

Extractive Industries Transparency Initiatives, Emission Reporting, Sustainability Reporting and Environment

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Quick Discussion

Question 1: Why Transparency and Sustainability is gaining importance in extractive industry?

Question 2: What are the benefits



SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

17 PARTNERSHIPS FOR THE GOALS



RELATION BETWEEN NATURAL RESOURCES AND THE SUSTAINABLE DEVELOPMENT GOALS



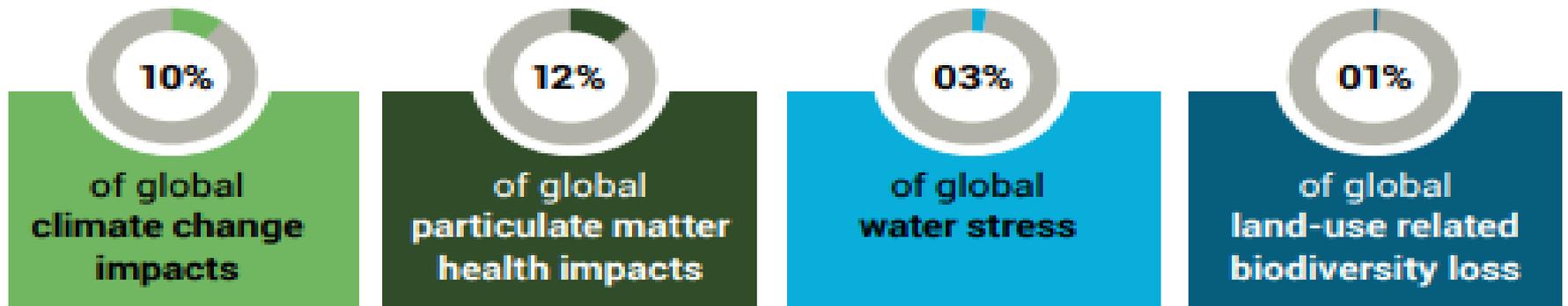
Global Footprints

Metals

Extracted 1970 **2.6 billion tonnes**

Extracted 2017 **9.1 billion tonnes**

Metals extraction has **increased 3.5 times** between 1970 - 2017



- The **iron-steel production chain** has the largest climate change impacts, with about two thirds of the overall metals group.
- **Aluminum production** has the second highest climate change impacts, with about one quarter of the group.
- In the **processing of copper and precious metals** toxicity impacts are the major concern, (representing about 30-45 per cent of toxicity impacts of the metals group)

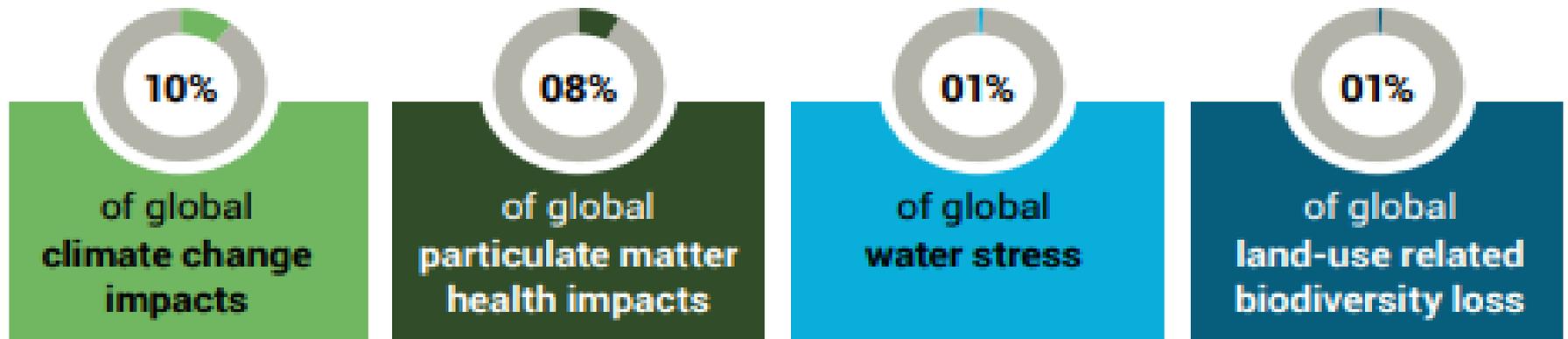
Non-metallic minerals

(mainly sand, gravel and clay)

Extracted 1970 **9 billion tonnes**

Extracted 2017 **44 billion tonnes**

Non-metallic minerals extraction was **4.9 times higher in 2017** than in 1970, which represents the highest growth rate of all resource groups



- **Cement production** has the highest climate change impacts (with over 80 per cent) and particulate matter health impacts (with over 50 per cent of the non-metallic minerals group).
- **Sand/gravel and limestone** have a minor impact on the global average. Nevertheless, mining activities may have severe local impacts on ecosystems.
- **Phosphorus fertilizer application** has high toxicity impacts that are more significant in the usage phase.

Fossil Fuels

Extracted 1970 **6 billion tonnes**

Extracted 2017 **15 billion tonnes**

Fossil fuel extraction was **2.5 times higher in 2017** than in 1970.



- **Methane emissions during fossil fuel extraction** have a large climate impact, with more than 1/3 of the material group (fossil extraction and processing) and 60% of fossil extraction (the latter without processing). Coal extraction alone contributes about half to these methane emissions.
- **Oil and gas extraction and processing** are responsible for 26 per cent and 27 per cent of the material group's climate change impact. Mostly, they arise from venting, flaring and local energy supply, as well as from leaks and other sources of fugitive emissions.
- Most climate change impacts of the group's emissions are caused by the **refining of crude oil** into useful products (for example chemicals, various fuels and intermediate products) and chemical production (together >60 per cent of impacts of the material group).
- Both **coal combustion and oil and gas extraction** release significant amounts of mercury into the environment (for coal this is 35 per cent of global anthropogenic emissions; for oil/gas extraction mercury is emitted with waste water and solid waste streams). These emissions are major contributors to mercury contamination in oceans.

Climate change impacts



Households



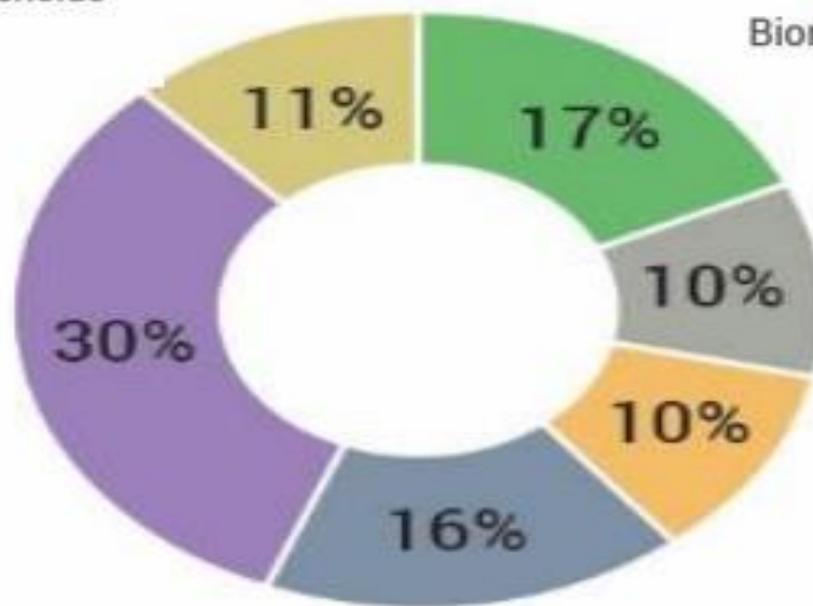
Biomass



Metals



Remaining
economy



Fossil fuels



Non-metallic
minerals

Economic benefits come at a cost

- **Climate change:** Resource extraction is responsible for [half of world's carbon emission](#);
- **Pollution:** the extractives sector contributes to air, water and land pollution. Oil production has also gravely impacted the environment in countries such as [Nigeria](#);
- **Biodiversity loss:** 20% of oil and gas contracts block [overlaps with biodiversity protected areas in Africa](#);
- **Social issues:** Tailing dam disasters have threatened peoples' lives and safety; human rights abuses, over [40,000 children](#) working in cobalt mines in DRC.

