

Preliminary Assessment of Benthic Infauna at Cape Three Points in the Western Region of Ghana

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ABSTRACT

Many of the potential impacts of oil and gas exploration and production activities in benthic environments are well-known in shallow waters but relatively little-known in deep water environments. Ghanaian commercial oil discovery in June 2007 is located at depths of 1,100 m and 1,700 m within the Jubilee Oil and Gas Field between the Deep water Tano and West Cape Three Points blocks. This study was undertaken in May, 2009 to obtain baseline information on the benthic ecology of the Jubilee Field and its environs for future impact assessments. In order to ascertain gradients in biological and chemical variables, sediment samples were collected along defined depths between 25 m and 1200 m along three transects. Abundance and biomass of major infaunal groups were assessed as well as sediment abiotic chemical variables such as trace metals, organic matter content and granulometry. Univariate techniques using distributional trends of diversity indices and multivariate techniques such as agglomerative cluster analysis, Non-metric Multidimensional Scaling (MDS) and Canonical Correspondence Analysis (CCA) were employed in data analysis. A total of 265 individuals (average density = 176 ind. $1m^2$) comprising 77 species belonging to four major taxonomic groups were recorded. Polychaetes constituted 72% of the abundance followed by crustaceans (14%), echinoderms (6%) and others (eg. cnidarians, sipunculids, etc.) (8%). No species of the phylum Mollusca were recorded. The spatial distribution and occurrence of species showed sipunculids appearing in 47% of the sampled stations, making them the most commonly distributed in the area. The echinoderm *Ophiotrix* sp. and polychaete *MageZona cincta* occurred in 40% of locations. Fifty-four percent of the species were recorded in only one or two samples. Species diversity and richness revealed a general declension from the west to the east of the Jubilee oil rig. Analysis of functional diversity indicated that the

community is dominated by deposit feeding polychaetes present at all depths, though other feeding groups such as filter feeders, carnivores and herbivores were also distributed evenly. Results of trace metal analysis showed a trend of increasing concentrations with depth across transects. The decreasing trend in metal concentrations was Chromium > Zinc > Barium > Copper > Lead > Cadmium. The findings indicated a decreasing trend of species diversity from 500 m and beyond, suggesting that future disturbances may not have any effect on the benthic fauna. It may just affect the distribution of a few rare species in the deep water areas. Furthermore, the results suggest distinct spatial and bathymetric variations in the species assemblages, attributable to environmental variables such as depth and sediment types.

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