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Issue: December 2016 - January 2017

Earthquake Risk in South - Eastern Africa

South-Eastern Africa is a developing market and constructing new infrastructure is one of the keys to the successful growth and prosperity for the region. However, the region is prone to various natural catastrophes such as earthquakes, floods, tsunami, volcano, and windstorms that might cause enormous economic losses and insured losses.

We present information on earthquake risk for three countries viz. South Africa, Zimbabwe, and Lesotho.

Seismicity of South Africa

Historic earthquakes reveal that in the wide plate boundary zone, which is in places as much as 1 600 km wide, there are "belt-like" zones of seismicity (often about 200 km wide) surrounding relatively aseismic "blocks". Notably, seismicity belts sometimes occur where no rift faults are apparent (e.g. the western seismicity belt near to the coast between 10° and 15° S).

Figure 1 shows a belt of seismicity extends north-south along the South Africa - Mozambique border, southwards into KwaZulu- Natal and another trends east-west through southern KwaZulu-Natal, Lesotho and the southern Free State.

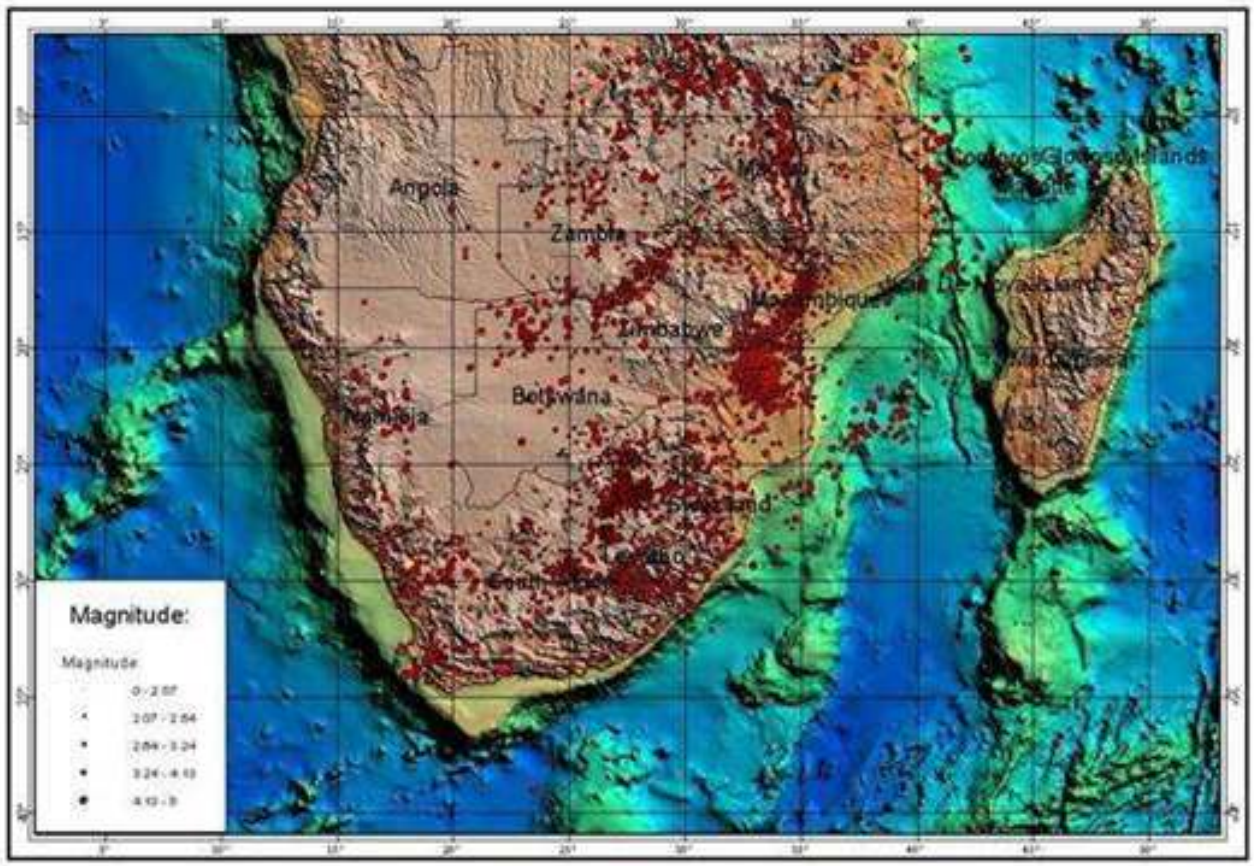

Fig 1 Map of seismicity of southern Africa for the period 1620 to 2010 | Source: *Council for Geo Science*

The seismicity of Africa, especially Southern Africa is, by world standards, very moderate and of shallow character.

Apart from the seismicity recorded in the Lebombo Mountains and the Cape Fold Belt at Ceres, two other areas in there to continental Southern Africa have been affected by large earthquakes. One is Cape Town, affected from December 1809 to June 1811 by a series of shocks of which the largest had an intensity VIII on the Modified Mercalli Scale, and the other one occurred at Koffiefontein in the southern Free State, affected in 1912 by a shock of maximum intensity IX on the Rossi-Forelscale. In addition, occasional bursts of seismic activity have occurred at numerous other places in South Africa.

Prominent Seismic Clustres in South Africa

- CapeTown area
- Ceres Cluster
- Koffie fonte in Cluster
- Lesotho Cluster
- Witwatersrand Basin Cluster

Since 1809, South Africa has experienced more than 60 earthquakes of magnitude 5. Figure 2 below shows seismic hazard distribution map of South Africa.

