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Study of Physical Characteristics of Serlui-A River, Mizoram, Northeast India

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ABSTRACT

The present study deals with the assessment of physical characteristics of Serlui-A River in Mizoram, North-East India, for a period of two years (from October 2016-September 2018). The samples were collected on a monthly basis and the results were presented on a seasonal basis, i.e., Post-monsoon (October-January), Pre-monsoon (February-May) and Monsoon (June- September) season. It was observed that temperature ranged from 16.70C to 26.70C; total dissolved solids from 24.7 mgL-1 to 148.5 mgL-1; electrical conductance from 23 µS to 277.2 µS and turbidity from 2.3 NTU to 5 NTU. The findings were compared with water quality standards given by USPH, BIS, WHO and ICMR.

1. Introduction

Rivers are generally used for different matters such as drinking domestic and residential water supplies, irrigation in agriculture, hydroelectric plants, transportation, tourism, recreation, etc and it is because of this reason that the water quality has considerable importance (Venkatramanan et al., 2014). The component of water which is present at the optimum level suitable for the growth of plants and animals is considered as quality of water (Kamal et al., 2007). Physical, chemical and biological parameters are used to assess water quality of a specific area or source. The water is considered to be harmful for the human health if these parameters fall above the permissible limit.

Water has now become a scarce resource due to over exploitation and pollution due to anthropogenic activities like urbanization, agricultural development, over use of fertilizers, inadequate management of land use and sewage disposal. This directly or indirectly affects the quality of water and makes it unfit for domestic purpose (Gupta and Shukla, 2006; Patil and Tijare, 2001; Singh and Mathur, 2005).

2. Study Area

Serlui-A river is approximately 7-8 kilometers long which flows from Lungleng Village (Aizawl District, Mizoram) towards Maubawk locality (Aizawl District, Mizoram) where it merges with the river Tlawng. This river was used to generate 1MW Serlui-A hydroelectric power station.

For detailed investigation, four sampling sites have been identified as:

1. Site 1: Was selected at the source in Lungleng village and considered as control/reference site.
2. Site 2: Was selected just before the hydroelectric power station.
3. Site 3: Was selected just after the hydroelectric power station.
4. Site 4: Was selected at the point where the river merges with the river Tlawng.

3. Materials and methods

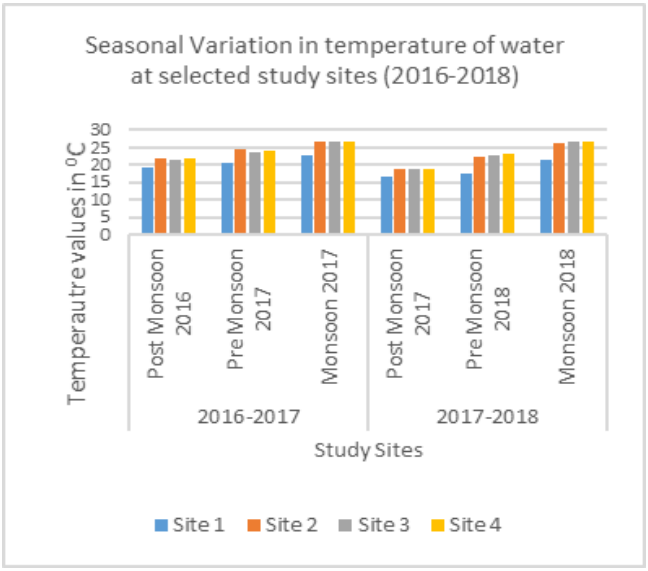
The water samples were collected from the selected sites in triplicates on monthly interval for a period of two years i.e., from October 2016 to September 2018. The water samples were analyzed for various physical-chemical characteristics namely: Temperature, Electrical Conductivity, Total Dissolved Solids, and turbidity. The methods for analysis were followed as shown in the `Standard Methods for Examination of Water and Wastewater` as prescribed by APHA and Handbooks of methods in environmental studies, water and waste water analysis. Temperature was measured using digital thermometer, electrical conductivity using electrical conductivity cell, total dissolved solids using digital TDS meter and turbidity using Nephalometer.

