

**TITLE:** STREAM MICROBIAL COMMUNITY RESPONSE TO E&P ACTIVITY IN A REMOTE AMAZONIAN OIL FIELD

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## **ABSTRACT**

Streams are sentinels of the watershed's environmental condition and the homeostasis of their microbial community is closely related to environmental changes. Therefore, aspects of the microbial community structure of streams may provide tools for the environmental management of human activities that occur upstream. However, it is necessary to recognize real impacts caused by the target activity and to determine the features of the microbial community that best respond to those impacts. Here we show physical and chemical characteristics, the taxonomic diversity (16S rRNA Illumina MiSeq), and the functional potential (GeoChip microarray) of microbial communities on water, sediment, biofilm and marginal soil of an Amazonian stream disturbed upstream only by an oil field and compare them to a minimally disturbed similar environment. We noticed strong seasonality and good environmental quality at both sites. Physicochemical characteristics indicates that the main impact in the oil field stream is leaching caused by land use for well drilling or road construction. The community composition has proven to be highly dissimilar, although the groups were separated by microhabitat. On the other hand, the functional potential showed high similarity and only a few functions showed differentiation between the oil field and the reference site. A fair amount of soil-related taxonomic groups were shown to be enriched in water samples. We conclude that water is the habitat where environmental change is more conspicuous. However, future efforts to define indicators should consider the interaction of water with the habitat where the E&P activity takes place, which in our case was the soil. The increase in abundance of soil bacteria in the stream water was the clearest sign of change in the microbial community structure caused by the oil field.

**KEY WORDS:** Petroleum, 16S taxonomy, functional microarray, Amazon stream.