

REVIEW ON PERFORMANCE EVALUATION OF STP FOR THE TREATMENT OF SEWAGE AT URBAN AREAS, FOR QUALITATIVE ANALYSIS

Nagabhoshoon¹, Nandini K², Vikas³, Vani S⁴, Dr. K N Vishwanath⁵

^{1,2,3,4}Student, Department Of Civil Engineering, Dayananda Sagar Academy Of Technology And Management, Bangalore, India.

⁵Assistant Professor & Head, Department Of Civil Engineering, Dayananda Sagar Academy Of Technology And Management, Bangalore, India.

DOI: <https://www.doi.org/10.58257/IJPREMS30756>

ABSTRACT

This research paper presents a comprehensive performance evaluation of sewage treatment plants (STPs) using data from several studies conducted in India and other countries. The study aims to evaluate the efficiency of STPs and identify the factors that affect their performance. The research methodology includes a literature review of seven peer-reviewed research papers that discuss the performance of STPs in various settings. The findings suggest that the performance of STPs can vary significantly depending on factors such as the type of treatment technology, the size and capacity of the plant, and the influent characteristics. The paper provides recommendations for improving the efficiency and sustainability of STPs, including the use of advanced treatment technologies and the implementation of integrated and holistic approaches to wastewater management.

1. INTRODUCTION

Sewage treatment plants (STPs) play a critical role in protecting public health and the environment by treating domestic and industrial wastewater before it is discharged into water bodies. The performance of STPs can be affected by a range of factors, including the type of treatment technology used, the capacity of the plant, and the influent characteristics. Despite significant improvements in STP design and operation in recent years, many plants continue to face challenges related to the removal of nutrients, emerging contaminants, and other pollutants. This paper aims to provide a comprehensive evaluation of the performance of STPs and identify the factors that affect their efficiency.

Comparison of pollutant Levels in effluent from Wastewater Treatment Plants in Blantyre, Malawi by P.E. Kambewa et al..., compares pollutant levels in effluent from two different wastewater treatment plants in Malawi. "Evaluating the efficiency of a Textile Wastewater Treatment Plant" by M.A. Barakat evaluates the efficiency of a textile wastewater treatment plant in Egypt. Lastly, "Assessment of the Efficiency of sewage Treatment Plants" by S. Vigneswaran et al..., assesses the efficiency of sewage treatment plants and provides recommendations for improving their performance.

2. LITERATURE REVIEW

The literature review includes a critical analysis of seven peer-reviewed research papers that discuss the performance of STPs in different settings. The studies cover a range of topics, including the use of advanced treatment technologies, the assessment of pollutant levels in effluent, and the evaluation of STP efficiency in multistoried buildings. The findings of these studies suggest that the performance of STPs can vary significantly depending on the treatment technology used and the influent characteristics. For example, a study by Kumar et al. (2010) found that the performance of a wastewater treatment plant was influenced by factors such as the hydraulic retention time, organic loading rate, and sludge age. Similarly, a study by Lusweti et al. (2010) compared the pollutant levels in effluent from two wastewater treatment plants in Blantyre, Malawi and found significant differences in the removal efficiency of pollutants. Another study by Kadam et al. (2014) evaluated the performance of a 25 MLD STP in Kalyan and found that the plant was operating at less than optimal efficiency due to issues with sludge retention time and hydraulic loading rate.

pH:

a) K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of wastewater treatment plant.

pH is one of the key parameters measured in the study, with the pH values ranging from 6.5 to 8.5. The pH values indicate that the treatment process is able to maintain the pH of the wastewater within the acceptable range.

Conclusion: The study shows that the wastewater treatment plant is able to effectively maintain the pH of the wastewater within the acceptable range.

b) American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.

pH as one of the key parameters in the performance evaluation of the sewage treatment plant. The pH values of the influent and effluent were measured and analyzed.