Benefits of Transparency & Sustainability Reporting

- Positive impact on stock market
- Attract investors
- Less legal interventions
- Reduce local conflict
- Resource conservation
- Improve local area development

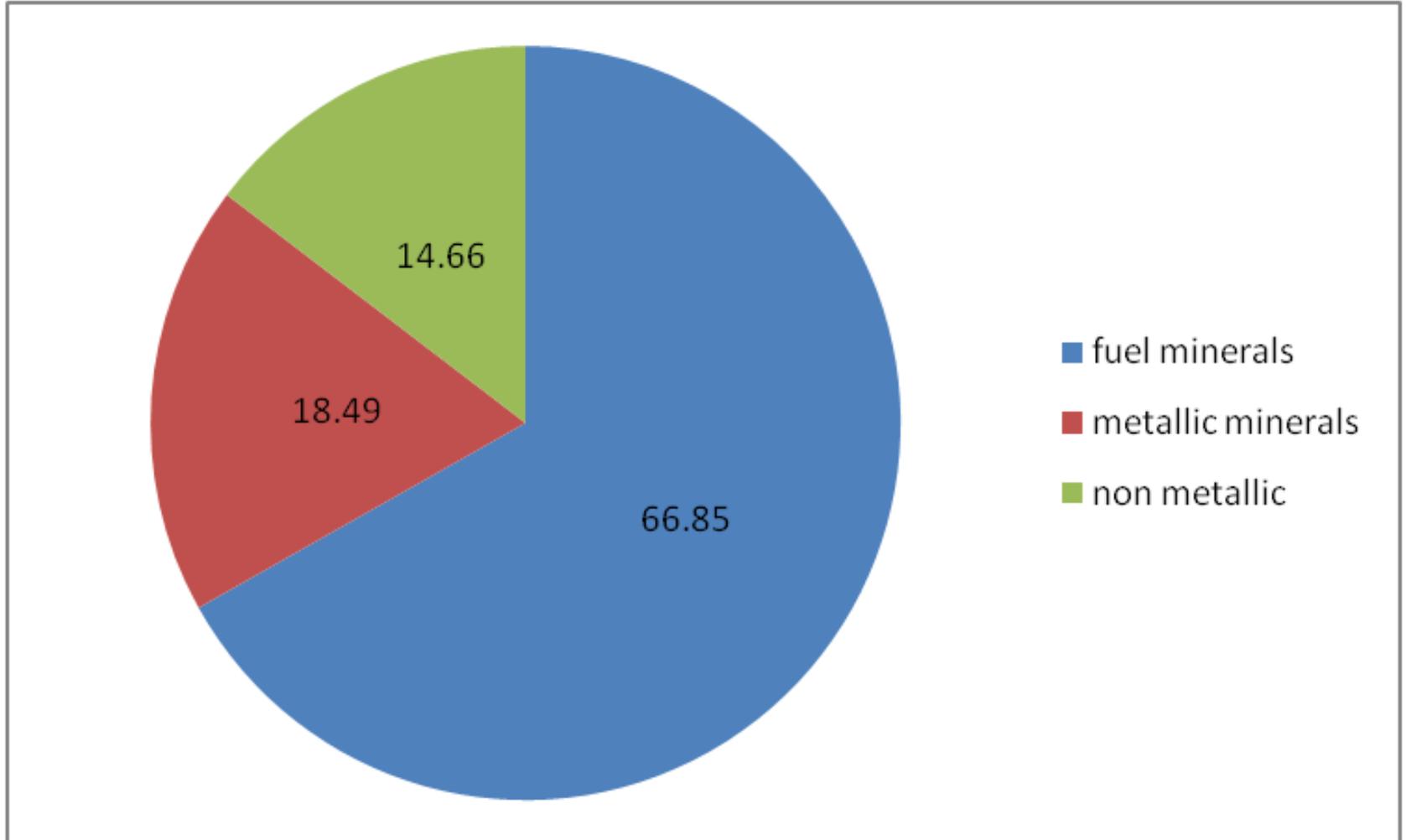
Sustainability and Transparency Initiatives Mineral Sector of India

Let's Take the Case of Mineral Sector of India

India produces around 89 minerals

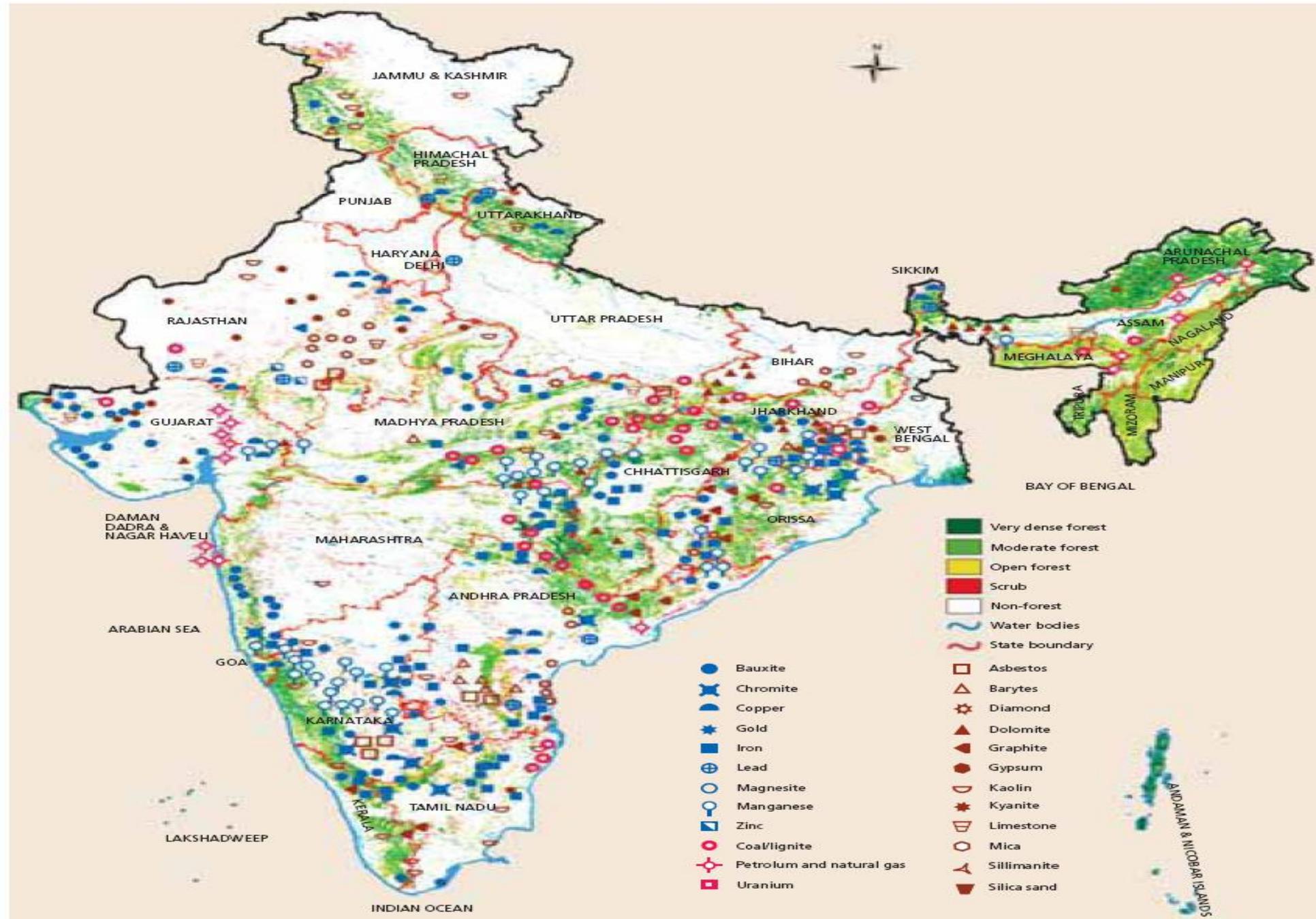
- Four fuels - *coal, lignite, oil and gas*
- 11 metallic - *iron ore, chromite, lead, zinc etc*
- 52 non-metallic - *limestone, dolomite, phosphorite, silica, etc.*
- 22 minor minerals - *stone, sand, marble, sandstone, etc.*

