
GIS Application on Arsenic Contamination and Its Risk Assessment in Ronphibun, Nakhorn Si Thammarat, Thailand

Jianjun Zhang¹, Xiaoyong Chen², Preeda Parkpian¹, Monthip Sriratana Tabucanon³, Skorn Mongkolsuk⁴

¹Urban Environmental Engineering and Management Program, Asian Institute of Technology, Bangkok, Mail box: 1201, AIT, P.O. box: 4, Klongluang, Pathumthani, 12120, Thailand

²Space Technology Applications and Research Program, Asian Institute of Technology, Bangkok, Thailand

³The Environmental Research and Training Center (ERTC), Bangkok, Thailand

⁴Laboratory of Biotechnology, Chulabhorn Research Institute (CRI), Bangkok, Thailand

Abstract

This paper presents a case study of GIS application on arsenic contamination and its toxicological effects in a tin mining area of southern Thailand. A GIS database was constructed which depicted the arsenic distribution profiles in different environmental media, i.e. the shallow groundwater, deep groundwater and near-surface soil. Estimation from the GIS interpolation showed that 72.31% of the study area had arsenic level higher than 0.05mg/L (Thailand standard) in shallow groundwater. The contamination situation in deep groundwater was more severe than shallow groundwater. Six major contamination sources were identified through correlation analysis between arsenic level in soil/groundwater sample sites with the distance to mining and waste dumping sites. The correlation between arsenism patients' distribution with arsenic concentration and other geological features were analyzed, the results showed a significant difference between the groundwater arsenic concentration inside and outside the distribution zone of arsenism patients. With the help of GIS, arsenic hot spots in each media were displayed. Arsenic risk assessment was also conducted in four villages based on the arsenic exposure from drinking water, which found that village 12 had the highest risk due to arsenic consumption.
