

Natural Disaster (Tsunami) and Its Socio Economic and Environmental Impact – A Case Study of Kanniya Kumari Coast

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Abstract

Natural Disaster (Tsunami) and Its Socio Economic And Environmental Impact – A Case Study Of Kanyakumari Coast. Kanyakumari is the southernmost district of Tamil Nadu. The software Arc Gis are used to demarcate the Natural Disaster (Tsunami) and its socio Economic and Environment Impact. The district lies between longitudes is 77°15' E 77°36' Eastern longitudes. The Latitudes is 8°03' N to 8°35' Northern latitudes. The District is bound by Tirunelveli District on the North and the East. The South Eastern boundary is the Gulf of Manner. On the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea. On the West and Northwest it is bounded by Kerala. The Kanyakumari District total areas area is 1430.3Km. The Coastal Villages elevations are 5 meter to 50 meter above mean sea level. Tirunelveli linked with the Kanyakumari city by both road and railways. It is located south of Trichy at distance of 335km. Kanyakumari was formed 1835 AD. It has an area of 1671.3 Km² with 16.76 Lakh populations as per 2011 Census. The study made by the researcher confirmed the various relief measures carried out in the affected areas in general and in Agashteeswaram Taluk in Kanyakumari measures be programmed in such a way that they facilities of their livelihood besides regaining their aspirations of life.

Keywords: Natural Disaster, Arc Gis.

I. INTRODUCTION

Natural disaster occurs at any time without warning, it is considered more dangerous than man made weapons of mass destruction. From the dawn of history, humanity has been suffering devastating losses from the natural disaster like earthquake, tsunami, volcano, tornado, storm, hurricane, cyclone, flood, droughts etc., Nobody can forget the 26 December 2004, which can be construed as a 'block day' in world history. Yes, it occurred recently land affected many countries in the world, particularly in south Asia. It is necessary to take stock of the situation in terms of damage caused to human, animal, crops and to the environment as a whole.

WHAT IS TSUNAMI

Tsunami (pronounced too- Na-mee) is a Japanese word which means "Harbor wave". Tsunami means harbor and name satads for wave. Tsunami is large waves that are generated when the sea floor is deformed by seismic activity, vertically displacing the overlying water in the ocean.

The causes of tsunami is oceanographers often refer to tsunami as seismic sea waves as they are usually the result of a sudden rise or fall of a section of the earth's crust under or near the ocean. A seismic disturbance can displace the water column, creating a rise or fall in sea level is the initial formation of a tsunami wave.

Tsunami waves can also be created by volcanic and landslides occurring above or below the sea surface. These types of activity produce tsunami with much less energy than produced by submarine faulting. The size and energy of these tsunamis dissipates rapidly with increasing distance from the source, thus resulting in more local devastation. (THE HINDU, December 27, 2004).

II. REVIEW OF LITERATURE:

Zaha Waheed marine Resources Research center, Maldives Islands Dale Dominey Risk Frontiers, Macquarie University, Sydney, NSW 2109 Australia, Studies Post-Tsunami field Surveys of the Maldives Islands (2005) where carried out to the effects of the Tsunami inundation. The study area was situated in the islands of south male Atoll that were some of the most heavily damaged islands of the Maldives Islands.

The Tsunami damaged that natural environment vegetation man made structural and residents, The maximum Tsunami wave height was 3-4 m. The level of inundation exceeded the height of most of residents.

V.Kanakasabai and M.Rajendran studied (2005) about the trend of Micrometeorological parameters during Tsunami on the east coast of India. The Micrometeorologies parameters are measured continuously at port nova on the east coast of India

with the help of a 30 m height meteorological tower by the Department of civil-Engineering, Annamalai University K.A.Abdul Rasheed,V.Kesava Das, C.Ravichandiran, P.R.Vijayan and Tony J.Thottam studied the Tsunami impacts on morphology of beaches along south Kerala coast, west coast of India's in Jan 2005.

Their investigation shows the Tsunami inundation and damater along the coast of Kerala. Janaka J.Wujetunge, department of civil Engineering, University of Peradeniya, Peraseniya 20400, Sri Lanka studied Tsunami on 26 December 2004; spatial Distribution of Tsunami Height and the extent of Inundation is Sri Lanka. He concluded that in Sri Lanka, 13 of the 14 districts lying along the coastal belt were affected.

J.P.Nrayan, M>L. Sharma and B.K.Maheshwari studied (2005) Effects of medu and coastal Topography on the damage pattern during the recent Indian Ocean Tsunami along the coast of Tamil Nadu. They concluded that the width of continental shelf has played a major role is the pattern of Tsunami damage. It was inferred that the width of continental shelf and this interface of reflected waves from Sri Lanka and Maldives Islands with direct waves and receding waves was responsible for intense districts respectively.

III. PROBLEM OF STUDY AREA IN KANNIYAKUMARI (COASTAL AREA)

After Tsunami the fish resource had become very low because of after giant waves (high tide) so the fisheries cannot go independently for fishing in the sea this was the strategic movement for them.

Sea level increase to the west coastal area roads. So the people of that area were affected. This information was given by the people of that area were affected. This information was given by the people of that area.

Because of high range of minerals in the coastal area (sand). To collect the sea shove sand not only the plants, coconut trees etc, were destroyed even they dug 10 feet in the sand including settlement. So the people of the coastal area were affected.

IV. OBJECTIVES

The main objectives of the study area as follows:-To understand the magnitude of socio economic loss due to tsunami.

To assess the environmental implication of the disaster.

To review the relief the relief measures undertaken by the Central, State Government Organization (NGOs) Coastal inundations found in the coast of Kanyakumari.

V. METHODOLOGY

The present study is on natural disaster (tsunami) and its economic and environmental impact on 5 Panchayat unions in Kanyakumari district. It also impacts on economic in coastal fishing communities and fisher folk in this area. This involves both primary survey based on interview in the study area and the secondary data from Revenue department, Statistical, department, Fisheries department, collector office, web sites and non Government Organizations(NGOs) the primary survey was undertaken in Agatheswaram Statistical tools such as analysis of statistical package of calculating the mean, median method.

A methodology has been formulated to carry out the present task of preparing. The following are the sequence of execution, through which the aims and objectives of the present study has directed and achieved.

Data Sources:

Base map prepared from the SOI Top sheets, Index numbers are 58 H/4, 58H/8, 58 H/12, 58D/15 quadrants sheets. Administrative divisions are derived firm the secondary data source of Corporation Map collected from the Kanyakumari Coastal.

