



Physico-Chemical analysis of Chulband River at Dodake-Jambhali, Gondia District. (MS), INDIA.

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Abstract:

Assessment of physico-chemical parameters were carried out during throughout the year Feb.2010 to Jan-2011 from Chulband River at Dodake-Jambhali in Gondia District. The various parameters such as Velocity, Temperature, Colour, Odour, Taste, Turbidity, Transparency, TDS, TSS, TS, pH, DO, BOD, CO₂, Hardness, Calcium, Magnesium, Chloride and Phosphorous were analysed. The results revealed that there was significant alterations in the physicochemical parameters and most of the parameters were in the normal range and indicated better quality of river water.

Keywords: Physico-chemical water parameters, Chulband River, Dodake-Jambhali.

Introduction

Water is essential to life on Earth. Water was useful to the people for drinking, cleaning, rearing animals and for agriculture, plantation etc. The greatest civilizations came up around river basins. Rivers are dynamic systems and change in nature several times during their course because of changes in physical conditions such as slope and bedrock geology. Water quality has direct relation with aquatic productivity (Moses, 1983; Shrestha and Kazama, 2003). River also serves for domestic, industrial and agricultural disposal, transportation, getting food resources and for recreational activities (Dhote and Dixit, 2011). Urbanization found to be root cause of water contamination. Animals use same water for drinking and can also contaminate through direct defecation and urination. Immersion of idols during festivals found to be one of the reasons of river pollution (Kamal et al., 1999). Biological assessment is a useful alternative for evaluating the ecological quality of aquatic ecosystems since biological communities integrate the environmental effects of water chemistry. Aquatic organisms need a healthy environment. Maximum productivity depends on optimum level of physicochemical parameters (Sadia et al., 2013). Assessment of riverine water was carried out by assessment of its physicochemical parameters (Rao and Vaidyanadhan, 1979; Muniyan and Ambedkar, 2011). In India, clean drinking water is available to only 12% of the people. The rest have to use polluted sources of water, which causes diseases, health & hygiene problems (Trivedi, 2004).

Cherian and Shahare (2011) studied earlier on "Pollution, a threat to conservation of biodiversity in fresh water body of Chulband River, Gondia dist., Maharashtra". Shahare

and Cherian (2012) worked on "Study of Cyanophycean diversity at Chulband Dam, Gondia Dist. (M.S.) India". Chulband River makes its origin from various small and large streams scattered in the forest hilly areas of eastern part of Gondia district. It flows in the forest area for few kms and then enter in the Jambhali village which the present study was undertaken.

Materials and Methods

Gondia (Latitude. 21° 28' N & Longitude. 80° 29' E) district is situated in the eastern part of Maharashtra state. The district covers an area of 4843.12 sq. km. of which 2644.70 sq. km. fall under forest area. The source streams of the Chulband River originate from the Salegaon Dalli near Dodake-Jambhali and Palasgaon hill complex. The Chulband flows southwards with a subparallel valley to that of the Wainganga to its east and joins it at the southern limits of the district near the village Soni. The river like Bagh, Chulband, Pangholi, Suz, Gadhavi, Chandan, Bavanthadi are the tributaries of river Wainganga. Thus Chulband River is the life line of Gondia district. The present investigation Dodake-Jambhali location is (Latitude. 21°12'36.93" N & Longitude. 80°15'45.40" E) and Fig. 1.

Sampling and Analysis of Water

The water samples of the Chulband River were collected at monthly intervals from the selected site on the each month, from Feb 2010 to Jan 2011. The samples were collected between 9.00 AM to 11.00 AM from sampling site in pre-cleaned, BOD bottle, sterilized polythene containers of one litre capacity and brought to the laboratory for the analysis of various physico-chemical parameters. Water velocity, temperature, pH, Colour, Odour, Taste, Turbidity and Transparency, were recorded immediately on the spot. The

following physico-chemical parameters were analyzed TDS, TSS, TS, pH, DO, BOD, CO₂, Hardness, Calcium, Magnesium, Chloride and Phosphorous. The parameters were analysed

by using standard procedures described in APHA (1998), IAAB (2006) and Water Velocity (<http://www.geography-site.co.uk>) method.