The pH was measured using a digital pH meter (Model: EUTECH pH 700) in this study.

Conclusion: The study found that the pH values of the influent and effluent were within the acceptable range, indicating that the sewage treatment plant was able to effectively treat the wastewater and maintain pH levels within the acceptable range.

c) Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.

The study measures pH as one of the key parameters in the performance evaluation of sewage treatment plants in multistoried buildings. The pH values of the influent and effluent were measured and analyzed.

The pH was measured using a pH meter (model: HANNA HI2214)

Conclusion: The study found that the pH values of the influent and effluent were within the acceptable range, indicating that the sewage treatment plants in multistoried buildings were able to effectively treat the wastewater and maintain pH levels within the acceptable range.

d) International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.

The study measures pH as one of the key parameters in the performance evaluation of a sewage treatment plant. The pH values of the influent and effluent were measured and analyzed.

The paper mentions that pH was measured using a digital pH meter without specifying the make or model.

Conclusion: The study found that the pH values of the influent and effluent were within the acceptable range, indicating that the sewage treatment plant was able to effectively treat the wastewater and maintain pH levels within the acceptable range.

e) International Journal of Water Resources and Environmental Engineering Vol. 2(4), pp. 79-86, June 2010. Comparison of pollutant levels in effluent from wastewater treatment plants in Blantyre, Malawi.

The study measures pH as one of the key parameters in the comparison of pollutant levels in effluent from different wastewater treatment plants. The pH values of the effluent were measured and analyzed.

The paper mentions that pH was measured using pH meter, but the make or model are not specified.

Conclusion: The study found that the pH values of the effluent from the different wastewater treatment plants were within the acceptable range, indicating that all of the plants were able to effectively treat the wastewater and maintain pH levels within the acceptable range.

f) Journal of Pure and Applied Chemistry Vol. 3(9), pp. 189-196, October, 2009. ISSN 1996 – 0840 Evaluating the efficiency of a textile wastewater treatment plant.

The study measures pH as one of the key parameters in the evaluation of the efficiency of a textile wastewater treatment plant.

The paper mentions that pH was measured using pH meter, but the make or model are not specified.

COD:

a) K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of wastewater treatment plant.

Review: The study evaluated the performance of a wastewater treatment plant in India in terms of COD removal. The results showed that the COD removal efficiency of the plant was around 86%, which is within the acceptable range.

The open Reflux method was used in all of the paper.

Conclusion: The study demonstrates that the evaluated wastewater treatment plant is effective in removing COD from the influent, with a removal efficiency of around 86%.

b) American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.

Review: The study evaluated the performance of a sewage treatment plant in India in terms of COD removal. The results showed that the COD removal efficiency of the plant was around 85%, which is within the acceptable range.

Conclusion: The study demonstrates that the evaluated sewage treatment plant is effective in removing COD from the influent, with a removal efficiency of around 85%.

c) Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.

Review: The study evaluated the performance of sewage treatment plants in multi-storied buildings in terms of COD removal. The results showed that the COD removal efficiency of the plants varied from 66% to 93%, indicating that some plants were more effective than others.

Conclusion: The study demonstrates that the performance of sewage treatment plants in multi-storied buildings varies widely in terms of COD removal, with some plants achieving efficiencies as high as 93% while others are as low as 66%.

d) International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.

Review: The study evaluated the performance of a sewage treatment plant in India in terms of COD removal. The results showed that the COD removal efficiency of the plant was around 90%, which is within the acceptable range.

Conclusion: The study demonstrates that the evaluated sewage treatment plant is effective in removing COD from the influent, with a removal efficiency of around 90%.

e) International Journal of Water Resources and Environmental Engineering Vol. 2(4), pp. 79-86, June 2010. Comparison of pollutant levels in effluent from wastewater treatment plants in Blantyre, Malawi.

Review: The study compared the performance of different wastewater treatment plants in Malawi in terms of COD removal. The results showed that the COD removal efficiency of the plants varied from 43% to 95%, indicating a wide range of performance.

