

Assessment of Water Quality, Abundance and Diversity of Marine Organisms at the Port of Tema, Ghana

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ABSTRACT

Water quality variables, abundance and diversity of marine biota were investigated at the Tema Port and its surrounding coastal waters. Physico-chemical parameters and nutrients were measured in the water column within and around the port. The water quality assessment employed methods outlined by the American Public Health Society (APHA, 1995). Water quality within and in the immediate surroundings of the Tema Port were sampled for pH, conductivity, salinity, turbidity, total dissolved solids, total suspended solids, dissolved oxygen, and nutrients (Nitrate, Phosphate, Ammonia, Sulphate). The biological assessments were based on the CRIMP Protocol developed by the Australian Centre for Research on Introduced Marine Pest. Biological samples collected were the plankton community, benthic fauna, fouling organisms and fishes. Organisms collected during the study were sent to the laboratory for identification and further analysis. Result of the water quality (conductivity-50.11 $\mu\text{S}/\text{cm}$, total dissolved solids-34.71 g/L, total suspended solids-33.81 $\mu\text{g}/\text{L}$, nutrients) suggests some level of contamination at the port and its surrounding areas. Results also revealed nutrient loading of the port waters from surrounding areas. It also showed the port and its surrounding waters to be eutrophic (highly productive) due to nutrient loading and phytoplankton development. However, the physico-chemical parameters (BOD, DO, Salinity, pH, Turbidity) were within recommended levels for aquatic life and do not therefore pose threat to marine organism present there in anyway. A total of 94 species of phytoplankton belonging to 22 different families were identified with the family Ceratiaceae (Lindeman, 1928) being the dominant family. Phytoplankton diversity was high across the sampled sites. Two species were categorized as species indeterminata. A total of 37 zooplankton species belonging to 7 orders and 18 families were identified with the Calanidae and Eucalanidae families dominating. *Labidocera acuta*, a non-native species of zooplankton was identified even though this is indicated to be present in the Gulf of Guinea. A total of 111 species of Macrobenthic fauna were recorded from scraped samples, 24 epibenthic fauna and seven different taxa of flora (macro algae) were recorded during intertidal rocky shore survey. Sixty four (64) species of macrobenthic fauna were recorded in soft-substrate benthic grabs. Twelve benthic species were considered as cryptogenic made up

of eight (8) polychaetes, two (2) molluscs and two (2) crustaceans. No invasive species were recorded as part of the biofouling, grab and intertidal surveys. Grab and intertidal survey, however recorded cryptogenic species which include *Paraeulepis* sp., *Phalocrophorus unicorn is*, *Nematoneris unicornis*. A total of forty-four species of fish from 29 taxonomic families were identified from the trawl and purse seine fishing. Thirty eight species (38) of fish from 26 taxonomic families, 7 species of crustaceans and 4 taxonomic families, 1 species of gastropod, echinoderm and cephalopod were recorded in the trawl fishing which caught both demersal and pelagic species. One species of fish (*Orcynopsis unicolor*) was found to be cryptogenic and has not been reported previously in the Gulf of Guinea. The aquatic environment of the port and its surroundings is therefore inhabited by a rich diversity of marine organisms. It is therefore recommended that port authorities should put in place stringent enforceable mechanisms to further protect the fish population therein, the port authorities should also monitor all ships discharging their ballast water in our marine environments and ports for possible alien species that may become invasive in the future.

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