Economic contribution



Source: <http://mines.gov.in/annual2013E.pdf>, as viewed on 17 February 2014

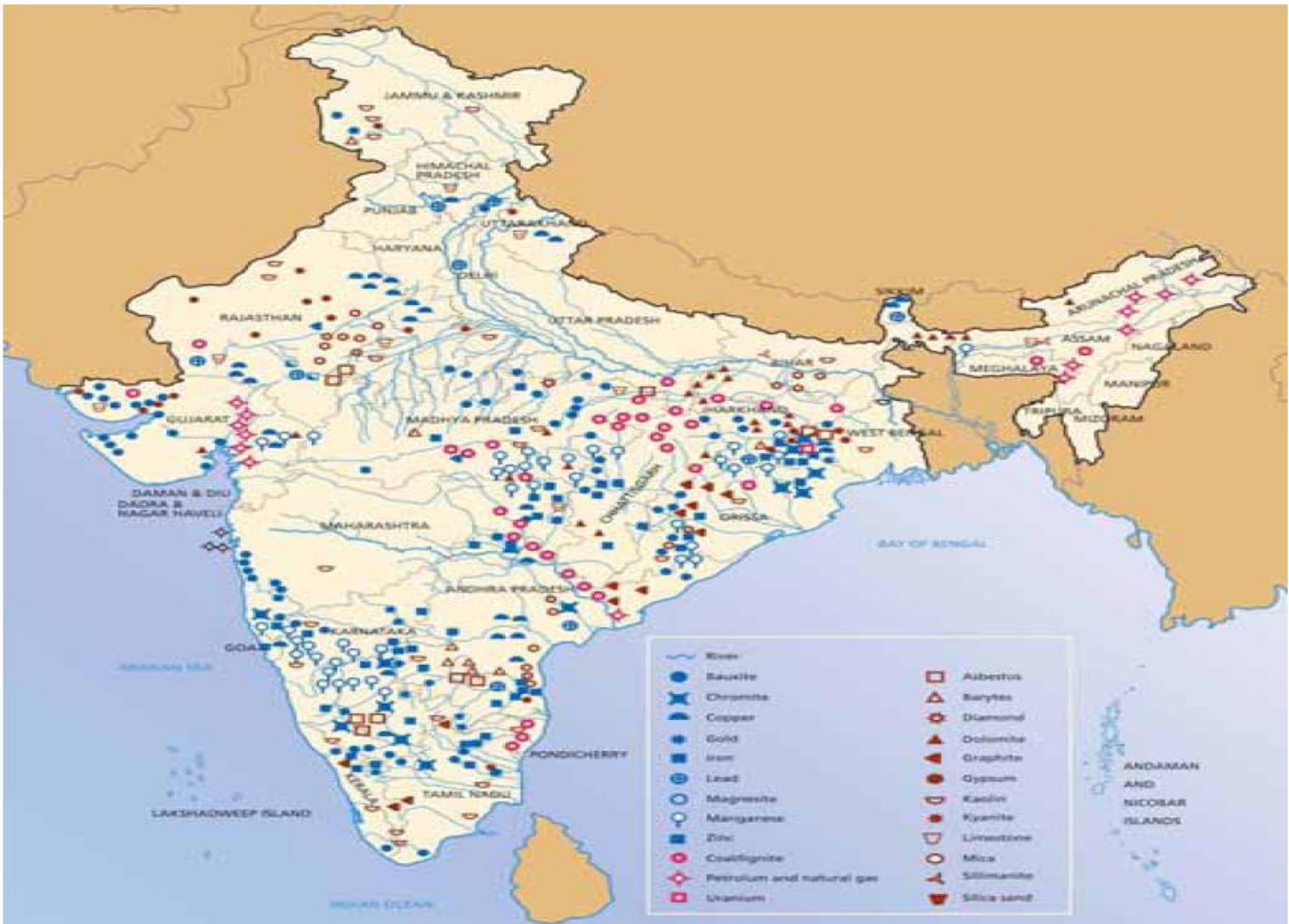
MAP 1.1: India – forests vs minerals
 India's mineral deposits are largely beneath its remaining forests