Fig.I Chulband River, Dodake-Jambhali.

Result and Discussion:

In the present investigation, considerable variation in physicochemical parameters is presented in Table no.1

Velocity: Water current in the river lies within the ranges of 0.455 to 0.086 m/sec (Graph.1). the max in the month of July and min in the month of Oct. seasonal variation in water current has been reported in streams of Palani hills (Sivaramkrishhnan and Venkataraman, 1990).

Temperature:

The water temperature depends on geographical location and meteorological condition. Hutchinson (1957) suggested that meteorological conditions are responsible for seasonal changes in temperature. In the present study water temperature ranged from minimum of 24°C in December 2010 to the maximum of 32 °C in Aug 2010 (Graph.2). Similar reports were observed by Salve and Hiware (2008).

Colour, Odour, Taste : The colour, odour and taste are given in the Table no.1. colour was note down on visual observation. Odour by smell and taste by drinking water condition.

Turbidity: Turbidity was higher which was because of rains bringing the sediments from the adjoining areas and due to turbulent flow which stirred up the nonliving matter like silt and sand at the bottom of the river during rainy seasons. However, other seasons may affects due to low level of water content and high anthropogenic activities along the river water. The turbidity ranges between Negligible to 360 in the month of July and rest of the month negligible turbidity recorded (Graph.3).

Transparency: Transparency represented the light penetration capacity of the water. For the Kolar River, Nagpur Region, was shown the contrasting results, 94 cm (Watkar and

Bhatkulkar, 2012), which was comparative higher with respect to present study. Dense population of algae reduces the water transparency. Similar results were reported by earlier studies in the country (Chaurasia and Adoni, 1985; Kaushik *et al.*, 1989, 1990; Kant and Raina, 1990). The transparency ranges between 6.09 cm in the month of July and 91.44 cm in the month of Sep (Graph.4).

TDS (Total Dissolved Solids): Total Dissolved Solids indicates the salinity behaviour of river water. The TDS value during the period of investigation was ranged between 98 mg/L in Oct 2010 and 289 mg/L in July 2010 (Graph.5). The permissible limit for the TDS throughout year was 120 mg/l was recommended by ICMR. In the present study, found higher value that may reflect the higher pollution status at Chulband River. The higher TDS was depends on the natural sources, location, and geology of the river. Similar trend was reported by Jindal and Sharma (2010) in Sutlej, and Bobdey *et al.* (2010) in Wainganga River.

TSS (Total Suspended Solids): Total Suspended Solids (TSS) of the water samples was minimum 65 mg/l at Nov and maximum 200 mg/l at the Sep (Graph.6).

