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Environment | Water | Sustainability

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Environmental & Water Management in Arid Landscapes



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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





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Meeting Environmental & Social Requirements



Mauritanian Law

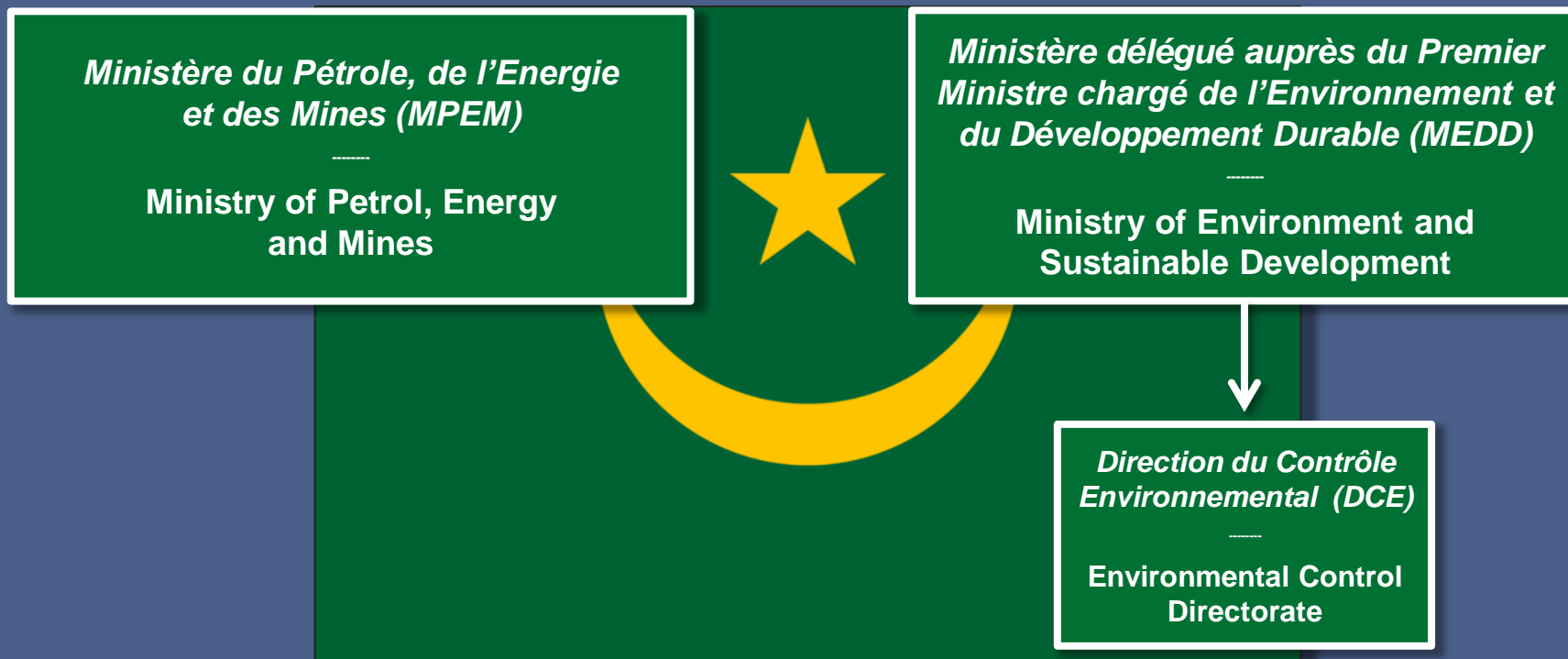


**International
Guidelines**



Legislative Background

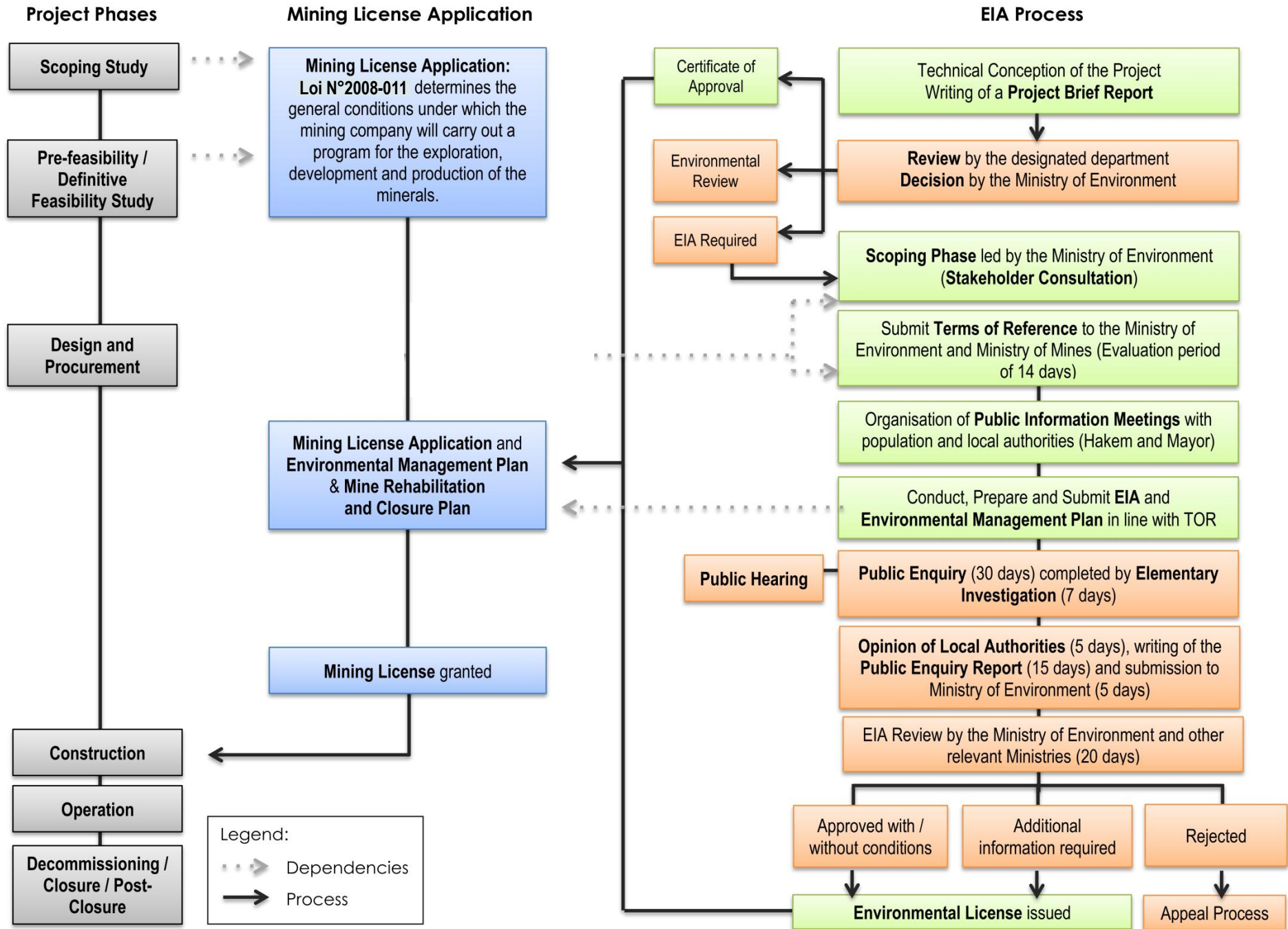
Mauritanian government agencies regulating mineral industry:





Legislative Background

- Key legislation for mining projects in Mauritania:
 - *Loi N°2008-011 portant Code Minier (2008)* – Mining Code
 - *Loi N° 2000-045 portant Loi Cadre sur l'Environnement (2000)* – Environment Code
 - *Décret relatif à l'Etude d'Impact Environnemental (2004)*
 - *Décret modifiant et complétant certaines dispositions du décret 2004-094 du 04 Novembre 2004 relatif à l'Etude d'Impact sur l'Environnement (2007)*
- 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



