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Assessment of physico– chemical parameters of water quality of Darna river water, Nasik (M.S.), India

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ABSTRACT

The term "Water quality" attributing to the overall make that significantly include physical, chemical constituents. Good water quality in rivers is critical for sustainable development and global health in terms of providing basic services and enabling economic activities. The domestic sewage, industrial waste and agriculture runoff discharged direct and indirect in water bodies of river and lake. This Pollutants deteriorate water quality especially River water. Due to contamination of water bodies the trophic status changes and renders them unsuitable for human use. Hence, regular monitoring of these factors is essential to determine the status of a water body. Studies on the ecological status and pollution levels of Darna River in Nasik district were found to be very scanty. Hence in the present study; pH, temperature, total dissolved solids, turbidity, DO, BOD, nitrates (NO_3) and phosphates (PO_4-) were analysed to understand their seasonal variations and to know the trophic status of Darna River.

Key word : *Physico-chemical properties, Water quality, Darna River*

Introduction

Water is the major component of all aquatic ecosystems existed on earth's surface and life supporting and sustaining role of the water is undoubtedly accepted worldwide. As there is continuous and a steady rise in population during last decade, the pressure on the fresh water bodies was ever increasing and till date most of these water resources have already being exploited to the great extent that resulted into "water crisis" both in terms of water quantity and quality. It has also been observed that the lack of adequate water sanitation and hygiene is responsible for an estimated 7% of all diseases and deaths globally. Assessment of water quality of the river is an important aspect for the development activities of the region because it is the sum of the water supply of drinking; domestic; industrial; agricultural and aquaculture practices Jain and Seethapathi (1996).

Darna River originates on the northern slopes of the Kullong hill fort in the Sahyadris about 13 km away from Nashik. Dam is constructed across Darna River near Nandgaon village. The Catchment area of Darna is wide, sandy and is broken by several small streams. Many of the chemicals, pesticides, detergents, fertilizers etc. alongwith the thermal power generation and automobile industries have been established on or near to the bank of Godavari as well as many of its tributaries like Darna River. Silts and organic matter that are carried away with water flow are directly discharged and accumulated in the Darna River.

Materials and Methods

Study Area

Following are the important features of Darna

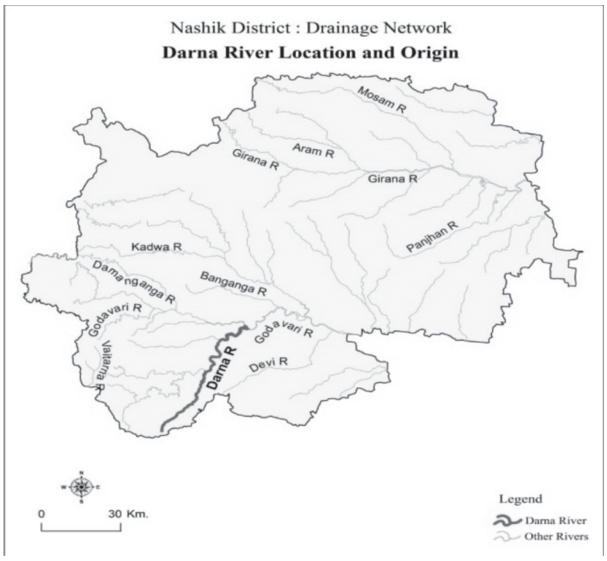

Fig. 1. Map showing location and origin of Darna River

River, Nashik
Origin of River: Kulang hill (south-east of Igatpuri.)
Location: Nasik District of Maharashtra
Length of River: 80 KM
River coordinates the Latitude: 19Â° 58' 0 N
River coordinates the Longitude: 73Â° 57' 0 E.
Dam on River: Lake Beale
Height: 28 m
Length: 1634 m
Reservoir total Capacity: 209,820 km^3
Gross storage Capacity: 226,870.00 km^3
Catchment area (km^2): 404 sq. km.
(Source: Official website of Nasik district; nashik.nic.in)

Field work

The sampling was done at selected six sampling stations; regular monthly intervals covering all seasons for the period of 24 months, i.e. two consecutive years from January 2015 to December, 2016. Such Intervals between sampling were so chosen that significant variations will not be missed. Also, meteorological data like temperature, rainfall during the period of study had been collected from Hydrology unit, Nasik. The ground glass stoppered bottles (250 cc) were used for the collection of water samples. The physical parameters like of temperature and pH were determined in the field, immediately with the help mercury thermometer, digital pH meter etc. The methods used for physical and chemical analysis were standardized according to the procedure given in 'Standard Methods for the Examination of Water and Waste Water' by APHA (1989); (Trivedy and Goel, 1984).

