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# A review of constructed wetlands and treatment analysis with physico chemical parameters for lake water

Harsh Gupta[1] and Prof. Atul Sharma[1]
[1]Department of Civil Engineering, Jabalpur Engineering College, Jabalpur (M.P.)

## ABSTRACT

The biggest problem occurred in summer when the resources to supply water to the area were not enough, people would walk long distances or queue for hours to collect water for daily use. The issue of water is complex, sensitive and internal. Water is a major issue facing rural and urban areas. Water used for drinking, cooking and domestic purposes comes from nearby lakes, rivers and other water sources. The government is trying to provide enough water through artificial reservoirs or by pumping water from nearby lakes and rivers. This study is based on the treatment of constructed wetland by lake water. In a constructed wetland, treatment is done with roots and available soil. After exploring the various benefits of wetlands, this research deals with "lake wastewater management using microflow in constructed wetlands. A constructed wetland with a low hydraulic loading rate (HLR) is very efficient and provides 80%–91% of biochemical oxygen demand (BOD), 60%–85% of chemical oxygen demand (COD) and 80%–95% of total provides. , It requires less operation and maintenance as compared to others. This review of constructed wetlands also suggests research and development related to land use, media, vegetation, engineering structures, and automated treatment equipment.

**KEY WORD-** Constructed wetland, Wastewater Treatment method, Lake water

## 1 INTRODUCTION

Water is a major component of oceans, seas, rivers and living things. It is essential for the survival of all living things and for keeping the air healthy. Due to the increase and expansion of human activities, domestic agriculture and industrial wastes are increasing, thus increasing the pressure on water sources, causing tension and conflict between users. The substances that come in contact with water turn the water into dirty water day by day, so it is not suitable for human health and also not suitable for agricultural use. In the early days, when the population was less, the water was discharged directly into the river, lake and sea for treatment, but now with the increase in population, the water becomes highly polluted, so we cannot release it directly into the natural resources without treatment. . Depending on the origin of wastewater, there are several types of wastewater: - domestic waste, industrial waste, agricultural waste.

(S. A. Manjare et al. 2010), this paper is presented for the study of physico-chemical parameters of Tamadalge water tank in Kolhapur district of Maharashtra. Monthly changes in physical and chemical parameters such as water temperature, transparency, turbidity, total dissolved solids, pH, dissolved oxygen, free carbon dioxide and total hardness, chloride, alkalinity, phosphate and nitrate. Water is one of the most important compounds of the ecosystem. Paula Popa et al. 2012), this study examines the level of wastewater pollution at five wastewater reservoirs by analyzing its chemical characteristics. Samples are collected before being released into the Danube during a two-week monitoring campaign. Organic and inorganic compounds, heavy metals and biogenic compounds have been analyzed using potentiometric and spectrophotometric methods. Experimental results show that the quality of wastewater varies from site to site and is highly dependent on the origin of the wastewater. Correlation analysis was used to identify possible relationships between the concentrations of the different analyzed parameters. (Patil. PN et al. 2012), people on the globe are at tremendous risk due to unwanted changes in physical, chemical and biological characteristics of air, water and soil. Due to increase in human population, industrialization, use of fertilizers and man-made activities, the water has become highly polluted with various harmful pollutants. Natural water gets contaminated due to weathering of rocks, soil leaching, mining processing etc. It is essential that the quality of drinking water should be checked at regular time intervals, as human population suffers from various types of water diseases due to the use of contaminated drinking water. congenital disease.

(Shazia Iram et al. 2013), water is extremely essential for the survival of all living organisms. Water quality is an important concern for mankind as it is directly linked to human well-being. Heavy metals are natural constituents of natural water; Some are present in low concentrations, which are biologically important in aquatic environments. They enter natural waters from various sources. Natural substances that cause water pollution are gases, soil, minerals, humus material, waste made by animals and other living organisms present in the water. (Mohamed El Mourehit and Latifa Mouhir, 2014), we must remember that in general there are three factors that control the aquatic environment, light on the one hand, temperature and depth on the other. Indeed, if light conditions occur first in plant and animal life, temperature adjusts the diffusion of gases (O2 and CO2) in the water and subsequently affects the process of photosynthesis. (Vandana Sharma et al. 2015), water is most important in shaping land and controlling climate. It is one of the most important compounds that profoundly affects life. Due to unwanted changes in the physical, chemical and biological characteristics of air, water and soil, people on the globe are in extreme danger. Due to increase in human population, industrialization, use of fertilizers and man-made activities, the water has become highly polluted with various harmful pollutants.

