

News Review

Some Facts about Tsunami

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Preamble

The December 26, 2014 edition of a well-circulated English news daily of Kolkata printed a photo on its front page that shows a small hand laying a half-bloomed white rose on a seabeach of Thailand to commemorate the said day of 2004, which witnessed a historic natural disaster of unimaginable scale in some parts of the globe. A decade ago on this day the severest tsunami ravaged the coastline of some countries by the side of Indian Ocean. These countries are Thailand, Indonesia, Sri Lanka and India. The people of these countries who lost their near and dear ones remembered them with bleeding hearts and till date they reminisce it with unbearable pain. This reminiscence is not only confined within their families and neighbours but also transmitted to the whole world through printed media and audiovisual way. Though a decade has passed by, yet the tsunami rampage of 2004 still seems to be a contemporary event and the young generation of today should know what happened in the morning hours of December 26, 2004. It is with this intention the present article is composed.

Tsunami and its Genesis

From time immemorial the waves of the oceans are striking on their shores. The nature of these waves varies and sometimes their heights become so great as to flood the shoreline and island. In earlier days scientists considered all kinds of waves to be of the same nature and termed them as tidal waves. However, in recent times the subject of ocean studies has emerged as a separate branch of science known as Oceanography and organized research on this science subject has changed many erroneous ideas of the past. Now the oceanographers have come to the conclusion that all waves are not tidal waves. In order to understand the nature of differ-

ent categories of waves one has to know some aspects of the geological structure of the ocean floor.

The ocean floor has a complex geological character. It is not a plane surface and there exists long ranges of mountains of both high and low altitudes along with deep trenches under the floor. These mountain ranges are called oceanic ridge having many active volcanoes. At the bottom of the Atlantic Ocean one such ridge starts from Iceland and extends upto 1000 miles. All the oceanic ridges under all oceans when taken together have a circular shape with a circumference of 60,000 km. The ocean floor undergoes frequent changes in shape and structure. Particularly the active volcanoes erupt with tremendous force and liberate enormous amount of energy. This event creates earthquakes of very high power. Due to the tremendous power of the earthquakes the ocean bottom frequently undergoes lots of changes and many ups and downs of the tectonic layers take place. The earthquakes, the tectonic movements and the energy liberated during volcanic eruption cause transmission of deep ocean water from bottom to surface as columns. These energy carrying water columns ultimately manifest themselves as waves on ocean surface. These waves are actually seismic waves and on earlier days they were named as tidal waves like all other waves in the ocean. But the present day scientists think this name to be erroneous. To put an end to this confusion the ocean researchers decided to designate the seismic ocean wave by the Japanese word TSUNAMI which is now internationally accepted.

The name Tsunami is very much known to even the common people and also being used in their vocabulary to refer to any uncommon event. However, the genesis of Tsunami can now be discussed in a simplified way.

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When a piece of stone is dropped on the undisturbed surface of a pond there is a series of waves that are produced which move in a circular way, the centre being the point of impact of the stone. In a similar way the sudden volcanic eruption, earthquake and subsequent movement of the tectonic plates cause the energy released thereby to come up and create an eruption of the ocean water surface to generate a series of low circular waves. These low circular waves are actually the Tsunami waves having low periods and long wavelengths. These waves move in a radial manner from the point of origin i.e., the point where the surface water erupts due to release of energy at the ocean floor. The Tsunami waves travel with a remarkably high velocity. As the wavelengths of these waves are more than 100 km, they are shallow water waves over most part of the ocean. On the open ocean where the water depth is very high the Tsunami waves travel at a speed of about 720 km/hour, a speed comparable to that of a modern jet aircraft. Of course when the waves reach shallow water the velocity is retarded due to the presence of solid landmass under the low water depth.

It is interesting to note that though Tsunami waves move with incredible velocity in the open ocean, yet it poses no danger to oceangoing vessels because actually it is energy and not mass that moves with this speed. Strangely enough the passengers and sailors of the ships plying on the open ocean do not even feel the passage of Tsunami beneath their vessel. The normal ocean waves are also not very much affected by the shallow water waves and they rarely increase in height by more than one or two meters. As has been pointed out earlier that in shallow water near the shoreline the Tsunami waves increase in height by even 10 meters. Due to this happens the flooding of the coastal zone causing devastation.

Early History of Tsunami Disaster

Japan and Philippine Islands are long known to be prone to Tsunami disaster. Japan has a long historical record of being hit by Tsunamis that dates back to 684 AD. Scientific studies of Japan tsunamis record that 150 tsunamis have struck the islands of Japan since 684 AD. It has now been known that the Meiji Sauriku Tsunami of 1896 caused the death of more than 27,000 people in Japan. At a later date a Tsunami originating in the Moro Gulf of the Philippine Islands hit Japan and caused 8000

deaths, injured 10,000 people and 90,000 were rendered homeless.

The Megatsunami of 2004 causing incredible disaster

From the information given above it is understood that Tsunami is an irresistible natural phenomenon. It ravages coastal ecosystem, disrupts the natural environment and causes immense damage to human and animal life. The extent of damage depends on the intensity of the Tsunami striking a particular area. This is the reason why Tsunami with an incredible intensity and devastating power is termed as 'Megatsunami'.

