iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 Issue: XII Month of publication: December 2022

DOI: https://doi.org/10.22214/ijraset.2022.48408

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue XII Dec 2022- Available at www.ijraset.com

Feasibility Study of Urban Raw Wastewater for Agricultural Uses in Nanded City, Maharashtra, India

Abhijit Kandlikar
School of Earth Sciences, Swami Ramanand Teerth Marathwada University, Vishnupuri, Nanded-431606, Maharashtra India.

Abstract: In several waste water studies, estimation of the quality of waste water is an important. The quantity, in as much as the usability of waste water available is determined by its chemical, and physical properties. The quality of waste water imagines field observations concerning the source and situation of waste water occurrence, source of pollution and other related aspects having a bearing on the quality of waste water. The sustainability of waste water for utilization purpose is judged on the basis of pH, EC, TDS, Hardness, Total alkalinity, Chloride, Nitrate, Sodium and Potassium, etc. The sustainability of waste water for irrigation purpose is judged on the basis of sodium contents and electrical conductivity mainly. These studies have been carried out during the year 2016-2017. In this study, water samples were analyzed from industrial wastewater mainly that has been utilized in the farmlands only in the surrounding areas.
Keywords: Physico-Chemical, Parameters, Permissible Limit, Chemical standards, Wastewater

I. INTRODUCTION

Increased population, urbanization, better living conditions and economic development have led to the generation of increased volumes of wastewater in the domestic, industrial and commercial sectors (Asano et al., 2007; Lazarova and Bahri, 2005). According to the United Nations World Water Development Report, industry accounts for 22% of all global water withdrawals. This ranges from 59% in high-income countries to 8% in low-income countries. This is not as much as is used in agriculture, which accounts for about 50% of freshwater use. (Brenda and Lee 2009) In India, only 24% of wastewater produced by households and industries is treated before being used in agriculture or discharged into rivers (Minhas and Samra, 2003). A large part of the sewage treatment plants, which deals with the second third, is not properly operated and maintained. The reality is that up to two-thirds of the wastewater produced in the world is not treated at all. For example, it is estimated that less than 10% of existing wastewater treatment plants in Mexico are operating satisfactorily (Mario and Boland, 1999). One of the negative environmental impacts associated with wastewater use is the contamination of groundwater with high concentrations of nitrates, salts, and microorganisms (USEPA 1992).

Salinity caused by wastewater can reduce crop productivity due to general growth suppression at the pre-seedling stage, due to nutritional imbalance and growth suppression due to toxic ions (Kijne et al. 1998). Where exotic vegetables are produced for the market, farmers generally do not consume them and may not be aware of the potential health consequences from their own experience (Drechsel et al., 2006). High levels of nitrogen in wastewater can result in nitrate contamination of groundwater sources used for drinking, which could have adverse health effects. Accumulation of heavy metals in soils and their uptake by plants is another risk associated with wastewater irrigation (Khouri et al., 1994). Discharged waste and unwanted materials inevitably result from human activities, whether domestic or industrial. If the wastes could accumulate on land or if they were indiscriminately discharged into rivers and other bodies of water, they would lead to unacceptable ecological problems (Eckenfelder, 2000). The main problems are caused by wastewater containing heavy metals, toxic chemicals, chlorides, lime with high content of dissolved and suspended salts and other pollutants (Uberai, 2003).

In developing countries such as China, Mexico, Peru, Egypt, Lebanon, Morocco, India and Vietnam, wastewater has been used as a nutrient source for crops for many decades (AATSE, 2004; Jimenez and Asano, 2008). Agricultural use of untreated wastewater has therefore been associated with land application and crop production for centuries (Keraita et al., 2008). Based on information from countries providing data on irrigated areas, it is estimated that more than 4–6 million hectares (ha) are irrigated with wastewater or polluted water (Jimenez and Asano, 2008; Keraita et al., 2008, UNHSP, 2008). A separate estimate puts it at 20 million ha worldwide, an area almost equal to 7% of the world's total irrigated land (WHO, 2006).

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue XII Dec 2022- Available at www.ijraset.com

In a new review that integrates data from Jiménez and Asano (2008) and UNHSP (2008), 46 countries report the use of polluted water for irrigation purposes. In large cities in West Africa, 50 to 90% of vegetables consumed by urban residents are produced in or near the city (Drechsel et al., 2006), where much of the water used for irrigation is polluted. In Pakistan, about 26% of the national vegetable production is irrigated with wastewater (Ensink et al., 2004).

