THE FISH PRODUCTIVITY OF FRESHWATER BODIES ANALYSED USING SATELLITE REMOTE SENSING TECHNIQUES – A CASE STUDY

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The spatial approach to evaluate fish productivity with the trophic status of reservoirs is limited in Sri Lanka. This study was aimed to evaluate fish productivity at Maduruoya (MO) and Senanayake samudraya (SS) reservoirs in dry zone from 2016 to 2019 using satellite remote sensing techniques. Trophic State Index (TSI) and turbidity of the reservoirs were extracted from Copernicus Global Land Service (CGLS). The TSI appraisal by estimating Chlorophyll-*a* content using Landsat-8 Operational Land Imager (OLI) and Sentinel-2 Multi-Spectral Instrument (MSI) was practiced as an alternative method, and the accuracy was evaluated against TSI derived from CGLS. The results showed a correlation (r) of 0.152 ($p>0.05$) and 43.7% of accuracy between TSI derived from Sentinal-2 MSI and CGLS. TSI derived CGLS, turbidity, fingerling stocking, reservoir water capacity, and temporal information were considered as predictive variables, and General Linear Modeling and Generalized Additive Modeling (GAM) were applied to model the variable relationships with the fish yield. The trophic status of MO revealed as upper mesotrophic (TSI 52 ± 0.54) while SS could be classified as lower mesotrophic (TSI 44.34 ± 0.76). The turbidity level of SS (20.23 ± 1.43 NTU) was higher in comparison to MO (9.31 ± 0.77 NTU). The best fitted GAM model with the lowest Akaike Information Criterion (AIC) (MO=63.7, SS=46.8) and the highest percentage of deviance explained (DE) (MO=62.7%, SS=76.1%) values were selected. From the deviance explained, turbidity (DE=30.5%) was dominant for fish productivity of MO, and sequence influence of the parameters was month>TSI>capacity>stocking. For SS it has been found that reservoir capacity was mainly influenced (DE=50.5%), and turbidity>TSI> month>stocking was the influence sequence. The model, integrated with satellite-derived TSI, turbidity, reservoir water capacity, and month can be incorporated to evaluate the fish productivity of dry zone reservoirs with similar characteristics.

Keywords: Fish yield, Satellite remote sensing, Trophic state index, Turbidity, Water capacity