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## Exhausting The Energy Of Tsunami Well Before It Reaches The Shore

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### **Abstract:**

*As of now, when sunami warnings are recieved, and confirmed, the govt authorities evaquating the people residing near coastal area to the high grounds. Even this is not possible in full when sunami occurs very nearer to the coastal area, or in the night times, because there is no sufficient time. After sunami's destruction, rehabilitation work starts. But I want to go one step ahead of exhausting the energy of sunami well before it reaches the shore. Thanks to Japan scientists for building the big wall, but that was not sufficient to tackle the huge energy of sunami because the load and energy of sunami was acting horizontally.*

*So I want my research way can be used to avoid the destruction by sunami. This is a tiny bigining only and I am sure that our younger generations are talented enough to tackle sunami in a better way in future. So, I have explained my implementation plans in my research papers as follows. I have requested the senior/junior scientists and researchers and others to comment on my papers because with the feed back somebody can find out a still better way to tackle sunami.*

### **1. Introduction**

I am V. Vijayaraghavan, a retired factory Manager aged 65 living in Chennai – 91, Tamilnadu, India. I am feeling happiness and pleasure in furnishing the following proposals & implementation plans regarding Tsunami with above said Title.

### **2. What Induced Me To Do So?**

When I was watching TV programme in 2004 and 2011, I saw horrible scenes of Tsunami destructing the lives (Human & Livestock), properties (movable & immovable) & water entering of huge volume into reactors of Nuclear plants. As for as Tsunami is concerned it cannot travel further on the shore, so it discharges energy there. But for humans & continents it is a great & worst destruction. Then I have decided to find out some solution to stop the destruction. But I know well, Nobody in the earth can stop earth quake & Tsunami from occurring. But I have somehow understood that the energy of Tsunami can be exhausted, so that we can stop the destruction of Tsunami. So, I started thinking in different angles about the implementation plans how to exhaust the energy of Tsunami? Finally I have got an implementation plan that can give expected results to exhaust the energy of Tsunami well before it reaches the shore.

### **3. How We Can Describe The Tsunami?**

Earthquake in the continental area is called still as an earthquake. But an earthquake underneath the oceanic rocks, releases the energy to the top surface of the sea and the energy spreads along with water displacement at very huge volume is called as a Tsunami. So the Tsunami is the Bi-product of the earthquake. Even though the word Tsunami represents harbour waves in Japanese language, the total process what is happening after energy released by the earthquake is called Tsunami. The energy reaches the top surface of the water and start spreading along with the huge volume of water in all the directions. Then the course of Tsunami is well set as per the conditions of the energy it took from earthquake and with refraction and diffraction process. The Kinetic energy & water displacement travels at Jet speed (over 600 km/hr) in the set directions. The tsunami waves travels unnoticed in deep waters because of constant depth and the waves start breaking with reduced velocity and with lot of turbulence and high tides starts when the waves reaches the shallow waters

If the energy is capable of travelling 2000 km for example, it strikes in the Coastal area which falls enroute. Because it could not travel beyond the sea it rises to 60/80 feet due to the continental slope. In the deep sea a column of water moves with great speed. But when it is approaching shallow water due to the slope the column of water converted as a tidal wave by the pressure developed at the bottom layer of water & strikes in the coastal area & travel, up to 20/25 km in coastal area & destroys almost everything. For Triggering the Tsunami the magnitude of the earthquake (richer scale) is important, and it should be above 6.8. This alone cannot trigger a Tsunami. The other vital parameter is a pattern of the earthquake. There are three patterns of earthquake. 1) Convergent, 2) Divergent, (3) Transform. The convergent pattern of earthquake is capable of displacing a very huge volume of water (which cannot be imagined) suddenly, due to tectonic plate dashes with each other and make oceanic rocks to raise fee meters. The result is the water from the epi-centre will be displaced suddenly on all the sides. So Tsunami warning is given immediately after the earthquake and it is confirmed

with the type of earthquake occurred immediately after the earthquake most of the times the Tsunami warning is cancelled due to the pattern of earthquakes is not fit and sufficient for triggering the Tsunami.

