

Nitrate contamination in spring water and its relation to land use at upper and lower river terraces

*Yutaro Nagasawa², Morio Tsuji¹, Masaki Suzuki¹, Hideyuki Itoh¹

1. Iwate prefectural university, 2. Geothermal Engineering Co., Ltd

Groundwater contamination including nitrate has long been regarded as an important social problem. Numerous earlier studies have implicated land use at the ground surface as the cause of such contamination. To elucidate land use effects in this study, we investigated water quality composition including nitrate of spring waters in the northern part of Morioka city, Iwate Prefecture. Spring water A and B samples were taken on the terrace at a mountain side. Also, C was obtained from a paddy field site on the terrace. D and E were obtained under the terrace. Land uses on terraces included paddy fields, houses, ironworks, poultry farms, electrical parts factories, and cafeterias. Water quality compositions of A and B samples tended to be similar. Compared to B, spring water C showed higher NO_3^- . Whereas D had higher values of Cl^- , Na^+ , K^+ , and HCO_3^- than B. In the E sample, Na^+ and K^+ , Cl^- concentrations were lower than in D; NO_3^- was conspicuously present. Annual changes in water temperature were observed in C, D, and E, suggesting that water was flow in the surface layer. The change in water temperature was more pronounced in D than in E; their groundwater flows are expected to be different. The cause of increased NO_3^- and SO_4^- in C was inferred as paddy field fertilization. Regarding D, tendencies showed increased K^+ and Cl^- , along with increased Na^+ and Ca^{2+} differing from C. Influences other than paddy fields irrigation and fertilization, such as households or industrial wastewater, were inferred. Moreover, D and E exhibited different water quality compositions, suggesting that groundwater was affected by narrow range of land use.

Keywords: groundwater, contamination, land use