VI. LOCATION OF THE STUDY AREA

Kanyakumari is the smallest district in Tamil Nadu. It has a number of places of Tourist importance. Kanyakumari Coastal total length for is 68 Km South East and South West Coastal.

India is in 3rd place in the world of terrible Tsunami Disaster. In India Tamil Nadu is the first place in Tsunami disaster. Kanyakumari is the second place in Tsunami disaster.The scattered sand is found in the Sea shore mixed the minerals.

VII. LOCATION AND EXTENSION:

Kanyakumari is the southernmost district of Tamil Nadu. The district lies between longitudes is 77°15' E 77°36' Eastern longitudes. Latitudes is 8°03' N to 8°35' Northern latitudes. (Fig 2.1,2,2)

The District is bound by Tirunelveli District on the North and the East. The South Eastern boundary is the Gulf of Manner. On the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea. On the West and Northwest it us bound by Kerala. The Kanyakumari District total areas area is 1430.3Km2. The Coastal Villages elevations are 5 meter to 50 meter above mean sea level.

Tirunelveli linked with the Kanyakumari city by both road and railways. It is located south of Trichy at distance of 335km.

Kanyakumari was formed 1835 AD. It has an area of 1671.3 Km2 with 16.76 Lakh populations as per 2011 Census.

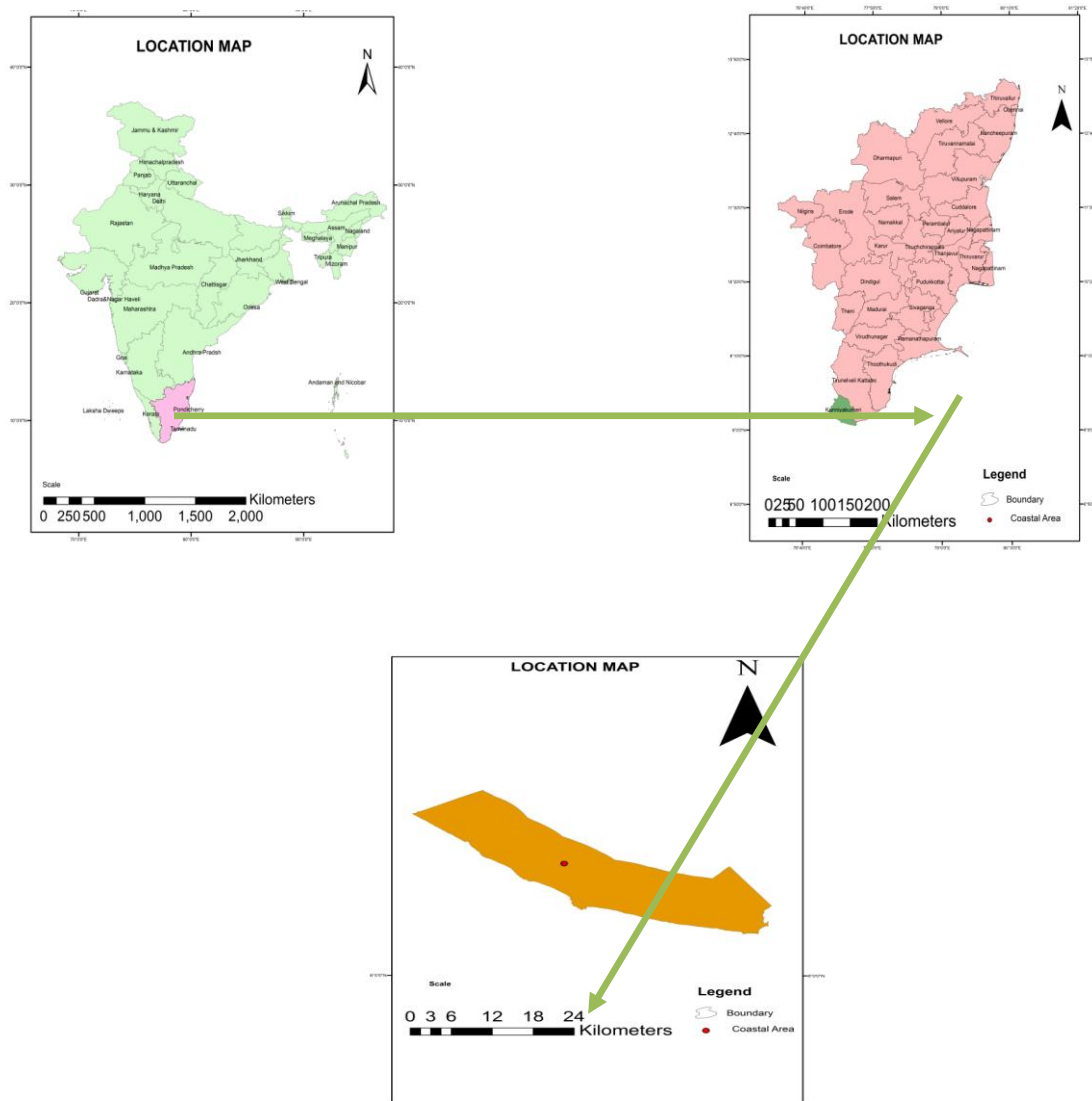


Fig 2.1

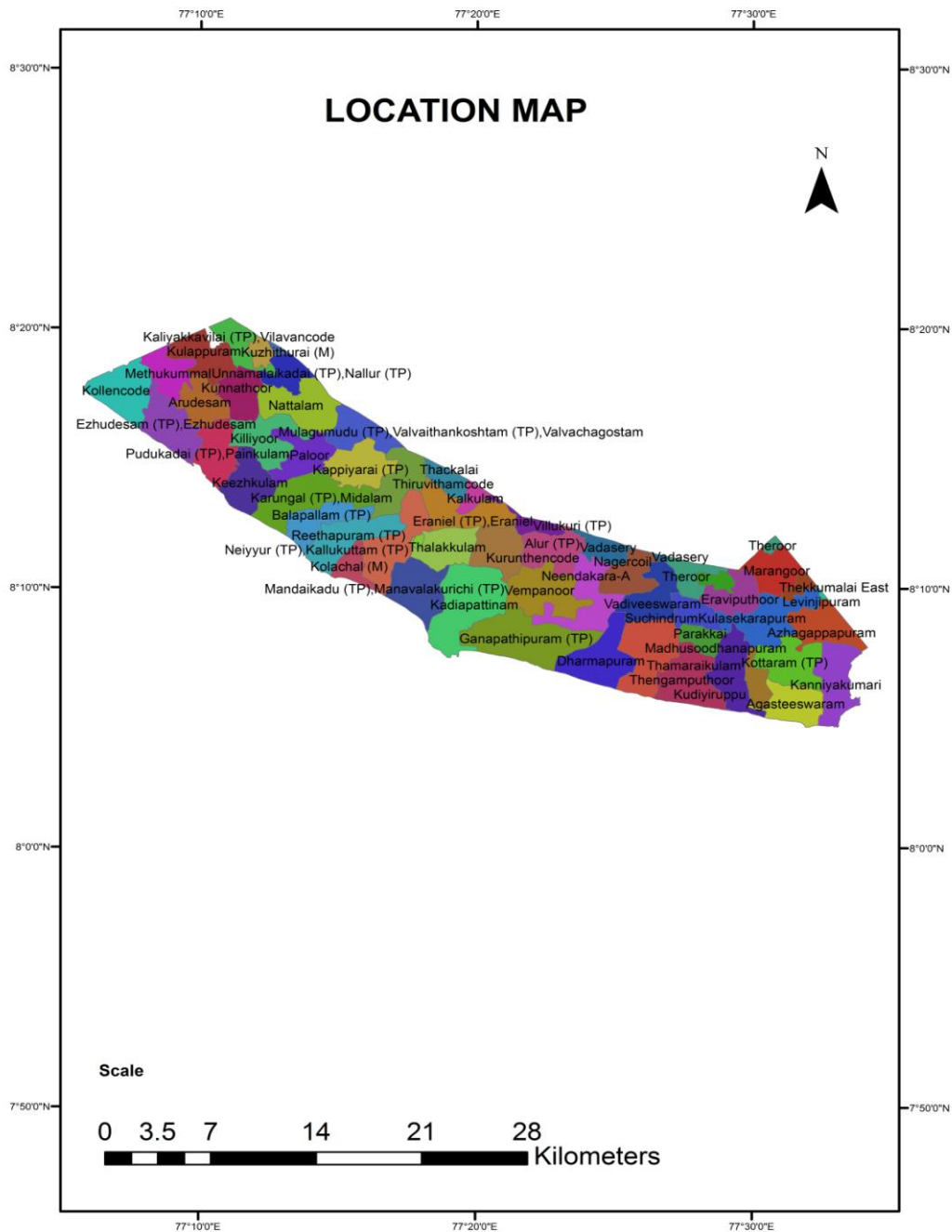


Fig 2.2

Table 2.1
 KANYAKUMARI TOTAL POPULATION – 2011

S.No	Name of Taluk	Male	Female	Total Population
1	Vilavancodu	266432	267218	533650
2	Kalhulam	266494	271119	537613
3	Thovalai	55057	55662	110719
4	Agasteeswaram	494052	247563	494052
	Total			1676034

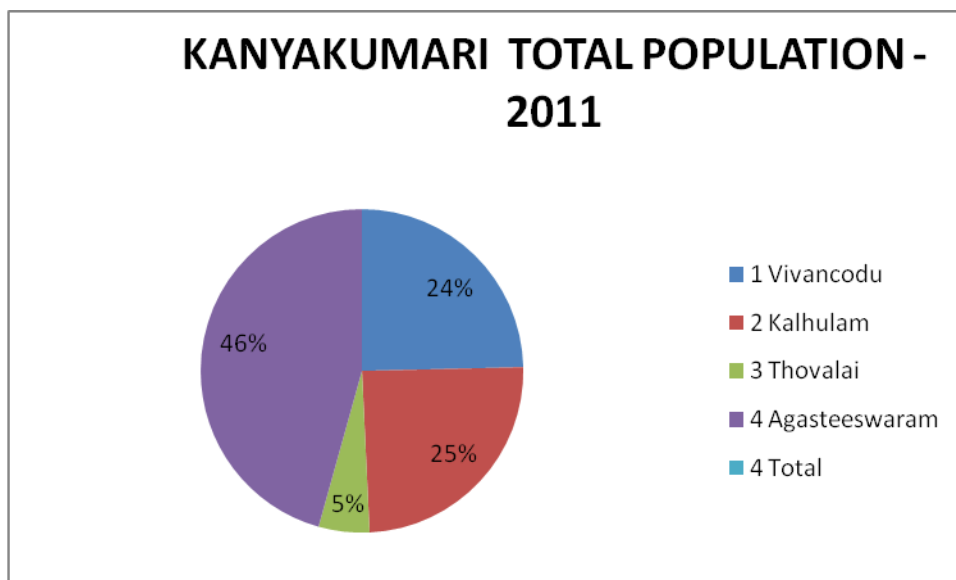


Fig 2.3

VIII. CLIMATE

