



## A Study on Impact of Water Pollution in Puri Town of Odisha

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### Abstract

Generally the excess of water nature is getting hampered and shortage of water nature is also get hampered. So water is the best friend for the human being to live in a long life. Here Puri town is famous for Lord Shree Jagannath and also its scenic attractions, so here lots of tourists, devotees arrived each day and they used some of plastics and use & throw items, these create the water pollution and also local peoples are get linked their washroom, toilet pipe with sewerage which is connected with the sea, and also used plastics and many pollutants which are getting create heavy pollution of water in sacred tanks and also sea beach. Nowadays it is the big challenge for Puri Municipality, local Govt., and also local residents. So here this paper is to find out the problems, objectives, impacts, quality of water and also planning for the control of water pollution in Puri town respectively.

**Keywords:** Impact, Quality, Planning, Pollution, Problem.

### 1. Introduction:

Water pollution is any chemical, biological or physical change in water quality that harms living organisms or makes water unsuitable for better uses. During the 20th century, human activities created pollution into nearly all segments of the Earth's hydrologic cycle. Pollution has increased high into the atmosphere, seriously altering the chemical balance of airborne moisture. Rainfall over much of the earth is actually polluted before it hits the ground (as acid rain) on the ground runoff from urban and agricultural areas washes contaminants into streams from streets, buildings, and fields, etc. Groundwater percolating through the soil picks up additional pollutants from buried wastes, leaking tanks, and pipes and delivers them to groundwater aquifers. In selected spots, even deep bodies of groundwater, thousands of meters down, have been polluted by mechanical injections of hazardous wastes.

According to WHO defines Water Pollution has "any foreign material either from natural or other sources that may contaminate the water supply and makes it harmful to life, causes their toxicity, leads to the reduction of normal oxygen level of water, causes aesthetically unpalatable effects and spread epidemic diseases."

### 2. Problems of study area:

In Puri Town, there are found so many problems. Such as:

- There are in the tanks or ponds, found maximum types of wastes materials, like, plastics, polythenes, bags, etc.
- The drains are getting blocked and choked in the rainy season and other times.



•In the Car Festival, DolaYatra, SivChaturdasi, etc. time so many tourists are get arrived in Puri Town and get create maximum pollution in the religious ponds and also the sea.

•Frequent Sewage discharge from every household to near the sea and ponds is a big matter of concern in polluting or degrading the water.

•As Puri is the religious Town a vast number of Hotels locating near the sea they discharge their garbage's and remnants.

•An increasing number of tourists and rapid population growth is creating Water Pollution in Puri Town etc.

### 3. Objectives:

- To access the present Water Quality.
- To know the impacts of water pollution.
- To formulate the plan to control Water Pollution.

### 4. Methodology:

Data and information are collected from primary and secondary sources. Primary will be based on field observation and interviews with some government officials. The secondary data includes some officials records (city development plan, details project report on municipal water supply and it is using Puri, Odisha census report, data information from the internet and from the state pollution control board (SPCB).

The water pollution study has been carried out using both qualitative and quantitative method of the data collected from various sources. The chemical water has been analyzed to find out the extent of water bodies degradation various diagrams are used to representing the analysis.

### 5. Review of Literature:

The Hindu, September, 18, 1988

“The reporter found the Vagu’s waters colored with chemical wastes and its margins distinctively marked by patches of greasy surfaces. A group of passing royts (Indian peasants), standing on the two vent bridge across the stream, closed their nostrils to ward off the odious chemical odor that below over the serpentine stream amidst fields from the nearby chemical factories.”

C Sivakolundu, Impact of Tourism on Environment, Yojana, May, 2015, Delhi

“Water, especially fresh water, is one of the most critical natural resources. The tourism industry generally over uses water resources for hotels, swimming pools, golf courses and personal use of water by tourist. This can result in water shortages and degradation of water supplies, as well as generating a greater volume of waste water.”

