ENVIRONMENTAL ETHICS AND MINERAL LEGISLATIONS IN INDIA FOR SUSTAINABLE DEVELOPMENT

P. SREENIVASULU [1]& P. PADMASREE [2]

[1]Department of Collegiate Education, Government of Andhra Pradesh, Hyderabad,
[2]Department of Geology, Government Degree College(M), Anantapur, A.P.
Mobile Number :919000994372.
vaspalagiri@yahoo.com, narayankoushik@gmail.com

ABSTRACT:
Mining and Mineral Exploration practices are very much essential for the economic prosperity of the Country. The environmental ethical problem of this field is the economic benefits on one hand and the environmental costs on the other hand. The problem of environmental impacts on exploitation and utilization of mineral resources presents a complex socioeconomic dilemma defying solution. Responsible Mining Principles and DPSIR (Drivers, Pressures, States, Impacts, and Responses) analysis are the two analytical tools which are highly supportive in a decision-making process. Through DPSIR and Stakeholder analysis, we can assess how future mining in India can be sustainably implemented. The analysis revealed that numerous stakeholders have to be taken into consideration with a wide range of different interests. Strict environmental legislation of 'National Mineral Policy', 'Environment Impact Assessment' and 'Polluter Pays Principle' can ensure economic benefits while environmental impacts remain negligible.

Key words: Responsible Mining, India, Ethics, Environment, Mineral legislations.

INTRODUCTION:

In a rapidly developing world of today, concerned mainly with higher GDP growth, environmental ethics in mining is even more meaningful due to skewed development and high rate of consumption of minerals. Mining and Mineral Exploration practices are very much essential for the economic prosperity of the Country. The rate of consumption of any mineral has exceeded in such a way that it has been forecasted as "Mineral Resources Famine" for our mineral hungry world (Meadows et al, 1972). This extraordinary rate of consumption of mineral resources is creating an imbalance in "environmental equity". A geologist has to exhibit his technical capability in approaching responsible mining principles and adhering to mineral legislations of the times.

Survival as well as destruction of mankind is directly related to environment. A harmonious balance has to be maintained among the different resources of environment including human resources. If balance is disturbed, mankind is going to land in adverse situations. The environmental ethical problem of this field is the economic benefits on one hand and the environmental costs on the other hand. No doubt that mining can entail many economic benefits but it has historically also been known to cause adverse environmental effects (Hansen et al., 2013**)** Looking at holistic point of view, the problem of environmental impacts on exploitation and utilization of mineral resources presents a complex socioeconomic dilemma defying solution. But, inclusive economic growth and environmental management in mining industry may solve the problem to certain extent.

The mineral and mining industry in India is reckoned not only an important contributor to the country's GDP and foreign trade, but also one of the major industries that absorb a considerable amount of the country's working population. Both in the organized and informal sector, this industry is spread almost all over the Indian territory and operates in some of the remotest areas of the country, where it can claim itself to be the sole leader of infrastructure development. In terms of global production, India ranks amongst the top ten producers.

In the face of the ever-increasing demand for minerals, there is a clear move in policy towards greater opening up of the mining sector for private and foreign investments. On the other hand, there are a number of developments in recent years that indicate rising awareness of environmental and socio-economic issues and consequently high expectations among the people directly or indirectly involved in or effected by mining. Questions of environmental

protection and socio-economic development that traditionally belong to the sphere of governance are now increasingly being seen as issues where private players are having a much more direct role. In most cases the development of a mining project has been visualized only in terms of reserves, markets and market prices, and production costs, with some 'gains to the local economy' used as an additional argument. However this approach is myopic, as projects impinge on and, therefore, need to take account of, the particular exigencies of the location, and the community. More than in other industries, the success of a mining project is dependent on recognizing and understanding the context in which it is located. As the share of private operators increase in the country's total mining activities, visibility in response towards addressing local issues becomes necessary for better acceptability. Therefore responsible mining is relevant in the present context. This can be achieved by examining the ethics of mining, social responsibility and honesty that swirl around our chosen professions.

This paper focuses on the environmental and ethical dilemma potentially associated with widespread mining in India by using Responsible Mining Principles and DPSIR (Drivers, Pressures, States, Impacts, Responses) analysis to derive at a set of recommendations. The combination of the two analytical tools makes up a great support in a decision-making process and checking out the inadequacies in mineral legislations through good governance.

RESPONSIBLE MINING THROUGH GOOD GOVERNANCE

There are a number of initiatives and tools that have been developed over the last few years to make mining more responsible. Responsible mining is engaging in the business of mining but with a clear focus on stakeholders, rights of local people, and proactive avoidance of environmental and negative health impact, generation of sustainable stream of income from mining areas /depleting resources and good governance. Implementation of the principles of Responsible Mining will ensure we are acting ethically.

