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# TEXTILE POLLUTION AND SOCIOLOGICAL IMPLICATIONS- A CASE STUDY IN THE SELECTED VILLAGES OF NOYYAL RIVER BELT, TAMILNADU

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## ABSTRACT

*In India, the major sources of contamination of natural waters, including coastal waters, is the discharge of untreated industrial wastes / effluents and residential wastes generated from cities, towns and industries. Most of the towns and cities in India do not have proper facilities and where they do exist such facilities are in the rudimentary form. Thus, most of the community and industrial wastes find their ways into water courses without check up, rendering the water downstream unsafe. In textile production, opportunities exist for the release of potentially hazardous compounds into the ecosystem at various stages of the operation. These pollutants are produced in an effort to improve human standard of living and fashion but ironically, their unplanned intrusion into the environment can reverse the same standard of living by impacting negatively on the environment. Hence, the present study is placed in this context to examine the textile pollutants and their intensity on rural environment with respect to the socio-economic and demographic background. The study used both primary and secondary data with appropriate methodology. A theoretical framework was also made to find the applicability of core issue in this study.*

**KEY WORDS:** *Effluents, Pollution, Environment, Community, Social issues.*

## INTRODUCTION

Water is one of the most important natural resources, essential and inevitable for the survival of living organisms. The proper management of water for domestic and economic purposes is the basic aspect of social management and governance. Water has its own source or locus, which forms a part of environment. Water bodies are located in the system of hydrosphere of environment, facing various changes due to human activities. Environmental problems are recognized as a worldwide disaster more formidable than any social, economic and political problems. Waste water from textile and chemical processes in industries contributes to water pollution. Textile waste water usually contains specific and readily identifiable chemical compounds. During the last fifty years, the number of industries in India has grown rapidly. But water pollution is concentrated within a few sub-sectors mainly in the form of toxic wastes and organic pollutants. In fact, a number of large and medium-sized industries in the region covered by the Ganga Action Plan do not have adequate effluent treatment facilities. Most of these defaulting industries are textile industries, sugar mills, distilleries, leather processing industries, and thermal power stations. Some of the major industries have treatment facilities for industrial effluents (Nelliyat, 2003). Nearly, 312 industrial units including textile units are dumping their waste into the river; only a dozen have effluent treatment facilities. The 27 cities contribute 902

million litres of wastewater to the rivers every day. Even the Ganga, one of the largest and holiest rivers of India is heavily polluted and the major source of pollution is the discharge of community wastes from human settlements. The water of Ganga affects the health of 250 million people of Northern India. The textile and other industrial waste waters go straight into water courses making them unfit for use. The domestic discharge is at the rate of 873 million litres a day while the textile effluent, including toxic waste is about 260 million litres a day. Further, by another tradition, hundreds of thousands of persons in villages and slums have the habit of defecating along the river line **(Subba Rao,** 1998**).**

The textile industries are very complex in nature as far as varieties of products, process and raw materials are concerned. During production, the cloth has to pass through various processes and chemical operations like sizing, desizing, scouring, mercerising, bleaching, dying, printing, and finishing. In a textile industry, a number of dyes, chemicals and auxiliary chemicals are used to impart desired quality in the fabrics. The wastewater of the industry is highly alkaline in nature and contains high concentration of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Dissolved Solid (TDS) and alkalinity. It can cause environmental problems unless it is properly treated before disposal**.**

## Environment and Social system:-

The term 'Environment' means 'life support system' which mainly consists of air, water and soil. The inter play of natural and man-made features over civilization have led to various changes in the surroundings of mankind. Today, all these three elements of life have got polluted to an extent that there have been health hazard and economic loses. The 20th century has been a period of high strides in technological development. The biosphere has been broken up into biographical regions, biomass, habitat, physical environment, biotic environment and ecosystem. But unfortunately the end product, which the mankind has harvested, to enter into the 21st century is the "Urban Environmental Crises" (Buchholz, 1998**).**

Environmental issues relate to two aspects of the relationship between society and its habitat:

1. Environment is the depot of materials and processes that the society transforms into goods and services (wealth) and its receptacle for refuse and waste matter formed as excreta of societal activities and physiology; here we recognize the issues related to resources, growth, sustainable development etc.
2. Environment provides the space, that is, the habitat of the society, human health (physiological and psychological processes) is influenced by the conditions prevalent in this space. Here, we recognize issue of environmental quality, pollution etc.

In that context, we would like to add that environmental issues, whether related to resources or quality, may have limited dimensions in space.

## Increase of Industrialisation:-

Advanced industrialization has been exploiting the natural resources to the maximum, giving birth to environmental pollution and health hazard activities. Industrialized world is advancing towards rapid urbanization and this has resulted in ecological mishaps. Most spectacular examples are un-controlled deforestation, water supply problem, sanitation problem, housing problem and disposal of waste. Unplanned human settlement, ignoring environmental balance, has resulted in great catastrophe like that of the 'Bopal Gas disaster' in India, which is said to be the worst possible mishap of the urbanized and industrialized society.

Many of the South Asian countries are experiencing severe environmental problems due to their rapid industrialization. This phenomenon is very common where the polluting industries like textile dyeing, leather tanning, paper and pulp processing, sugar manufacturing, etc. thrive as clusters. Around the 1950s, South India, especially Coimbatore district, grew into a major powerloom centre. The high concentration of ginning, weaving and spinning mills in the area provided the impetus for the growth of the knitwear industry in Tirupur.

## Textile Wastage Discharges and Water Pollution in Tamilnadu:-

Groundwater pollution has become a major issue in several parts of Tamil Nadu. Important industries such as tanneries, textile dyeing units, viscose, paper pulp, sugar, sago, oil refineries, fertilizer units and chemical manufacturers often discharge wastages onto the land surface or into rivers, tanks and ponds and thereby polluting groundwater as well as surface water bodies. Ground water contamination has been widely reported in parts of the state where tanneries and dyeing and bleaching units are concentrated in large numbers (Emongor et. al., 2005).

