

Microbial activity and mercury availability indicators of quality restoration in French Guiana old gold mining sites

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Gold mining activities in Amazonian rainforest have led to deforestation and pollution since decades. While ecological rehabilitation applied is essential to restore biodiversity, few studies point out the benefits of the various rehabilitation protocols on the soils carbon and nitrogen cycles. Any studies were focused on the behaviour of trace metal and their environmental risk after rehabilitation process. In this context, our study evaluates the use of microbial function related to C and N turnover and mercury speciation to assess ecological impact and quality of revegetation processes.

For this study, four plots were sampled: (A) with *Acacia mangium*, (C) with *Clitoria racermosa*, (AC) with both species and (Sv) with spontaneous vegetation. Microcosms experiments were performed in controlled conditions where mercury speciation and microbial soil functional diversity were estimated to characterize biological soil functionality metal stress risk.

Our results showed that restoration with leguminous (soils A, C and AC) produce a positive and significant effect on microbial activity. Mercury solubilisation is significantly decreased to comparing to Sv soil. While among revegetated soils, *Acacia mangium* had the best effect on microbial parameters, the significant decrease of pH observed led to mercury solubilization. Our original approach suggested that microbial activity related to C, N cycle and mercury availability constitute a sensitive biogeochemical parameter to select efficient and safety vegetation protocols.