INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Water Pollution in India: Analysis of the Core Parameters of Water Quality of Canals & Creeks

Jayesh Shubham[1], Ashok Kumar Maurya[2]

[1]*Student, M.A. Economics,* [2]*Supervisor, Department of Economics, School of Liberal Education, Galgotias University, Gautam Buddha Nagar, UP, India*

Abstract: Water pollution in India is a serious problem because most of the surface water sources and groundwater reserves are affected by various kinds of pollutants. In this report the water pollution of creeks and canals is analysed through various parameters provided by the government and other reputed agencies which are; temperature, dissolved oxygen, pH level, conductivity, biochemical oxygen demand (B.O.D), nitrite level, faecal coliform level, total coliform level. Also, the effect of temperature on the other parameters is being studied through analysing correlation between temperature and other factors. Using various data sets and information, this study aims to identify the parameters which have a significant impact on water pollution level of creeks and canals and also which parameters are affected by the temperature.
Keywords: Water pollution, creeks, canals, temperature, dissolved oxygen, pH level, conductivity, biochemical oxygen demand, nitrite level, faecal coliform level, total coliform level.

I. INTRODUCTION

Water pollution in India has been an issue for many decades now. Although there have been many kinds of initiatives that the government has taken in recent years but issue still prevails and is a major environmental concern for us. There are various kinds of water pollutants which are responsible for contamination of water but some of the major ones are: Domestic waste materials which not only affect the pollution level of surface water but groundwater as well; Surface run-offs which indirectly contaminates the water by first entering the surface of soil and then flows into natural water with the help of rain; & Industrial discharge which are the harmful by-products containing various toxic chemical discharged by the industries.[1]

There are various parameters taken into consideration while checking the water pollution level such as bio-monitoring parameters (saprobity index, diversity index, P/R ratio, etc); trace metals (arsenic, cadmium, lead, chromium, nickel, zinc, iron, mercury, etc); pesticide level (alpha BHC, aldrin, dieldrin, malathian, anilophos, etc); general parameters (turbidity, total alkalinity, total dissolved solids, total suspended solids, etc) and many others. In this report, the study is done by undertaking core parameters defined under NWMP (National Water quality Monitoring Programme) which are:

A. Dissolved Oxygen: the amount of oxygen dissolved in the water that is available to aquatic organisms.
B. pH: the measure of the acidic or basic nature of water. Less than 7 is acidic, more than 7 is basic or alkaline. 7 is neutral.
C. Conductivity: the measure of ability of water to pass an electric current. Change in conductivity may indicate discharge of pollutants in water bodies.
D. Biochemical Oxygen Demand: the amount of dissolved oxygen required by aerobic biological entities to break the organic substances present in water.
E. Nitrite: nitrogenous substance found in water bodies which are the main source of ammonia and nitrogen.
F. Faecal coliform: it includes that category of bacteria group which are shaped like rod, are non-spore forming, gram-negative, lactose fermenting in nature.
G. Total coliform: it is the collection of those kinds of microorganisms that reside in the intestines of animals.

This study takes into consideration various variables affecting water pollution level and analyse them to get a better understanding of those variables by identifying the level of threat each variable possesses towards the water bodies.

II. METHODOLOGY

A. *Sources of data*
The study relies on secondary data which has been taken from CPCB (Central Pollution Control Board) which is sponsored by the Ministry of Environment and Forest, Govt. of India.

B. *Statistical Methods*

1) Measures of Central tendency: In this report, median value has been used as a tool for the representation of the data set of a particular year for a parameter as it gives a clear idea about the middle score and is less affected by the outliers than the other methods.

2) Correlation analysis: This analysis has been used for the second part of the research which is understanding the relationship between temperature and parameters affecting water pollution level. Pearson (r) Correlation has been used to measure the strength of association between above mentioned two variables and also to find out the direction of the relationship.

3) Graphical analysis: The inputs from the data set were shown in line charts representing the median value of magnitude of parameter on one axis and the year of recording for the corresponding parameter on another axis. Only two-dimensional graphs were used for analysis.

