

The role of science in public ecology and sustainable development in mining

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Overview of presentation

- Public ecology and mining
- Role of stakeholders in measuring/accepting contributions of mining to SD
- Identified “shortfalls” in understanding mining and SD
- Science needs

Overview (cont.)

- Role of science in decision making
- Case Studies
 - Coal
 - Tar sands
 - Base metals
- Conclusions

Public Ecology

the nexus of **science**, engineering, public policy and interest, citizen views and values, market forces, and environmental protection statutes and regulations, which, through an open and participatory discourse, is intended to ensure that the ecological systems continue to function as societies operate within and derive benefits from them

Science and Sustainable Development

Each of the pillars of sustainable development (economy, ecology, society) are directly impacted by mining. We need science to understand exactly how mining contributes to each.

Public Ecology

- Primary Goal: building common ground among competing beliefs and values
 - Science and engineering are “beliefs and values” that some of us consider as primary
 - Other stakeholders consider science of less importance than their values and beliefs
 - Why?
 - Lack of respect for their values by scientists
 - History
 - One-sided “science”
 - Scientific process of debate

Decision processes and contexts

- Contexts for decision making on issues of resources involve natural systems and social structures that are independent of what the specific project entails
- These systems relate directly to the sustainable development concerns of economy, ecology, society and governance
- Numerous decision making processes can be used to ensure all these factors are considered
- Common bases of “knowledge” are critical to decision processes

Components of Natural Systems

- Natural environmental systems (ecology)
 - Physical sciences
 - Biological sciences
- Social system (society)
 - Attitudes (values)
 - Institutions (governance)
 - Technology (science)

Natural systems (cont.)

- Resource system (economy)
 - Values (economy)
 - Institutions (governance)
 - Behaviors (governance)
- Political system (economy and governance)
 - Policy
 - Laws
 - Government

Mining and Sustainable Development

- Impacts on:
 - Economic well being (economy)
 - Social structures and well being (society)
 - Environmental resources (ecology)
- Relationship to governance at many levels

Dealing with stakeholder issues

- Communication problems
- Addressing concerns with respect
- Problem with “experts” versus “public”

Role of stakeholders

- Identifying and engaging stakeholders and their concerns
 - Public involvement models
- Science and values
 - Whose science?
 - What science?
 - Whose values?
 - What values?
 - Who pays for the science?

Who pays for the science...

- A matter of trust
 - History of violated trust(s)
 - Mercenary science

It is naïve to caricature scientific disputes as battles between “industry” and “public interest”, as if bureaucrats and activists didn’t have their own selfish interests... Too often, corporate conflict-of-interest accusations have been used as smear tactics to silence scientists who ended up being correct. (Tierney, 2010)

Science and values

- Often seen in direct opposition but can support each other
- Stakeholder involvement critical to minimizing conflicts
- Requires outside the box thinking and skilled facilitation

Scientific challenges

- Diversity of disciplines
- Concerns about communication and analysis
- Relationship to
 - Economic concerns
 - Social concerns
 - Environmental concerns
 - Governance structures

Why Science-Based Approaches?

- Most issues and problems related to the environment have scientific and engineering components
- Scientific-based discussions can allow for communication, cooperation and collaboration with all stakeholders
- Optimum planning, operation and post-mining use of mining projects for economic benefit must rely on science-based approaches
- Government policies and regulations must be based on science-based solutions and practices not on politics or self-serving agendas

Needs

- Better frameworks for engagement
 - Identifying science needs
 - Understanding of multiple scientific disciplines
 - Physical sciences
 - Biological sciences
 - Social sciences
 - Values

Science and decision making

- Challenges
 - Translating science to non-experts
 - Respecting values
- Structures
 - Ensuring transparency
 - Allowing for input and respect

Case study: Coal

- Discussion of ARIES
 - Coal based
 - Industry funded
 - Focus: peer reviewed science

Conclusions

- Science is key to support the decision processes for resources in the context of sustainable development
- The key tenets of sustainable development (economy, ecology, society and governance) require different scientific disciplines to be engaged
- Stakeholder participation is key to ensure values are respected and science is translated