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Short Communication

Compliance of ponds water quality towards mathematical modules

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Abstract

Mathematicians have successfully proposed different mathematical modules for calculate the water quality of various water reservoirs. On these modules basis the water reservoirs may be categorically classified and the may be assigned for different purposes. Not only this, the nature of the catchment area of the water reservoirs may also be assessed. The water quality of five selected ponds in Varanasi has been subjected to different modules. It has been observed that ponds with identical catchment area follow one mathematical modules and show ponds water contains usable quality which are useful for anthropogenic purpose while other ponds water quality disagreeable and reject able.

Keywords: Mathematical models, water quality index.

Introduction

Water is the one of the most important requirement of biotic species. Its water quality explains the total characteristic features of those regions Diersing and Nancy[1]. As the increments of the population in cities, the water quality also affected and reduces its pureness. Today, pollution is a very serious threat and to destroy them a very large step in environment. For future planning water modeling is a necessary system. Our future totally darkness, if we can't maintain water quality, so the measurements of the water quality is very essential requirement of human purpose Johnson et al[2]. Human health is directly related to the water quality of those regions or space. At Varanasi water quality reduces by the uses of the fertilizers, soap, detergents, bathing buffaloes and industrial purpose Hulga[3]. Water quality index method measures them by some parameter such as DO, BOD, COD, TDS etc. The accuracy of water quality show by this method of those specific regions. Water quality is the central peak of the pond water. This peak graph is also related to the human health and ponds water. Water quality managements by some method and its controls are very necessary steps of human life Jagadeeswari and Ramesh[4]. In many cities the uses of water is continuously reduces by its quality. The increment of water quality in ponds can obtain by regulation of domestic, industrial, pilgrims and agricultural waste discharge waste water treatment technique by chemical and biological process are highly developed. The important management decision in water quality controls relates to the level of waste treatment consistent with the different uses of natural and man-made water bodies.

This implies the best ability to choose the response of waste-receiving water to future in future investment in waste treatment facilities. Therefore, the development and management of water resources system requires an analysis of waste discharge taking place in the aquatic environment.

The models can be use to evaluate the better plans for control and management of water quality. The models can also assist in evaluating the relative benefit to water quality from removal of different constituent. The factors which directly effects the degree of complexity of modeling effort include the water quality and their problems at present time, the observe data available on present water quality associated with employing a simplified model in complex analysis.

Sampling sites and sample collections: The water samples were collected from five ponds of Varanasi city. The selected ponds contained different dischargeable effluents. The samples were collected in year 2008-2010. Polythene double Stoppard containers were used for collection of water samples. All the containers were thoroughly cleaned and rinsed before the collection water samples. The analysis was carried out by using standard methods for the examination of water and waste water (APHA) Clesceri et al[5]. The digital DO analyzer for analysis for dissolved oxygen, bio-chemical oxygen demand (BOD) in mg/L and chemical oxygen demand (COD) mg/L parameters measured by standard method of APHA.

Materials and methods

The water samples were collected from different regions and analyzed for four parameters. The parameters Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD) and Total dissolved solid (TDS) were analyzed in the laboratory as per the standard procedure of APHA (1995).

The water quality has been calculated by using the standards procedure of drinking water quality recommended by the

(WHO) world health organization. The calculation of water quality index of the water system has been used by weighted arithmetic index method Brown et al[6]. Further, quality rating (q_n) was calculated using the following standard expression.

$$q_n = 100 [V_n - V_{io}] / [S_n - V_{io}]$$

(Let there be n letter use for water quality parameters and quality rating (q_n) and related to n^{th} parameter is that number which shows the fluctuate value of that parameter with respect to it[s] standard permissible value (S.P.V).

Where: q_n = represent the quality rating for the n^{th} water quality parameter. V_n = at a given samples site show the estimated value of the n^{th} parameter. S_n = show the S.P.V value (standard permissible value) of the n^{th} parameter. V_{io} = n^{th} parameter give ideal value in pure water. (i.e., 0 value for all parameters except the parameter PH (7.0mg/l) and Dissolved oxygen (14.6 mg/l) respectively.

