Site-specific factors influencing earthquake hazard assessment: examples from New Brunswick

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Seismic hazard studies by Earthquakes Canada place most of New Brunswick in the moderate part of the hazard range. Seven earthquakes with estimated magnitudes in the range of 4.5 to 6 have occurred in the last 200 years. In addition, seven larger regional earthquakes in Quebec, New Hampshire, and on the Grand Banks have had notable effects within the province. Interpretations of intensities associated with these 14 events range between Modified Mercalli (MM) values of II to VII. The higher intensity values have mostly occurred where local geology and site specific factors play a dominant role. Many of the communities in New Brunswick were settled along river valleys and coastal areas, which are underlain by thick deposits of glacial and alluvial sediments. Historical documentation and paleoseismic studies that identify seismic-generated disturbances are reviewed in this presentation. Both moderate local and larger regional earthquakes have caused significant effects at some locations, particularly those sites adjacent to steep slopes or sites underlain by thick surficial deposits, which amplify ground motion. Amplification of ground motion would be expected at sites overlying low shear wave velocity zones, such as alluvial sediments, and may explain the larger shaking effects experienced in the downtown area of Fredericton from distant earthquakes. Minor alteration of springs, rivers, and groundwater supplies has happened as a result of earthquakes, although few effects remain permanent. Earthquake-induced rock falls occurred along some rock slopes during moderate earthquakes in 1855 and 1937. This study has identified the need for future paleoseismic research and microzonation studies for the major communities within the province.

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