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## RESEARCH AGENDA

- ⌘ Developing a simple, cheap, easy to operate and financially rewarding technology to protect the safety and health of communities and the environment at ASGM locations
- ⌘ **Phytoextraction & phytomining**, a farming activity that could develop agriculture as an alternative livelihood in ASGM areas.
  - Primary aim: to contain the hazardous tailings into a manageable area and thereby mitigate the risk of Hg movement into edible crop plants.



## RESEARCH AGENDA

### ☪ Phytoextraction

- ☪ Plants are used to extract metals from waste rock, soil or water. These metals can subsequently be recovered from the plant in pure form, and sold or recycled.
- ☪ Gold phytoextraction is a commercially available technology, while international research has shown that phytoextraction will also work for mercury.



## RESEARCH AGENDA

### ☪ Restoration of Land Degradation

- ☪ Development of improved natural succession as alternative for sustainable natural resources management.
- ☪ Design of land rehabilitations using indigenous vegetation for landscape management .
- ☪ Restoration as a part of climate change mitigation strategy.



# CONDUCTED RESEARCH WORKS

## ☪ Completed & on going

- Phytostabilization potential of indigenous vegetations for gold mine tailing
- Detoxification of Fe, Zn, Cd and Al in gold mine tailing by indigenous mycchorized plant
- Soil amendments and weathering process of overburden materials originated from gold mine waste
- Improvement of crop production on land contaminated by ASGM waste containing mercury through phytomining technology



# CONDUCTED RESEARCH WORKS

## ☪ Completed & on going

- Phytoremediation of Pb and Hg in soil contaminated by artisanal gold mine waste using *Cromolaena sp.*, *Paraserianthes sp.*, and *Vertiver sp.*
- Assessment of biogeochemical mercury cycling: Sekotong artisanal mining area, Lombok, Indonesia

## ☪ To be conducted (April 2012)

- Alternative livelihoods in artisanal gold mining areas of West Nusa Tenggara (WNT) Province, Indonesia (USAid)
- Phytomining of metals in ASGM tailings of West Java (ARD-EMS)



# TEAM

- ☉ WH. Utomo (UB)
- ☉ CWN. Anderson (MU)
- ☉ BD. Krisnayanti (Unram)
- ☉ X. Feng (CAS)
- ☉ M. Beutel (WSU)
- ☉ E. Handayanto (UB)
- ☉ N. Madiutomo (Tekmira-EMS)
- ☉ BM Kumar (KAU)



## 1<sup>ST</sup> INTNL, CONF. ESHI-ASM (7-8 FEB 12)

- ☉ Mercury contaminations from artisanal zinc and mercury smelting in Guizhou, PR China.
- ☉ Health impact of artisanal and small-scale mining.
- ☉ Social and environmental production of suffering: socio-economic impact of artisanal and small-scale gold mining in Indonesia, case study Palu, Central Sulawesi.
- ☉ Legal aspects on ASGM to reduce the environmental, social and economic negative impacts.
- ☉ Thiosulphate assisted phytoextraction of mercury (Hg) contaminated soils at the Wanshan Mercury Mining District, Southwest China.
- ☉ Mercury level in hair artisanal gold miners and its solution with affordable technology.



## 1<sup>ST</sup> INTNL. CONF. ESHI-ASM (7-8 FEB 12): SELECTED PAPERS

- ☉ Mercury concentration on tailing and water from one year of ASGM at Lantung, Sumbawa, Indonesia.
- ☉ On-site and off-site impacts of artisanal smallholder gold mining of pongkor mountain to water quality of Cikaniki River
- ☉ Effect of traditional gold mining to surface water quality in Murung Raya District, Central Kalimantan Province.
- ☉ Environmental stewardship for gold mining in tropical regions.
- ☉ Mining waste contaminated lands: an uphill battle for improving crop productivity.



## 1<sup>ST</sup> INTNL. CONF. ESHI-ASM (7-8 FEB 12): SELECTED PAPERS

- ⌘ Government policy in the management of artisanal gold mining: challenges and opportunities.
- ⌘ The potential use of indigenous nickel hyperaccumulators in small scale mining in the Philippines.
- ⌘ Potential accumulator species in nickel post-mining land at Soroako, South Sulawesi.
- ⌘ The use of glyphosate herbicide as the sole source of phosphorus for screening of soil-born fungal strains from treated soil.
- ⌘ Contribution of arbuscular mycorrhizal fungi on growth performance, soil physical and biological quality on post mining landuse.



## 1<sup>ST</sup> INTNL. CONF. ESHI-ASM (7-8 FEB 12): SELECTED PAPERS

- ⌚ Clay and organic matter applications on the coarse quartz tailing material and the sorghum growth on the post tin mining at Bangka Island.
- ⌚ Phytoextraction to promote sustainable development.
- ⌚ The potential of *Chromolaena odorata* as a remediation species for gold mine tailings.
- ⌚ Tolerance mechanisms in mercury-exposed *Chromolaena odorata* (L.f.) R.M. King et H. Robins, a potential phytoremediator.
- ⌚ Selection of hyperaccumulator plants for mercury contaminated soil.
- ⌚ Ecosystem evaluation of post sand mining land in Cimalaka, Sumedang