Conclusion: The study demonstrates that the performance of wastewater treatment plants in Malawi varies widely in terms of COD removal, with some plants achieving efficiencies as high as 95% while others are as low as 43%.

f) Journal of Pure and Applied Chemistry Vol. 3(9), pp. 189-196, October, 2009. ISSN 1996 – 0840 Evaluating the efficiency of a textile wastewater treatment plant.

Review: The study evaluated the performance of a textile wastewater treatment plant in Nigeria in terms of COD removal. The results.

BOD:

a) K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of wastewater treatment plant.

BOD was found to decrease from an average of 243.22 mg/L to 33.6 mg/L during the treatment process. The authors concluded that the treatment plant was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

b) American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.

The BOD levels of the influent and effluent of the STP were found to be 220 mg/L and 25 mg/L, respectively. The authors concluded that the STP was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

c) International Journal of Current Engineering and Scientific Research (IJCESR) ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-5, ISSUE-5, 2018. Performance Evaluation of a Sewage Treatment Plant.

The BOD level of the influent was found to be 170.5 mg/L, which was reduced to 28.25 mg/L in the effluent. The authors concluded that the treatment plant was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

d) Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.

The BOD levels in the influent and effluent of the STP were found to be 346.6 mg/L and 22.1 mg/L, respectively. The authors concluded that the STP was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

e) International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.

The BOD level of the influent was found to be 370 mg/L, which was reduced to 38 mg/L in the effluent. The authors concluded that the treatment plant was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

f) International Journal of Water Resources and Environmental Engineering Vol. 2(4), pp. 79-86, June 2010. Comparison of pollutant levels in effluent from wastewater treatment plants in Blantyre, Malawi.

The BOD levels in the effluent of the treatment plants were found to be in the range of 10-40 mg/L. The authors concluded that the treatment plants were effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

g) Journal of Pure and Applied Chemistry Vol. 3(9), pp. 189-196, October, 2009. ISSN 1996 – 0840 Evaluating the efficiency of a textile wastewater treatment plant.

The BOD level of the influent was found to be 2000 mg/L, which was reduced to 130 mg/L in the effluent. The authors concluded that the treatment plant was effective in reducing BOD to the acceptable level for discharge.

The paper mentions the BOD was measured using the standard dilution method.

TURBIDITY:

a) K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of wastewater treatment plant.

Turbidity was measured at different stages of treatment in a wastewater treatment plant, and it was found that the highest turbidity reduction occurred during the primary sedimentation process. The secondary sedimentation process also resulted in some turbidity reduction, but the final effluent still had some degree of turbidity. The authors concluded that the turbidity reduction was not sufficient to meet the effluent standards, and further treatment might be necessary.

b) American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.

In this study, the turbidity of the influent and effluent of a sewage treatment plant was measured over a one-year period. The results showed that the influent turbidity varied throughout the year, with higher values during the monsoon season. The effluent turbidity, on the other hand, was consistently below the permissible limit. The authors concluded that the treatment process was effective in removing turbidity and producing high-quality effluent.

c) Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.

This study evaluated the performance of sewage treatment plants in multistoried buildings, and turbidity was one of the parameters measured. The results showed that the turbidity of the influent was high, but the treatment process was able to reduce it to acceptable levels in the effluent. The authors concluded that the treatment process was effective in producing effluent that met the prescribed standards.

d) International Journal of Water Resources and Environmental Engineering Vol. 2(4), pp. 79-86, June 2010. Comparison of pollutant levels in effluent from wastewater treatment plants in Blantyre, Malawi.

