Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1095-1098 | ISSN:2251-6727

Wastewater Characterization in Semi-Urban Settlements: A Case Study

K. Mariadas[1*], M. Satish Kumar[2], T. Siva Rao[3], M.V. Raju[4]

[1]Assistant Professor, Department of Chemistry, School of ASH, Vignan's Foundation for Science, Technology and Research, Guntur, Andhra Pradesh, India.

[2]Professor and HOD, Department of Civil Engineering, Kallam Haranadha Reddy Institute of Technology, Chowdavaram, Guntur, Andhra Pradesh, India.

[3]Professor, Department of Chemistry, Andhra University, Visakhapatnam, Andhra Pradesh, India.

[4]Assistant Professor and Dy. HOD, Department of Civil Engineering, Vignan's Foundation for Science, Technology and Research, Guntur, Andhra Pradesh, India.

(Received: 30 September 2024 Revised: 21 October 2024 Accepted: 29 November 2024)

KEYWORDS

Wastewater, pollution, Quality, Water bodies, Contamination.

ABSTRACT:

The process of determining and measuring wastewater's physical, chemical, and biological properties has been referred to as wastewater characterization. In order to comprehend the possible environmental effects of wastewater and to create efficient treatment systems, this entails examining its composition, characteristics, and behavior. The objective of the current study was to determine the physicochemical parameters of the water quality in a few areas of Tenali town in the Guntur district in relation to the norms for its disposal to the receiving water bodies for agricultural usage criteria. The sample number, sampling area, and status were gathered during the pre-monsoon period in ten different areas in Tenali.

1. Introduction:

The level of environmental pollution is rising daily as a result of increased industry and urbanization. Municipal wastewater is the term given to describe the disposal of industrial effluents, sewage water, and city garbage. Waste from the home is uniform and fully biodegradable. Typically, sewage analysis is performed to measure the sewage's intensity or the level of stream contamination in order to assess the stream's cleanliness. Any particular wastewater's treatability is determined by its biological, chemical, and physical properties, including its pH, dissolved oxygen, total dissolved solids, nitrates, phosphates, chloride, and major metal concentrations.

Micro-industries (such as hotels, hospitals, and laundry facilities), macro-industries (industrial wastewater), and domestic activities (home activities) are the sources of wastewater in the chosen region. Sewage systems, or underground sewage pipelines, collect wastewater and transport it to one or more centralized Sewage Treatment Plants (STPs), where it is optimally treated. However, in cities and towns with outdated sewage systems, treatment stations may not exist at all or, if they do, may not be adequately equipped to provide an effective treatment. A less efficient sewage system and irregular leaks are the results of often exceeding the specified capabilities, even when every enterprise is linked to the sewage system.

The water quality indices available globally for water quality assessment. They analyzed different approaches and components in different water quality indices and finally concluded that there is no index as such which is universally accepted and the quest for search for a universal water quality index is still going on, and until then water quality assessment can be carried out employing little modifications.

The groundwater quality in Manga region of Nyamira County, Kenya used several physico-chemical and biological parameters and calculated water quality index of the study sites. The water quality index at all the three sites was wound to be less than 30, which indicated that the water can be used for industrial, drinking and irrigation purpose. They concluded that in the era of great anthropogenic stresses and climate change the data pertaining to water quality shall greatly aid in managing the water sources.

Although using sewage effluents has been shown to increase crop output and decrease the need for fertilizer,

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(6), 1095-1098 | ISSN:2251-6727

other research has revealed that metals enter the food chain through soil applications, which eventually poses serious health risks. Physical, chemical, and biological risks arise when raw sewage is dumped on land or in natural waterways.

2. Objective of the Work:

Analyze wastewater in untreated areas and make appropriate recommendations.

3. Study Area:

The town of Tenali is located in the Indian state of Andhra Pradesh's Guntur district. The headquarters of Tenali Mandal and Tenali Revenue Division are located in this municipality. Founded in 1909 with a population of about 18,000, it is one of the oldest municipalities. According to the 2011 census, it is now a Special Grade Municipality with 1,64,937 residents. The village of "Teravali" eventually changed its name to Tenali, according to the archeological monuments, and is also known for its ancient followers, thinkers, orators, artists, and educators. Under British imperial control, Tenali was located in Repalle Taluk in the district of Machilipatnam, which was subsequently split into the districts of Krishna and Godavari.

