Biljana Balabanova
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Contaminant Levels and Ecological Effects

Understanding and Predicting with Chemometric Methods

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Chapter 8
Groundwater Pollution Under the Intensive Agriculture Production

Biljana Kovacevik, Sasa Mitrev, Blažo Boev, Natalija Markova Ruzdik, and Vesna Zajkova Panova

Abstract Groundwater quality situated under the intensive agriculture production of the Strumica region, Republic of North Macedonia, is investigated. Carbonate rock watering plays a significant role in groundwater chemistry. Nitrate concentrations greater than 50 mg/l were observed in 14% of investigated samples with a maximum concentration of 284 mg/l (med 3 mg/l). Almost 33% of Mn levels were above the levels of public health concern (>50 μg/l). Arsenic was found in elevated concentrations (>10 μg/l) in almost 35% of investigated groundwater samples, and 16% had concentration greater than 50 μg/l (max 177 μg/l). It is assumed that the reductive dissolution is a major mechanism by which arsenic is released into the groundwater. Statistical analysis shows significant differences regarding NH_4^+, PO_4^{3-}, Fe, Mn, As, Ba, Ti, and Zn concentrations between shallow and deep groundwater. Factor analysis revealed four significant factors. F1 (Cl^-, SO_4^{2-}, Na, K, and B) associates the most affected ions by rainwater leaching. F2 (HCO_3^-, Ca, As, and Mg) makes an association between ions that arise from the hydrogeochemical reactions. F3 (NO_3^-, NO_2^-, Mg, and Cu) associates ions affected by the reduction processes, while F5 (NH_4^+, PO_4^{3-}, and Fe) associates ions which are related to the use of fertilizers.

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