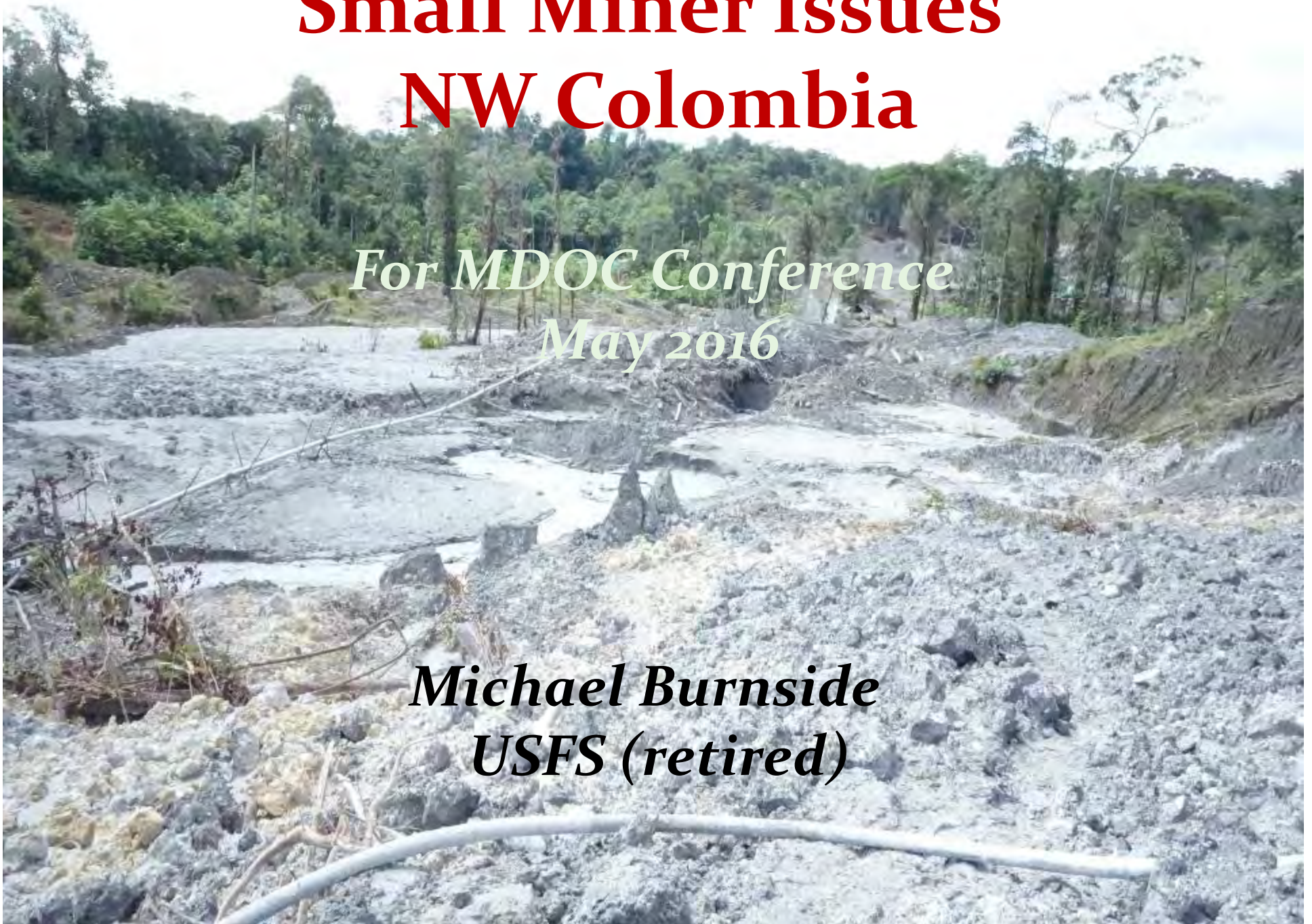


Small Miner Issues NW Colombia

*For MDOC Conference
May 2016*

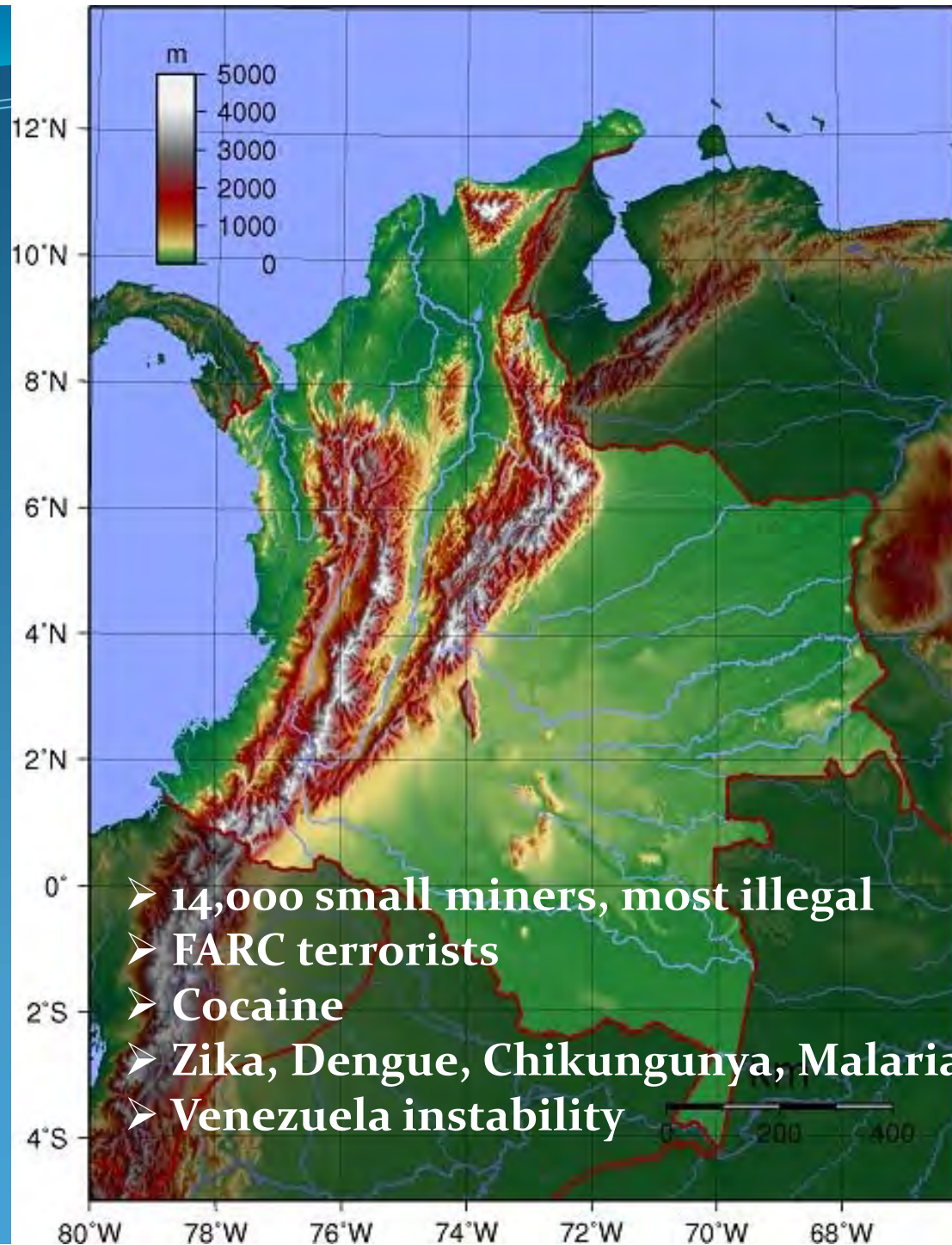
*Michael Burnside
USFS (retired)*

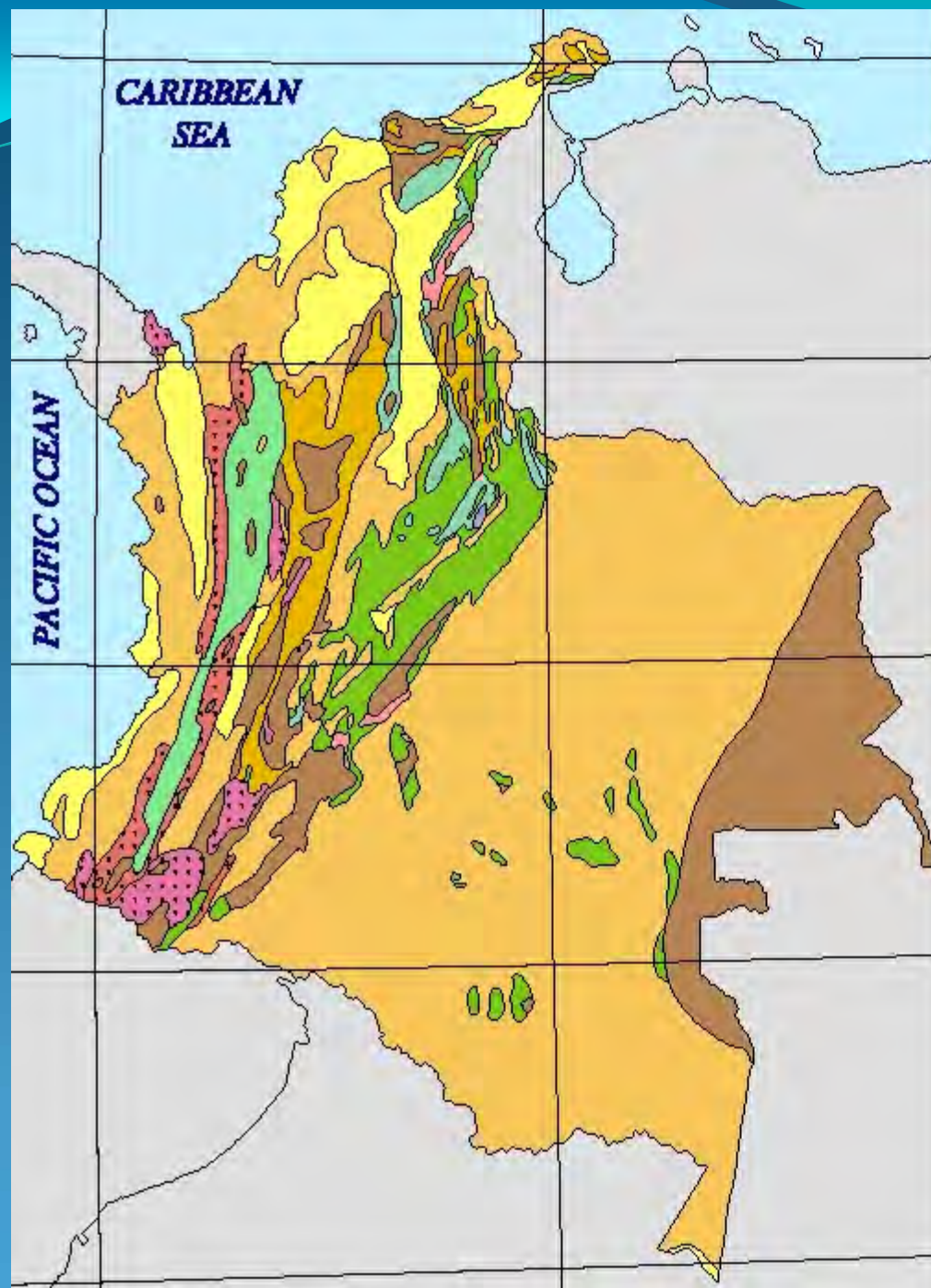


Colombia



** 2/3 size of
Alaska*





Sedimentary Rocks

- Quaternary
- Tertiary
- Cretaceous
- Jurassic-Cretaceous
- Triassic-Jurassic
- Carboniferous-Permian
- Devonian
- Cambrian-Ordovician
- Precambrian-Paleozoic

Igneous and Metamorphic Rocks

- Cretaceous-Tertiary volcanics
- Mesozoic volcanics
- Mesozoic-Cenozoic intrusives
- Paleozoic-Mesozoic intrusives
- Precambrian undifferentiated

