An Analysis of Marine Pollution: Danger to Coastal Inhabitants in Kanyakumari District

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Abstract

The short-sightedness policy of economy, commerce, and production inject the slow poison to people, flora and fauna in the name of pollution. The gravest effects of all attacks on the environment are suffered by the poorest especially in case of marine pollution; it is the fisherfolk of any country. Fishermen who are considered to be marginalized and backward in all aspects- socio, economic, educational, cultural and even political suffer a lot due to marine pollution in terms of health and loss of fish stock. Therefore this paper is an eye opener for the readers to know that how far marine pollution bring havoc in the life of the coastal inhabitants and bring danger to their livelihood. Results from 225 sample respondents indicate that how the marine water is polluted due to domestic and industrial sewage water and bring danger to fishermen community in the form of health hazards. This paper too offers few suggestions to the government and the well wishers of the fishermen to take care of marine sea with far sightedness which protects the life of quarter of the world's population lives on the coast or nearby and that the majority of our megacities are situated in coastal areas .Otherwise14.47 million fishermen may be washed up and peril in the marine pollution.

Keywords: Marine pollution, Coastal inhabitants, Environmental diseases, Coastal Erosion.

INTRODUCTION

The earth's resources are being plundered because of short-sighted approaches to the economy, commerce and production. Each year hundreds of millions of tons of waste are generated, much of it non-biodegradable, highly toxic and radioactive from homes and businesses, from construction and demolition sites, from clinical, electronic and industrial sources. As

a result the earth is beginning to look more and more like an immense pile of filth.

Marine sea is no way exempted to this. Like the earth, the marine sea is polluted to greater extent due to throw away culture. As per the survey of Central Marine Fisheries Research Institute-2014 that the scientists discovered giant garbage patch swirling in the Indian Ocean. The patch containing plastics, chemical sludge and other debris, indicated the amount of waste that makes its way into the ocean. The United Nations Environment programme, South Asian report states that waters are at the highest risk of sewage pollution. Most people living along its Coasts do not have basic sanitation facilities. Every year the south Asian waters receive more than four billion litres of sewage, most of which is untreated. The Bay of Bengal alone receives 2000 tonnes of pesticides a year. Industrial activities along the South Asian Coast and oil spills from refineries and shipping activities add to this pollution burden. Though composition of these pollutants may vary from region to region, depending on the activities, they broadly include oil, dissolved and suspended solids nitrate, ammonia and inorganic phosphates and toxic metals such as

mercury, lead, Zinc and Copper. Sewage continues to be a major concern for India. Its Coastal district generates 4067 million litres of domestic sewage a day. 80 per cent of this makes its way to the sea. The marine pollution directly affects the ocean organisms and indirectly affects human health and resources. As per the statistical report of National Institute of Oceanography the coastal pollution in India stems from population growth, urbanization, agriculture and industrialization, all of which release a wide range of pollutants into the ocean each year. A large and growing part of the population now lives close to coasts. The threats posed to coastal populations and infrastructure by rising sea levels and extreme events such as storm surges. There is an urgent need for action now in order to limit the adverse effects of climate change upon ecosystems and human society. Coastal erosion happens primarily as a result of sea level rise, intense storm action, and changed or more intensive wave action. The natural processes of erosion are aggravated by the human-induced changes to the Environment. Several coastal villages experience an increase in the intensity of erosion which leads to loss of long stretches of coastline and damage to properties

annually. Erosion of the shoreline has reduced space for living and for fisheries, stalinized freshwater sources, and increased population pressure in the locality.

