Fluctuations in turbidity in response to rainfall and land use associated to river basins experiencing elevated flood levels

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ABSTRACT

Five river basins (*Gin, Kalu, Kelani, Kala Oya, Mundeni Aru*) were selected to study the contribution of rainfall, land use and flood occurrence to turbidity fluctuations in coastal waters associated with river basins in Sri Lanka. Shallow reefs and seagrass extent up to 10m depth were mapped. Monthly turbidity data from January 2019 to December 2021 were derived using the shallow water turbidity estimation algorithm from Allen Coral Atlas and the Google Earth Engine. Satellite-based precipitation data, the occurrence of flood and land use data were analyzed to describe landscape and seascape interactions. Only *Gin* (5.071Km^2) and *Mundeni Aru* (0.086Km^2) had shallow reefs directly facing the river basins. Considering adjacent basins, the shallow reef extent expanded in *Gin (9.202*Km^2*), Kalu (5.435*Km^2*), and Kala Oya (0.215*Km^2). The average turbidity level was 3.0FNU during the study period, with the *Gin* river exhibiting the lowest turbidity (2.0FNU), and the *Mundeni* river the highest (4.2FNU). *Mundeni Aru* had the highest cover of natural vegetation (54.92%) and the least was in *Kelani* (18.91%). The land above 500m was considered as hilly terrain, and in *Mundeni Aru*, 83.78% was natural vegetation, 16.02% was rocky terrain and 0.11% was paddy fields. In *Kelan*i, natural vegetation covered 51.30%, followed by tea (32.85%). Monthly rainfall, flood occurrence and monthly mean turbidity had no significant relationship. Ground truthing, trend analysis and incorporation of data related to coastal sediment fluxes from the ocean over the long term are recommended in interpreting the interactions.

Keywords: Allen Coral Atlas, Turbidity, River water discharge, River mouth