

**THE IMPACT OF ABANDONED SURFACE GOLD MINING ON WATER
RESOURCES MANAGEMENT; A CASE STUDY OF THE GOLDENRAE MINING
COMPANY LIMITED**

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ABSTRACT

The abandoned dredge mining operations of the defunct Goldenrae Mining Company on the Awusu River basin in the Kwabeng and Akrofufu Communities were studied for a period of six months, spanning October 2005 to March 2006 to assess the likely physico-chemical, microbial and social impacts that such a development could possibly have on water resource management in the rural setting. The concentration of contaminant levels of the physico-chemical and bacteriological aspects of water resource quality parameters were determined from nine (9) surface water sampling points and three boreholes in the Awusu-River basin to assess their suitability as drinking water sources, water contact recreation, irrigation water supply, aquaculture and livestock development. Macro-invertebrate samples were collected from the nine surface water sampling point on the Awusu River basin underlain by Birimian formations which are covered by forest oxysols to provide information on the integrity of the freshwater ecosystem and their response to mine pollution. Structured questionnaire were administered to one hundred and eight respondents from the Kwabeng and Akrofufu communities located between longitudes 0°35'W to 0°38'W and latitude 6°18'N and 6°21'N on the north-western end of the Atewa range covered by moist deciduous forest, to obtain information about water-related problems and challenges to water resource management as perceived or experienced after mine closure. Result obtained from the analysis of the water samples from the various sites indicated that turbidity and colour values ranged from a minimum of 1.95NTU and 2.5Hz to a maximum of 220NTU and 300Hz with means of 17.55NTU and 45.34Hz respectively. This does not meet the WHO guideline values 5NTU and 15Hz for desirable physical characteristics of water intended for drinking. Analysis of water samples also indicated the concentrations of all the major ions were below threshold values for domestic water consumption. The concentrations of four heavy metals (Fe, 0.01-14.93mg/l; Cd, <0.002-0.01mg/l; As, <0.001-0.003mg/l and Pb,

<0.005-0.05mg/l) analysed for surface water samples were above WHO threshold values (Fe 300µg/l, Cd 3µg/l, As 10µg/l and Pb 10µg/l) for drinking water and two (Cu, <0.002-0.05mg/l and Zn, <0.005-0.03mg/l) were below (Cu 2000µg/l and Zn 3000µg/l). However, the heavy metal content was within water quality guideline values for water resources intended for irrigation water supply and therefore sources can be used for that purpose. Dissolved iron gave the highest concentrations with the Slime Retention Areas (SRA) dominating with a mean concentration of 4.98mg/l. The faecal coliform counts over the study period ranged from 0cfu to 3906cfu per 100ml whilst total coliform was from 0cfu to 35745cfu per 100ml. Coliform bacteria counts from the surface water samples were significantly higher than that from the boreholes because they were probably subject to faecal contamination reaching them directly with storm water runoff. All the sampling points were being used as drinking water sources by the two communities. However, all the water sources do not conform to WHO guidelines for zero total and faecal coliform bacteria counts per 100ml of water sample intended for drinking purposes. The higher counts of Gastropod slim 637, Odonata anisoptera 32 and Odonata nichrogombus 9 at the mine impact site (AB2), together with the presence of other indicator species, is suggestive of the restoration of fresh water ecosystem for a period of over ten years after mine closure. The social survey indicated that operations of the abandoned surface gold mine, primary occupations, family size, habit and perceptions contributed significantly to the degradation of the resources of the Awusu-meshwork. Also the prevalence of water and sanitation related infections were attributed to the use of the surface waters without any form of treatment as well as lack of toilet facilities at private homes. Only thirty-eight percent (38%) of the respondents had toilet facilities at home and the rest of the respondents defecate at any place of convenience or use public toilets. It is recommended that remediation measures aimed at ensuring the sustenance of the livelihoods of the subsistence populations without compromising that of the future generations to benefit same be implemented. Also integrated approach to water resources management in would be mining areas, one that would involve not only the mining companies concerned and regulatory agencies but also the local community to enable the latter better understand and appreciate, among others, various post-mining water resource management issues. Plans and programmes for the provision of alternative livelihood projects for mining communities must be in consonance with the policies of government aimed at achieving the

Ghana Poverty Reduction Strategy III (GPRS III) and the Millennium Development Goals (MDGs).

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