The District has a favorable agro-climatic condition, which is suitable for growing a number of crops. The proximity of equator, its topography and other climate factors favour the growth of various crops. Table (2.2) and Fig (2.4) The paddy varieties grown in the second crop season in Thovalai and Agateeswaram taluks are grown during the first crop season in Kalkulam and Vilavancode taluks. This

shows that there is distinct variation in the climatic conditions prevailing within the district. Unlike other district in TamilNadu, it has a rainfall both during the South West and the North East monsoons. The South West monsoon period starts from the month of June and ends in September, While the North East monsoon period starts from October and ends in the middle of December. The average rainfall is as shown.

Table 2.2

TIME SERIES DATA OF RAINFALL BY SEASONS (LAST 10 YEARS)

South west monsoon		North East Monsoon		Winter season		Hot Weather season		Total		% Deviation (+ or - or =) from Normal
Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	
559.1	5935.0	526.0	927.8	50.2	17.0	321.5	205.5	1456.8	1743.5	+19.68
559.1	492.8	526.0	1039.9	50.2	77.1	321.5	276.7	1456.8	1886.4	+29.49
559.1	595.7	526.0	630.3	50.2	41.2	321.5	509.6	1456.8	1776.8	+21.97
559.1	592.8	526.0	608.0	50.2	19.5	321.5	213.5	1456.8	1343.8	-7.76
559.1	593.0	526.0	646.5	50.2	10.6	321.5	269.2	1456.8	1519.3	+4.29
559.1	760.0	526.0	653.4	50.2	2.8	321.5	240.4	1456.8	1656.9	+13.74
559.1	667.8	526.0	1069.3	50.2	52.7	321.5	458.6	1456.8	2248.4	+54.34
559.1	590.4	526.0	602.0	50.2	204.1	321.5	138.8	1456.8	1535.3	+5.39
559.1	894.6	526.0	360.3	50.2	73.9	321.5	419.2	1456.8	1748.5	+20.02
559.1	650.9	526.0	484.8	50.2	28.2	321.5	341.6	1456.8	1505.5	+3.34
559.1	232.0	526.0	750.6	50.2	9.5	321.5	188.5	1456.8	982.7	-32.54
559.1	623.6	526.0	348.95	50.2	10.5	321.5	480.7	1456.8	1463.8	+0.48
559.1	729.0	526.0	667.7	50.2	32.8	321.5	461.5	1456.8	1791.3	+22.96
559.1	644.4	526.0	620.7	50.2	21.5	321.5	368.1	1456.8	1654.7	+13