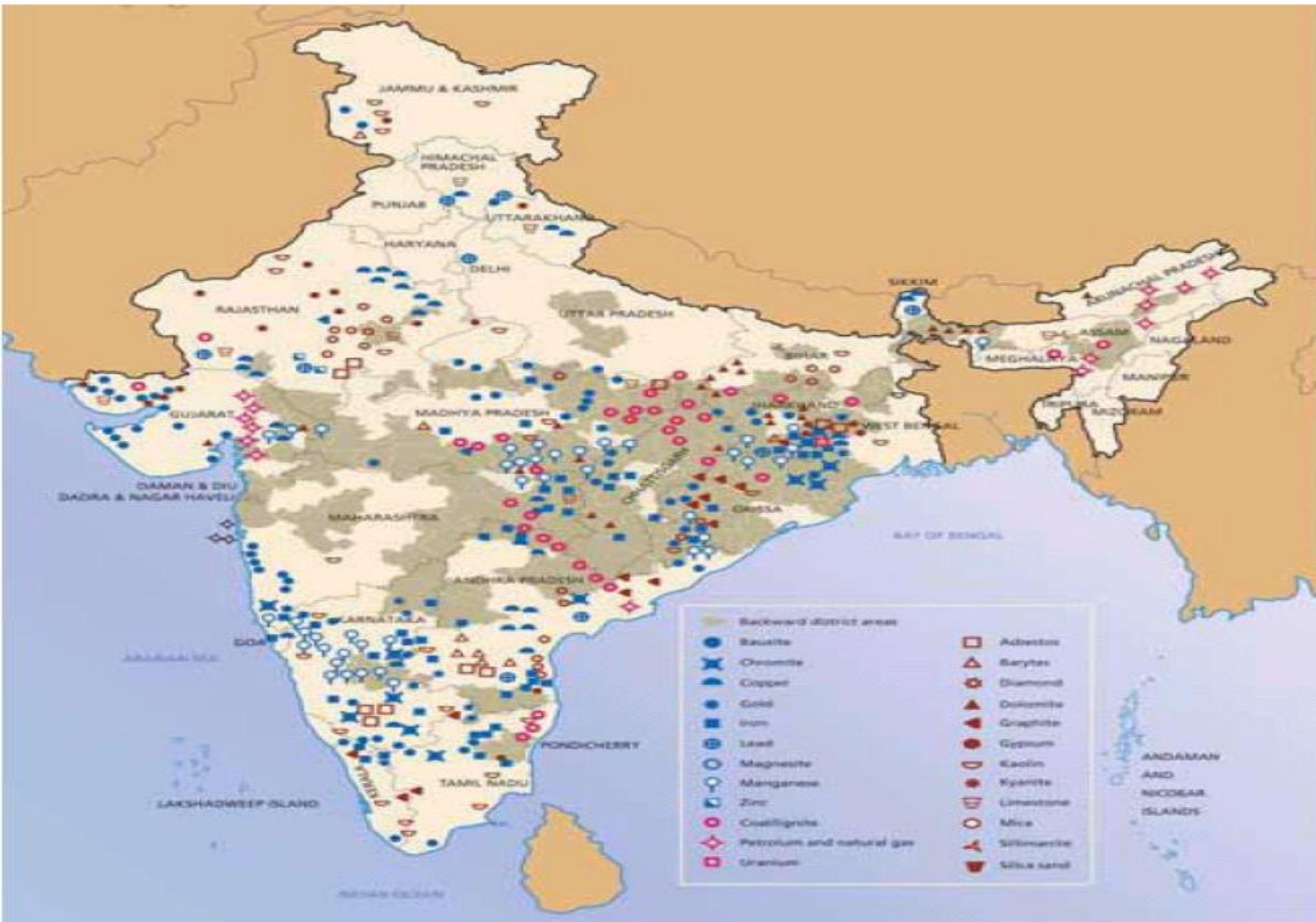
Forest land diversion from 1981 - 2012

Purpose/sector	Forestland diverted	
	Area (ha)	Percentage (%)
Defence	46,087.93	3.89
Social services	65,165.24	5.50
Power Projects (Hydel, Thermal, Wind and Transmission lines)	167,118.00	14.12
Irrigation	141,641.76	11.96
Mining	159,660.34	13.49
Transport (Railways and roads)	60,363.10	5.10
Others (including industries)	175,498.24	14.82
Regularisation of encroachment	368,432.07	31.12
Total forestland diverted	1,183,966.68	

Most mineral reserves in India lie near the origin or in the catchments of rivers

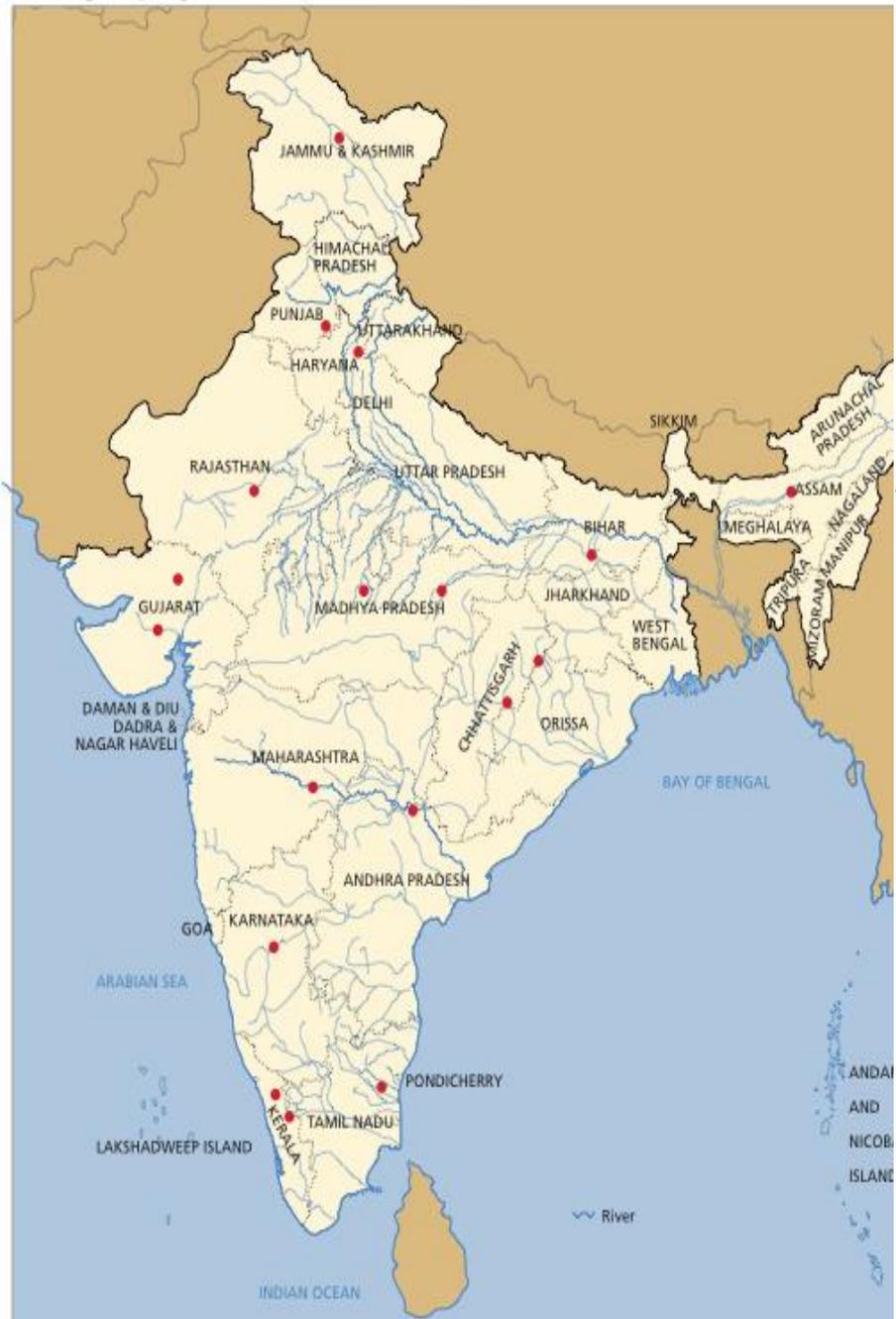


Mineral-bearing districts continue to be among the most backward districts of the country, in spite of the immense wealth they generate



Source: Anon, 2003, 'Identification of districts for wage and self-employment programmes', Report of the Task Force, Planning Commission, New Delhi

Geography of conflict — 1991



Geography of conflict — 2011



Mineral Sector : Transparency and Sustainability Initiatives in India

- Many mining companies voluntary publishing Environment Sustainability Report (big company) not small

Some of key **legal intervention** by GOI in the recent time

- The Right to Fair Compensation and Transparency in Land acquisition, Rehabilitation and Resettlement Act, 2013
- Forest Rights Act (FRA), 2006
- Mandatory CSR - companies to spend at least 2% of their average net profit in the previous three years on CSR activities

Mineral Sector : Transparency and Sustainability Initiatives in India

- In 2015, the Indian Mining Act was amended to insert the concept of benefit sharing with the local communities in the District Mineral Foundation
- Submission of Environmental Statement Every Year
- On-line auction of mine – promote transparency
- Star Rating Concept for metal & non-metal mines
- Star Rating policy for Coal Sector (2019)



- [Star Rating Policy](#)
- [Evaluation Template for an Opencast\(OC\) Coal Mines](#)
- [Evaluation Template for an Underground\(UG\) Coal Mines](#)
- [Star Rating of all coal and lignite mines for the year 2019-20](#) **NEW**
- [Star Rating of all coal and lignite mines for the year 2018-19](#)
- [Result of Star Rating base year 2019-20](#) **NEW**
- [Result of Star Rating base year 2018-19](#)

About Star Rating of Coal Mines

Coal Mining operations are expected to comply with many rules & regulations. These are mainly regarding safety, environment, rehabilitation of project affected families, welfare of workers etc. Although all the Mines are expected to comply with all the regulations, there are some digressions in varying degrees.