STATEMENT OF THE PROBLEM

Consumerism, Materialism and throw away culture pollute the marine environment and all the living beings. Marine pollution deteriorates the health of the fishermen as well as coastal environment. Fishermen, in general solely depend upon the sea for their livelihoods are tremendously affected due to domestic, industrial sewage, toxin and chemical particles which reduces the fish stock as well as it harms the species in the sea. Fishermen in general are very poor and live in abject poverty are vulnerable to coastal environment. Moreover, the coastal inhabitants are exposed to both manmade and natural calamities. Tsunami -2004 brought major havoc in the life of the fishermen and changed the environmental situation in the coastal belt. Moreover the sea is polluted by dumping garbage and immersing the pollutants like plastic, e-waste and other degradable substances. This

is turn affects the livelihood of the fishermen. It is sad to note that due to pollution the fish production in the sea is diminishing to the certain extent. Hence the fishermen always cross the border of other states or country to catch fish which brings the conflict among the fishermen community itself. This is the main cause for the fishermen to remain at the ebb of the social rung. At this juncture, numbers of questions arise in the mind of the researcher, like what are the impacts of the pollution in the marine water? What are the consequences the respondents face due to pollution in the sea? In which way the pollution can be controlled? Is there any relationship between pollution and health hazards? To find fitting answers to these problems this study has been undertaken.

OBJECTIVES OF THE STUDY

The general objective of the paper is to analyze the coastal environmental pollution and its danger to the coastal inhabitants in the study area. The following are the specific objectives

- To measure the factors that contributes to marine pollution in the sea.

- To analyze the impact of coastal pollution and its consequences in the study area
- To discuss any relationship between pollution and environmental diseases among the sample respondents.

HYPOTHESES

Ho_1: There is no significant difference among mean rank of age group with regard to pollution

Ho_2: The opinion regarding factors affecting marine pollution is not equal to average level.

Ho_3: The opinion regarding impact of coastal pollution is not equal to average level.

Ho_4: There is no significant difference between mean rank of marine pollution and environmental diseases

METHODOLOGY

There are thirteen coastal districts in Tamilnadu. The researcher has purposively selected Kanyakumari District for this study which is in the southernmost tip of Indian Peninsula and closely linked with the coastal villages of Kerala. This district is divided into four taluks namely, Agastheeswarm, Kalkulam,Vilavancode and Thovalai. Among these four taluks, Agastheeswarm, Kalkulam and Vilavancode are in the coastal belt. The coastal belt of this district has a length of 71.5Kms (India's total coast line is 8118km) with 47 coastal villages. The researcher has selected the coastal taluks where in the villages which have the highest and lowest population on the basis of multi stage sampling. Further the respondents are chosen on the basis of simple random sampling basis. The collected data had been analyzed with the help of the statistical tools like Krushkal Wallis Test, one sample t-Test, Friedman Test. The secondary data were collected from various books, journals and websites.

TABLE 1

SAMPLE VILLAGES

Taluk	S. No	Name of the village	Total Population	No. of Sample
Agastheeswarm	1	Kanyakumari	7770	50
	2	Siluvaiyanager	397	25
Kalkulam	3	Colachel	9947	50

	4	Chinnavalai	1248	25
Vilavancode	5	Neerodi	7035	50
	6	Helen colony	1031	25
		Total	**27428**	**225**

Source: *Marine Fisheries Census 2010, Part – II (4) – Tamilnadu, Government of India, Ministry of Agriculture, New Delhi, p.107.*

RESULTS AND DISCUSSION

Age is one of the significant factors which decide about the association of someone else or with something we interact. Right from birth to till death, the fisherfolk are familiar with the sea and it becomes their mother to cater to their needs. By their very occupation itself the sea becomes part of them. Through their experience they see that how the sea had been in the past and how the sea is at present. This is tested with the help of the statistical tool of Krushkal Wallis test.

