

# In rush for gold, miners in Senegal ignore mercury poisoning

Published: March. 21, 2012 at 8:42 AM

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Tenkhoto was once a quiet agricultural village in southeastern Senegal. But the unceasing rise in the price of gold on the world markets has changed that.

In the past three years, Tenkhoto has become an anything-goes boom town. It's an outpost replete with winners, losers, buyers and sellers, as well as the problems associated with such frontier towns: prostitution, sexually transmitted diseases, alcohol abuse and violence.

But perhaps the biggest problem associated with the increase in independent gold mining in this area is the environmental pollution and human poisoning caused by the miners' use of elemental mercury to mine their fortunes from gold.

In fact, the low-tech method employed by artisan miners to mine gold is creating a major environmental and human catastrophe, Martin Van Den Berghe, a geological engineer stationed in Senegal with the Peace Corps, said in an interview via Skype. Van Den Berghe is working to combat the problem of mercury contamination.

"Most people know to some extent that mercury is not that great to deal with but obviously there's no alternative, or they don't know (of one)," he said.

Van Den Berghe is designing a long-term program to help educate the mining community about the dangers of working with mercury and to change their habits to reduce the risks to themselves and the residents of the village.

Van Den Berghe said the process of mercury contamination is illustrated in the story of Kassi Cissokho, one of the more than 10,000 young men in southeastern Senegal who is seeking his fortune mining one of the largest gold veins in West Africa. The Sabodala deposit is estimated to contain more than 1 million ounces of gold. Since the rise in gold prices from 2004, other miners have crossed the border from Mali, Guinea and Gambia to profit from the boom.

Every day, Cissokho descends a dozen meters into a shaft just wider than his shoulders, a flashlight strapped to the side of his head, to scrape out bagfuls of soil and rocks. It's dangerous and hot work and accidents are common. Of the thousands of workers in the area, it's usually the youngest men like Cissokho who are sent to the bottoms of these holes. They are also, in many cases, paid the least.

After crushing the soil and rocks by hand into a fine powder, the workers pan the soil in river water to concentrate the gold into a wet muddy mush. This mush is mixed in a container with elemental mercury, which amalgamates with the small amounts of gold in the soil. After filtering through a hand-held cloth, the process creates a tiny pebble of amalgam that is 50-70 percent gold.

If he is lucky in his excavations, Van Den Berghe said, a young man like Cissokho can earn much more money by gold mining than he can as a farmer, an occupation which is "the lowest of the low" in terms of income and social status for Senegalese rural dwellers.

"There's not much opportunity in this area. If you're a farm boy, there's not much choice but to head to the mines once the rains stop," Van Den Berghe said.

Most mining occurs in the dry season from November through May, since the rains make gold mining very difficult from June through October.

Up to this point, Cissokho's exposure to mercury has been relatively minor. When handling mercury, about 1 percent is absorbed through the skin. But it is during the final stage of recovering the gold that the real harm to the environment and people's health occurs, Van den Berghe said. Each miner places his amalgam in a pan over a hot flame to evaporate the mercury in a puff of gray vapor, leaving the gold, along with other trace metals. When inhaled, up to 80 percent of the mercury is absorbed into the lungs.

Mercury is one of the most potent neurological toxins on the planet. After it is inhaled by the miners, it accumulates in their bodies. Because the process often takes place indoors, the residue accumulates further in kitchens and living spaces, poisoning the miners' families and children.

The U.N. Industrial Development Organization said miners use 8-13 grams of mercury for every 10 grams of gold recovered. Nearly 95 percent of the mercury used by miners ends up in the atmosphere or in the soil that the miners discard during the process. This constitutes an estimated total of 1,000 tons of mercury a year by artisan miners worldwide. The extent of the problem is enormous: Artisan gold miners are responsible for 30 percent of the mercury pollution caused by man, the Blacksmith Institute, an organization working on the problem, said.

After it's been vaporized, the mercury eventually falls to the ground. Rains wash the mercury into the watershed, where bacteria transform it into methyl mercury, one of the most toxic elements on Earth. Methyl mercury persists in the environment for decades, circulating between air, water, sediments and soil, eventually entering the food chain through contaminated fish, where it poisons animals and humans alike, Van Den Berghe said.

Although the Senegalese government is aware of the miners, most of whom operate without permits or legal status, it isn't equipped to deal with the enormity of the crisis, Van Den Berghe said. Tenkhoto is 700 kilometers from the capital, Dakar, and the rural villagers operate largely outside the government's influence.

"The government really doesn't exist in this part of the country," Van Den Berghe said. "There's no roads, there's no infrastructure."

Marianne Bailey, a mercury pollution specialist with the U.S. Environmental Protection Agency, says the Senegalese government and American non-governmental organizations have been working on the problem of mercury contamination since the mid-2000s.

Her organization sponsored the Blacksmith Institute's efforts to deal with the problem in Senegal in 2007. Since then, the Blacksmith Institute has performed a series of training courses in the Tambacounda region, the same area where Van Den Berghe operates.

"We closed out our end of the program a couple of years ago," Bailey said. "But the (organizations) and government officials that were involved are still working on the project. It was designed so that we could then step back and they would have the tools to carry it forward."

The Blacksmith Institute worked with other aid agencies and the Senegalese government in a small-scale project to educate miners and villagers about the problem of mercury contamination. In a series of reports released by the organization, alarming details emerged of some of the miners' practices.

Men, women and children participated in every activity from digging soil to breaking rocks to burning mercury amalgam, the reports stated. Amadou Diouf, a toxicologist with the University of Dakar and a lead researcher in the initial project, described a woman using her bare hands to combine mercury with the raw soil. Just 5 minutes later, the woman was breastfeeding her child.

The Senegalese miners recognize the risks, Van Den Berghe said, but they have little choice but to ignore them.

"Gold mining is not a dynamic profession," he said. "It doesn't provide long-term solutions for the people. But they have no other choice at this point."

Van Den Berghe is teaching the miners to use a retort, a simple metal device that fits over the pan when the amalgam is heated. The retort condenses the elemental mercury vapor and allows it to be reused rather than evaporating into the atmosphere. Each retort costs less than \$5, Van Den Berghe said, and they're easy to make. Any metal worker in the area can build one using recycled materials such as teapots or tin cans. The hard part is getting the people to use them.

he said.

“It's just a matter of convincing the people,” he said. “This is, as usual, by far the hardest thing. Changing habits is sadly always the hardest part of development, no matter where you are or who you deal with.”

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