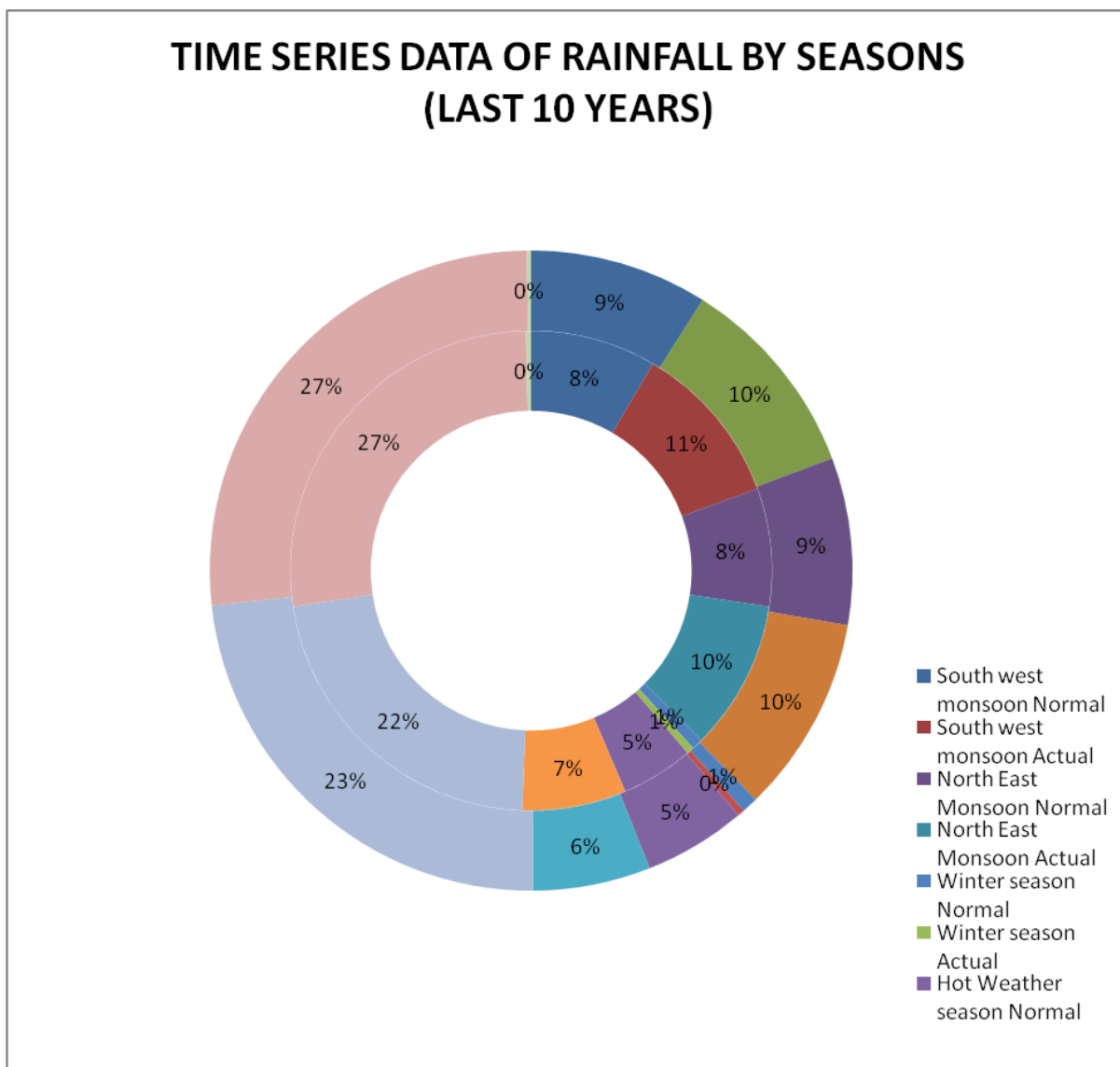


Fig 2.4

IX. ROAD TRANSPORT SERVICES:

Roads play a vital part in economic development, opening up remote areas, stimulating the growth of agriculture as well as industry, besides facilitating communication. As an essential element of the transport infrastructure, they contribute, along with the railways, the nation's lifeline. The road network in Kanyakumari district consists of National highways, State highways, District roads and rural roads. The trunk road from Madras to Nagarcoil joins the Kanyakumari - Trivandrum road near Aralvoimozhi and passes through important places over a distance of 62.4Km. And finally enters Kerala State. The road from Kanyakumari to Trivandram is one of the busiest roads in the country. The erstwhile State of Travancore- Cochin adopted a policy of nationalization of transport and as a result the Transport Department was formed in the State in 1938. Routes between Trivandrum and Kanyakumari

(Via) Nagarcoil and Colachel were the first to be taken up for nationalization. After the reorganization of state in 1956, the bus transport service in Kanyakumari district was taken over by the State Transport Department of the then Madras State.

The important private bus operators in the district during 1960's were Messrs. Pioneer Motors (P) Limited, P.T.S Motor Service and Sri Ganapathy Motor Service at Nagarcoil and Messers. R.K.V.Motors and Timbers (P) Limited and P.C. Motor Services at Marthandam. For the purpose of providing an efficient, adequate and coordinated road transport service, the State Government decided to nationalize certain classes of routes in 1967 which resulted in the nationalization of the following routes in the district.

X. SOCIO – ECONOMIC AND ENVIRONMENT IMPACT

Tsunami Impact:-

A great deal humanitarian aid is needed due to widespread damages of infrastructure, shortages of food and water, and economic damages. The economic impact on coastal fishing communities and fisher folk, some and marginal, Agricultural land – holders, especially poor women. In almost all the places, after completing the first phase of providing relief how does aid agencies are in the process for engaging with the communities for short term and long term rehabilitation programmers.