The aim of the presented work is the analysis and discussion of the suitability of industrial wastewater for agricultural practices for crops and irrigation purposes in an around areas of Nanded city.

II. MATERIALS AND METHODS

A. Study Area

The Nanded is located between 18°.15' and 19°.55' North latitude and 77°.7' to 78°.15' east longitudes. The district has a geographical area of 10528 Sq. Km. Nanded is one of the fastest growing city of Marathwada region of Maharashtra Yannawar et al. (2013), & Yannawar (2015)

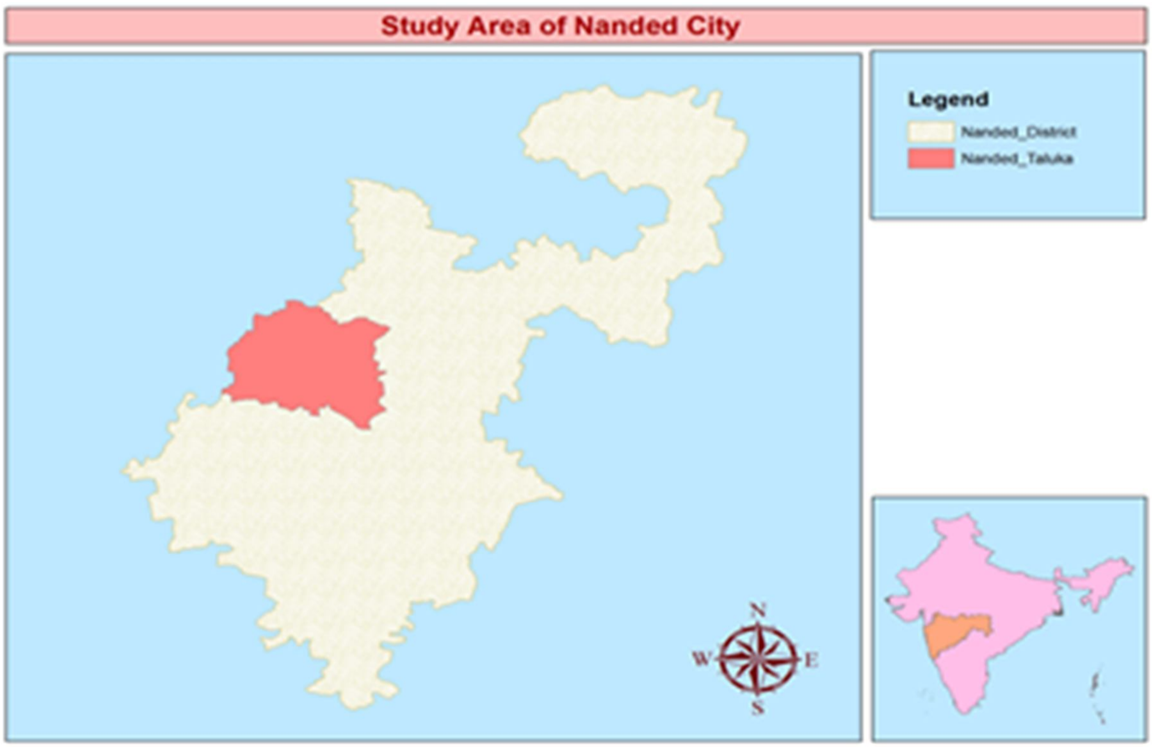

Fig. 1.1 Showing the study areas map of Nanded Taluka in Nanded District

B. Site and Field Selection

Two sites and three fields were selected to monitor irrigation and nutrient applications and heavy metal build up. Since wastewater which is coming from oil & cattle feed industry which is used in surrounding agriculture area near Vasarni Nanded. The main wastewater had received over a period of thirty years, from the Cattle feed industries which located in (MIDC) Maharashtra & Industrial Development Corporation of (CIDCO) City and Industrial Development Corporation of Maharashtra New Nanded.

C. Sampling Methods

For the present investigation the effluent samples were collected from local cattle feed industries, situated in MIDC of Nanded. The physical and chemical parameters were analyzed as per Standard Methods for the Examination of Water and Waste Water, 17th edition, APHA (1998). Sampling was done three times in the year at morning in 2011-12. The pH, temperature, dissolved Oxygen, and Total Dissolved Solids were determined on the spot rest of the parameters were analyzed in the laboratory by standard methods.