As most of these industries are highly water intensive in nature, they are concentrated along the river courses. This gives them good access to water (both surface and groundwater), and also enables use of rivers for

effluent discharge. Important rivers in the state, which have become badly polluted, include: (i) the Bhavani in Coimbatore district (ii) the Kalingarayan Canal in Erode district (iii) the Noyyal in Tirupur, (iv) the Amaravathi in Karur district (v) the Kodaganar in Dindigul district and (vi) the Palar in Vellore district. Of these, the first five fall within the large Cauvery basin.

## The hub of textile units and mushroomed industries:-

Tirupur has become an important textile cluster in India both for overseas market and the domestic market. It has 2500 knitting and stitching units, around 800 dyeing and bleaching units, 300 printing units, 100 embroidery units and other 200 units catering to compacting, raising and calendaring. Buyers from around 35 countries visit Tirupur frequently. This small town annually contributes about INR.3600 crores in foreign exchange earnings to our country, besides an earning matching or surpassing the above figure to cater the domestic market. The dramatic improvement in Tirupur's export market can be attributed to the disbanding of garment manufacturing in western countries due to environmental pollution and high cost of labour. In Tirupur, annually the textile industries alone utilize around 28.8 billion litres of ground water. This is around 0.1% of present total water potential, and 1% of present water demand of Tamil Nadu state (Balaji, 2003), and 0.005% of worldwide withdrawal of ground water (Revenga,2000). Heavy utilization of ground water has severely depleted the ground water table in Tirupur.

## Textile Effluent Discharges:-

The rapid growth of the industry has resulted in serious environmental problems, especially from the bleaching and dyeing units. Hence, there is an evidence to suggest that these units extract considerable quantity of ground water from the peripheral areas and discharge the effluent without adequate treatment. The discharge of effluents has caused severe pollution to both surface and ground water in the region and also contaminated agricultural land. The disposal of untreated waste water on land and the Noyyal River has affected the quality of surface water, ground water and the soil not only in Tirupur but in downstream. Based on the amount of discharges of textile wastes into nearby water bodies, the industries are categorised as Green, Yellow and Red. The authorities of Tamilnadu Pollution Control Board (TPCB) supervise the industries according to the discharges of wastes committed by industries. The number of visits and supervisions are decided depends upon the amount of discharges of pollution from the industries. TPCB not only undergo the decision of visits and supervision on industries alone but it examines the villages where the industrial wastes creates imbalance in natural and geographical systems. Accordingly the areas were categorised and specified by the TPCB and frequently send the socio-economic, cultural, geographical reactions to the state Government.

There are more than 3,000 industrial units in Tamil Nadu which have been classified under the highly polluting or 'red' category. The total effluent generated is about 6 lakh litres per day of which more than 5 lakh litres (85 per cent) are generated by large industries. About 400 units discharge directly into rivers. Nearly 1000 tanneries which are located in Vellore, Kancheepuram, Dindigul and Erode districts are the vital pollutants affected Palar basins. Similarly, there are a large number of textile bleaching and dyeing units in Tirupur, Erode, and Karur which contaminate Noyyal, Amaravathy and other water bodies. With the growing competition for water and declining fresh water resources, the utilization of marginal quality water for agriculture has posed a great challenge to environmental management (Business line, 2002).

**Table 1.1 Type of Chemicals used in Textile Industries**

| Chemicals used in Indian textile industry | Hazards |
|---|---|
| a. Detergents: Non-ionic detergent based on nonyl- Phenol Ethoylates | problem on biodegradation, generates toxic metabolites highly poisonous to fish |
| b. Stain remover: Carry solvents like CC14 | ozone depletion, capacity of ten times more than CFC |
| c. Oxalic acid used for rust stain removal | toxic to aquatic organisms boosts COD |
| d. Sequestering agents: Polyphosphates like Tricsodium, Polyphosphate, Sodium hexameta phosphate | Banned in Europe still used in India in water and household detergents |
| e. Printing gums: Preservative Pentachlorophenol is used in Europe and India | dermatitis, liver and kidney damage, carcinogenic banned |
| f. Fixing agent: Formaldehyde and Benzindie | Harmful, internationally banned |
| g. Bleaching: Chlorine bleaching | Itching, harmful |
| h. Dyeing: Amino acid liberating groups | Carcinogenic, internationally banned |

*Sources:"Environmental Hazards of the Textile Industry," Environmental Update #24, published by the Hazardous Substance Research Centers/ South & Southwest Outreach Program, Business Week, June 5, 2005.*

## Effects of Textile Wastages on Farmers:-

In India, the use of wastewater from industries for irrigation encourages the textile industries to discharge their effluents either on their own land or on the surrounding farm lands with the belief that it will get assimilated in the environment through percolation, seepage and evaporation without causing any environmental hazards. But environmental problems related to disposal of textile effluent on land have been reported from various parts of India and other countries (Rahmani, 2007).

Domestic wastewater has always been a low cost option for farmers to go for irrigated agriculture in water scarce regions of the world. Apart from its resource value as water, the high nutrient content of domestic wastewater helps the farmers to fertilize their crops without spending substantial amounts on additional fertilizers. In addition, temporal (of time) water scarcity, along with the rising demand for water from competing sectors (growing population, urbanization and industrialization), has also forced the farmers to go for wastewater irrigation. However, safe utilization of waste water for irrigation requires the use of proper treatment and precautionary measures as it may cause environmental and human health hazards.

Currently in India, most of the urban local bodies cannot afford to make large investments in infrastructure for collection, treatment and disposal of wastewater and as a result wastewater is mostly used without proper treatment and adequate precautionary measures. In developing countries like India, textile effluents as well as hospital and commercial wastes often get mixed with domestic sewage and in developed countries textile effluents often get mixed with domestic sewage to dilute industrial pollutants and toxicants for better and easier treatment.

