

## Mercury Pollution Due to Small-Scale Gold Mining: *A Serious Menace!*

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Small-scale gold mining is an activity that relies heavily on manual labor and employs simple implements and methods. Although it is a humble form of livelihood, it contributes significantly to the Philippine economy, producing about 25 percent of the national gold output and directly employing some 250,000 miners. Furthermore, it involves, in one way or another, around 400,000 to 500,000 of the entire population (Israel and Asiro 2000, Bayle 1995, Dhar 1994).

### Mercury pollution: Dangers and effects

Notwithstanding its being economically important, however, small-scale gold mining has been the subject of strong opposition in recent years due to its adverse environmental and social side effects. Foremost is the mercury pollution brought about by the practice of amalgamation in gold processing. When amalgam and impure gold

are blowtorched by miners and gold shopworkers, vaporized mercury is released into the air and inhaled by them and people close by. The potential long-term effect on the health is the impairment of the metabolism of the nervous system that likely leads to neurobehavioral disturbances (e.g., Veiga 1997a, 1997b).

Amalgamation also results in the careless release of mercury into rivers and waterways, along with other mine wastes. This again impairs human health by endangering the water supply and contaminating fish and other marine organisms which are sources of food. The potential effects of this exposure on people are neurological but other problems such as complications in the reproductive and other body organs may likewise occur.

### Empirical evidence

Numerous studies already investigated the problem of mercury pollution due to small-scale gold mining in other countries, particularly Brazil. In general, the studies indicated the presence of high levels of mercury concentration in the hair and blood samples of miners and other affected people as well as in fish, soil sediments and forest and river ecosystems in small-scale mining areas of the Amazon.

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*PIDS Policy Notes are observations/analyses written by PIDS researchers on certain policy issues. The treatise is wholistic in approach and aims to provide useful inputs for decisionmaking.*

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In the Philippines, several studies also looked into mercury pollution, based mainly on the experience in Diwalwal, Compostela Valley, the largest and most controversial small-scale mining site in the country (Mahinay et al. 1998, Breward 1996, Williams et al. 1995). These works pointed to the worsening mercury pollution due to mining activities in the area. Williams et al., in particular, found that the mercury loads in some sectors of the Agusan River, where Diwalwal drains into, were already considerable. They also noted that water samples from the mining site itself showed higher concentrations of mercury than those in other gold rush areas in the world.

Results of a recent survey conducted in two other important small-scale mining sites further highlight the gravity of mercury pollution in the country (Israel and Asiro 2000) as shown in Table 1. Many of the miners interviewed mentioned that they have heard of people getting sick due to mercury exposure in their mining sites. A significant number also said that they themselves have been exposed to mercury pollution in the course of their mining activities while several of those who worked in sites close to a water body noted that siltation and sedimentation as well as a significant loss of fishery resources have occurred in the water body since mining activities started.

**Table 1. Environmental Information from Small-scale Miners in Panique, Aroroy, Masbate and Tugos, Paracale, Camarines Norte, 1999**

	Survey Area				Total Frequency Percentage	
	Panique Frequency Percentage		Tugos Frequency Percentage			
Have you heard of people getting sick due to mercury exposure in your area?						
Yes	27	60.00	22	44.00	49	51.58
No	16	35.56	28	56.00	44	48.32
No response	2	4.44	0	0.00	2	2.11
Total respondents	45	100.00	50	100.00	95	100.00
Have you been exposed to mercury during the course of your mining activity?						
Yes	7	15.56	12	24.00	19	20.00
No	30	66.67	38	76.00	68	71.58
No response	8	17.78	0	0.00	8	8.42
Total respondents	45	100.00	50	100.00	95	100.00
Is your mining area close to a water body?						
Yes	4	8.89	30	60.00	34	35.79
No	41	91.11	20	40.00	61	64.21
No response	0	0.00	0	0.00	0	0.00
Total respondents	45	100.00	50	100.00	95	100.00
Have you noticed significant siltation and sedimentation in the water body since mining started?						
Yes	3	75.00	23	76.67	26	76.47
No	1	25.00	7	23.33	8	23.53
No response	0	0.00	0	0.00	0	0.00
Total respondents	4	100.00	30	100.00	34	100.00
Have you noticed significant fishery loss in the water body since mining started?						
Yes	3	75.00	18	60.00	21	61.76
No	1	25.00	12	40.00	13	38.24
No response	0	0.00	0	0.00	0	0.00
Total respondents	4	100.00	30	100.00	34	100.00

Source: Israel and Asiro (2000)

Among ball-mill operators practicing amalgamation who were interviewed, meanwhile, practically all mentioned that they did not require hand gloves as protective equipment during the handling of mercury and other chemicals in processing (Table 2). And while all said they had tailings ponds, upon ocular inspection, these were found to be inadequate to handle the volume of wastes produced. Some operators mentioned that blowtorching of the amalgam was done indoors. And all those interviewed said that retorts, which prevent the mercury from escaping into the air, were not used at all during processing.

