



The recovery of native desert vegetation from hydrocarbon contamination in a war affected area: a case study from the state of Kuwait after the second gulf war

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The world's largest hydrocarbon spill occurred in Kuwait desert as a result of Iraq's invasion and occupation in 1990. Oil lakes and tarcrete were deposited throughout Kuwait's desert. The central objective of this project was to use remote sensing and geographic information system (GIS) to explore the ecosystem response to the hydrocarbon disturbance. This work was implemented at two potential protected areas in Kuwait including Umm Gdair and Wadi Al Batin. The work was divided into two key stages: the first stage focused on understanding the dynamic changes in the extend and coverage of the hydrocarbon pollution over the affected lands using remote sensing technology for the period extended from the action year in 1991 until the disappearance of the hydrocarbon from the ground surface in year 1998. The second stage focused on determining the major factors that influence the vegetation recovery, and how did the ecosystem respond to the hydrocarbon pollution. The results showed that autogenic recovery occurred at both sites within few years and that desert native vegetation has the ability to adopt and recover over hydrocarbon pollution. It was illustrated that native vegetation recovered across 31% of the oil contaminated areas at Umm Gudair, and 34% at Wadi Al Batin. The changes in hydrocarbon contamination were significantly correlated with several factors including vegetation cover, plant communities, soil groups, geology, geomorphology, and rainfall. These factors can interact, for example, vegetation recovery differed according to the differences in the soil types. It was also illustrated that native desert vegetation can recover rapidly and that some native vegetation communities can play an important role as phytoremediators such as *Stipagrostis plumosa*, *Haloxylon salicornicum* along with *Cyperus conglomeratus* and *Rhanterium epapposum*.