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MASTER THESIS PROJECT

Toxicological and Health Risk Assessment of Ehrenberg's Snapper in the United Arab Emirates (UAE)

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SUMMARY

The Arabian Gulf and the Gulf of Oman are marine regions that have been significantly impacted by various sources of pollution such as climate change, oil and gas activities, and anthropogenic disturbances along their coastlines. Using Ehrenberg snapper fish species "Lutjanus *ehrenbergii*" as bioindicator, this study analyzed the muscle tissue concentrations of heavy metals and selected persistent organic pollutants (POPs), specifically polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) in the United Arab Emirates (UAE). Techniques such as microwave digestion with ICP-OES and QuEChERS extraction with GC-MS were used for analysis. The average concentrations (mg/kg dry weight) of heavy metals in descending order are as follows: Cu (2.882) > Pb (1.357) > Sn (0.9400) > Ni (0.7036) > Ba (0.6952) > Ag (0.4859) > V (0.4355) > Mn (0.2784) > Cr (0.2683) > Mo (0.06009) > As (0.01616) > Co (0.01368) > Tl = Se = Sb = Cd = Be (0.0000). As for the PAHs, they had a total average concentration of 23.7218 ng/g ww amongst all the samples. Moreover, PCBs had a total average concentration of 7.222 ng/g ww amongst all the samples. In addition, human health risk assessment associated with the heavy metals Ni, Mn, and Pb surpassed the recommended limits set by the WHO and FAO. The Threshold Hazard Quotient (THQ) for Pb and the Hazard Index (HI) calculated from metal concentrations showed a potential non-carcinogenic risk. The Cancer Risk (CR) values for adults were within acceptable levels, but for children, the concentration of nickel (Ni) exceeded the acceptable limit. Additionally, PAH exposure found a low TEQ, indicating relatively low toxicity and risk towards human health. Also, ILCR calculations showed cautionary but negligible cancer risk for adults and cautionary but not negligible cancer risk posed to children consuming the fish. These findings contribute to the assessment of contamination in the region and provide valuable information for further research and conservation efforts.