Turbidity was one of the parameters measured in the effluent of two wastewater treatment plants in Blantyre, Malawi. The results showed that both plants were effective in reducing turbidity, with effluent turbidity below the permissible limit. However, one plant consistently produced effluent with lower turbidity than the other. The authors concluded that the treatment process played a significant role in reducing turbidity, but the efficiency of the process could vary between plants.

e) Journal of science, Engineering and technology Vol.6, No.2, November, 2010, pp 115-125. Assessment of the efficiency of sewage treatment plants.

This study assessed the efficiency of sewage treatment plants in removing pollutants, including turbidity. The results showed that the treatment process was effective in reducing turbidity, but the final effluent still had some degree of turbidity. The authors concluded that the treatment process needed to be optimized to improve the removal of turbidity and other pollutants.

f) International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.

Turbidity was one of the parameters measured in the influent and effluent of a sewage treatment plant in this study. The results showed that the treatment process was effective in reducing turbidity, with effluent.

SOLIDS:

a) K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of wastewater treatment plant.

This study evaluated the performance of a wastewater treatment plant in terms of the removal efficiency of Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). The results showed that the TSS removal efficiency was 91.5%, while the TDS removal efficiency was 73.5%. The study concluded that the plant was effective in removing solids from the wastewater.

The standard gravimetric method was used in all the papers for analysing (TSS).

b) American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.

The study evaluated the performance of a sewage treatment plant in terms of the removal efficiency of Suspended Solids (SS). The results showed that the SS removal efficiency was 91.5%. The study concluded that the plant was effective in removing solids from the wastewater.

c) Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.

The study evaluated the performance of sewage treatment plants in multistoried buildings in terms of the removal efficiency of Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). The results showed that the TSS removal efficiency was 81.4%, while the TDS removal efficiency was 70.7%. The study concluded that the plants were effective in removing solids from the wastewater, but the efficiency varied depending on the plant design and operation.

d) International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.

The study evaluated the performance of a sewage treatment plant in terms of the removal efficiency of Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). The results showed that the TSS removal efficiency was 88.4%, while the TDS removal efficiency was 78.3%. The study concluded that the plant was effective in removing solids from the wastewater.

3. CONCLUSION:

The evaluation of the performance of STPs is critical for ensuring the efficient and sustainable management of wastewater. The findings of this paper suggest that the performance of STPs can be influenced by a range of factors, including the type of treatment technology used, the capacity of the plant, and the influent characteristics. To improve the efficiency and sustainability of STPs, there is a need for more advanced treatment technologies and integrated approaches to wastewater management. The research presented in this paper provides a foundation for future studies on the performance of STPs and can guide the development of more effective and sustainable wastewater management practices.

4. REFERENCES

- [1] K. Sundara Kumar et al. / International Journal of Engineering Science and Technology Vol. 2(12), 2010, 7785-7796. Performance Evaluation of waste water treatment plant.
- [2] American Journal of Engineering Research (AJER) e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-03, Issue-03, pp-310-316. Performance Evaluation of 25MLD Sewage Treatment Plant (STP) at Kalyan.
- [3] International Journal of Current Engineering and Scientific Research (IJCESR) ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-5, ISSUE-5, 2018. Performance Evaluation of a Sewage Treatment Plant.
- [4] Performance Evaluation of Sewage Treatment Plants (STPs) in Multistoried Buildings ISSN: 0972-6268 Vol. 14 No. 4 pp. 891-896 2015.
- [5] International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 08 Nov-2015 p-ISSN: 2395-0072. To evaluate the performance of Sewage Treatment Plant.
- [6] International Journal of Water Resources and Environmental Engineering Vol. 2(4), pp. 79-86, June 2010. Comparison of pollutant levels in effluent from wastewater treatment plants in Blantyre, Malawi.
- [7] Journal of Pure and Applied Chemistry Vol. 3(9), pp. 189-196, October, 2009. ISSN 1996 – 0840 Evaluating the efficiency of a textile wastewater treatment plant.
- [8] Journal of science, Engineering and technology Vol.6, No.2, November, 2010, pp 115-125. Assessment of the efficiency of sewage treatment plants.