



Artisanal Gold Mining Mercury Phaseout: Philippine Experience

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Who We Are...

- An independent non-profit environmental non-governmental organization focusing on the Southeast Asian region on issues pertaining to:
 - Environmental Justice
 - Prevention of Toxic Trade – products, wastes and technologies
 - Trade, Human Rights and Governance
- Southeast Asian office of the Basel Action Network
- Active member of the global coalition on mercury Zero Mercury Working Group (ZMWG)



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Context of our Approach

- Environmental group focused on toxics
- National consultant of the Philippine government for the NSP on Hg Reduction in ASGM
- Projects
 - US Department of State Project (2010-2014)
 - Dialogos, University of Copenhagen, GEUS, and ICOEPH project (2010-2014)
 - UNIDO-GEF Mercury Reduction in ASGM (2013-2015)

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Issues To Consider

1. Audience;
2. Type of Ore;
3. Technical;
4. Cost Component/Materials;
5. Legal and Social context;
6. Leadership/Ownership;
7. Government role; and
8. Role of Other Stakeholders



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1. Audience

- Who is the technology/process for?
- Philippines different levels of small-scale miners:
 - Artisanal
 - Small-scale with little capital
 - Small-scale with capital middling to medium-scale
 - Medium-scale
 - Large-scale



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2. Type of Ore

- What type of ore does your audience deal with?



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3. Technical Component

- Improved gravity concentration with application of sodium tetraborate (borax) at refining stage (Benguet Method)
- Other gravitational techniques
- Cyanidation – carbon in pulp (CIP), carbon in leach (CIL), cyanide in drum (CID).

Benguet Method

- Type of Ore: coarse gold/visual
- Audience: artisanal, small-scale with limited capital
- Set up: almost similar to mercury amalgamation (without the mercury) = longer sluice box, process management, panning



TYPICAL BENGUET RODMILL FACILITY

Title:
TYPICAL BENGUET RODMILL FACILITY
Designed & Illustrated By:
Alfred S. Bugnosen & Reden S. Pion

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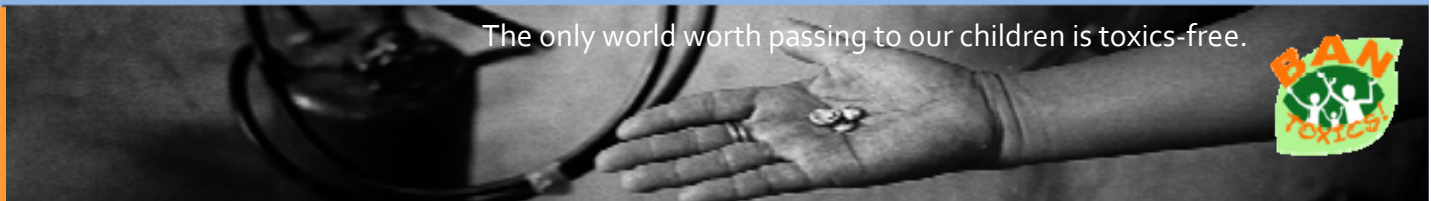
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Benguet Method

Advantages	Disadvantages
<ul style="list-style-type: none">✓ No mercury✓ Improve gold capture✓ Better gold quality✓ Minor equipment change✓ Miner's familiarity with the process✓ Cheaper operating cost✓ Better tailings management and recovery	<ul style="list-style-type: none"><input type="checkbox"/> Learning curve<input type="checkbox"/> Miner perceptions<input type="checkbox"/> Easier to steal the gold<input type="checkbox"/> Availability of pans<input type="checkbox"/> Availability of borax<input type="checkbox"/> Smelting equipment

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Cyanidation

- Type of Ore: various
- Audience: small-scale with capital to medium scale
- Set up: drums, agitators, additional chemicals = facility

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Cyanidation



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Cyanidation

Advantages	Disadvantages
<ul style="list-style-type: none">✓ No mercury✓ Very high gold recovery✓ Better gold quality✓ Better tailings recovery	<ul style="list-style-type: none"><input type="checkbox"/> High learning curve - technical<input type="checkbox"/> Capital costs<input type="checkbox"/> Facility requirements<input type="checkbox"/> Public perception<input type="checkbox"/> Tailings management

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Cost Considerations

Materials	Mercury	Benguet Method	Cyanide-In-Drum
Lime	0	0	.05
Activated Carbon	0	0	1.43
Cyanide	0	0	.16
Mercury	.50	0	0
Borax	.01	.33	.17
Zinc Dust	0	0	0
Lead Acetate	0	0	0
TOTAL	.51	.33	1.88

Per 60 kg of fresh ore processed

Average minimum ore input

Benguet: 60 kg

Mercury: 60 kg

CID: 60 kg

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Social Context

- Existing laws and regulations on mining
- Prevailing attitude of community
- Government effectiveness
- Corruption
- Miner population
- History of mining in the area
- Acceptability of alternatives to miners and community
- Health impacts

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Leadership / Ownership

- Leadership – someone (individual or entity) needs to take the lead in the process
- Ownership – the mining community must accept the change, it can not be imposed on them.



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Government Role

- Government (national and local) key role
 - Policy direction
 - “Table setting”; “Rule-Making” – incentives/disincentives
 - Support – technical, health, etc.
- Failure in meeting this role creates distrust among miners
- NOT exclusive

Role of Other Stakeholders

- Not just government
- Identify and create synergies with other stakeholders



Thank you!



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