Results and discussion

The various physicochemical parameters of the water system (ponds) have been established by the water quality index method of different regions. The values of various physico-chemical parameters have been shown in Table-1. The water quality index obtained for the water body in different regions of i.e., WA_1, WA_2, WA_3, WA_4 and WA_5 ponds respectively. The actual quality of water Chatterji and Razinddin[7] has been shown in Table -2.

Table-1: Physico-chemical characteristic of surface water samples.

Sampling site	Years	DO (mg/l)	BOD (mg/l)	COD (mg/l)	TDS (mg/l)
WA_1	2008	745	6032	754	435.25
	2009	52.47	5830	954	657.25
	2010	332	6539	1254	571
WA_2	2008	545	6188	600	608.75
	2009	295	5632	712	357.25
	2010	382	6489	425	358.37
WA_3	2008	545	6019	754	332.75
	2009	349	5620	954	557.25
	2010	407	6319	779	296
WA_4	2008	654	654	412	307.75
	2009	445	154	612	507.25
	2010	332	854	32211	508.3
WA_5	2008	237	47652	32211	351
	2009	287	47652	32160	301
	2010	391	47377	31666	324

Table-2: Quality of water for study area with higher and lower values at these parameters.

parameters	Higher value	Sampling sites	Lower value	Sampling sites
DO mg/l	0.303	WA_3	-0.117	WA_5
BOD mg/l	0.191	WA_1	-2167	WA_5
COD mg/l	0.2300	WA_2	-37.021	WA_5
TDS mg/l	0.2175	WA_2	-0.654	WA_1

The pollution level is considerably very high, so that the pond (Ramnager, Ashapur and Kapildhara) water is unhealthy for the human purpose. This water quality values clearly has shown that it is unsuitable for the human uses. It is also observed that the pollution level is relatively very high Ramnager pond, Ashapur pond and Kapildhara pond.

From the observed data it's clearly indicates that these values are also supported by the following physico-chemical parameters of different regions. All the physico-chemical parameters selected for the water quality index classification by weighted arithmetic method (WQI).

The present observed value indicated that the concentration of dissolved oxygen fluctuated between 0.303 ppm to 0.117ppm. These observe values high in Kapildhara pond and lower in Bhabhniaw pond. This investigation is in conforming to the observation data of Reddy et al[8], Ghose and George[9], Swarnalatha and Narasingaro[10] and Venkateswarlu[11].

Biochemical oxygen demand (BOD) is the amount of oxygen taken up by micro-organisms that decompose organic waste matter in water. The BOD concentration ranged between 0.191mg/l to 2167mg/l. Its value is higher in Ramnager pond and least value in Bhabhniaw pond. These value high in industrial pond being in conformity of Chatterjee[12].

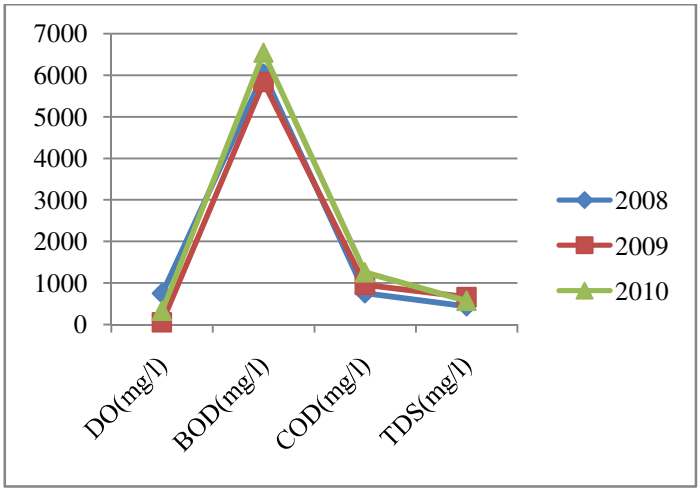
The chemical oxygen demand (COD) of water represent the amount of oxygen required to oxidize all organic matter, biodegradable and non-biodegradable by a strong chemical oxidant. The COD concentration ranged between 0.2300mg/l to 37.021mg/. Its value high in Ashapur pond (WA_2) while least value in Bhabhniaw pond (WA_5). From chemical point of view domestic pond water show many variations.