Ho₁: There is no significant difference among mean rank of age group with regard to pollution

Table 2

Age with Factors Related to Pollution

Factors	Age Group in Years	Mean Rank	Chi -Square	p- value
Awareness about Pollution	Below 25	104.78	5.074	0.079
	25-35	95.09		
	36-45	82.08		
Factors contributing to Marine Pollution	Below 25	98.90	0.890	0.641
	25-35	89.48		
	36-45	89.85		
Impact of Environment Problems	Below 25	101.28	5.114	0.078
	25-35	80.40		
	36-45	96.88		

Impact of Coastal Pollution	Below 25	98.72	1.022	0.600
	25-35	87.79		
	36-45	91.45		

Source: Computed Data

Since p-value is greater than 0.05, the null hypothesis is accepted at 5 per cent level of significance. Hence it is concluded that there is no significant relationship with regard to age group in terms of awareness regarding pollution. Based on the mean rank, the age groups of below 25 years have higher awareness in terms pollution, factors contributing to marine pollution, impact of environment problems and impact of coastal pollution. It is due to the awareness and exposure programme conducted by the schools, colleges, NGOs and Government with regard to pollution and climatic change.

At the same time the level of awareness of above 25 years of age is not very satisfactory and good numbers of them are ignorant about the marine pollution. It is they who throw all the domestic wastages in the sea which pollutes the fish and other species in the sea. It requires the attention of the policy makers. The following table clearly depicts all the factors that pollute the marine sea either by the sample respondents or other people in the study area.

Ho_2: The opinion regarding factors affecting marine pollution is not equal to average level.

Table 3

Factors Contributing To Marine Pollution

S. No	Marine Pollutants	Mean	S.D	t-value	p-value
1	Domestic Sewage	3.88	1.172	11.261	<0.001**
2	Industrial Sewage	4.17	1.017	17.244	<0.001**
3	Fishing waste	3.87	1.096	11.918	<0.001**
4	Tourism/ Recreation	3.50	1.111	6.784	<0.001**
5	E-waste	2.89	1.236	1.348	0.179
6	Oil spilling	3.49	1.214	6.040	<0.001**

7	Bursting of crackers	3.00	1.136	0.059	0.953
8	Maritime transport	2.89	1.042	1.535	0.126
9	Production /refining	2.85	1.086	2.026	<0.044*
10	Excreta(human waste)	3.42	1.241	5.052	<0.001**
11	Plastic/glass wastage	3.59	1.099	8.070	<0.001**
12	Pesticide	2.93	1.146	0.873	0.384

Source: Computed Data

**Significant at one per cent level

* Significant at five per cent level

Since, p value is less than 0.01, the null hypothesis is rejected at 1 per cent level of significance with regard to factors affecting marine pollution. Hence it is concluded that the opinion regarding factors affecting marine pollution is not equal to average level. Based on the mean score the highest score is given to Industrial sewage, Domestic sewage , Fishing waste and plastic or glass waste with its value of 4.17,3.88,3.87,3.59 with S.D of 1.017,1.172,1.096, 1.099 respectively. This study is supported by Rajesh Prasanna and Ramesh. (2013) that Pazhayar River which is in Kanyakumari district is polluted with chemical properties which come from both domestic sewage as well as the waste from hospitals mingles with the Arabian sea. An average value of the water quality index for Pazhayar River was 81.59 indicating that this river is under very poor quality rating. People nearby this river largely depend upon this river as a source for drinking and domestic purpose. Therasita Mary and Jansi (2014) state that Marine environment is polluted through human and animal excreta through river runoff, rain water, kitchen wastes, land agricultural waste, industrial wastes, etc. Further Isabella Annie Abraham (2014) States that plastic pollution in oceans is a growing problem. Over time, movement of waves and exposure to the sun breaks the material into tiny particles called micro plastics which harm even the smallest oceanic organisms and Prasad (2015)) says that 83 per cent of mismanaged plastic waste that entered the ocean. Moreover Kanyakumari is one of the tourist spot where in both domestic and foreign tourist come for

sight scene who pollute the sea with lot of plastic papers. It requires the urgent attention of the policy makers.

Based on the mean score, E-waste, Maritime transport, Production /refining, Pesticide are below the average level. It is inferred that the sample respondents are not aware of this type of pollution that pollute the sea water. It is due to lack of awareness and ignorance about this type of pollution. It too requires the attention of the policy makers. The following table clearly depicts about the impacts and its consequences of coastal pollution in the study area.