Economic Impact:-

While putting the overall damages estimated to be at 574.5 million dollars and losses at 448.3 million dollars, the Asian Development Bank report observes that the tsunami has had no impact on India's GDP or that of the affected states because economic activity along the coastline is largely in the informal and unorganized sector. The tsunami affected about 2,260 km of coastline, causing extensive damage to the coastal area of TamilNadu and Pondicherry, and more localized damage to the coast of Kerala and Andhra Pradesh. The disaster severely affected fisher folks and boats and gears. Tamil Nadu was worst affected states in India. Out of 75 percent affected the damage and losses on Kanyakumari District. Agastheeswaram and Rajackamangalam panchayat union was more affected in India.

Macroeconomic Impacts:-

The tsunami has had no impact on India's GDP or that of the affected states GDP are unaffected because economic activity along the coastline contributes very little to the states income. A marginal impact in the short run on the balance of payments can be expected to the extent that exports of shrimp are adversely affected along with coastal tourism.

Expenditure Impact:-

The impact on the public finances of the states is limited in the expenditure side only. There is no impact on state revenues the economic activity along the coastline is largely in the informal and unorganized sector. The contribution of the affected coastal regions to consumption taxes like sales tax, excise etc is relatively insignificant. This impact could be mitigated by alternative sources of financing to meet additional expenditures. However, the overall finances will be affected by the terms and condition on which the states are likely to borrow funds to meet the additional expenditures. The fiscal cost in terms of additional expenditures can be divided into two categories immediate and temporary relief, falling in (2004-2005) and reconstruction cost

– short – terms (2005-2006) and (2007 – 2008), spared over a couple of years.

Fiscal Deficit:-

For TamilNadu, it is estimated that the ratio of fiscal to GSDO expands during the reconstruction period (2005 – 2006, 2007-2008) by more than the Tsunami-induced expenditures due to as additional interest burden attributable to the additional debt stock caused by tsunami-related expenditures. The spiral effect of debt-deficit dynamic through a higher interest burden will spill over beyond 2007-08 till it stabilizes as a percentage of GSDP.

Environmental impact :-

The damage to the agricultural sector, though not significant in overall terms, has a great impact on the livelihoods of small and marginal agricultural land – holders, especially poor women. Moreover, sea water intrusion and the deposit of infertile sediments have also severely affected agricultural land in low lying areas, leading to problems of water logging and salinity.

The United Nations environmental programmed (UNRP) report on the tsunami is extremely relevant for India too, which bring home the fact that 'disproportionately many to the victims of this disaster were poor people who depended on ecosystem services and natural resources for their livelihoods'. The direct environment impact of the tsunami has many coastal wetlands have been affected, at least temporarily, by the large inflow of salt water and silt load. The presence of shelter belts comprising the emoted Casuarinas species are reported to have reduced damage and injures and loss of life in some places along the coast, notably in Kanyakumari.

However their use should be governed by the results of the disaster risk analysis and their social, economic and environmental costs and benefits should be evaluated against other potential options. The use of exotic species and the planting of such belts on the beach itself are avoided unless the social and economic benefits are shown to greatly outweigh the environmental costs.

Impacts on production Systems:-

Certain environmental impacts have implication for production system such as fisheries and agriculture. The most visible is the salinizations of agricultural land and ground and surface freshwater sources, including ponds, tanks, irrigation canals, lakes, streams and rivers.

Social Impact:-

The disaster has devastated communities with its high toll of human lives, injuries, and adverse effect on family networks, homes and livelihood. There are

long term consequences for families torn by the death or disability of a member, such as for widows, single parents and their children, orphans, children separated from their families, the elderly and disabled. In all the tsunami affected states and Union Territory, more women and children have tied than men. Special attention needs to be paid to the shelter, livelihood, social security and legal requirements of vulnerable groups like orphaned and separated children, widows and female – headed households, single parents, displayed and the elderly besides socially marginalized groups like the scheduled castes and poor.

In Kanyakumari Coast, cape Comorian, Muttumthurai, Manavalakurichi, Colachel, are important place of Tourist interests.

Within the 31 villages more affected villages are Kolachal, Kanyakumari, Muttum, Rajackamangalam, Kodimunai, Murumpanai, Vaniakkudi, Inanayam puthanthurai, and Azikkal. The remaining villages are moderately affected. The very little or low value affected by Tsunami are Puthanthurai, Periakadu, Midalam, Pizhikarai and Annai Nagar.

The remaining areas are affected moderately by Tsunami. Such places are Chinnamuttam, Puthukkiramam, Keezhamanakkudi, Melmidalam, Ramanthurai, Kottilpadu, Pallam, Arokiapuram and Chinnamuttam. Table (2.4)

In the study area there are 31 villages are affected by Tsunami. Total population of 115,933 in these coastal fishing villages. The population 28933 are affected by Tsunami. The death people are 846. The damaged houses are 5061 by Tsunami waves. Table (2.5) Fishing boats are nearly 395 boats, 1423 Vallams, 6892 catamarans and 24385 nets also affected by Tsunami waves.

The following tables, maps and located circle and sector diagrams shows the affected losses in each Taluks in Kanyakumari coastal. The total losses values are 261775 crores Rupees.

A part from all coastal Inundation found in the coast of Kanyakumari. In the old maps shows clear picture of sea coast and west coastal roads runs towards neighbouring state Kerala. Now the beach touches the coastal roads. This verified by the direct interview method. This information was given and seen by the investigator.

Table 2.4

VILLAGE VISE POPULATION, FAMILY'S DEATH MISSED PERSON'S AND HOUSE DAMAGE IN KANYAKUMARI COAST.

