

Effect of Hydrological regimes on Fish yield in Reservoirs of Kala Oya River basin, Sri Lanka

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Biological productivity of reservoirs is known to be influenced by abiotic factors such as reservoir morphology and hydrological regimes. Seasonal water level fluctuations in reservoirs influence physical, chemical and biological features in reservoirs and thus exert impacts on water quality. It is also a fact that such physio-chemical, biological parameters and the morpho-edaphic factors influence fish yield. As such, the present study was conducted to investigate the influence of reservoir hydrological regimes on fish yield. Water quality parameters were measured in 8 irrigation reservoirs of Kala Oya river basin from June 2013 to December 2014. The hydrological data of reservoirs were gleaned from the Department of Irrigation and Mahaweli Authority. Fish yield data were collected from the fishermen's log books. Several empirical relationships were derived between abiotic and biotic variables such as total phosphorus, dissolved phosphorus, seston weight, organic weight and chlorophyll-a content against flushing rate (annual outflow/mean reservoir capacity). Also, conductivity, alkalinity, morpho-edaphic indices (MEI) defined as MEI_a (alkalinity/mean depth), and MEI_c (conductivity/mean depth) had significant positive influences on reservoir fish yield. Conductivity and alkalinity are more significantly related to than fish yield MEIs, possibly due to less variability of mean depth of reservoirs. Dissolved phosphorus and seston weight showed strong positive correlation with flushing rate ($p < 0.05$). However, the relationships of total phosphorus and organic weight with flushing rate were not significant at 5% probability level. The flushing rate had a significant second order influence on chlorophyll-a, which perhaps suggests that nutrient enrichment in reservoirs through release of phosphate from the sediments had a greater influence on biological productivity at intermediate levels of flushing rate. There appears to be a negative influence of flushing rate on reservoir fish yield and as such, it can be concluded that through manipulation of hydrological regimes in irrigation reservoirs, fish yields can be optimized. An effective dialogue between irrigation and fisheries authorities is therefore needed for reservoir fisheries management.

Key words: Flushing rate, Fish yield, Water quality, Morpho-edaphic indices, Irrigation reservoirs