Although people from all walks of life have a role to play in responsible mining, a geologist has to exhibit his technical capability in approaching responsible mining principles like sustainable development, equity, decision making, accountability, transparency and efficiency. He has to set out criteria for environmentally responsible exploration, Environmental Impact Analysis (EIA), water consumption and use, energy consumption, air and noise impacts, waste management, reclamation and rehabilitation.

For achieving environmental protection in a proper way, the geologist has to help and advice in all stages of mining operations like exploration, planning, operation and reclamation. Environmental awareness should be created right from the commencement of exploration and not at the exploitation stage, where significance damage is caused to the environment. If the mining operations are conducted with care and cautions the environmental disturbance can be minimized to a great extent.

The magnitude of environmental damage caused by mining is visible in all stages of mining operations starting from exploration of minerals and continuous up to mineral beneficiation. If the adverse effects have to be enlisted, they may be umpteen like damage to landscape and topography by opencast mining and dumping (Fig.1), loss of productive land and property by underground mining, ecological imbalance due to topographic alterations, disrupted drainage patterns and dumped streams and lakes, pollution of water sources, adverse effect on the water table, various health hazards, loss of greenery, tremors during blasting leading to injuries, disturbed quality of air due to release of pollutants and many other adverse effects. But harmony can be maintained between mining and environmental protection if a geologist carefully plans all the operations. The geologist has to decide the final usage of the land after mining to make mining as a means of reclamation.

Fig :1. Open cast mining and dumping

DPSIR ANALYSIS:

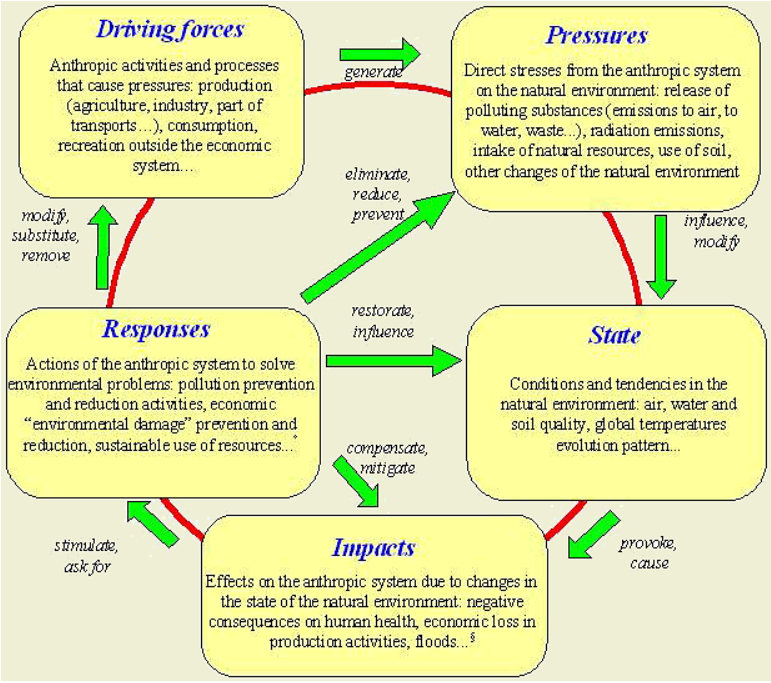
The DPSIR framework was developed to help decision makers manage and conserve the environment the best way possible. The tool is used to structure different factors that might influence the surroundings and identify possible ways to solve or minimize the given problem **(**K. Tscherning et al (2012).

The DPSIR framework is a five-step chain of events that consists of driving forces, pressures, states, impacts and responses. The DPSIR model is presented in Fig. 2.

1 Driving Forces:
The driving forces are described as needs, which can be either economic or social (P. Kristensen, 2004). In the case of mining in India driving forces are resource consumption, economic independency, employment, and social status. In the face of the ever-increasing demand for mineral consumption, there is a clear move in policy towards greater opening up of the mining sector for private and foreign investments. Mineral investments have been visualized in terms of market profits along with gains to the local economy, resulting in poverty reduction, improved economy of the country which will result in increasing social status of people.

2 Pressures:
The consequences of the driving forces are defined as pressures, which can be positive or negative. However, the main focus is generally on the negative aspects of the environment (Ness, B. et al., 2010**)**. The major pressures from an operating mining industry are emissions of metals to water, soil and air, changing land use, exploitation of resources, and waste generation. Emissions of metals from mine tailings, waste rock dumps and emission of dust particles to air are pressures on the environment resulting from mining industry. Implementing a new mine will also put pressure on the environment by the change of land use. It is not only the mine itself that takes up land.