Turbidity was measured by Nephelometric Turbidometer. Electric conductivity was measured in the laboratory with the help of an instrument; conductivity meter. Total hardness of water samples was calculated in the laboratory by using EDTA complexometric method by titration (Goetz *et al.,* 1959). TDS were calculated by multiplying the observed electrical conductance of the samples, measured by using digital conductivity meter. Determination of carbon dioxide from collected water samples by Moore (1939). Dissolve oxygen was determined with the help of Winkler s iodometric modified azide method (APHA, 1989). BOD & COD ware measure by oxidation method. Nitrate ions react with brucine in strong sulphuric acid solution to form a yellow colour that measured spectrophotometrically. Vanado-molybdate method was estimation of phosphate in water samples. Argentometric method was considered for determination of chloride ions.

Results and Discussion

The present limnological studies carried out at Darna River, Nasik during the period from January 2015 to December 2016. The present study includes analysis wear fourteen parameter of water quality parameters, changes in their values, season wise fluctuations. Average water temperature ranged between the 17 °C to 30.5 °C and recorded as lowest in winter and highest in summer and monsoon (Lashari *et al.,* 2009). The pH values during the present study were observed in the range between 6.6 between 8.86. pH values which were comparatively higher in winter season. It can be said thatthere is a direct relationship between water temperature and pH according to Mishra *et al.* (2007). Conductivity values were ranged between 110 µmhos/cm to 320 µmhos/cm. The values of conductivity were recorded as comparatively higher in the summer season (Ramulu and Benarjee, 2013).

The average DO was recorded as maximum in the summer season and minimum in winter and monsoon during the study period due todecrease in the water level, high temperature and rapid rates of decomposition of organic matter (Seeta and Reddy, 2018). Monthly values of BOD were recorded and these were found to be ranged from minimum of

Table 1. Average variation in Physico-chemical parameters of Darna River from January 2015 to December 2015

Sampling Sites	Temp °C	Turbidity NTU	T.D.S mg/L	Total Hardness mg/L	Conduct. mhs/cm	Dissolved O_2 mg/L	pH	Free CO_2 mg/L	B.O.D mg/L	C.O.D. mg/L	Nitrates mg/L	Sulphates mg/L	Chlorides mg/L	Phosphates mg/L
S1	23.25	20.05	137.1	102.4	194.45	6.65	7.90	5.13	3.40	13.33	1.13	8.23	16.6	0.43
S2	22.59	18.92	143.1	116	188.59	6.43	8.01	5.55	3.94	14.50	1.55	8.61	20.4	0.38
S3	23.34	19.12	125.2	118.6	201.25	6.50	8.00	5.40	4.29	15.58	1.86	8.55	23.5	1.33
S4	22.91	19.44	134.5	129.8	232.92	6.83	8.01	5.57	4.76	17.17	1.83	8.49	22.9	0.95
S5	23.91	19.06	132.9	141.8	212.59	7.04	8.09	5.08	5.18	19.50	2.34	8.17	39.2	1.26
S6	23.75	20.49	116.8	157.8	202.17	7.15	8.05	4.98	5.72	21.17	3.37	7.95	46.4	0.87

Table 2. Monthly variation in Physico-chemical parameters of Darna River from January 2016 to December 2016

Sampling Sites	Temp °C	Turbidity NTU	T.D.S Mg/L	Total Hardness Mg/L	Conduct. mhs/cm	Dissolved O_2 Mg/L	p^H	Free CO_2 Mg/L	B.O.D Mg/L	C.O.D. Mg/L	Nitrates Mg/L	Sulphates Mg/L	Chlorides Mg/L	Phosphates Mg/L
S1	22.25	17.35	137.5	94	180.34	7.20	7.62	5.3	2.24	13.83	1.39	8.34	11.7	0.88
S2	22.16	17.51	122.0	106.6	228	7.52	7.55	5.54	2.76	15.50	1.78	8.41	19.4	0.88
S3	21.58	17.75	137.8	129.5	222.15	7.66	7.78	5.64	3.43	17.67	2.72	8.62	21.6	0.89
S4	22.25	18.05	130.9	159.4	175.34	7.64	7.74	5.39	3.94	18.75	1.01	8.67	28.7	0.57
S5	22.58	17.54	138.4	185.0	185.09	7.80	7.78	5.50	4.45	20.33	2.74	8.61	35.5	1.01
S6	22.5	17.44	133.25	220.5	220.5	7.81	7.84	5.52	5.37	21.33	3.18	9.16	45.5	0.87

