

OIL SPILL DETECTION, MONITORING AND RESPONSE IN THE NIGERIAN COASTAL ENVIRONMENT USING GEOSPATIAL INFORMATION TECHNOLOGY (GIT)

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Abstract

Oil spillage has been a major environmental problem in Nigeria for more than two decades. Between 1976 and 1996 Nigeria recorded a total of 4835 oil spill incidents, which resulted in a loss of 1.9 million barrels of oil into the environment. From 2006 to 2008 reported oil spill occurrences amounted to 1260, where 40,000 barrels of oil from Mobil platform off the Akwa Ibom coast were spilt, causing severe damage to the coastal environment - destruction of flora, fauna, economic damage to resort centers, properties and lives. Oil spillage has continued to cause regional civil unrest, particularly in the Niger Delta. Factors responsible for oil spillage in the region include corrosion of oil pipes and tanks, sabotage, port operations, and inadequate care in oil production operations and engineering drills.

This paper presents a methodology of integrating ancillary data, medium and high resolution satellite imagery from SPOT-5, Quickbird, and GPS points using ILWIS 3.5 open source and ArcGIS 9.3 software's to detect, monitor and map oil spills in the Niger Delta environment of Nigeria. This was done using ArcCatalog 9.3 to create a geodatabase of operating petroleum companies in the region. ILWIS 3.5 open source was used to analyse satellite images to detect presence of fresh and old oil spill pollution. ArcGIS 9.3 was used to produce Environmental Sensitivity Index (ESI) maps of vulnerable and prone areas, Environmental Impact Assessment (EIA) was integrated into Geographic Information Systems (GIS) to model best practice in oil spill response at varying stages from clean-up of injected petrol hydrocarbons on impacted sites using the tired response approach, bioremediation for ecosystem recovery, Carbon Exchange Capacity (CEC), and Heterotrophic Fungi Counts to degrade oil as supposed to chemical remediation.