(N. Rahmanian et al. 2015), Investigation of drinking water quality in suspected parts of Perak State, Malaysia to ensure continuous supply of clean and safe drinking water for public health protection. In this regard, detailed physical and chemical analysis of drinking water samples from different residential and commercial areas of the State was carried out. Several parameters like pH, Turbidity, Conductivity, Total Suspended Solids (TSS), Total Dissolved Solids (TDS) and heavy metals like Cu, Zn, Mg, Fe, Cd, Pb, Cr, As, Hg, and duration of winter and summer Sn was analyzed for each water sample collected during. The obtained values of each parameter were compared.

(Sajitha V., Smita Ashok Vijayamma 2016), This study is designed to assess the quality of pond water in Athiyanoor Panchayat, Thiruvananthapuram district, Kerala with respect to physico-chemical parameters

including temperature, pH, EC (electrical conductivity) it was done. TDS (Total Dissolved Solids), TA (Total Alkalinity), DO (Dissolved Oxygen), TH (Total Hardness), NaCl (Salinity), Ca (Calcium), Mg (Magnesium), Cl (Chloride), Na (Sodium) and K (potassium). The results were evaluated and compared.

(J Arun Raj and SP Sewarakodione, 2018), living organisms on earth require water for their survival and growth. So far only Earth is the only planet that has about 70% water. But due to increasing human population, industrialization, use of fertilizers in agriculture and man-made activities, it is heavily polluted with various harmful pollutants. (Berhanu Zoude Bakure et al. 2020), composite samples were collected from upstream, middle and downstream of all land-use types. Twenty-three physico-chemical parameters were measured from each sampling site. Temperature, DO, pH, EC, turbidity, width, depth, current velocity and discharge were measured onsite. Two milliliters of unfiltered water samples were collected from each site for laboratory analysis. NMDS and cluster analyzes differentiated the sites into three groups of land-use types.

(Rohit Sharma et al. 2020), the process, in which people from rural areas migrate to urban areas in search of a brighter future, resulting in a huge increase in the population of people living in cities, is called urbanization. As a result, the number of cities and towns grows rapidly. There is immense pressure on the depleting natural resources. As it is, the natural resources are facing a major decline due to mindless plunder by the people. The rate of spread in different regions of the world in the last few decades has been unprecedented and unimaginable. In most cities, the rate of expansion of infrastructure has not matched the pace of urbanisation.

(Arafat Rahman et al. 2021), factor analysis presented the best fit between parameters, with the four factors explaining 94.29% of the total variation. The cluster analysis showed seasonal variation in surface water quality, usually indicative of pollution from rainfall or other sources. However, the values of various physico-chemical properties varied with season, and the highest values of pollutants were recorded in winter.

## 2 WASTEWATER TREATMENT METHOD

Wastewater treatment is a process and technology used to remove most of the impurities found in wastewater to ensure a healthy environment and good public health. Therefore, wastewater management means managing wastewater for environmental protection to ensure public, economic, social and political health.

Wastewater treatment is the process of removing pollutants and unwanted substances from wastewater so that the water is ready for use. There are various common treatment methods, but the use of these treatment methods depends on the water source and its type. Various methods include trickling filter, activated sludge process, septic tank, oxidation ditch, rotating biological compaction.

All of these wastewater treatments involve a combination of physical, chemical, and biological processes and operations to remove solids, organic matter, and nutrients from the wastewater. These processes and operations are further divided into increasing levels of organization, namely primary, secondary and advanced wastewater treatment. Finally, a disinfection process is used to remove the germs.

**Impact of Waste Water**

In global sources we are all dumping water into a river, lake or ocean which means we are polluting our water supply. Some of the direct effects of wastewater are:

- Destruction of natural habitats.
- Soil pollution
- Water borne disease
- Water can be toxic.

The effects of untreated wastewater on the environment (such as local streams and rivers) and human health are clear. Adequate wastewater treatment is fundamental to maintaining people's health, protecting environmental quality and ultimately promoting economic development (Kaseva 2004; Kyambadde, 2005).

According to recent regulations set by state and central legislative bodies (CPCB, 2009), treatment to remove pollutants from wastewater is mandatory to avoid adverse impacts on water bodies in developing countries.