The Mining sector has kept evolving and becoming more efficient. Safer Mining techniques are coming up. Some Mines are leading others in terms of adoption of best practices. Also there is considerable variation if we consider the economic performance of different Mines. It becomes important to identify the best performers in terms of above mentioned areas and give them due recognition. The Star Rating of Coal Mines is expected to do the same.



Star Rating Coal Sector: Environment and Social Sustainability Report Card

Rating Year	Name of Company	No of Mines evaluated	Type of Mine	No of mines declared star rating					
				OC+UG+Mixed	5 star	4 star	3 star	2 star	1 star
2019-20	Total mines	358	182+152+18	16	41	135	99	61	6
	BCCL	30	18+5+7	0	2	3	13	10	2
	CCL	41	36+5+0	0	3	23	12	2	1
	ECL	71	15+48+8	0	6	21	18	25	1
	MCL	18	15+3+0	0	1	2	6	7	2
	NCL	10	10+0+0	2	0	3	5	0	0
	SECL	63	20+43+0	2	4	33	18	6	0
	WCL	56	31+24+1	0	11	25	15	5	0
	SCCL	36	13+23+0	1	6	17	8	4	0
	NLCIL	4	4+0+0	3	0	1	0	0	0
	Captive & Others	29	20+7+2	8	8	7	4	2	0

<https://starrating.coal.gov.in/policy/result-star-rating2019-20.pdf>

Criteria for Star Rating: Coal Mine

Percentage of score	Star rating
91 TO 100%	5 Star
81 TO 90%	4 Star
71 TO 80%	3 Star
61 TO 70%	2 Star
41 TO 60%	1 Star
0 TO 40%	No star

Discussion

Questions : What should be reported in Environmental Sustainability & Transparency?

Example: Thematic Areas used for Star Rating of Coal Mine

In Coal Mining Star Rating Policy - Seven thematic areas has been used

- Mining Operations Related Parameters
- Environment related parameters
- Adoption of Technologies: Best Mining Practices
- Economic performance
- Rehabilitation & Resettlement related parameters
- Worker related Compliance
- Safety and security related parameters

Star Rating: Metal and Non-Metal Mine

**Government of India
Ministry of Mines**

Notification No.- 31/4/2016-M.III

New Delhi, the 23th May, 2016

Star Rating of Mines

A 'Star Rating' will be awarded to the mining leases for their efforts and initiatives taken for implementation of the Sustainable Development Framework (SDF). One to five stars would be given to the mines. The best performing leases would be given 5 Stars. The star rating scheme is designed to have a built in compliance mechanism for environment and forest safeguards and will help in recognizing good performers in the sector while encouraging all mining lease holders to strive for excellence. The platform would not only encourage sharing of best practices but would also incentivize the adoption of best practices. The rating system in future may be useful in obtaining faster clearances from various regulatory bodies.

The 'Star Rating' will be started initially for the major mineral mines. The mining leases which have been operational for more than 180 days in the year of reporting would be eligible for star rating.

The evaluation template has been designed for the assessment of the SDF implementation in the mining lease based on the following parameters-

- The management of impact by carrying out scientific and efficient mining.
- Addressing social impacts of our resettlement and rehabilitation requirements for taking up mining activities,
- Local community engagements and welfare programmes,
- Steps taken for progressive and final mine enclosure
- Adoption of international standards

Policies Comparison
&
Learning
India, Tanzania, and Namibia
on
Transparency & Environmental & Social
Sustainability

Indicators	India	Tanzania	Namibia
<p>Classification of mines</p>	<p>Categorization based on: Types of minerals, namely metallic, non-metallic, fuel minerals and atomic minerals</p> <p>Basis of mechanization— Category A (mechanized mines), and Category B (non-mechanized mine)</p> <p>For conducting environmental impact assessment (EIA), the mines are categorized on the basis of size (category A and category B)</p>	<p>Categorization is based on investment: Large-, medium- and small-scale mines</p>	<p>Categorization is based on the size</p> <p>Small-scale mines and minerals deposits are only available to the Namibian citizens. An individual or company can have a maximum of 10 claims (size of claims 600 x 300 m)</p>

Indicators	India	Tanzania	Namibia
Permit system	<p data-bbox="401 182 946 396">Well-defined, specified time-limit, and disqualification and penalty in case of violation</p> <p data-bbox="401 528 956 796">Both state and Central governments are empowered to issue exploration and exploitation licenses</p> <p data-bbox="401 925 956 1142">Online Auctioning of mine lease has been introduced to promote transparency and accountability</p>	<p data-bbox="996 182 1400 342">Commission issues all exploration and exploitation licences</p> <p data-bbox="996 925 1400 1028">No process of online auctioning</p>	<p data-bbox="1454 239 1874 396">Minister of Mines and Energy issues all the licences</p> <p data-bbox="1454 925 1864 1028">No process of online auctioning</p>

Indicators	India	Tanzania	Namibia
Mine Safety and hygiene	Rules and regulations are properly laid down with proper benchmarks	Safety and hygiene are adequately addressed under acts and regulations	Safety and hygiene are adequately addressed under acts and regulations
Child labour	Child Labour Act prohibits the employment of children	Prohibited under the law; however, child labour is still prevalent, particularly in small-scale mines	Prohibited under the law
Groundwater	In case of groundwater intersection, a no objection certificate needs to be obtained from the concerned authority (Central Groundwater Board). Clearance is given subject to use of mine seepage water for agriculture and other public purposes	No such provision for effective use of mine seepage water	Prohibition on wastage of groundwater in boreholes, wells, shafts, mines or other excavations. A requirement of a licence to dispose of groundwater extracted from a mine or during any underground work

Indicators	India	Tanzania	Namibia
Land acquisition	<p data-bbox="336 182 710 287">People's consent is mandatory</p> <p data-bbox="336 411 836 515">Social impact assessment is mandatory</p> <p data-bbox="336 582 809 796">No irrigated multi-crop area can be acquired for mining unless as a last resort</p> <p data-bbox="336 868 784 1029">Both title and non-title holders are eligible for compensation</p> <p data-bbox="336 1096 826 1253">Method of compensation and R&R package is mentioned in act</p>	<p data-bbox="867 182 1136 287">No consent is required</p> <p data-bbox="867 411 1228 458">No such provision</p> <p data-bbox="867 582 1228 629">No such provision</p> <p data-bbox="867 868 1251 972">Only titleholder are compensated</p> <p data-bbox="867 1096 1199 1253">Compensation is calculated as per market value</p>	<p data-bbox="1333 182 1746 344">People's consent is mandatory in case of private land</p> <p data-bbox="1333 411 1694 458">No such provision</p> <p data-bbox="1333 582 1694 629">No such provision</p> <p data-bbox="1333 811 1721 915">Only titleholder are compensated</p> <p data-bbox="1333 1039 1850 1143">Compensation depends on negotiation</p> <p data-bbox="1333 1210 1881 1368">No rehabilitation and resettlement is mandated by law</p>

Indicators	India	Tanzania	Namibia
Land acquisition	In tribal areas - five-year plan for socio-economic development	No such provision	No such provision
	No declaration of land acquisition is made unless the developer or project proponent deposits the cost of acquisition with the government	No such provision	No such provision
	Construction of resettlement colonies having defined amenities in case of relocation	Provisions exist, but require strengthening	No such provision

Indicators	India	Tanzania	Namibia
CSR	CSR is mandatory and capped at 2 per cent profit (i.e., net profit before taxes for CSR corpus)	CSR is mandatory, but no financial provision defined on annual CSR expenditure	Voluntarily done by large mine only
	It is mandatory for companies to file annual return on CSR expenditure	No such provision	--
Benefit-sharing	<p>Mining Act mandates the formation of District Mineral Foundations.</p> <p>Funds are to be used for socio-economic development of the area around the mine.</p>	No such provision	No such provision

