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Spatio-Temporal Variation in Heavy Metal Concentration near mining site using *Enhalus acoroides* as biomonitor

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In this study, spatial and temporal variation of heavy metals (Cr, Mn, Co, Ni, Cu, Pb, As, Zn, Cd) in Hinadkaban Bay, Claver, Surigao del Norte was investigated. Historical contamination trend of the area was traced through variations of heavy metal concentrations in the rhizome of seagrass *Enhalus acoroides*. Water, sediment, and *E. acoroides* samples were collected at different sampling points with varying distance and exposure from the mine tailings. Pollution Load Index (PLI) was also calculated to assess the degree of contamination in the area. Background metal concentrations were established using collected samples that were least exposed to contamination. Levels of heavy metals in water, sediment, and *E. acoroides* (leaves and rhizomes) were quantified using Agilent 7500cx Inductively Coupled Plasma Mass Spectroscopy. Results showed that level of heavy metals among sites in the water of Hinadkaban Bay does not vary significantly ($p>0.05$). Nonetheless, spatial variation was highly observed for sediments. Levels of Cr, Ni, As, Cu and Co in the sediments were reported to decrease as the distance from the mine tailings increases. Analysis of variance (ANOVA) showed that there is a significant difference in the levels of Cr, Mn, Co, Ni, Cu, Pb and As across sites. It was also observed that heavy metal concentrations in tissues of *E. acoroides* in areas near mining discharge points were higher. Levels of Co, Mn, Cu and Pb in *E. acoroides* leaves were found to be statistically different across sites. Consistent with the observed trend, highest PLI (13.45) was obtained in the site nearest to the mine tailings. Furthermore, all calculated PLI values were indicative of heavy metal pollution in the area. Mean concentrations of heavy metals between *E. acoroides* leaves and rhizomes were compared and it was observed that accumulation of heavy metal is greater in the leaves. Through lepidochronology technique, rhizomes were retroactively dated from 2009-20015. Rhizomes from the site nearest to the mine tailings showed higher metal concentration peaks for 2009-2011. These peaks coincided with the construction period (2009-2010) and the starting operation (2010) of an additional mining company in the area. Furthermore, it is found to be correlated with the amount of Ni production in mining operations. Several peaks were also correlated with years of high precipitation. Construction period, increased mining activities and high precipitation may have resulted to increased sediment transport in the study area, thus, increasing the heavy metal load. The result of this study supported that *E. acoroides* is good a biomonitor of heavy metals.