

Neutralization potential of bulk deposition in two distinct environments (Urban and Rural), Sri Lanka

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The constituents in bulk deposition influence its composition, either neutralization or acidification. This study aimed to determine the neutralization potential of acidity in bulk deposition in two distinct locations, the urbanized Crow Island-Colombo area and the pristine Kudawa-Sinharaja rainforest. A manually prepared high-density polyethylene collector was used for the weekly sampling from March to August 2023. A total of fifty samples were analyzed for pH and major ions. The analysis of major ionic species (Na^+ , K^+ , Ca^{2+} , Mg^{2+} , NH_4^+ , Cl^- , NO_3^- , SO_4^{2-}) was performed using ion chromatography, atomic absorption spectrophotometry and ultraviolet spectrophotometer. Data analysis was performed using the Minitab 21 package. The neutralization factor (NF) was followed in order of $\text{NF}_{\text{Ca}^{2+}} > \text{NF}_{\text{NH}_4^+} > \text{NF}_{\text{Mg}^{2+}}$ in Crow Island while $\text{NF}_{\text{NH}_4^+} > \text{NF}_{\text{Ca}^{2+}} > \text{NF}_{\text{Mg}^{2+}}$ in Sinharaja. The relationship between Mg^{2+} and NO_3^- or Mg^{2+} and SO_4^{2-} was statistically insignificant ($p > 0.05$) in both locations. The enrichment factor calculated ratios for $\text{Ca}^{2+}/\text{Na}^+$, $\text{Mg}^{2+}/\text{Na}^+$ and K^+/Na^+ were higher than the reference value, indicating a significant influence of natural and anthropogenic sources other than marine influence at both sites. This study shows a great capacity of neutralization potential of pristine areas compared to urban areas by resulting in higher NF values in Sinharaja and lower NF values in Crow Island, highlighting the impact of human influence on ion concentrations and neutralization processes in these different settings.

Keywords: Bulk deposition, enrichment factor, major ions, neutralization factor

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