3 States:
The pressures will change the state of the environment. It is a combination of physical, chemical and biological conditions **(**Smeets, E., Weterings, R., 1999**)**. The states that are affected by pressures are soil quality, water quality, air quality, ecosystems, and humans. The states of soil, water and air quality could be affected both locally and regionally depending on the degree of pressures. Ecosystems might also be affected locally with regard to biodiversity and vegetation. Depending on the extent of pressures, humans might also be affected.



Source: ISTAT, C. Costantino, F. Falcitelli, A. Femia, A. Tuolini, OECD-Workshop, Paris, May 14–16, 2003)
Fig. 2 The DPSIR model in relation to mining activities**.**

4 Impacts:
When the state of the environment changes due to mining activities, it might have positive and negative social, economic or environmental impacts (Tscherning, T. et al., 2012), such as better living standards, better health care, destruction of habitats, heavy metal accumulation in plants and animals, and negative effects on human health. The positive impacts are social and economic improvements of society. There are no positive improvements of the

environment related to mining activities. For instance, habitats are destroyed when land is changed into a mining area and there is a release of heavy metals from mine tailings that consequently pollutes the water, which again accumulates in plants and animals (impacts). Negative impacts on human health can arise from intake of contaminated fish or surface water. However, when it comes to humans, it is the health of mineworkers, which are of most concern, as they could be impacted from exposure to dust containing metals, which might lead to lung diseases and cancer.

5 Responses:
There are a number of potential adaptive or mitigative responses or actions that society and decision-makers could take to minimize the negative impacts of mining (Ness, B. et al., 2010**)** as for instance setting emission limitations, implementing mandatory water and waste treatment, use of the polluter-pays principle, reuse and recycling of scarce resources and ban of products and reclamation of mined sites.

Evaluation of Applied Tools:
The DPSIR analysis is regarded as a useful tool to create an overview of the consequences on the environment arising from mining operations. However, the DPSIR framework has been criticized for oversimplifying the ethical problem (Ness, B. et al., 2010**)** where important factors could be neglected or forgotten. Implementation of the principles of responsible mining will ensure that we are acting ethically. Another important tool is the innovative thinking of different stake holders to become engaged with responsible mining, both for ethical and strategic reasons. The combination of the two analytical tools makes up a great support in a decision-making process, provided the following methodology is adopted following mining ethics (Mihir Deb, 2012).

Deciding Whether Mining is an Appropriate Land Use acknowledges that mining modifies landscapes and has possible long-term impacts on communities and natural resources. It proposes guidelines for determining whether areas should be classified as so environmentally or socially sensitive that the risk posed by mine development is too high to undertake mining.
Ensuring Environmentally Responsible Mining focuses on the critical elements of site-specific environmental issues and explains why adoption of recommended criteria leads to improved environmental performance. Criteria are set out for environmentally responsible exploration, Environmental Impact Analysis, water consumption and use, acid mine (rock) drainage, air impacts, energy consumption, noise impacts, waste management, cyanide use, reclamation and rehabilitation, financial guarantees, post-closure practices, and monitoring and oversight.
Ensuring that Mine Development Results in Benefits to Workers and Affected Communities focuses on the social costs and benefits of mining and provides information on the ways in which mining companies can provide direct benefits to local community members.
Ensuring Good Governance examines good governance issues at a national or corporate scale, including the transparency with which companies and governments acknowledge revenue payments and the degree to which companies report on and can be held accountable for progress made against stated commitments.

Discussion :

Based on the analyses above, inadequacies of National Mineral Policy, Environment Impact Assessment and Polluter Pays Principle will be identified and explained together with recommendations for improvements to the legislation (Hansen et al 2013) through good governance,

National Mineral Policy:
The Ministry of Mines is responsible for survey and exploration of all minerals, (other than natural gas and petroleum) for mining and metallurgy of non-ferrous metals like aluminium, copper, zinc, lead, gold, nickel etc. and for administration of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act) in respect of all mines and minerals other than coal and lignite. The subject of 'mineral regulation and development' occurs at S.No. 23 of the State list in the VII th schedule to the Constitution. After the liberalization in 1991, a separate National Mineral Policy was promulgated in 1993 which set out the role of the private sector in exploration and mining and the MMDR Act was amended several times to provide for a reasonable concession regime to attract the private sector investment including FDI, into exploration and mining in accordance with NMP 1993. Since that the existing law had already been amended several times and as further amendments may not clearly reflect the objects and reasons emanating from the new Mineral Policy, Government decided to reformulate the legislative framework in the light of the National Mineral Policy, 2008 and consequently, the Mines and Minerals (Development and

Regulation) Bill was drafted in 2009-10 and formulated as The Mines and Minerals (Development and Regulation) Bill, 2011. The Bill has important recommendations on the need for a Sustainable Development Framework(SDF).

