Assessment of wastewater from some selected locations in an around Faizpur area of Khandesh Region, MS, India

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Abstract

The present study was done for the investigation of Physico-chemical parameters of wastewater from different locations of Faizpur area of khandesh region. Standard procedures were adapted to calculate Physico-chemical properties in wastewater samples. The wastewater characteristics was analyzed for various water qualities like pH, TDS, TSS, Conductivity, Total Hardness, Salinity, etc. The results obtain from the study were compared with BIS standards to check out their pollution level. Elements and their impacts on human health was discussed. Effect of wastewater shows that most of the parameters were much higher compare to the standards. Hence, the flow of these wastewater into the river cause a serious pollution problem in an around Faizpur area of Khandesh region. Wastewater should not be disposed into the nalla of Faizpur directly or be used as irrigation water for agriculture.

Keywords: Nalla wastewater, Physico-chemical parameters, Faizpur area, Khandesh region.

Introduction

Today environmental pollution by waste has developed as one of the most dangerous environmental problems. Sewage sludge is a main source to provide plant nutrients hence, its drawbacks can be seen in the form of gradual absorption of heavy metals in the soil work as a supply of nutrients for crop production due to the high content of organic matters. Many Indian villages and cities don't have a safe water to drink. Rain water is the main source to recharge the ground water. Zadi river is located in the Faizpur area but this river gradually converted into a nalla. The wastewater that flows after use for domestic and other purposes is discharge in to this nalla. Sewage comprises water as the main constituent, while other constituent, also contain organic waste and chemical. Untreated sewage discharge is one of the main problems presently. The solid wastes and wastewaters are discharged into the water bodies and then ultimately pose a risk to human and routine functioning of ecosystem. Domestic sewage water with high organic matter dissolved solids and unwanted chemicals causes huge ground water problems[1]. During the past decade, widespread reports of ground water contamination have increased public concern about drinking water quality[2]. Sewage provides water and valuable plant nutrients; it leads to the potential accumulation of heavy metals in agricultural soils[3].

Present study was focused on the estimation of the Physical and chemical parameters of wastewater from some selected areas in an around Faizpur area of Khandesh region, Maharashtra. Research shows that almost all rivers are polluted in most of the stretches of Khandesh region by some or the other irrigation and aquatic life. Research work was ongoing for the progress of resourceful treatment technologies appropriate to people of Faizpur area.

Materials and methods

Area of study: The Jalgaon district is one of the main rivers of the river Zadi based on Latitude 21.162222 and Longitude 75.863236.Cane-sugar industry exists in an around Faizpur city and the sewage and the unused materials e.g. organic waste of this Faizpur area is responsible for humiliating the quality of river Zadi and converted into a Lendi nalla. All Physico-chemical parameters were assessed using[4].

Procedure for Sampling: Nalla water was collected during February 2016 to January 2017, which cover entire Faizpur city. Graph 1-9 shows the physical and chemical parameters how it gets affect nearby area of the river. The quality of surface water changes with respect to season and is easily get contaminated. Samples were collected for determination, during February 2016 to January 2017. Samples were collected between morning 07.30to 10.30 in clean sampling cans, labeled and brought to the laboratory for estimation.

Sampling Methods: Sewage water sample was collected below the surface about 40-50 cm, to sidestep the collection of surface scums, oils etc. Each sample was collected separately in plastic cans to measure the Dissolved oxygen respectively.