Bogota, Colombia

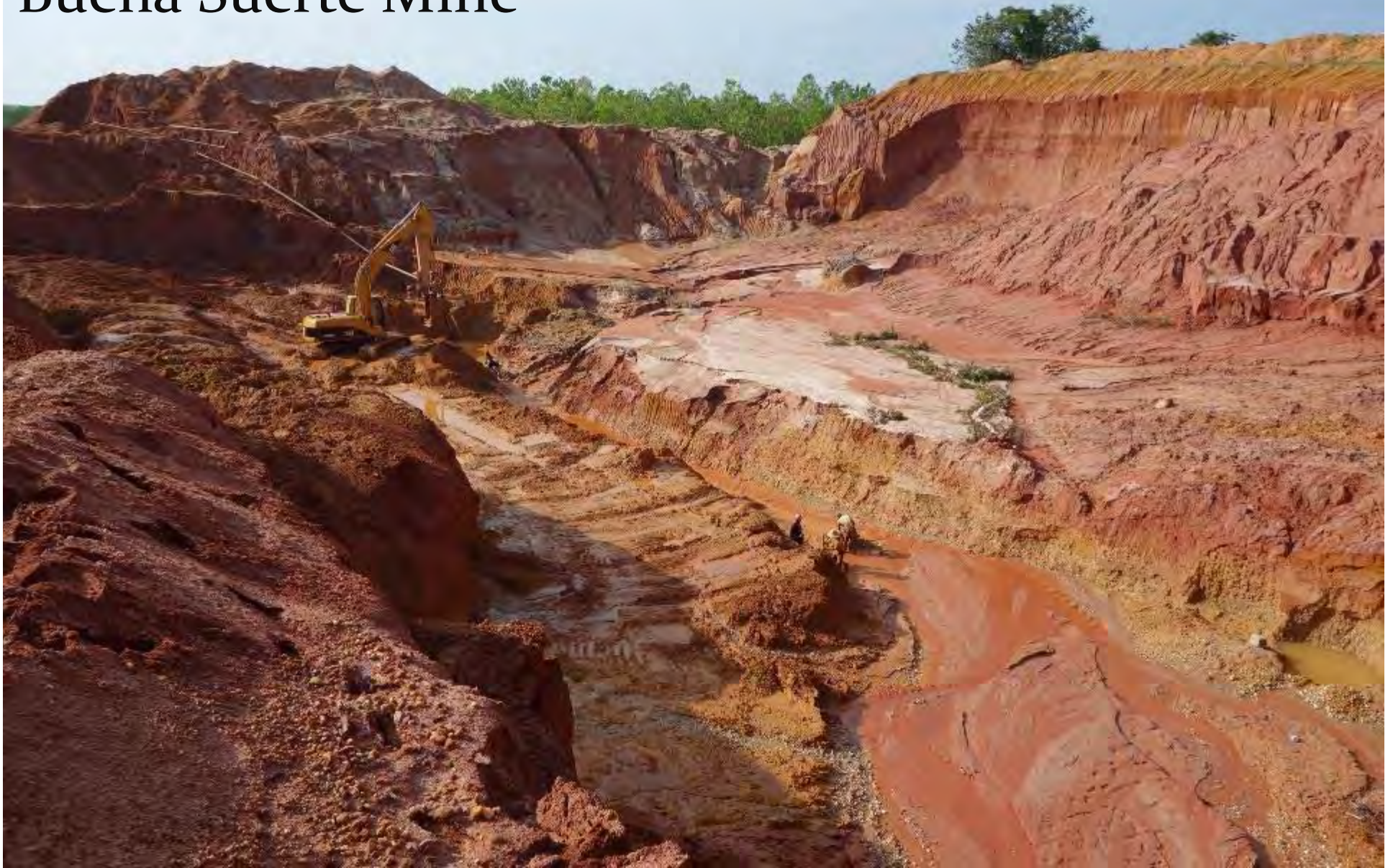


Caucasia, Colombia





Buena Suerte Mine






Buena Suerte Mine









A photograph showing two individuals standing in a dense forest of acacia trees. The ground is covered with a thick layer of fallen, brown leaves. The trees have thin, vertical trunks and a canopy of green leaves. One person is wearing a light blue shirt and dark pants, while the other is wearing a light-colored patterned shirt and khaki pants. They appear to be engaged in a conversation or inspection of the trees.

Acacia trees used for revegetation on mine waste
At the Buena Suerte Mine



Acacia leaves produce nectar for insects



Small saw mill turning acacia logs into lumber for furniture, flooring, & bee hives



Bee hives placed in mined area that was reforested with acacia trees

Rio Rayo Mine



Rio Rayo haul road to wash plant and sluice







Using Rio Rayo concentrates
with mercury



Rio Rayo mine retorting
mercury amalgam





Caucasia gold buyers



Gold buyer furnace & fume “filters”



USAID's Rio Cauca suction dredge Gold concentrate processing facility







Dept. of Choco, Colombia





Quibdo, Colombia



Officials from local mine cooperative

San Pablo Adentro placer mine



San Pablo Adentro mine









Tailings from previously mined area still unconsolidated





Las Animas mine

Las Animas mine shaft with drifts at bottom









Observations:

- **Poor mine design and practices**
- **Inefficient gold recovery systems**
- **Excessive surface disturbance**
- **No salvage of topsoil or vegetation for reclamation**
- **No designed settling ponds for water treatment**

Observations (cont.):

- **No provision for leveling, reshaping, & reclaiming as mining progresses**
- **Little or no sampling to aid mine design, check gold loss, or characterize the size and fineness of the gold in the deposit to optimize recovery**
- **Inefficient mining equipment choices**
- **Poor handling of mercury**

Recommendations:

- 1. Help each miner design a logical mine operating plan & include reclamation.**
- 2. Develop a BMP guide for the miners specific to local conditions.**
- 3. Hold local workshops & public meetings to educate miners on these issues.**
- 4. Create ASM demonstration projects out of operations where miners are doing well.**
- 5. Provide a pool of experts to give hands on technical assistance & advice to the miners.**

Recommendations (cont.):

- 6. Introduce a reclamation bond program & involve the local mining cooperatives.**
- 7. Continue work to reduce mercury use through education & alternative gold recovery systems.**
- 8. Provide training to Colombian regulatory agencies on compliance inspections.**
- 9. Begin an abandoned mine program to inventory and prioritize old sites for cleanup.**
- 10. Seek help from US agencies, mining industry, universities, and experts who have worked with small miners.**



Alguien tiene preguntas?