

Seasonal Variation of Physicochemical Properties of Pan Hlaing River Water near Hlaing Tharyar Industrial Zone

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Abstract: In the present work, the water samples (sample 1 and sample 2) were collected from two different sampling sites of Pan Hlaing River near Hlaing Tharyar industrial zone in Hlaing Tharyar Township, Yangon Region in wet and dry season. Determination of some physicochemical properties of collected water samples were carried out by conventional methods. According to these results, water body of the Pan Hlaing River was slightly alkaline as the pH was within 7-8.5 in both wet and dry seasons. In wet season and dry season, the values of some physicochemical properties such as pH, temperature, total alkalinity, total hardness, conductivity, TDS, DO, PO₄-P, NO₂-N, NO₃-N, and NH₃-N of sample (1) and (2) were found to be acceptable levels of EPA guideline standard values. BOD values of all water samples were found to be more than 5 ppm (EPA standard), indicating the falling of DO level in water body. COD values of all water samples were found to be more than 10 ppm (EPA standard), which indicated the organic pollution. The turbidity values in two seasons for all water samples were greater than the permissible level of EPA standard (150 NTU). Determination of nutrients such as NH₃-N, NO₂-N, NO₃-N and PO₄-P were carried out for two seasons. Concentration of NO₂-N was not detected within the study period. NO₃-N concentrations were found to be within 0.01 to 0.05 ppm in wet and dry seasons. Although NH₃-N contents were not found in wet season, the observed value of NH₃-N was 0.05 ppm in dry season. This value and NO₃-N value were found to be within the permissible value of EPA standard. PO₄-P concentrations in Pan Hlaing River were found to be in the range of 0.01 to 0.02 ppm for both seasons. The value of PO₄-P was higher in dry season than the permissible value of EPA standard.

Key Words: Pan hlaing river, Hlaing tharyar industrial zone, Physicochemical properties, Heavy metals.

1. INTRODUCTION:

Water quality assessment provides the base line information on water safety. Since water quality in any source of water and at the point of use can change with time and other factors, continuous monitoring of water is essential. Pan Hlaing River is one of the major rivers since it flows into Yangon River. Three industrial zones, Shwe Pyi Thar, Hlaing Tharyar and Shwe Lin ban are situated along the banks of Hlaing River. They were established in 1995–1996. The effluents from those factories are discharged into the Pan Hlaing and Hlaing River. Thus, the quality of water way will eventually become affected due to these extended discharges. People living on fishing business and agriculture farming are naturally increasing along the riverbank. Thus, this research work was undertaken to be explored how industrial pollution can be effected on the environment and also feasibility of using river water body as a resource of agricultural, irrigation and other activities.

2. MATERILS AND METHODS:

The water samples were collected from two sampling sites of Pan Hlaing River near Hlaing Tharyar Industrial Zone. The water samples were taken 3 feet depth from the surface water level and center of the river near Hlaing Tharyar Industrial Zone. The water samples were collected in the month of July to October 2016, representing wet season and November to January 2016, representing dry season. Determination of some physicochemical properties (Temperature, Turbidity, Conductivity, Total Dissolved Solids (TDS), pH, Total alkalinity, Total hardness, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrite Nitrogen, Nitrate Nitrogen, Ammonia Nitrogen and Orthophosphate) of collected water samples were carried out by conventional methods. Comparison of the various physical, chemical and nutrient of the studied water samples were compared with the EPA standard values for the public health.

3. RESULTS AND DISCUSSION:

Investigation of the physicochemical properties of Pan Hlaing River water were conducted on two sampling sites near Hlaing Tharyar Industrial zone in dry and wet seasons. From the results of this study, it was observed that, the physicochemical properties such as temperature, conductivity, TDS, pH, total alkalinity and hardness were within

the safe limit throughout the year. Nevertheless dissolved oxygen concentration was within the minimum level of EPA standard (2013) as shown in Table 1. The minimum DO level in the Pan Hlaing River water seems to be the effect of various microbial activities. In contrast, BOD and COD were relatively higher during both (dry and wet) seasons than EPA guideline (2013) due to diverse industrial and urban activities. Turbidity of all samples in both seasons was higher than the permissible level of EPA standard (2013) due to the suspensions of sediments and phytoplankton. Turbidity values were higher in wet season than dry season. The three main plant nutrients are nitrogen, phosphorus and potassium. Nitrite nitrogen (NO₂-N) was not detected in all samples in both seasons. Ammonium (NH₃-N) was not found in wet season but it was found to be within the permissible levels of EPA standard (2013) in dry season. Nitrate nitrogen (NO₃-N) and orthophosphate (PO₄-P) were found to be within the EPA standard (2013) in both seasons as shown in Table 2 and Figures 1 to 3.

