COMPARATIVE STUDY OF WATER QUALITY IN DRY ZONE & WET ZONE OF SRI LANKA

By

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ABSTRACT

This study was mainly concerned the comparison of selected water quality parameters in ground water and surface water in wet zone and dry zone of Sri Lanka. Special consideration has been taken on multiple usage of lakes in Anuradhapura district namely Nuwarawewa, Tissawewa and Basawakkulama as surface water in dry zone and with the Kelani river and Kalatuwawa reservoir in wet zone.

Major problems in dry zone surface water are high colour and turbidity and this is due to algae growth, which enhances eutrophication. The average measured colour levels were 359.9 Pt Co, 190.9 Pt Co, and 251.6 Pt Co in Nuwara wewa, Tissa wewa and Basawakkulama respectively. The average measured turbidity levels were 57.2 NTU, 33.8 NTU and 41.3 NTU in Nuwara wewa, Tissa wewa and Basawakkulama respectively. This algae growth is mainly due to high temperature and accumulation of nutrients in lakes. Prechlorination was proposed to remove algae in surface water but suspect disinfections byproduct (DBP) will result in drinking water by that process.

The Kalatuwawa and Kelani River is considered as wet zone surface water sources because Colombo water supply is mainly covered by these sources. Kalatuwawa raw water is within the Sri Lankan standards but the Kelani River is highly contaminated from industrial waste from Biyagama. Although many parameters can be used to describe the water quality, the most significant for the Kelani River is heavy metals resulting from large volume of sewerage and industrial effluent from Biyagama industrial zone and also from Kelaniya area where several industrial complexes are situated.

Water samples collected from Kelani river were tested for Cr, Cu, Cd, Mn, Pb, and Zn using atomic absorption spectrophotometer. The measured ranges in 2001 – 2002 were Cd (0.005 -0.008 mg/dm^3) Cr (0.021 - 0.007 mg/dm^3) Cu (0.038 - 0.024 mg/dm^3) Pb (0.080 - 0.266 mg/dm^3) Zn (0.059 – 0.045 mg/dm^3) and Mn (0.08 – 0.086 mg/dm^3).

With reference to the physical and chemical requirement for potable water Cd, Pb and Mn levels are exceeded. The standard levels for those metals are Cd (0.005 mg/dm^3), Cr (0.05 mg/dm^3), Cu (0.05 – 1.5 mg/dm^3), Pb (0.05 mg/dm^3), Zn (5.0 – 15 mg/dm^3) and Mn (0.05 – 0.5 mg/dm^3).

Therefore, tendency in accumulation of those metals in fish and aquatic plants are possible. In addition to that if conventional water treatment process is not adapted to remove those metals, which will contaminate the drinking water.

Kalatuwawa reservoir is less contaminated and raw water is rather good but the failures in filtration system - cracking of filter beds and formation of mud balls - are some of the problems associated with Kalatuwawa.

The reservoir sediment is not detected for Cr and Cd but mud balls on the filter bed contain Cr (36.99 μg/g) and Cd (2.70 μg/g). Therefore, it suspects those contaminants come from water treatment chemicals and proposed to test treatment chemicals for those metals also.

As the ground water sources, three bore holes were selected in Mihintale. The major problems arise in the water from Mihintale water purification plant are scaling in distribution network, water meter blocking and reduction in carrying capacity of the distribution system. The water quality is not in Sri Lankan standards due to high fluoride, alkalinity total hardness and pH. Simple method was developed for the water quality improvements in water purification plant.

Addition of sulfuric acid to Mihintalae drinking water has lowered the alkalinity and scaling problems significantly. Thus treated water satisfies the criteria specified by the Sri Lankan standards and also minimizes the possible metal corrosion problem in water supply scheme.