

# Seasonal water-level fluctuations and changes in macro-benthic community structure in tropical reservoirs: A Sri Lankan case study

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## Abstract

Seasonal water-level fluctuations (WLFs) in reservoirs influence ecological processes, in turn affecting their benthic macroinvertebrate communities. The present study was carried out in 10 irrigation reservoirs of Sri Lanka to investigate the effects of seasonal WLFs on the benthic macroinvertebrate fauna. The study period was divided into two distinct phases: the drained period and the inundated period. Benthic macroinvertebrates were sampled during both periods and enumerated. Air temperature and soil quality parameters were also measured simultaneously, and hydrological data related to the Kala Oya River basin were obtained from irrigation authorities. Data analysis using non-metric multi-dimensional scaling revealed two distinct reservoir groups, namely, Hydrological Stress Group 1 (HSG1) and Hydrological Stress Group 2 (HSG2). A low hydrological residence time and low relative reservoir level fluctuations (RRLF) characterized HSG1, with the opposite describing HSG2. Temporal variations of macrobenthos indicated a high taxa richness and diversity in HSG1 reservoirs during the drained period, with scrapers and collector-gatherers being the dominant functional feeding groups. Reservoirs in the lower river basin (HSG1) exhibited a high taxa richness and diversity. During the inundated periods, insect taxa colonized, particularly, chironomids and ephemeropterans. Molluscan taxa were prominent during the drained periods. These observations highlight the influence of seasonal fluctuations of reservoir water levels on benthic macroinvertebrates. Benthic macroinvertebrate communities in reservoirs were significantly influenced by the RRLF, manifesting the importance of hydrological regimes in reservoirs to develop macroinvertebrate metrics for water-quality monitoring.

**Keywords:** Benthic macroinvertebrates, diversity indices, hydrological stress, irrigation reservoirs, relative water level fluctuation