



Seasonal and Spatial Dynamics of selected Physico-chemical Parameters of Water in Accelerated Natural Regeneration of Mangrove Site and Vicinity at Anawilundawa

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The success of mangrove restoration depends on suitable hydrological conditions and water quality. To improve restoration efforts, this study assessed four water quality parameters: pH, temperature, conductivity, and salinity at the Accelerated Natural Regeneration of Mangroves (ANRM) site in Anawilundawa Ramsar Sanctuary. Sampling was conducted in six different environmental sites: natural mangroves, nearby brackish water canal, shrimp pond outlet, and mangrove plots restored in 2021, 2023 and 2024, with three replicates collected from each site, yielding 18 water samples. These parameters were measured using a portable multi-parameter meter. Although the significance of sampling site differed among the measured parameters, significant month $\times$ site interactions occurred only for salinity and conductivity, demonstrating that seasonal changes in these parameters varied across sampling sites. Both sampling month and site significantly influenced pH ($p < 0.05$), with values declining steadily from a peak in November (8.40 ± 0.08) to a minimum in April (7.58 ± 0.06), while the 2023 restoration site recorded a significantly higher pH than all other settings. Water temperature varied significantly with month ($p < 0.05$) but not with site, with the highest values recorded in February and April ($31.4 \pm 1.08^\circ\text{C}$, $31.3 \pm 0.19^\circ\text{C}$) and the lowest in December and January ($26.18 \pm 0.1^\circ\text{C}$, $26.89 \pm 0.24^\circ\text{C}$), reflecting a typical dry-season versus wet-season temperature pattern. Both salinity and conductivity exhibited a strong dry-season increase (February–April) relative to the wet season (November–January). These findings suggest that seasonal changes and spatial location play a key role in changing the water quality of this system. This highlights the importance of considering seasonal timing, alongside location, when assessing or managing water quality in similar environments.

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