CREATING A SUSTAINABLE ARTISANAL AND SMALL-SCALE GOLD MINING SECTOR

Case Study : La Segovia, Colombia

Researchers and educators collaborate to promote mining techniques that improve gold recovery, reduce emissions of mercury, and promote human health

Existing Process

Miners add mercury to ore in ball mills, during the milling process (whole ore amalgamation). Resulting amalgam is burned (without filtration) in gold shops and processing centers. Contaminated waste (tailings) from this process are saved and leached with cyanide afterwards.

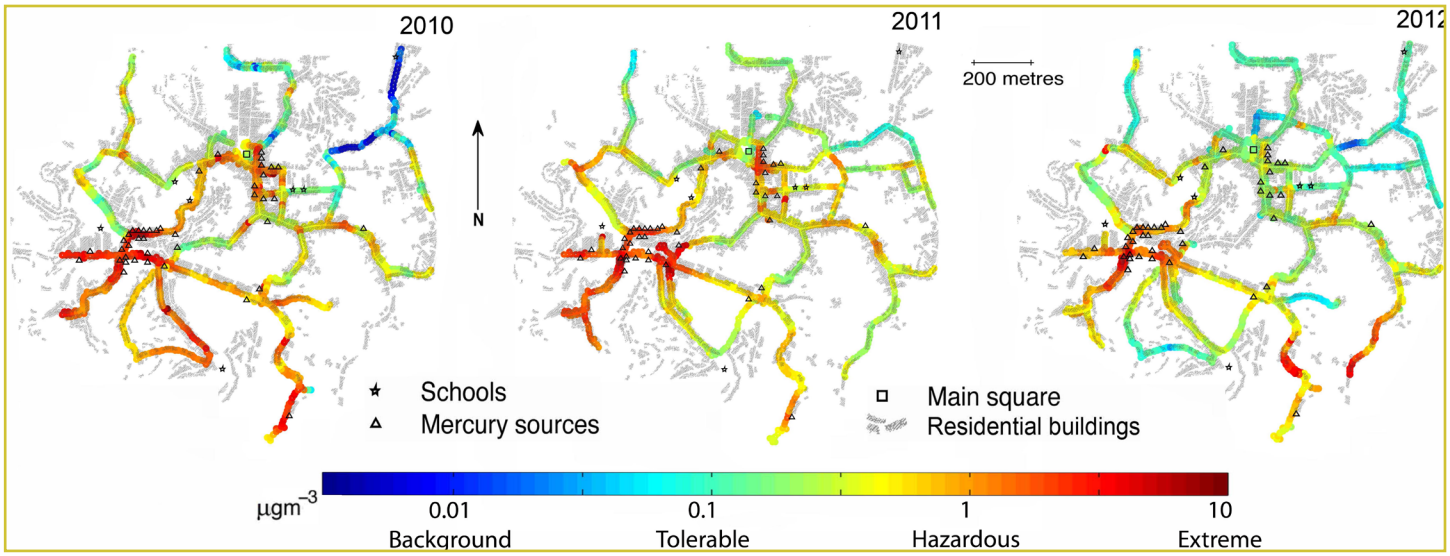
Intervention

- UNIDO demonstrated that by optimizing milling (which liberates gold from the ore) and then using sluices, centrifuges, or shaker tables to concentrate the gold, miners could greatly reduce the amount of mass of ore to which mercury must be applied (and thereby greatly reduce the amount of mercury used).
- The education campaign emphasized the amount of money that could be saved by reducing mercury consumption and how much more money could be earned through superior gold recovery from cleaner techniques.
- A few mineral processing centres also largely eliminated mercury amalgamation in favor of properly managed cyanidation in agitated tanks.
- Mercury vapor filters and retorts were installed in gold shops and processing centres.
- To create an sustainable enabling environment for the transition to cleaner techniques, the project assisted with formalization of previously illegal miners working in the tenure of Gran Colombia Gold, by negotiating contracts in which miners sell their ore directly to Gran Colombia to be processed using best practices. Gran Colombia in return provides safety equipment and reinforcement of entrances to underground mines (called “adits”). Gran Colombia also agreed to establish pension funds for these contracted miners.

Artisanal miners in Segovia regularly use cocos for whole ore amalgamation.

Outcomes

- Miners in 35 processing centres that participated in the intervention consume, on average, half the amount of mercury than they did previously.
- Though the number of existing miners using WOA in the region has only declined slightly, but a great deal of new processing capacity has been developed in the region, and most of the new processing capacity is mercury-free. It also requires far less labour from miners because they are selling their unprocessed ore to cyanidation operations rather than processing the ore themselves.
- Mercury filters and retorts in gold shops and processing centres decreased mercury vapour concentrations in the Segovia urban core by almost 50% over the three years of mercury reduction initiatives, despite a 30% increase in gold production.



Mercury vapour concentration changes in the urban zone of Segovia, Colombia. UNIDO estimates that 5.5 tonnes of mercury are now recycled per year and that the project has prevented the consumption (and release to environment) of 4.4 tonnes of mercury per year.

Reasons for Success

- Implemented by highly competent and professional local field experts that are well known and trusted within the community and government.
- Focus on financial incentives for miners
- Not a punitive approach, except for the local government ban on all new mercury emitters in the urban core and the requirement for all operations to use retorts.
- The emitter ban was accompanied with a comprehensive and widely delivered training program, through collaboration with local universities and government agencies ("more carrot than stick" approach).
- Gran Colombia Gold managed to negotiate employment contracts with the miners who were illegally working in their tenure. They also adopted reliable assay methods to determine the gold content of the ore. These assay methods, along with overall trust-building, convinced some miners to sell their ore directly to mercury- free processing plants.

Artisanal miners in La Segovia learn methods that improve gold recovery that do not rely on mercury.

For Further Information

Cordy et al. (2013) Characterization, mapping, and mitigation of mercury vapour emissions from artisanal mining gold shops. Environmental Research. DOI: dx.doi.org/10/1016/j.envres/2012.10.015

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