Table 1. Comparison of Physicochemical Properties of Water Samples for Dry and Wet Seasons and EPA Guideline Standard

Parameter	Sample (1)		Sample (2)		EPA Standard (2013)
	Wet	Dry	Wet	Dry	
Temperature(° C)	22	29	22	29	<32
Turbidity (NTU)	188	166	220	152	150
Conductivity (µS/cm)	222	612	204	550	<700
TDS (ppm)	180	190	250	270	500
pH	7.2	7.6	7.2	7.9	6.5-8.5
Alkalinity (ppm)	60	108	54	100	30-150
Hardness (ppm)	58	126	60	116	40-150
DO (ppm)	4.6	4.4	4.8	4.2	4-6
BOD (ppm)	12	28	18	22	5
COD (ppm)	64	64	64	64	10

Table 2. Comparison of Nutrients of Water Samples for Dry and Wet Seasons and EPA Standards

No.	Elements	Season	Sample (1)	Sample (2)	EPA Standard Value (2008)
1	Nitrite Nitrogen (ppm)	Wet	ND	ND	0.08
		Dry	ND	ND	
2	Nitrate Nitrogen (ppm)	Wet	0.01	0.02	0.1-4
		Dry	0.05	0.05	
3	Ammonia Nitrogen (ppm)	Wet	ND	ND	0.05- 0.1
		Dry	0.05	0.05	
4	Orthophosphate (ppm)	Wet	0.01	0.01	0.01
		Dry	0.02	0.02	

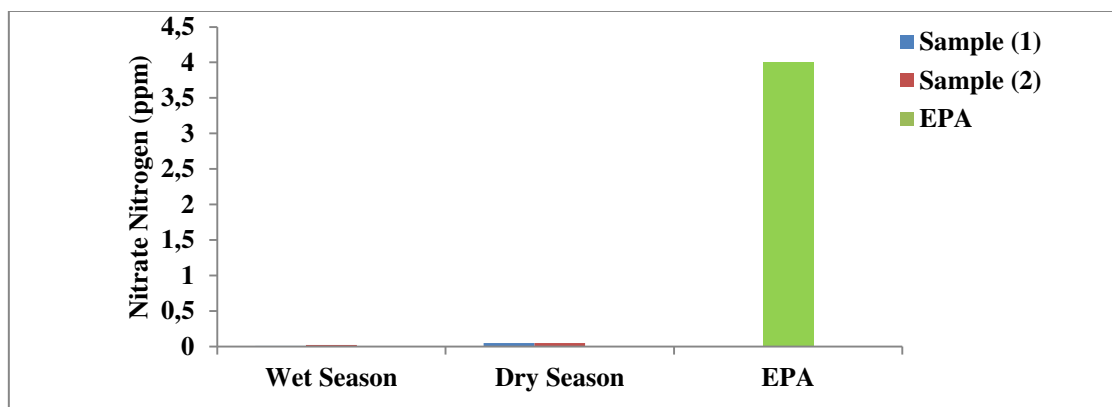


Figure 1. Histogram of Nitrate Nitrogen of Water Sample for Dry and Wet Seasons and EPA Standards

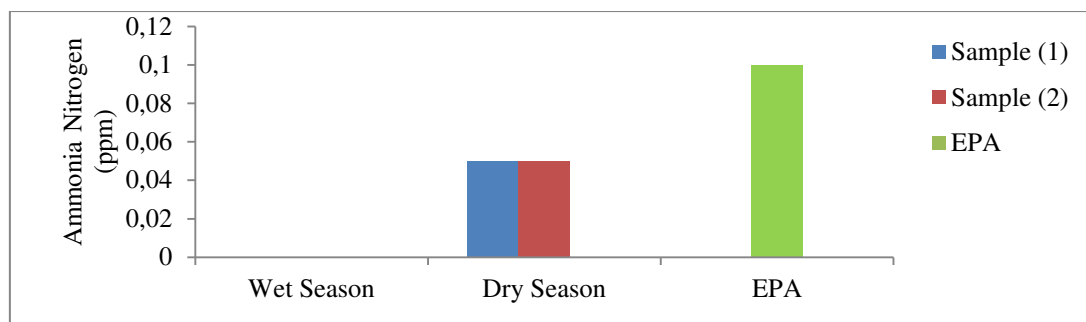


Figure 2. Histogram of Ammonia Nitrogen of Water Sample for Dry and Wet Seasons and EPA Standards

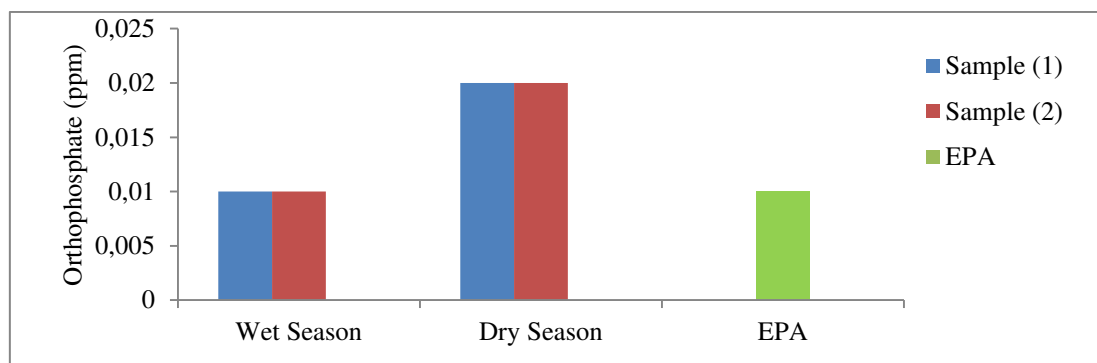


Figure 3. Histogram of Orthophosphate of Water Sample for Dry and Wet Seasons and EPA Standards

4. CONCLUSIONS:

The present study showed that quality of Pan Hlaing River water is not now safe limit. By the comparison of water quality parameters in terms of EPA standard, it could be deduced that water quality was poor and unfit for human consumption and could only be used for aquaculture, irrigation and for industrial purposes.

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