Country	Policy measures
Botswana	<ul style="list-style-type: none"> • Establishment of Tribal Land Boards
Democratic Republic of Congo	<ul style="list-style-type: none"> • 10 per cent of the total royalty to the Mining Fund for future generations • Establishment of an entity or committee which includes representatives from local communities—0.3 per cent of the total turnover allocated to the entity for development of affected communities • Mining rights holder to develop a concrete framework of social responsibility towards affected communities
Ghana	<ul style="list-style-type: none"> • Mineral Development Fund: Provisioning of 20 per cent of mineral royalty in the fund to provide financial resources for the benefit of a mining community • Establishment of the Mining Development Scheme for each mining community • Establishment of local management committees with representation of traditional community members, representatives from women's group and youth groups

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South Africa	<ul style="list-style-type: none"> • Affirmative action: At least 26 per cent of the units of production of prospecting or mining projects should be held by historically disadvantaged South Africans • Existence of a Mining Charter (2018, draft) under the act for entrance of historically disadvantaged South Africans in the minerals and mining industry (amended in 2010)
Uganda	<ul style="list-style-type: none"> • 3 per cent royalty to lawful occupiers of land

Indicators	India	Tanzania	Namibia
Environmental clearance	EIA is mandatory	EIA is mandatory	EIA is mandatory
	Cluster approach is used for small-scale mines and EIA is done for clusters.	No such provision	No such provision
	Accreditation of consultants (available in public domain)	Registration of consultants, not exhaustive	Registration of consultants, not exhaustive

Indicators	India	Tanzania	Namibia
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	Cluster approach is used for small-scale mines and EIA is done for clusters.	No such provision	No such provision
	Accreditation of consultants	Registration of consultants, not exhaustive	Registration of consultants, not exhaustive
	Bank do but not stipulated in act	Environment clearance is pre-requisite for project financing, stipulated in act	No legal mandate

Indicators	India	Tanzania	Namibia
Insurance against damage	Covered in Land Act	Insurance coverage against losses, injuries, and damage to environment, communities, individual and properties due to mining operations	No such provisions
Mineral conservation	Mandatory for every lease holder to complete the exploration of the whole area at G1 level within a period of five years from the start of the lease period	No such provision	The Mining Act has provided for mineral conservation, but it doesn't have any legal mandate for G1 level exploration
	Online daily record on production	No such online system for filing daily production	No such online system for filing daily production

Indicators	India	Tanzania	Namibia
	<p data-bbox="426 182 823 282">Mineral Exploration Trust</p> <p data-bbox="426 354 865 515">Fund is generated by levying a cess of 2 per cent on the royalty.</p> <p data-bbox="426 582 871 743">This is in addition to mineral royalty paid to the government</p>	<p data-bbox="950 297 1306 344">No such provision</p>	<p data-bbox="1450 297 1806 344">No such provision</p>
	<p data-bbox="426 829 904 1105">Clean energy cess - Rs 400 per tonne of coal for development of renewable energy (now merged with GST)</p>	<p data-bbox="950 829 1306 876">No such provision</p>	<p data-bbox="1450 829 1806 876">No such provision</p>

Indicators	India	Tanzania	Namibia
Acid mine drainage	No specific provision for controlling acid mine drainage. It is covered separately under water pollution laws	For environment protection - Mining regulations clearly define the procedure for placing the overburden dump so as to reduce chances of acid mine drainage	No specific provisions for acid mine drainage and heavy metals
Performance security	For mines granted lease through auction, performance security is 0.5 per cent estimated value of the reserve deposited in the bank. The security is required against any non-compliance of environmental, social, mine closure and other provisions	Rehabilitation bonds for mine closure	No such provisions

Indicators	India	Tanzania	Namibia
Mine closure	<p data-bbox="426 129 794 168">Rehabilitation cost</p> <p data-bbox="426 244 852 396">Coal Open cast - 9 lakh/ha (12328 USD/ha)</p> <p data-bbox="426 472 890 572">Underground - 1.5 lakh/ ha (2054 USD/ha)</p> <p data-bbox="426 644 620 682">Non-Coal</p> <p data-bbox="426 758 909 1025">US \$4,800 per hectare in case of mechanized mines, and US \$3,200 per hectare in case of manual mines.</p>	<p data-bbox="950 187 1392 339">Rehabilitation bonds is deposited in banks for mine closure.</p> <p data-bbox="950 415 1335 572">Value of the bond is calculated by a mine closure committee</p>	<p data-bbox="1450 187 1875 686">Section 128 (3) of the Mining Act stipulates that failure to rehabilitate a mined area properly is an offence carrying a penalty of N\$100,000 (US \$8,400) or five years imprisonment</p>
	<p data-bbox="426 1115 890 1386">Mining companies have to submit progressive (submitted after every five year) and final closure plans</p>	<p data-bbox="950 1115 1296 1158">No such provision</p>	<p data-bbox="1450 1115 1798 1158">No such provision</p>

Indicators	India	Tanzania	Namibia
Compliance and monitoring	Mandated under Mining and Environment Act	Commission and NEMC is the nodal agencies to ensure mine compliance.	Ministry of Mines and Energy and Ministry of Environment and Tourism is the nodal agencies for compliance and monitoring.
	Adequate framework/guidelines for compliance assurance, mandated under different acts	Lack of guidelines	Lack of guidelines

Indicators	India	Tanzania	Namibia
Separate judiciary	Separate environmental courts called National Green Tribunal look into environment-related complaints	No such provision	No such provision
	The Mining Act also establishes special courts for dealing with non-compliance with provisions of the Mining Act	No such provision	No such provision
	Separate courts to address grievances related to land acquisition, compensation and R&R package	No such provision	Land Tribunal has been constituted to deal with matters related to compensation and R&R issues

Indicators	India	Tanzania	Namibia
Audits	<p>Every year, companies have to disclose production and environmental compliance in the form of an environmental statement.</p>	<p>Environmental control audits are done every five years. Provision for conducting self-audit, every year.</p> <p>An audit petition is made whenever the public complains about the project</p>	<p>Audit is done annually under EMA Act 2007 (section 26)</p>
	<p>Six monthly compliance report under EIA notification 2006</p>		
	<p>Star rating (non-coal mine) - The rating is based on an assessment of four area - mine management, Env & social impacts, mine closure,</p> <p>Mandatory to achieve four-star rating, otherwise their licence might be cancelled</p>	<p>No such rating exercise</p>	<p>No such rating exercise</p>

Indicators	India	Tanzania	Namibia
Local content plan	No such provision	The Act provides for local content to boost the Tanzanian economy and provide training and employment to the host communities	Mining Act provides for the employment and training of the host communities. But broader concept of local content plan is missing.

