Volcano threat level

The volcano threat level is the outcome of qualitative assessment of relative danger a volcano with its potential hazard poses to its surroundings (animal population, natural vegetation, civilization infrastructure). Threat level of volcanoes in Papua New Guinea (PNG) are ranked systematically by cumulative scores calculated from the common hazard and exposure information from each volcano.

The level of danger ranking for each volcano is based on the derived threat score using the adopted USGS-NVEWS and the PNG-Lowenstein and Talai systems appropriate and applicable to PNG volcanoes. For instance, All PNG volcanoes having eruptions recorded after 1870 considered active and are given a certain score but the USGS-NVEWS system scores any volcano with eruptive activity within the Holocene (11 700 years before present) epoch as active. Based on the relative threat assessment, the volcanoes are categorized into for groups; **Very threat, High threat, Moderate threat** and **Low threat**.

Below are the 4 categories of volcano threat level.

Very high threat volcano – A volcano that poses a very high level of threat to the surrounding communities based on its relative level of hazard and exposure (population, infrastructure resources, etc.) ranking. It has a very high potential of causing significant damage when it erupts. Monitoring at these volcanoes require a level 3 category.

High threat volcano – A volcano that has a high level of threat to the surrounding communities determined by its relative level of hazard and exposure (population, infrastructure resources, etc.) ranking hence, a high potential of causing significant damage when it erupts. Monitoring at these volcanoes require a level 3 category.

Moderate threat volcano – A volcano that has a relatively moderate danger ranking it poses to the surrounding communities based on its level of hazard and exposure factors. Its potential of causing significant damage is moderate. Monitoring at these volcanoes require a level 2 category.

Low threat volcano – A volcano that has a low potential of causing significant impact to the surrounding communities. It poses a low threat level to the surrounding communities based on its relative hazard and exposure rankings. Monitoring at these volcanoes require a level 1 category.

The volcano threat assessment could determine the current level of monitoring at each volcano and monitors the gap in monitoring capabilities required. This is vital for better volcanic disaster mitigation through effective volcano monitoring. For instance, 20 000 people affected within 30km radius from an erupting A volcano require better monitoring than 20 people living within 30km radius from volcano B. Hence, efficient eruption mitigation is prioritized at volcanoes that need it most to reduce potential disaster.

4 different levels of monitoring are applied to volcanoes under each category are defined by specific monitoring techniques, number of equipment/instrumentations required and how often monitoring is needed.

The ground-based monitoring categories are;

a) Level 3 – Complete monitoring. Monitoring provides the ability to detect and track pre-eruptive and eruptive changes in real or near-real time, with an understanding of what is occurring and what activity might be expected.
b) Level 2 – Limited monitoring for change detection. Monitoring provides the ability to detect and track activity at intervals that allow recognition that something anomalous is occurring.
c) Level 1 – Minimal monitoring. Monitoring provides the ability to detect that an eruption is occurring or that gross changes are occurring/have occurred near a volcano. Data collection is event-driven and is not collected systematically.
d) Level 0 – No ground-based monitoring. No real-time data from ground-based sensors are available. Eruption confirmation (up to hours after the fact) is provided only by remote sensing data (i.e., Darwin VAAC, MODIS thermal alert) or from people observing the event.

These categorized monitoring level respective to each volcano category shows any gap that exists against the required and current monitoring status on each volcano. This is the monitoring gap.

Table 1. PNG volcanoes listed by threat group rankings with required level of monitoring indicated. See above for further description of monitoring levels.

THREAT GROUP	REQUIRED MONITORING LEVEL
Very High Threat Rabaul Karkar	LEVEL 3: Well-Monitored
High Threat Manam Ulawun Pago Lamington Long Island Garbuna Group Bagana Hargy (Galloseulo; Ibi) Bamus	

Kadovar Langila	
Moderate Threat Ritter Island Dakataua (Makalia; Benda; Doko; Lalala) Billy Mitchell Bam Lolobau Sulu Range Loloru Ambitle (Feni, Anir) Victory Tuluman Waiowa (Goropu) Tavui	LEVEL 2: Limited monitoring for change detection
Low Threat Garua Harbour (Talasea; Pangalu) Dawson Straight Group (Oiau, Lamonai, Deidei, Dobu) Lihir Yelia Umboi (includes Talo) Sakar Garove Baluan Balbi	LEVEL 1: Minimal monitoring

Narage	
Wagipa	
Koranga	
Lolo	
Bola	
Takuan Group	
Madilogo	
Hydrographers Range	
Mundua	
Tore	
Blup Blup	
Boisa	
Doma Peaks	
Crater Mountain	
Sessagara	
Iamalele	
Musa River (Mona R.; Awaru R.)	

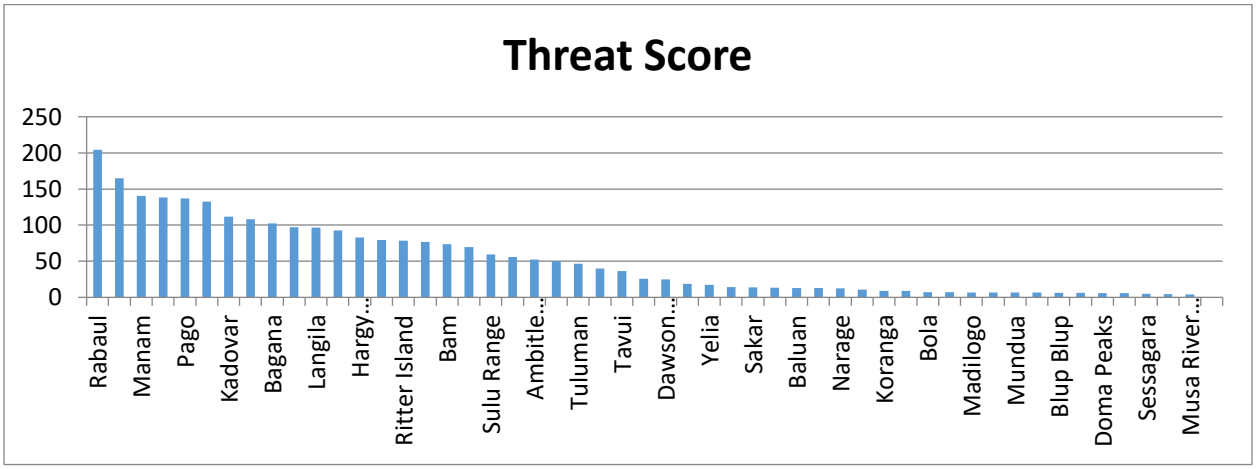

Fig.1 Graph showing the relative threat score for each volcano in PNG.