Source of mercury from mining communities of Guyana.

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Abstract
CIDA facilitated a small scale mining project in Guyana for alluvial gold and diamond mining activities. One of these activities was to provide a better understanding of the fate of mercury coming from burning amalgam and of its relationship to fish flesh mercury concent. The results show that mining communities are more subject to high mercury fish flesh content then those from pristine (non-mining) communities. This is due to the hydraulicking of fine sediments located in the ore overburden.

Analysis
Mercury analysis were conducted on fish flesh, water, riverbed sediments and on land at bank and mine facings. Total mercury and methyl-merdury analysis were performed in order to relate to human toxicity.
Speciation analysis were also conducted in order to provide independent measurements of the source of mercury in the environment.

Results
Wheter the samples came from pristine or mining communities, the behavior of mercury in the water column was the same, showing a peak concentration at sub-surface depth.
The sediment samples, selected based on their mineralogical and geochemical compositions, and spatial relationship with antropogenic activities, were analyzed for total mercury and its species by sequential extraction tests. The results indicate that higher Hg concentrations were measured in the fine (<63μm) sediment fractions. There is an overall increase in the mercury concentrations in the silty and clayey river sediments. Mercury variations are correlated with particle size in that as the median particle size is decreased, the total Hg concentrations increase. On land, we found no significant difference in mercury concentration boot in pristine and in mining communities. In rivers, mercury was also associated with the mud fraction. Although no mercury enrichment per mud weight was measured in riverbed sediments from mining communities, the mercury containing mud fraction was more abundant downstream from mining creeks then upstream and then in pristine communities.
Sequential extraction tests indicate that organo-complexed mercury is the predominant mercury fraction in the samples.
For carnivorous fish, the data indicates a significant level above the recommended level of 0,5ugHg/g fish flesh by the WHO (World Health Organisation). For non-carnivorous fish, mercury was present but below the WHO threshold value of 0,5 μg/g. The difference in mercury fish flesh content between mining and pristine areas is significant for carnivorous fish but not for non-carnivorous fish. The magnitude of the mercury bioaccumulation throughout the trophic level is estimated to 3 to 4 times, wich is generally reported in various studies.

Conclusion
The erosion of land sediments from land dredging activity is associated with the abundant mud fraction found on riverbed sediments downstream from mining creeks. Since mercury is present in the land mud faction, is washed to the rivers by jetting and settles to the riverbed, it is made available to the aquatic biotope and incorporated in the food chain all the way to the carnivorous fish.