Earth Systems
Environmental & Water Management in Arid Landscapes
Earth Systems

- Environmental & social consultants
- Specialists in mining industry
- Environmental and Social Impact Assessment (EIA / ESIA)
- Technology Innovators:
  - Water management solutions
  - Geochemical engineering
Earth Systems

- Experience throughout Africa and internationally
- International and Local presence:
  - Regional office in Dakar, Senegal
  - Government contacts, local specialists, key language skills
- Much experience in Arid Climates
Introduction

• Mining – Key economic sector in Mauritania
• Numerous environmental & social challenges for resource companies in arid settings
• Need to cost-effectively:
  • Meet legislative environmental requirements
  • Minimise environmental and social risks
  • Avoid impacts at design stage
  • Mitigate remaining and cumulative impacts
  • Maximise Project benefits
• A robust ESIA minimises Project risks
Meeting Environmental & Social Requirements

Mauritanian Law

International Guidelines
Legislative Background

Mauritanian government agencies regulating mineral industry:

- Ministère du Pétrole, de l’Energie et des Mines (MPEM)
  - Ministry of Petrol, Energy and Mines

- Ministère délégué auprès du Premier Ministre chargé de l’Environnement et du Développement Durable (MEDD)
  - Ministry of Environment and Sustainable Development

- Direction du Contrôle Environnemental (DCE)
  - Environmental Control Directorate
Legislative Background

• Key legislation for mining projects in Mauritania:
  • Mining activities – Category A of Environment Code
    • Requires an Environmental (and Social) Impact Assessment
International Standards & Guidelines

IFC Performance Standards (2012):
1. Assessment & Management of Environmental & Social Risks & Impacts
2. Labour & Working Conditions
3. Resource Efficiency & Pollution Reduction
4. Community Health, Safety & Security
5. Land Acquisition & Involuntary Resettlement
6. Biodiversity Conservation & Sustainable Management of Living Natural Resources
7. Indigenous Peoples
8. Cultural Heritage

IFC EHS Guidelines:
- General Environmental Health & Safety Guidelines (2007)
- Environmental Health & Safety Guidelines for Mining (2007)
International Standards & Guidelines

Equator Principles (2012):
- Used by banks and financiers
- Based on IFC Performance Standards

ICMM Sustainable Development Principles:
- 10 principles
- Public reporting, external independent assurance

Global Reporting Initiative (GRI):
- Sustainability reporting guidelines
- Mining / metals sector-specific reporting
Best Practice Environmental & Social Management in Mining

- Exploration
- Feasibility
- Planning & Design
- Construction
- Operations (Progressive Rehabilitation)
- Decommissioning and Closure

Environmental and Social Management Best Practices

Closure Planning and Implementation

Project Completion

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Key Environmental & Social Issues – Projects in Arid Climates

- **Water Management** (logistics, source, evaporation, groundwater, water storage dams)
- **Hydrology** (flash flooding, transport of oxidised material)
- **Rehabilitation** (restoring vegetation, stabilising landforms)
- **Ecology** (endangered plants and animals, protected areas)
- **Air quality / Noise** (pollution, impacts on ecology)
- **Archaeology** (surface deposits, “chance find procedure”)
- **Transport** (new routes, increased traffic)
- **Social issues** (public consultation, land use by nomads, security concerns etc)
An In-Depth Look At: Water Management

LIMITING FACTOR IN MINE DEVELOPMENT IN ARID CLIMATES

- Low rainfall or drought
- Groundwater & seepage loss
- Evaporation / discharge
- Competition with other users
- Political / Legislative restrictions
- Corporate objectives
- Sustainability of resource
- Logistics
Interactions – Hydrology & Geochemistry

• Fresh rock materials brought to the surface will still oxidise
• Potential for releasing metals and salinity
• Hydrological impacts are less obvious:
  • No consistent surface flow
  • However, during unusual rain events oxidised products from mining wastes can be flushed out
• Management of waste rock and tailings and understanding geochemistry is therefore still very important.
Rehabilitation - Arid Environments

- Often difficult to restore / revegetate landscape
- Important to stabilise the landscape
  - Limits the area of impact
  - Un-stabilised sites generate erosion and dust, which can spread far
- Natural arid landscape processes are slow – scars on the landscape can last many lifetimes!
- Techniques adapted for arid environments are required to stabilise landscapes and restore ecological values.
Conclusions

1. Include environmental & social inputs at Project design phase (i.e. at feasibility):
   • Facilitates permitting, can lower operating / closure costs.

2. Working in arid setting reduces some environmental and social risks but introduces new challenges
   • e.g. water supply, rehabilitation, remote working etc.

3. Resolve environmental and social challenges through:
   • Strong and early technical expertise,
   • Integration with other technical disciplines, and
   • Consultation with key stakeholders.
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Merci - Thank You

Questions?

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