



# Earth



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Damage in Banda Aceh During 2004 tsunami | Source: US Military

## Earthquake Risk In Indonesia

The Indonesian archipelago is located at the boundary of three major tectonic plates, the Indo- Australian, Pacific, and Eurasian plates, stretching from Sumatra in the west to Papua in the east.

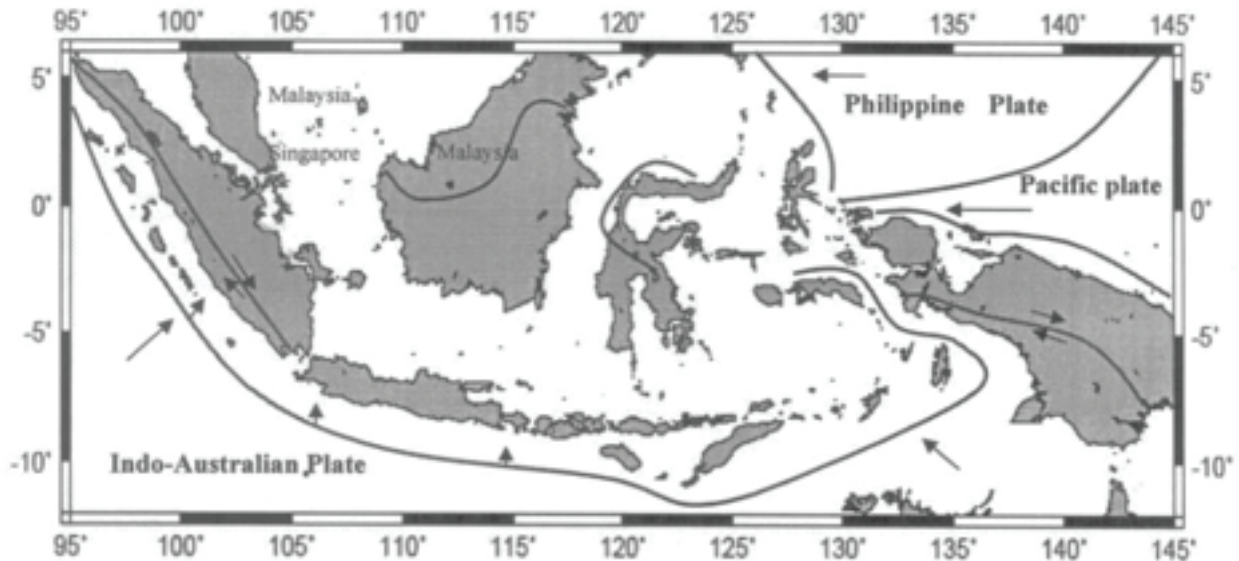


Figure 1: Tectonic and plate boundaries, Large arrow indicate direction of plate motion | Source: R. Putra

Indonesia experiences more earthquakes than any other country in the world. Its borders encompass one of the most active tectonic regions of Earth including over 18, 000 kilometers of major tectonic plate boundary. Overall, approximately 20 % of the world's damaging earthquakes occur in Indonesia. The 2004 Earthquake and tsunami highlight the potential of events that could occur in Indonesia.

Figure 2 below showcases more than 48, 000 earthquakes with magnitude 4 or more in occurred in Indonesia. Most of them are shallow focus earthquakes that cause more damage.