The total dissolved solid concentration ranged between 0.2175mg/l to 0.654mg/l. Its value high in Ashapur pond (WA_2) while least value in Ramnager pond (WA_1).

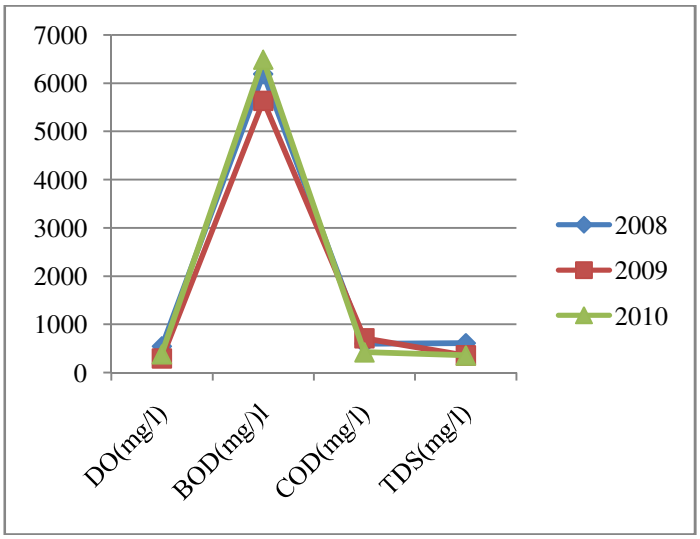
The water quality parameters DO, BOD, COD, value very least in sites WA_5 and TDS value in WA_1 site while DO parameter show high value in WA_3, BOD in WA_1, COD in WA_2 and TDS in WA_2 sites, so from above observation of the physico-chemical parameters, it can be concluded that WA_5 pond water quality is suitable from drinking and other activities but WA_1 and WA_2, WA_3 sites pond water disagreeable due to very high value of these parameters. The water quality observed of different sites has been shown in Figure-1.

Conclusion

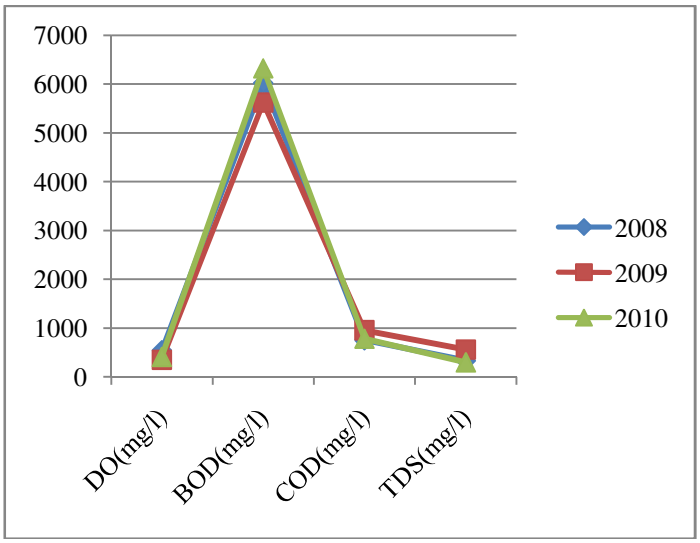
The low value of DO, BOD, COD and TDS at the WA_5 and WA_1 sample sites and high value at the WA_3,WA_1 and WA_2 sites are due to variation in the climate, study area and topographic conditions. These parameters value effect the quality of water on those regions. Public health directly attach to the water quality on those area.