Thematic Areas for Environmental & Social Sustainability & Transparency



View of Gold mine



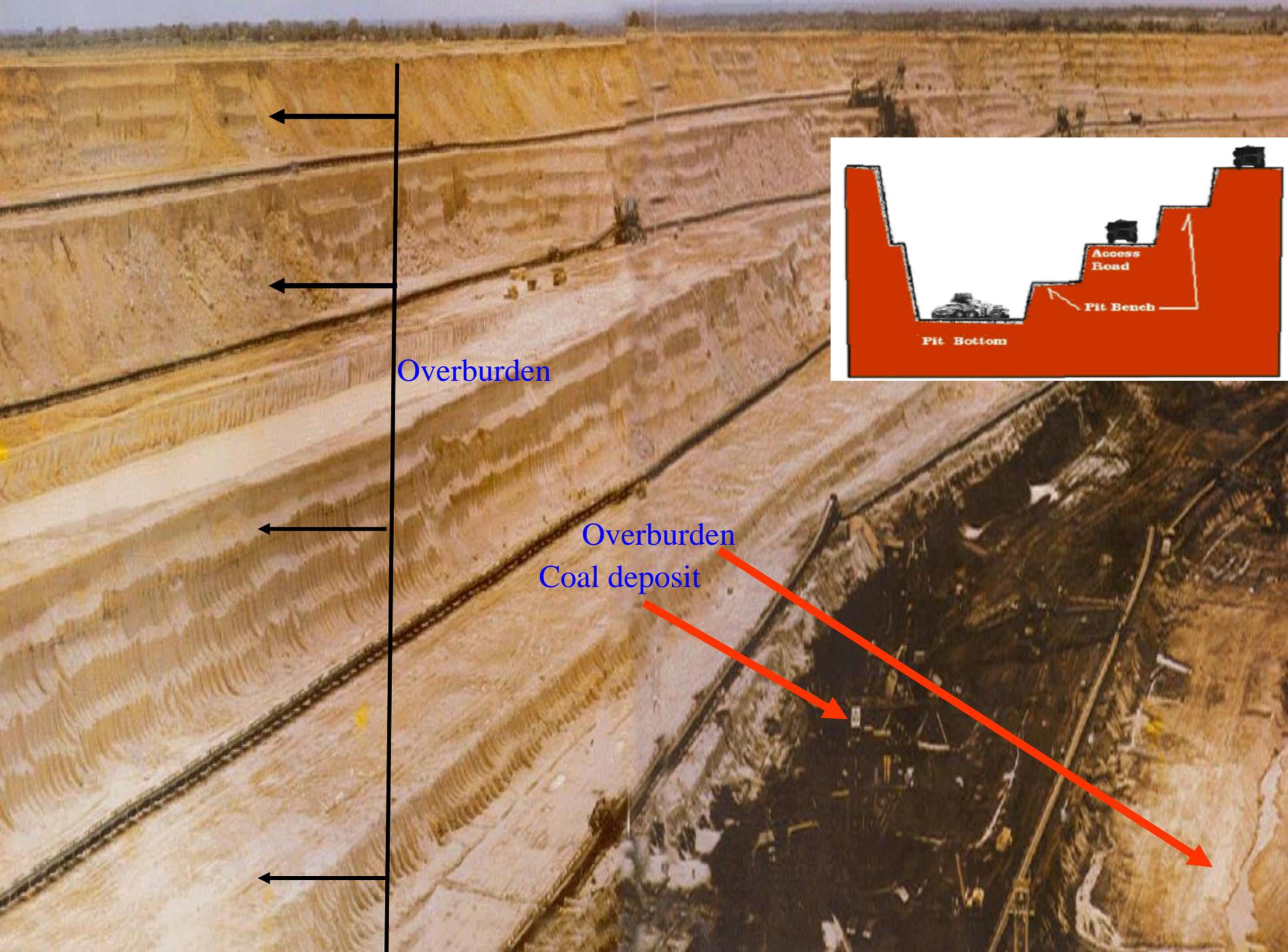
Uranium mine





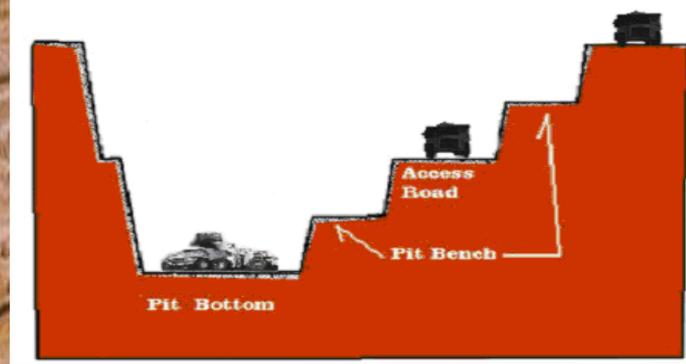


View of blasting



Overburden

Overburden
Coal deposit





L&T 300

श्री श्री जी.पी.
श्री श्री जी.पी.जी.
अटॉम डेप
प्रकारित मंगल एकरे सीले
दो पांरुषा बाइव
पुणरि-श्रीरि
केरन अनुशानि प्रापन
बाइव शे प्रेता के ।

श्री श्री जी.पी.
श्री श्री जी.पी.जी.



Direct Tipper Loading By Surface Miner



KSM304

LARSEN & TOUBRO LIMITED
KORCHIANG ROAD
HYDRABAD



Bucket wheel excavator

Rock breaker



Rock breaker technology can be applied for breaking of rock/coal/ore even about 500 kg/sq.cm.

It can be used wherever it is not possible to go for blasting – near vicinity of structures and habitations.







