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Research Article

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Physico-chemical and microbial analysis of certain water sources and industrial waste water samples in Chandrapur District, Maharastra, India

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ABSTRACT

Wardha, Wainganga and Penganga are the important rivers surrounding Chandrapur district. Wardha river flows into the district from western boundary and then flows along the boundries of Warora, Chandrapur, Korpana, Rajura, Ballarpur and Gondpipari talukas and Penganga and Irai meets the Wardha river. Monitoring of water quality of Wardha river was carried out from November 2011 to July 2012. Water samples were collected and analysed as per standard methods. Parameters such as pH, turbidity were measured in situ. Raised values of physico-chemical parameters indicate the pollution of riverine ecosystem. Due to domestic waste , muncipal sewage, industrial effluent agricultural runoff that influence the water quality directly or indirectly. The microbiological analysis exhibited presence of pathogenic bacteria.Bacterial count was found tobe more than 10 /100 ml so the sample is unsafe for drinking.

Key words: Wardha river, Water pollution, Chandrapur city, Physico-chemical and microbial analysis

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INTRODUCTION

Water is one of the chief vehicles of gastrointestinal disease. Therefore, water for human consumption must be free from chemical substances and micro organisms which may cause disease in human being. In addition, it should be pleasant to drink .Water is said to be contaminated or polluted when it contains infective and parasitic agents.Poisonous chemical substances, industrial or other wastes or sewage.

Water receives micro organisms from air, soil sewage, organic wastes, dead plants and animals etc. Water becomes contaminated by intestinal pathogens such as coliform group of bacteria, salmonella, vibrio and dysentry causing Bacilli. The human faecal material carried in sewage is often dumped in rivers and lakes that leads to water contamination.

According to the study of World Health Organisation (WHO) in 1980, at least 30,000 people die every day in developing countries of the World because of unsafe water supplies.(14)

The area is drained by major tributaries of the Godavari river. The major tributaries are the Wardha, Wainganga and Penganga rivers. The Penganga, flowing along part of the western boundary, merge into the Wardha river near

Ghugus. It further flows in NW–SE direction finally merging in to the Wainganga river at the south eastern corner of the district where it completely drain out.

The Wainganga river is the main river which flows along the border of the Chandrapur and Gadchiroli district. The Wardha river is the only perennial river and having the longest river course as compared to the other two major rivers. One of the main tributaries of the Wardha river is Erai river, rises in the northern part of Warora tahsil which flows along south side of Chandrapur covers distance about 80 km and merge. The Penganga flowing along western border takes east west course and then joins the Wardha river at Ghugus (12).

The aim of microbiological examination of water is to detect whether pollution by pathogenic organisms has taken place or not.

EXPERIMENTAL SECTION

The water samples were collected from the Wardha river at selected stations (Ghugus), over a period of ten months during the year November 2011 - July 2012. The river water samples were collected in different sampling bottles as per standard methods mentioned in literature (standard methods for the examination of water and waste water APHA, AWWA , WPEC 19th edition, Newyork 1998). The pH and turbidity were measured and estimated at sampling sites. The other parameters were measured by the procedure given by APHA in the laboratory. The investigation period was divided into three seasons that are pre-monsoon, monsoon and post-monsoon .

Microbial analysis

Cultivation media used for Isolation and purification of micro organisms

Eosin methylene blue(EMB) agar for differentiation, isolation of gram negative. Enteric bacilli (E.coli).Salmonella Shigella agar (SS agar) used for Salmonella species. Pseudomonas isolation agar is used for Pseudomonas species. Thiosulphate citrate bile sucrose (TCBC) agar is used for identification of Vibrio cholerae.

Serial dilution of the water samples are prepared and transferred on Nutrient agar for standared plate count. From the last two dilutions 1 ml of the sample was transfered to sterile Lactose broth for detection of coliform bacteria in water media .

After isolation of bacteria on selective media gram staining and biochemical reactions Indole test, Methyl Red test, Voges-Proskauer test, Citrate Utilisation test, (IMVIC) were performed for identification of bacteria.

Reagents used for the present investigation were A.R. /G.R. grade and double distilled water used for preparing various solutions. All the reagents and calorimetric solution were prepared and purified according to standard method for the examination of water and waste water.

