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## 19. IMPACT OF WATER POLLUTION IN TAMIL NADU

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### ABSTRACT

**W**ater resource is one of the important natural resources it essential for the survival of living organisms. The adequate safe water is essential to human lives and it is required in day to day life. Water pollution may take place due to natural causes such as silt carried by run-off, organic wastes of plants and animals, minerals leaching through soils, thermal pollution and algal blooms. In most of the developing countries are being polluted beyond their capacity because of high population growth. Increasing the urbanization and industrialization has reason for create a very large point of water pollution. Agro – based industries has seriously damaged surface water quality's, even in many rivers and groundwater has been contaminated. Polluted water is like poison for human beings. A large number of diseases in Tamil Nadu can attributed to drinking of sewage mixed water. Various diseases like polio, cholera, patches, jaundice, fever, viral fever etc are spread through polluted water.

**KEYWORDS:** pollution, contaminated, sewage, ground water.

### INTRODUCTION

Water resource is one of the important natural resources it essential for the survival of living organisms. The adequate safe water is essential to human lives and it is required in day to day life. Water pollution may take place due to natural causes such as silt carried by run-off, organic wastes of plants and animals, minerals leaching through soils, thermal pollution and algal blooms. It may also be due to the discharge of domestic and industrial wastewaters. In most of the developing countries are being polluted beyond their capacity because of high population growth. Increasing the urbanization and industrialization has reason for create a very large point of water pollution. Agro – based industries has seriously damaged surface water quality's, even in many rivers and groundwater has been contaminated. Toxic chemicals used for agriculture and other purposes, solid wastes, oil from garages and cleaning of vehicles, drainage from farms and manure, land surface drainage, cattle washing, watering and dipping agricultural wastes, dust

fall, wastes due to recreational use, intrusion of sea water and many more such activities cause pollution of water bodies.

In the state Tamil Nadu most of the rivers are affected due to sewage, oil, chemicals and effluents. The discharge of domestic waste and industrial effluents into water courses such as rivers, streams and lakes in Tamil Nadu results of physical, chemical and biological changes leads to undesirable condition. The growth of urbanization is lead to increase in industrial activity and dependence of the agricultural sector use on chemicals and fertilizers has led to polluted ground waters. In different types water has polluted: surface water pollution, oil pollution, chemical water pollution, agricultural pollution, ground water pollution and thermal pollution.

### RESEARCH METHODOLOGY

In this study based on explanatory research and adopt a secondary date. The data are collected from different journals, books, government annual reports and periodicals for the purpose of the study.

### OBJECTIVES OF THE STUDY

- 1.To study the impacts of water pollution.
- 2.To study the water pollution control policies.
- 3.To examine the health impact due to contamination of water.

### TAMIL NADU POLLUTION CONTROL BOARD (TNPCB)

Tamil Nadu pollution control board (TNPCB) was constituted by the Government of Tamil Nadu on 27th February,1982 in pursuance of the Water Prevention and Control of Pollution Act, 1974 (Central Act 6 of 1974). Increasing the pace of industrialization in Tamil Nadu its need to monitoring pollution level continuously. In the 3 industries are required to provide pollution control measures to meet the standards prescribed by the board. In the board field officers are inspect the industries continually with some pollution control measures provide by the industries sewage, trade effluent and emissions. For effective monitoring industries are categorized as Red, Orange, Green and White according to their pollution level. Also in the industries has been classified a large, medium and small scale based on the gross fixed

assets of the industry. And depending upon the category and size industries are monitored periodically.

The various legislations are created by the government to control the water pollution. Water pollution control legislations with which the TNPCB is concerned are given below. Most of the legislations are implemented directly by the TNPCB and some of other legislations implemented by departments of the government.

