TSUNAMI WARNING SYSTEM:A LIFE SUPPORT TECHNOLOGY

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Abstract- **Tsunami is a system of ocean gravity and occur due to earthquake the tsunami wave have so much speed like million of nuclear bomb.**

Tsunami warning system is developed to protect the resources and life of human being from the natural hazard TSUNAMI.

The tsunami warning system first developed in

Year 1920 in Hawaii. There are so many tsunami warning system at various level like local level, regional level ,national level.

"There was reporting in the National Geographic Magazine, and it said, 'On the evening of June 15, 1896, the northeast coast of Hondo, the main island of Japan, was struck by a great earthquake wave,' " Zimmer says, "and then it explained that the Japanese term for this was 'tsunami.' "

Figure1:en.wikipedia.org[1]

There are so many country who give their contribution for the welfare or development of tsunami warning system like Japan ,Australia etc. In India there is a tsunami warning station situated in Hyderabad that is Incois(Indian national centre for ocean services). Established under ministry of earth science in 1998.

Figure 2: *www.disasterwarning.[2]*

I. INTRODUCTION

Tsunami wave is very high speed wave .through tsunami very much destruction and distress is occurs. tsunami have two types of wave .tsunami wave .seismic wave.

These wave have different range of speed. seismic wave have high speed in comparison of tsunami wave.

Tsunami Warning System is developed by the efforts of ATWS and GA with the contribution of Australia. These are the organization who help to developed Tsunami Warning System .

The first tsunami warning station in India is INCOIS which passes the information at various level [3]

Like –local, regional , state ,national as well as international level. This station is under earth and science department.

II. EARLY WARNING SYSTEM FOR TSUNAMIS

Tsunami warning system has two tools hardware and software part. tsunami wave is the high speed wave. s peed is about 300 -600 mph(miles per hour).

Establishment of Indian tsunami warning system

The Indian tsunami warning system is under the Indian national centre for ocean. and situated only in Hyderabad and gives the information and service regarding the Indian ocean ,pacific ocean. the service is available 24*7.the ocean. and warn us by tsunami wave .and Indian tsunami warning tsunami warning system is used because mostly tsunami wave is generated in Indian ocean and pacific ocean.

The earthquakes that occurred since September 2007. Comparison of the earthquake parameters estimated by ITEWS with other international seismology-agencies suggests that the system is performing well and has achieved the target set up by the Inter-governmental Oceanographic Commission. Indian ocean and pacific ocean is the ocean of tsunami ,where tsunami came so many times and with maximum speed. if one looks at the distribution of

earthquakes globally, more than 75% of earthquake energy is released in the circum-Pacific belt, about 20% in the Alpine-Himalayan belt, and remaining 5% through the mid-oceanic ridges and other stable continental region earth- quakes. Pacific coast countries, in advance, about the arrival of tsunami waves at specific locations. Known as the "Tsunami Warning System in the Pacific (TWPS).[4]

facts and figure of tsunami in India

1. The December 26, 2004 Indian Ocean tsunami was caused by an earthquake that is thought to have had the energy of 23,000 Hiroshima-type atomic bombs.
2. The speed of tsunami wave on the reactor scale is 9.0 magnitude in the coastal of Sumatra.
3. The speed of tsunami wave is effected the layer of tsunami wave and due to this so many hazard is occur. The tectonic plates in this area had been pushing against each other and building pressure for thousands of years. They continue to do so and will likely cause underwater earthquakes and tsunamis in the future.
4. The rupture was more than 600 miles long, displacing the seafloor by 10 yards horizontally and several yards vertically. As a result, trillions of tons of rock moved, causing the largest magnitude earthquake in 40 years.
5. Tackle a campaign to make the world suck less.
6. Within hours of the earthquake, killer waves radiating from the epicenter slammed into the coastlines of 11 countries, damaging countries from east Africa to Thailand.
7. A tsunami is a series of waves - the first wave may not be the most dangerous. A tsunami "wave train" may come in surges five minutes to an hour apart. The cycle is marked by the repeated retreat and advance of the ocean.
8. Despite a lag of up to several hours between the earthquake and the impact of the tsunami, nearly all of the victims were taken completely by surprise because there were no tsunami warning systems in place.
9. The Indian Ocean tsunami traveled as far as 3,000 miles to Africa and still arrived with sufficient force to kill people and destroy property.
10. The tsunami resulted in at least 227,898 fatalities[5]

III. LITERATURE

Tsunami warning system structures has so many components and technology that is used in tsunami warning system that is Sensing ,GPRS,GPS etc.
There is some criteria where the speed is exceed from 6.6 at the reactor scale .