#### 4. Earthquake

After 1960, the root cause of the earthquake is the movement of tectonic plates, which are parts of the crust and beneath the continental & oceanic rocks. There are three types of earthquake, (1) shallow earthquake (2) intermediate earthquake & (3) deep seated earthquake. First one occurs between 0 – 40 km 2<sup>nd</sup> one is 40 – 80km, 3<sup>rd</sup> one is above 80 km. The first one is the root cause combined with tectonic plate movement is to create the earthquake. So the crust in which we are living is placed on the floating tectonic plates. So there must be always, a small amount of movement in these regions which cannot always be felt. We speak more about this later.

#### 5. Tectonic Plates & Its Movement

Tectonic plate is larger in sizes (rocks) (50 km thick x 100 km wide x 1000 to 1500 km long) are about 12. Smaller sizes more than 20 to 30 are floating on the outer mantle of the earth. It is not secured firmly with anything and it is floating and secured only with its own weight. It is spread beneath the continental and oceanic rocks. The convection current which is being produced from deep inside (inner core) comes to the top and makes the movement of these tectonic plates.

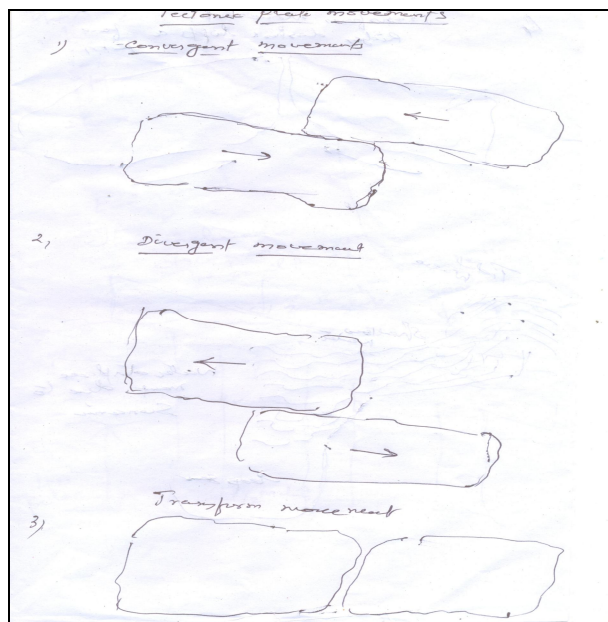


Figure 1

When these plates move, they rub on each other, due to that, the seismic energy is produced and this triggers earthquake on the crest. In this type, chance for 2 types of earthquake patterns are to occur 1. Convergent, 2. Divergent. If this is 6.8 and above on the Richter scale, this can produce the earthquake with normal and minimum or heavy destruction depending upon the superstructure in the enroute area and upon the crest.

convergent pattern of tectonic plate movement causes severe destruction on the crust because in this pattern not only the plates dash with each other but also raises a few km on the top and make the superstructure collapse accordingly.

#### 6. What Makes The Tectonic Plates To Move From Its Position?

Already the tectonic plates are not secured perfectly on the top of the outer mantle. (Molten metal iron and nickel) No firm grip with other objects. Due to high pressure and heat with inner core and surrounding molten metal a current is produced and it is called as convection current. This convection current passes through the molten metal and moves the tectonic plates considerably. So, sudden movement causes the earthquake. Some of the tectonic plate in the region of the globe. i.e., Japan, Chile, Indonesia and China, Philippines are situated in such area that the convection current passes very often and makes the plate movement in continental and oceanic area by triggering the earthquake and Tsunami. But strictly speaking at present the movement of tectonic plates are more often in the above said region and one can not rule out such movement in other places also. And also nobody can predict the movement of these plates and its region. But Tsunami can be predicted and warning can be given and but not for the earthquake.