4. Results and discussion

Temperature: During 2016-17, the temperature of water ranged from 19.2 ^{0}C (Site I during Post-monsoon season) to 26.7 ^{0}C. Subsequently, during 2017-2018 values were between 16.7 ^{0}C (Site I in Post-monsoon season) and 26.6 ^{0}C (Site IV in Monsoon season). Overall findings state range of temperature as 16.7^{0}C to 26.7^{0}C.

The temperature was found to be high in Monsoon season for both the years. Similar findings were made by Singh & Gupta (2010), Lalchhingpuii (2011) and Lalzahawmi et al., (2016). During the rainy months, there may be an increase in temperature due to the discharge of organic matter through surface runoff and subsequently microbial decomposition which leads to release of catabolic energy in the form of heat which results into increase of water temperature.

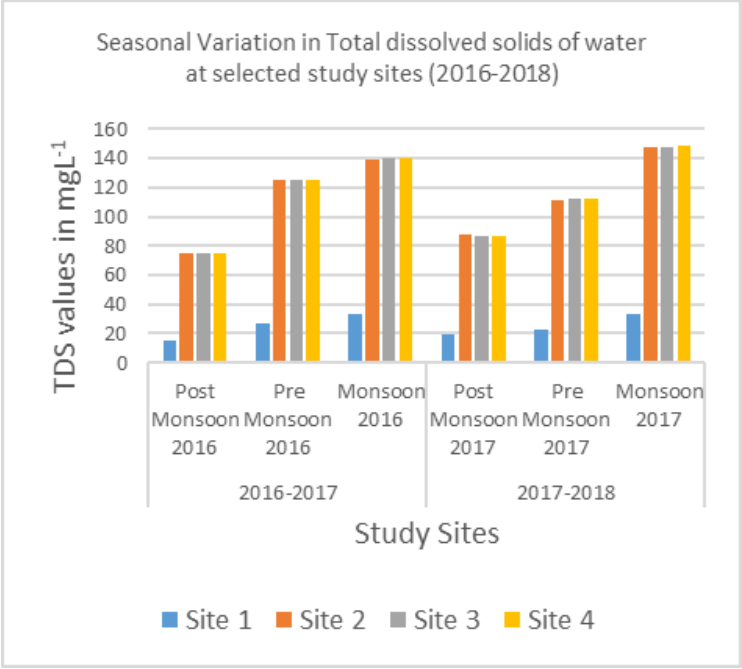
Figure-1
Seasonal variation in temperature of water



Total Dissolved Solid: During 2016-17, the total dissolved solids of water ranged from 14.7 mgL^{-1} (Site I during Post-monsoon season) to 140 mgL^{-1} (Site III during Monsoon season). Subsequently, during 2017-2018 values were between 19 mgL^{-1} (Site I in Post-monsoon season) and 148.5 mgL^{-1} (Site IV in Monsoon season). Overall findings state range of total dissolved solid as 24.7 mgL^{-1} to 148.5 mgL^{-1}.

Total dissolved solids was found to be high during monsoon season and lower during post-monsoon season for both the years. The addition of domestic waste water, garbage and sewage etc. in the natural surface water body may lead to high TDS value during monsoon season (Verma et al., 2012). Similar observations were made by Lalzahawmi Chenkual et.al (2016) and Lalchhingpuii (2011).