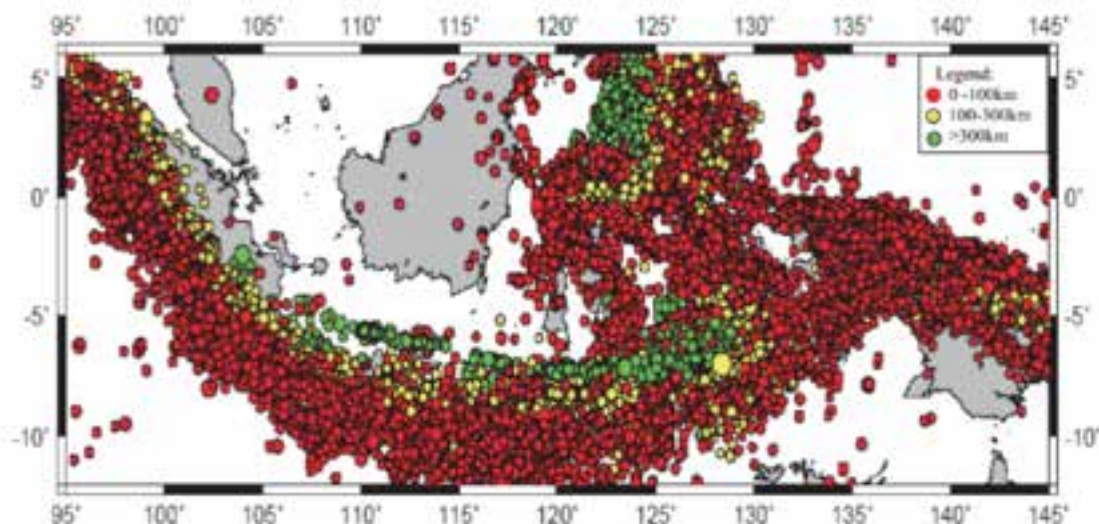


Figure 2: Historic earthquakes with magnitude 4 or more occurred between 1779-2010 | Source: R. Putra

Based on historic hazards and damage experiences, Earthquake Risk Zone Map of Indonesia is prepared. Please note that risk increases from zone 1 to zone 5.

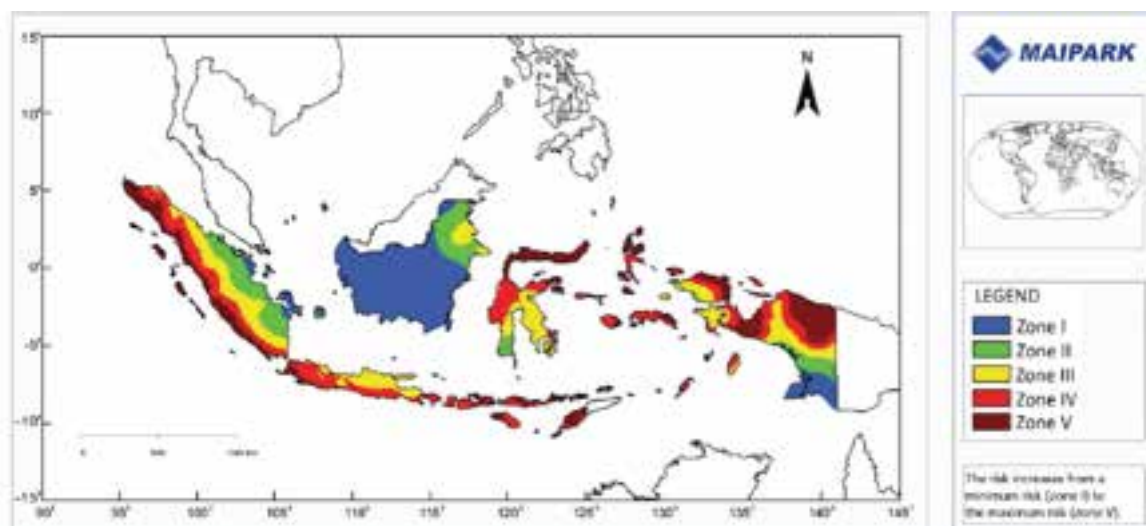


Figure 3: Earthquake Risk Zone Map of Indonesia 2010 | *Source: MAIPARK*

### Seismic Design Code For Indonesia

SNI 1726: 2012 is the Engineering Design Code for Indonesia. This code provides engineers with up-to-date advice to design and construction of buildings in Indonesia to resist the effects of earthquakes.