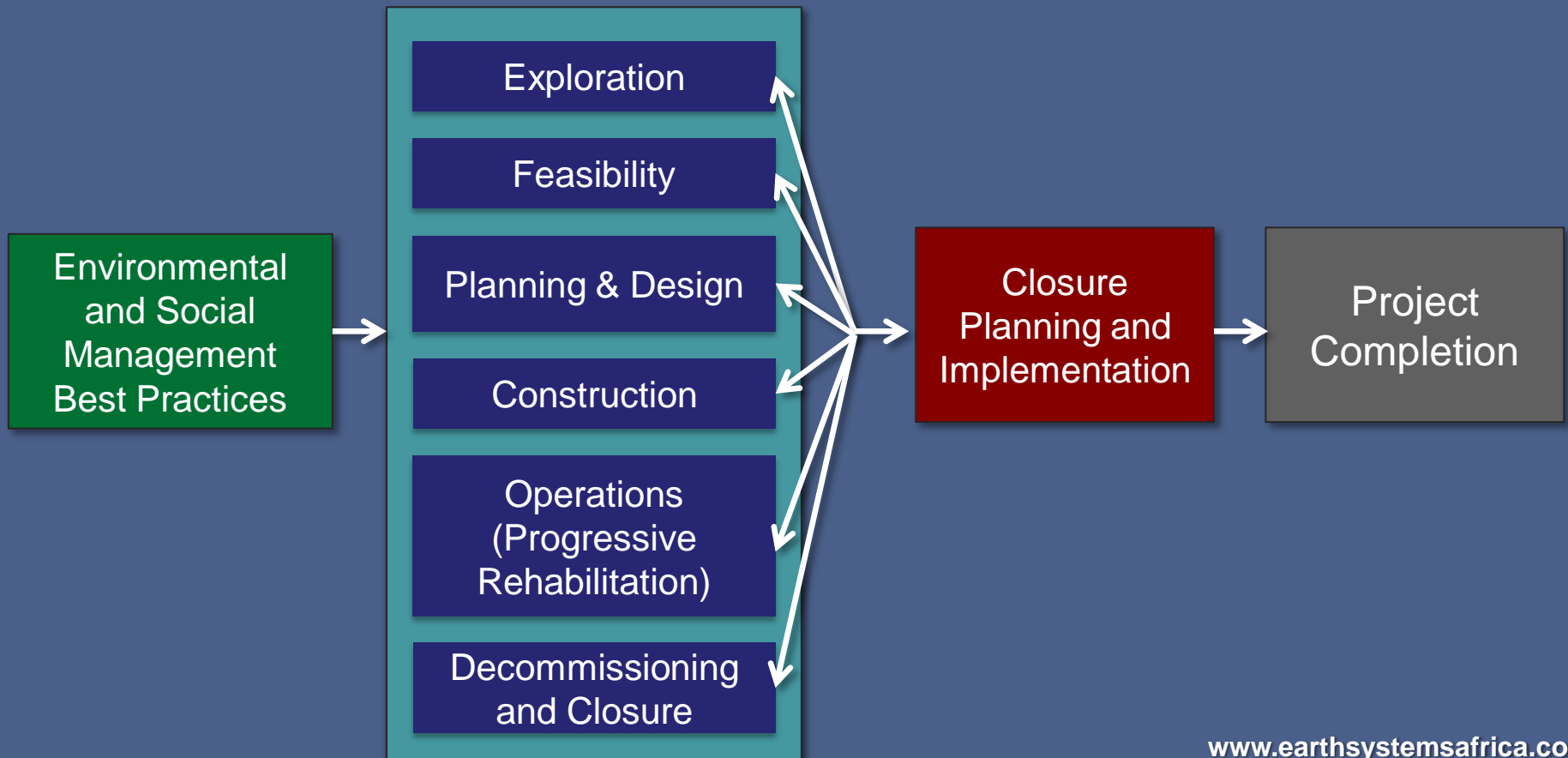
Global Reporting Initiative (GRI):

- Sustainability reporting guidelines
- Mining / metals sector-specific reporting





Best Practice Environmental & Social Management in Mining





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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