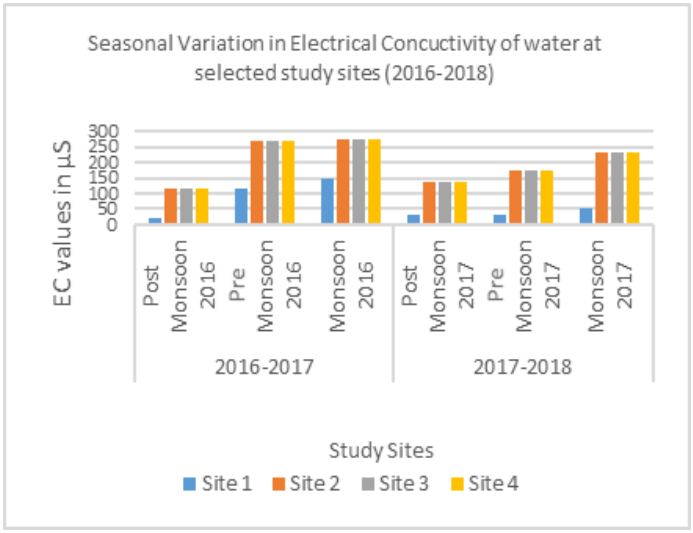
Figure-2
Seasonal variation in total dissolved solids of water



Electrical conductivity: During 2016-17, the Electrical Conductivity of water ranged from 23 µS (Site I during Post-monsoon season) to 277.2 µS (Site IV during Monsoon season). Subsequently, during 2017-2018 values were between 28.7 µS (Site I in Post-monsoon season) and 232 µS (Site IV in Monsoon season). Overall findings state range of electrical conductivity as 23 µS to 277.2 µS.

The electrical conductivity was found to be high in Monsoon season for both the years. Higher EC values during monsoon season may be attributed to the high concentration of dissolved solids, decomposition and mineralization of organic matters (Sunar, 2017). Similar findings were made by Mustapha (2008) and Sunar and Mishra (2018).

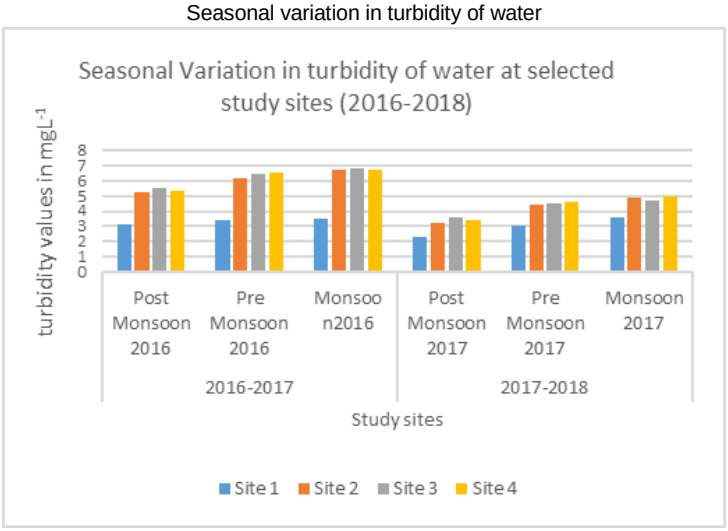
Figure-3
Seasonal variation in electrical conductivity of water



Turbidity: During 2016-17, the turbidity of water ranged from 3.1 NTU (Site I in Post-monsoon season) to 6.7 NTU (Site II and III in Monsoon season.) Subsequently, during 2017-2018 values were between 2.3 NTU (Site 1 in Post-monsoon season) and 5 NTU (Site IV in Monsoon season). Overall findings state range of turbidity as 2.3 NTU to 5 NTU.

The turbidity of water was found to be lowest during Post-monsoon season and highest during Monsoon season. Turbidity value may be higher during rainy season due to the flow of rainwater carrying significant amount of organic and inorganic material, suspended particles, sediments and other pollutants from the surroundings which contributes to turbidity in water. Similar results were found by Joshi et al., (2009) and Sunar (2017).

