

PECC MINING CONFERENCE



Mining Rehabilitation in Papua New Guinea An Overview

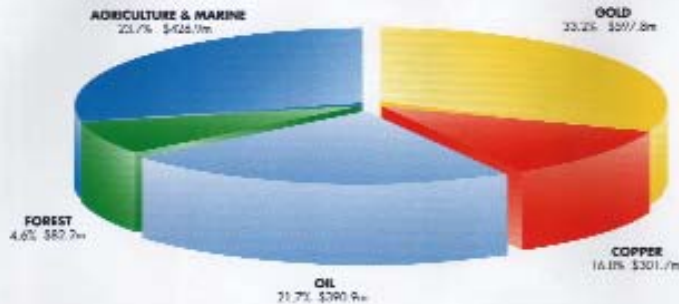
Vele P. Ila'ava & Ravendra Naidu

Abstract

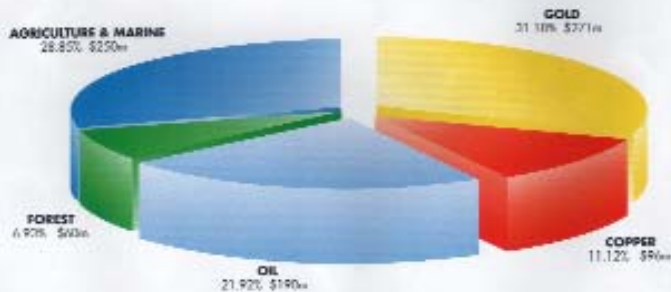
Mining activities generally enhance the bioavailability of metals thus enhancing the risk that it poses to both environmental and human health. While much has been reported on remediation of metal contaminated sites in the urban environment, ecosystem restoration at mine site degraded soils have posed considerable challenge to mining operators and scientists all over the world. However, scientists in developing countries in the humid tropics face many unique challenges in mining rehabilitation. There is generally little or no information on the agronomy of native plant species, and many of the rehabilitation procedures used in developed countries are not applicable in the humid tropics due to differences in soils, plants, climate or the environment. This is further exacerbated by a lack of understanding of contaminant behaviour in the humid tropical soils. In many developing countries, these limitations are often accompanied by poor government guidance and support and, the inability of local communities and often mining companies to see the long term benefits of sound rehabilitation programs based on good scientific research. The most practical rehabilitation endpoint in many cases is to return the disturbed area to some agreed functional system. These rehabilitation endpoints are generally low-input natural systems. Advances in knowledge and technology offer hope for improvement in management strategies for low input systems in the humid tropics. This paper discusses some of the unique challenges and opportunities in mining rehabilitation research in Papua New Guinea. The concept of natural attenuation and whether this process could be enhanced to minimize contaminant toxicity problems in the tropics will be considered in the presentation.

PAPUA NEW GUINEA MINING & THE ECONOMY

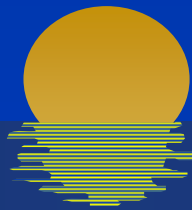
JANUARY - DECEMBER 1998 PNG EXPORT REVENUE
Total Value US\$1,795.3



