Catastrophic Earthquakes in a Crowded World
Thomas L. Holzer
U.S. Geological Survey

The 21st century began with 5 catastrophic earthquakes (>50,000 fatalities) in the first decade compared to only 7 in the entire 20th century. This sudden increase prompted concern that the growing human population of the planet was leading to significantly more earthquake fatalities. We analyzed multiple earthquake fatality catalogs going back centuries and concluded that catastrophic earthquakes are indeed increasing in frequency, and the frequency can be correlated with world population. Based on U.N. population projections and our correlation, we estimate that number of catastrophic earthquakes will triple or quadruple in number in the 21st century compared to the 20th century. We also estimate that total global earthquake fatalities during the 21st century will double or triple compared to the 20th century, when only 1.5 million people died. This will greatly increase the need for post-earthquake humanitarian aid. An interesting question that arises is how many people might die in a worst-case earthquake scenario. We speculate that an earthquake with a death toll of one million people is conceivable because of the increasing urbanization of the planet. Since the first modern city to exceed a population of one million people developed in the early 19th century, more than 525 cities with populations of more than one million now exist. Twelve cities exceed 20 million. Many of these cities sit in seismically active areas and do not practice seismic resistant construction. Thus, a direct hit could easily kill one million people.

Biography

Thomas L. Holzer
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
tholzer@usgs.gov

Dr. Thomas L. Holzer is a research engineering geologist with the U.S. Geological Survey in Menlo Park, California, and a consulting professor with joint appointments in the Departments of Civil and Environmental Engineering and Geological and Environmental Sciences at Stanford University. He is also a California certified engineering geologist. He received his B.S.E. in geological engineering from Princeton University and his M.S. in hydrology and Ph.D. in geology from Stanford University. His current research interests are probabilistic liquefaction hazard mapping and the statistics of earthquake fatalities. He is the author of more than 120 professional publications.