#### 7. Pattern Of Earthquake

The pattern of earthquake decides finally the amount of destruction, whether it is an earthquake or Tsunami.

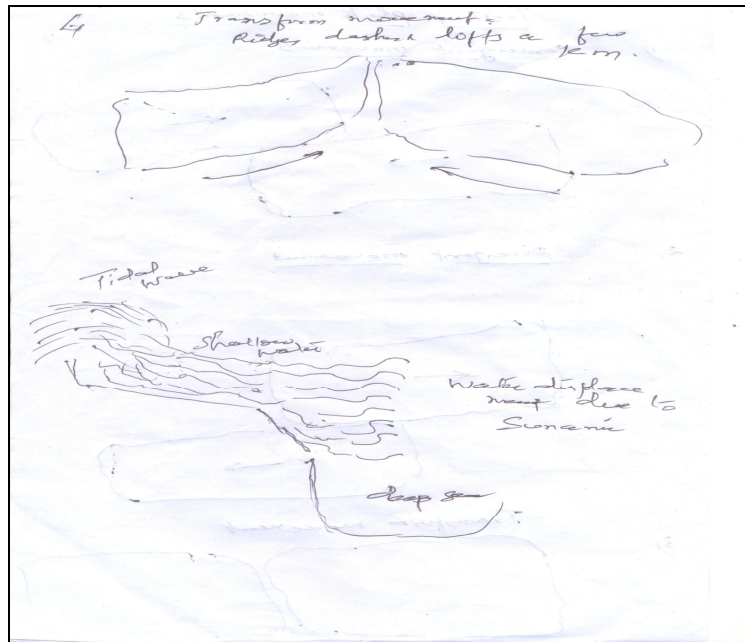


Figure 2

For each type of earthquake, the result varies.

- Convergent earthquake
- Divergent earthquake
- Transform earthquake

The tectonic plates in both continental and oceanic rocks are not secured as separate. In some areas, it is settled one upon another see the above diagram.

Nobody made like this, when the earth was forming its structure the tectonic plates could have been settled like this or with longer years of time, it might have moved and settled by itself due to convection current's influence. The present situation of places of tectonic plate will definitely go different in future. Nobody can predict. The movement of tectonic plate is taking place below the earth and the seismic energy spreads around and causes the damages. No preventive action can be taken to avoid the moments of the tectonic plates. Only containment action is possible for earthquakes. But for Tsunami some proposal and implementation plans be discussed firmly to avoid destruction. The construction of earth structure can be seen below and can be understood. This is given to increase the awareness about the earth structure. In all countries, the earthquake prone area to be identified, and the permission not to be given for RCC structures and super structures of houses. only wooden house should be allowed to construct. By thus, the loss of lives can be avoided considerably against earthquake. Earth structure-----1) Inner core(iron ball)2( inner mantle(iron and nickel in dense molten state) 3)outer mantle(iron and nickel in lose molten state) 4 oceanic and continental rocks 5 crusts.

### 8.Magnitude Of Earthquake / Formation Tsunami / How It Travels To Shore

Strictly speaking I expect a minor earthquake (little movement of tectonic plates) always or most of the times. But it is not felt on the upper crust where we are living. Because, if the magnitude is less than 6.8 on Richer scale, the destruction would be minor or there won't be any destruction but a jolt or a shake is felt near the epicentre and surrounding areas according to the magnetite. 1 to 4 magnetite of earthquake will bring no effect on the crust. Thanks for the riches scale instrument to find out the magnitude of the earthquake. There cannot be any preventive action against earthquake on continental area. But, precautionary measures are definitely possible to bring down destruction. But no government in some countries where the earthquake is a frequent visitor in particular places of their countries not taking any serious steps to avoid destruction eg. New Zeland Christ church and China. They are allowing RCC structure and superstructure and multi-story buildings to be constructed. This should be avoided to prevent destruction. Any construction with one ground floor with wood, bamboo or with lite roof structure to be allowed. So the prediction of earthquake in the particular place in any country is not possible only the precautionary measure are possible in case of earthquake. Where the earthquake is a frequent visitor, a clear instruction and rules to be followed to avoid destruction.