Parameters: Almost09 water quality constraints were estimated to understand the contamination of the sewage: pH, Total solids, Conductivity, Total dissolved solids, Total hardness, Total suspended solids, Calcium hardness, Salinity, Chloride and Dissolved oxygen.
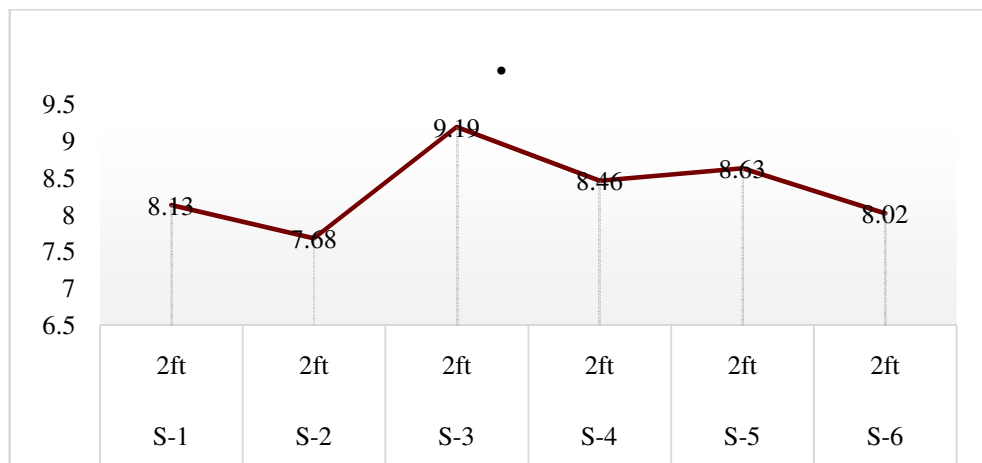
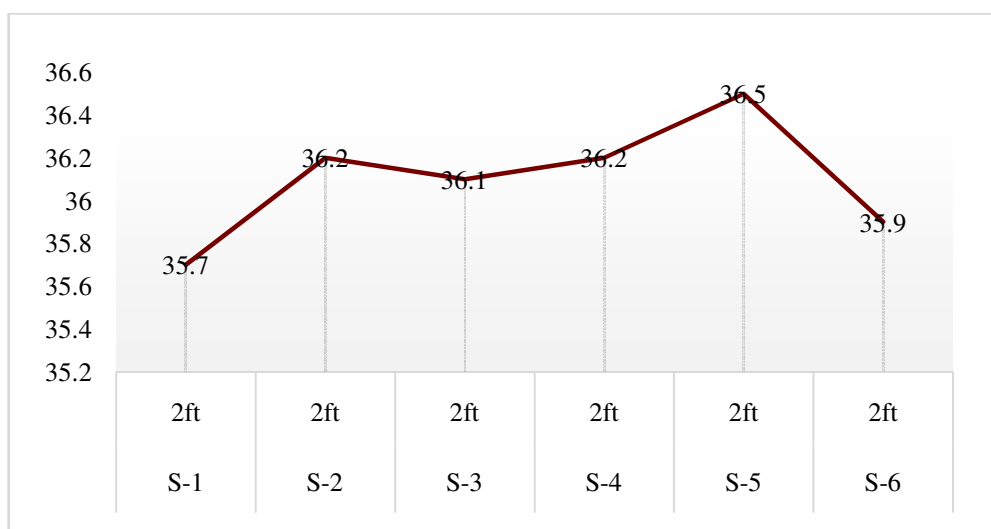**Figure-1:** pH content of wastewater from selected sites.

