



SEASONAL VARIATIONS IN THE PHYSICO-CHEMICAL QUALITY OF WELL WATER IN THE PROBISTIP AND KOCANI REGION

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Introduction: Multiple factors, including recharge water composition, atmospheric precipitation, surface water interactions, and subsurface geochemical processes influence groundwater quality. This study aimed to assess seasonal physicochemical variations in well water quality and evaluate the effect of disinfection with peracetic acid (PAA).

Material and methods: Water samples were collected from three wells in the Probistip region and two wells in the Kocani region. Sampling was conducted twice per season across all four seasons, both before and after PAA disinfection. Nine physicochemical parameters were analysed: electrical conductivity (EC), pH, colour, KMnO₄ consumption, NH₄, NO₂, NO₃, Fe, and Cl. Results were compared against control water quality and national legislative standards. A General Linear Model (GLM) with repeated measures was applied to assess the influence of risk factors on water quality.

Results and discussion: Physical parameters consistently fell within maximum permissible limits. Most chemical parameters were also within acceptable ranges, with the exception of NO₃ levels, which served as an indicator of organic matter oxidation. Regression analysis revealed that season and disinfection significantly affected physicochemical quality. PAA disinfection had a statistically significant effect on physical water quality ($p < 0.05$), but did not significantly alter the chemical composition of the water.

Conclusion: These findings suggest that systematic monitoring combined with regression analysis offers a practical and efficient approach for ongoing well water quality assessment.

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