III.   RESULT & INTERPRETATION
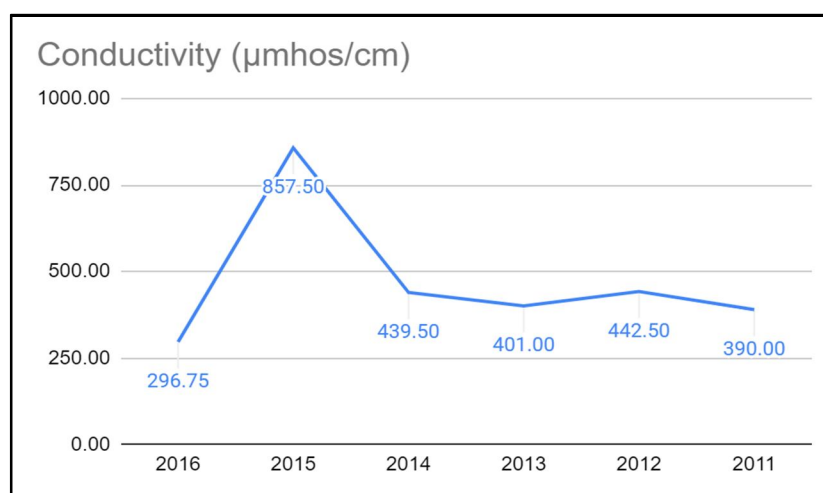
A. *Parameters of Major Concern*

1) *Canals*

Fig. 1 Median value of level of conductivity in canals in India.

The standard limit of conductivity is considered to be less than 250 µmhos/cm. In Fig. 1, the level of conductivity in the canal water is above the standard limits in all the six years. The lowest was in 2016 which is still above the standard limits. The level of conductivity is beyond the standard limit which is a major concern as it denotes high possibility of chemicals in canal waters. 2015 was the worst year but due to many initiatives taken by the government it was brought down which was the lowest in six years.
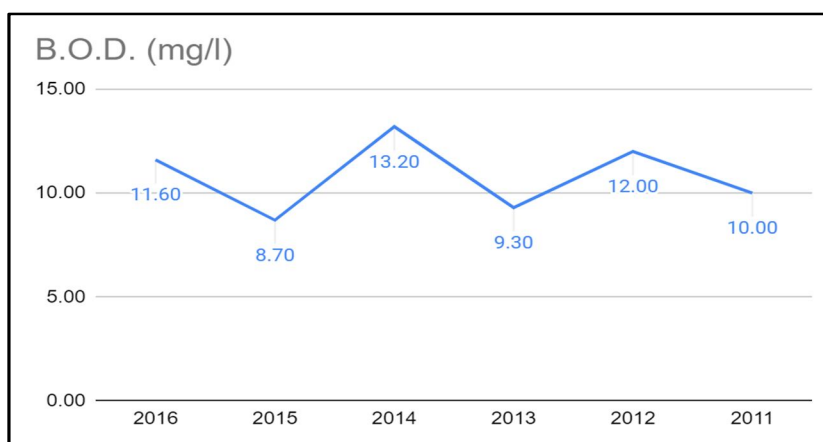
2) *Creeks*

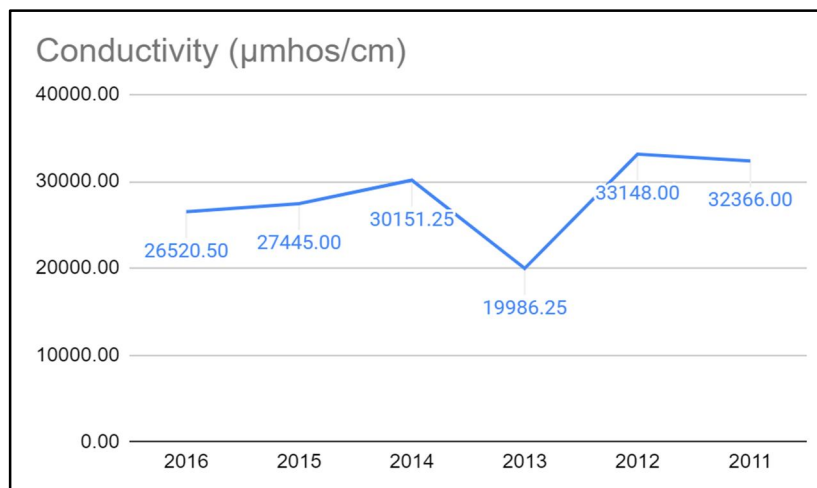Fig. 2 Median value of level of B.O.D in creeks in India.