## Environmental Protection and Public Health:-

Access to safe and clean water is a critical factor in realizing the right to health. Human beings are unable to maintain life without access to clean drinking water. But, a national or local government authority poorly allocates water resources or fails to regulate water-borne contaminants or industrial discharges in waterways, depriving the community's right to life and health. Another important legal principle with respect to the right to water is freedom of information. The United Nations background papers on environment emphasize the relationship between public access, political freedom and public health. Without public access to information and public freedom to participate in environmental decision-making, especially with respect to community's water resources, government agencies may find that they have compromised the long-term health and well being of a community in achieving long-term social and economic development goals (Chindah et al., 2004).

## Environmental Pollution in Noyyal River basin:-

Rapid growth of industrial output and exports has occurred in certain sectors during the post liberalization period. The cotton textile and garment industries have grown due to availability of cheap labor and raw materials and the percentage share of textiles in total exports almost doubled from 17 % in 1981-82 to 31.6 % in 1998-99. But, the bleaching and dyeing units in the textile industry have caused severe environmental pollution problems. The government has passed different laws for controlling pollution, and the major enforcement agency, the Pollution Control Board has not been able to implement the pollution control measures effectively, due to large number of small units.

There are 702 bleaching and dyeing units, which are functioning in this region. Some of these are involved in bleaching; some in dyeing and rest are engaged in both bleaching and dyeing activities. The total water consumption by these units is about 86 mld while the water used per kg of cloth processed is 144.8 litres. The non-availability of local water due to the textile pollution has actually led to a decline in the consumption of water, over the years. The discharge of effluents has caused severe pollution of both the surface and ground water in the region and has also contaminated agricultural land. From 1980 onwards the effluents have gradually accumulated causing pollution of the river and ground water in Tirupur and downstream. Tirupur is a recently created district capital, located in the state of Tamilnadu on Noyyal river basin and it is declared as a drought prone area by the Government of India.

Tirupur has a large concentration of bleaching and dyeing industries which generate between 100 to 120 mld of effluents. These effluents have a high Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), color and salt content. The chemicals used include wetting agents, soda ash, caustic soda, peroxides, sodium hypochlorite, bleaching powder, common salt, acids, dye stuffs, soap oil and fixing and finishing agents. The Common Effluent Treatment Plants (CETPs) and Individual Effluent Treatment Plants (IETPs) set up by the industry do not effectively tackle the salt content or

reduce the Total Dissolved Solids (TDS) in the effluents. As a result, effluent with high salt content is discharged into the River Noyyal which flows downstream to be stored at the Orathapalayam reservoir, seriously by affecting the agricultural lands irrigated by these waters. Water is also discharged into the River Nallar. The two rivers are natural drainage courses and are seasonal carrier of water only during the monsoon period. For the rest of the year, they only carry industrial effluents that stagnate in the river beds and percolate into the ground water. This Orathupalayam dam was constructed way back in 1991 at the cost of INR.16.46 crores within water spread area of 1049 acres in order to irrigate an area of 500 acres in Erode district and9875 acres in Karur district (Govindarajalu et al., 2003). Now this Orathupalaym Dam has become a mere storage tank for industrial effluent, which could neither be discharged into the river, nor be stored due to percolation and contamination of ground water aquifers. Thus, the environmental pollution due to industrial activity in Tirupur has significantly affected the Noyyal River, totally contaminated the Orathupalayam Dam, and has caused great economic loss for farmers in the downstream areas of Erode and Karur districts in addition to contaminating the river Cauvery.

**Table. 2 Tolerance limits for bleaching and dying effluents**

| Parameters | Bleaching Effluents | Dyeing Effluent | Tolerance limits of Inland surface water disposal |
|---|---|---|---|
| pH | 8-9.5 | 6.9-9.5 | 5.5-9.0 |
| BOD5 (mg/L) | 150-180 | 300-400 | 30 mg/L |
| COD (mg/L) | 250-300 | 650-750 | 250 mg/L |
| SS (mg/L) | 130-150 | 300-400 | 100 mg/L |
| TDS (mg/L) | 1600-1800 | 8000-11000 | 2100 mg/L |

*Source: Central Pollution Control Board (CPCB)*

## Textile Processing and Pollution Level:-

According to the TNPCB, 8.8 crore litres of effluents, after primary treatment through effluent treatment plants, are being let out into the Noyyal river every day. According to the DAT, there are about 500 dyeing units located in Tirupur alone. Most of them are either linked to Common Effluent Treatment Plants (CETP) or have their own plants. The problem of disposal of sludge is likely to become serious in the days ahead because of the possibility of affecting the ground water in Tirupur itself. The environmental problems of textile manufacturing are related to the bleaching and dyeing (textile processing) industries. In Tirupur, during 1981, only 68 textile processing units were functioning. The number rapidly increased to 450 in 1991 and 866 in 1997. But, because of the pressure from the Tamilnadu Pollution Control Board (TNPCB) against the discharge of untreated effluents, some units have been closed and at present 750 textile processing units are functioning. These units together used around 85 million litres per day (mld) of water and discharged a similar quantity (83 mld) of effluents, which carry considerable volume of chemicals used at the wet processing stage. The quantity of cloth processed by these units is around 15,000 tonnes per month. The continuous discharge of untreated effluents for more than a decade has accumulated in the soil, ground water, etc. at Tirupur and the villages in Erode district (CPCB, 2005**).**

**Table. 3 Details of CETP in Tamil Nadu**

| S. No | Name of the Sector | No. of CETP planned | No. of CETP under operation |
|---|---|---|---|
| 1 | Tanneries | 23 Schemes | 12 Schemes |
| 2 | Textile Bleaching and Dyeing | 23 Schemes | 18 Schemes |
| 3 | Hotels and Lodging Houses | 1 Scheme | 1 Scheme |
| 4 | Hospitals (Common facility) | 1 Scheme | 1 Scheme |
| **Total** | | **48 Schemes** | **32 Schemes** |