RESULTS AND DISCUSSION

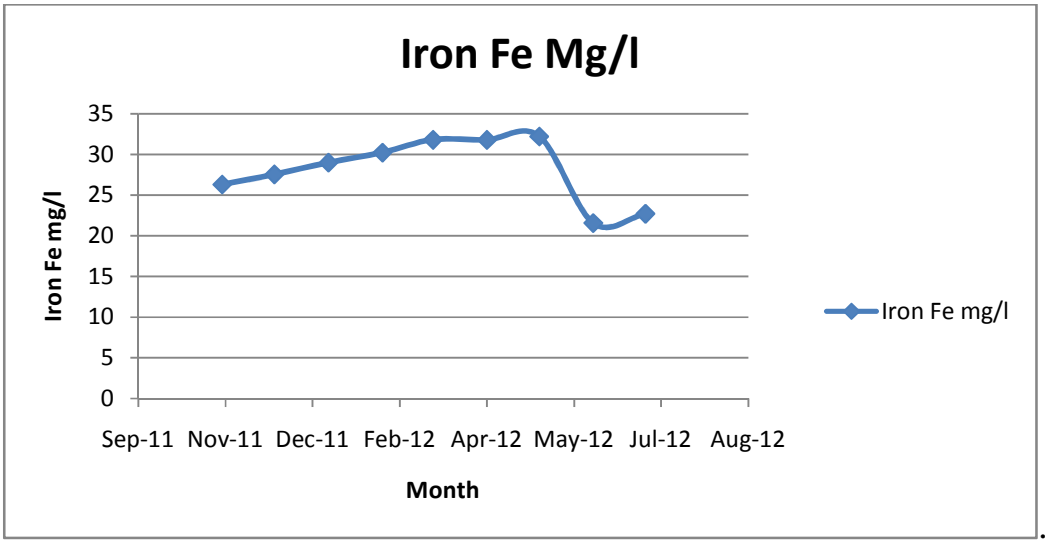
Table 1: physico-chemical parameters of Wardha river water sample

Wardha river water sample over a period of nine months during the year November 2011 - July 2012.									
Month of sampling	**Heavy Metals**		**General tests**						
	Iron (mg/l)	Manganese (mg/l)	Total Hardness (mg/l)	Chloride (mg/l)	pH (mg/l)	TDS (mg/l)	Dissolved Oxygen (mg/l)	Nitrate (mg/l)	COD (mg /l)
Nov. 11	26.3	17.51	518.00	22.00	7.5	970.00	7.50	0.07	18.50
Dec. 11	27.54	17.87	545.00	23.00	8.5	873.00	7.10	0.08	16.90
Jan. 12	28.99	18.43	572.00	35.00	8.3	785.00	6.75	0.09	17.60
Feb. 12	30.22	19.00	629.00	39.00	8.1	707.00	6.40	0.75	16.35
Mar. 12	31.80	19.59	692.00	43.00	8.9	636.00	6.10	0.08	16.00
Apr.12	31.78	20.20	700.00	50.00	8.7	572.00	5.80	0.17	18.80
May. 12	32.20	18.90	715.00	76.00	8.5	515.00	5.50	0.19	23.40
Jun.12	21.56	16.40	494.00	55.00	8.1	1090.00	7.80	0.20	24.00
Jul.12	22.70	16.20	470.00	62.00	7.9	1694.00	8.15	0.10	24.00
Average	28.12	18.23	592.77	45.00	7.45	871.33	6.78	0.19	19.50

The average Iron concentration is 28.12 mg/l in Wardha river water sample of Chandrapur Tahsil, though which is not in the limit. The permissible value for Iron in water is 3.0 mg/l.

