Water Quality of Meleng River in Jorhat District, Assam

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Abstract - *Water quality through analysis of physicochemical parameters of River Meleng in Jorhat District (Assam) reported. Average monthly water temperature ranged from 16.27^0 to 28.14^{0}C. pH varied between 6.15 and 7.58 while Dissolved oxygen between7.13 and 7.7 and free carbon-dioxide from 1.28 to2.28 mg/l. Other parameters like transparency, velocity, total alkalinity also showed monthly variation. However, the study revealed that water quality parameters were within permissible limit and it can be said that the river water is safe for aquatic biota particularly the variety fish inhabiting in the R. Meleng.*

Key Words: Water quality, R. Meleng, aquatic biota, Assam, physicochemical parameters

1.INTRODUCTION

Water balances human life system in a positive way; rivers constitute great potential of fishery resources in India. However, human activities often alter the water bodies and influence the water quality and also determine the use of water. Therefore, it is necessary to monitor water quality, understand the chemical characteristics and provide a reliable assessment of water quality (Zhang, *et al.* 2010). Seasonal variation study of water quality parameters provides information about the health over a period of time. Water quality determines not only how well fish will grow in an aquaculture operation, but whether or not they survive. The knowledge of testing procedures and interpretation of results are important to the fishermen too. The present communication highlights the water quality of River Meleng, a tributary of the Brahmaputra and also assessed the impact of water quality on the riverine biota.

2. MATERIALS AND METHODS

2.1 Study area and collection of sample: - River Meleng is tributary of the Brahmaputra River, located in the north east of Jorhat town (26^{0}48/to 26^0 49/ N and 94^0 08/to 94^0 10/E). The river is an important source of fisheries in Jorhat district of Upper Assam. Water samples were collected seasonally from three different localities of River Meleng between April 2011 and March 2012. Four seasons viz., pre-monsoon (Mar-May), monsoon (Jun-Aug), post-monsoon (Sept-Nov), and winter (Dec-Feb) were considered for the present study. Methods applied for the estimation of the physico-chemical parameters of water were as follows:-

Air and water temperature were recorded by mercury thermometer graduated up to 110^0 C. pH of the water value was recorded with the help of a digital pH meter. Dissolved oxygen (DO), free carbon dioxide (FCO_2) and current flow were estimated by titration method (Trivedy *et al.* 1987). Total alkalinity was recorded by titration method (APHA 1995). Transparency was recorded by Secchi disc.

Table 1: - Monthly variations of physico-chemical parameters in Meleng River

Month	Atm. Temp (^{0}C)	Water Temp (^{0}C)	Transp (cm)	Velocity (m/s)	pH	DO (mg/l)	FCO_2 (mg/l)	Total alkalinity (mg/l)	TSS (mg/l)
Jan	16.16 ±0.54	16.27 ±0.65	19.12 ±0.56	0.66 ±0.03	6.47 ±0.05	7.38 ±0.05	1.39 ±0.07	55.32 ±1.05	78.97 ±0.55
Feb	18.31 ±0.23	18.06 ±0.37	20.88 ±0.78	0.42 ±0.04	6.5 ±0.2	7.6 ±0.04	1.54 ±0.05	57.48 ±1.11	64.41 ±1.06
Mar	22.21 ±0.29	18.27 ±0.51	17.88 ±0.32	0.24 ±0.04	6.62 ±0.04	7.13 ±0.05	1.56 ±0.05	58.33 ±1.08	68.22 ±0.99
Apr	25.16 ±0.72	18.87 ±0.45	17.59 ±0.72	1.11 ±0.03	6.71 ±0.08	7.3 ±0.06	1.58 ±0.05	59.28 ±0.69	132.06 ±6.49
May	26.37 ±0.07	21.21 ±0.17	18.79 ±0.82	1.22 ±0.04	6.73 ±0.07	7.297 ±0.06	1.83 ±0.08	61.47 ±1.08	161.26 ±2.68
June	27.31 ± 0.53	26.23 ±0.56	16.93 ±0.15	1.27 ±0.06	7.49 ±0.07	7.32 ±0.02	1.71 ±0.07	89.28 ±3.55	208.57 ±0.79
July	28.58 ±0.26	27.13 ±0.56	17.15 ±0.41	1.32 ±0.26	7.43 ±0.03	7.3 ±0.02	1.78 ±0.06	114.96 ±8.08	297.78 ±1.27
Aug	29.28 ±0.23	28.14 ±0.36	17.99 ±0.23	1.37 ±0.25	7.58 ±0.07	7.24 ±0.03	2.28 ±0.04	119.31 ±3.48	311.3 ±0.79
Sept	26.28 ±0.31	24.17 ±0.46	18.17 ±0.33	1.26 ±0.07	6.8 ±0.04	7.23 ±0.06	1.79 ±0.04	75.52 ±0.91	285.45 ±1.84
Oct	26.43 ±0.45	23.22 ±0.68	19.18 ±0.13	1.18 ±0.05	6.7 ±0.09	7.4 ±0.02	1.79 ±0.03	77.19 ±1.61	194.26 ±1.04
Nov	28.39 ±0.39	22.29 ±0.67	20.61 ±0.22	0.95 ±0.05	7.08 ±0.14	7.7 ±0.06	1.87 ±0.06	77.52 ±2.53	112.68 ±0.49
Dec	19.97 ±0.37	16.71 ±0.58	18.52 ±0.37	0.83 ±0.07	6.15 ±0.05	7.33 ±0.05	1.28 ±0.07	53.14 ±0.55	106.04 ±0.75