*Source: Tamil Nadu Pollution Control Board (TNPCB)*

## STATEMENT OF THE PROBLEM

The present study attempts to assess the environmental damages caused by these bleaching and dyeing units in Tirupur industrial city in the Coimbatore district of Tamilnadu. The bleaching and dyeing units use a large quantum of water. Most of this water is discharged in the form of effluents into land and water polluting the local environment. The villages of Erode districts are severely affected while they are used as the trench of wastages which are caused due to the hub of textile

industrial activities of cities of Tirupur, Erode and their surroundings. Textile units in Tirupur are combined with various functionaries in order to complete its tasks. The end products of textile units are heavily exported to other nation. Normally, textile industries combined with dyeing and bleaching processes. These dyeing and bleaching units are continually discharge their effluents into nearby water bodies. These untreated waste water result in the discharge of sewage into the Noyyal and Nallar rivers every day. Thus, these two rivers become the dumping points for both domestic and industrial waste water. The growth of textile units has led the depletion of ground water resource and a serious deterioration in quality of environment of both ground and surface water level. The condition of villages where the environmental crises happened was sever and pathetic. As a result, out-migration, ill-health condition, illiteracy, agricultural loss, death of fishes, death of birds, affects of fauna and flora are the outcome of pollution crises in these regions. People of these villages socially and economically deprived due to the textile wastages of different textile processing units.

These rivers are natural drainage courses and to carry rain water during monsoon period. They now carry industrial effluents and deposit the effluents in the river beds and water bodies which ultimately percolate into the ground water. As a result, the ground water is highly polluted and unfit for domestic, industrial and agricultural activities. This waste water discharge has severely affected the environmental setup of the Noyyal river system as well as Orathapalayam Dam, the villages such as which was constructed for irrigation development in the downstream areas of Karur and Erode districts of Tamil Nadu.

## IMPORTANCE OF THE STUDY

In general sense, if the creation of awareness and the initiation of social change in the existing scenario such as pollution awareness promoted gradually, then that would be appreciated very much by the environmentalists. Meanwhile, the present study is inevitable to know the relationship of events that are the causes and effects, irrespective of gender, caste, religion, economy etc. An attempt has been made in the study to evaluate the nature and limits of textile wastages, their major problems due to textile water pollution and sociological impact on the sectors such as agricultural, economical, health and so on. There are more than 100 villages located in the banks of rivers Noyyal and Nallar but their impacts were severe on fauna and flora. Hence, People in these villages loss their interest to live and generate their income for survival. Therefore, they gradually start moving out of their ancestral and lands of sentiment towards safer areas. The condition has worsened where the textile wastages were accommodated and discharged their wastages into nearby water bodies. The study plays an important role in order to find the problems and classify categorically by conducting field survey and deriving appropriate suggestions.

## REVIEW OF LITERATURE

Khoshoo, (1988) Environmental management attempts to integrate natural and social system for the benefit of the latter and without being detrimental to the stability of the former. Environmental management is proper, natural and scientific resource use and management. There is need for rapid and intensive development of many kinds to ensure a better quality of life for the people. But this has to be done without undue damage to the environment so that its capacity to support life is not unduly impaired. Many conservationists fear that is has taken so long to become aware of the need for wise environmental management based on the principles of ecology that the best we can hope for now is to prevent further disruption of natural ecosystems and resource exploitation and environmental pollution. He concluded that the man is firmly located a s part of global ecosystems, which depends on him much as he depends on it even though the viewpoint of the environmental management process is fundamentally that of man, whose decisions determine whether he himself or even the rest of the global ecosystem will survive at all.

Krishnamoorthy (1994) has reported that the water pollution is severe in Dindigul where there are more number of tanneries. In the surrounding area of Dindigul town, the tanks and wells are highly polluted and the government has to supply drinking water in affected areas. The inhabitants, particularly women have to go a long way to fetch potable water. This forced the people to spend more time on accessing pure water. Besides, it causes severe health problems to women.

Irshad et al. (1997) found that air, soil and water were increasingly becoming polluted by textile pollutants such as organic and inorganic chemicals and toxic metals. Due to failures in following the guidelines of environmental planning in Pakistan, textile industries and factories dumped their solid and liquid wastes on open spaces. The authors also found that sewer and streams mixed with groundwater raising the pollution level higher than the level recommended by WHO.

Saxena (1999) in his study on, 'Institutional framework for Environmental planning and Constitutional provision', stated that the purpose of 'The

water (Prevention and Control of Pollution) Act, 1974 was to ensure that the river streams and sources of drinking water, water for the support of fish life and water for using in ironisation were not allowed to be polluted by the discharge of domestic, textile and other industrial effluents. Central and state Boards for the prevention and control of water pollution deal with the problem of water pollution in the country. He concluded that the water (prevention and control of pollution) Act 1977 was the law and Central Pollution Control Board and the State Pollution Control Boards were constituted for the prevention and control of water pollution under water (prevention and control of pollution) Act, 1974.

Hunshal et al. (2005) have found that poor sanitation and unsafe drinking water are the major health problems in our rural areas and many of the diseases such as diarrhoea, dysentery, typhoid, jaundice, cholera and intestinal diseases are very common. Water borne diseases constitute nearly 80% of the illness. In rural villages, there is no systematic water supply and sanitation. Inadequate and inefficient disposals of solid wastes have also became serious health hazards in rural community.

Ranganathan et al. (2007) have pointed out that the textile dyeing industries in Tirupur and Karur of Tamil Nadu (India) usually discharge effluents ranging between 80 and 200 $m^3$/t of production. Dyeing is performed either by conventional winch process or by advanced soft flow reactor process. The authors concluded that dying industries are the main cause of pollution in these regions and severely affected the socio-economic conditions of the rural communities.