But in case of earthquake occurs beneath the oceanic rocks, the energy suddenly released and travels, upright and the energy reach to the top of the surface. As soon as the earthquake under sea is recorded and a warning sent to the tsunami research centre and from there the warning is given to coastal areas by siren. Immediately the evacuations started in the coastal area, If tsunami is conformed from the U.S. Tsunami research centre, the evacuation is hurrying up in a massive way. But if a tsunami warning is cancelled, the evacuation is stopped. The tsunami is confirmed, provided if the magnitude and pattern of the earthquake (because it can displace the

huge vol. of water suddenly). The energy after reaching the top of the sea, started travelling along with a column of displaced water in all the directions.

But with the assistance of the enormous energy from earthquake tsunami may set its course of movement accordingly. If earthquake occurs, very near to coastal area and Tsunami is conformed, there is no time for the people near coastal area even to move to safe area because, after the warning, anytime the tsunami can strike the coast. That has happened in Sendai and in the Miyahi in Japan in 2011. (extreme bad luck for the people in the coastal area).

The way of destruction, amount of destruction. How many km to the sea water will enter are all depends upon the magnitude of the earthquake and the volume of water displaced due to patterns of earthquake.

The movement of column of water in deep sea can not be identified with waves height during the tsunami is travelling to the coast only when it starts entering the shallow water, the bottom area of water will put pressure on water on the top and as a result the whole column of water converted into a tidal wave and strikes the coastal area and enters the shore accordingly with a heavy Bang and it is discharging all its energy in the coastal area immediately after shallow water as it could not travel further. The tectonic plate movements beneath the oceanic rocks will be there for about 3 hrs . Slowly again the tectonic plates will settle down after the movement. Until then, the quake and aftershocks will be there approximately for every 15 mins. Accordingly the energy will be released because of that the displacement of water in the form of waves will strike the coast approximately for every 10 mins.

### **9.What Is Being Done For Tsunami?**

At present, if tsunami warning is given anywhere in the world, people residing in that coastal area are evacuated is higher ground. And after the destruction of tsunami in that coastal area, rehabilitation work is taken up. In almost all countries where coastal area is there, the tsunami research centres are established what type of research is being done is not known clearly. To stop the destruction of the tsunami, what is being done? And anything to counter the tsunami is trying so far, is that to be answered by research professors and the department of the different countries. Even with tsunami warning systems, there should be 3 types (3 different of warning) 1. Warning when an earthquake occurs within 200 km. So that people do not waste time in running to higher grounds. 2) Warning when an earthquake occurs at 600 km. People can take necessary things from their houses and vacate to higher place. 3. Warning when an earthquake occurs near 1000 km. So that people when they are vacating their houses they can go out with their important belongings. I do not know, these steps are followed when tsunami warnings are given in countries like Japan and Indonesia.

### **10.Tsunami Protection Walls**

Tsunami protection walls are being built in some places in Japan along the village coastal areas. This can not help to protect the area from destruction of Tsunami, because the energy of surname can not be anticipated of all times. Suppose, it we are building the tsunami wall to withstand 50,000 tones of energy and pressure, it any particular time, if the energy of Tsunami well within 50,000 Tones, the wall will not be damaged or uprooted when tsunami strikes. But if any particular time, if energy exceeds 50,000 tones the waves with water simply uproot the wall and destroys the coastal area. A tsunami, How worst can make the destruction can not be predicted in advance. It mainly depends on the energy released from the earthquake and most important factor is the patterns of earthquake due to which what is the volume of water will be displaced from the epi - centre. A wall in Japan built along the coast for 30 years with 1.5 billion dollars, easily toppled by tsunami in minutes in 2011. This is the best example, the wall will not protect that area from destruction of Tsunami.