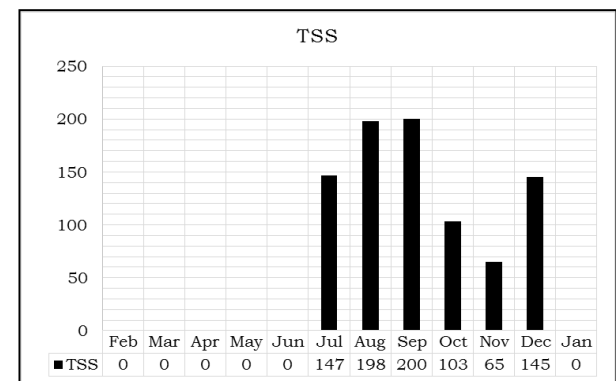
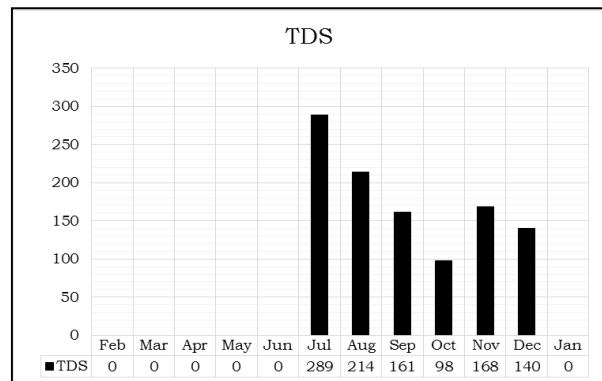
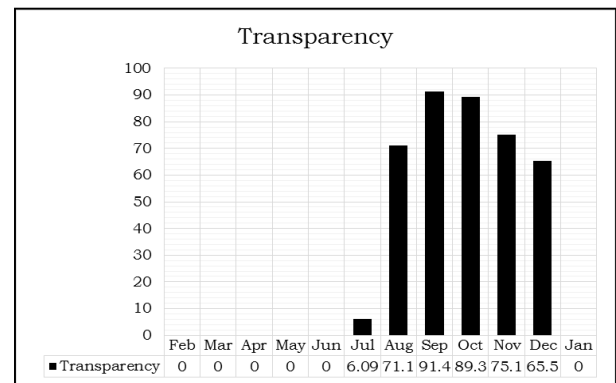
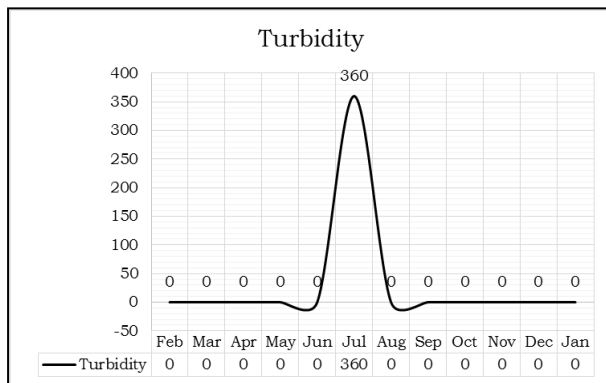
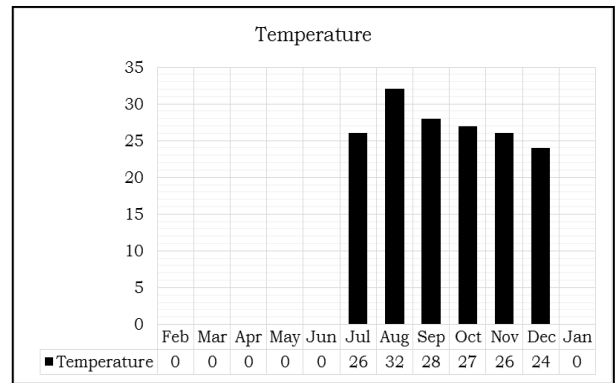
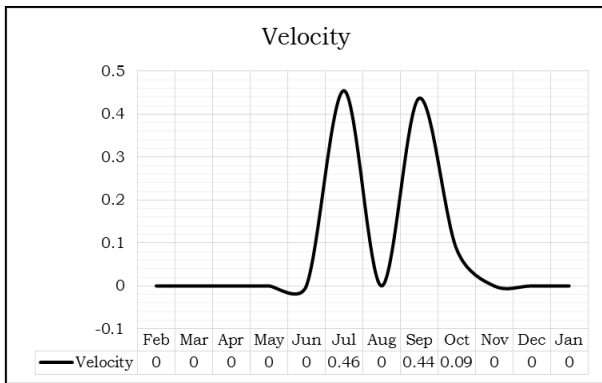
TS (Total Solids): TS of the water causes the reduction in light penetration, ecological balance and ultimately affects the water quality. It may affect the osmotic regulation of aquatic fauna. TS ranged between 436 mg/l in the month of July 2010 and 201 mg/l in the month of Oct 2010. (Graph.7).