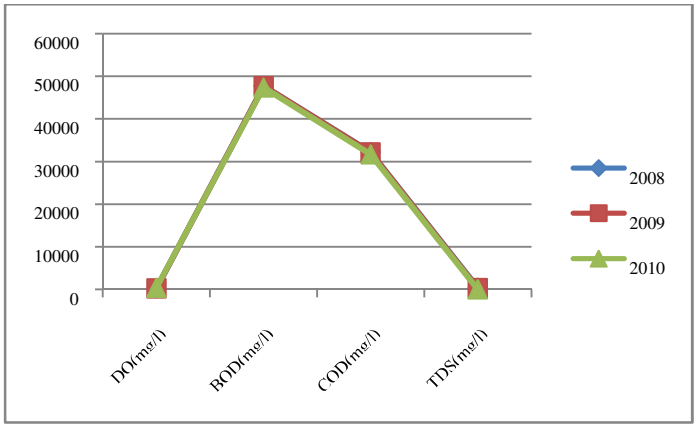
WA_1



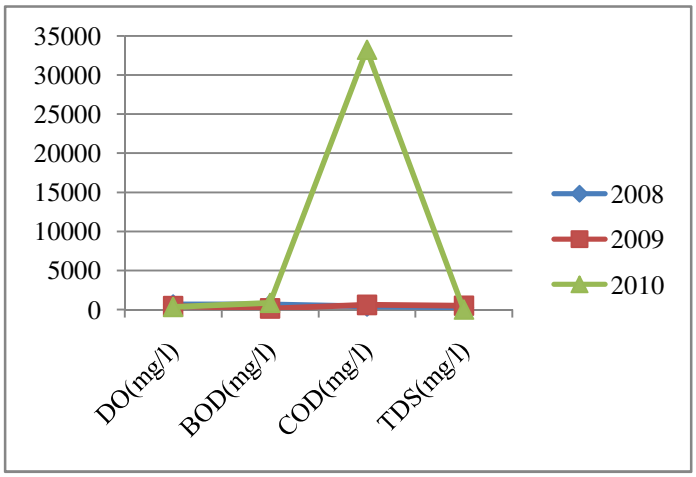
WA_2



WA_3



WA$_4$



WA$_5$

Figure-1: Water Quality observed at different sites of study area.

References

1. Diersing Nancy (2009). Water Quality: Frequently Asked Questions. Florida Keys National Marine Sanctuary, Key West, FL.

2. Johnson D.L, Ambrose S.H, Bassett T.J., Bowen M.L., Crummey D.E., Isaacson J.S., Johnson D.N., Lamb P, Saul M. and Winter- Nelson A.E. (1997). Meaning of Environmental terms. *Journal of Environmental quality*, 26(3), 581-589.

3. Hulya B. (2009). Utilization of the Water Quality Index Method as a Classification Tool. *Environmental Monitoring and Assessment*, 167(1-4), 115-124.

4. Jagadeeswari P.B. and Ramesh K. (2012). Water Quality Index for Assessment of Water Quality in South Chennai Coastal Aquifer, Tamil Nadu, India. *International Journal of Chem. Tech Research*, 4(4), 1582-1388.

5. Clesceri L.S., Arnold E.**,** Greenbery and Andrew D. (1998). Standard method for the examination of water and wast water (APHA). 20th Edition American water works Association (AWWA) and Water pollution control Feredation (WPCF).

6. Brown R.M., Mc Clelland N.I., Deininger R.A. and Connor M.F.O. (1972). Water Quality Index–Crashing, The Psychological Barrier. Proc. 6th Annual Conference and *Advances in water pollution research*, 787-797.

7. Chattterjee C. and Raziuddin M. (2002). Determination of Water Quality Index of a degraded river in Asanol Industrial area (West Bengal). *Nature, Environment and Pollution Technology*, 1(2), 181-189.

8. Reddy K.R., Sacco P.D., Graetz D.A., Campbell K.L. and Sinclair L.R. (1982). Water Treatment by Aquatic Ecosystem: Nutrient Removal by Reservoirs and Flooded Fields. *J. Environmental Management*, 6(3), 261-271.

9. Ghosh A. and George J.P. (1989). Studies on the Abiotic Factor and Zooplankton in a Polluted Urban Reservoir Hussain Sagar, Hyderabad : Impact on Water Quality and Embryonic Development of Fishes. *Indian J. Environ Health*, 31(1), 49-59.

10. Swarnalatha N. and Narasingrao A. (1993). Ecological Investigation of two Lentic Environments with Reference to Cyanobacteria and Water Pollution. *Indian.J.Microbial. Ecol*, 3, 41-48.

11. Venkateswarlu V. (1986). Ecological studies on the rivers of Andhra Pradesh with special reference to water quality and pollution. *Proc. Indian Acad. Sci. (Plant Sci)*, 96(6), 495-508.

12. Chatterjee A.A. (1992). Water Quality of Nandakanan Lake, India. *J.Environ. Hlth*, 34(4), 329-333.