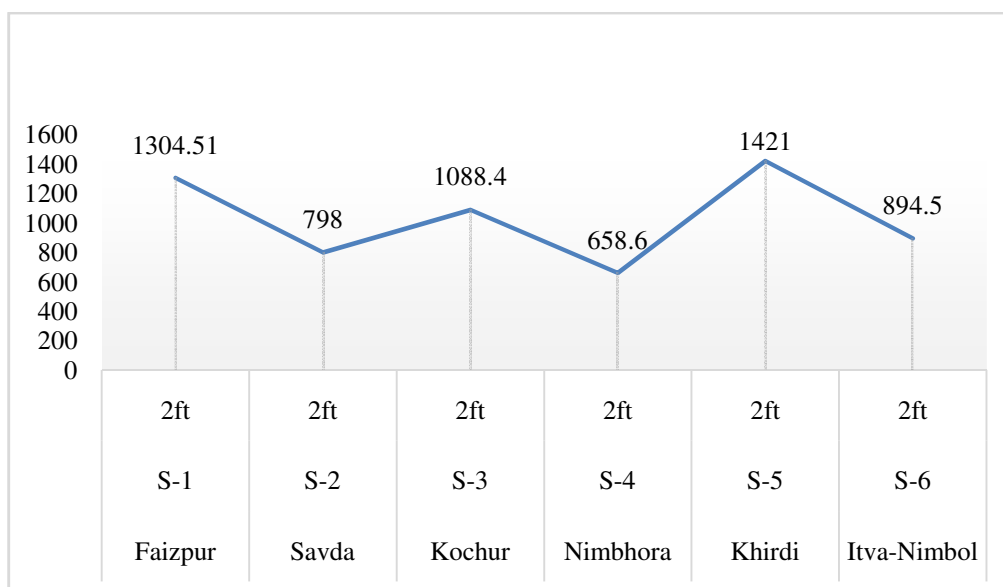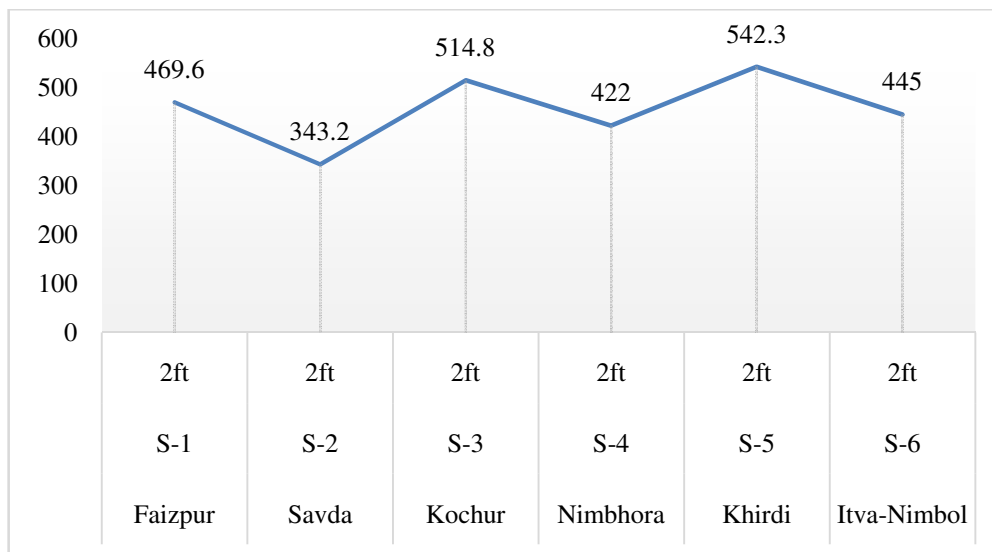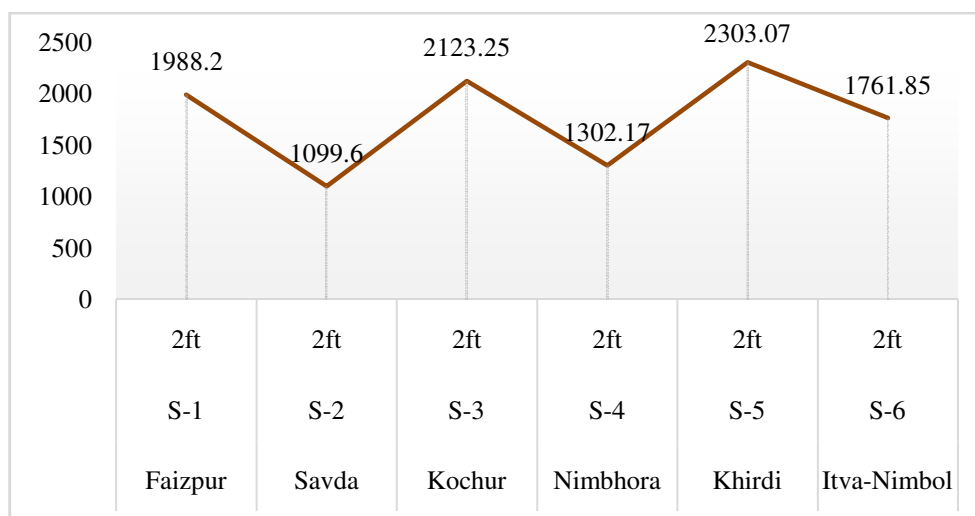**Figure-2:** Temperature content of wastewater from selected sites.
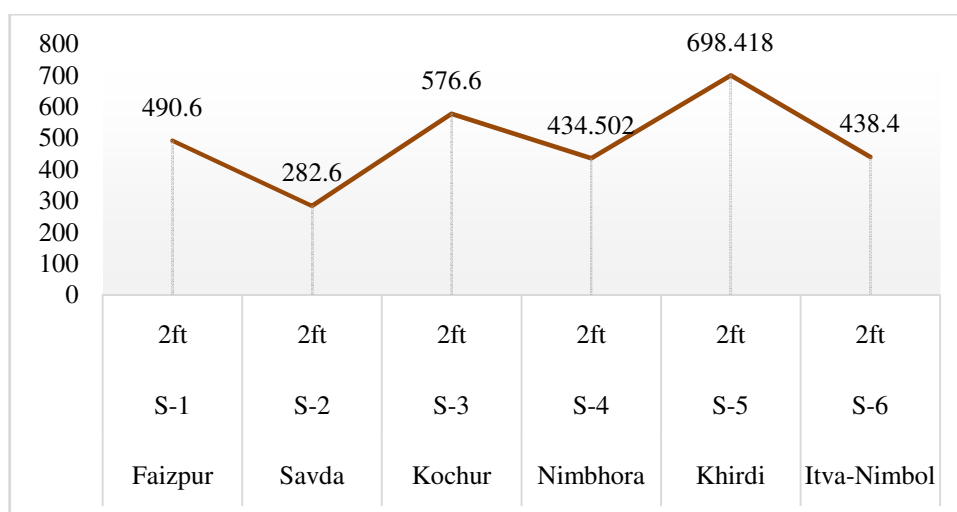

