detail, along with their economic connections to other zones.

Researchers used an improved version of the system, called the Southern California Planning Model, to incorporate effects caused by damage to the highway system. James Moore II, who is a professor of Industrial and Systems Engineering, Civil Engineering and Public Policy and Management at the Viterbi School, worked with Richardson on the application of the model to a tsunami.

"We have not attempted to account for the cost of fatalities in our estimates," said Moore. "We chose not to model fatalities because we were being deliberately conservative, and because we wanted to avoid contentious assumptions about the economic value of life." Moore noted that "the Papua New Guinea tsunami of 1998 was generated by a mechanism similar to the one modeled here, and that event cost over 2,000 lives. The toll here could be much higher."

The study assumed four possible scenarios, of increasing severity. In scenario 1, losses were confined to inundated areas, with no freeway links closed, and no crippling damage to the ports of Los Angeles/Long Beach.

The following 3 scenarios assumed escalating problems, with a worst case being closure of critical freeway links and the ports for one year, forcing the shipment of \$83 billion in exports now going through these facilities elsewhere.

The study also breaks down direct losses by municipality, with Long Beach suffering some \$3.6 billion in damage, by far the largest for any single city.

The authors note that these losses, significant as they are, would be only a part of a general picture of damage. The most likely trigger of a landslide off Palos Verdes would be a large earthquake -- which itself would produce billions in damage.

"However, it is important to remember that these tsunami costs would be incurred in addition to earthquake costs," the authors note.

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In addition to Borrero, Moore, Richardson and Synolakis, Sungbin Cho contributed to the article.

The complete pdf text of the Civil Engineering article is available at
http://viterbi.usc.edu:81/pdfs/unstructured/news/2005/2005_03_28_socalTsunami2.pdf