Rajaram and Ashutosh Das (2007) in their study on 'Water pollution by industrial effluents in India: Discharge scenarios and case for participatory ecosystem specific local regulation' stated that around the world, countries are struggling to arrive at an effective regulatory regime to control the discharge of industrial effluents into their ecosystems. Indian economy holds a double edged sword of economic growth and ecosystem collapse. They found that this situation, if mishandled, can cause irreparable ecological harm in the long term. They also sketched out the industrial effluent discharge under the various market-enforced conditions and proposed possible strategies for effective regulatory regime in India.

## THEORETICAL FRAMEWORK

A theoretical understanding has been made for present study to understand in the perseverance of Sociological approach. R.K.Merton's theory of Latent and Manifest functions was applied. Robert K. Merton distinguished the types of functions within each social structure, manifest functions and latent functions. Merton's contribution to sociology is one of the great milestones with regard to the functional perspective of society. Merton and other functionalists viewed society as an organism with various parts, and each part has a function to perform. Merton recognized that some functions were intentional and other functions were not. He also acknowledged that some functions actually disrupted society and may create dysfunctions too. These functions are known as the manifest and latent functions and dysfunctions. The results of dysfunctions may create inequality, deprivation etc.

Robert Merton pointed out that all parts of society have various functions in which they perform. Some of these functions are obvious and others are not-so-obvious. He distinguished between the two by stating that the recognized and intended functions were the manifest functions and the unrecognized and unintended functions were the latent functions.

**Manifest functions (Intended results):** Textile units carry out their production processes in a regular manner and it has been continued in a longer duration with the expectation of higher production of textile outcomes. These regular processes include bleaching and dyeing with the usage of nominal level of chemicals and colouring agents. Economical growth and flourishing of industries are in this category.

**Latent functions (Unintended results):** Where there is an irregular supervision or improper maintenance and purification of water leads to unintended waste water discharges. **Environmental aspect:** Water pollution, sewage, stinky smell, fouls smell, land becomes as barren, plants and bushes are affected. **Social aspect:** Out-migration of people from their own land, high literacy rate. **Economic aspect:** Farmers loos their self-reliance, Economic sustainability, no economic empowerment. **Psychological aspect**: Mental instability, more depressed among villagers since the land becomes unfertile, fear upon their future, emotionally attached to the land and properties. **Health aspects:** Asthma, skin disease, cholera, communicable, water borne, air borne diseases. **Cultural aspect:** People lose their interest to perform cultural celebrations in the midst of irreversible polluted environment. **Dysfunctions**: Unable to control or regulate the problems of pollution on fauna and flora.

## METHODOLOGY

The study is intended to cover a few selected villages of Erode district based on the report of Tamilnadu Pollution Control Board as per the intensity of textile

wastages released from the textile industries of in-and-around of Coimbatore and Erode districts into river Noyyal and other water bodies. The research study focused on the sociological implications among different sections of population in the villages of study area. The study is descriptive in nature and the cross section of population on socio-economic background they were classified. The socio-economically deprived conditions of villages were observed and suitable sampling procedure was used in order to collect the data from the textile waste polluted fields. The collected data were calculated with the tool of SPSS and the same were analysed and simple frequency tabulation method was used with necessary interpretations and suggestions.

## Selection of Study area:-

According to the Tamil Nadu Pollution Control Board, an estimated 80.70 million litres of effluent water is discharged daily into the Noyyal River from dyeing and bleaching units in Tirupur. Another 3 million litres of untreated municipal waste water also found on its way into the river, making it one of the most polluted rivers in the State. The study has been targeted few villages of Erode district, where the intensity of pollution affects socio-economic, Psychological, health, environmental and cultural aspects of the villages and they were studied and evaluated with suitable tools. The villages selected for the study were Orathupalayam, Kodumanal and Ganapathipalaiyam of Erode district, Tamilnadu. According to Tamilnadu Pollution Control Board though more than 100 villages in the Noyyal river basins are affected among them these three villages located in Erode district were severely affected.

## Objectives of the study:-

The main aim of the present study is to assess the socio-economic and the environmental implications of textile effluents. The important objectives are:

1. To assess the impact of textile pollution on socio-economic and demographic structure of study area.
2. To evaluate the impact of textile pollution on health, agriculture, culture and human resources.
3. To examine the nature of land, water and environmental pollutions caused by textile pollutants.

## Sampling:-

180 respondents (60 from each village) belonging to a cross-section of the population of the three villages namely, Kodumanal, Ganapathipalayam and Orathapalayam are selected using purposive random sampling technique to assess their perception about the impact of textile pollution on water, land and air. The 180 respondents consist of agricultural labourers, landowners, fishermen, community leaders, industrial workers and village panchayat leaders were studied.

## Data Collection:-

After selecting the samples and study villages, the next process comprised was the tools for data collection. Hence, appropriate tool namely structured interview schedule was used with open ended and closed ended options since, the study area was found backward in literacy. The interview schedule was classified in based on the objectives with necessary options. The respondents were interviewed and observed patiently by the researcher from each village.

## Data Analysis:-

On the basis of variables and attributes selected for the study, the collected information were tabulated. The data collected from the respondents through interview schedules were computerized using SPSS and presented in tables.

## Limitation of the study:-

The study was confined within three villages of Noyyal river basin, Erode district. The people of three villages (Kodumanal, Ganapathipalaiyam, and Orathupalaiyam) are affected due to the textile wastages discharged in to the water bodies and therefore, natural systems namely fauna and flora are affected in the study area. Keeping all these in mind, the questions and suitable options were used in the schedule and the study covered with primary and secondary sources of data.

