

# SUSTAINABLE DEVELOPMENT PRACTICES IN MINING INDUSTRY

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**Abstract:** Sustainable development (SD), an all-inclusive, somewhat ambiguous concept basically means economic and social development that endures over the long-term and its core ethic is intergenerational equity. Sustainability principles have application for all stages of mine life cycle – exploration, mine planning, construction, mineral extraction, mine closure and post-closure reclamation and rehabilitation. This paper highlights the basic concepts and philosophy of sustainable development practices for mining industry. It also discusses in detail the various strategies to be adopted to make mining socially, economically and environmentally sustainable. It also elaborates important aspects of promulgated sustainable development framework for the mineral sector in India besides International practices on SD in Australia, Canada and South Africa.

## 1. INTRODUCTION

Mining, more than any other industrial activity tends to leave strong negative impacts on environment and society. However, a complete ban on mineral extraction is from the earth's crust. The efforts instead should be to limit the negative consequences of mining through the application of the concept and principles of sustainable development to mining operations.

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The government should primarily be concerned with the ‘legal framework’ for sustainable mineral development and ensure that the relevant laws are implemented fairly and effectively in order to ensure good governance in the mineral sector.

## 2. SUSTAINABLE DEVELOPMENT: CONCEPTS, PRINCIPLES AND APPLICATIONS

Sustainable development refers to a mode of human development in which resource use aims to meet human needs while ensuring the sustainability of natural systems and the environment, so that these needs can be met not only in the present, but also for generations to come. The term was used by the Brundtland Commission in 1987 which coined what has become the most often-quoted definition of sustainable development. According to this definition, **“sustainable development” is that pattern of development which “meets the needs of the present without compromising the ability of the future generations to meet their own needs [World Commission on Environment and Development, 1987].”**

## 3. SUSTAINABLE DEVELOPMENT AND MINING

The sustainability of the mining industry stands on three pillars: **economic, environmental and social**. Striving for sustainable development involves balancing the inevitable conflicts in these three areas. It is also clear that encompassing all these is the issue of governance which is required to provide and maintain legal and regulatory framework in order to further support the sustainability of the minerals industry.

## 4. SUSTAINABILITY AND THE MINERAL CYCLE

The sustainability principles that have relevance for all the different stages of the mining cycle may be summarized as follows:

For achieving sustainability, what is required is that a mining project should be economically viable, financially profitable and technically efficient. In operational terms, sustainable development in the mineral sector implies a mix of scientific mining, improved environmental management including pollution control and enhanced socio-economic development, especially for local communities in mining areas.

## **5. DRAFT SUSTAINABLE DEVELOPMENT FRAMEWORK (SDF) FOR THE MINERAL SECTOR IN INDIA**

The SDF framework outlines a working definition for sustainable development in the mining sector as - "Mining that is financially viable; socially responsible; environmentally, technically and scientifically sound; with a long term view of development; uses mineral resources optimally; and, ensures sustainable post-closure land uses. Also one based on creating long-term, genuine, mutually beneficial partnerships between government, communities and miners, based on integrity, cooperation and transparency".

It provides guidance for the mining companies to improve performance on environmental and social aspects. However, over time it can also become the common benchmark against which all mining operations may be evaluated in terms of their comparative performance on sustainable development terms.

Provision of SDF is also incorporated in Section 46 in new MMDR Bill 2011 and is given below:

- The Central Government shall take all such steps as may be necessary for the conservation of strategic mineral resources in the national interest and for the scientific development and exploitation of all mineral resources.
- The Central Government in order to facilitate the scientific development and exploration of mineral resources and to ensure the protection of the environment and prevention and control of pollution from prospecting and mining related operations, shall cause to be developed a National Sustainable Development

## **6. INTERNATIONAL EXPERIENCE IN SUSTAINABILITY PRACTICES IN MINING INDUSTRY SUSTAINABILITY PRACTICES IN CANADA, AUSTRALIA & SOUTH AFRICA**

The sustainable development measures in mining comprise the following major elements: environment protection, local stakeholder engagement, socio-economic development in mining project areas and benefit sharing of mineral resources revenue. The sustainability practices (in mining) being followed in three leading mining nations - Canada, Australia & South Africa have been discussed and given below:

### **6.1. Environment protection measures in mining**

Safeguarding the environment through environment impact assessment and environment management plans is a prominent feature in all the countries. In the developed mining nations (Canada and Australia), mine closure plans are an important part of environmental impact assessment as well as of environmental management plan. Mine closure planning is initiated from the exploration stage and the process continues throughout all the phases of mine life cycle.