Figure-3: Conductivity (dSm^{-1}) content of wastewater from selected sites.

Figure-4: Salinity mg/l content of wastewater from selected sites.

Figure-5: Total Hardness content of wastewater from selected sites.

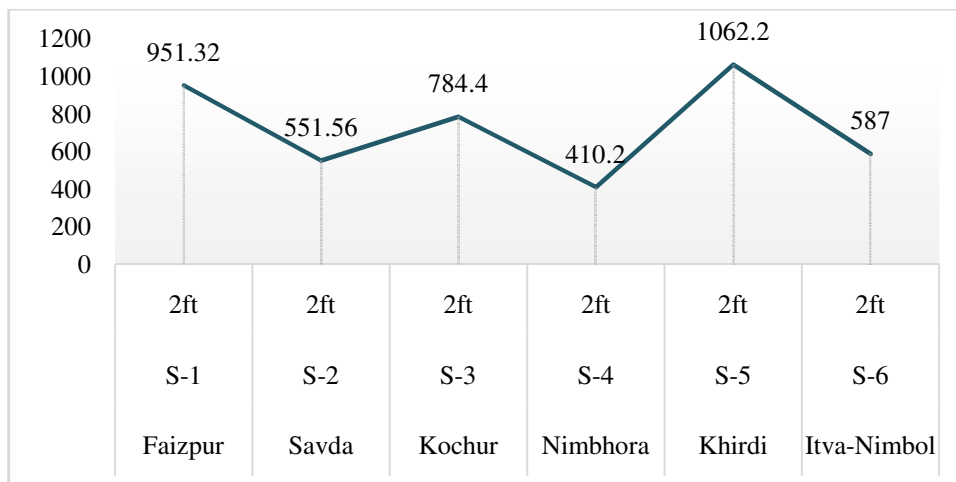**Figure-6:** Chloride mg/l content of wastewater from selected sites.