- The water (prevention and control of pollution) act, 1974 as amended in 1978 & 1988.
- Tamil Nadu water (prevention and control of pollution) rules, 1983.
- The water (prevention and control of pollution) cess act, 1977, as amended in 1991 and 2003.
- The water (prevention and control of pollution) cess rules, 1978 as amended in 1992.
- Coastal Regulation Zone notification, 2011.
- The Solid Wastes Management Rules, 2016.

### **MAJOR CAUSES OF WATER POLLUTION**

It can be classified under two broad categories.

- Point source: which occurs when harmful substance are emitted directly into the body of water.
- Non-point source: which occurs when harmful substances are emitted directly into a body of water and 'nonpoint source' which delivers pollutants indirectly through transport or environmental change.

Important Driving Forces

The following are considered to be the major driving forces of water pollution.

1. Urbanization
2. Industrialization

Impact of water pollution in Tamil Nadu

### **INDUSTRIAL POLLUTION**

In Tamil Nadu have a more than 3000 industrial units are classified under highly polluting or red category industry. In the red category industries total effluent generated around 6 lakh liters per day of which more than 5 lakh liters (85%) of total effluent generated by large scale industries. About 400 units discharge directly into rivers; of particular concern are the tanneries which are located in Vellore, Kancheepuram, Dindigul and Erode districts. The effluents have caused serious problems in the Palar basin. Similarly, there are a large number of textile bleaching and dyeing units in Tiruppur, Erode, and Karur, which have contaminated the Noyyal, Amaravathy and other water bodies. In majority of effluents come from main five industrial complexes in Tamil Nadu: Manali/Ennore, Ranipet, Cuddalore, Mettur and Tuticorin areas placed chemical, petro-chemical and other industries. These complexes have also become more environmental hotspots. There

are cement units, distilleries, sugar, sago, paper, dairying, electroplating, chemical and fertilizers (Agro chemicals), mining industries, ores/mineral processing industries and a variety of other industries which are water consuming and also generate large quantities of effluent. Some of the industries have also provided the treated effluent for irrigation with some degree of success.

### **COASTAL POLLUTION**

The major activities that are responsible for coastal pollution in Tamil Nadu are discharge and disposal of untreated domestic and industrial wastes, discharges of coolant waters, harbour activities such as dredging, cargo handling, dumping of ship wastes, spilling of cargo's chemicals and metal ores, fishing activities etc. There are 14 major industries located in the Ennore-Manali areas. The industries at Manali and Ennore are mostly chemical based, manufacturing petro-chemicals, fertilizers, pharmaceuticals, paints etc. There are two power plants at Ennore, namely, Ennore Thermal Power Plant with a production capacity of 200 MW and North Chennai Thermal Power Plant with a production capacity of 600 MW. The fly ash continuously deposits in the sea. The industries at Ennore-Manali are using a wide variety of raw materials and discharge waste products into the air, water or land as gaseous emissions, liquid effluents and sludge, respectively. In the coastal area of Tamil Nadu 488.02 MLD of wastewater is generated and only 226 of MLD is treated.

### **SEWAGE POLLUTION**

The state Tamil Nadu out of 152 municipalities and 5 corporations, only 15 municipalities and 4 corporations have partial underground sewerage system. The river water is used downstream for irrigation or drinking by people/livestock, contamination of the river has increasingly become a serious problem in many of the river basins of the State. River basins like Palar, Tamiraparani, Cauvery, Noyyal, Bhavani and Amaravathy face serious pollution problems due to sewage.

### **RESPONSE**

All the industries discharging effluents are regulated by the Tamil Nadu Pollution Control Board. In the board fixed the effluent standards in the industries. Industries pay a cess based on their water consumption to the Tamil Nadu Pollution Control Board. Most of the industries have a own effluent treatment plants. In small size industrial 109 pollution clusters, although the units are connected to common effluent treatment plants.