0.52 mg/L (July 2016) to maximum of 20.60 mg/L (January 2016). The study showed low BOD values in monsoon and higher summer. Kumar *et al.* (2012); Sharma *et al.* (2014). The TDS fluctuated between 65 to 217 mg/L. Temperature increase may also result in the increase of turbidity; decrease of DO; that can further decrease photosynthetic activity of algae. (Ajagekar and Nikam, 2018). Turbidity values are generally found higher in monsoon season also; that may be due to slightly heavy rainfall in mountain areas Igatpuri region. Increased high concentration of TDS increases the nutrients of water body which was resulted into eutrophication of ponds (Singh and Mathur, 2005). The total hardness of water from Darna River was found to be varied from 56 mg/L to 350 mg/L. The highest amount of total hardness in the water was recorded during 350 mg/L. was recorded during the months of October. Tyagi and Malik (2018). The range of free CO_2 recorded as between the 2.6 mg/L, to 9.1 mg/L. Free CO_2 of water samples was found to be higher in summer season as compared to monsoon and winter seasons Mehta (1999). The high value COD record in monsoon than winter and summer due to the rapid deposition of an organic matter Khulbe and Durgapal (1993). Nitrates values were recorded in the range from minimum of 0.12 mg/L in the month of January to11.30 mg/L in the month of May. Pawar and Sonawane (2011). The values of chlorides were found to be in the range between 4.2 mg/L to 143.2 mg/L. The comparatively higher values of Chlorides were recorded in the winter. Verma *et al.*, (2012) sulphates values were recorded between the ranges of 1.5 mg/L to 15.89 mg/L. The low sulphate values during summer months during the present studies (Bharadwaj *et al.*, 2011).

Conclusion

The present limnological studies at Darna River, Nasik involves water quality analysis so as to get status of water quality with its season wise fluctuations. The physico-chemical parameters show stable condition of the river Darna, which suggests that the

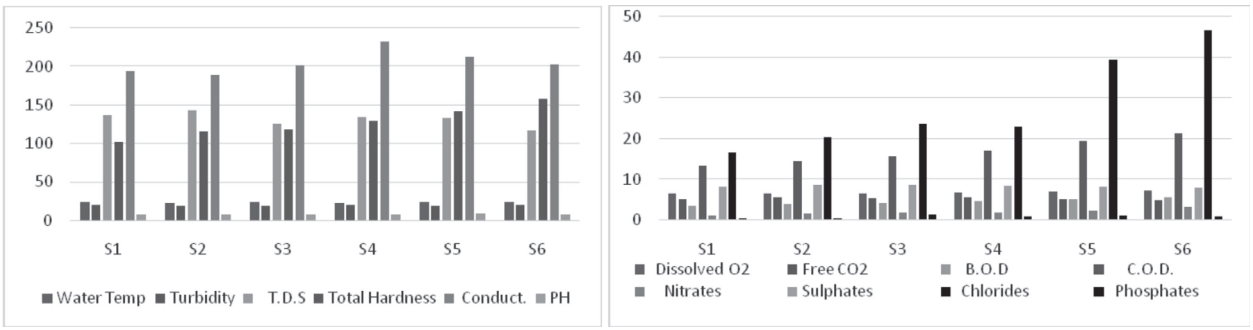

Fig. 2. Average variation in Physico-chemical parameters of Darna River from January 2015 to December 2015

