



## ***Removal of Barriers to the Abatement of Global Mercury Pollution from Artisanal Gold Mining***

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It is a matter of fact that Governments, national and international institutions, industry, and society in general become more and more conscious of the problems posed to our planet by the release of toxic chemicals. Mercury is one of numerous pollutants causing growing concern because of the long-term impact on the ecosystem and human health. This concern was reflected in over hundreds of publications presented at the last International Conference on Mercury as Global Pollutant in Minamata/Japan in 2001.

Only part of the mercury emissions to the environment is man-made. Because of its high vapor pressure and due to degassing from the earth's surface, natural mercury emissions greatly exceed the man-made pollution. Besides coal and natural gas combustion and the electrolytic production of chlorine and caustic soda, the mining sector remains, however, an important anthropogenic source of mercury emissions.

The official consumption figures of mercury show a downward trend since the early 1980s owing in part to regulations regarding mercury discharges and emissions, and to concern to the ultimate fate of mercury-bearing products. In industrialized countries the concern is so serious that regulations have virtually eliminated the use of mercury in electrical batteries. In these countries people have even had their amalgam fillings removed knowing that mercury exposure from dental fillings is toxicologically significant and unnecessary.

In contrast to the chemical and electrical industry, where innovations led to a substantial decrease of mercury emissions, artisanal and small-scale mining remains a dangerous source of mercury pollution. This problem affects all developing countries in Latin America, Africa and Asia, where gold is produced on artisanal basis. According to a conservative estimate, 1.5 million people are directly involved in this sub-sector, whereas several million people are economically dependent on these activities.

Within the last decades, small-scale gold mining activities have increased steadily. It is

foreseeable that a sharp increase of these activities will occur with the rising gold price which is experienced since 2003. Now, small-scale mining might account for one-quarter of the world gold output. A high percentage of these small-scale miners use the mercury-based amalgamation process with potentially catastrophic results for the environment and their own health. Some hundred tons of mercury vapors are released every year into the atmosphere. Since they quickly return to the river ecosystem with rain, they add up to the mercury spillage occurring during the amalgamation process.

Diagnostic missions of UNIDO revealed the excessive use of mercury in many parts of the world. It is well known that this amalgamation process is devastating to health, not only to users but also to those indirectly involved, including the unborn, through peripheral contamination and introduction into the food chain. Within the last years, life-threatening mercury pollution has been identified in most hot spot areas, where artisanal gold production is taking place.

### **UNIDO Intervention Programme Objective**

Since many years, continuous efforts have been made by the Organization to provide assistance to the small-scale mining sector, in particular to the artisanal gold mining sector. The requests for assistance in reducing mercury emissions were forwarded to UNIDO especially by those governments, which had become increasingly aware and concerned about the dangers involved in these activities. Since the issue of impact on health and environment is multifaceted and complex, Governments requested support, especially in education, training and technology transfer for improving the situation.

In this respect, UNIDO had to offer cross-disciplinary programmes, comprising measures for environmental protection, introduction of new technologies and manufacturing of equipment and training in these fields, especially training for women. In these programmes, UNIDO is undertaking special efforts to ensure that women participate and benefit equally from the introduction of new equipment and processing techniques.

More than 10 countries have requested UNIDO's assistance in different projects related to artisanal gold mining. In general, these governments have inadequate resources, lacking capacity and insufficient institutional framework to control informal gold mining activities and the resulting mercury pollution. UNIDO's approach in addressing this problem is to replace low recovery, high mercury consuming and discharging processes with environmentally safe and high-yield gold extraction alternatives that will sharply reduce or eliminate the use and discharge of mercury. Thanks to the financial assistance of the Global Environment Facility (GEF), UNIDO can focus now on selected areas, which are subject to transboundary mercury contamination problems in shared river basins or enclosed water bodies.

During the initial phase of the GEF Project, diagnostic missions to countries with active artisanal gold mining activities have been undertaken, especially to areas where waterbodies and basins with global ecological significance are shared. In collaboration with host governments, barriers limiting the adoption of cleaner artisanal gold mining and extraction technologies have then been identified in the following countries: Brazil (Amazon), Sudan (Nile), Tanzania (Lake Victoria and Lake Tanganyika), Zimbabwe (Zambezi), Lao PDR (Mekong), Indonesia (marine environment). In this phase, UNIDO was especially identifying hot spots with the potential for affecting international waters in Africa, Asia and Latin America.

### **Implementation Strategies**

The large-scale (follow-up) Project, which has started in August 2002, aims at establishing the extent of mercury pollution through studying the general health conditions of those living in selected areas, conducting geochemical sampling and analysis in order to identify "hot spot" areas, collecting and analyzing human specimens and other biological samples, studying mercury migratory patterns in the area and assessing the impact and extent of mercury pollution in waterbodies. In collaboration with respective Governments, local laboratories will be identified and their resource capacities enhanced in order to enable them to develop and conduct continuous monitoring of mercury pollution of waterbodies in artisanal gold mining areas. The Project will also formulate and carry out measures for remediation of the identified "hot spots". The Project is expected to be completed in 2006.

Since training and awareness raising are important tools for developing the small-scale mining sector, UNIDO focuses also on

- On-the job training in cleaner technology;
- Training of women and women entrepreneurs, who have a big share in the sector;
- Enhancing awareness through workshops on local, regional and international level
- Raising the interest of the medias. Inter alia BBC and CNN have already reported on mercury-related activities of UNIDO.

In order to introduce efficient and affordable technologies, the project will analyze the existing processes and propose modifications for technology and equipment. The aim of these activities are

- To familiarize local manufacturers with the design of non-high-tech but efficient gold recovery equipment;
- To demonstrate alternatives to amalgamation;
- To prove the cost effectiveness of the new techniques;
- To develop micro financing programmes in cooperation with the private sector.

On request of the participating governments, UNIDO will

- Review current policies and advise on legislation;
- Establish sustainable gold extraction indicators;
- Convene workshops to discuss recommendations on the legal framework;
- Assist Governments to develop enforcement programmes and set enforceable standards;

**Conclusion:**

The involvement of the Global Environment Facility can be considered as a breakthrough in reducing mercury emissions emanating from small-scale gold mining to international waters. It has to be noted that the GEF will cover only the difference, i.e. the increment, between the costs of the project with the global environmental objective in mind, and the costs of an alternative project that the country would have implemented in the absence of a global environmental concern regarding mercury.

The cooperation of UNDP, UNIDO, and the GEF in programmes related to reducing mercury emissions has resulted in an increased awareness about this problem in developing countries. This is reflected by the increasing number of requests for technical assistance and an obvious interest of governments and donor agencies in supporting these activities. Funds made available so far do, however, not suffice to cover the demand for assistance. Therefore, donor efforts need to be encouraged and coordinated in order to improve the effectiveness of assistance to the small-scale gold mining sector.