3. RESULT

The river water was found to exhibit interesting values in its physico-chemical parameters. Both air and water temperature was found to be lower in January (Table 1) and higher in August. Transparency varied from 16.93±0.15 (June) to 20.88±0.78 (February). The highest value of pH was observed in August (7.58±0.07) and the lowest in December (6.15±0.05). Current velocity also varied from 0.24 ±0.04 (March) to 1.37 ±0.25 m/s (August). Dissolved oxygen varied from 7.13 ±0.05 (March) to 7.7 ±0.06 mg/l (November). Maximum value of free carbon dioxide was observed in August (2.28±0.04mg/l) and the minimum in December (1.28±0.07mg/l). Again, the maximum value of total alkalinity recorded in August (119.31±3.48mg/l) and that of minimum in December (53.14±0.55mg/l). The highest value of total suspended solid (TSS) was observed in August (311.3 ±0.79mg/l) and the lowest value in February (64.41 ±1.06mg/l). High amount of suspended solids (TSS) were recorded in monsoon months particularly during high floods when the river water was found highly turbid.

4. DISCUSSION

Physico-chemical parameters are very important to identify the nature, quality and type of the water for any aquatic ecosystem. Temperature affects the organisms, as well as the chemical and physical characteristics of water (Delince, 1992). Here both the air and water temperature is higher in August and lower in January. Environmental temperature fluctuates both daily and seasonally which is an important physical parameter directly relate to chemical reactions in aquatic ecosystem (Goel *et al*., 1986). According to Dhar and Slathia (2014) longer photoperiod, intensified bright sunlight and clear sky during summer may result in high air temperature while shorter day length and reduced bright light may explain winter decrease in atmospheric temperature. Transparency increases due to the increasing water level. According to Ekeh and Sikoki (2003) with the seasonal variation, transparency is higher in the dry season than in the rainy season. In the present study, maximum transparency was recorded in February and that of minimum in June. According to Welcome (1985), acceleration of water flow causes rivers to pick up sediments; hence water heavily charged with silt load. The trend of low transparency in the wet season, between monsoon and pre-monsoon during the heavy rains, accompanied by increased water velocity occurred because of an increased sediment load from surface run-offs (Lucinda and Martin, 1999). Velocity of the water showed maximum in August and minimum in March. According to Otobo (1995) the faster water velocity during the flood or rainy season and low flow in the dry season is natural. The pH values of water is higher in the hot period and lower in cold and it varies from 7.8-9.3 (Gupta and Mathur 2001). In the study pH is higher in monsoon and lower in winter months. Krumgalz *et al*., (1980) and Ezz El-Din (1990) reported that the seasonal variation in pH was mainly affected by temperature, salinity, carbonate and bicarbonate system, rather than the photosynthetic activity of the primary producers. The high bicarbonate values of the water body indicated that their high productivity and consequently favorable contribution for fish production. High temperature during the warm period can result in intensive evaporation and flow minimization which may lead to the accumulation of organic matter responsible for oxygen depletion in the water (Justic *et al*, 1997). In the study DO showed higher values during winter (December) and lower during pre-monsoon (March). Dissolved oxygen is one of the most important parameter of the water quality which directly affecting survival and distributing flora and fauna in an ecosystem. The quantity of DO in water is directly or indirectly dependent on water temperature, partial pressure of air etc. (Chaurasia and Pandey, 2007). The increase in CO_2 level during summer season may be due to decay and decomposition of organic matter (Joshi *et al*, 1995). At R. Meleng, the FCO_2 was observed relatively higher during monsoon (August) and lower during winter (December). The acceptable limit of FCO_2 of surface water is 10mg/l. It increases the pollution of water (Koshy and Nayar, 2000). On the other hand, alkalinity generally observed to see the nutrient level in water. Accordingly to them alkalinity was classified into three different level groups (Moyle 1949)- (a) 1-15mg/l (poor), (b) 16-60mg/l (moderate) and (c) more than 60m/l (highly nutrient rich). Highest value of total alkalinity recorded in monsoon-August (119.31±3.48mg/l) and that of lowest value in winter-December (53.14±0.55mg/l). The solids are suspended and dissolved matter in water and are related to the productivity of water body (Goher, 2002). The TSS was high during pre-monsoon but low during winter months. This finding is in close conformity with Manjare *et al*., (2010) and Jagtap *et al*. (2011). So the river water is rich in nutrient. All the physico-chemical parameters show healthy and suitable status of the river water.

5. CONCLUSIONS

The air and water temperature found higher in monsoon and lower in winter. Transparency was higher in dry season and lower in rainy season which influences the productivity. Velocity of the water body shows higher value in rainy season and lower in dry season. The pH values of water was higher in rainy month and lower in winter months. DO showed higher values during winter and lower during pre-monsoon. CO_2 showed a reverse trend. The alkalinity and the suspended solids also showed seasonal fluctuation As a whole, the parameters studied were found with in the permissible limit of BIS and hence it may be concluded that the Meleng River is healthy environment for survival of its biota.

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BIOGRAPHIES

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