### **11.How The Energy Of Tsunami Can Be Exhausted?**

I recommended inclined structure (RCC ramp structure) to be constructed for the purpose of exhausting the energy of Tsunami. When the tsunami started travelling in all directions, through the wave wrinkle from the epicentre, guided by the enormous energy it took from the earthquake at Jet speed in deep water. If the tsunami displaced water capable of travelling 2000 km, it will definitely travel within 4 to 5 Hrs to that coast. If the coastal area is beyond 2000 km for example, the energy will be automatically exhausted and the destruction will not be there only 2 to 3 m waves can be seen in the coastal area. If the coast are falling within 1000 km or 1500 km destruction will be there definable. The displaced water with energy taken from earthquake when it approaches shallow water near the coast, the water at the bottom trying to rise to top when it is approaching the coast. The water at the top with no other option other than raising from the top surface to a height of 40 to 50 meters. The whole column of water jumps gradually and change in the form of tidal waves and enters in continental area and travels up to 20-25km inside and destruct lives, properties and Nuke plant. To avoid this, we should construct inclined RCC structure inside the sea 8 to 10 km from the coastal area (most important point is the depth of water is to be between 25 to 30 feet only). We are creating a slope gradually inside the sea well before the shore so that the full energy of Tsunami is exhausted in the particular region of structure and will not affect the coastal area.

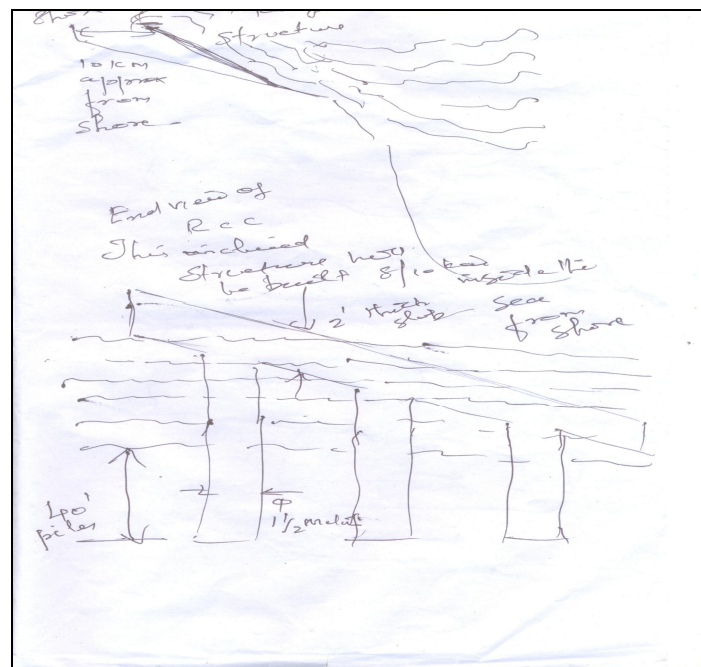


Figure 3

Once the Tsunami's energy is exhausted, the accumulated water before to shore and the place of structure, will return automatically to the sea. The inclined construction cannot be constructed near sea port because of the dredged depth to more than 100 or 150 feet to accommodate the entry and exit of ship movement. The construction can take place only from 8 to 10 km from shore inside the sea, where the depth will be about 25 to 30 feet only. This will be one time investment. If it is constructed properly, it can protect the coastal area for more than 40 to 50 years and with proper maintenance because it is immersed in the sea water always, proper corrosion resistant chemicals to be added with construction material.

### 12. Specification Of RCC Structure

The pillar size should be min 1.5 meters India with proper steel inside with core proof channels. The top panel should be 40 feet note around 50 feet as length and 2 feet thick. This is my idea. But a designer is a better person to design these structures.