Figure-4
Seasonal variation in turbidity of water



5. Conclusion

The result obtained from the present study are compared with the standards of drinking water given by different scientific agencies like BIS, ICMR, USPH and WHO. It was found that all the values were within the permissible limit. This river is frequented by visitors for picnic and washing of blankets but in spite of that the river is suitable for household use if not for drinking purpose.

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References

1. Venkatramanan S, Chung SY, Lee SY, and Park N. Assessment of river water quality via environmentric multivariate statistical tools and water quality index: A case study of Nakdong River Basin, Korea. Carpathian Journal of Earth and Environmental Sciences. 214; 9(2) :125–132.

2. Kamal D, Khan AN, Rahman MA and Ahamed F. Study on the Physico-chemical properties of water of Mouri River, Khulna, Bangladesh. Pakistan Journal of Biological Sciences. 2007, 10(5)710-717.
3. Gupta, S and Shukla, DN. Physico-Chemical Analysis of Sewage Water and its Effect on Seed Germination and Seedling Growth of Sesamum indicum. Journal of Research in National Development. 2006; 1:15-19.
4. Patil, D B and Tijare, RV. Studies on Water Quality of Godchiroli Lake. Pollution Research. 2001; 20:257-259.
5. Singh, RP and Mathur P. Investigation of Variation in Physico-Chemical Characteristics of a Fresh Water Reservoir of Ajmer city, Rajasthan. Indian Journal of Environmental Science. 2005; 9: 57-61.
6. APHA (2005). Standard Methods for the Examination of Water and Wastewater: 21st Edition as prescribed by American Public Health Association, American Water Works Association and Water Environment Federation, Washington, D.C.
7. Maiti SK (2001). Handbook of Methods in Environmental Studies, Vol 1: Water and Wastewater Analysis, ABD Publishers, Jaipur, India. 8. George JP (1997)
8. Singh, M.R. and Gupta, A. 2010. Seasonal variation in certain physicochemical parameters of Imphal, Iril and Toubal rivers from Manipur river system, India. Ecology, Environment and Conservation, 16(2): 197-207
9. Lalchingpuii. Status of Water Quality of Tlawng river in the Vicinity of Aizawl City, Mizoram. [Unpublished Ph.D Thesis]. Department of Environmental Science: Mizoram University, 2011.
10. Lalzahawmi, Laltanpuia and Mishra BP. Seasonal Variation in Physical Characteristics of Tamdil Lake, Mizoram, Northeast India. IJMSET. 2016; 3(6):24-29.
11. Verma PU, Purohit AR and Patel NJ. Pollution Status of Chandlodia Lake Located In Ahmedabad Gujarat, IJERA. 2012; 2:1600-1606
12. Sunar Sangeeta. Variations in water quality characteristics of Serlui river as impacted by Serlui-B hydel project in Kolasib district, Mizoram. ISROSET. 2017; 3(6):39-47.
13. Mustapha MK. Assessment of the water quality of Oyun Reservoir, Offa, Nigeria, using selected physico-chmical parameters. Turk J Fish Aquat Sci. 2008; 8:309–319.
14. Sunar Sangeeta and Mishra, BP. Correlation and linear regression as a water quality monitoring tool for Serlui River in Kolasib district, Mizoram, India. IJARD. 2018; 3(2):676-680.
15. Joshi DM, Kumar A and Agarwal N. Studies on physicochemical parameters to assess the water quality of river Ganga for drinking purposes in Haridwar district, Rasayan. J. Chem. 2009; 2(1): 195-203
16. BIS. Manual of Specifications for Drinking Water, BIS: New Delhi. 10500-1983.
17. ICMR (1996). Guidelines for Drinking Water Manual, New Delhi: Indian Council of Medical Research, India.
18. USPH. Drinking Water Standards. P.H.S. Pub. U.S. Department of Health, Education and Welfare, Washington D.C.1982: 956.
19. WHO. Guidelines for Drinking Water Quality, Vol 1, 3rd Edition. Geneva, Switzerland.2004.