## 3 CONSTRUCTED WETLAND

"Constructed wetlands are treatment systems that use natural processes involving wetland plants, soils, and their microbial communities to improve water quality" (USEPA). These are engineering structures that promote controlled flow supported by hydrophytes such that they use their pollutants through phyto-remediation processes. "Performance of constructed wetlands depends on bacterial activity, hydraulic retention time, load, temperature and plant species". Constructed wetlands are gaining importance as an effective and inexpensive method of sewage treatment in small villages. Such systems have some advantages over conventional treatment systems: they can be installed in the same area where the wastewater is generated; can be maintained by relatively untrained personnel; They have low power requirements and are very inexpensive systems.

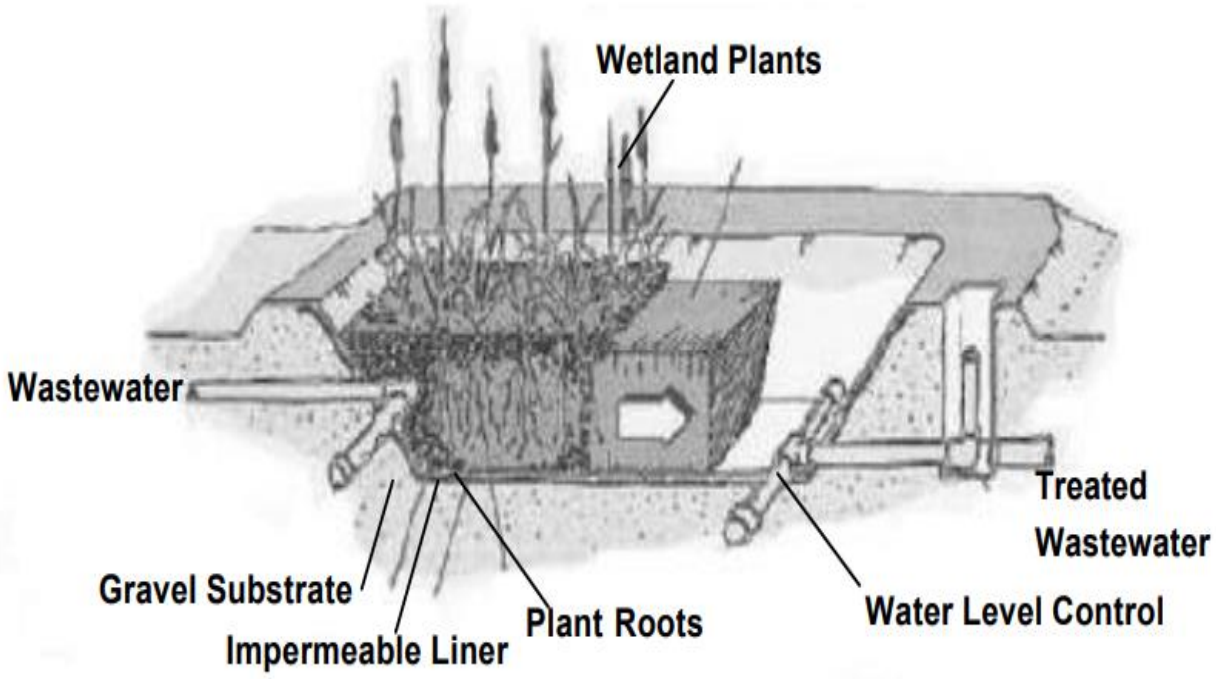


**Figure 1 Constructed Wetland**

**Advantages of Constructed Wetlands**

1. As research has shown a wetland can eliminate the need for oxygen for organisms and stabilize solids.
2. It is capable of sustaining a variable daily and seasonal load.
3. Initial and maintenance costs of a constructed wetland are lower than conventional treatment systems.
4. The process involved in a constructed wetland is very simple.

**Limitations of Constructed Wetlands**

1. The required area of constructed wetland is large.
2. It is a saving process when the parameter (location, soil, favorable climate) is readily available near the wetland.
3. There are no proper guidelines for designing a constructed wetland, so it is under research.

## 4 CONCLUSIONS

This paper includes information on constructed wetlands considering site requirements using media sources, vegetation, removal efficiency, construction costs, maintenance costs and life cost analysis. Through this thesis research we compare how a wetland is constructed and why it is a better method in terms of treatment efficiency, and is more cost effective with other wastewater treatment technologies. This study also revealed that there are no proper guidelines for media and plant selection in constructed wetlands.

A constructed wetland with a low hydraulic loading rate (HLR) is very efficient and provides 80%–91% of biochemical oxygen demand (BOD), 60%–85% of chemical oxygen demand (COD) and 80%–95% of total. It requires less operation and maintenance than others. This review of constructed wetlands also suggests research and development related to land use, media, vegetation, engineering structures, and automated treatment devices.

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