## RESULTS AND DISCUSSION

**Table 1 Age-Wise Classification of Respondents**

| Sl. No. | Age | No. of Respondents | Percentage |
|---|---|---|---|
| 1. | 20-35 year | 18 | 10.00 |
| 2. | 36-50 year | 49 | 27.22 |
| 3. | 51-65 year | 78 | 43.33 |
| 4. | Above 66 | 35 | 19.45 |
| | **Total** | **180** | **100.00** |

*Source: Field survey*

The above table represents the age group of the respondents selected for this study. It is found from the total number of 180 respondents, 78 (43.33 per cent) belong to age group of 51 – 65 years, 49 (27.22 per cent) belong to age group of 36 - 50 years. In order to get the opinion of elders and their experiences, elderly people were interviewed and included as respondents. According to the field survey 35 (19.45 per cent) were above 66 years and only 18 (10.00 per cent) are in the age group of 20-35 years. It was noticed that majority of the respondents participating in the field survey belonged to 51-65 years. As they face degradations such as water, land and air pollutions due to textile waste discharges from textile units they were not reluctant and hesitant to argue with any one regarding this issue.

**Table 2 Sex-Wise distributions of Respondents**

| Sl. No. | Sex | No. of Respondents | Percentage |
|---|---|---|---|
| 1. | Male | 148 | 82.22 |
| 2. | Female | 32 | 17.78 |
| | **Total** | **180** | **100.00** |

*Source: Field survey*

Table 2 shows the distribution of respondents according to their sex. It is seen from the table found above that, out of total sample, majority of them were males and it constitutes 82.22 per cent (148) while the other 17.78 per cent (32) of the sample were females. The analysis indicates that the male population is higher than the female population in the villages under study. In the meantime, this is not predestined that women are not affected as much as men, but they have not come up with the answers when the researcher asked them to do so. Men revealed their thoughts elaborately as they have higher responsibilities to make the changes in the village. On the whole, without gender differences residents were looking for a social transformation towards positive changes, in terms of a pollution free environment throughout Noyyal River belt in this district.

**Table 3 Educational attainment of Respondents**

| Sl.No | Education | No. of Respondents | Percentage |
|---|---|---|---|
| 1. | Illiterate | 78 | 43.33 |
| 2. | Primary | 57 | 31.66 |
| 3. | Higher Secondary | 33 | 18.34 |
| 4. | College level | 12 | 6.67 |
| | **Total** | **180** | **100.00** |

*Source: Field survey*

In fact, the educational level remains rather low for the village community as a whole. It is observed from the table found above that the majority of the respondents are illiterate, they constitute 78 (43.33 per cent). Out of total sample 57 (31.66 per cent) studied upto primary level; whereas 33 (18.34 per cent) attained the educational level upto higher secondary. Only 12 out of total sample (6.67 per cent) belong to the status of collegiate level. Thus, illiteracy is prevalent in these areas. Still they need to receive Governmental schemes and programmes more for their progress.

**Table 4 Occupation of the Respondents**

| Sl. No. | Occupation | No. of Respondents | Percentage |
|---|---|---|---|
| 1. | Farmers | 86 | 47.78 |
| 2. | Industrial labourers | 45 | 25.00 |
| 3. | Business / Trade | 36 | 20.00 |
| 4. | Any other | 13 | 7.22 |
| | **Total** | **180** | **100.00** |

*Source: Field survey*

Table 4 shows the distribution of respondents according to their occupation. The table reveals that 86 (47.78 per cent) of respondents are farmers, while 45 (25.00 per cent) of the respondents are industrial labourers whereas 36 (20.00 per cent) of them in business or trade and only 13 (7.22 per cent) of the sample belong to other occupations such as private and governmental services. From the above table, it is seen that many of the villagers depend upon agricultural activities, significantly, they cannot harvest with expected cropping outcome as water is too much polluted. Sometimes, they need to face loss in their cultivation. Breeding and cropping are very much affected due to effluents. Therefore, they are forced to migrate from one occupation to another one.

**Table 5 Perception of the Respondents about Pollution**

| Sl. No. | Perception on pollution | Yes (%) | No (%) | Total |
|---|---|---|---|---|
| 1. | Air Pollution | 82 (45.55) | 98 (54.45) | 180 (100.00) |
| 2. | Water Pollution | 180 (100) | 0 | 180 (100.00) |
| 3. | Land Pollution | 163 (90.55) | 17 (9.45) | 180 (100.00) |
| 4. | Any other specify | 26 (14.46) | 154 (85.54) | 180 (100.00) |

*Source: Field survey*

The above table represents the intensity of pollution faced by the respondents in the study villages. It is seen from the above data that the chemically contaminated effluents were released from the textile industries into nearby water resources such as, rivers, tanks, ponds and streams. Out of 180 respondents, 45.55 per cent reported that air pollution is common in their residential area. On the whole 100 per cent of the respondents experience water pollution, severely. 90.55 per cent answered that land pollution is evident in their surroundings.

**Table 6 Sources of land pollution**

| Sl. No. | Source | Yes | No | Total |
|---|---|---|---|---|
| 1. | Intrusion of polluted water into the land | 156 (86.66) | 24 (13.34) | 180 (100.00) |
| 2. | Water with chemicals released into land | 162 (90.00) | 18 (10.00) | 180 (100.00) |
| 3. | Dumping industrial waste on land | 104 (32.01) | 76 (42.22) | 180 (100.00) |
| 4. | Other Reasons | 13 (7.22) | 167 (92.78) | 180 (100.00) |

*Source: Field survey*

The above table shows the sources of land pollution in study villages. Out of 180 respondents, 156 (86.66 per cent) stated that polluted water intrusion is the main source and it makes land not suitable for cultivation. The majority 162 (90.00 per cent) stated that disposal of chemically contaminated waste water with effluents was released into land. 104 (32.01per cent) stated that both chemical contaminated water and dumped effluent waste were the main sources of land pollution in the villages. Only 7.22 per cent of the respondents stated some other sources such as polythin covers deposits, plastic dumps, human excreta, dump of plants, rubber and wooden deposits are polluting the land.