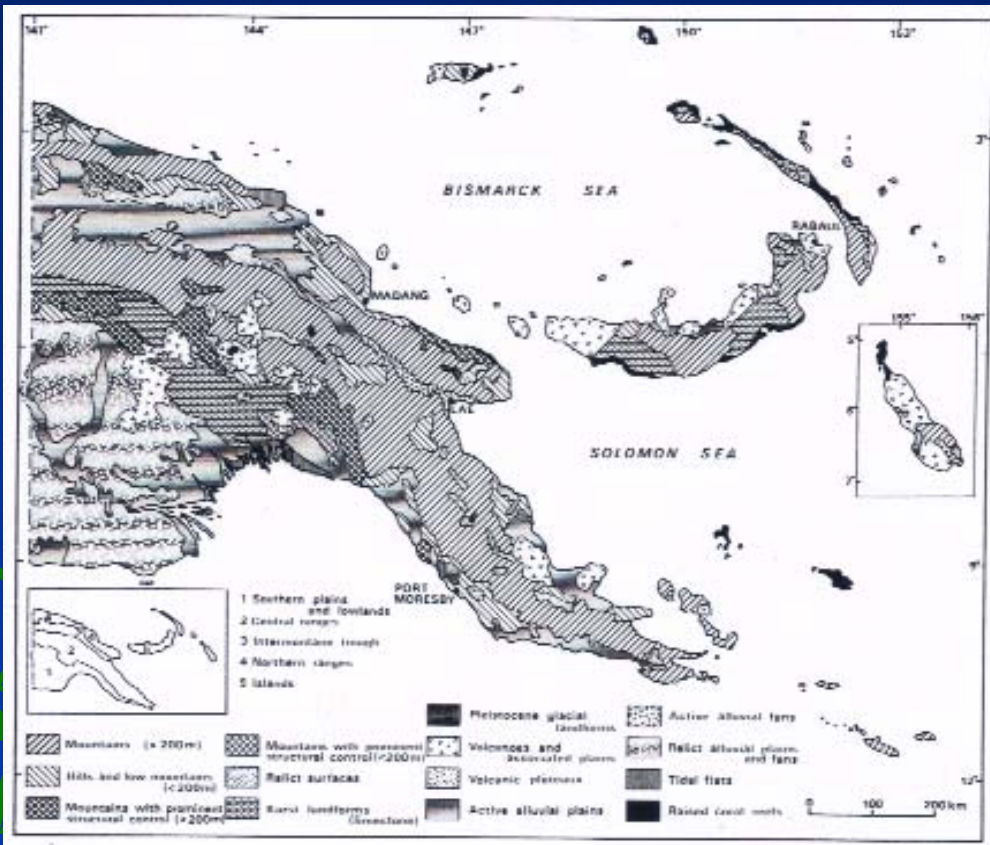
JANUARY - JUNE 1999 PNG EXPORT REVENUE
Total Value: US\$867



- Important – Since the early 1900's.
- Contributes about 50% of export earnings.
- Currently 3 large & 2 medium scale mines in operation.
- Future – Uncertain?



PAPUA NEW GUINEA CLIMATE & ENVIRONMENT



- 5 Major Landscape Regions
- Rugged terrain
 - ❖ mountains up to 4500m
- Mean Annual Temp.
 - ❖ 22 – 30°C
- Annual Rainfall
 - ❖ <500 - >8000 mm
 - ❖ Mean: 3000-4000 mm

MINING REHABILITATION IN PNG - STATUS



- Each mine doing own thing in rehabilitation.
- Mining Rehabilitation in PNG – Trial & Error.
- Importance in mine closure now realised.

REHABILITATION OBJECTIVES



- Safe & sustainable ecosystem
- Practical & achievable plan
- Scientifically sound & community acceptable

REHAB. ENDPOINTS – UNCLEAR?



- Natural Forest
- Fallow Vegetation
- Others
 - ❖ Residential
 - ❖ Recreational
 - ❖ Garden land
 - ❖ Residual Mining



LANDFORM DESIGNS

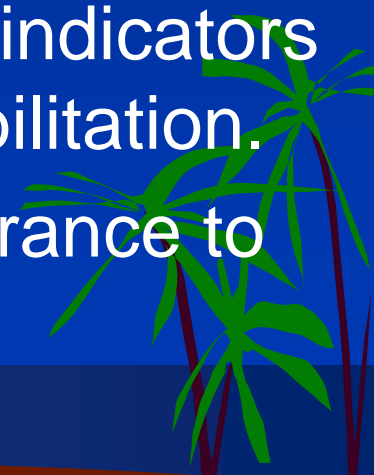


- Structural Stability
 - ❖ High intensity rainfall + large volumes of water involved.
- Drainage Plans
 - ❖ Perimeter & internal.
- Biostabilisation is slow
 - ❖ 3 to 12 months



VEGETATION

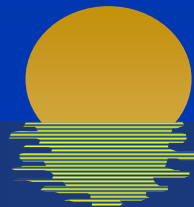
- There are 8 Major Vegetation Types in PNG
 - ❖ Impt: Wooded freshwater swamps, lowland & lower montane forests.
- Limited agronomic data on species for rehabilitation.
- Limited data on bio-indicators for measuring rehabilitation.
- Limited data on tolerance to metal toxicities.



SOILS



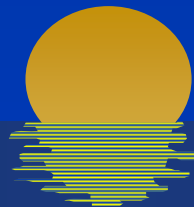
- Limited top soil.
- Mostly volcanic soils.
 - ❖ Have high variable charge.
- Management?
 - ❖ Dynamic & complex.
 - ❖ More scope for use of bio-fertilisers.



