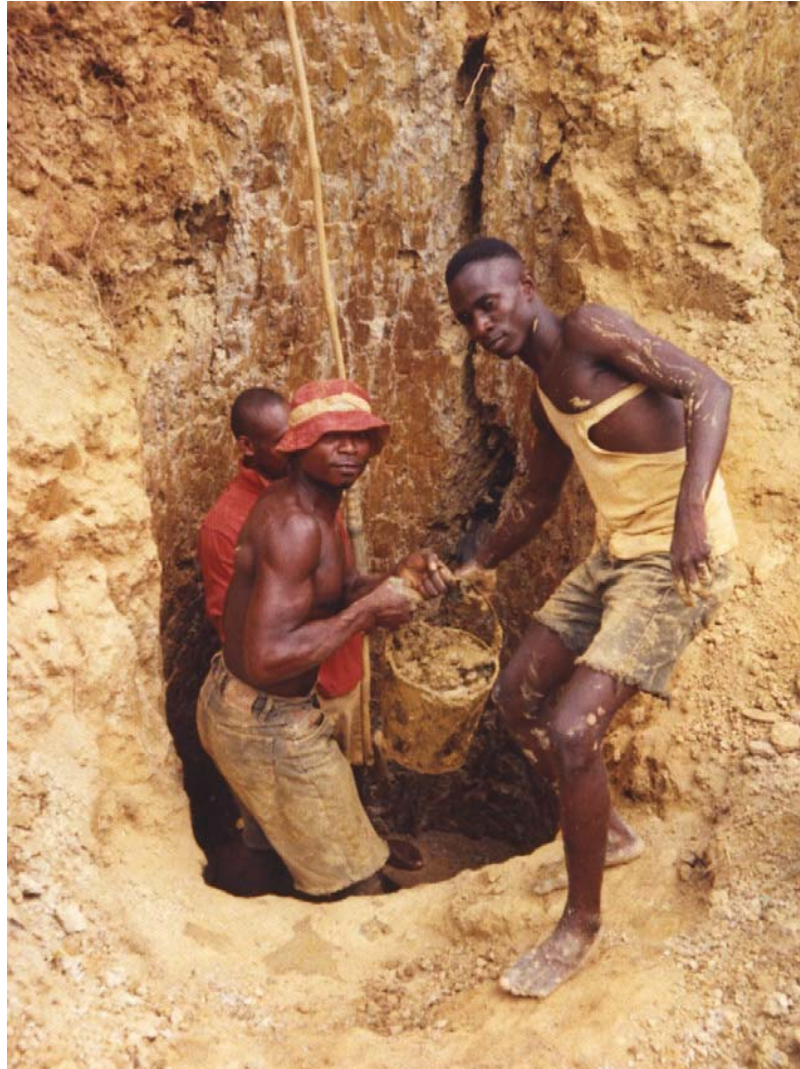


Global Mercury Project



Next Steps of the Global Mercury Project

Marcello M. Veiga

Chief Technical Advisor

GEF/UNDP/UNIDO

Global Mercury Project

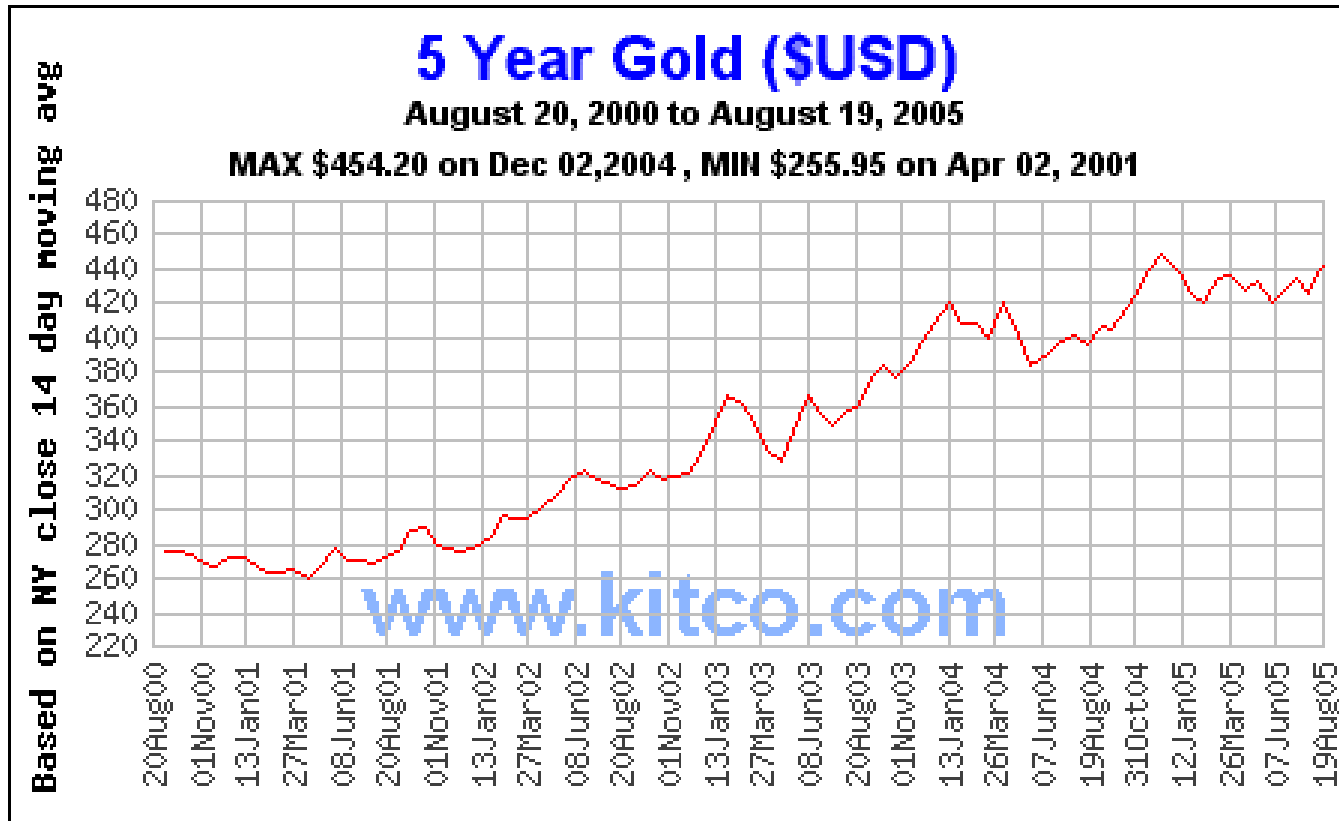
A Song from El Callao, Venezuela

Ai, ai, ai bandido, que estabas callado
Que estabas escondido
Lavando su oro muy cerca del rio

Ai, ai, ai bandit, who was quiet
Who was hidden
Washing his gold very close to the river

Gold Price

Gold price increasing = More people involved



Gold in ASM

- **Number of miners have increased in Asia and Africa and reduced a bit in Latin America**
- **800 to 1000 tonnes/a gold from ASM worldwide**
- **Best guess: 10 to 15 Million ASM involved in gold**
- **More than 1000 tonnes/a of Hg released into the environment by ASM**
- **This represents 30% of the man-made mercury pollution**

This is the biggest gold rush the world has ever seen

More than 100 million people directly and indirectly involved in artisanal gold mining



Brazil, 1985

Why Mercury is Used by ASM?

Main reasons by which Hg is widely used by ASM:

- **Easy to be used**
- **Cheap: 1g Au = US\$ 10**
1g Hg in minesites = US\$ 0.03 – 0.10
- **Very accessible**

