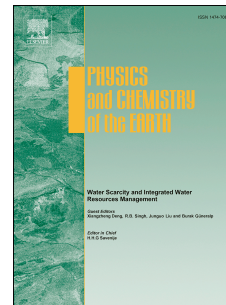


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Remote sensing of surface water quality in relation to catchment condition in Zimbabwe

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12 13 Abstract

14 The degradation of river catchments is one of the most important contemporary environmental
15 problems affecting water quality in tropical countries. In this study, we used remotely sensed
16 Normalised Difference Vegetation Index (NDVI) to assess how catchment condition varies within
17 and across river catchments in Zimbabwe. We then used non-linear regression to test whether
18 catchment condition assessed using the NDVI is significantly ($\alpha = 0.05$) related with levels of Total
19 Suspended Solids (TSS) measured at different sampling points in thirty-two sub-catchments in
20 Zimbabwe. The results showed a consistent negative curvilinear relationship between Landsat 8
21 derived NDVI and TSS measured across the catchments under study. In the drier catchments of the
22 country, 98% of the variation in TSS is explained by NDVI, while in wetter catchments, 64% of the
23 variation in TSS is explained by NDVI. Our results suggest that NDVI derived from free and
24 readily available multispectral Landsat series data (Landsat 8) is a potential valuable tool for the
25 rapid assessment of physical water quality in data poor catchments. Overall, the finding of this
26 study underscores the usefulness of readily available satellite data for near-real time monitoring of
27 the physical water quality at river catchment scale, especially in resource-constrained areas, such as
28 the sub-Saharan Africa.

29
30 **Key words:** Catchment degradation, data poor, Landsat 8, NDVI, total suspended solids

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