## COMMON EFFLUENT TREATMENT PLANTS (CETPS)

Leather industry creates emission of high incidence is pollution affecting the ground water quality. In order to arrest the effluents of waste from the leather industries the board has been directing the leather industries come under the fold of common effluent treatment plants. In addition to the leather industry, textiles, dyeing, hotels and lodges are also bound to generate adverse externality. The common effluent treatment plant constructed in Nagalkeni near Pallavarm is showcasing the effective role of the TNPCB in abatement of water pollution.

## IMPACTS OF HUMAN HEALTH

Polluted water is like poison for human beings. A large number of diseases in Tamil Nadu can be attributed to drinking of sewage mixed water. Various diseases like polio, cholera, patches, jaundice, fever, viral fever etc are spread through polluted water. Polluted water contains lead which when consumed by the humans while drinking water leads to producing various ailments such as joint pains, kidney disease and heart disease in them.

The waterborne diseases are infectious which spread primarily from polluted water. Hepatitis, cholera, dysentery and typhoid are the common waterborne diseases, which affect the majority of tropical areas. If the polluted water gets stagnated, it becomes a breeding ground for mosquito and many other parasites which are very common in tropical areas. In children often get sick if they drink polluted water and sometimes they even die due to intensity of the diseases. Large amounts of chloride in drinking water deform the spine which becomes snaky and their teeth go yellow, start falling and more over their hands and feet lose flexibility of the bones and their body deforms. It also increases the risk of kidney diseases. A large amount of sulphide in polluted water is the reason of various respiratory diseases and drinking water contaminated with urea increases intestinal disorder. Thus continuous intake of contaminated drinking water is the reasons behind various stomach related disorders and other diseases like lumps in throat, tooth decay, etc.

Composition of nitrate resulting from fertilizer and chemicals used in agricultural lands, waste dumps or pit latrines causes contamination of the groundwater. Such contaminated drinking water is the reason of blue baby disease in kids which changes their skin colour. In this disease, nitrate contamination in groundwater results in decreased oxygen carrying capacity of haemoglobin in babies, leading to their death.

Radioactive substances produced from nuclear explosions also reach the water bodies and makes drinking water severely contaminated. If one uses this water, one can fall a victim to terrible diseases like cancer. The use of such water also increases the risk of having children with disabilities.

## CONCLUSION

Polluted water is like poison for human beings. A large number of diseases in Tamil Nadu can be attributed to drinking of sewage mixed water. It creates various diseases like polio, cholera, patches, jaundice, fever, viral fever etc are spread through polluted water. Tamil Nadu Pollution Control Board was following the Indian water pollution control acts, rules and notifications. The TNPCB officers inspecting the industries periodically with some pollution control measures. In the board monitoring the industries effectively and categorized a Red, Orange, Green and White according to their pollution level. In many of the Tamil Nadu river basins contaminates with industrial effluents. River basins like Palar, Tamiraparani, Cauvery, Noyyal, Bhavani and Amaravathy face serious pollution problems due to sewage. In the study concluded that urbanization and industrialization is the main reason for the water pollution it creates many diseases in human beings.

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## 20. CHALLENGES OF CLIMATE CHANGE ON HUMAN HEALTH

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### ABSTRACT

*Climate change is the biggest global health threat of the 21st century. Climate change is adversely affecting the human health. Maximum impact of global warming and climate change will be seen on underdeveloped and developing countries like India. In Indian context the implications of climate change are broadly classified into rising sea levels, increasing CO<sub>2</sub> levels, rising temperatures and extreme weather conditions. Climate change affects the human health in various ways. In developing countries like India, the health sector and the infrastructural facilities are very weak. The impact of the human activity on climate system is the most serious environmental challenge nowadays. The impacts of climate change on human health will be difficult to reverse in a few years or decades. Yet, these possible impacts can be avoided or controlled. This paper analyses the challenges of climate change on health.*

### INTRODUCTION

Climate change is a geological process which has been occurring throughout the planet's lifetime. The increase and decrease in atmospheric temperature has been happening at a low rate due to the changes in Earth's orbit. However the sudden climate change happening now can be described as earth's response to human activities which has caused an increase in the emission of carbon dioxide and other greenhouse gases. As the level of carbon dioxide in the atmosphere increases, the oceans are absorbing more carbon dioxide, making them more acidic and warmer. As oceans become warmer, they can expand and can aid in shrinking of glaciers and snow. This will further increase the atmospheric temperature as snow reflects heat into the space.