Recycled Hg comes from Europe

- **Miners are not aware of risks**



Tanzania, 2003

Amalgamation of the Whole Ore

Hg is lost to the environment by attrition



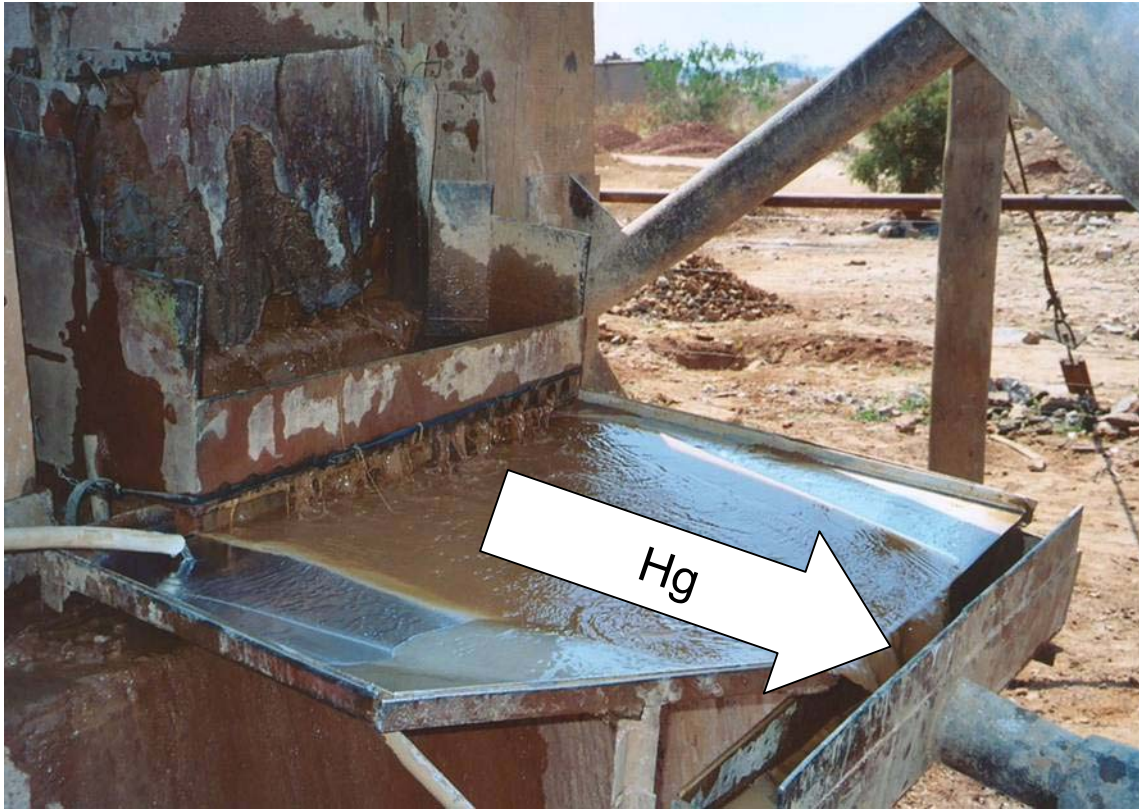
Hg is spread
on the riffles

Hg goes with tailings

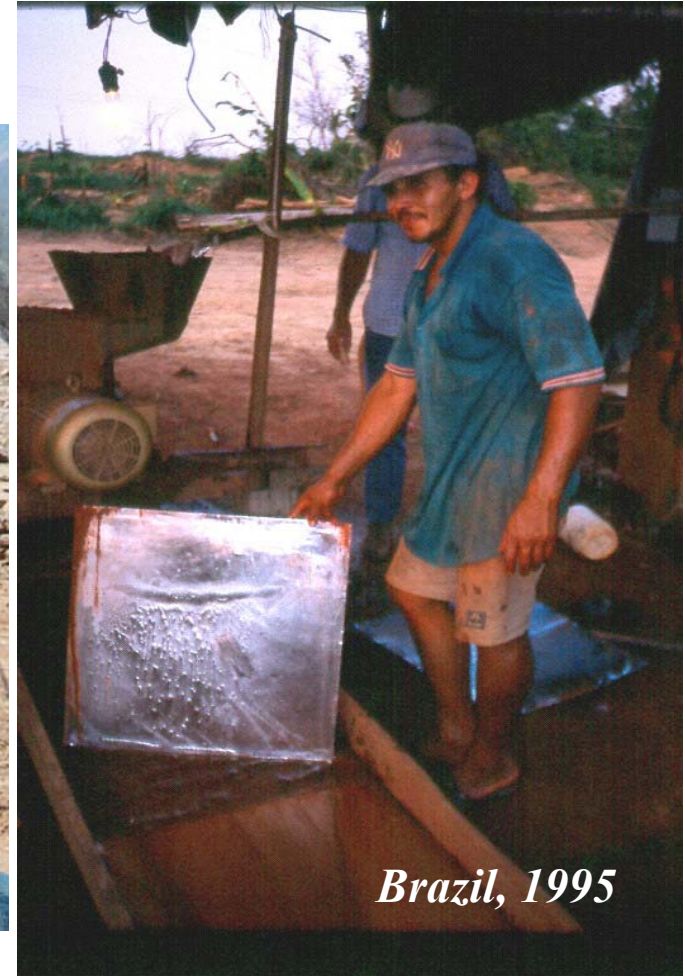
Brazil, 1999

Amalgamation of Whole Ore (*Cu-amalgamating plates*)

- Attrition remove Hg from plates



Zimbabwe, 2003



Brazil, 1995

Amalgamation of Whole Ore (*Cu-amalgamating plates*)



Venezuela, 2003

Amalgamation of Whole Ore (*Cu-amalgamating plates*)



Venezuela, 2003

Amalgamation of Whole Ore (*Cu-amalgamating plates*)

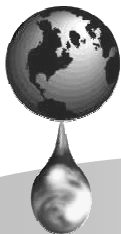


Venezuela, 2003

Burning Amalgam in an Open Pan

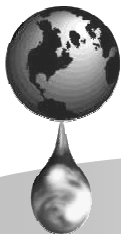
Any solution is better than this





Global Mercury Project





Global Mercury Project



Main Result of the E&H Assessments

- **Intoxication of miners, families and neighbors is the main problem in all 6 countries**
- **Health problems are evident**
- **Environmental problems (methylation) are evident in Brazil, Indonesia and Zimbabwe**
- **Methylation is enhanced by cyanidation of Hg-contaminated tailings**

Cyanidation of Amalgamation Tailing

- Oxidize and solubilize part of the Hg
 - **DANGER:** Hg solubilizes and can be methylated
- ✓ Brazil
 - ✓ China
 - ✓ Ecuador
 - ✓ Indonesia
 - ✓ Peru
 - ✓ Philippines
 - ✓ Venezuela
 - ✓ Zimbabwe