Fig. 3 Median value of level of conductivity in creeks in India.

The standard limit for B.O.D is considered to be less than 3 mg/l but in Fig. 2, the B.O.D level of the creeks is very high, exceeding the standard limit for all the six years. The values lie between 8.70 to 13.20 which is not a suitable class. The B.O.D levels in creeks gives an alarming sign as it shows very degraded water quality. Govt. should take effective measures quickly to ensure that this condition could come under check quickly.

The standard limit for level of conductivity is considered to be less than 250 µmhos/cm but the conductivity level in the creeks shown in Fig. 3 is exceptionally high, almost 10 times the standard limits, for all the six years. There is no such year where the levels are said to be in the limits which are closely crossing the standard limit. The level of conductivity in creeks gives an alarming sign as it shows highly degraded water quality. Govt. should take effective measures quickly to ensure that this dangerous condition could come under check quickly.

B. Correlation Between Temperature and Parameters of water Pollution

TABLE I
PEARSON COEFFICIENT CORRELATION VALUE

Parameters/ Water body type	CANALS	CREEKS
D.O.	0.071	-0.069
pH	-0.174	-0.070
Conductivity	0.074	-0.106
B.O.D	0.016	-0.007
Nitrite	0.023	0.133
Faecal coliform	-0.088	0.237
Total coliform	-0.035	0.204

In table 1, the Pearson coefficient correlation value between temperature and other parameters are mentioned for both aquatic bodies, canals and creeks. Since all the absolute values are less than 0.30, which is a sign of negligible correlation, there is no significant degree of association between temperature and other parameters.

IV. CONCLUSION

Conductivity levels in creek & canals are the biggest threat for India as their levels mostly rose up to extreme levels and are found to surge quickly compared to preceding years. B.O.D is also a concerning issue for water quality of creeks & canals in India as their level is also high and is a factor to be concerned with. The effect on temp on other parameters is negligible in certain conditions as water bodies in nature undergo various processes and face various kinds of situations which can disturb their standard water quality level.

V. DISCUSSION

With the growing urbanisation and economic growth in India, there is also a rise in the degradation of the environment, especially water bodies. With the increase in the number of industries and manufacturing plants, the overall toxic level of water bodies has also increased rapidly. There is an estimation according to which 70% of surface water is not suitable for daily consumption. *[2]*

Some reports also suggest that there is a negative impact of water pollution on the economy in certain regions of a country, mainly downstream regions and India falls under the category of those nations where these kinds of areas exist in a large number, thus impact on the economy is more hazardous. *[3]*

Another study suggests that polluted water bodies in India has led to downfall in the agricultural revenue by 9% and 16% reduction in downstream areas of overall yield in the agricultural sector. *[4]-[5]*

During the course of a certain research, scientists looked at the most important factors and found out that one of the key factor was biological oxygen demand(B.O.D) which helped in assessment of how much organic pollutants is there in the aquatic bodies and used it to describe as the major indicator of water pollution level. *[6]*

With all these factors, one should always remember that the effect of water pollution has not only led to environmental issues but also has an impact on the social, economic, geographic and demographic structure of a nation.

VI. ACKNOWLEDGEMENT

REFERENCES

[1] (2016) Central Pollution Control Board. [Online]. Available: http://www.cpcbenvis.nic.in

[2] Central Water Commission (2010). [Online]. Available: https://www.adriindia.org/adri/india_water_facts

[3] World Economic Forum (2019). [Online]. Available: https://www.weforum.org/agenda/2019/10/water-pollution-in-india-data-tech-solution/

[4] Reddy, V. Ratna and Bhagirath Behera, "Impact of water pollution on rural communities: An economic analysis," Ecological Economics, 2006, 58 (3),   520-537

[5] Greenstone, Michael and Rema Hanna, "Environmental Regulations, Air and Water Pollution, and Infant Mortality in India," American Economic Review, Oct. 2014, 104 (10), 3038–3072.

[6] The Guardian (2019). (Online). Available: https://www.theguardian.com/global-development/2019/aug/20/whats-in-our-water-report-warns-of-growing-invisible-crisis-of-pollution

INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 ◎ (24*7 Support on Whatsapp)