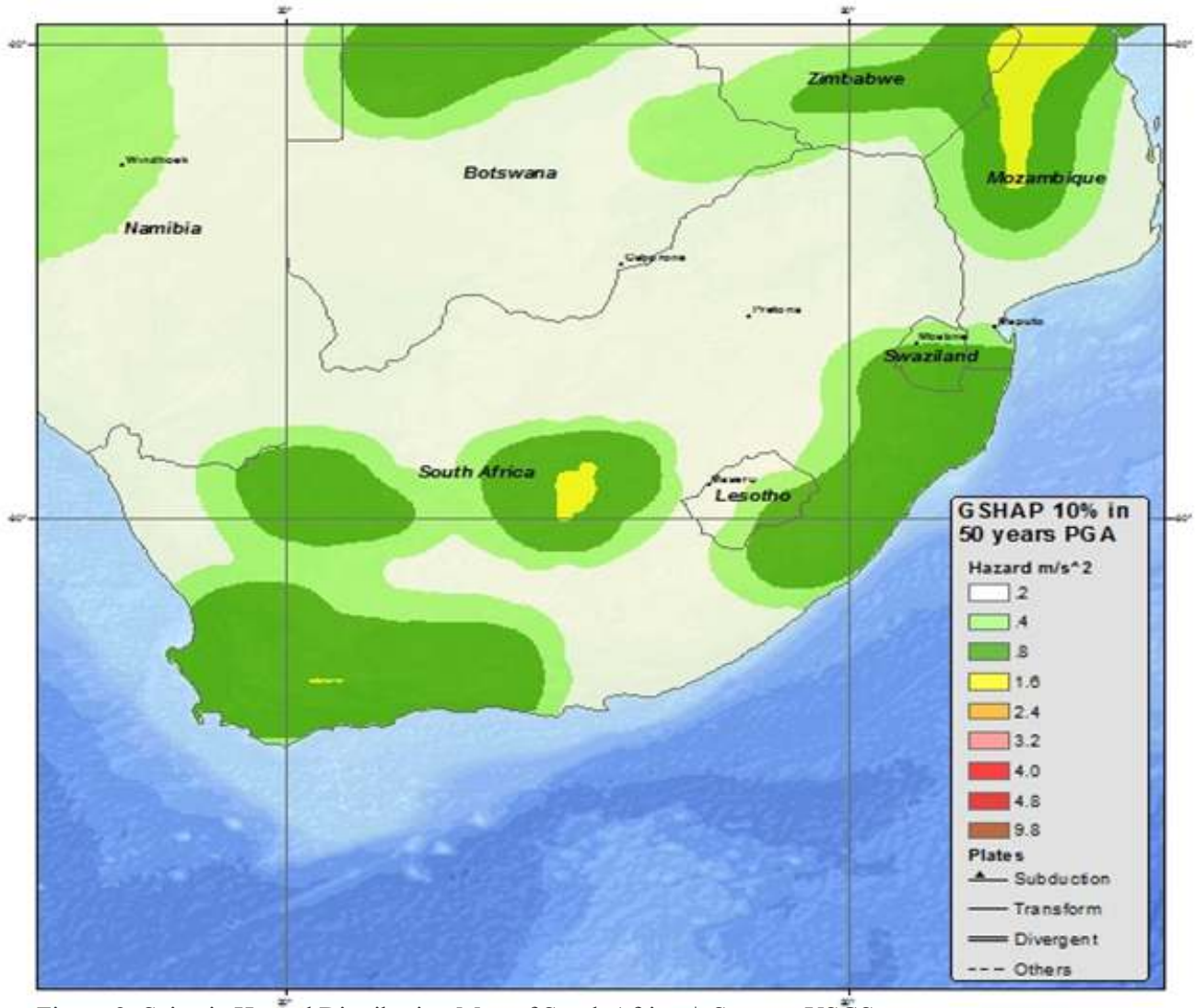

Figure 2: Seismic Hazard Distribution Map of South Africa | Source: *USGS*

The Ceres earthquake which occurred on September 29, 1969 with local magnitude (M_L) 6.3 is the most destructive earthquake in South African history till date. Structural damage in Tulbagh was extensive with in excess of 70% of the buildings suffering damages and over half of the local population being left homeless, there was also a number of damaged homes in the Ceres area. Damage was not confined to homes and buildings though, majority of the local roads in the area were left with large cracks. Repetition of such event might cause severe damage and huge economic and insured losses.

Seismicity of Zimbabwe

The seismicity of Zimbabwe is generally moderate with some notable events occurring near the Zimbabwe- Mozambique border, the Nyamandolvu area as well as the northern part of the country which covers the Zambezi area.

The country lies at the southern tip of the EARS. In terms of seismicity, the country can be divided into three broad seismic zones viz. the eastern area of the country, the Zambeji basin, and the central area. Seismic activity is mainly centered along the border with Mozambique, to the east, in the Deka Fault zone in the Hwange area, to the north west and over the miz-Zambeji basin in the Lake Kariba area.

Earthquakes of magnitude more than 5.0 have occurred in the mizd-Zambeji basin and reflect normal faulting. The south-eastern border area of country forms the western flank of the rift expansion from Lake Malawi. Two surface wave magnitude (M_s) 6.0 earthquakes had occurred in 1910 and 1940.

Since 1995, the notable events occurred in country are of June 25, 2004 and March 15, 2008 with bodywave magnitude (M_b) 4.3. The earthquake on Febraury 22, 2006 that occurred near the Zimbabwe border in Mozambique caused a lot of destruction especially in Chipinge and surrounded areas. Also, the 2006 Wedza earthquake M_L 4.0 caused intense shaking near its epicenter.