S.no	Name of the village	Population	Family's	Total Death	Mis person	House damage
1	Arockyapuram	2578	560	0	0	19
2	Chinnamuttam	2128	500	0	0	3
3	Puthukkiramam	2114	605	0	0	17
4	Kanyakumari	8163	3350	0	1	127
5	Kovalam	3866	900	0	0	170
6	Keelamanakudi	2252	620	33	5	350
7	Melamanakudi	4420	1525	102	13	750
8	Annainagar	1303	311	5	0	49
9	Pallam	2820	625	0	0	35
10	Puthanthurai	1403	260	0	0	7
11	Kesavanputhanthurai	1769	400	0	0	6
12	Periyakaadu	985	220	0	0	0
13	Rajakkamangalam	5362	1306	0	0	44
14	Azhikal	3824	1200	59	5	750
15	Muttom	8022	1900	49	16	410
16	Kadiapattinam	7963	1500	29	3	200
17	Chinnavailai	1370	360	3	0	62
18	Peryavilai	1672	330	6	1	0
19	Pozhikkarai	1470	380	0	0	1
20	Puthoor	1831	700	11	2	200
21	Kottilpadu	2319	800	197	22	580
22	Colachel	13971	2500	338	34	900
23	Kodimunai	5257	1350	1	0	125
24	Vaniyakudi	3880	1100	2	2	172
25	Kurumbanai	6651	1200	5	2	70
26	Midalam	1424	364	2	0	0
27	Melmidalam	2023	480	2	0	13

28	Enayam	5320	1209	1	0	0
29	Enayamputhanthurai	4902	1240	0	0	0
30	Ramanthurai	2957	687	1	0	1
31	Mulluri thurai	1934	497	0	0	0
		115933	28979	846	106	5061

Table 2.5
VILLAGE VISE DAMAGE OF FISHING CATCH INSTRUMENTS IN KANYAKUMARI COAST

S.no	Name of the Village	Boat	Vallam	Kattmaram	Net	Net
1	Arockyapuram	0	113	219	1171	1171
2	Chinnamuttam	80	1	142	0	0
3	Puthuckiramam	8	51	39	103	103
4	Kanyakumari	300	100	450	750	750
5	Kovalam	0	0	379	1200	1200
6	Keelamanakudi	0	32	300	1500	1500
7	Melamanakudi	0	300	1000	3000	3000
8	Annainagar	0	0	130	360	360
9	Pallam	0	22	350	1100	1100
10	Puthanthurai	0	0	35	35	35
11	Kesavanputhanthurai	0	3	42	30	30
12	Periyakaadu	0	0	17	27	27
13	Rajakkamangalam	0	0	100	185	185
14	Azhikal	0	1000	0	6500	6500
15	Muttom	0	28	125	600	600
16	Kadiapattinam	0	150	225	1200	1200
17	Chinnavilai	1	85	146	5	5
18	Periyavilai	0	12	50	40	40
19	Pozhikkarai	0	4	31	10	10
20	Puthoor	0	40	150	300	300
21	Kottilpadu	0	13	100	200	200
22	Colachel	0	300	1000	5000	5000
23	Kodimunai	0	2	75	150	150
24	Vaniyakudi	0	19	100	100	100
25	Kurunbanai	0	45	300	620	620
26	Midalam	0	15	52	35	35
27	Melamidalam	0	15	90	150	150
28	Enayam	0	45	212	10	10
29	Enayamputhanthurai	2	20	2	0	0
30	Ramanthurai	4	4	21	2	2
31	Mulluri thurai	1	4	10	2	2
	Total	395	1423	6892	24385	24385

XI. SAND RESOURCE

IRE (INDIAN RARE EARTH LIMITED):-

This is a Sand Resource. These are processing by the central government. Kanyakumari is the District where can find more, Ilmanite, Garnet, Monosite, Rootail, Sirkoniyam etc, are the Rare Minerals more found in Kanyakumari. These minerals are used in Atomic power Department, Atomic Department, Electric Department. Space research, paint, Paper, and also used for plastic factories.

Ilmanite hydrogen-di-oxide and paints are used in Factories.

Metals are used for melting and well shaped, monosite chemicals and electricals and electrical manufacturing and also used for Garnet-Atom bomb.

In this valuable sand the thorium which is more valuable are used for making power energy. Midalam, Mmanavalakurichi etc, and also in Kanyakumari District only were found in this worked. Naturally in this thorium more power energy, as well as the weight of thorium increases more than the minerals. So this is used for atomic heat energy.

This minerals are exporting to the countries like Australia, China etc.

This Sand Resource was affected by Tsunami and the losses in this is up to Rs 1 Crore.

IREL-COMPANY

From 1965 the Rare Minerals Industries are processing under atomic energy's department.

This type of minerals are destroying in some part of the villages in area in Kanyakumari District. Strating period the sands have taken by the machineries and tankers Lorries.

1. Minerals Sands are more heavy that the normal sand so it is useful for storing sand decreasing from the Sea waves.
2. These villages have taken for contract and they used it for taking sand but the Village people were again it, These Villages are, Periyavilai, Chinnavillai, Puthur, Kottilpadu, Kurumbanai, Medalam, Malamedalam ect.

By taking sand from sea shore the sea water increases to the coastal area. so there is not enough of place for the fisheries to keep their boats, Catamarans and fishing net. Although the Kanyakumari is affected by sand decreasing. Huge amount of sand taking from the sea shore is processing. It may cayses entering water into villages and destroys the fertile land and also the drinking way may become marine.

The people living for about centuries they may have to migrate.

Old people and children's will suffered a lot because of the wastage coming form the industries makes the environment unclean. The scattering sand particles from the machines may lasses some dangerous diseases. Villages are naturally protecting by these sands. It is ours duty to protect the sand from decreasing.

3. Thorium has its ray from thorium alpha ray produces. It the rays pashas to human animals, plants cell, it causes, cancer, abnormal mind, to the birth of body, these causes very effective. They Research this sand from the sea shore and its ray's causes more powerful and spread to the sea and many causes cancer.

PERIYAVILAI SAND:-

A fisherman named Amirthaiya who is a senior citizen says:-

The Tsunami waves came very high at Periyuavillai region which brought enormous sand deposited covering most of the residential areas and heaped up granet sands were disappeared. Says Amirthaiya.

XII. TAMILNADU FISHERIES UNION A PETITION TO THE DISTRICT COLLECTOR:-

A information given by the Tamil Nadu forest department. A view of natural sea shore protector of Ramesuvaram due to Tsunami. In Kanyakumari District. Sea shores the Government department (IRE, Manavalakuruchi) In 1965. Some private companies were collaborates in taking sand. So this district has some affected indication which cannot be

measured. The well compounds are made by the Tamil Nadu Government to the coastal side of the sea. The project work is taking place. So the steps should be taken of sand taking from your district by TamilNadu fisheries union leader T.Peter doss M.A.Says.

Natural disaster of human processing characteristic of earth's heat is going on increasing. So the sea level may increases due to melting of ice-bars. These were guessed ten years before sea level increases to a few centimeters next 30-40 years due to not controlling of Globalization up to the distance of 15 kilometer the water level may increases to the sea shore.