IV. METHODOLOGY

Tide Gauges-

Tidal gauge is used to collect the sea level data so we protect the people who stay near to the coastal area.
If system can passes the signal of the sea level data to the real time operating station. the operating station can be used to detect the tsunami wave.
In tidal gauge the system that we used give the warning in small time for the existence for tsunami.
Pacific tsunami warning centre uses tidal gauge data in addition to the BPR(bottom pressure record)and seismic data.[6]

DART(DEEP ASSESMENT REPORTING TSUNAMI)

Dart system is developed my NOAA(NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION) IN 2003.
If we placed dart system in Indian ocean then we save thousands of lives.
In tsunami warning system the system that we use is DART SYSTEM. here two DART SYSTEM

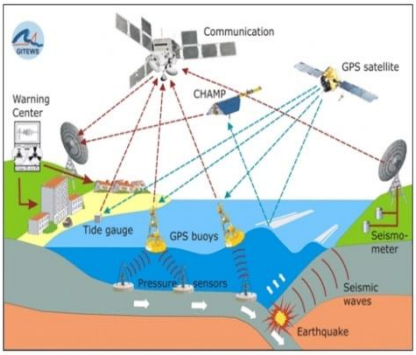

Figure 3: davidscienceblogishungry.blogspot.com[7]

DART1 AND DART2.

DART1- DART1 is established in 2003 .it has one way communication. The communication between BPR(Bottom Pressure Recorder) and Tsunami Warning System.
DART2- DART2 is invented after the removing the drawback of DART1 in 2005.it has two way

communication. The communication between BPR and Tsunami Warning System through Satellite
The Satellite that we used is iridium satellite and it has 66 active satellite.
In this the first step is tsunami detector which detects the tsunami wave speed and pressure and we
Use BPR for measuring the speed and pressure when earthquake strikes on ocean surface .the Tsunami detector passes the acoustic link to the surface buoy .In second step the surface buoy it is placed on ocean surface and this is the main component
of tsunami warning system and it has acoustic transducer and modem as well.
In third step the surface buoy passes the acoustic links to satellite. and satellite passes the signals to early warning station and station passes the warning to public through various resources.
In tsunami warning system to determine the pressure and speed of the wave of the tsunami wave we use the algorithm. Through this algorithm we have the information regarding the height of tsunami wave .
•Tsunami is caused by uplift of massive amount of water •It can be caused by: subduction along fault lines, submarine landslide and volcanoes •Speed of Tsunami is very high in deep sea (500 km/hr or more) and less in shallow area (30-40km/hr)
Height of Tsunami wave is very small in deep sea and large near the shore. Time period of Tsunami wave is large 10 to 30 minutes or more. Spatial period of tsunami changes with depth. At deep sea it is near the shore it is . v =(g*d)^1\2 Seismic Data
•Strong earthquakes (greater than 6.5 in Richter scale) can result in Tsunami so occurrence of a earthquake may indicate occurrence of Tsunami too, however, not always.
•Warning can be issued in less than 15 minutes.
The all information that I collect about tsunami warning system is from secondary resource .all the research is do by the scientist and all the specialist peoples.[8]
As in this system the hardware part and the software part -

Hardware

1) 3 killer American acculeval Pressure sensor .
2) ES 308 board.

Figure 4:www.kelleramerica.com[9]
3 Keller American pressure sensor

Software 1) dynamic c
2) Microsoft excel\met lab.

The hardware and software part are used for knowing the speed and pressure of the tsunami wave.[9]
Tsunami information bulletin – A very small possibility of a local tsunami .
Tsunami information bulletin – A very small possibility of a destructive local tsunami.

V ADVANTAGES

1. Good advance warning when earthquake strikes on ocean layer it gives the warning within 10-20 min.
2. Deep water pressure produces low relatively low false –positive as wind driven.
3. Multiple sensors can triangulate epicentre of water displacement and wave propagation can predicted.
4.

Disadvantages

1. Expensive
2. High maintenance
3. Used so man communication links

Figure 5:www.latimes.com[10]

VI RECENT DEVELOPMENT

for the welfare of human being and other resource we should have develop that kind of warning system that gives the information within with in a seconds and have less maintenance cost too . and for this we use that device which transmit the signal in few seconds from very long distance .

we use that kind of computer system that detects the occurrence and the timing of the occurrence of tsunami and use the algorithm of find the graph between pressure verses speed of tsunami waves.

And the method that we used in tsunami warning system to generate the alarm of the occurrence of tsunami wave has consist the satellite and the cost of satellite is so much high.

VII CONCLUSION

In tsunami warning system there is so many development is occur before the

invention of DART system . The structure of tsunami warning is consist so many device .so its working is complex some time.

And in tsunami warning system the devices is used so the cost of DART SYSTEM is about 250,000 us$\unit. In methodology the tidal gauge method is used for detect the speed and height of the wave .

And hr coastal line ,tidal gauge ,and other method is apply for finding the speed of tsunami wave.

In DART SYSTEM the components are passing the signal to one device to other .the signal is passes is called acoustic link.

Acoustic link is used for sending and receiving the signals placed in bay of Bengal .and 2 are placed in Indian ocean to measure the pressure

VIII ACKNOWLEDGEMENT

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