

# Urbanization exposes French cities to greater seismic risk

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French researchers have looked into data mining to develop a method for extracting information on the vulnerability of cities in regions of moderate risk, creating a proxy for assessing the probable resilience of buildings and infrastructure despite incomplete seismic inventories of buildings. The research exposes significant vulnerability in regions that have experienced an "explosion of urbanization."

"Considering that the [seismic hazard](#) is stable in time, we observe that the [seismic risk](#) comes from the rapid development of [urbanization](#), which places at the same site goods and people exposed to hazard" said Philippe Gueguen, co-author and senior researcher at Université Joseph Fourier in Grenoble, France. The paper appears today in the journal *Seismological Research Letters (SRL)*.

Local authorities rely on seismic vulnerability assessments to estimate the probable damage on an overall scale (such as a country, region or town) and identify the most vulnerable building categories that need reinforcement. These assessments are costly and require detailed understanding of how buildings will respond to ground motion.

Old structures, designed before current seismic building codes, abound in France, and there is insufficient information about how they will respond during an earthquake, say authors. The last major earthquake in France, which is considered to have moderate seismic hazard, was the 1909 magnitude 6 Lambesc earthquake, which killed 42 people and caused millions of euros of losses in the southeastern region.

The authors relied on the French national census for basic descriptions of buildings in Grenoble, a city of moderate seismic hazard, to create a vulnerability proxy, which they validated in Nice and later tested for the historic Lambesc earthquake.

The research exposed the effects of the urbanization and urban concentrations in areas prone to seismic hazard.

"In seismicity regions similar to France, [seismic events](#) are rare and are of low probability. With urbanization, the consequences of characteristic events, such as Lambesc, can be significant in terms of structural damage and fatalities," said Gueguen. "These consequences are all the more significant because of the moderate seismicity that reduces the perception of risk by [local authorities](#)."

If the 1909 Lambesc earthquake were to happen now, write the authors, the region would suffer serious consequences, including damage to more than 15,000 buildings. They equate the likely devastation to that observed after recent earthquakes of similar sizes in L'Aquila, Italy and Christchurch, New Zealand.

Provided by Seismological Society of America

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