In India more than 7500 kilometer in coastal area ex. In west coastal area the people were living very congested approximately the sea water increases so the people of west coastal area may drown.

Scientists say due to Tsunami the water level increases and may drowned the land. In the Kanyakumari District area the protection sands were taken illegally and after Tsunami the sand become level. In this way the river meets in the sea confluence were normally below the levels The sudden attack of Tsunami in Kanyakumari District has lead death rates in palayares (Menaced) Valliyaru (Kadiyapattinam) and Pambaru (Colachel) areas.

In Manakkudi the bridge was thrown away by tsunami at they distance of 100 meter and the bridge was built for Rs.8 Crores. Sudden flood in the Palayaru confluence it attacks double in palayaru and in Keezhaamanakkudi.

Tsunami represents a big danger in land ex. Mostly in the coastal area were many people were lived affected coastal area should re-construct the settlement by knowing this all. The first duty is to save the sand walls these should be ceasing of sand digging in Kanyakumari District.

The beaches of the study area have been classified into different zone based on their relative geomorphic features and there by the vulnerability could be decoded based on the inundation extent with respect to the coastal geomorphic features which in turn would develop a criteria to delineate the hazard area boundaries. According the beaches has been divided into different zones based on their geomorphic features as below.

OPEN COAST ZONE:

This zone is low-lying zone is which the coast is relatively in the power position with reference to the MSL (Mean Sea Level), says for example, Lubmerment coast, sandy beach etc.

UPLAND ZONE:

This zone includes the coasts which are comparatively elevated well above the MSL. For example emergent coast, rocky coast etc.,

Tsunami hazarded area boundaries are initially defined for each zone above on elevation and inundation distance. The maps are intended to improve awareness of Tsunami hazards.

The extent of inundation has also been determined by the angle of incidence of the Tsunami surge as well as its velocity. Due to the presence of Sri Lanka most of the beaches along the east coast had experienced the shadow waves but the beaches along the west the west coast starting from Kanyakumari had experienced the refracted waves of comparatively high rapidity.

The following figure and table shows the coverage of the inundated Sea water during the have along his study area. Sea water inundation had occurred to the maximum if around 750 m in Colachel and in the beaches Kadiyapatnam, Mandakadu and Vaniakudy the inundation had not exceeded 100m.

XIII. INTERVIEW METHOD

MR.B.SUBAIYAN (COLACHAL HARBOUR OFFICER, GOVT.OFFICE QUARTERS) SAID:

Since it was holiday on Sunday, I was at home. A person called me out to; of sea harbor level measure had risen. We five surveyors from Chennai head of Colachal, had been to take harbor sea level at the edge of an, harbor bridge. Suddenly a giant wave 25-30 feet in height came and threw all always of us. Luckily, at a distance we saw a coconut tree and we hold it tightly. After 10 minutes the water reached the shore. I was holding the tree tightly my wrist, watch and dresses were drowned in the water. After holding tree safely for a few minutes I got down from the tree took a vest from a person and then returned to home. The lives of us are safe now. But the instrument we had was drowned in the waves. After a week later we he saw an old man coming with one of an instrument. We were very much thankful to the old man because, the cost of it is about Rs.1, 00,000.

SALT MINES (RESOURCE)

KEELAMANAKUDI SALT RESOURCE LABOUR SELVARAJ SAYS:-

On Sunday 26-12-2004 I was at home. I heard that the sea water entered in to the salt mines. So, I had been there at 11 'o'clock again one giant wave (Tsunami wave) came and passed through the church of Keelaamanakudi and it destroyed the church. He said the water was at his hip (waist) level.

This wave water passed through Palayaru river separation of Keelamenakudi and Melamankudi drainage and flow towards sea.

AFFECTS OF SALT RESOURCE:-

He said After Tsunami there was no work done for the next 6 months.

150 acres of land are engaged by salt Resource in Keelamanakudi. In this area with the help of Bore wells, Sea water is pumped for utilization. This process depends on heat of Sun light. This process take place only is summer season. This process affected in the Rainy season. More of this work is taken place nearby areas of Samythoppu land covering an area of 200 acres. In Kamarajapuram 100 acres of land; Aandivilai 250 acres of land are utilized for salt resources processing.

BUSINESS OF SALT:-

The processed salt is exported to Kerala. The 75 kg wt of salt costs Rs.30% to 35% in Rainy season and Rs. 22% to 25% in summer season.

Workers should weigh and tied the salt of 75 kg in a sack. Rupees only 7% is given for each sack of 75 kg of salt to the workers. 80 workers are working in the Keelamanakudi.

Kovalam Salt Work:-

Total length of land with a spread area 95 to 100 acres of salt are produced here. The work was stopped for 6 months because of Tsunami. These salts are taken to Kerala to the inner of Tamil Nadu.

EXPORT OF FINS, TAILS, AND BONES OF FISHES:-

In Vallaavillai, Thoothur, Chinnadurai and in Puthanthurai the bone fish as well as the shark fish tails, fins, were cut, dried and exported to many countries from Kanyakumari District.

This information is given by "Lukash" who is the senior worker in the place of Chinnadurai.

The bone fishes and the shark fish tails were cut and dried and taken to Chennai from there they are exported to other countries.

The cost of 1kg of bone fish tail and fins cost up to Rs. 60 to 70 and the Shark fish tails and fins cost up to Rs 5000 per Kilogram. Even fish oil businesses are taking place. Fat are taken from the fish and ground in the machines then, they are poured into big vessels and heated. After heating the oil particles flow and separated into sinks. The sink particles were kept in big Jeskin. After 2 or 3 days, flowed oils are taken and the wastes are thrown into the sea. The cost of 1 kg oil sold up to Rs.1700 to 1800. And it is also exported from Chennai.

Bones as well as flesh are sold in the local market, head and waste are thrown into sea.

Nearly, fifty workers are working in all villages. Their wag is calculated by separating the bones from the fish by spending Rs.7 per kg. Due to Tsunami the workers business are affected for 3 month.

DRY FISH WORK:-

Dry fish are mainly processed in the villages along sea shore. Mostly in Vallavillai, Thuthur,

Chinnadurai, Puthenthurai etc, and the main process of dry fish is in Chinnamuttam area.

In the district of Kanyakumari, Chinnamuttam is the main resource of dry fish says Mr.Thomas, we asked him about Tsunami disaster in these places.