Zimbabwe, 2004



Global Mercury Project



Outline

SOLUTIONS

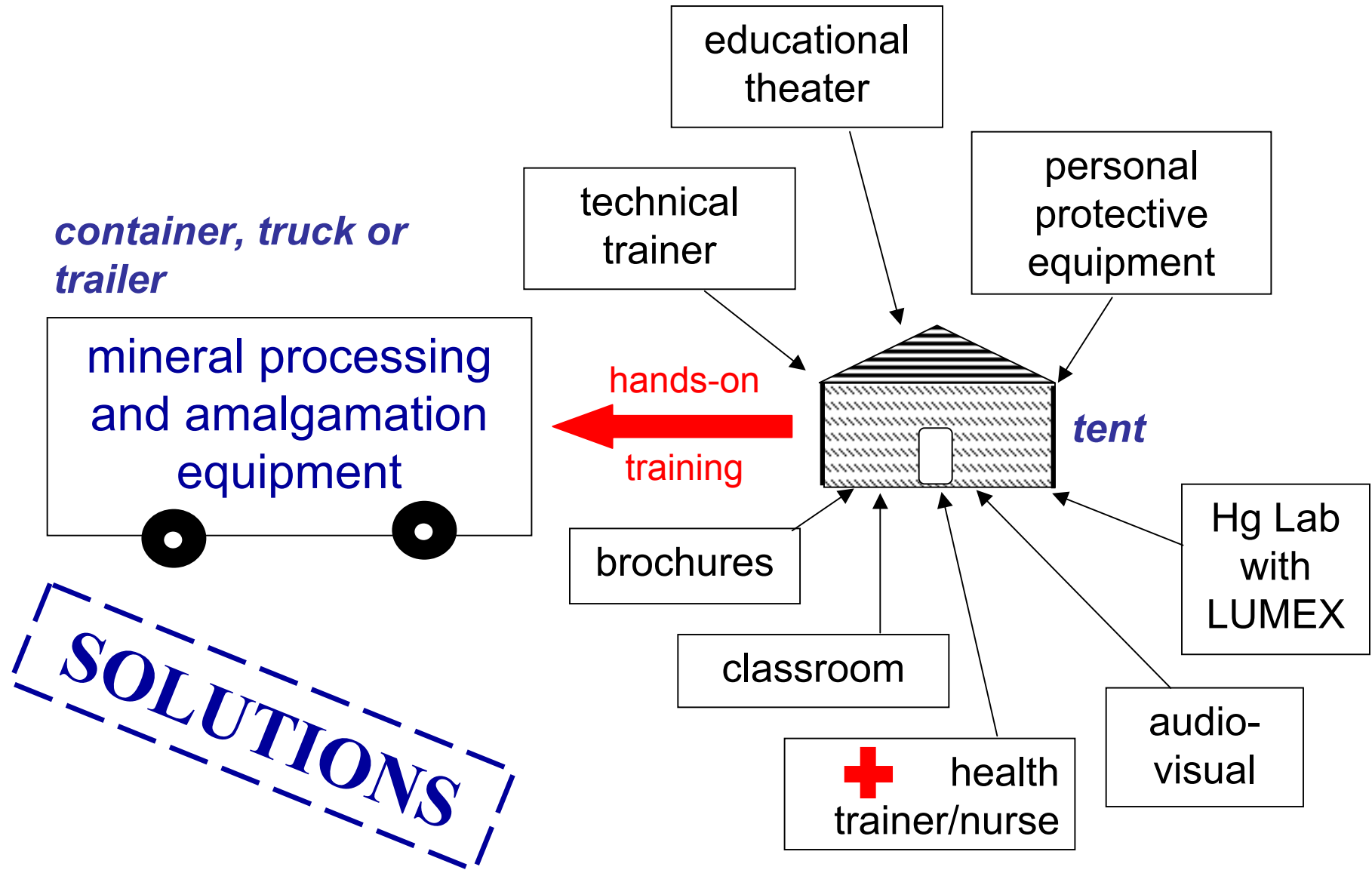
- ✓ First phase was devoted to environmental and health assessment
- Now it is time for **INTERVENTIONS**
 - Education of miners and communities
 - Higher efficiency gravity concentration
 - Reduction of Hg emissions and exposure

Education is Everything



Sudan, 2004

Transportable Demonstration Units (TDU)



Why Health Issues are Important

- **Hg poisoning is a big problem, but not the worst**
- **HIV/AIDS is rampant in ASM regions; e.g. $\frac{3}{4}$ of miners in Kadoma are HIV positive**
- **The clinic will be multifunctional (HIV, malaria, Hg, diarrhea, parasites, hepatitis, etc.)**
- **This is also a way to attract miners and families to the TDUs**