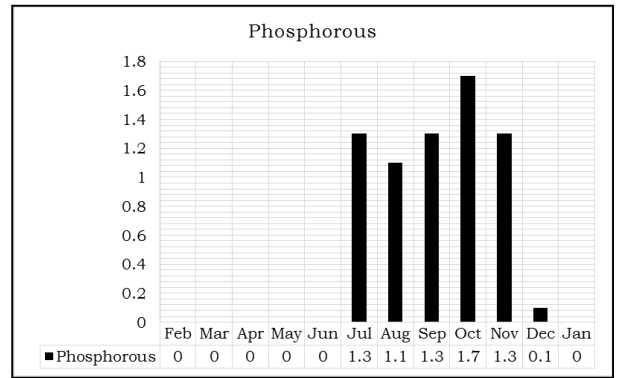
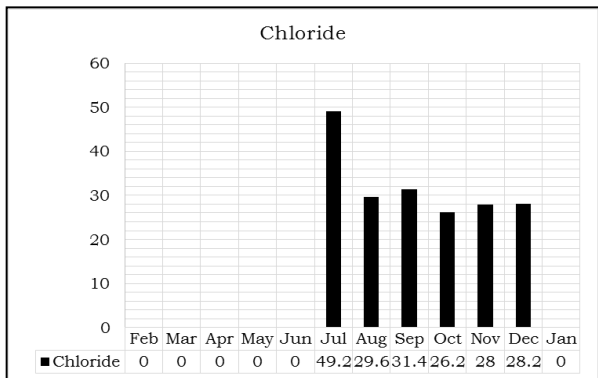
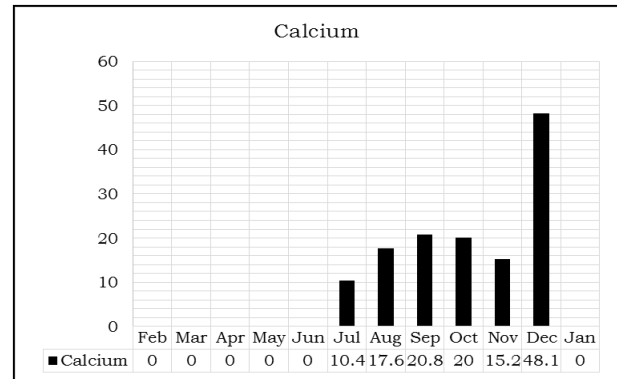
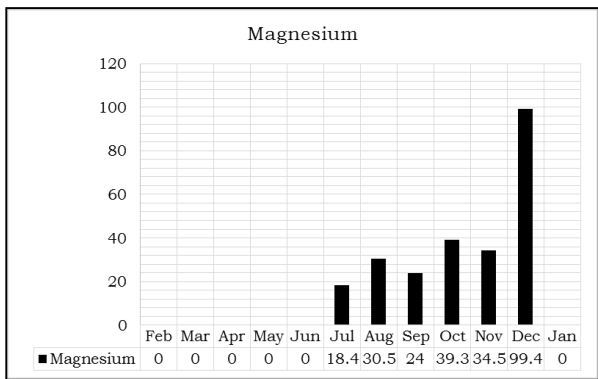
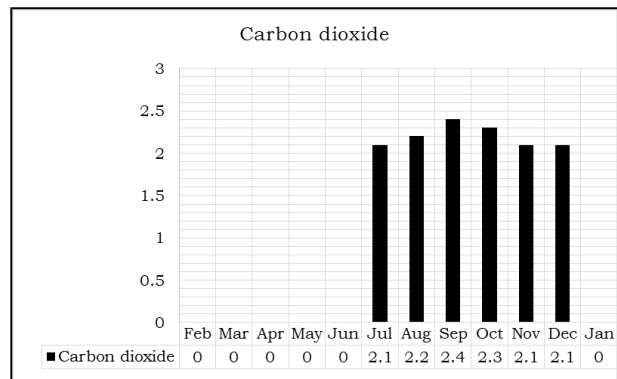
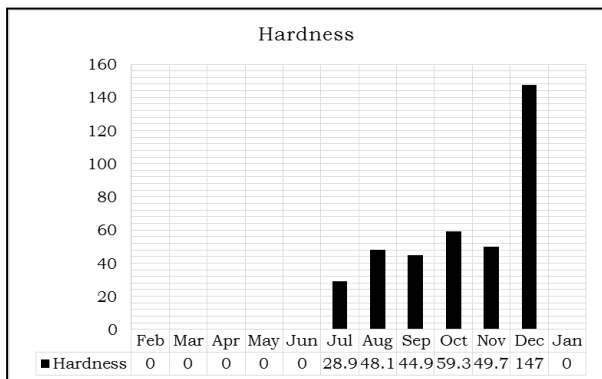
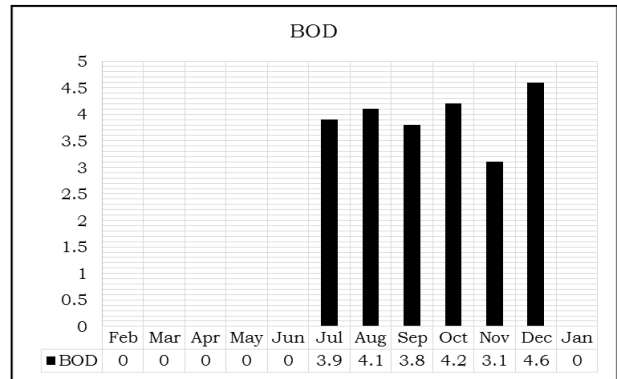
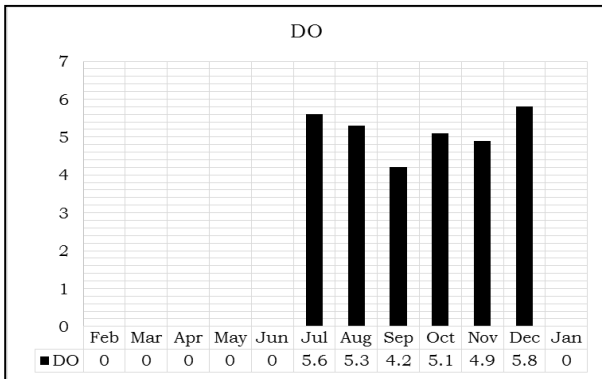
