

STUDIES ON PHYSICO - CHEMICAL CHARACTERISTICS OF SITTAUNG RIVER WATER (SWAR) MYANMAR

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Abstract: Water is most essential compound for all living matter on the earth. It plays an important role in human living and industries. The two important sources of water are surface water and underground water, the surface water available on the earth's surface, includes rainwater, river water, lake water and seawater. The present study was aimed at assessing the surface water quality characteristics of Sittaung river water in Swar, Yedashe township Bago Region . Attempts were made to study and analyze the physicochemical characteristics of the water by collecting from different locations. Various parameters like pH, total alkalinity, total hardness, chloride, organic pollution indicator such as dissolved oxygen (DO), chemical oxygen demand (COD) were investigated. Moreover, inorganic micro-pollutants iron and lead were also determined. The results of dissolved oxygen value from this research work are slightly higher than the values which described in WHO standard. But chemical oxygen demand values are lower than the values that are limited by WHO. Some inorganic substances such as Lead and Iron were in a non-detectable range. Surface water within this research area is thus considered safe for using household needs (drinking and domestic uses) with respect to these analyzed parameters.

Key Words: Physicochemical analysis, Surface water, Sittaung river in Swar, Yedashe township.

1. INTRODUCTION:

Water is absolutely essential for the existence, development, preservation of all human life, making it essential commodity in the world. Fresh water is finite resource ,essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible (Kumar, 1997). Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life (Gorde and Jadhav, 2013). Water is mainly obtained from two sources, that is , surface water which includes rivers, canals, fresh water lakes , streams etc, and ground water like well and borehole water (Murry J, Fay RC(2004). Usually the ground water is considered less polluted as compound to the surface water due to less exposure to the external environment (Iqbal , Gupta (2009). Myanmar is rich in water resources and catchment area of myanmar's rivers about 737800 Km². As an arro-base country of myanmar, water utilization for agricultural sector stands for 90% of the total water use. Control and measurement of surface water and ground water is therefore important for sustainable development of the country in future. Water, although an absolute necessity for life, can be a carrier of many diseases (Mcjunkin, 1982).Health effects from chemicals in water occur, when an individual consumes water containing a harmful amount of a toxic substance. A man can live without food for weeks and without water for a few days only. Water in its natural state is never 100 percent pure. As water vapour condenses in the air, it absorbs dust and dissolves oxygen, carbon dioxide and other gases (Bailey, 1978). Water for drinking and other domestic needs must be pure. Contamination by sewage or by human or animal excrement is the greatest danger associated with water for drinking. Water quality is affected by a wide range of natural and human influences. The most important of the influences are geological, hydrological and climatic, since they effect the quantity and the quality of water available (chapman, 1996). The sampling frequency necessary to allow average water quality to be described correctly is normally much greater for a stream than for a river (Meybeck and Helmer, 1996) .The quality of water may be describe in terms of the concentration and state of some or all of the organic and inorganic materials present in the water, together with certain physical characteristics of the water.

Thus, in this research work an attempt, has been made to assess the physical and chemical parameters of surface water.

2. METHODOLOGY:

Water Sample Collection Area

During the study, surface water samples from Swar , Yedashe Township have been chosen. Since it is simply a model of rural area and residential area concerning with the water environment. Water collected from three different

points, namely SwarYwarma, Shwe Ka Soung, Katoeseint. After collecting, water samples from chosen points were studied for their quality. A total of nine water samples were collected for analysis in the period of raining season.

The samples were collected in white plastic containers. Sample containers were used only for water samples and never for the storage of chemical or other liquids. Storage time was kept to a minimum under appropriate conditions. As the water was sample from the river, the bottle was immersed into the water at a certain distance (about 50 cm). The distance of each station was equal but the depth of sample collection was depth on the condition of the area where the sample was collected. Surface water samples were collected in plastic bottle of 1 litre capacity for physicochemical analysis. Bottles were properly washed and rinsed thoroughly with distilled water and then surface water of each sampling site.

3. RESULTS AND DISCUSSION:

The physicochemical parameters of the water sample were tabulated of below.

pH

The pH of water (upper layer) was determined by the pH meter (Smethurst, 1979). It is the scale which measures the intensity of acidity and alkalinity of water, pH of water is an important environmental factor. If the pH of water is too high or too low, the aquatic organisms living within it will die. The majority of aquatic creatures prefers a pH range of 6.5-9.0. The pH values of water samples varied between 7.4 to 8.6 and were found above the limit prescribed by WHO (Table 1).

Total Alkalinity

Alkalinity can be defined as the capacity to neutralize a strong acid and it is normally due to the presence of salts like bicarbonate, carbonate and hydroxide compound of calcium, sodium, and potassium. The results clearly indicate the presence of sodium and potassium salts due to methyl orange alkalinity (Purandara, 2003 :Reginaa, 2004)

In this study, total alkalinity of water samples from Swar region were from 108 to 175 ppm (Table 1). It was found that Katoeseint had slightly higher alkalinity content compared to Swar Ywarma and Shwe Ka Saing in this study. It may be probably due to the fact that the sample of Katoeseint has higher inorganic matter than of Swar Ywarma.

Total Hardness

The increase in the maximum level of total hardness is due to presences of carbonate and non-carbonate compounds (Ramesh 2013). Water are commonly classified in terms of the degree of hardness of 0-75 mg/L is soft, 75-150 mg/L is moderately hard, 150-300 mg/L is hard and 300 mg/L and above is very hard (Moe Moe Aye 2001). In this study the minimum and maximum value recorded were 40.82 and 59.18 ppm (Table 1). So that it may be regarded as soft water, the value of total hardness for the Katoeseint was highest and that of Swar Ywarma was the lowest since the formers is residential area which may be easily contaminated from use whereas the latter is rural area which is not easily contaminated, the total hardness is the Shwe Ka Saung is the second lowest. This area is partly residential area and partly agricultural area.

