

Title: Factors Influencing Fluoride Contamination in Groundwater Resources of Eastern Chiang Mai–Lamphun Basin

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ABSTRACT

This study investigates fluoride contamination in groundwater resources in the eastern Chiang Mai–Lamphun Basin, which includes Doi Saket, San Kamphaeng, and Saraphi Districts in Chiang Mai Province, as well as Ban Thi District in Lamphun Province. These areas are known to be prone to elevated fluoride levels in groundwater. This research aims to assess contamination and distribution of fluoride and examine the factors influencing its occurrence in groundwater resources across the study area. A total of 50 groundwater samples were collected from groundwater wells with depths ranging from 25 to 438 meters in December 2024. The fluoride concentrations were analyzed using ion-selective electrode (ISE) analysis. Out of the 50 wells, there were 15 wells, predominantly in Ban Thi District, with fluoride concentrations exceeding the World Health Organization (WHO) standard of 1.5 mg/L. Additionally, 7 wells (3 in Ban Thi District and 4 in San Kamphaeng District) had fluoride concentrations exceeding the Ministry of Natural Resources and Environment (Thailand)’s drinking water standard of 0.7 mg/L. Multiple linear regression analysis was conducted to explore the relationship between fluoride concentrations and five potential influencing factors: land use, rainfall, well depth, slope, and distance from faults. While individual linear regression analyses showed some correlations between fluoride concentrations and each variable, the multiple linear regression analysis revealed that only land use was a statistically significant factor influencing fluoride concentration. These findings emphasize the need for monitoring and mitigation

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strategies in areas with elevated fluoride concentrations, as high fluoride levels can pose health risks, especially for populations relying on groundwater for drinking.

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