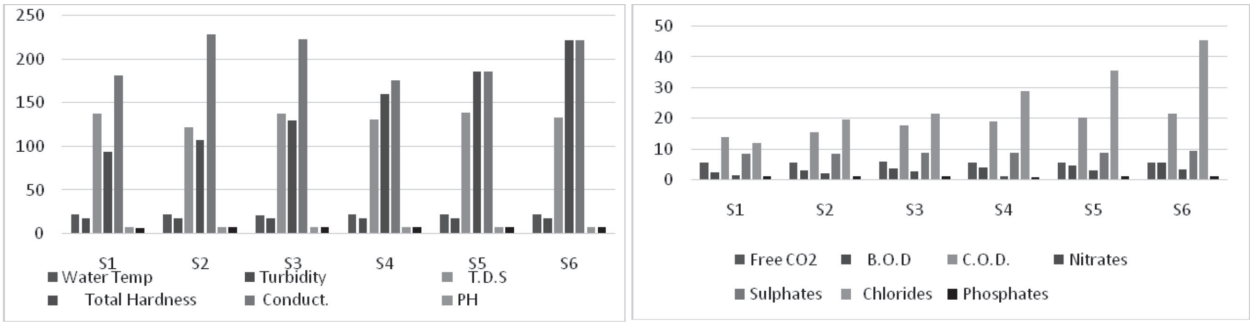

Fig. 3. Average variation in Physico-chemical parameters of Darna River from January 2016 to December 2016.

river is still in productive stage and suitable for various purposes like irrigation, fishing etc. During the last few years; there is a rapid growth in population, urbanization in the vicinity of catchment area of the Darna River. Hence mechanisms for the collection and disposal of domestic, industrial sewage, the sewage treatment plants are observed to be insufficient.

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References

Ajagekar, V.V. and Nikam, K.N. 2018. Limnological study of water from Khanapur Dam Ajara Dist:-Kolhapur, MS, India. *Int. Journal of life Scences* Special Issue A 10 No 48951.

APHA 1989. *Standard Methods for the Examination of Water and Waste Water*, 17th Edition APHA, *Washington D.C.*

Bharadwaj, K.N. Kainthola, A. and Tiwari, S.C. 2011. Re-assessment of taxonomic diversity of Cyanobacteria in microbial mats and physicochemical characteristics of Badrinath thermal spring, Garhwal Himalaya, India. *Pro. Nat. Acad. Sci. India. Sect. B.* 81 (II): 235-241.

Diya Tyagi and Malik, D. 2018. Assessment of Physico chemical parameters and water quality index of Ram-Ganga reservoir at Kalagarh, Uttarakhand *Int. Journal of Current Research in Life Sciences.* 7 (3) : 1234-1239. ISSN 2319-9490.

Gonzalves, E.A. and Kamat, N.D. 1959. Two new species of *Anabaena* from Western India. *Hydrobiologia.* 13 (3): 236-238.

Jain, C.K. and Seethapathi, P.V. 1996. Limnological studies of Kayamkulam lake. *Indian J. Environ. Protection*. 16 (8) : 561-568.

Khulbe, R.D. and Durgapal, 1993. Studies on the water pollution in Naintal Lake with special reference to Mycofloral and other pollutants. *Indian J. Microbiol. Ecol.* 3 : 19-28.

Lashari, K.H., Korai, A.L., Sahato, G.A. and Kazi, T. G. 2009. Limnological studies of Kinjhar Lake, District Thatta, Sindh, *Pakistan Pak. J. Anal. Environ. Chem.* 10 (1-2): 39-47.

Mehta, Ashish, J. 1999. Sedimentary process in the intertidal Zone. *Limnol. Oceanogr.* 44 (4). 1184-1185.

Mishra, Vidya, Goldin Quadros and Athalye, R.P. 2007. Hydrological study of Ulhas river estuary, Maharashtra, India. *J. Aqua. Biol*. 22 (1) : 97-104.

Narasimha Ramulu K. and Benarjee, G. 2013. Physico-chemical factors influenced plankton biodiversity and fish abundance-a case study of Nagaram tank of Warangal, Andhra Pradesh. *Int. J. Life Sc. Bt & Pharm. Res.* 2 (2) : 248-260

Rakesh Verma, 2013. Current status of physico-chemical characteristics and biological factor of W. Ramganga River in Kumaun Himalaya, India. *Int. J. Curr. Microbiol. App. Sci*. 2 (8): 114-123

Seeta, Y. and Manikya Reddy, P. 2018. Diversity of Diatoms in the Rivers of Telangana *International Journal of Recent Research Aspects* ISSN: 2349-7688, Vol. 5, Issue 1.

Singh, R.P. and Mathur, P. 2005. Investigation of physico chemical properties of fresh water reservoir of Ajmer City, Rajasthan. *Ind. Journ. Env. Sci.* 9 : 57-61.

Trivedy, R. K. and Goel, P.K. 1984. *Chemical and Biological Methods for Water Pollution Studies.* Environmental publications.