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Effects of dam water extraction on the population dynamics of red breasted
bream (*Tilapia rendalli*) in Mushandike dam, Masvingo, Zimbabwe.

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Abstract

Many studies demonstrate that excessive dam water extraction impairs aquatic ecosystem functioning disturbing littoral habitats. With declining Mushandike dam water level due to extraction of its water to Mushandike irrigation, *Tilapia rendalli* nests are exposed out of the water. Physical characteristics of Mushandike dam bed surface become less conducive for *T. rendalli* nest construction. *T. rendalli* habitat gets reduced and its level of off take and the rate at which it is preyed on increases. The impact of dam water extraction on littoral habitat of *Tilapia rendalli* remain less studied. Data collection on nest characteristics (density and size), abundance, percentage catch, morphometric measurements and gonadosomatic indices was conducted in Mushandike dam from 2000 and 2016. One-way ANOVA was used to test the differences in nest architecture (nest density and nest size) and physical site characteristics (soil texture and surface cover) between the strata formed by receding dam water. Time-series linear regression analysis was used to determine change in percentage catch, abundance, morphometric measurements and gonadosomatic indices of *T. rendalli*. The relationship between *T. rendalli* nest variables and possible controlling environmental variables at Mushandike dam were tested using a Redundancy Analysis (RDA). Stepwise multiple linear regression analysis was used to determine the predictors of *T. rendalli* nest density and nest size. The results demonstrated that nest density and nest size decreased as the dam water receded ($P < 0.05$). Similarly, soil texture (proportion of clay, silt, fine sand, coarse sand), surface cover (stones, rocks, bare ground, live vegetation and organic matter) significantly declined as the dam water receded. However, humus content did not change as dam water receded. Percentage catch and abundance of *T. rendalli* declined from year 2000 to 2016. A multiple regression analysis revealed that live vegetation had a positive relationship with *T. rendalli* nest density ($\beta = 0.034$, $r = 0.297$, $p < 0.05$) whilst live vegetation and silt were predicted to have a positive relationship with nest density ($\beta = 0.193$, $r = 0.289$, $p < 0.05$) and ($\beta = -0.088$, $r = 0.289$, $p < 0.05$), respectively. The results suggest that Mushandike dam water extraction has a negative effect on percentage catch, abundance nest density and nest size of *T. rendalli*. The results also indicated that dam water extraction had a negative effect on soil texture (clay, silt, fine sand, coarse sand and humus) and soil cover (bare ground, live vegetation abundance, organic matter, stones and rocks. Consequently, littoral resources will diminish completely, leaving the pelagic system devoid of littoral services such as food resources, hiding places (from predation), and fish spawning sites, thus affecting the biodiversity, structure and function of the aquatic ecosystem.

Key words:-Drawdown, *Tilapia rendalli*, abundance, percentage catch, nest, morpho-metric, gonads, water level fluctuation, littoral, Mushandike dam, physical characteristics.