MINE CONTAMINATED LANDS



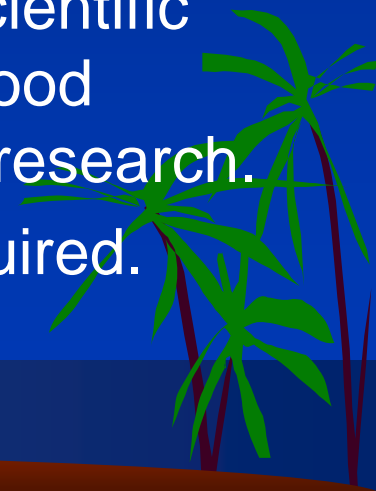
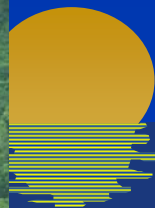
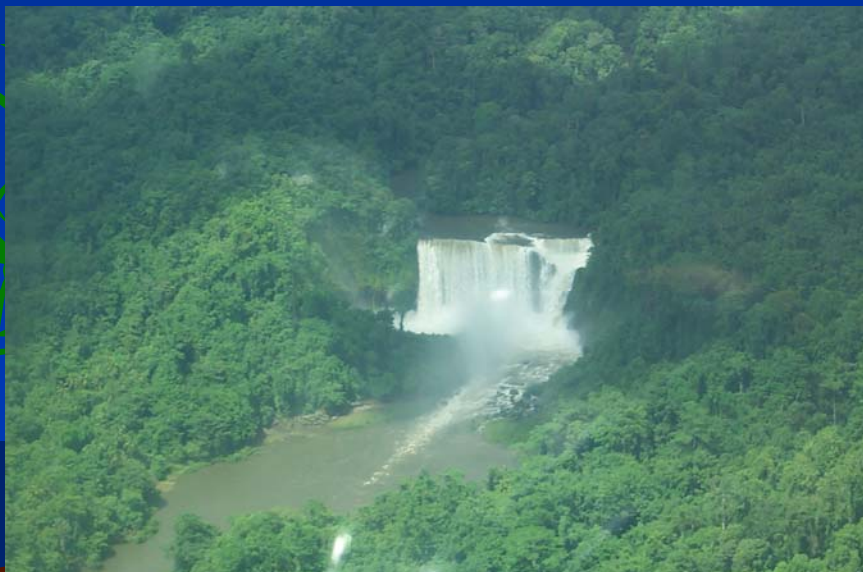
- Plant nutrients
 - ❖ toxicities/deficiencies.
- Chemical toxicity
 - ❖ Acid Rock Drainage
 - ❖ Heavy metals



STATUS OF RESEARCH



- Fundamental – Processes
- Basic – Processes in systems
- Applied – Design systems
- Adaptive – Site trials
- Emphasis on Applied & Adaptive research.
 - ❖ Quick fix mentality.
 - ❖ Ignorance of scientific principles for good environmental research.
 - ❖ 5-10 years required.



STATUS OF RESEARCH



- Large data from compliance monitoring.
- Lack of technical expertise in systems research (encourage eco-systems research)
- Relationships – Aim
 - ❖ Indicators important
- Vast local knowledge on relationships.



What to do 1? Within the box!

Political

- Strong leadership & will.

Government

- Upgrade management & technical capacity.

Research

- Develop database & info management syst.

Program

- Encourage integrated approach by mines.

Community

- Encourage max involvement (start-end).
- Utilise local knowledge.

What to do 2? Outside the box!

Political

- Encourage tied aid.

Government

- Develop practical & strict criteria for aid.

Research

- Develop criteria for selecting local partners.
- Support/facilitate access to donor funds.
- Facilitate network of local & o/seas groups.

Program

- Support & promote excellence programs.

Community

- Support community based programs.
- Develop realistic monitoring guidelines.

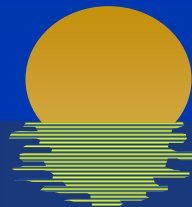
Bottom Line: Culture Change!!!



What can I get?



How can I help?



Final Remarks



“Economic growth on the careless pattern of the past century poses undeniable threat to the environment and ultimately to the very ecological foundations of development itself.”

Robert McNamara

Free Market Systems Advocate