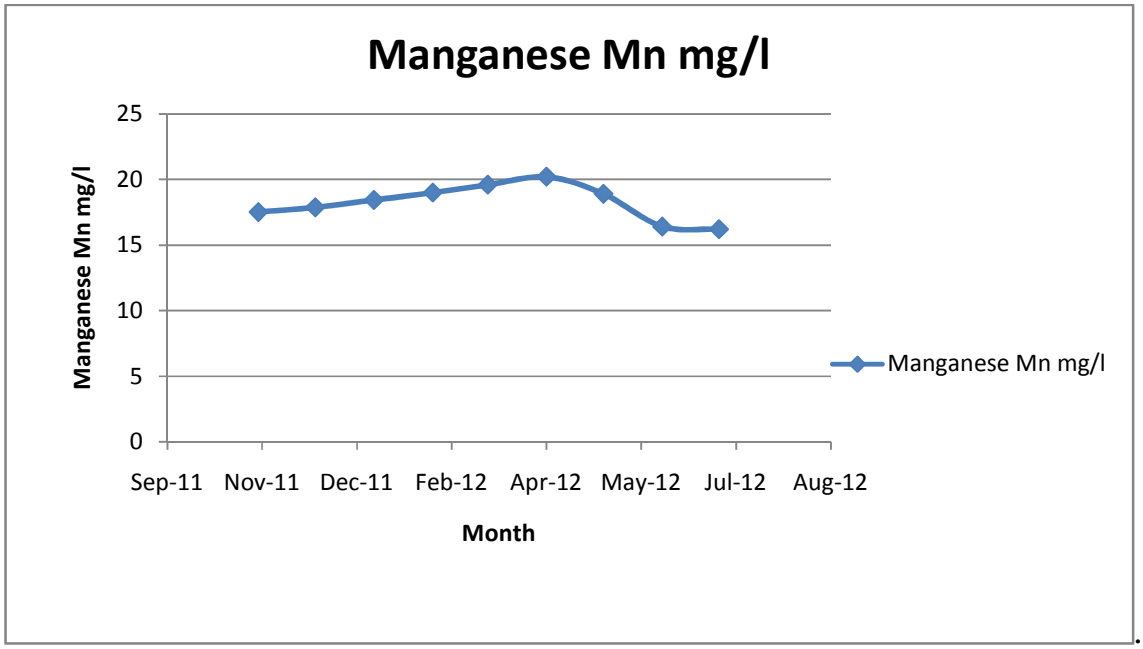
Graph- 1.1(a) :- Month variation in Iron

From the graph it comes in consideration that, the value of Iron content is high in summer season and less in rainy season in Wardha river water sample of Chandrapur Tahsil.



Graph-1.1(b):- Month variation in Manganese

From the graph it comes in consideration that the value of Manganese less in rainy season and high in summer season.



The average Manganese concentration is 18.23 mg/l in Wardha river water sample of Chandrapur Tahsil, though which is not in the limit. The permissible value for Manganese in water is 3.0 mg/l.

Table 2: Microbial analysis of Wardha river water sample

Sr No	Test Organisms	Media	Observation	Result
1.	E.coli	EMB agar	Green metallic sheen	E.coli present
2.	Salmonella Typhi	Salmonella shigella agar	Black colour colonies	Salmonella Typhi present
3.	P.aeroginosa	Pseudomonas isolation agar	NoGreenish colour colonies	P.aeroginosa absent
4.	V. cholerae	TCBC agar	Yellow colour colonies	V. cholerae present

Drinking water contaminated with E. coli is known to cause stomach and intestinal illness including diarrhoea and nausea, and even lead to death Total coliform, while not being regarded as a health threat in itself; It has been used as an indicator of other potentially harmful bacteria such as E. coli, Salmonela Typhi, V.cholerae and other viruses and parasites. The presence of E. coli in water suggests enteric pathogens and faecal pollution and has been reported to be the causative agent of diarrhoea, urinary track infection, haemorrhagic colitis, and haemolytic uraemia syndrome .

CONCLUSION

This study provides an informative primary data on water quality parameters and helps to understand the contamination of Wardha river water and its possible influence on the the ecological system. The major sources of pollutants are local anthropogenic activities, agricultural runoff containing fertilizers, pesticides, insecticides and industrial effluent containing toxic chemicals in higher amount. In the present study it is our efforts to evaluate many physico-chemical parameters and its characteristic behavior of a river water samples in different seasons. Many values of parameter crossed the maximum permissible limit, due to heavy discharge of effluent waste and domestic sewage in the river basin indicating deterioration of Wardha river water quality. The study suggested immediate need to take extensive water quality monitoring studies and to find the remedial measures to protect this important natural water sources in the study area.