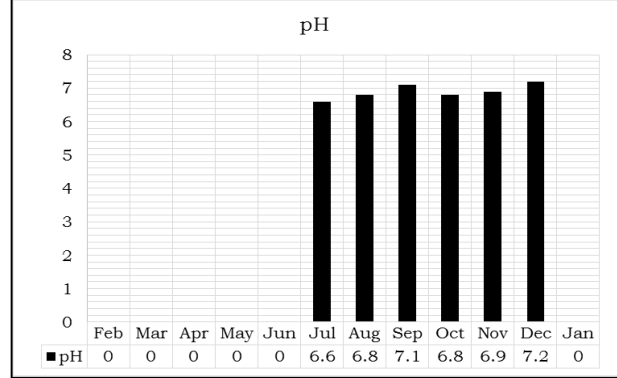
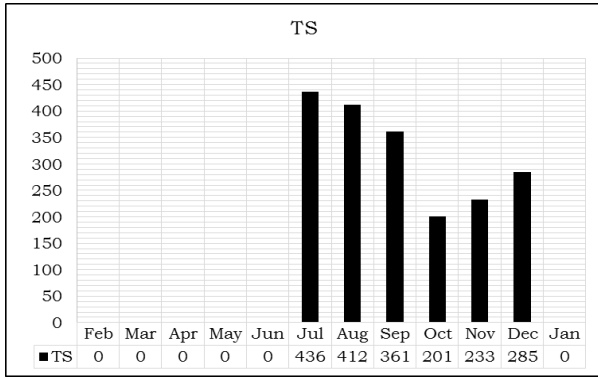
pH: Present study revealed that pH of water ranged from 6.6 in July 2010 to 7.2 in Dec 2010 (Graph.8). Bobdey (2002) had recorded pH values between 7.0 to 8.50 in the river Wainganga at Pauni, Maharashtra.

