Preliminary Findings on Temporal and Spatial Variations in Phosphate Dynamics in Riverine Systems in Samoa

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Abstract:

This study investigates the temporal and spatial variations of phosphate concentrations in riverine systems, highlighting their relationship with precipitation patterns and temperature. Monthly climate data reveal distinct wet and dry seasons, with precipitation peaking in December and January at over 450mm and 525mm, respectively, and reaching its lowest levels in June and July at approximately 75mm. Maximum and minimum temperatures remain stable, averaging 30°C and 25°C, respectively. Phosphate concentrations follow a seasonal pattern, with low levels (1.0–1.3mg/L) recorded from July to November. Peaks occur in December (3.50 ± 0.63 mg/L) and June (4.00 ± 1.34 mg/L), coinciding with periods of heavy rainfall. Increased precipitation likely contributes to run-off from agricultural and residential areas, introducing higher phosphate loads into water bodies. Site-specific analysis reveals statistically significant differences ($p<0.05$) in phosphate levels, influenced by land use, vegetation cover, and human activities. The lower stream, subject to cumulative upstream runoff, exhibits the highest variability, while the upper stream shows reduced concentrations due to minimal human interference and better vegetation cover. This study provides critical insights into the interplay between climatic variables and nutrient dynamics, offering valuable implications for water quality management and the preservation of aquatic ecosystems in Samoa.