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Grain size distribution, mineral composition and total organic carbon content of the channel and floodplain sediments of the Swartkops estuary, Port Elizabeth, South Africa

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Transportation and deposition of marine and fluvial sediments in estuaries is a serious problem facing South African estuaries. Sediment grain size distribution and hydrodynamic setting studies are of absolute significance in the conservation and management of estuaries to provide support for remediation decision making. Thus the aim of this research project is to provide new information and crucial data to the South African Coastal Engineering and Conservation Division for the Swartkops estuary remediation and management. Dry sieving was used for grain size analysis and revealed that the estuary channel is of predominant sands; the lower estuary is dominated by very fine to fine (0.125-0.25 mm) sands; the middle estuary consist of a mixture of very fine (0.125 mm) and fine (0.25 mm) sands, and as well silts (0.031 mm); and the upper estuary is dominated by coarse (0.50 mm) and very fine (0.125 mm) sands as well. Mineral composition was determined by several techniques including petrographic microscope, X-ray powder diffraction (XRD), scanning electron microscope (SEM), and Raman spectroscopy. Total organic carbon content (TOC) was also determined by using a Loss-on-ignition (LOI) technique. The predominant mineralogical type is quartz contained in the sands at ~30%.The subordinate is the skeletal carbonate material at ~20%. The coarse-grain fraction of the sands consists largely of calcite ($CaCO_3$) at ~20%. Other common mineral constituent in the estuary are clay minerals at ~23%. The clay mineral assemblage consists mainly of kaolinite, chlorite, smectite, and glauconite. Small amounts of heavy minerals are also consisting at ~7%. Total organic carbon content (TOC) for the channels and floodplain sediments vary from 0.00 to 9.76 wt. % and 0.10 to12.34 wt. %, respectively. TOC is used to measure the anthropogenic impact on the system.

Biography

Sipho Gift Ndibo, is a Geology Master student at the University of Fort Hare and completed his Bachelor of Science degree and Honours degree in sediment dynamics of the Agoa Bay. He is currently completing his research on the sediment dynamics of the Swartkops Estuary. His Honours and Master research have been supported by the South African Institution of Aquatic Biodiversity (SAIAB) and South African Environmental Observation Network (SAEON).



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