Central role of microbial biofilms in the biodegradation of hydrocarbons

Bioremediation is a technology that utilizes the metabolic potential of microorganisms to clean-up polluted environments. Intrinsic bioremediation (or natural attenuation) is rapidly gaining favour as a possible remediation strategy of polluted environments. However, in order to apply natural attenuation as a rational remediation option, suitable methods for the assessment and evaluation of the efficiency of these processes must be developed, the sustainability of the natural attenuation processes has to be demonstrated and regulatory and public acceptance has to be established. To demonstrate natural attenuation, the degradation of pollutants must be associated with degradative activity/capability of the microbial community. The limitations of classical microbiological methods coupled with the inherent non-representative nature of sampling strategies hinder any full characterisation of a microbial community and its specific role in the attenuation process. Conversely, the impact of high pollutant loads on bacterial communities is poorly understood. However, by applying a multidisciplinary approach, comprising bacteriological, molecular and chemical analyses coupled with a detailed site characterisation, the potential for remediation can be assessed by providing more than one line of evidence.