Mapping the Hg-impacted area in the Paglia River Basin (Mt. Amiata Mining District - Italy)

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Mercury (Hg) is recognized as a global pollutant and a potentially harmful element (PHE) to human health and to the environment.

The Mt. Amiata Hg district, Southern Tuscany (Italy), was the third largest worldwide site for Hg production (1847-1982). It is part of the large circum-Mediterranean Hg belt, which hosts 65% of the world's cinnabar deposits.

As a consequence of this large Hg anomaly and extensive mining activity, the Mt. Amiata region is a Hg source of remarkable environmental concern at the local (Paglia River), regional (Tiber River), and Mediterranean scales. Meteoric events and weathering of the abandoned mining wastes facilitated the transport of Hg associated to fluvial particulate, principally in the environments of the Paglia River and its tributaries downstream of the mines.

Concentrations of Hg in stream sediments (>0.2-1900 mg/kg), suspended particulate sediments (2-290 mg/kg) and soils (<0.2-120 mg/kg) from alluvial terraces along the Paglia River and its main tributaries (Stridolone and Siele Creek) are mostly above the legal limit (1 mg/kg) defined by the Italian law. Thus, using GIS-based software, a "Hg impacted" area was defined along the course of the Paglia River, including sediments and soils with Hg>1 mg/kg along transects longitudinal to the river course.

The extent of the contaminated area does not allow any environmental remediation. The identification of the "impacted area" can be a useful tool for the local communities and environmental national agencies when planning works involving the remobilization of sediments, to prevent the dispersal of old deposited contaminants, as well as to prevent Hg exposure pathways to humans.