

**TITLE:** MICROBIAL COMMUNITY AS INDICATOR OF PETROLEUM EXPLORATION ACTIVITIES IN BRAZILIAN STREAMS.

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**ABSTRACT:**

The use of indicators to monitor water quality is restricted to abiotic parameters with a focus on sewage pollution. Other activities, such as oil exploration in continental areas, are verified on a case-by-case basis through environmental impact studies. The society's energy demand requires a constant oil extraction activity that can generate several environmental problems if not properly managed. Unlike the large impacts caused by spills, the disturbances that occur due to the operational routine of an oil well are less evident but far more abundant. In order to verify the influence of these disturbances on the microbial community we analyzed the taxonomic diversity (NGS of 16S gene) of streams in three biomes (Amazon, Atlantic Forest and Cerrado) that have oil industry activities with no history of spills in their drainage basin. Then we compare them to three biome related reference sites. We used model selection by maximum likelihood for the comparison, checking if the species presented significant enrichment or depletion ( $AIC > 2$ ). We also consider OTUs present in one site and absent in their counterpart. We found 7574 OTUs but only 125 were selected as indicators. The main results come from 106 species that occurred in the three oil fields sites but that were not observed in the reference sites. The other 19 species had the reverse pattern. The main indicator species that appeared only at the reference sites were either unclassified or had aquatic origin. On the other hand, OTUs occurring only in oil field streams originated mainly from soil or pond sediment. The existence of the oil field may be the explanation for an enrichment of the soil species in the stream. The oil wells require a deforested area in their surroundings, which leaves the soil exposed. Drainage of rainwater can drive these organisms into the watercourse. The absence of some species may be associated with another effect of the same phenomenon, since the exposure of the soil also causes the leaching of metallic ions. These can be biosorbed by some species and precipitate, removing them from the water column. Although we need more studies focusing on the ecological relationships of microorganisms and also a more user friendly platform for obtaining data, it is clear that microorganisms are sensitive even to low magnitude changes as those we evaluate here. This makes them a very promising group for the establishment of water quality bioindicators for environmental monitoring.

Keywords: indicators, environmental monitoring, petroleum

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