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Environmental impacts associated with gold mining in Chocó, Colombia

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The Chocó department is located in the western part of Colombia and known for its biodiversity but also for alluvial gold mining exploitation, which represents the main local economic activity. Metal mining is concentrated in the upper and middle part of the Atrato river basin, with mainly gold and platinum deposits, but its effects have been detected downstream all the way to the river's discharge in the Caribbean (e.g. Palacios-Torres et al., 2018). The aim of this study was to assess the impact of mining on the overall environmental health and to evaluate the potential exposure of the population. To achieve this, metal and semimetal concentrations in water, sediment and soil samples in the Quito river, located in the upper portion of the Atrato basin, were measured. Additionally, the mercury content of fish mussels was determined to trace the potential metal incorporation into the food web. Metal concentrations in water and sediments were the highest immediately after active mining areas, allowing us to establish a direct correlation with gold extraction. Soils showed incorporation of copper, and cadmium in shallow horizons most likely from mining waste dumping. Mining activity has also resulted in a decrease of the tree cover in the exploitation areas as well as changes in the river channel and an overall reduction in biodiversity. Fish species with higher trophic levels present greater mercury concentrations suggesting food web magnification. While metal levels in fish are generally below the 0.5 µg/g guidelines (WHO, 2017), most people in the area consume contaminated fish daily. Epidemiological studies in the area indicate metal levels up to 3 orders of magnitude higher in people's blood and urine, confirming a strong accumulation and magnification through the food web. It is crucial to carry out further studies in the area aimed at examining the geochemistry, origin and accumulation sites of metals and semimetals of importance in public health.

References

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