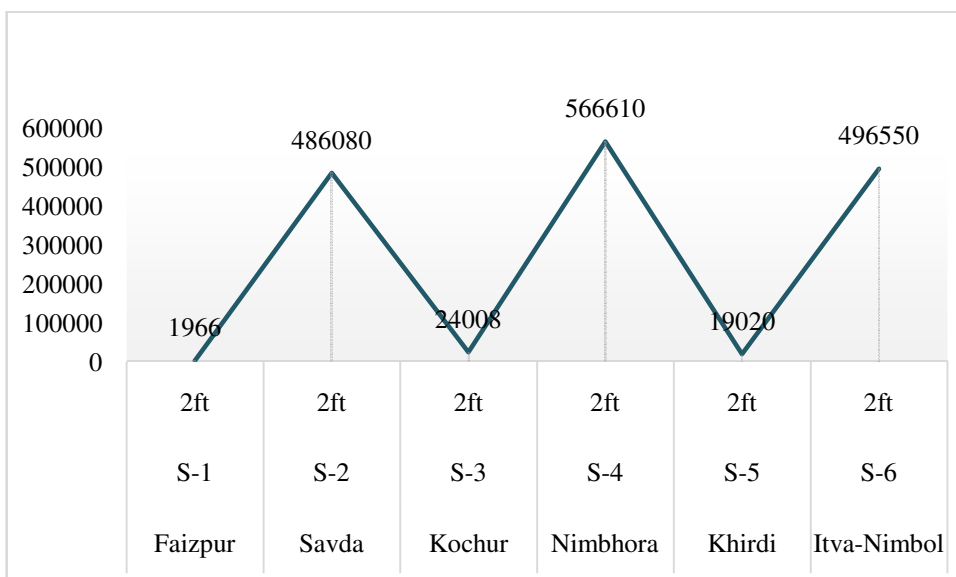**Figure-7:** TDS content of wastewater from selected sites.

Figure-8: TSS content of wastewater from selected sites.
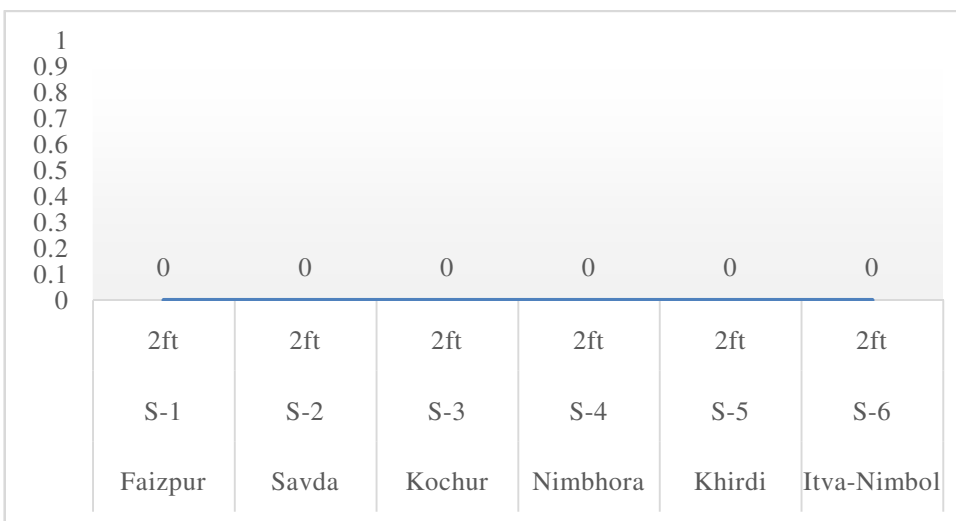

Figure-9: DO mg/l content of wastewater from selected sites.

Results and discussion

The study carried out shows that the analysis of physical and chemical characteristics of some selected locations in an around Faizpur area of Khandesh region was based on Physico-chemical parameters e.g. pH, Temperature, Total Solids and Conductivity in combination with chemical features like Salinity, DO, Hardness and Chloride. All above parameters assessed with the help of APHA, 2000.We have selected six sampling sites in an around Faizpur area of Khandesh region *i.e.* Faizpur (S_1), Savda (S_2), Kochur (S_3), Nimbhora (S_4), Khirdi (S_5) and Itva-nimbol (S_6). The samples were collected from the depth of 2ft of each area.

pH: pH is an significant parameter which determine the suitability of water for various determinations. In the present study pH ranged between 8.02 to 9.19 in many of the collections the pH continued accurately neutral. However, when the average values are considered the sewage water sample were observed to be slightly alkaline. The extreme pH value (9.19) was noted in the Kochur area at S_3 site and minimum (7.68) at S_2 site in Savda area. Extreme bio-chemical and chemical reactions are prejudiced by the pH. Jogi *et. al.,*[5] have also made similar observations in their studies on different water bodies.