On the 26th of December 2004, such a Megatsunami hit the coastal areas of several countries situated by the side of the Indian Ocean. When the local time of Northern Sumatra showed 7-58.53 in the morning (seven O'clock fifty eight minutes and fifty three seconds) of the above date a very powerful earthquake took place in the Indian Ocean at a depth of 6.5 Km offshore Sumatra-Indonesia. The magnitude of the earthquake in the Richter scale was 9.0 and its epicenter had been located at the Sunda Trench, a deep depression under the ocean which, in the language of geology is a Subduction Plate boundary where the Indian Plate collided with the Euro-Asian plate. Due to this event there was a drastic change in the geological structure of the area.

The most remarkable aspect of this earthquake was its duration. Normally the earthquakes continue for several seconds to maximum 2 to 3 minutes. But most astonishingly the earthquake which is referred to above continued for more than 10 minutes and triggered minor tremors even as far as places like Alaska. This seismic event not only changed the geological structure of the ocean bed but its influence was instantly transmitted to the ocean surface to produce a Megatsunami. This Megatsunami had a catastrophic effect on the coastlines of Indonesia, Thailand (Sumatra-Java), Sri Lanka and India. In India the Tamilnadu and Kerala coasts and also the Andaman and Nicobar Islands were severely devastated.

The total death toll due to this calamity could still not be ascertained. According to one report the number was given to be 2,40,000 and a later report showed it to be 3,50,000. Megatsunami wave ranging from heights of 10 to 30 meters hit the shores of the aforesaid countries. Even news of death was reported from Port Elisabeth in South Africa which is 8000 km away from the epicenter of the earthquake.

Scientists are of the opinion that the death toll of 2004 Megatsunami exceeds the total number of deaths that happened in all the Tsunamis taken together during the previous 300 years. This information is enough to indicate the terrible dreadfulness of the 2004 Tsunami. The senior and experienced journalists of the renowned news media Associated Press (AP) have published the descriptions of the unimaginable rampage caused by this Megatsunami. In a very concise manner some of these are given here in order to enlighten the present day young generation about the heartbreaking natural calamity.

One of the correspondents of AP writes that heaps of dead bodies were dumped on the roads of Aceh and Suburbs in Indonesia. They were being buried but the manpower available for the job was inadequate. The scene was unbearable even to the seasoned reporter, one photojournalist of AP observed mounds of coloured debris on seabeach of Khaolak in Thailand. As his car slowed down near it he found the colourful debris to be nothing but heaps of bodies wearing coloured swimming costumes and sunbathing garments. All these deceased people were foreign travelers enjoying holidays in tropical climate. The whole scenario was so heartrending that the photojournalist was compelled to shut his eyes. Another AP journalist engaged in covering the Tsunami damage in Sri Lanka found people crying for a piece of bread. In a hospital in Galle in Sri Lanka heaps of dead and injured were being brought in a tractor, the number was beyond counting. In India maximum damage occurred in Tamilnadu and Kerala coast and also in the Andaman and Nicobar Islands. A photographer of a widely circulated Indian English daily newspaper was awed to find a fishing trawler landed on the roof of a three storied building, in Nagapattinam which was the worst affected area in Tamilnadu. The survey of the Ministry of Home Affairs (MHA) shows that in Indian Territory including Andaman and Nicobar Islands 11000 people died, 5000 were missing and 3,80,000 were rendered homeless. The death toll was 8000 in Tamilnadu, 200 in Kerala and rest in Andaman and Nicobar. The MHA estimated the cost of rehabilitation to be 1.2 billion rupees.

Tsunami Warning System

It is undeniable that like other natural calamities Tsunami is also irresistible. Attempts have, however, been made by the scientists and technologists to find out ways to control and reduce the damage level of this

natural calamity and as a result they have invented the International Tsunami Warning System (ITWS) and implemented the same. The main function of ITWS is to detect and measure the intensity of earthquakes under the ocean and predict the possibility of occurrence of Tsunami and its intensity in different Tsunami prone areas. This has been done by installation of sophisticated electronic and computer aided devices. With the help of ITWS prior warning reaches the Tsunami prone places, so that proper measure could be taken to shift human and animal population, valuable properties and ships anchored in harbours to safe zones. Normally the Tsunami flooding extends 1-2 Km inland from the shoreline. Scientists have also suggested draining manpower to do the shifting operation. The ITWS together with the measures like evacuation, relocation of coastal habitats and development of engineering structures to absorb or reflect the energy of Tsunamis have proved effective. The success of the programme has been observed in 1957 Tsunami striking in Hawaii where no one was killed despite excessive flooding. At present under the management of ITWS many regional stations in Japan, Hawaii, Alaska and some parts of former Soviet Union have been installed in the form of a network. Question may arise regarding the matter that in spite of ITWS programme why so much devastation happened in 2004 Megatsunami. The reason has been attributed to the fact that never before in known times any occurrence of such severe earthquake in the Indian Ocean near the affected territories of 2004 has been recorded. So this region was not under the surveillance of ITWS and so prior intimation could not be given. However, the good news is this that after the 2004 calamity the Ministry of Environment and Science (MOES) has sanctioned Rupees 125 crores to install the National Tsunami Early Warning System. The nodal agency for management is MOES in collaboration with the Department of Science and Technology (DST) and Council of Scientific and Industrial Research (CSIR) with its centre at Hyderabad. This centre is named as Indian National Centre for Ocean Information Services (INCOIS). In view of this activity of the Government of India one may hope that the inhabitants of the coastal region of India would be a bit safe from any Tsunami disaster in future.