Demonstrating Availability of Gold Concentrators



Filtering Amalgam

A centrifuge can be made with PVC tubes attached to a bicycle wheel



Recovering Hg coalescence

Fred Pantoja's method to agglomerate mercury



Mozambique, 2005

Burning Amalgam in an Open Pan



Any solution is better than this

Kitchen-Bowl Retort



Ecuador, 2004

Kitchen-Bowl Retort

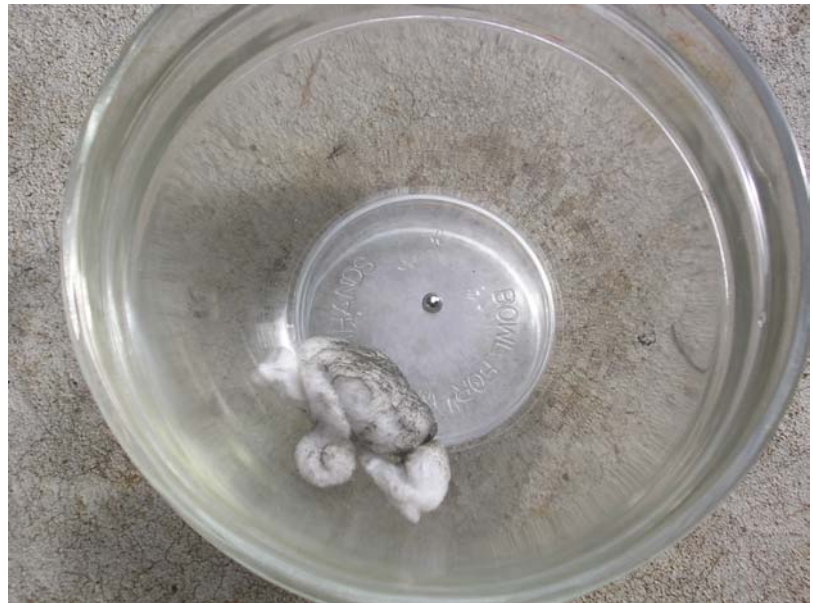


Ecuador, 2004

Home-made Retort Using Kitchen Bowls



Lao PDR, 2005



Retort Made of Kitchen Bowls



Sudan, 2004

Using Kitchen Bowl Retorts



Zimbabwe, 2005

Using Kitchen Bowl Retorts



Mozambique, 2005

Using Kitchen Bowl Retorts

- **Without retort: 50,000 $\mu\text{g}/\text{m}^3$**
- **Using the kitchen-bowl retorts, the levels at 0.1 m from the bowl = 35 $\mu\text{g}/\text{m}^3$**
- **1 meter from the bowl = 3 $\mu\text{g}/\text{m}^3$**
- **nose level decreased to 0.4 $\mu\text{g}/\text{m}^3$**

Results obtained using LUMEX Hg analyzer

Water-pipe Retort



Mozambique, 2005

Awareness Campaign Materials

- **Communicate**
 - **Mercury hazards**
 - **Mineral processing solutions**
- **Promote**
 - **Health seeking behaviors**
 - **Community health solutions (Child and women's health, Water and sanitation, etc.**
- **Country and culture specific**
- **Brochures contain lots of pictures/illustrations**
 - **Very few words**

Awareness Campaign (Pamphlet made by CETEM)

Queimar ouro não é errado,
mas o azougue vai disfarçado,
vira fumaça, o bicho é danado!
Põe veneno pra todo lado:
no rio, no peixe, nos filhos, na patroa.
O troço é ruim, não é a toa,
que toda essa gente boa
anda muito preocupada,
em mudar sua atitude.
Se usar máscara e retorta,
vai ter muito mais saúde!



Olha só o resultado,
mole, igual um melexete,
numa rede entevado.
Se usasse o equipamento,
não teria esse sofrimento,
tudo seria evitado!



Trabalhe com mais cuidado,
e *VIVA* com mais saúde!



Results and Policy Development

- **Study capacity for micro-financing for ASM in each GMP country**
 - to acquire mineral rights
 - to acquire better equipment
 - to promote better organization
- **Test pilot micro-finance programmes**

Risk Assessment and Reclamation Strategies

- **Use GIS to evaluate the growth and mobility of artisanal mining:**
 - **How ASM increased over time**
 - **Relationship between impacted area, Au production and Hg loss and mobility**
 - **Migration patterns of miners**
- **Create tools to establish mitigation strategies for mercury contaminated sites**
- **Develop plans for land use and economy diversification of mining communities based on natural resources vocation**

GMP Annual Meeting, Salvador

- **After the CASM: Sept 26 to 28, 2005**
- **Geological Museum of Bahia, Salvador**
- **No registration fee**
- **Good talks, good food and ...**
- **Good songs!!!**

Conclusion

- **Artisanal mining is a poverty-driven activity**
- **Hg emissions are increasing up to 1000 tonnes/a...and growing!**
- **Number of ASM is increasing with gold price and more women and kids are being involved**
- **GMP must focus this phase on INTERVENTIONS:**
 - **Awareness campaign**
 - **Transportable Demo Units**



“It’s easier for a man to become an artisanal miner than for an artisanal miner to become a man”
(a miner in the Amazon)



**Obrigado
Thanks**