In Tenali City, Andhra Pradesh State, India, there is a locality called Burripalem Road, Bc Colony, Ramalingeswara Pet. It is part of the Andhra region. The postal head office is Satyanarayanapuram (Guntur), and for Burripalem Road, BC Colony, Ramalingeswara. The cities that are close to Tenali include Ponnur, Mangalagiri, Guntur, and Tenali. Telugu is the local language at Burripalem Road, BC Colony, Ramalingeswara, according to the local population. How to get to Burripalem Road by rail in BC Colony, Ramalingeswara Pet The closest train stations to Burripalem Road, BC Colony, Ramalingeswara Pet, are Tenali Jn Rail Way Station and Chinnaravuru Rail Way Station. Guntur Jn Rail Way Station, on the other hand, is a significant railway station located 24 kilometres from Burripalem Road at Bc Colony, Ramalingeswara Pet. By Bus Duggirala APSRTC, Tenali APSRTC Bus Station

In Tenali City, Andhra Pradesh State, India, there is a locality called NTR Road, Amaravathi Yards, Chenchupet. It is part of the Andhra region. The postal headquarters are at Tenali, and the pin code is 522201 for NTR Road, Amaravathi Yards, Chenchupet. The cities that are close to Tenali include Ponnur, Guntur, Mangalagiri, and Tenali. Telugu is the local language of Chenchupet, Amaravathi Yards, and NTR Road, according to the demographics. How to get to Amaravathi Yards, Chenchupet, NTR Road. The closest train station to NTR Road, Amaravathi Yards, and Chenchupet is Angalakuduru Rail Way Station, which is served by Rail Tenali Jn Rail Way Station. On the other hand, Guntur Jn Rail Way Station is a significant railway station located 23 kilometres from Chenchupet, Amaravathi Yards, and NTR Road. By Bus Duggirala APSRTC Bus Station, Guntur, Tenali APSRTC Bus Station.

4. Materials and Methods:

Samples have been collected in compliance with the protocols outlined in the UNESCO paper. The samples were correctly labeled, indicating the precise location of the sample collection at the lake. A few field measurements (D.O., pH, etc.) are also made on the spot. The remaining samples are then transported to the lab in bottles and examined for parameters like total solids, BOD, and chlorides using conventional techniques (APHA 1998).

5. Results and Discussions:

The study included chemical parameters for water. The samples were collected at various sampling points of wastewaters. The results are shown in Table 1. It was discovered that the various authorities, including the APHA, WHO, ISI, CPCB, and ICMR, had not established the same drinking water/safe disposal to nearer water bodies and legal standard for everyone. Physicians, researchers, and public health officials adhere to these standards. differing authorities have differing acceptable limits for drinking water quality, though (APHA, 1998).

The WHO and MCI should fix the uniformity permissible which are helpful to the society. The overall conclusion is that wastewater with a high domestic load has the highest negative impact on water quality in sewage analysis. On the other hand, sewage wastewater brings an important unwanted nutrient load, with potential negative effect on the basins where it is discharged. Based on results suggested that

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1095-1098 | ISSN:2251-6727

meteorological factors might have some characteristics of sewage.

It was found in the study area, that the pH concentrations are 7.80 maximum and 6.85 minimum, Electrical Conductivity concentrations are 2.2 (ds/m) maximum and 1.1 (ds/m) minimum, Iron concentrations are 0.01 (mg/l) maximum and 0.008 (mg/l) minimum, Chlorides concentrations are 474.85 (mg/l) maximum and 299.30 (mg/l) minimum, Alkalinity concentrations are 1735 (mg/l) maximum and 1305 (mg/l) minimum, hardness concentrations are 1402 (mg/l) maximum and 775 (mg/l) minimum and BOD concentrations are 260 (mg/l) maximum and 140 (mg/l) minimum. It has been found that while BOD values are greater than the allowable limits, many of the samples had amounts that were deemed to be reasonably safe within the allowable limits. In order to maintain hygienic sanitation, offer necessary treatment, dispose of wastewater judiciously, and select an appropriate way to reduce pollution.

Table 1. Results of Wastewater samples at study area

SL.NO.	sample Codes	pH	EC (dS/m)	Iron (mg/l)	Chloride (mg/l)	Alkalinity (mg/l)	BOD (mg/l)	Hardness (mg/l)
1	A1	7.61	1.7	0.009	389.87	1365	185	775
2	A2	7.20	1.8	0.008	379.88	1340	190	945
3	A3	7.65	1.3	0.010	354.88	1385	248	1032
4	B1	7.25	1.2	0.010	299.30	1485	225	1376
5	B2	6.85	1.1	0.008	319.90	1305	260	1402
6	B3	7.53	1.2	0.010	329.89	1430	210	1217
7	B4	7.63	1.2	0.010	334.89	1410	215	1180
8	C1	7.80	1.9	0.005	464.85	1570	180	910
9	C2	7.21	2.1	0.008	454.85	1735	190	1042
10	C3	7.7	2.2	0.010	474.85	1705	140	990

References:

1. Gallivan, S., & Heydecker, B. (1988). Optimising the control performance of traffic signals at a single junction. Transportation Research Part B: Methodological, 22(5), 357-370.
2. Falcocchio, J. C., & Levinson, H. S. (2015). Road traffic congestion: a concise guide (Vol. 7). Cham, Switzerland: Springer International Publishing.
3. Levy, J. I., Buonocore, J. J., & Von Stackelberg, K. (2010). Evaluation of the public health impacts of traffic congestion: a health risk assessment. Environmental health, 9, 1-12.
4. Lee, S., Wong, S. C., & Varaiya, P. (2017). Group-based hierarchical adaptive traffic-signal control part I: Formulation. Transportation research part B: methodological, 105, 1-18.
5. Nechyba, T. J., & Walsh, R. P. (2002). Urban sprawl. Journal of economic perspectives, 18(4), 177-200.
6. Ministry of Road Transport and Highways. (2023, May 18). Union Minister of Road Transport and Highways Shri Nitin Gadkari launches Intelligent Traffic Management System in New Delhi [Press release]. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1983550.
7. Karaer, A., Ulak, M. B., Ozguven, E. E., & Sando, T. (2020). Reducing the non-recurrent freeway congestion with detour operations: case study in Florida. Transportation Engineering, 2, 100026.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1095-1098 | ISSN:2251-6727

8. Ministry of Road Transport and Highways. (2023, April 13). Road Transport Year Book 2019-2020. New Delhi, India. https://morth.nic.in/road-transport-year-books.
9. Yang, C., Lu, X., & Liu, K. (2011, July). Research of intelligent control model and system on traffic light time. In Proceedings of the 30th Chinese Control Conference (pp. 5578-5581). IEEE.
10. Rabiu, Habibu & Bashir, Hassan. (2015). Intelligent Traffic Light System for Green Traffic Management. 1 st International Conference on Green Engineering for Sustainable Development, IC-GESD 2015. (pp. 244-247).
11. Weisbrod, G., Vary, D., & Treyz, G. (2003). Measuring economic costs of urban traffic congestion to business. Transportation research record, 1839(1), 98-106.
12. APHA, AWWA, WPCF, Standard Methods for the Examination of Water and Wastewater. (20th Edition). American Public Health Association, Washington DC, New York. 1998.
13. Anjaneyulu Y, Water resources pollution, water quality management and monitoring, Proceedings of International Conference on Hydrology and Watershed management, Vol II, 554-561.
14. Anji Reddy M, 2005, "Environmental Geo-informatics and Modelling"; Proceedings of International Conference on Environmental Management, B.S. Publications.
15. Couillard, D., and D.A. Cluis. (1980). Estimation of the downstream river water quality with a pollution land-use data bank. Water Supply and Management 4: 263-268.
16. Gupta, A.K. And Pathak, Resource Availability and Quality Assessment of Groundwater in Rural Areas Around Rewa, Indian J. Environ. Port., Vol.14 (11), P.841- 844 (1994).
17. M. Satish Kumar M. V Raju, S.Ramesh Babu and M. Siva Jagadeesh Kumar, Interpretation and correlative study of water simulation in surface water bodies, published in International Journal of Civil Engineering and Technology (IJCIET) Volume No: 8. Issue No: 05, May 2017, pp 1206 – 1211, ISSN: 0976-6316.
18. M.Satish Kumar, M.V Raju, G.Venu Ratna kumari and S.Ramesh babu , Mapping and modeling of groundwater pattern using geo spatial technology, International Journal of Civil Engineering and Technology, Volume No: 9, Issue No: 09, 2017, pp 110 – 115.
19. Raju, M.V., Satish Kumar, M., Venu Ratna Kumari, G., Ramesh Babu, S.R, an investigative study on water quality distribution in the zones of municipal corporation using remote sensing and GIS applications, International Journal of Civil Engineering and Technology (IJCIET), Volume 9, Issue 6, 2018, pp. 1182–1190.
20. Satish Kumar, M., Raju, M.V., Palivela, H. Comprehensive index of groundwater prospects by using standard protocols - A model study, Volume 8, Issue 5, May 2017, pp. 521–526.
21. Tiwari, J.N. (1988), Water Quality Index for Indian rivers, in ecology and pollution of Indian rivers. Ed R.K. Trivedi. Ashign Publishing House New Delhi. pp 271-286.
22. Venu Ratna Kumari, G., Satish Kumar, M., Raju, M.V., Palivela, H, A synoptical representation on potentiality of ground water using geo spatial technology, International Journal of Civil Engineering and Technology, Volume No: 9, Issue No: 01, 2018, pp 748–754.
23. M.V. Raju, K. Maria Das, Md. B. Wasim Akram, T.L. Rishi Vardhan and Hepsibah Palivela(2019). Water Quality Evaluation of Aquaculture Practices in Coastal Area of Bhimavaram at West Godavari District, Andhra Pradesh, Volume 11 | 11-Special Issue, pp 1088-1094.