## Recommendations

In the face of this serious situation, what can be done?

While existing laws and regulations in the Philippines related to mercury pollution due to small-scale gold mining are fairly adequate, monitoring and enforcement are weak. To improve on these, we recommend the following actions to be taken:

\* *Licensing by the local government units (LGUs) of all small-scale gold mining and processing operations within their jurisdiction and imposition of membership in a cooperative as a licensing requirement.* Licensing will give legal status to the miners while organizing them into cooperatives will help facilitate common efforts for improved environmental management. An added advantage of cooperatives is that they promote a better marketing of the gold produced by the miners.

\* *Earmarking of the licensing proceeds for the establishment and operation of a small-scale mining monitoring and enforcement unit within the management framework of LGUs.* Together with other relevant local and national law enforcement units, this office will have the major function of apprehending violators and imposing appropriate penalties on them.

\* *Development of an effective internal system within cooperatives that will force the proper use of hand gloves, mercury retorts and tailings ponds in small-scale mining and processing.* Miner cooperatives should impose a fee on their members for the purchase and distribution of hand gloves and other protective equipment. Processor cooperatives should impose the use of mercury retorts and appropriate tailings ponds.

\* *Active involvement and selective deputization of nongovernment organizations (NGOs) and other respon-*

*sible members of the local population in the tasks of monitoring and enforcement.* With these additional watchdogs, the administrative cost of environmental management to the LGUs will be lowered while at the same time increasing coverage.

\* *Strengthening of the Small-Scale Mining Section of the Environment and Safety Division of the Mines and Geosciences Bureau at the national and regional levels.* This is essential because the section is the national government office that is involved in small-scale mining and coordinates with the LGUs for the purpose.

**Table 2. Environmental Information from Small-scale Ball-mill Operators in Panique, Aroroy, Masbate and Tugos, Paracale, Camarines Norte, 1999**

	Survey Area				Total Frequency Percentage	
	Panique		Tugos			
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Do you require gloves as protective equipment in the handling of mercury and other chemicals?						
Yes	0	0.00	1	5.00	1	2.22
No	25	100.00	19	95.00	44	97.78
No response	0	0.00	0	0.00	0	0.00
Total respondents	25	100.00	20	100.00	45	100.00
Is there a tailings pond in the processing area?						
Yes	25	100.00	20	100.00	45	100.00
No	0	0.00	0	0.00	0	0.00
No response	0	0.00	0	0.00	0	0.00
Total respondents	25	100.00	20	100.00	45	100.00
Is blowtorching of the amalgam done indoors? or outdoors?						
Indoor	7	28.00	8	40.00	15	33.33
Outdoor	18	72.00	12	60.00	30	66.67
No response	0	0.00	0	0.00	0	0.00
Total respondents	25	100.00	20	100.00	45	100.00
Are retorts used in blowtorching of the amalgam?						
Yes	0	0.00	0	0.00	0	0.00
No	25	100.00	20	100.00	45	100.00
No response	0	0.00	0	0.00	0	0.00
Total respondents	25	100.00	20	100.00	45	100.00

Source: Israel and Asiot (2000)

\* *Concerted conduct by the national government, LGUs and NGOs of education and awareness campaigns on mercury pollution.* Miners in general are not fully knowledgeable of the health risks they are facing associated to mercury pollution. Heightened education and awareness should make them voluntarily compliant to regulations.


\* *Involvement of international organizations in the fight against mercury pollution particularly in the promotion of technologies that can prevent or minimize it.* An example of this is the current project of the United Nations Industrial Development Organization (UNIDO) which promotes the use of mercury retorts among miners in Diwalwal.

\* *Serious consideration of the promotion of the carbon-in-pulp (CIP) method of processing for small-scale mining.* This method may be less dangerous to human health but is not widely used due to high investment requirement. With the setting up of cooperatives and their pooling of funds, the communal operation of CIP plants may be made possible.

The above recommendations, when put into action, will, however, address only future mercury pollution and *not pollution already in place.* For existing pollution, it is financially very costly for the government to dredge and clean up entire rivers and waterways affected by the problem. *A practical approach therefore is simply to identify populated sites with high levels of mercury contamination. Then, selective clean-ups can be done in these sites.*

## Conclusions

Small-scale mining is a refuge of last resort to an increasing number of people because of economic necessity. Despite mercury pollution, therefore, it is here to stay.

While it is a real menace, mercury pollution in small-scale mining is not irreversible. The government can do a lot to make it more health- and environment-friendly. Some of the needed actions are presented here but just like in many other aspects of governance, strong political will and moral leadership are needed to transform them into reality. 

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