### Insurance Market in Indonesia

Total non-life premium in Indonesian non-life market was US\$ 4.7 billion in 2016 with inflation-adjusted growth of 5.8 %. Property and Motor were two largest segments with total share of 30.8 % and 26.5 % of total non-life premiums.

Insurance penetration – ratio of non-life premium and GDP of country in 2016 – was 0.51 %. It implies that Insured Losses for an event will just be a fraction of Economic Losses.

### Earthquake Index Insurance (EQII)

EQII is an earthquake insurance to protect financial institutions that provide loans to its customers. This policy provides cash benefits to protect the liquidity of financial institutions after the earthquake occurred. EQII will provide benefits in cash as compensation for the non-performing loan (NPL) after a large earthquake magnitude and intensity (MMI) is in a range that is insured.

### Damage Caused by Earthquakes

Earthquakes impact Indonesia badly. Loss of lives and properties has a negative impact on progress of country. Economic loss caused by the 2004 earthquake – US\$ 10 billion – was 1.5 % of Indonesia’s then GDP. Likewise, the September 2009 Sumatra earthquake caused US\$ 2.2 billion that was 0.23 % of GDP.



Damage from the Sep 30, 2009 Padang earthquake | *Source: AusAID*

Table 1 below shows Insured and Economic Losses for some past events occurred in Indonesia.

<b>Date of Event</b>	<b>Magnitude</b>	<b>Area(s) of Impact</b>	<b>Economic Loss (million US\$)</b>	<b>Insured Loss (million US\$)</b>
04/11/2015	Mw 6.3	Indonesia, Dili, Timor	4	NA
02/07/2013	Mw 6.2	Aceh(Sumatra)	113	NA
25/10/2010	Mw 7.8	Indonesia	Thousands of homes, roads, and bridges destroyed	NA
09/11/2009	Mw 6.6	Sumbawa, Raba	2	NA
30/09/2009	Mw 7.6	Padang, Sumatra	2,300	50
02/09/2009	Mw 7.0	West Java, Bandung, Jakarta	160	NA
12/02/2009	Mw 7.2	Indonesia	9	NA
04/01/2009	Mw 7.6	West Papua, Indonesia	10	NA
25/11/2007	Mw 6.5	Sumbawa Island, Raba, Bima	NA	Na
12/09/2007	Mw 8.4	Sumatra, Bengkulu, Padang	500	NA
06/03/2007	Mw 6.3	Sumatra, Padang	200	5
27/05/2006	Mw 6.4	Bantul	3,100	48
28/03/2005	Mw 8.7	Sumatra, Nias etc.	7,000 buildings destroyed, damage to port & airport infrastructure	NA
26/12/2004	Mw 9.0	Indonesia, Thailand et al.	10000 (Earthquake), 4,450 (Tsunami)	2,068



*Damaged building during Dec 7, 2016 EQ in Aceh, Indonesia | Source: The Independent*