DO (Dissolved Oxygen): In the present Dec 2010 and 4.2 mg/L in Sep 2010 investigation DO varied between 5.8 mg/L in

Table No.1: Physico-chemical parameters Chulband River, Dodake-Jambhali

Parameters	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Velocity	RD	RD	RD	RD	RD	0.455	0	0.437	0.086	0	0	RD
Temperature	RD	RD	RD	RD	RD	26	32	28	27	26	24	RD
Colour	RD	RD	RD	RD	RD	Yellowish	Watery	watery	watery	Watery	Watery	RD
Odour	RD	RD	RD	RD	RD	NO	NO	NO	NO	NO	NO	RD
Taste	RD	RD	RD	RD	RD	DA	AG	AG	AG	AG	AG	RD
Turbidity	RD	RD	RD	RD	RD	360	Neg.	Neg.	Neg.	Neg.	Neg.	RD
Transparency	RD	RD	RD	RD	RD	6.09	71.12	91.44	89.26	75.12	65.45	RD
TDS	RD	RD	RD	RD	RD	289	214	161	98	168	140	RD
TSS	RD	RD	RD	RD	RD	147	198	200	103	65	145	RD
TS	RD	RD	RD	RD	RD	436	412	361	201	233	285	RD
pH	RD	RD	RD	RD	RD	6.6	6.8	7.1	6.8	6.9	7.2	RD
DO	RD	RD	RD	RD	RD	5.6	5.3	4.2	5.1	4.9	5.8	RD
BOD	RD	RD	RD	RD	RD	3.9	4.1	3.8	4.2	3.1	4.6	RD
CO2	RD	RD	RD	RD	RD	2.1	2.2	2.4	2.3	2.1	2.1	RD
Hardness	RD	RD	RD	RD	RD	28.8576	48.096	44.8896	59.3184	49.6992	147.494	RD
Calcium	RD	RD	RD	RD	RD	10.4208	17.6352	20.8416	20.04	15.2304	48.136	RD
Magnesium	RD	RD	RD	RD	RD	18.4368	30.4608	24.048	39.2784	34.4688	99.3584	RD
Chloride	RD	RD	RD	RD	RD	49.15	29.56	31.41	26.23	27.95	28.15	RD
Phosphorous	RD	RD	RD	RD	RD	1.3	1.1	1.3	1.7	1.3	0.1	RD





(Graph.9). DO is most important factor of the water ecosystem, as it regulates the metabolic processes of the most organisms. DO in water bodies depends on various factors like climatic conditions, partial pressure of gases, dissolved salts, stream velocity, relative solubility, photosynthetic activity of plants, respiration by aquatic microbes, plants and animals (Zutshi and Vass, 1978).

BOD (Biochemical Oxygen Demand): In the present research BOD was ranged between 3.1 mg/L in November 2010 and 4.6 mg/L in Dec 2010 (Graph.10).

CO₂ (Carbon Dioxide): The CO₂ of the water sample varied between 2.1 mg/l in July, Nov & Dec. months. and 2.4 mg/l in the month of Sep. (Graph.11). Similar results were reported by Jindal and Sharma (2010) in Sutlej. The CO₂ level mostly governs by the available algae as well as diffusion through atmospheric air.

Hardness: Hardness was found to fluctuate between 28.85 mg/l in the month of July 2010 and 147.49 mg/l in the month of Dec. (Graph.12).

Calcium: The presence of calcium in the water is more likely in the form of carbonate, which is also indicated by high values of hardness in water samples. Calcium ranged between 10.42 mg/l in the month of July and 48.13 mg/l in the month of Dec. was recorded (Graph.13).

Magnesium: Magnesium is an essential element for all living organisms as it takes part in chlorophyll biosynthesis and enzymatic transformation (Weztel, 1975). The Magnesium of the water sample varied between 18.43 mg/l in the July month and 99.35 mg/l in the month of Dec. (Graph.14).

Chloride: In the present study, Cl⁻ concentration varied from 26.23 – 49.15 mg/L, minimum being in the month of October and maximum in the month of July 2010 (Graph.15). Similar results were reported by Gourkar et. al, (2016).

Phosphorus: Phosphorus is the essential elements for increase in productivity of biological produce (Hutchinson, 1957). The Phosphorus of the water sample varied between 0.1 mg/l in the month of Dec 2010 and 1.7 mg/l in the month of Oct. (Graph.16).

Conclusion:

During study, water sample from of Chulband River, Dodake-Jambhali Gondia district (M.S) were collected for the period of 12 months (Feb 2010 to Jan 2011) and analysis of various physico-chemical parameters had been carried out. The results revealed that there was

significant alterations in the physicochemical parameters and most of the parameters were within the permissible limit and indicated better quality of river water. The results indicate that the Chulband River, Dodake-Jambhali is non-polluted and can be used for Domestic, Irrigation and Pisciculture.

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