

NEOM Coast from Intertidal to Sabkha Systems: A Geological Overview

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Abstract : Neom has a relatively long coastline on the Red Sea and the Gulf of Aqaba, which is about 300 kilometres long, in addition to many naturally formed bays along the Red Sea coast. Undoubtedly, these coasts provide an excellent opportunity for tourism and other activities; however, these coastal areas host a wide range of salinity-dependent ecosystems that need to be protected. The main objective of the study was to identify the coastal features, including tidal flats and salt flats, along the NEOM coast. A base map of the study area generated from the satellite images contained the main landform features and, in particular, the boundaries of the inland and coastal sabkhas. A field survey was conducted to map and characterize the intertidal and sabkha landforms. The coastal and inner coastal areas of NEOM are mainly covered by the quaternary sediments, which include gravel sheets, terraces, raised reef limestone, evaporite successions, eolian dunes, and undifferentiated sand/gravel deposits (alluvium, alluvial outwash, wind-blown sand beach). There are different landforms that characterize the NEOM coast, including rocky coast, tidal zone, and sabkha. Sabkha area ranges between a few to tens of square kilometers. Coastal sabkha extended across the shoreline of NEOM, specifically at Gayal and Sharma areas, while the continental sabkha only existed at Gayal Town. The inland Sabkha at Gayal is mainly composed of a thin (15-25 cm) evaporite crust composed of a dark brown, cavernous, rugged, pitted, colloidal salty sand layer with salt-tolerant vegetation. The inland Sabkha is considered a groundwater-driven sedimentary system as indicated by syndepositional intra-sediment capillary evaporites, which precipitate in both marine and continental salt flats. Gayal coastal Sabkha is made up of tidal inlets, tidal creeks, and lagoons followed in a landward direction with well-developed sabkha layers. The surface sediments of the coastal Sabkha are composed of unlithified calcareous, gypsiferous, coarse to medium sands, and silt with bioclastic fragments underlain by several organic-rich layers. The coastal flat is graded landward into widespread, flat vegetated Sabkhas dissected by tributaries of the fluvial system, which debouches to the Red Sea. The coast from Gayal to Magna through Ras El-Sheikh Humaid is continuously subjected to tidal flows, which create an intertidal depositional system. The intertidal flats at NEOM are extensive, nearly horizontal land forming a very dynamic system in which several physical, chemical, geomorphological, and biological processes are acting simultaneously. The current work provides a field-based identification of the coastal sabkha and intertidal sites at NEOM. However, the mutual interaction between tidal flows and sabkha development, particularly at Gayal, needs to be well understood through comprehensive field and lab analysis.

Keywords : coast, intertidal, deposition, sabkha

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