### 6. Water Pollution in Puri City:

Among all the districts of Odisha, Puri district has the highest area of water tanks i.e. which is 34% of total water tanks of the state. Puri with its annual rainfall of over 200 cm support and sustain diverse and unique water tank habitats. Ponds and tanks are an important part of components of



the life of the inhabitants of Puri city. Almost every Sahis of Puri city has one such water body used for various purposes like the most important of sun birthing. Pond are associated with temples or these are located in places held sacred by Hindu's assume additional significance. Lakhs of pilgrims consider it a privilege to take a bath in these ponds, many festivals and rituals are associated with them and water is used in the number of auspicious occasions. The water tanks played an important role in the great festivals and the tourists are get birth and do the ritual works by those traditional water tanks respectively.

## **7. Quality of Water:**

Water quality is a major concern of all the water tanks of Puri Town. It has adversely affected the lives of millions of people and caused many death and health disorders. Water quality is contaminated by the human activities and by a chemical agent that renders part of the environment unfit for the intended or desired use. Monitoring is done for 5 tanks, thrice a year in Puri by OSPCB. The tanks are a very important part of the Puri town as they have a historic and cultural significance. Also, they form part of the day to day activities of the local population. The OSPCB carries out ambient water quality monitoring Puri.

Three times in a year such as:

1. Before Rath Yatra
2. During Rath Yatra

After Rath Yatra at such 5 tanks namely Narendra tanks, Indradyumna Tanks, Markandya Tanks, Swetaganga Tanks, and Parbati Sagar. It carries out monitoring for different parameters namely, PH, DO, BOD, COD, Turbidity, Suspended Solids, Hardness and total dissolved solids (TDS) and conductivity.

### **7.1 Importance of Parameters:**

#### **(a) Oxygen Demanding Wastes:**

Dissolved Oxygen concentration in freshwater average about 0.01% by weight, which is 40 times less than the weight of oxygen in an equivalent volume of air while the concentration of oxygen in air varies little, the amount of DO in aquatic ecosystems varies widely, depending upon various factors. The aesthetic qualities of water required sufficient dissolved oxygen to avoid the onset of septic conditions with their attendant malodorous emissions insufficient. Do in water columns causes anaerobic decomposition of many organic materials to present such decomposition tends to cause the formation of notorious gases such as hydrogen sulfide and methane, in addition to carbon dioxide. Traditionally, the waste treatment requirement was based on the removal of oxygen-demanding materials so as to maintain the DO concentration in receiving waters in prescribed levels.

Most industrial and municipal wastes contain a high concentration of organic substances. Their presence encourages the growth of decomposers which consume large quantities of oxygen. The amount of dissolved oxygen needed by decomposer to decompose organic materials in a volume is called BOD (Biological Oxygen Demand). This BOD is a measure of contamination of wastewater. Besides organic matter, the wastewater may also contain chemicals that are



susceptible to reaction with oxygen. The extent of pollution due to these substances expressed in terms of Chemical Oxygen Demand (COD).

**(b) PH:**

PH is a measure of acidity. Neutral water has a PH of 7 natural PH of water is around 7 due to dissolved CO<sub>2</sub> water of low PH (acidic) has the ability to dissolve many metals and carry toxicity. Besides, highly acidic or alkaline nature of water (high PH) may themselves be detrimental to certain vital biological process.

**(c) Turbidity:**

Turbidity of water may be caused by a wide variety of suspended materials of varying size. Turbidity in natural water bodies may be due to the growth of bacteria and other microorganisms and algal growth resulting from the inflow of nutrients like nitrogen and phosphorus. Besides their unacceptability on aesthetic grounds, turbidity water causes difficulty infiltration and disinfection high turbidity hamper photosynthesis of aquatic plants, phytoplankton, etc. thereby decreasing the DO level.

**(i)Suspended Solids:**

Suspended solid usually refers to large settle able solids. Besides giving some problem as turbidity, SS may also adversely affect the fish population.

**(ii) Hardness:**

It is caused due to the presence of certain divalent cations like Ca, Mg, Sr etc. when hardness is greater than about 100 Mg/l the water may be termed as hard. Except their adverse action with soap, hard water is as satisfactory for human consumption as soft water.

**(iii) Total dissolved solid (TDS) and Conductivity:**

TDS is generally associated with inorganic salts and there is a close parallelism between TDS and conductivity. Though there is no generally valid exact quantitative relationship between TDS and conductivity. High conductivity indicates high TDS.