This is descriptive-cross sectional study that sampling from raw urban wastewater was directly preformed in orchards and farms in spring and summer to determine levels of important parameters in irrigating agricultural crops in orchard and farm inlets in spring and summer (May to August). Sampling was carried out based on Standard Method.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue XII Dec 2022- Available at www.ijraset.com

III. RESULTS AND DISCUSSION

In this study, water samples were analyzed from industrial wastewater during the year of 2016-2017. A number of physical parameters such as total solids, total dissolved solids, electrical conductivity, color were measured. Estimated chemical parameters such as pH, carbon dioxide, total hardness, phenolphthalein alkalinity, total alkalinity, salinity, total acidity, oil and grease. Some ionic parameters such as chloride, phosphate, sulfate, calcium, magnesium, sodium, potassium, fluoride, iron, chromium, and manganese were also determined. Biological properties such as standard plate count and most probable count were performed. Color is usually the first contaminant recognized in wastewater and affects the aesthetics, water transparency, and gas solubility of water bodies (Yuxing and Jian 1999). All discharge samples were blackish in color. The pH of the waste water ranges from 6.9 to 8.7 and the temperature from 200C to 300C. Total dissolved solids range from 784 to 1730 µM. Because water contains dissolved and suspended components in different proportions.

In this study, the data revealed that there is considerable variation in quality with respect to their physicochemical properties. The average value of various wastewater quality parameters was given in Table 1 and shown in graphs. This document describes the strong links between wastewater use and management.

The most important benefit for farmers in this semi-arid region is a reliable supply of wastewater that allows them to grow high-value vegetable or agricultural crops. The wastewater supply runs continuously throughout the year, and farmers not only have their own rotations in its use, but can also exchange moves with each other to make water availability more responsive to crop water requirements. However, at the end of irrigation systems or during dry periods, wastewater may be the only water flowing in canals in areas such as Haroonabad, Pakistan and Hyderabad, India (Ensink et al., 2004; Ensink, 2006).

Table 3.1: Physico-chemical parameters of industrial water samples

Sr. No.	Water Parameters	Mean ± SD
1.	Total Solids	1199.3±376.9
2.	TDS	1368± 510.5
3.	EC [uS/cm]	222±15.0
4.	Colour	Blackish
5.	Temperature	24.3 ±5.1
6.	P^H	7.96±0.9
7.	Carbon Dioxide	20.6±2.3
8.	Total Hardness	166.6±41.6
9.	Phenolphthalein Alkalinity	BDL
10.	Total Alkalinity	1426.6±75.0
11.	Salinity	316.9±14.1
12.	Total acidity	210 ±115.3
13.	Oil & grease	789.3± 26.1
14.	Chloride	188.3 ±20.06
15.	Phosphate	4.0±1.59
16.	Sulphate	92.56 ±29.52
17.	Calcium	29.44± 12.3
18.	Magnesium	26.32 ±14.37
19.	Sodium	207.0±30.2
20.	Potassium	35 ±13.75

Except EC, pH, all the parameters are expressed as mg/Lit. Limits for industrial effluent discharged into inland surface waters.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue XII Dec 2022- Available at www.ijraset.com

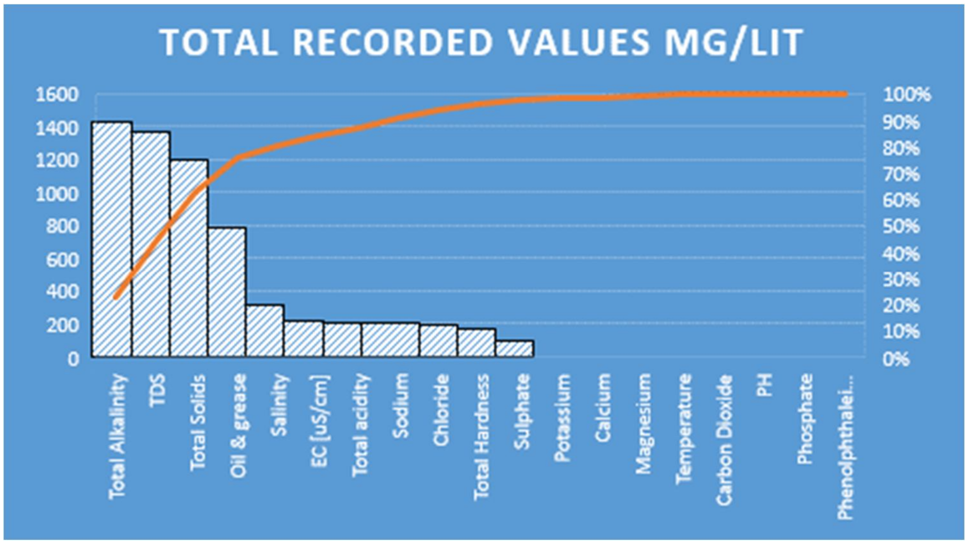

Fig.3.1: The total mean values observed of Physico-chemical parameters of industrial wastewater samples in mg/Lit.

