

Physico-Chemical and Bacteriological Water Quality Assessment of the Upper Catchment of the Birim River

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ABSTRACT

The Birim River plays an important role in the lives of the inhabitants within its catchment. The river serves as a major source of water for domestic uses such as washing, bathing and drinking. The river water is also abstracted by the Ghana Water Company for treatment and subsequent distribution to consumers within and around the catchment of the river. The quality of the Birim River is however deteriorating rapidly in light of rapid land use change in favour of illegal small scale gold mining (galamsey) and this threatens to destroy the other uses of the river. It is against this background that this study was conceived to generally assess the quality of the river and to investigate confounding factors that are contributing to the deterioration of the river. As part of the study, the physical and chemical character of the Birim River was assessed. Sampling was carried out in Anyinam, Apapam, Osino, Bunso, Kibi, and Supong-Nsutam. In all, six samples were collected each month for a period of six months. Socio-cultural surveys were also conducted using questionnaires and personal interviews in the catchment area. The results of the study revealed that anthropogenic activities such as illegal small scale mining have had a negative impact on the quality of the Birim River. The concentrations of some chemical water quality variables such as Fe (33.56mg l^{-1}), as (0.052mg l^{-1}), and Mn (4.01mg l^{-1}) were found to be higher than the Ghana Standards Authority (2009) limits for drinking water. The high values were attributed to the activities of galamsey operators whose activities liberate these metals from the underlying geology and eventually finds its way into river when it rains. Other anthropogenic activities such as improper waste disposal and poorly constructed sanitary places were found to have led to elevated levels of total coliforms, faecal coliforms and faecal streptococci. Bacteriologically, the study revealed that the river was unwholesome for human consumption without treatment. The mean total and faecal coliforms were as high as 1925 cfu/100ml and 1073 cfu/100ml respectively where as that for faecal Streptococci was as high as 16 cfu/100ml. The Solway weighted water quality index which was used to classify the river at the various sampling points indicated that the water was of fairly good quality. Thus if

pollution regimes are controlled the quality of the river could be improved. In order to address the issues identified, there is the need to increase the effectiveness of existing legislation by making use of a community participatory model. Since the chiefs are close to the people and have significant control over the actions of individuals within their jurisdiction, collaborative enforcement of environmental regulations by the Municipal Assembly and the local authorities would improve compliance with environmental regulations. It was also recommended that the Assembly in collaboration with the local authority and the government should try to introduce livelihood diversification programmes in order to curb the increasing number of unemployed youth who are taking up illegal small scale mining as a source of livelihood. Unemployment among those interviewed in the social survey was found to be 8%. The findings of this study is important to government agencies and organizations that regulate and administer the use of Ghana's water resources such as

- The Water Resources Commission
- CSIR Water Research Institute and
- The Environmental Protection Agency

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