Temperature: Minor variation of temperature was recorded study carried out. The temperature ranges from 35.7°C to 36.5°C. The observed values of temperature were indicating the wastewater quality has surely affected by this parameter. Jayab et al[6] and Salvehave et al[7] detected similar study during summer, water temperature was high due to low water level, high temperature and clear atmosphere.

Conductivity: Observations shows that the electrical conductivity (EC) varies from station S_1 to S_6 *i.e.* 658.60 $\pm$ 0.300 to 1421.00 $\pm$ 0.500 dSm^{-1}. High electrical conductivity shows a larger quantity of dissolved mineral salts similar observation was also reported by Gaikwad *et. al.*[8] for river Tapi at Bhusawal (Jalgaon). Near about all sampling sites reported high electrical conductivity.

Salinity: The salinity concentration ranged from 343.200 $\pm$ 0.040 to 542.300 $\pm$ 0.230. The highest salinity concentration was recorded 542.300 $\pm$ 0.230 Khirdi area *i.e.* S_5 sampling station while lowest 343.200 $\pm$ 0.040 in S_2 at Savda sampling station. Concentration of salinity might be due to release of domestic waste covering high chloride absorption. The result obtained from this study were lower than the results reported by Krishnan *et. al.*[9].

Total Hardness: The rate of hardness varies from 1099.600 mg/l recorded at S_2 sampling station Savda and the maximum hardness was recorded at S_5 sampling station in Khirdi area *i.e.* 2303.070mg/l. Sheejan *et. al.*[10] was stated total hardness was high during summer season than rainy and winter. During summer, high value of hardness can be credited to decrease in water volume and increase of evaporation rate of water.

Chlorides: Chloride is most important parameter in assessing the quality of water Chavan *et. al.*[11] believes advanced concentrations of chlorides indicate developed degree of organic contamination. In this study, the absorption of chloride varied between 282.600mg/l S_2 site Savda area and 698.418 mg/l S_5 site Khirdi area respectively. Chloride concentration in wastewater was found to be high by Chaudhari *et. al.*[12] and a similar observation has been made by Chavan *et. al.*[13].

Total dissolved solids: The total dissolved solids vary from 410.20mg/l to 1062.20mg/l. The extreme value 1062.20mg/l was notedat the site S_5 Khirdi area. It might be due to heavy rainfall in the Khirdi area of Khandesh region.

Total suspended solids: Fluctuation of TSS was recorded between S_1 Faizpur area 1966 mg/l to S_4 Nimbora area 566610 mg/l. It might be due to suspended matter contains of silt, clay, fine particles of organic and inorganic matter, soluble organic complexes, plankton and other microscopic creatures.

Dissolved Oxygen: The concentration of DO regulates the distribution of flora and fauna. The present study shows that the concentration of dissolved oxygen was absent in the entire six sampling sites studied of Faizpur area of Khandesh region. This suggest that most of the releases are organic in nature and hence need oxygen for breakdown. High disintegration of organic substances in sewage, show high contamination load and decreases the dissolved oxygen.

These observations are in conformity with the observation of Sheejan and Thorat[14] studies have been carried out in Khandesh region of Maharashtra. Few workers concentrated on the hydro biological studies in Maharashtra, India *i.e.* Studies on the rivers, lakes, ponds, etc. carried out[15-20].

Conclusion

The quality of water is directly and indirectly concern to human health. The growing concentration of numerous organic and inorganic since the households and their following proclamation to their neighboring as well as the sewage water release to drain advanced extensive and growing community anxiety over their opposing effect on human-health and environment. The level of parameters investigated exceeded the permissible limit for sewage water determinations and agriculture purposes. As per our study we conclude, that the wastewater must be treated before dispose into the rivers or nallas in Khandesh region to avoid health hazards to agriculture as well as human being.

Acknowledgment

References

1. Tyagi P., Buddi D., Chowdary R. and Sawhney R. (2000). Physicochemical quality of Ground water in industrial areas of India. *Pollut. Res*., 19, 443-445.

2. Yanggen D.A. and Born S.M. (1990). Protecting ground water quality by managing local land use. *J. Soil Water Conser*., 45(2), 207-210.