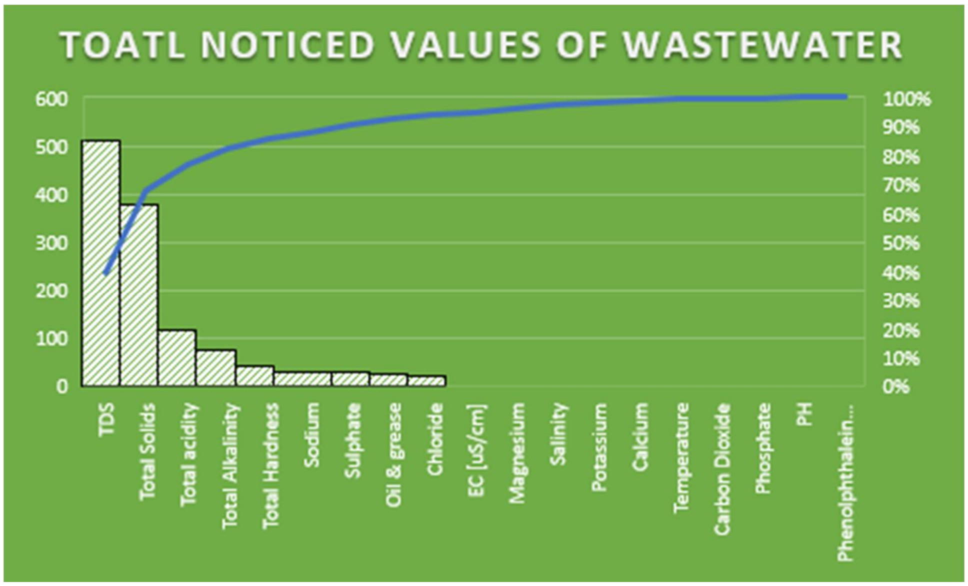

Fig.3.2: The total SD values observed of Physico-chemical parameters of industrial wastewater samples in mg/Lit.

Farmers generally experiment on their own and respond to perceived production risks such as pest attacks, water shortages or reduced availability of fertile land and labor (Mutsaers et al., 1997). Among the perceived drivers of change, health risks are not prominent, which is not surprising given the low awareness of health risks. However, poor water quality can be a problem for farmers, even if its health-affecting components are not perceived. It is therefore important to encourage farmers to find solutions themselves, and several home remedies actually reduce health risks, even if unintentional (IWMI, 2008).

Salinity caused by wastewater can reduce crop productivity due to general growth suppression at the pre-seedling stage, due to nutritional imbalance and growth suppression due to toxic ions (Kijne et al. 1998). Where exotic vegetables are produced for the market, farmers generally do not consume them and may not be aware of the potential health consequences from their own experience (Drechsel et al., 2006). Thus, in many cases, farmers have been found to develop strategies and innovations to adapt to deteriorating water quality in order to maintain or increase yields and reduce other negative trade-offs, including health problems of special concern, which are innovations aimed at reducing inputs., such as labor while reducing health risks such as furrow irrigation compared to overhead watering with watering cans. There are a number of management options for smallholder farmers in developing countries to address the problems and risks of exposure to heavy metals or excessive salts and nutrients through irrigation water. Similar consequences have been noticed by Yannawar et al (2014) in Nanded and its surrounding areas in the year 2014.

IV. CONCLUSIONS

In Nanded where water is scarce, poor farmers use untreated wastewater and industrial pollution is limited, there is scope for improvement in the use of water and nutrients to further optimize the economic benefits of wastewater use. At the same time adequate measures should be put in place to control various infections in populations exposed to wastewater. It is concluded that the effluent discharged from oil and cattle feed industry and surrounding industries except oil and grease all values prescribed by the Standards of Environmental Protection Act and Ministry of Environment Forest, New Delhi. Therefore, it should take little attention towards here before to disposal in the environment. In order to find common ground and to use knowledge to change perceptions and behavior, farmers and scientists need to work together. Without its proper supervision, wastewater use poses serious health and environmental risks in agriculture crops and human health respectively.

