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Review of Impact of 2004 Great Sumatra-Andaman Mega Thrust Earthquake and Tsunami on Affected Countries using ECLAC DaLA Framework

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ABSTRACT

This study carries the effects of the great Sumatra-Andaman earthquake on the neighboring countries. on Sunday, 26 December 2004 at 00:58:53. UTC the Earthquake struck the Sumatra-Andaman island, which disrupted the Sunda Trench Subduction zone, the undersea mega-thrust earthquake was caused due to the subduction of Indo-Australian plate below the Eurasian plate. The epicenter of this earthquake was located 160 Km of the Western coast of North Sumatra Indonesia with a depth of 30 Km prompted a devastating tsunami. After the global monitoring in the 1980s, it was the third major devastating earthquake with the seismic moment of Mo = $1:00 \times 10^{23}$ to $1:15 \times 10^{23}$ 10²³ Nm and the corresponding magnitude of 9.0-9.3 on Richter scale and had the longest interval of time of faulting ever detected between 8.3 to 10 minutes. The propagation of rupture was found from South to North and the southerly part of the fault ruptured at a speed of 1.739 miles/s. The objective of this review paper is to study the consequences of the 2004 great Sumatra-Andaman earthquake on Sumatra Island and its surrounding countries using an accounting framework for damage and loss assessment that is ECLAC DaLA methodology.

Keywords-- Earthquake, faulting, subduction, sumatra-andaman, sumatra-indonesia, tsunami

INTRODUCTION

The great devastating earthquake and the resulting tsunami on Sunday, 26 December 2004 caused widespread damage in many countries around the Sumatra; the magnitude of the shock was 9.3 on the Richter scale and the maximum intensity on the Medvedev-Sponheuer-Karnik MSK scale was of VII [1]. It was the third-largest earthquake after Chile and Alaska earthquakes in 1960 and 1964 with the magnitudes of 9.6 and 9.4

on the Richter scale and the consequences of this earthquake were tsunamis i.e. earthquake caused the seafloor to uplift, displacing the seawater above by forming the waves up to the height of 30 meters. By the shaking of this earthquake and the consequent tsunami caused the most devastating damage to structures in and around the Sumatra surroundings that included overhead water tanks, buildings, lives, property and harbors etc. It was one of the deadliest natural disasters in previously recorded disasters. The epicenter of this earthquake was located on the West coast of Sumatra Island. Various countries were affected by the resulting tsunami of this great earthquake including Malaysia, Somalia, Sri Lanka, Thailand, Bangladesh, Maldives, India, Myanmar, Tanzania, Indonesia, Kenya, Seychelles and Yemen [2]. The percentage magnitude of tsunami impact state-wise is shown (Refer Fig. 1). The death toll was reported as 224,685 and 174,729 were confirmed dead, along with 49,956 were missing. It was the tectonic type earthquake in which the Indo-Australian plate was subducted underneath the Eurasian plate which results in the great Sumatra earthquake and thus produced the great destructive tsunami.

Approximately after 40 minutes of the earthquake, the first tsunami wave was approaching and the people of coastal areas saw that the huge wave was approaching the coast and also the sea level was subsided from the beach. After the two waves a third strong tsunami wave came up and it destroyed the infrastructures, lives, property etc. Some people issued warnings when the first tsunami wave was approaching about the flood and started running towards the core of the city. Because of the early warning, 30% of people succeeded and survived the tsunami and the other 70% were wiped along with their houses. After this earthquake, another earthquake took place with a moment magnitude of 8.6 on 28 March 2005 near to the island. There were two zones affected by the December 2004 tsunami (Refer Fig. 2) i.e. zone 1 was the coastal area which was destructed by the tsunami forces; this zone goes up to 3 km inland.

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Zone 2, this area was approximately 1.5 Km and in this zone, the tsunami forces were not much strong

and caused only flooding and dumping of mud and debris without causing serious damages.



Figure 1: Country wise magnitude of the impact of tsunami [3].



Figure 2: Flooding Zones.