**(d) Bacteriological quality of Water:**

A wide range of pathogenic microorganisms is potentially transmittable to man through drinking and bathing. The coil from a group of bacteria include microorganisms of diverse characteristics 16 groups comprising of 256 species, which by physical and biochemical laboratory procedures are found to sit in the domain of coil from classification. In addition to groups and species which originate from the intestinal tract of humans and other warm-blooded animals, there are other types of the coil from bacteria that are not revival from sewerage and body waste. The aspects of standard tests for bacterial contamination of water involve the determination of the indicators organism, the coil from groups of bacterial contamination of water involves the determination of the indicators organism. The coil from a group of bacteria as a whole.

Thus the present total coil form is taken as an indicator of the bacterial contamination and fecal coil form as the indicator fecal contamination of water. Here the water quality of July 2010 is given below.

**Table-1. Quality of water in five sacred Tanks of Puri city:**

Name of the Tanks	Frequency of Monitoring	Temp.,0C	PH	DO,mg/l	BOD, mg/l	COD ,mg/l	Cond, .us/cm	Nitrate - N,mg/l
<b>Narendra Tank</b>	QUARTERLY	33	8.3	11.7	7	49.6	986	1.483
<b>Markanda Tank</b>	QUARTERLY	33	8.4	15	10.5	40	695	5.316
<b>Indradyumna Tank</b>	QUARTERLY	34	8.2	13.8	13.5	49.6	609	1.146
<b>Sweta Ganga</b>	QUARTERLY	34	8.2	13.8	13.5	49.6	609	6.125
<b>ParbatiSagar</b>	QUARTERLY	32	7.6	9.19	8.66	72	1311	1.735

Name of Tanks	NH <sub>4</sub> -N mg/l	TC.MPN/100ml	FC,MPN/100ml	Nitrate-N,mg/l	T.Alk.,mg/l	P.Alk., mg/l
<b>Narendra Tank</b>	2.128	1700	1100	0.071	284	46
<b>Markanda Tank</b>	2.352	2000	1300	0.061	202	44
<b>Indradyumna Tank</b>	1.848	1200	930	0.049	146	16
<b>Sweta Ganga</b>	2.184	1700	780	3.300	202	20
<b>ParbatiSagar Tank</b>	2.072	2500	1300	0.006	106	14

Source: State Pollution Control Board (Odisha)

### 8. Impact of Water Pollution in Puri town:

By this Water pollution process there are found so many types of impacts to human beings, plants and animals in Puri Town, such as:

- The use of polluted water for drinking purpose causes epidemics and several dangerous diseases such as cholera, tuberculosis, loose motion, jaundice etc. will found in Puri Town.
- Heavy concentration of toxic chemicals in water (of rivers, lakes, ground water etc.) causes death of aquatic organisms, both plant, animals and microorganisms. This process will much found in the Narendra Tank and Markanda Tank every year.



- Water having higher concentration of salt content increases alkalinity of soils. In this process will occurring in rainy season and also in disaster time. The sea water is comes forward in the road side and get create salt content in some agricultural small lands near Puri Town.
- Water polluted with higher concentration of sulphuric acids, an outcome of rain water, causes destruction and deaths organisms in water tanks and ponds in Puri Town.
- Rise in the concentration of inorganic and organic nutrients in river water and water tanks or ponds causes eutrophication which leads to rapid rate of increase in the populations of plant and animals in the aquatic ecosystems beyond controllable limit, is found in the Puri Town.

So in this way these are the sum of major impacts which occurring in the Puri Town respectively.

### **9. Planning for Water Pollution in Puri town:**

In Puri Town, there are found Water Pollution and it's problems, impacts. So some development authority and many NGOs and some people were given some plans, these are discussed below.