Drastic change in our atmospheric climate is having a wide scale impact on the economy by affecting many global sectors including agricultural sector and industrial sector. The global economy is further affected, due to the long term effects of climate change such as natural disasters and conservation of animal and plant species.

Populations of all animal species depend on supplies of food and water, freedom from excess infectious disease, and the physical safety

and comfort conferred by climatic stability. The world's climate system is fundamental to this life-support. But today, humankind's activities are altering the world's climate. We are increasing the atmospheric concentration of energy-trapping gases, thereby amplifying the natural "greenhouse effect" that makes the Earth habitable. These greenhouse gases (GHGs) compromise, principally, carbon dioxide (mostly from fossil fuel combustion and forest burning), along with other heat-trapping gases such as methane (from irrigated agriculture, animal husbandry and oil extraction), nitrous oxide and various human-made halocarbons. To support this in further, the Fifth Assessment Report (2014) of the UN's Intergovernmental Panel on Climate Change (IPCC) stated: "There is a clear human influence on the climate. It is the dominant cause of observed warming since 1950s."

As humans are the primary cause of sudden changes in the planet's climate, it is important to understand that climate change is a significant threat to the health of present and future generation of our community. The impacts of human-induced climate change are increasing worldwide. Rising greenhouse gas concentrations have resulted in increased temperature, precipitation changes, increased frequency and intensity of extreme weather events, and rising of sea levels. These effects of climate change has shown its impacts on climate-related extremes including alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being. According to the IPCC, there has been increased heat-related mortality and decreased cold-related mortality in some regions as a result of warming. As the climate continues to change, the risks to human health continue to grow. Another key finding from the Working Group II, Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) supports this by stating that health issues caused by climate change have occurred in the past and are currently occurring. Even with immediate reductions in greenhouse gas emissions, the health of our community will be

affected will continue to occur for at least the foreseeable future. For instance, the changes in temperature and rainfall have altered the distribution of water-borne illness and disease vectors.

The World Health Organisation (WHO) 2017 estimates that the climate change undermines access to safe water, adequate food, and clean air, explaining the approximately 12.6 million deaths each year that were caused by avoidable environmental risk factors. Between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress, and in turn will need billions of dollars to cover the costs of maintaining a healthy community. The impact of global warming and the greenhouse effect is cited as the world's most serious environmental challenge.

Our personal health may seem to relate mostly to prudent behaviour, hereditary causes, occupation and local environmental exposures. However, environmental degradation and climate change represent one of the biggest threats to human health, particularly the health of younger people in future and that of future generations. Although global warming may bring some localised benefits, such as fewer winter deaths in temperate climates and increased food production in certain areas, the overall health effects of a changing climate are likely to be overwhelmingly negative – as it affects social and environmental determinants of health.

## **IMPACT OF CLIMATE CHANGE ON HEALTH**

Climate change represents a fundamental threat to lives and wellbeing. Its effects are being felt most immediately and severely among those living in least developed countries and developing countries like India. However, ultimately the global population will be indirectly or directly affected by the drastic change in climate. The major climate changes are raising sea levels, increasing CO<sub>2</sub> levels, rising temperatures and extreme weather – which are causing issues which affects the human health and quality of life.

Immediate action is now needed to protect health from climate change. This is recognised in the reference made in the Paris Agreement for the need to protect “the right to health”, and for the need to hold global warming to well below 2 degree Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5 degree Celsius.

