EARTHQUAKE RISK IN DHAKA

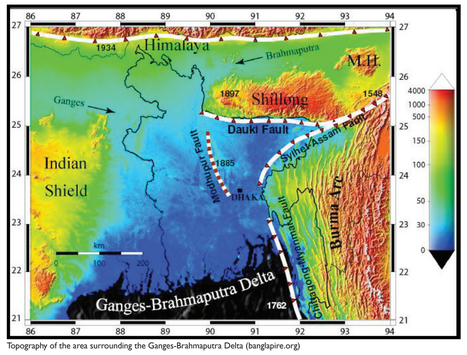
How a magnitude 7.5 earthquake will affect the world's densest megacity.

Expected losses from a postulated magnitude 7.5 earthquake on the Madhupur Fault

US$5.7 billion
estimated losses

180,000
estimated damaged buildings

over
200,000 injured
&
50,000 fatalities



Topography of the area surrounding the Ganges-Brahmaputra Delta (banglapire.org)

Bangladesh is exposed to significant seismic risk due to its proximity to the seismically active tectonic plates. A Magnitude 7.5 event on the Madhupur fault and a Magnitude 8 event on the Plate Boundary 2 fault have the greatest impact on the city of Dhaka, Bangladesh's capital.

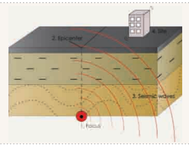
The Madhupur fault event is to the north of the city. Ground motions generally decrease from north to south and are amplified in areas of soft soil. The Plate Boundary 2 fault is to the east of the city and ground motions decrease going east to west.

What earthquakes have impacted Dhaka?

Intensity VIII
- Bengal Earthquake, 1885. Magnitude 7
- Great Indian Earthquake, 1897. Magnitude 8.1

Intensity VII
- Srimangal Earthquake, 1918. Magnitude 7.6

Intensity VI *(intensity where structural damage begins to occur)*
- 1923, Magnitude 7.1
- 1934, Magnitude 8.1
- 1935, Magnitude 6.0
- 1943, Magnitude 7.2
- 2001, Magnitude 5.1



Ground motion is the measure of the amplitude and period of seismic waves once it arrives at the earth's surface.** Higher ground motion may bring higher damage or impact

WHAT CAN BE DONE?

Awareness Raising
Knowledge of hazards and risks by the general public will raise awareness and build social responsibility and social resilience.

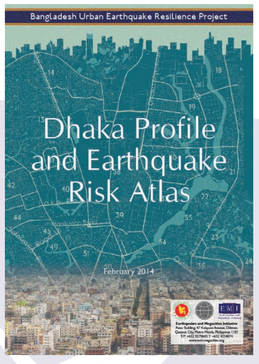
Competency Building
Training of architects, engineers, planners, and construction professionals will improve standards for earthquake-resilient construction, thus protecting people and property.

Improving Response
Having competent Emergency Management plans, drills, exercises and trainings for first responders.

Implementation of Building Codes
Implementation and enforcement of the building codes will ensure that buildings will protect their occupants and reduce damages and losses.

Risk-Sensitive Land Use Plans
Understanding of hazards and risks can inform land use plans and zoning ordinances to build away from hazardous areas and reduce exposure to earthquakes.

For more information:



The **Dhaka Profile and Earthquake Risk Atlas** is a compilation of physical & socio-economic profiles, built environment, hazards, vulnerability & risks information, and maps of Dhaka. It is one of the tools that will assist to raise awareness and support decision making and policies aimed at mitigating the impact of earthquake hazards through structural and non-structural vulnerability reduction measures. The Atlas will help in providing essential scientific data and information to improve capacity for earthquake resilience of Bangladesh.

For more information on where to get a copy of the Dhaka Profile and Earthquake Risk Atlas, contact:

Disaster Risk Management and Climate Change Unit
South Asia Sustainable Development Department
The World Bank Office Dhaka
Plot E 32, Sher-e-bangla Nagar, Agargaon
Phone: 880-2-8159001-28

1 Dhaka City Profile
Background
Physical and Socio-economic Profile Components
- Political
- Physical
- Socio-cultural
- Built Environment

2 Earthquake Hazards
Bangladesh Tectonics
Historical Seismic Activity
Modeled Sources
Soil Classification
Peak Ground Accelerations
Liquefaction

3 Earthquake Vulnerability and Risk Analysis
Vulnerability Definition
Physical Vulnerability
- Building Exposure and Inventory
- Buildings Vulnerability
- Building Losses
- Lifelines
- Essential Facilities

Social Vulnerability
- Casualties
- Population Affected
- Economic and Property Losses

Risk Definition
Physical Risk Indicators
Socio-Economic Impact Factors

4 Urban Disaster Risk Index
Physical Risk
Socio-Economic Impact Risk
Combined Risk

Considering ground motion amplifications due to soil conditions, Dhaka will receive stronger ground shaking intensities, especially in areas to the west and to the northwest where there are streams.

Peak ground acceleration (PGA) is a measure of earthquake acceleration on the ground and an important input parameter for earthquake engineering. Unlike the Richter and moment magnitude scales, it is not a measure of the total energy (magnitude) of an earthquake, but rather of how hard the earth shakes in a given geographic area. PGA is expressed as a percent of the acceleration due to gravity (g) which is 980 cm/sec/sec. ***

Peak Ground Acceleration (g) with Soil Amplification
0.216 Very Strong
0.471 Severe

136.37 sq km

6.54 million Population

91 wards

Commercial 19,225 (5.86%)
Institutional 6,308 (1.85%)
Industrial 9,651 (2.95%)
Residential 266,486 (81.44%)
Others 25,833 (7.90%)

there are **327,503*** Building Structures in Dhaka

Fire Station
Hospital
Police Station
School

*based on RAJUK Dataset **Disaster Risk Management Online Program, Global Facilty for Disaster Reduction and Recovery, 2011 ***National Disaster Management Authority, Government of India (2013, September 15). Seismic Vulnerability Assessment of Building Types in India, Final Report Executive Summary.

The data used in the poster was shared to the Bangladesh Urban Earthquake Resilience Project (BUERP) courtesy of RAJUK in 2013

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Earthquakes and Megacities Initiative
Puno Building, 47 Kalayaan Avenue, Diliman, Quezon City, Metro Manila, Philippines 1101
T/F: +632 9279643; T: +632 4334074
www.emi-megacities.org