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REFERENCES

[1] Agrawal I.C. and Srivastava H.C. ,pollution Survey of major drains discharge into river Ganga and Yamuna at Allahabad., Instn. Pub. Lic. Hlth. Engrs., TS III -48, (**1984**)
[2] APHA, Standard method for the examination of water and waste water. APHA,AWWA,WPEC, 19th edition, New York,(**1998**)
[3] APHA. Standard Methods for the Examination of Water and Wastewater, 18th Edition,
[4] A.Mahadevan; S.Krishnaswamy, A quality profile of river Vaigai (south India). Indian J.E APHA (American Public Health Association),Standard Methods for the Examination of Water and Wastewater. 18 Ed., Eds.,G. E. Greenberg, L.S. Clesceri, A.D. Eaton. Publ. Office American Public Health Association. Washington, D.C. 9-1-9-147 (**1992**)
[5] Ali J., An Assessment of the Water Quality of Ogunpa River Ibadan, Nigeria. M.Sc. Dissertation. University of Ibadan, Ibadan, Nigeria (**1991**)
[6] A.Mahadevan; S.Krishnaswamy, *Indian J.Environ Health*, **1983**, Vol.21(4),288-299.
[7] B K Sharma , Industrial Chemistry, Goel publishing house Meerut, **2001**
[8] BIS IS 10500 (**2004**) standard parameters given by Government of India.
[9] BIS IS 13428 (**2005**), Standard parameters of drinking water given by Government of India
[10] BIS IS 10500 (**1991**),standard parameters given by Government of India
[11] De AK, Environment chemistry (III edu), New Delhi, **1994**.
[12] District Gazetieer Chandrapur, **1979**.
[13] Evaluation of Water quality of Narmada river with reference to physico chemical parameters at Hoshangabad city, MP,India Sharma Shradha Vishwakarma Rakesh,Dixit Savita and Jain Praveen vol.1(3) June (**2011**)

[14] EI- Fadaly,H., M.M.EI-Defrawy, F. EI-Zawawy and D.Makia, *Pakistan J of biological Sciences*,3 (5), 777-781,(**2000**)
[15] Garg V.K., Gupta R., Goel S., Taneja M. and Khurana B., *Ind. J. Env. Prot*., 20(6),407-412 (**1999**)
[16] Iskandar M.B., The effectiveness of biofilter as a treatment for domestic waste water, University Malaysia Pahang (thesis) (**2010**)
[16] Karikari A.Y. and Ansa-Asare O.D., *West Afr. J. Appl. Ecol*., 10, 87-100 (**2006**)
[17] Maharashtra Pollution Control Board Mannual(MPCB,MUMBAI- 400 022), **2006**.
[18] Pratiksha Tambekar, Pravin Morey, R. J. Batra and R. G. Weginwar, *Journal of Chemical and Pharmaceutical Research*, 4(5):2564-2570, **2012**.
[19] Pratiksha Tambekar, R. J. Batra and R. G. Weginwar, *Journal of Chemical and Pharmaceutical Research*, 4(8):3813-3821, **2012**.
[20] Roy Y. and Kumar R. A., *J. Env. Prot*. 21(5), 398-402 (**2002**)
[21] Sangu R.P.S. and Sharma S.K. *Ind. J. Ecol*., 14(20), 278-287 (**1987**)
[22] Srinivasa,Rao B. and Venkateswarlu P., *Ind. J. Env. Prot.*, 20(3),161-164 (**1999**)
[23] SS DARA, A text book of Engineering Chemistry,S.Chand New Delhi, **2007**
[24] Tebutt T.H.Y.,Principles of Quality Control, Pergamon, England, 235 (**1983**)
[25] Text book of microbiology second edition by D.R.Arora.CBS publishers and Distributors (653-658)
[26] UNEP. Global Environmental Outlook .United Nations Environment, (**2000**)
[27] WHO. World Health Organization. Guidelines for Drinking Water Quality, World Health Organization, Geneva, Switzerland (**1993**)
[28] Water Standards and Health Advisories, EPA United States Environmental Protection Agency, Washington, DC, **2011**
[29] www.aphachemicals.com
[30] www.google.com
[31] http://www.apha.org/programs/healthweek/05nphw/ assessed on 02/11/**2010**.