Based on these recommendations, the National Mineral Policy 2008 explicitly underlined the need for "mining within a Sustainable Development Framework" which is defined as mining that is financially viable, socially responsible, environmentally, technically and scientifically sound and takes a long term view of development using mineral resources optimally and ensuring sustainable post-closure land uses.Also it has to be based on creating long-term, genuine, mutually beneficial partnerships between government, communities and miners, based on integrity, cooperation and transparency. The Framework recognises 7 Principles as defining the Framework namely Incorporate environmental and social sensitivities in decisions on leases, Undertake strategic assessment of key Mining Regions at periodic intervals, Manage impacts at the mine level through sound management systems ,Address land, R&R and other social impacts upfront Promote community engagement, benefit sharing and contribution to socio-economic development, Ensure orderly mine closure planning and implementation and post-closure activities and Put in place systems for assurance and credible reporting. The MMDR Bill 2011 has the provisions to provide legal backing for the SDF. The Bill also directly promotes more sustainable mining in the following ways like Providing for systematic augmentation of mineral resources through GSI's survey and exploration and integration of data arising from private exploration work (Section 4),Allowing transfers and amalgamation of mines to promote better utilization of the ore body (Section 7(4)),Concessional royalty for mineral beneficiation at ore stage (Section 41) and Mining Plan to include scientific methods of mining, beneficiation and economic utilization (Section 26) (Rajagopal, V.D.,2010).

Environmental Impact Assessments:

An environmental impact assessment is a formal process used to predict the environmental consequences (positive or negative) of a plan, policy, program, or project prior to the implementation decision. It proposes measures to adjust impacts to acceptable levels or to investigate new technological solutions. Although an assessment may lead to difficult economic decisions and political and social concerns, environmental impact assessments protect the environment by providing a sound basis for effective and sustainable development.

Environmental impact assessments commenced in the 1960s, as part of increasing environmental awareness. EIAs involved a technical evaluation intended to contribute to more objective decision making. EIAs have been used increasingly around the world. The number of "Environmental Assessments" filed every year "has vastly overtaken the number of more rigorous Environmental Impact Statements (EIS)." After an EIA, the precautionary and polluter pays principles may be applied to decide whether to reject, modify or require strict liability or insurance coverage to a project, based on predicted harms. Some inadequacies in the legislation regarding limit values on water and air emissions and renewable energy must be identified to make EIA more effective. The DPSIR analysis also emphasized that general emission limitations on water and air are essential in order to minimize the environmental impacts of mining.

Polluter-Pays Principle:

*"The 'polluter pays principle' states that whoever is responsible for damage to the environment should bear the costs associated with it." (Taking Action, The United Nations Environmental Programme.) (*Roy E. Cardato, 2001). One response from the DPSIR analysis is PPP. Even though PPP is stated in the Mineral Resources Act, it is unclear how comprehensive it is. The PPP may be interpreted as consequential ethics of utilitarianism. It has a monetary consequence for the mining company to pollute, but if the mining company still makes profit benefits exceed costs), it will continue—the PPP will not avert pollution, it will only guarantee that someone is going to pay (Harremoës.P, Krauss, M.K. 2006).

Conclusion:

In this study, we have investigated the environmental ethical aspects of mining activities in India and we used Responsible Mining tools and DPSIR analysis to understand the potentially negative environmental consequences of mining as well as the several economic and social impacts. It can be found that numerous stakeholders have to be taken into consideration when considering the issue of sustainable mining .The DPSIR analysis clarified the availability of various potential political responses that could affect the drivers, pressures, states and impacts of mining mainly focused on implementation of effective environmental regulation strategies. The findings revealed different environmental ethical dilemmas of which the most critical is how the Government can open up for mining,

gain economical revenue without causing damage to the environment. The concept of national development with co-existence of eco development has to be followed. Though the environmental administration cost is rather expensive for a miner, it cannot be reckoned merely on economic parameters. The Japanese idea of PPP (Polluter Pays Principle) may be a proper theme for environmental administration in earth sciences. Need of the day is to apply and follow mineral legislature techniques in all stages of mining, through good governance, for conserving the environment.

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