Appendix 1 show number of Earthquakes with magnitude more than 6.0 since 1900

<b>Date of Occurrence</b>	<b>Region of Occurrence</b>	<b>Magnitude</b>
31/10/2017	Maluku	6.3 M <sub>w</sub>
07/12/2016	Sumatra	6.5 M <sub>w</sub>
02/03/2016	Mentawai	7.8 M <sub>w</sub>
04/11/2015	Indonesia, Dilli, Timor	6.3 M <sub>w</sub>
28/07/2015	Papua	7.0 M <sub>w</sub>
02/07/2013	Northern Sumatra	6.1 M <sub>w</sub>
11/04/2012	Wharton Basin	8.6 M <sub>w</sub>
05/09/2011	Northern Sumatra	6.7 M <sub>w</sub>
25/10/2010	Sumatra	7.7 M <sub>w</sub>
16/06/2010	Papua	7.0 M <sub>w</sub>
09/05/2010	Sumatra	7.2 M <sub>w</sub>
06/04/2010	Sumatra	7.8 M <sub>w</sub>
09/11/2009	Sumatra, Raba	6.6 M <sub>w</sub>
01/10/2009	Sumatra	6.6 M <sub>w</sub>
30/09/2009	Sumatra	7.6 M <sub>w</sub>
02/09/2009	Java	7.0 M <sub>w</sub>
16/08/2009	Siberut, Mentawai	6.7 M <sub>w</sub>
12/02/2009	Talaud	7.2 M <sub>w</sub>
04/01/2009	West Papua	7.4 M <sub>w</sub>
04/01/2009	West Papua	7.7 M <sub>w</sub>
16/11/2008	Sulawesi	7.3 M <sub>w</sub>
25/02/2008	Kepulauan Mentawai	6.7 M <sub>w</sub>
20/02/2008	Simeulue	7.4 M <sub>w</sub>
12/09/2007	Sumatra	8.4 M <sub>w</sub>
06/03/2007	Sumatra	6.3 M <sub>w</sub>
06/03/2007	Sumatra	6.4 M <sub>w</sub>
21/01/2007	Molucca Sea	7.5 M <sub>w</sub>
17/07/2006	Java	7.7 M <sub>w</sub>
26/05/2006	Java	6.4 M <sub>w</sub>
14/03/2006	Seram	6.7 M <sub>w</sub>
05/07/2005	Nias	6.7 M <sub>w</sub>
28/03/2005	Northern Sumatra	8.6 M <sub>w</sub>

<b>Date of Occurrence</b>	<b>Region of Occurrence</b>	<b>Magnitude</b>
26/12/2004	Sumatra–Andaman	9.0 M <sub>w</sub>
26/11/2004	Papua	7.1 M <sub>w</sub>
11/11/2004	Kepulauan Alor	7.5 M <sub>w</sub>
07/02/2004	Western New Guinea	7.3 M <sub>w</sub>
05/02/2004	Western New Guinea	7.0 M <sub>w</sub>
26/05/2003	Halmahera	7.0 M <sub>w</sub>
02/11/2002	Northern Sumatra	7.3 M <sub>w</sub>
10/10/2002	Western New Guinea	7.6 M <sub>w</sub>
04/06/2000	Southern Sumatra	7.9 M <sub>w</sub>
04/05/2000	Central Sulawesi	7.6 M <sub>w</sub>
17/02/1996	Biak	8.1 M <sub>w</sub>
01/01/1996	Sulawesi	7.9 M <sub>w</sub>
06/10/1995	Sumatra	6.8 M <sub>w</sub>
03/06/1994	Java	7.8 M <sub>w</sub>
15/02/1994	Sumatra	7.0 M <sub>w</sub>
11/12/1992	Flores	7.8 M <sub>w</sub>
01/08/1989	West Papua	6.0 M <sub>w</sub>
17/11/1984	Northern Sumatra	7.2 M <sub>w</sub>
19/01/1981	Papua	6.8 M <sub>L</sub>
18/12/1979	Bali	6.3 M <sub>s</sub>
19/08/1977	Sumba	8.3 M <sub>w</sub>
15/07/1976	Bali	6.5 M <sub>s</sub>
25/06/1976	Papua	7.1 M <sub>w</sub>
19/10/1968	Sulawesi	7.4 M <sub>L</sub>
24/01/1965	Sanana Island	8.2 M <sub>w</sub>
23/07/1943	Java	8.1 M <sub>s</sub>
08/06/1943	Sumatra	7.2 M <sub>w</sub>
01/02/1938	Banda Sea	8.4 M <sub>w</sub>
28/12/1935	Sumatra	7.7 M <sub>w</sub>
20/01/1917	Bali	6.6 M <sub>s</sub>

Source: Govt. of Indonesia, General Insurance Association of Indonesia, USGS, Swiss Re, and MAIPARK

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