#### **9.1 Disposal of treated Wastewater through HRTS:**

The existing treatment system was designed on a zero discharge concept. The treated effluent was utilized for developing indigenous plant species on the coast. The effluent was also pumped to a reserve forest 4.5 km away from the plant. The plantations were known as high rate transpiration system (HRTS). HRTS is a land application system wherein the wastewater is applied in specially designed field layout with wide ridges and furrows and planted with trees having higher transpiration capacity. It uses the soil as a filtration device and further polishes the treated wastewater through processes taking place in the soil mass such as adsorption, ion-exchange, precipitation and stabilization of pollutants through microbial degradation. The earthworms present in the soil provide aerobic conditions through a network of burrows which further help stabilization of organic matter in the Effluent wastewater. The high transpiration capacity of plants enables the system to serve as a bio-pump. The plants e.g. bamboo (*Dendrocalamus tinctures*), Neem (*Azadirachta indica*) and shishum (*Dalbergiasissoo*) transpire water equivalent to 7 to 13 times of potential evapotranspiration from the soil alone. Thus, HRTS permits the disposal of 250 to 450 m<sup>3</sup> of wastewater per hectare of land per day. As all the treated wastewater is utilized in this process, the groundwater pollution problem is avoided. The nutrients present in the wastewater are used by the plants and partly retained in the soil matrix with a positive impact on the soil ecosystem. The system has the following advantages:

- Works on the natural treatment process and could thus be termed as eco-friendly.
- Facilitates the development of forests and green belts in urban agglomerations.
- Generates sink potential for air pollutants
- Low energy and cost requirements compared to conventional wastewater treatment systems.
- Ease of installation and simplicity of operations.
- Biomass generation and revenue returns.



## 9.2 Development of conventional sewerage system:

Following the Direction of the Hon'ble Supreme Court of India in the year 1996, a techno-feasibility report was prepared and a detailed project report was prepared for wastewater collection and treatment system for Puri town. The objective of the project is to collect the domestic wastewater generated in the town, treat it to acceptable National Standard and safely dispose of the treated effluent. Puri being a major tourist destination in the country, the project has significance. The project is intended to achieve the overall goal of better health for the inhabitants as well as the tourists, protection of these beach from pollution and prevention of pollution of the water sources. The collection system is designed for the year 2021 as conventional underground sewer network and pumping stations. Wastewater collection network, zones, gravity main sewers, pumping stations, pumping mains and treatment system for Puri town In order to select suitable wastewater treatment system, alternative wastewater treatment system was evaluated based on criteria such as risk, reliability, capital cost, O & M cost, and land requirement.

## 9.3 Preservation of water bodies:

The 5 major or important water tanks along with the other 60 ponds within Puri Municipality area used by communities have been included in CDP for their preservations. During the preparation of DPR the aspect of the maintenance cost, portability of water and institutional aspect will be taken care of. The investment plan is included in CDP.

### ISSUES:

- The existing water bodies are in a deteriorated condition with no proper facility for inlet and outlet of stormwater from adjacent catchment areas.
- Additionally, solid waste, specifically plastic materials, is dumped into these tanks and water bodies compound the problems.
- The existing water bodies are reportedly heavily silted due to non-maintenance and require strengthening of embankments.
- Proper fencing and access control to prevent misuse are absent.
- The collected water is not treated nor re-circulated resulting in anaerobic conditions.
- Illumination and landscaping to these water bodies are missing to attract tourists.

## 9.4 Other Plans:

- To aware about, how this pollution will occurring to the all over the town.
- To provide awareness by Govt's, NGOs, and other institutions to the control of Water Pollution.
- To stop throwing garbage, God idols, etc. in the Water Tanks or Ponds.
- To adopt the Biological Nutrient Removal (BNR) process from municipality wastewater to check water Pollution in Puri Town. Repair the underground home supply water pipes, which are to connect every home of Puri Town.



•To provide Govt.by the use of Waste Water Treatment Plant (WWTP), to control the drainage water and garbage entering to Sea Beach in Puri Town. So in this way, these are the sum of planning for the control of Water Pollution in Puri Town respectively.

#### 10. Conclusion:

Generally, Puri town is famous for Lord Shree Jagannath, so each time so many tourists and also many devotees have arrived. So here the growth rate of those populations and also local peoples activities the town is affected by water pollution. It is now a great headache for Municipality and also Govt. in this case every local residing peoples and also tourists are not occur many type of using things like, polythene bags, plastics, etc. those are get choked the sewerage and the sewerage wastewater get mixed with sacred pond or tank and also sea, and provide maximum types of diseases to every people in Puri town and also other devotees. So in this way to control the pollution of water and create the clean town of Puri respectively.

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