**Table 7 Nature of Land Pollution**

| Sl. No. | Nature of land Pollution | No. of Respondents | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 1. | Soil becomes saline | 173 (96.12) | 7 (3.88) | 180 (100.00) |
| 2. | Soil colour changed | 96 (53.33) | 84 (46.67) | 180 (100.00) |
| 3. | Soil becomes harder | 142 (78.88) | 38(21.12)) | 180 (100.00) |

*Source: Field survey*

The above table explains the perceptions of respondents regarding the nature of land pollution caused by textile effluents in the villages. 96.12 per cent of the total sample reported the salinity of soil as nature of land pollution. While 53.33 per cent of the total sample reported change of soil colour and 78.88 per cent cited the entire natures namely, salinity of the soil, change of soil colour and hardness of land are prevalent for land pollution in the village communities. They have also viewed that land became unfit for reuse because of over sedimentation of chemicals.

**Table 8 Type of problems faced by the respondents**

| Sl. No. | Type of problems | No. of Respondents | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 1. | Access to land blocked | 24 (13.33) | 156 (86.67) | 180 (100.00) |
| 2. | Water stagnation | 142 (78.88) | 38 (21.12) | 180 (100.00) |
| 3. | Water ways blocked | 43 (23.88) | 137 (76.12) | 180 (100.00) |
| 4. | Water pollution | 174 (96.67) | 6 (3.33) | 180 (100.00) |
| 5. | Land pollution | 168 (93.33) | 12(6.67) | 180 (100.00) |

*Source: Field survey*

It is found from the above table that out of 180 respondents, 13.33 per cent of them reported that land access is blocked due to effluents in their villages. 78.88 per cent stated that water stagnation is the basic problem in carrying out agricultural activities. Only 23.88 per cent stated that water ways were blocked due to sedimentation of textile waste in agricultural land. The majority of the respondents (96.67 per cent) cited that water pollution is the main cause for difficulties in their respective agricultural lands. Hence, soil fertility is decreased. 93.33 per cent stated that dumped effluents on land affect agricultural activities, widely. Land is an important natural resource and it becomes unfertile, non cultivable and loses it texture and quality due to textile pollution in the villages of Erode district. Therefore, the problems caused by textile pollution are bound to create multi dimensional effects on rural communities.

**Table 9 Impact of land pollution**

| SL. No. | Impact of land Pollution | No. of Respondents | | Total |
|---|---|---|---|---|
| | | Yes (%) | No (%) | |
| 1. | Crop growth affected | 173 (96.12) | 7 (3.88) | 180 (100.00) |
| 2. | Electric telephone posts rusted | 113 (62.78) | 67 (37.22) | 180 (100.00) |
| 3. | Land value declined | 54 (30.00) | 126 (70.00) | 180 (100.00) |
| 4. | Agricultural produce declined | 86 (47.78) | 94 (52.22) | 180 (100.00) |
| 5. | Biodiversity affected | 138 (76.67) | 42 (23.33) | 180 (100.00) |
| 6. | Tree growth affected | 144 (80.00) | 36 (20.00) | 180 (100.00) |
| 7. | Trees affected | 171 (95.00) | 9 (5.00) | 180 (100.00) |
| 8. | Bush growth affected | 55 (30.55) | 125 (69.45) | 180 (100.00) |
| 9. | Cattle affected by disease | 92 (51.12)) | 88 (48.88) | 180 (100.00) |
| 10. | Agricultural implements rusted | 163 (90.55) | 17 (9.45) | 180 (100.00) |
| 11 | Taste of agriculture produce affected | 98 (54.45) | 82(45.55) | 180 (100.00) |
| 12. | Agricultural labourers affected by Disease | 76(42.22) | 104 (57.78) | 180 (100.00) |

*Source: Field survey*

The table 9 illustrates the impact of land pollution due to textile effluents. Out of 180 respondents, 96.12 per cent of them stated that crop's growth was affected severely; 62.78 per cent cited that electric and telephone posts were rusted due to contamination of land; 30.00 per cent opined that land values were declined due to chemical deposited land texture; 47.78 per cent of them stated that agricultural production such as grain, vegetables, fruit, groundnuts were declined; 76.67 per cent of the respondents replied that agricultural production, bio-diversity, cattle, trees are affected by land pollution caused by textile effluent; 80.00 per cent cited that the growth of trees such as coconut, palm, plantain, neem are affected due to intrusion of polluted water into land; 95.00 per cent stated that whole trees and their cropping patterns were affected severely; 30.55 per cent of the respondents replied that land affected by ground water pollution, and it results in extinction of bushes. 51.12 per cent of the total sample cited that cattle on land were affected by diseases while consuming the contaminated water from the textile industries; 90.55 per cent stated that agricultural implements such as iron plough, tractor, hoe, pipes were rusted due to land and water pollution. Further, the primary data show that tastes of agricultural products were affected heavily and it constitutes 54.45 per cent. 42.22 per cent replied that agricultural labourers

were affected by diseases such as skin allergy, cholera, malaria, eye irritation, when the villagers having works in the polluted agricultural lands.

**Table 10 Nature of Water Pollution Caused by Textile Pollutants**

| S. No. | Nature of Water Pollution | No. of respondents | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 1. | Water taste affected | 168 (93.33) | 12 (6.67) | 180 (100.00) |
| 2. | Water became saline | 162 (90.00) | 18 (10.00) | 180 (100.00) |
| 3. | Worms insects seen in the water | 107 (59.44) | 73 (40.56) | 180 (100.00) |
| 4. | Water colour affected | 114 (63.34) | 66 (36.66) | 180 (100.00) |
| 5. | Bad smell | 122 (67.78) | 58 (32.22) | 180 (100.00) |

*Source: Field survey*

Out of 180 respondents 93.33 per cent stated that water taste was affected due to water pollution in their villages; 90.00 per cent perceived that water became saline when textile effluents intruded into the ground water; 59.44 per cent of the respondents reported that worms and insects are seen in the polluted water and water causes severe health disorders. 63.34 per cent felt that water colour was changed due to the discharge of effluent water into water bodies; 67.78 per cent of the respondents revealed that they felt bad smell whenever they used water; it is reported that, this condition continued in their respective villages for more than a decade because, deposit of textile effluents was let into the river water.