Chloride

Higher concentration of chloride is harmful to heart and kidney diseases of the peoples, indigestion, taste, palatability and corrosion are also affected. Excess chloride is the indicator of pollution due to sewage water. Since there is no influx of sewage water in the river the range of chloride is very less and hence the water is not at all salty to taste (Shrinivasa and Venkateswaralu, 2000: Motiram and Gupta, 2004).

In this study the chloride content of water samples were found to be in the range of 3.45 to 5.38 ppm, 7.86 to 8.33 ppm and 15.54 to 16.66 ppm for Swar Ywarma, Shwe Ka Saung and Katoeseint respectively (Table 1).

Dissolved Oxygen (DO)

Dissolved oxygen is always saturated in the upper layer of water (Smethurst, 1979). The amount of DO in water is determined by a combination of factors including temperature. Cold, flowing water generally has a higher DO level than still warm water. It can occur by diffusion of oxygen into the water from the air. The desirable DO concentration for maintaining the aquatic life population is about 5 mg/L.

In this study, DO contents in Swar Ywarma were in the range of 6.53 to 7.12 ppm, those in Shwe Ka Saung were found to be in the ranger of 7.32 to 8.31 ppm and in Katoeseint were found to be in the range of 8.31 to 9.10 ppm (Table 1). It was observed that the trend of the DO contents was not obviously greater between the three types of water samples studied.

Chemical Oxygen Demand (COD)

The COD test indicates the quantity of oxidizable materials present in water and varies with water composition, concentration of reagent, temperature, period of contact, and other factors (Schlieper, 1971). COD is largely used to characterize the organic strength of waste water and contamination of natural water or fresh water. Many inorganic compound like nitrites, sulphides and metal ions oxidized into nitrates, sulphates and metallic oxide.

In this study , COD contents in Swar Ywarma, Shwe Ka Saung and Katoeseint were found to be in the range of 3.45 to 4.90 ppm, 6.35 to 7.12 ppm and 7.85 to 8.45 ppm respectively (Table 1) .In this investigation the contents of COD in this water samples studied were lower than than the values limited by WHO. These water samples can be said to be unpolluted surface water since COD concentration is ≤ 20 mg/L oxygen in unpolluted surface water.

Iron and Lead

Iron is found in the blood as part of haemoglobin in red blood cells and myoglobin in muscle tissue. The guide line for iron content of drinking water is 0.3 mg/L (Kobe,1948). The element lead is not essential for plant growth and it is also believed to be toxic to animals life (Fifield and Kedey, 1990). Lead occurs in water in the +2 oxidation state and arises from a number of industrial and mining resource lead is probably not major problem in drinking water, except in those cases where old lead pipe is still in use.

In this study, iron and lead contents were found to be absent in these water samples (Table 1). The assessment on the water quality has proved that drinking or using for household needs provides tremendous health benefits.

Table 1 . Results of the Physicochemical Parameters of Sittaung river water in Swar, Yedashe Township

Sample	S.no	pH	Total Alkalinity ppm	Total Hardness ppm	Cl- ppm	DO ppm	COD ppm	Fe,Pb ppm
Swar Ywarma	1	8.2	135	42.84	4.53	7.12	3.45	ND
	2	8.6	140	40.82	3.45	6.93	4.10	ND
	3	8.4	130	45.92	5.38	6.53	4.90	ND
Shwe Ka Saung	1	7.8	115	50.02	8.33	7.32	6.35	ND
	2	7.6	110	55.23	7.86	7.52	7.12	ND
	3	7.4	108	48.88	8.03	8.21	6.53	ND
Katoeseint	1	7.7	175	59.18	16.66	9.10	8.11	ND
	2	7.5	162	56.24	15.54	8.65	7.85	ND
	3	7.9	155	57.16	16.60	8.31	8.45	ND
WHO		6.5-9.0	200	>200	250	>4	10	-

4. CONCLUSION:

The main aim of this work is to assess the quality of water samples from Sittaung river in Swar, Yedashe Township, Bago Region from the aspect of environment and chemical standpoints. When Swar region is differentiated, we get three different points of area.

1. Swar Ywarma
2. Shwe Ka Saung
3. Katoeseint

It is necessary to study whether the water can be used for drinking purpose. Water is a necessity for human as well as plants and animals. Without water, none of these can survive. Therefore water is necessary for daily life. However, drinking unclean water may be also caused disease due to infection or in toxication.. The public should be aware and concerned that pollution of the rivers and costal waters with agricultural, industrial and municipal waste has the potential to make them unsuitable for drinking.

In this investigation, chemical means were employed to assure the water quality. Chemical composition such as pH, total alkalinity, total hardness, chlorite, DO, COD and mineral contents are needed for human being. So these constituents were necessary to be determined. Besides this parameter, it will be necessary to be determined other parameters, such as (ammonia nitrogen, nitrite nitrogen, nitrate nitrogen), so that the fully required quality of water for human consumption is acquired.

The above study which was carried out clearly shows that all the parameters which were analyzed showed permissible amount of concentration. It can be concluded that these water samples can be said to be unpolluted surface water. These water samples are good for agricultural purpose and are suitable for using household needs.

5. SUGGESTION:

Surface water within the research focus areas are considered safe for domestic and agricultural uses and even drinking purpose with respect to these analyzed parameters. But needs to be protected from the perils of contamination by pollution from the industrial and agricultural waste. Because sample collection was carried out in raining season, this study should be continued seasonally. By comparing the analytical results, we can conclude whether changes in season will affect to human and environment or not.

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