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| Title | Spatial distribution and ecological risk assessment of potentially toxic metals in the Sundarbans mangrove soils of Bangladesh | | |
| Author(s) Name | Md Mahfuz Islam, Sayada Momotaz Akther, Md Faruque Hossain, Zakia Parveen | | |
| Contact Email(s) | mislam25@ncsu.edu | | |
| Published Journal Name | Scientific Reports | | |
| Type of Publication | Journal | | |
| Volume | 12 | Issue |  |
| Publisher | Springer Nature | | |
| Publication Date | 21 June, 2022 | | |
| ISSN | 2045-2322 | | |
| DOI | https://doi.org/10.1038/s41598-022-13609-z | | |
| URL | https://www.nature.com/articles/s41598-022-13609-z | | |
| Other Related Info. | Page 10422 | | |
| **Keywords:** | | | |
| Citation: Islam, Md Mahfuz & Akther, Sayada Momotaz & Hossain, Md. Faruque & Parveen, Dr. (2022). Spatial distribution and ecological risk assessment of potentially toxic metals in the Sundarbans mangrove soils of Bangladesh. Scientific Reports. 12. 10422. 10.1038/s41598-022-13609-z. | | | |

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| Abstract |  |
| At present, there are growing concerns over the increasing release of trace metals in the Sundarbans mangrove areas in Bangladesh due to nearby shipbreaking and metallurgical industries, untreated waste discharge, navigation activities, and other natural processes that deposit trace metals into soils. The current study investigated the spatial distribution, contamination level, and ecotoxicity of eight trace metals (Fe, Mn, Cu, Zn, Pb, Cd, Cr, Ni) in Sundarbans soils. Results revealed that all the trace metals except Cr were present in higher concentrations compared to Earth’s shale and/or upper continental crust. Principal component analysis and Pearson correlation showed strong positive correlations (p < 0.05) between Fe, Mn, Cu, and Zn; Ni with Mn and Cr. There were significant associations (p < 0.05) of % clay and total organic carbon (TOC) with Pb-Ni-Cr and negative correlations of pH with all the trace metals. The hierarchical cluster analysis grouped Pb, Ni, and Cd into one distinct cluster, suggesting they are derived from the same sources, possibly from anthropogenic activities. Geo accumulation index (I-geo), enrichment factor (EF), contamination factor (CF), and spatial distribution showed moderately polluted soils with Ni, Pb, and Cd (EF = 3–7.4, CF = 1–2.8, I-geo = 0–0.9) and low pollution by Zn, Cu, Fe, and Mn (EF < 3, CF < 1, I-geo < 0). The ecological risk index (RI) revealed that S-4 (RI = 114.02) and S-5 (RI = 100.04) belonged to moderate risk, and other areas posed a low risk (RI < 95). The individual contribution of Cd (25.9–73.7%), Pb (9.2–29.1%), and Ni (9.6–26.4%) to RI emphasized these metals were the foremost concern in the Sundarbans mangroves due to their long persistence time and high toxicity, even if they were present in low concentrations. | |

**Please specify which Sustainable Development Goal (SDG) (s) falls under your research:**

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| Goal 1 | No Poverty | Goal 2 | Zero Hunger |
| **Goal 3** | **Good Health and Well-Being** | Goal 4 | Quality Education |
| Goal 5 | Gender Equality | Goal 6 | Clean Water and Sanitation |
| Goal 7 | Affordable and Clean Energy | Goal 8 | Decent Work and Economic Growth |
| Goal 9 | Industry, Innovation and Infrastructure | Goal 10 | Reduced Inequalities |
| Goal 11 | Sustainable Cities and Communities | Goal 12 | Responsible Consumption and Production |
| Goal 13 | Climate Action | Goal 14 | Life below Water |
| Goal 15 | Life on Land | Goal 16 | Peace, Justice and Strong Institutions |
| Goal 17 | Partnerships for the Goals |  |  |