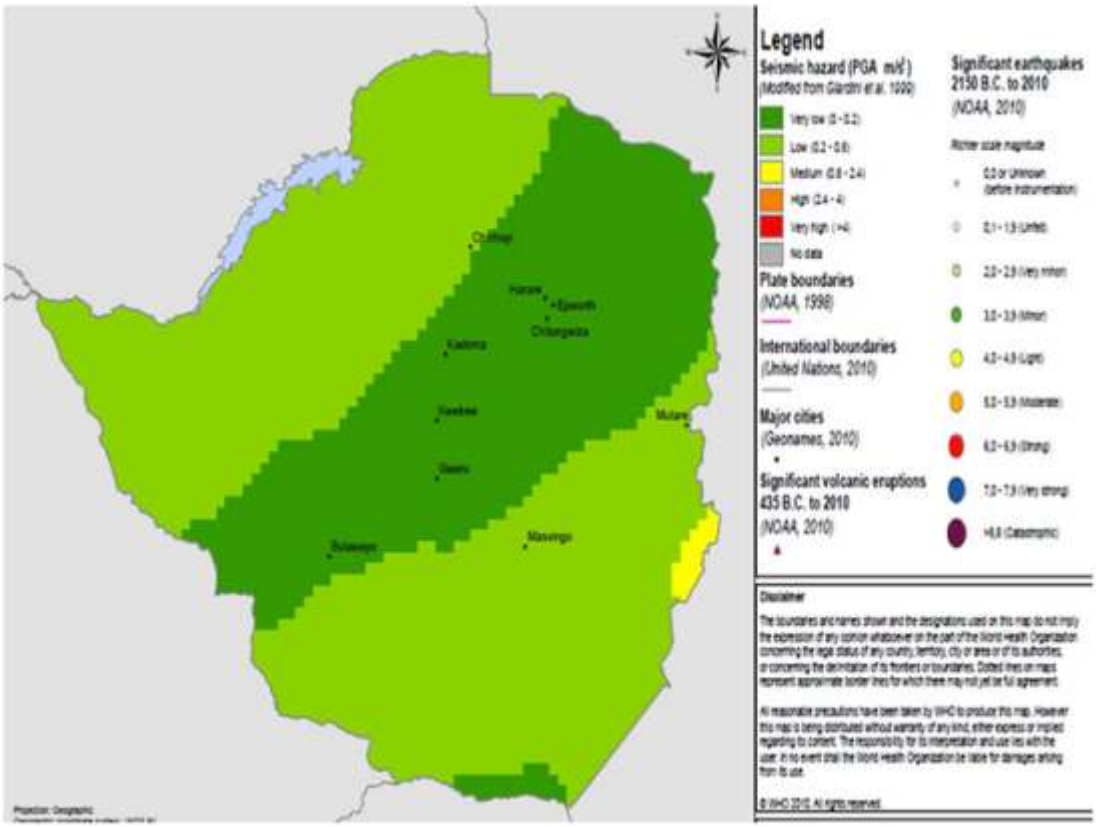

Figure2: Seismic Hazard Distribution Map of Zimbabwe | Source: *WHO*

Seismicity of Lesotho

Lesotho is situated on the stable continental interior of the African plate and characterized by a low level of intraplate seismicity, which may represent internal deformation of the plate.

Scientists consider the central part of country part of extention occurring along the EARS into the Indian Ocean. This part experienced two earthquakes of M_L more than 4.6 on January 27, 2002.

An M_L 5.1earthquake in 1986 occurred in the southern part of Lesotho and is the largest recorded with in the country. Previously, an earthquake with M_L 3.0 occurred in 1883. In addition, several earthquakes with M_L more than 4.5 have also occurred in the past.

Reservoir induced seismicity has been observed during the filling of the Katse dam under the Lesotho Highlands Water Project. The largest earthquake was recorded on January 3, 1996 some 5 km upstream of the main dam (Katse) with M_b 3.2. Data shows that seismicity of Lesotho is more in the southern part of country. Researchers anticipate that, someday, Lesotho might experience an earthquake like the February 22, 2006 moment magnitude M_w 7.0 Mozambique earthquake.

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