Declaration: The authors of this manuscript do not oppose the interest.

V. ACKNOWLEDGEMENT

We are thankful to the School of Earth Sciences of Swami Ramanand Teerth Marathwada University, Nanded for providing laboratory and library facilities for my research activities etc.

REFERENCES

[1] APHA, 1998, Standard Methods for the Examination of Water and Wastewater. American Public Health Association, 20th edition, Washington. D.C.
[2] Asano, T., Burton, F. L., Leverenz, H., Tsuchihashi, R. and Tchobanoglous, G. (2007) Water Reuse: Issues, Technologies, and Applications, McGraw-Hill, New York.
[3] Drechsel, P. S., Graefe, M., Sonou, O. and Cofie, O. (2006) Informal Irrigation in Urban West Africa: An Overview, Research Report 102, IWMI, Colombo,
[4] Eckenfelder, W. W. (2000) Industrial water pollution control. Boston: McGraw-Hill.
[5] Ensink, J. (2006) 'Water quality and the risk of hookworm infection in Pakistani and Indian sewage farmers', PhD thesis, London School of Hygiene and Tropical Medicine, University of London, London.
[6] Ensink, J., Mahmood, T., van der Hoek, W., Raschid-Sally, L. and Amerasinghe, F. (2004) 'a nation-wide assessment of wastewater use in Pakistan: An obscure activity or a vitally important one?' Water Policy, vol. 6, pp197–206.
[7] Jimenez, B. and Asano, T. (2008) 'Water reclamation and reuse around the world' Water Reuse: An International Survey of Current Practice, Issues and Needs, IWA Publishing, London, pp. 648.
[8] Jiménez, B. and Asano, T. (2008) 'Water reclamation and reuse around the world' Water Reuse: An International Survey of Current Practice, Issues and Needs, IWA Publishing, London, pp 648.
[9] Keraita B. (2008) 'Low-cost measures for reducing health risks in wastewater irrigated urban vegetable farming in Ghana', PhD thesis, Faculty of Health Sciences, University of Copenhagen.
[10] Keraita, B., Drechsel, P. and Konradsen, F. (2008a) 'Using on-farm sedimentation ponds to reduce health risks in wastewater irrigated urban vegetable farming in Ghana', Water Science and Technology, vol 57, no 4, pp519–25
[11] Khouri, N.; J.M. Kalbermatten; and C.R. Bartone. (1994). Reuse of wastewater in agriculture: A guide for planners. World Bank, Washington D.C., USA: UNDP-World Bank Water and Sanitation Program.
[12] Kijne, J, W.; S. A. Parthaper; M. C. S. Sahrawat. (1998) How to manage salinity in irrigated lands: A selective review with particular reference to irrigation in developing countries. SWIM Paper 2, International Water Management Institute, Colombo: Sri Lanka
[13] Lazarova, V. and Bahri, A. (2005) Water Reuse for Irrigation: Agriculture, Landscapes, and Turf Grass, CRC Press, Boca Raton, FL.
[14] Mari o, M.; and J. Boland (1999) An integrated approach to wastewater treatment. Washington, D.C: The World Bank.
[15] Minhas, P. S. and Samra, J. S. (2003) 'Quality assessment of water resources in Indo- Gang etic basin part in India', Central Soil Salinity Research Institute, Kernel, India, p 68.
[16] Uberai, N.K. (2003) Environmental Management. Excel Books, New Delhi. pp. 269.
[17] USEPA (United States Environmental Protection Agency). 1992. Guidelines for water reuse. Washington, U.S.A.: USEPA.
[18] WHO (World Health Organization). 2006. Guidelines for the safe use of wastewater, excreta and grey water.
[19] Yannawar VB, Bhosle AB, Khadke PA and Waghmare PB, (2013), Monitoring Physical Growth of Nanded City by Using Geoinformatics Techniques, Researcher, Vol. 5 No. 2, pp. 80-86.
[20] Yannawar VB., Bhosle AB. and Shaikh PR. (2014) Assessment of Industrial Wastewater Quality and Management Science Park Research Journal Vol-1, No 27, PP. 1-10.
[21] Yannawar Vyankatesh B. (2015): The Nanded Information System, Lap Lambert Academic publishing, Germany.