3. Zhang Y.L., Dai J.L., Wang R.Q. and Zhang J. (2008). Effects of long-term sewage irrigation on agricultural soil microbial structural and functional characterizations in Shandong, China. *Eur. J. Soil Biol.* 44(1), 84-91.

4. APHA (2000). Standard methods for analysis of water and waste water. American public Health Associated. Washington, D.C., 1110-2420.

5. Jogi R.D., Wani P.P., Kulkarni M.N. and Thorat S.R. (2013). Study of Limno-chemistry river Godavari in Nashik with reference to Zooplankton. *International J. of Research in Social Sciences*, 3(1), 253-262.

6. Jayabhaye U.M., Pentewar M.S. and Hiware C.J. (2006). A Study on Physico- Chemical Parameters of a Minor Reservoir, Sawana, Hingoli District, Maharashtra. *J. Aqua. Biol.,* 21(2), 123-128.

7. Salve V.B. and Hiware C.J. (2008). Study on water quality of Wanparakalpa reservoir Nagpur, Near ParliVaijnath, District Beed. Marathwada region. *J. Aqua. Biol*., 21(2), 113-117.

8. Gaikwad S.R., Thorat S.R. and T.P. Chavan (2004). Phytoplankton and zooplankton diversity with respect to pollution starts of river Tapi in North Maharashtra Region. *J. of Current sciences,* 5(2), 749-754.

9. Krishnan Radha R., Dharmaraj K. and Kumari Ranjitha B.D. (2007). A comparative study on the physicochemical and bacterial analysis of drinking, bore well and sewage water in the three different places of Sivakasi. *J. of Environ. Biol.*, 28(1), 105-108.

10. Sheejan P.G., Kulkarni M.N. and Thorat S.R. (2012). Study of Zooplankton of River Tapi Relation to Pollution from Bhusawal Taluka Dist. Jalgaon, MS, India. *International J. of Environmental Sciences*, 3(3), 317-322. ISSN0976-4534

11. Chavan T.P., Kakade Harshad R. and Thorat S.R. (2015). Photo-Catalytic Technological Aspect Used in Industrial Wastewater Treatment Process. *International Journal in Management and Social Sciences,* 03(2), 473-477.

12. Chaudhari R.T., Kakade Harshad R. and Thorat S.R. (2015). Effect of Cadmium Chloride on the Biochemical Characteristics of Fresh Water Fish. *International Journal in Management and Social Sciences,* 03(3), 85-89.

13. Chavan T.P., Dandge K.P. and Thorat Sanjaykumar R. (2013). Study on Hydrobiological Chemistry of Surface and Ground Water Quality in Yavatmal City. *J. of Aquatic Biology*, 63-66.

14. Sheejan P.G. and Thorat S.R. (2013). Impact of Phytoplanktonic Community in River Waghur Relation to Pollution of Kandhesh Region. *International Journal on Agricultural Sciences*, 4(3-4), 107-116.

15. Chaudhari R.T., Deshmukh S.A., Wakode A.V., Kulkarni M.N. and Thorat S.R. (2013). Impact of Sant Muktabai Festival on Water Qualities in Stretch of River Tapi at Muktainagar, MS, India. *International Journal of Physical and Social Sciences*, 3(4), 446-454.

16. Dubey Savita (2013). Analysis of Physico chemical parameters of Kshipra river water at Ujjain, India. *Int. Res. J. Environment Sci*., 2(7), 1-4.

17. Gaikwad S.R. and Thorat S.R. (2006). Study of selected heavy metals a residential area nearby Tapi River. *Bull. Env. Sci*., 4, 71-75.

18. Gaikwad V.B. and Gunale V.R. (2001). Water quality monitoring of Godavari river in and around Nashik region. *J. Hydrobiologia*, 1-20.

19. Chavan T.P. and Throat Sanjaykumar R. (2013). Study on Physico-Chemical Properties with Coefficient and Correlation with Ground Water Quality at Yavatmal, Ms, India. *International Journal of Physical and Social Sciences,* 3(1), 256-262.

20. Ingole S.P., Chavan Arvind and Dhote J.D. (2013). Study of Physico chemical parameters of wastewater from some selected locations on Amba nalla, Amravati. *Indian Journal of Applied Research,* 3(8), 311-314.