Ho_3: The opinion regarding impact of coastal pollution is not equal to average level.

Table 4

IMPACT AND Its CONSEQUENCES OF COASTAL POLLUTION

S. No	Impact	Mean	S.D	t-value	p-value
1	Climate change (Rising of sea levels)	4.27	1.045	18.251	<0.001**
2	Cyclones	3.79	0.963	12.253	<0.001**
3	Tidal waves	3.82	1.081	11.352	<0.001**
4	Tsunami (Earth quake)	4.14	1.139	14.981	<0.001**
5	Depletion of ground water	3.40	0.995	5.963	<0.001**
6	Loss of bio-diversity	3.37	1.062	5.273	<0.001**
7	Reduction of fish stock	3.97	1.124	12.935	<0.001**
8	Unemployment	3.91	1.136	11.972	<0.001**
9	People are prone to diseases	3.44	0.939	7.030	<0.001**
10	Sea erosion	3.54	1.044	7.730	<0.001**
11	Global warming	2.97	.968	0.413	0.680

Source: Computed Data

**Significant at one per cent level

Since, p value is less than 0.01, the null hypothesis is rejected at 1 per cent level of significance with regard to impact of coastal pollution. Hence it is concluded that the opinion regarding impact of coastal pollution is not equal to average level. It is inferred that after the effect of Tsumani 2004 in Kanyakumari district, the coastal populace experience that the Rising of sea levels, Earthquake, Reduction of fish stock and they have given the highest score for these variables with its mean score of 4.27, 4.14 ,3.97 with S.D of 1.045, 1.139,1.062 respectively. Previous studies state that coastal pollution and its impacts have resulted in a number of environmental issues including the enrichment of enclosed waters with organic matter leading to eutrophication, pollution by chemicals such as oil, and sedimentation due to land-based activities or rise due to the global change. Again the Annual Report of Department of Animal Husbandry ,Dairying and Fisheries 2012-13 shows that there is a drastic fall of marine fish from 60 per cent in 1990-91 to 36.70 per cent in 2012-2013.Due to this

impact of marine pollution the socio-economic conditions of the sample respondents are very pathetic and heartbreaking.

Based on the mean score, the global warming is below the average level. It shows that people are highly aware of coastal pollution than global warming. It is due to illiteracy and ignorance of the sample respondents in the study area. Moreover they interested only in their survival rather than global warming. The topic of global warming is very much discussed by the politicians and business tycoons and not by the poor people. However it affects the people in terms of their health and creates environmental related diseases. The following hypothesis is proved with the help of mean rank to find out that how far marine pollution has the relationship with the environmental diseases.

Ho4: There is no significant difference between mean rank of marine pollution and environmental diseases

Table -5

Marine Pollution and Environmental Diseases

Rank	Size	Mean Rank	Z value	P value
Negative	192	118.41		
Positive	30	67.25	10.815	<0.001**
Ties	3			

Source: Computed Data

Note: 1. Negative Rank: MP < ED

2. Positive Rank: MP > ED

3. Ties: MP=ED

Since p-value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, it is concluded that there is a significant difference between mean rank of marine pollution and environmental diseases. Based on mean rank the marine pollution is more influence on environmental diseases and significant at 1 % level. The coastal inhabitants are prone to get diseases like cancer, Immune deficiency, Asthma/wheezing, Skin irritations, Birth defects, Miscarriage/premature death, Heart disease, Respiratory, Gastrointestinal, Memory loss, Dermatitis and Impaired hearing due to all environmental pollution. The study conducted by Padua JC and Basil Rose MR (2013) reveals that due to black soil deposited in the coastal villages turn out radioactivity which results in cancer to the fishermen and their family members. Various research studies state that average fishermen spent for medication is more than 10,000 per annum in the study area. A recent survey of World Health Organization (WHO) points out that over 20, 00,000 children worldwide suffer from environmental hazards. It requires the attention of the policy makers.