### **6.2 Stakeholder engagement**

In Canada, constitutional legal provisions make it mandatory for the Government and also mining companies to engage in meaningful consultation with Aboriginal Communities who occupy land upon which mineral development is proposed.

### **6.3 Socio-economic development in mining areas**

In South Africa also there is a formal legal requirement for mineral rights holder to make arrangements of socio-economic development plan in his mining project area. The mining law (Mineral and Petroleum Resources Act 2002 – MPRDA) provides for the submission of a Social and Labor Plan as pre-requisite for granting of mining and production right.

## 6.4 Technology and mining practices

The adoption of technologically advanced mining methods and machinery in mining can contribute to conservation and efficient exploitation of mineral resources and consequently to sustainable mineral development.

## 7. INTERNATIONAL INITIATIVES TO PROMOTE SUSTAINABLE DEVELOPMENT IN THE MINERALS SECTOR

### 7.1 principles of ICMM

- ✚ Implement and maintain ethical business practices and sound systems of corporate governance.
- ✚ Integrate sustainable development considerations within the corporate decision-making process.
- ✚ Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.

## 8. CONCLUSION

In the Indian mining sector, the more urgent necessity is to ensure effective, efficient and purposive administration of the existing mining and environmental laws that are designed to ensure scientific mining, optimum utilization of mineral resources and environmental integrity. Duality of central and state control of mineral administration and multiplicity of regulatory bureaucracies with inadequate staff and budget seem to be the major deterrent for sustainable development of mining industry.

## REFERENCES

1. Azapagic, A. 2004. "Developing a framework for Sustainable Development indicators for the mining and minerals industry," *Journal of Cleaner Production*, 12 (2004), pp. 639–662.
2. Draft Mines and Minerals (Development and Regulations) (MMDR) Bill, 2011 [approved by the Indian Union Cabinet on 30 September 2011].
3. Environment Australia. 2002. Overview of Best Practice Environmental Management in Mining, one Booklet in a series on Best Practice Environmental Management in Mining, Environment Australia, August.
4. Environment Canada. 2004. "A Guide to Understanding the Canadian Environmental Protection Act, 1999," Environment Canada, available at [www.ec.gc.ca](http://www.ec.gc.ca).
5. GRI. 2000-2011. Sustainability Reporting Guidelines & Mining and Metals Sector Supplement, Version 3.0; Sustainability Reporting Guidelines, Version 3.1, Global Reporting Initiative (GRI).
6. ICMM. 2002. "The Mining and Metals Industries: Progress in contributing to Sustainable Development," Working Paper, 27 February.
7. IIED. 2002. "Research on Mine Closure Policy," MMSD Working Paper No. 44, Cochilco, Chilean Copper Commission, MMSD project of International Institute for Environment and Development (IIED), January.
8. MMSD. 2002. *Breaking New Ground: Mining, Minerals and Sustainable Development*, Report of the MMSD Project, London; Sterling, VA: Earthscan Publications.
9. MMSD+10, 2012, IIED, June, 2012.
10. MPWGSC. 1996. *The Minerals and Metals Policy of the Government of Canada – Partnerships for Sustainable Development*, Minister of Public Works and Government Services Canada (MPWGSC), Ontario.
11. Natural Resources Canada. 1994. *Whitehorse Mining Initiative (WMI): Leadership Council Accord*, Final Report, October, available at <http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/mineralsmetals/files/pdf/mms-smm/poli-poli/pdf/accord-eng.pdf>.
12. Mohanty, N.M., 2012, *Sustainable Development: Emerging Issues in India's Mineral Sector*, Planning Commission, Government of India, ISID, New Delhi, May 2012.