## **EXTREME HEAT EVENTS– EFFECT ON HEALTH**

Climate change also affects human health by increasing the frequency and intensity of extreme heat events. Increase in the overall temperature of the atmosphere and oceans associated with climate change cause changes in the wind, moisture, and heat circulation patterns. These changes contribute to shifts in extreme weather events, including extreme heat events. Extreme heat events can trigger a variety of heat stress conditions, such as heat stroke. Heat stroke is the most serious heat-related disorder which occurs when the body becomes unable to control its temperature and eventually cause overheating. Extreme heat events (EHEs) cause dehydration which is defined as loss or deficiency of water in body tissues caused by sweating, vomiting and diarrhoea. Symptoms for dehydration include excessive thirst, nausea, and exhaustion. Furthermore, heat cramps can be described as a heat event in which painful and often incapacitating cramps occur in muscles. Symptoms for heat cramps include dry, hot skin, high body temperature (usually over 105F), and mental dysfunction; higher atmospheric temperatures are also linked to the increase respiratory illnesses present in the current global population. This is because higher temperatures contribute to the build-up of harmful air pollutants. These extreme heat events will lead to an increase in heat-related deaths and illness.

## **AIR QUALITY AND HEALTH**

According to the National Climate Assessment, climate change will affect human health by increasing health problems, including diminished lung function, increased hospital admissions and emergency department visits for asthma and increase in premature deaths.

Climate change decreases the quality of the air we breathe. When we burn fossil fuels, such as coal, we release carbon dioxide (CO<sub>2</sub>), which builds up in the atmosphere and causes Earth's temperature to rise. This extra trapped heat disrupts many of the interconnected ecosystem in our environment. Climate change also affects human health by making our air less healthy to be inhaled. Higher temperatures lead to an increase in allergens and harmful air pollutants. For instance, longer warm seasons can mean longer pollen seasons – which can increase allergic sensation and asthma episodes, which will in turn diminish productive work. Exposure to allergens causes health problems for many people. When sensitive individuals are simultaneously exposed to allergens and air pollutants, allergic reactions often become

more severe. People with existing pollen allergies may have increased risk for acute respiratory effects.

Climate change can increase natural disasters such as wildfires at a larger scale, which will further reduce air quality and affect people's health in a number of ways. Firstly, smoke exposure can increase acute respiratory illness, leading to increased respiratory and cardiovascular hospitalisations, and medical visits for lung illnesses. Rising temperatures and wildfires and decreasing precipitation will lead to increases in ozone, a harmful air pollutant. This issue is being addressed by the Government of India by introducing compressed natural gas (CNG) for transport and replacement of wood fire for cooking by the liquid petroleum gas (LPG) in villages.

### **DISASTERS AND HEALTH**

Globally, the number of reported weather-related natural disasters has more than tripled since the 1960s. The disasters include excessive floods, cyclones, storms, tsunamis, droughts and earthquakes. Every year, these disasters result in over 60,000 deaths - mainly in developing countries.

Climate change also affects human health by impacting the quality and safety of both our water supply and our recreational water. As the earth's temperature rises, surface water temperatures in lakes and oceans are also rising proportionally. Flood waters often contain a variety of contaminants as floods can overwhelm a region's drainage or wastewater treatment systems, increasing the risk of exposure to bacteria, parasites and other unhealthy pollutants. There is also loss of life and property. Increased coastal and inland flooding exposes populations to a range of short term and long term negative health impacts before, during, and after events.

### **VECTOR-BORNE AND RODENT-BORNE INFECTIOUS DISEASES**

One way climate change might affect human health is by increasing the risk of vector-borne and rodent-borne infectious diseases. A vector is any organism such as mosquitoes, ticks, fleas, rodents, rats or ground squirrels when they carry diseases that can transmit a pathogen, or infectious agent from one host to another. Different insects can carry different diseases. As warmer average temperatures can mean longer warm seasons, earlier spring seasons, shorter and milder winters, and hotter summers - conditions might become more hospitable for many carriers of vector-borne diseases, with malaria and dengue being the most important. There is historical evidence of association between climatic conditions and vector-borne

diseases. The development and survival of ticks, their animal hosts, and the bacterium that causes vector-borne diseases are all strongly influenced by climatic factors.