After construction, when Tsunami is approaching in the particular direction will slide over the inclined structural will not uproot the structure because of its inclined design. Whatever height the waves, will rise in shore, the same effect will be there at the nearby constructed area which is minimum 8 km inside the shore. No warning system, no evaluation or rehabilitation are required really to save the coast from destruction of Sumani.

### 13. Whether The Construction Is Required In Full Coastal Area Of Any Country

Yes, if money can be allotted, the construction can be done along full coastal area of any country leaving the harbors area & Access area of ships and travelers.

The routes for ships and other vessels can be marked in order and maintained. If it is not possible for construction full coastal areas, at least important coastal areas where thick population are there and where Tsunami is a frequent visitor, the construction can take place portion by portion. i.e., 1<sup>st</sup> Phase 3 Km length & 2<sup>nd</sup> Phase 8 Km length & 3<sup>rd</sup> Phase 15 Km length and so on like that.

In the constructed Area, through lighting, it can be identified for maritime and other fishing boats about the structure existence beneath the water. So incoming and outgoing routes can be finalized and informed to the vessels. So that the vessels need not come and dash with the structures. This construction will not effect the work in harbour, coastal or beach area in any way. The structure can be inspected and maintained by the sea divers periodically. At least, I request all countries to try this construction in their coastal area in the particular place for 3 to 5 Km and results are observed when Tsunami strikes. In Japan and Indonesia and other countries where the Tsunami threats are there, they can try these type of construction to avoid the destruction of Tsunami.

### 14. Conclusion

I have contacted important persons in India and in other countries in this regard, only 2 persons were acknowledged after receiving my proposal and implementation plans.

I thank scientist Mr. George Carayanees and Mr. Alison Bird for advising me to correct my theory regarding formation of earthquake, tsunami and travelling of tsunami in deep sea and in shallow waters.

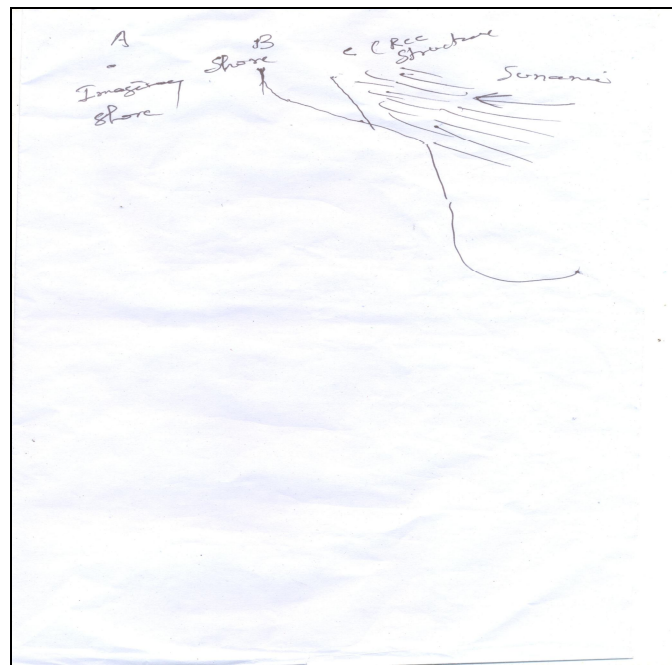


Figure 4

For example, a Tsunami which approaches coastal A starts its destruction with the tidal waves enters continental area in coastal A. Suppose if the coastal A is 100 Km away from that place the destruction will not be done in coastal A instead it will be in coastal B. So from coastal A we will have to go inside the sea for about 8 Km and construct an inclined structure shown as per the diagram. The diagram drawn as per my idea, But it should be designed properly by a structural engineer who has got the experience in sea construction.

Now I would request the viewvers whoever is going through my proposal and implementation plan in computer to send me a reply through email about their opinion. My mail ID is raghavan2909@gmail.com, Cell No. 09994752823, Phone No. 044 – 22422202. India

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