**Table 11 Impact of Textile Pollution on Farmers**

| S.No | Impact of textile pollution on farmers | No. of respondents | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 1. | Lost cultivation | 132 (73.33) | 48 (26.67) | 180 (100.00) |
| 2. | Effected migration of farmers | 98 (54.45) | 82 (45.55) | 180 (100.00) |
| 3. | Lost land | 134 (74.44) | 46 (25.56) | 180 (100.00) |
| 4. | Shortage of food grains | 106 (58.88) | 74 (41.12) | 180 (100.00) |
| 5. | Lost social respect | 118 (65.54) | 62 (34.46) | 180 (100.00) |
| 6. | Lost agricultural income | 130 (72.23) | 50 (27.77) | 180 (100.00) |

*Source: Field survey*

The above table illustrates the impact occurred due to textile pollution upon farmers in the village communities. Out of 180 respondents 73.33 per cent of the respondents stated that they had lost their cultivation. In certain cases, they observed irregularity in their cultivation. 54.45 per cent reported the migration to some other places as they were not getting enough income due to effluent in their agricultural process. 74.44 per cent replied that they lost their land, as it turned uncultivable or barren. 58.88 per cent cited that they felt difficulties in getting food grains; shortage of food grains happens due to the impact of textile effluents in farm lands. 65.54 per cent stated that their social respect is affected. While searching for bride or groom the villagers face much difficulty. This condition is only due to the unstable condition to live the affected villages behind the cause of polluted ecosystem.

**Table 12 Diseases caused by textile pollution**

| Sl. No. | Name of the diseases | No. of respondents | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 1. | Diarrhoea | 104 (57.78) | 74 (41.12) | 180 (100.00) |
| 2. | Malaria | 112 (62.22) | 68 (37.78) | 180 (100.00) |
| 3. | Skin disease | 137 (76.12) | 43 (23.88) | 180 (100.00) |
| 4. | Tuberculosis | 6 (3.34) | 174 (96.66) | 180 (100.00) |
| 5. | Jaundice | 17 (9.45) | 163 (90.55) | 180 (100.00) |
| 6. | Eye irritation | 48 (26.67) | 132 (73.33) | 180 (100.00) |
| 7. | Cholera | 99 (55.00) | 81 (45.00) | 180 (100.00) |

*Source: Field survey*

From the table of 12, it is clear that out of 180 respondents 57.78 per cent of them got the infection of diarrhorea; 62.22 per cent reported that they were infected by malaria; 76.12 per cent of them got skin related diseases; only 3.34 per cent stated that they were affected by tuberculosis; 26.67 per cent of them responded that they got the problem of eye irritation; 55.00 per cent spoke of cholera infection on them; finally, 40.00 per cent of them reported some other diseases such as fever, cold, head ache, hair loss and fatigue due to different involvement of pollution in their respective villages. The respondents attributed these diseases caused due to effluents because, (i) Waste water with poisonous chemicals, unconsumed feed and pest control medicines was released into land and water resources.

## MAJOR FINDINGS AND CONCLUSION

The major findings of the study bring out the nature of the problem as follows: 43.33% were illiterates in the study area; overwhelming 100% of the respondents were affected by water pollution; 90.00% of respondents answered that water bodies were polluted due to the intrusion of chemical content and it affects living habitations of the study area; 96.12% responded that land becomes saline; 78.88% of them said that life is too hard due to water stagnation along with chemicals; 96.12% were affected by crop failure, generally plants are integral part of farmers and when it becomes insane they feel as loosing the source of survival. This is remarkable to know that 90.55 of respondents felt that their agricultural implements such as iron rods, iron spade, etc. were rusted and it cannot to be used; 93.33% of them replied that the taste of water were changed and seems to be unused; 76.12% of the respondents answered that they found unhealthy along with skin diseases when they use the polluted water and this will cause major setbacks in their healthy daily life. Based on income 72.23% of villagers in the study area, lost their income from agriculture as a result, 65.54% of them gradually lost their social respect. When the villagers found all of these environmental issues, it becomes as the push factors and causing out-migration of population from their native land and they lose a century long affinity of their farming ground.

In toto, the study reveals the impact of industrialisation along with the growth of urbanisation on society. The aftermath of the two phenomena lead the society in both positive and negative results. When the rulers failed to take safety measures in the favour of both fauna and flora in immediate manner that too cause a pathetic condition in their symbiotic relationships. The study attempts to understand the socio-economic and demographic conditions of the villages Orathupalayam, Kodumanal and Ganapathipalaiyam of Erode district with respect to the water, land and air pollution caused due to the discharge of untreated polluted water from textile processing units such as dying, bleaching etc. on the banks of Noyyal river. Fish cultivation took major part in the source of economy in this region for more than four decades and after the percolation of untreated water into habitation field that too affected and fisheries started migrating into different income source. Dumping of textile wastes on open space polluted air. Air pollution was also caused by textile effluents discharged from the textile units. Villagers reported that they were experiencing foul smell created by effluents. According to the data from the field survey, though the agitation, procession, fasting and

legal steps taken to regulate or decrease the polluted water, they have been out of favourable results. The lost of social respect, forces for migration, sever economical loses are the significant conditions of study area to be noted. The study applied the Merton's Sociological theory and disseminated the focal points with verified on-field and off-field secondary sources.

## SUGGESTIONS

- ☆ Eco-development camps should be organised in the villages to create awareness about pollution and pollution control mechanisms.
- ☆ All the textile units should be monitored regularly and the Common Effluent Treatment Plant (CETP) has to be checked whether they are connected well with their respective plants.
- ☆ Government should ensure the NGO or community development bodies to be as the 'watchdogs' of textile units and their normal duties.
- ☆ Health camps should be conducted in the affected villages regularly.
- ☆More awareness programmes should be conducted in the pollution affected regions since more illiteracy prevails.

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