### **RAINFALL AND DROUGHT**

Water is fundamental for life. Increase in precipitation extremes, either heavy rainfall events or droughts, can impact our health. Warmer temperatures cause more water to evaporate into the air and allow that air to hold more water. This sets the stage for heavier downpours. At the same time, global temperatures influence the way heat and moisture move around the planet, meaning drier conditions will occur in some regions of the world. Over the last several decades, we have already seen an increase in the number of heavy precipitation events in India. These events have contributed to more severe flooding in certain regions. Floods are one of the deadliest weather-related hazards. Living with poor air quality and damp conditions has been shown to increase health problems. These health problems include aggravation of asthma and other upper respiratory tract symptoms such as coughing and wheezing due to mould exposure. They also include lower respiratory tract infections like pneumonia. People living in drought conditions are more likely to encounter certain dangerous situations which can range from dust storms to flash floods. Wildfires associated with drought conditions greatly reduce air quality. This poor air quality affects people's health in a number of ways.

### **HEALTH EFFECT DUE TO FOOD INSECURITY**

Food insecurity has been associated with health in variety of ways. Food insecurity refers to the lack of nutritious foods in sufficient quantities to maintain good health. Food insecurity and hunger have been associated with increased risk for poor nutritional status and poor health outcomes. Climate change can cause food insecurity as increasing temperatures and more variable rainfalls and loss of agricultural land are expected to reduce crop yields. This is further supported as the dynamic crop models indicate a decrease in the yield of crops as temperature increases in different parts of India. Children who are food insecure may be at higher risk for chronic health conditions, such as anaemia and asthma. Malnutrition causes number of deaths each year and it is one of the important public health problems. In India, almost half of the children under age five and more than two out of five women are undernourished.

### **MENTAL HEALTH AND WELL-BEING**

The effects of global climate change on mental health and well-being are integral parts of the

overall climate-related human health impacts. Mental health consequences of climate change range from minimal stress and distress symptoms to clinical disorders, such as anxiety, depression, post-traumatic stress and suicidal thoughts. The social and mental health consequences of extreme weather events have been the focus of research for more than three decades. The mental health and well-being consequences of extreme events, particularly natural disasters are common and form a significant part of the overall effects on health. The cumulative and interactive effects of climate change, as well as the threat and perception of climate change, adversely impact individual and societal health, mental health, and well-being.

### SUGGESTIONS TO OVERCOME CLIMATE CHANGE

- Reduction in the use of fossil fuels
- Use of renewable energy resources that do not emit Greenhouse Gases (GHGs)
- Reducing deforestation
- To raise the awareness on climate change
- Institutionalisation of disaster risk reduction approaches
- To limit the growth of population
- To plant more trees
- Recycling of waste materials
- To use bio-technical methods like bio-gas and bio-diesel etc
- Reduction of plastic materials

### CONCLUSION

According to World Health Organisation (WHO), "health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". In this regard, this paper shows the linkages between the climate change and human health. The climate change is now a mainstream issue affecting the human health. There are important mechanisms in which climate change can affect population health: through extreme heat events, air quality, disasters, vector-borne and rodent-borne infectious disease, rainfall and drought, food insecurity, mental health and well-being. These climate changes are affecting quality of human health directly and indirectly. Even the developed nations are struggling to cope up with the challenges posed by the changing climate; hence concluding that India needs to put more efforts to counter the same. Moreover, the longer we wait to reduce the causes of climate change, the more expensive it will become. By concluding this article it is vital to understand that the government policies alone will not be able to make a large impact on the climate change. Our day to day activities

should also be altered to being eco-friendly.

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