On 26-12-2004 there was no loss of life and destroyed houses. But there was destroyed of boats and the loss of fishing business said Mr. Thomes.

The business took places only if fishes are caught by fisherman. Businesses were dull due to non fishing No work was done for 3 months.

Government can only help the fisherman. We can't do steps depend on government. They did not get any help from govt. There was a big problem created for the past 3 months.

BOAT MAKING:-

Boat making are still progressed only in the part of Chinnamuttam and Vallavilai in Kanyakumari District.

In this area these business are progressing by the unity of many owners (Businessman). This information is given by a person named Mr. Dhobiyas who is also a business man among them.

An average length of fishing boat is 66 ft. To complete this work it takes up to 4 months. It costs Rs.32 lakhs.

Carpenter labours for making the boat costs up to 7 lacks, copper needle as Rs. 3.5 lakhs and other parts costs 3 lakhs.

Ayani and teak wood is used to float the boat in waters. It costs Rs.4 lakhs and for sinking part of the boat is made from voaghai tree wood. Its cost 3 lakhs and other part costs 5 lakhs said by Dhovbiyas. If the business continuous for one year then the profit they is 5 to 8 lakhs.

On December 26 the boats are tied which are kept for repairing Totally 35 boats. Were destroyed by Tsunami. in these 15 boats were reconditioned, 20 boats half damaged, approximately loss if 1 to 5 lakhs.

Totally cost of total damage on boats alone is 4.2 crores.

Ayani trees are imported from Kerala for making boats. Voaghai trees are available on sales.

Ready boats are exported to the area from Andhrapredesh Tuticorin etc.

Fore looking such monstrous natural disasters, the government alone can help the fisherman with heavy compensations. Otherwise coastal fisheries cannot survive.

PLANNING OF COASTAL VILLAGES IN KANYAKUMARI DISTRICT:-

To place a district administration for taking census from Kanyakumari District coastal increasing areas. Below 500 meters 38000 houses from 500 to 1000 meters 8500 houses from 1000 to 1500 meters

below 4000 houses are there villages are improving like having living facilities news information and up to security facilities and also the drinking water facilities these are the facilities which can give by to the coastal area villages Keezhamanakudi is one of the good examples.

In palayaru and the Keezhamanakudi, which is situated in between the sea there were 650 houses, but now there are only 300 houses including destroyed and coastal one, else were totally destroyed. These 650 houses were shacked from the foundation. Water is up to the level of neck. These houses were not good for living. So these houses should be built at a distance of 500 meter and 150 meter from the confluence.

We should not lose a single person on December Tsunami because the Honolulu says that we can feel the approaching Tsunami when it attacks don't combos in 1945. It was about 118 Meter in height. Even in 1967 caution given to media but they don't take keen interest.

NEW CONSTRUCTED HOUSE:

Enayam – 136 houses were constructed in Enna puthanthurai 52 houses were built for Tsunami affected people in Enayamputanthurai (Kayal nagar) area K.S.S.S, CRS AND Enyaamputanthurai(church)

As same as in Enayam (Aalithrai) 84 new constructed houses were opened for Tsunami affected people.

Collector Devraj Dev inaugurated 329 houses for Tsunami affected people in Colachel salt marines area.

The Tsunami affected area in colachel the simon colony's people to full fill the salt marine, Cottar social services Caritas India,C.R.S.ect. were the trusts who spent 15 crores to built 329 permanent houses. This Tsunami constructed houses were given a name of Fr.Bishop lean.

The collector S.J.Siru inaugurated the new constructed houses and says;

HIS SPEECHES ARE AS FOLLOWS:-

Inami affected Kanyakumari District 836 houses were planned to be constructed for Tsunami affected people but 682 houses are still under construction and more in the memory of late Prime Minister Rajeev Gandhi. The central Government has permitted to built 2015 houses in the distance of 40 feet up ward and the work is progressing.(13-01- 2008).

Suresh Rajan MLA Says:

In Ieepuram (Arokyapuram) M.L.A Suresh Rajan says while starting foundation, the plan for Tsunami affected people should be allotted new houses in the memory of Rajeev Gandhi.

TSUNAMI CAUTION MACHINE (INSTRUMENT) :

After three years India has found the condition machine.

The instrument which can easily find the force of the sea wave set in the sea of Bay and Arabian Sea. After occurring Earth quake with in 30 minutes with the help of this instrument we can find the Tsunami affects in the sea, if some dangers occur it indicates red. After 2 hour of Tsunami it indicated arrange signal knowing exact information condition of Tsunami information are given to those district which may cause affect. This information were given to these villages to vacate the place completely.

AKUMARIDISTRICTS:

From Arokyapuram Neerodi Colony 30 Villages elected which may cause Tsunami in Kanyakumari Districts. In these villages newly instruments in very high frequency public addresses system and more instruments have been setting. If any Tsunami information were announced from the collector office in a same time it can be reaches to these 30 villages. This will help than to protect in a safe place.

ISRO (Indian Space Research Organization):

The ISRO has invented new alarm to system to warn the fishermen well well in advanced to protect them from suffering. The actual cost of such a warning system is amount Rs.40000% at present but Rs.10000% on a sub sided rate for the sake of fisher folks life safety. The warning system is comprised of feather touch buttons that are classified for medical help, drowning boats, theft by strangers and fire accidents. Pressing relative buttons automatically send messages to concerned coastal protectors and

XIV. CONCLUSION

The natural disaster that struck last year caused havoc to earth, human beings, and livestock crops. Tsunamis devastation brought misery and sufferings to those living in coastal areas. Human efforts however hug; cannot prevent tsunami to happen. Also sudden that this disaster is not induced one. But human efforts can go into taking some precautionary measures. Many of programs is in the offing; then like construction wall in the sea shores to prevent water from entering land areas, conserving mangroves, preserving "manual medu" and soon.

The measures, if taken in a scientific manner, will definitely save human life besides artifacts. Fishing boats have been pre designed to with stand shocks. The world witnessed the positive side of the globalization process; the people all over the world expressed concern and contributed their might towards salvaging the tsunami victims. The NGOs played a vital role in implementing relief measures.

Needless to say that Central and state government acted on help the tsunami victims.

The study made by the researcher confirmed the various relief measures carried out in the affected areas in general and in Agashteeshwaram Taluk in Kanyakumari measures be programmed in such a way that they facilitate sustenance's of their livelihood besides regaining their aspirations of life.

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