FINDINGS

- There is no significant relationship with regard to age group in terms of awareness regarding pollution. Based

on the mean rank, the age groups of below 25 years have higher awareness in terms pollution, factors contributing to marine pollution, impact of environment problems and impact of coastal pollution while the age group of above 25 years are not very satisfactory and good numbers of them are ignorant about the marine pollution. It is they who throw all the domestic wastages in the sea which pollutes the fish and other species in the sea

- The null hypothesis is rejected at 1 per cent level of significance with regard to factors affecting marine pollution. Hence it is concluded that the opinion regarding factors affecting marine pollution is not equal to average level. Based on the mean score the highest score is given to Industrial sewage, Domestic sewage , Fishing waste and plastic or glass waste with its mean score of 4.17, 3.88, 3.87 3.59 with S.D of 1.017, 1.172, 1.096, 1.099 respectively.

- The null hypothesis is rejected at 1 per cent level of significance with regard to impact of coastal pollution.

So it is concluded that the opinion regarding impact of coastal pollution is not equal to average level. It is inferred that after the effect of Tsumani 2004 in Kanyakumari district, the coastal populace experience that the Rising of sea levels, Earthquake, Reduction of fish stock which affects the socio-economic conditions of the sample respondents.

- There is significant difference between mean rank of marine pollution and environmental diseases. Based on mean rank the marine pollution is more influence on environmental diseases and significant at 1 % level. It is inferred that due pollution, the coastal inhabitants are prone to diseases like cancer, Immune deficiency, Asthma/wheezing, Skin irritations, Birth defects, Miscarriage/premature death, Heart disease, Respiratory, Gastrointestinal, Memory loss, Dermatitis and Impaired hearing for which their hard earned labour is going in vain.

SUGGESTIONS

- The municipality authorities or town panchayat can regularly collect garbage and dispose it in an appropriate place and set up recycling industry in the study area so that the sea may not be polluted due to the arrival of tourists since Kanyakumari district is one of the potential tourist places.

- The municipality authorities or town panchayat can advise the shop keepers in Kanyakumari tourist spot to sell their product with eco-friendly package which might protect the sea.

- The Government can construct proper drainage channels to dispose the household wastages which in turn may not pollute the sea water.

- The Government can set up a special monitoring force to impose certain penalties for all those who pollute the common places as well as the sea, as it has been practiced in the developed countries.

- The Government can create awareness to the general public especially to the fishermen about the evil effects of pollution with the help of NGOs as well as through student communities in the form of street display or role play.

- A toll free number can be given to the general public to contact the local administration to collect back the household wastage when the person responsible are not prompt in collecting the same.

- The well-wishers of the coastal community can construct waste bin and insist them to dumb the garbage only in such bin which in turn make the coastal villages clean and tidy.

- The Government can constitute funds in the forth coming budgets to give Awards or prizes to the coastal villagers who keep their seashore surroundings without pollutants.

- The Pollution and control board authorities can check that the wastewater of the industries should not mix with the sea water at the time of issue of certificate for approval and renewal of the same. In such case the waste water of the industries would not pollute the sea.

CONCLUSION

As Pope Francis quotes in his encyclical letter that our earth is our home

and we need to care for our common Home. Caring for eco systems demand far-sightedness. Hence all our consumption pattern, changes in the life style, and production should be oriented towards eco-friendly product which might not pollute our environs and may not bring any health hazard to people. So when the Government and business tycoons formulate the policies they should borne in mind that quarter of the world's population lives on the coast or nearby and that the majority of our megacities are situated in coastal areas. Thus the life of millions and millions of the fishermen can be saved and marine sea becomes their mother to feed not only to the coastal inhabitants and cater to livelihood of every citizens of our nation.

Acknowledgement

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