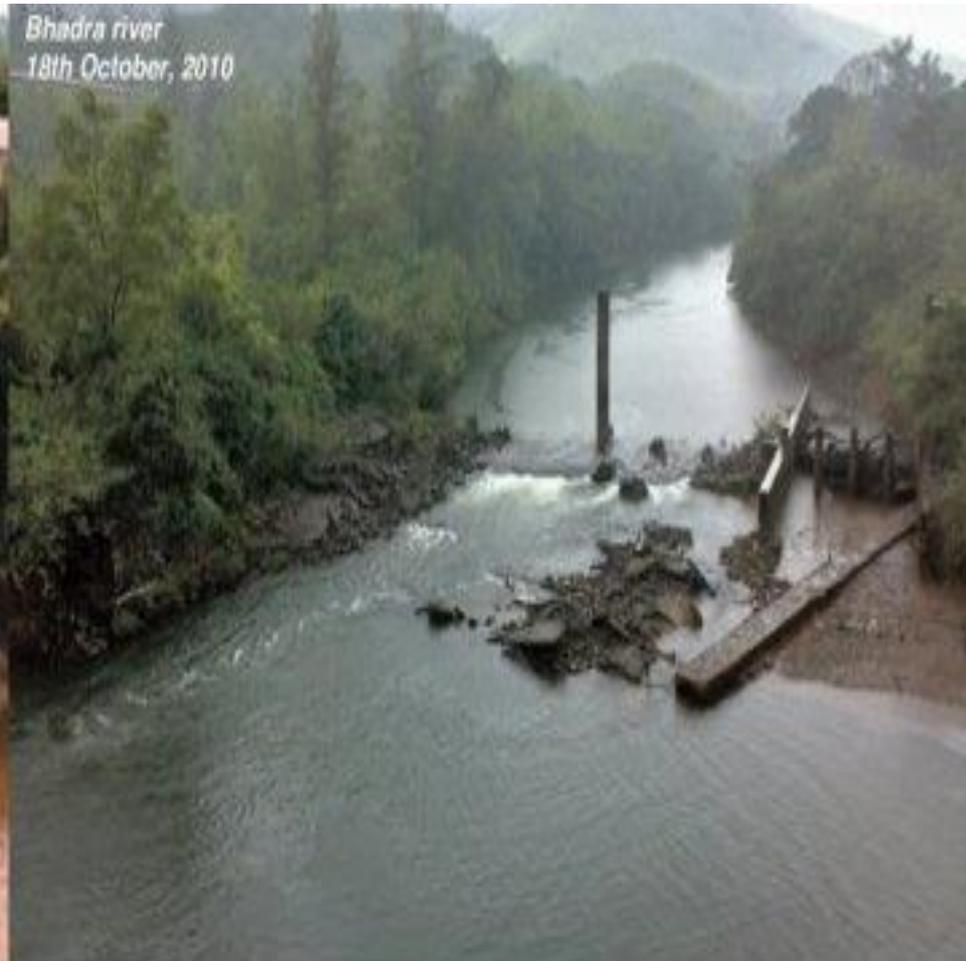
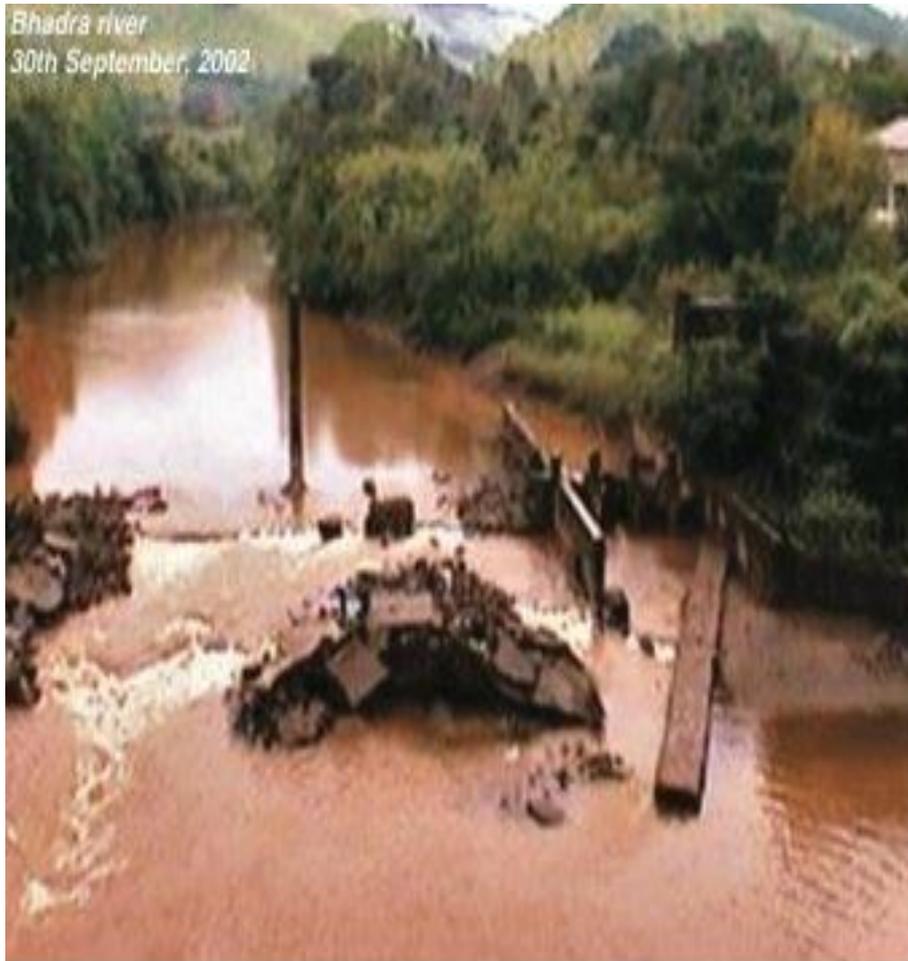
A photograph of a river with a sharp color change from muddy brown to clear green, illustrating the impact of monsoon rains. The river flows from the background towards the foreground, where it splits into two distinct sections. The upper section is a thick, opaque, reddish-brown color, while the lower section is a clear, vibrant green. The surrounding area is lush with green vegetation, including trees and bamboo-like plants. The text "Impact on river during monsoon" is overlaid on the image in a black serif font.

Impact on river during monsoon





Bhadra River: Supreme Court of India stopped the mining





Tailing pond of Uranium mine



Tailing pond of Copper mine





Environmental And Social Risks - Mining Sector

Magnitude of impact of mining on land depends on a number of factors, like

- Existing land use pattern,
- Topography of the area,
- Climatic condition
- Stripping ratio,
- Quarry depth
- Mining Technology





















NATIONAL AMBIENT AIR QUALITY STANDARDS

CENTRAL POLLUTION CONTROL BOARD

NOTIFICATION

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-I—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃) µg/m ³	8 hours* 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃)	Annual*	100	100	-Chemiluminescence

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m ³	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m ³	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m ³	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

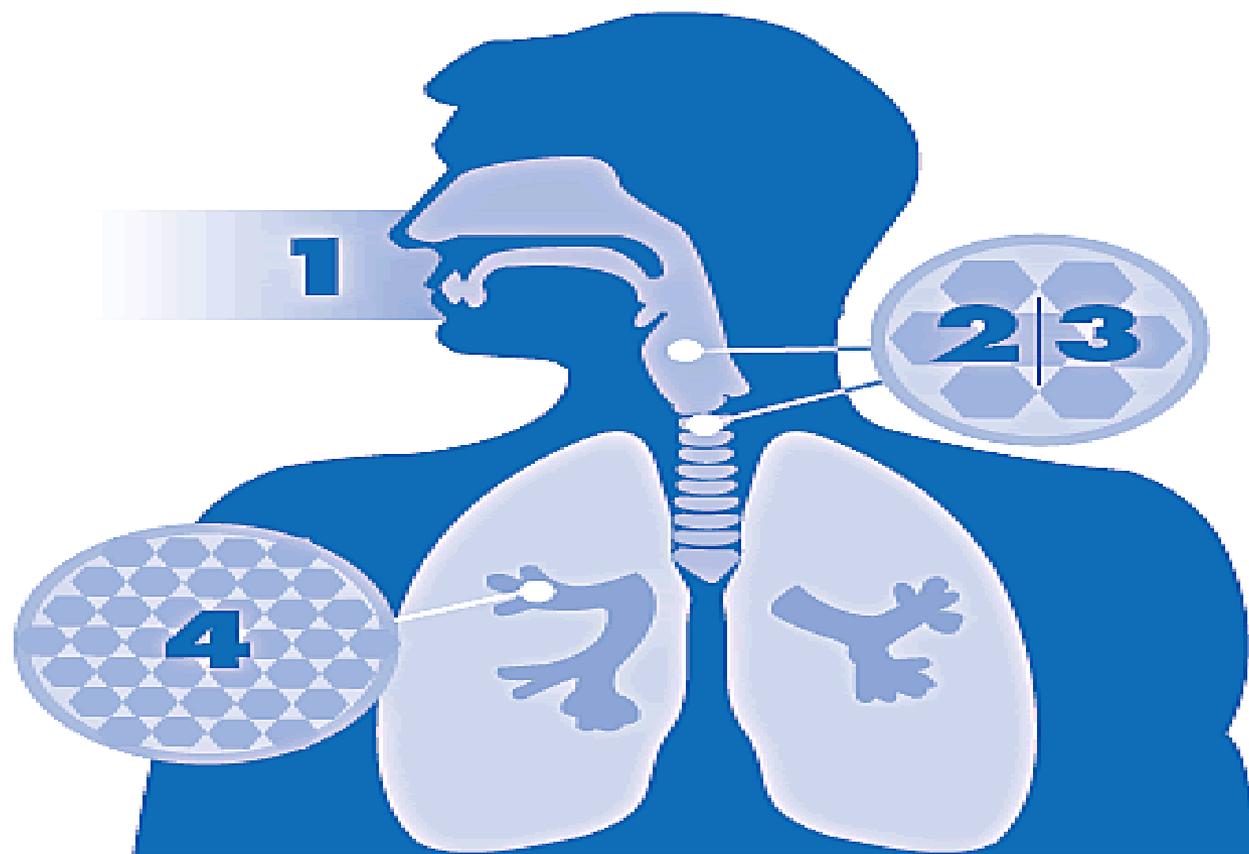
** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Ext.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

How Particulate Matter Enters Our Body



- 1** Particulate matter enters our respiratory (lung) system through the nose and throat.
- 2 | 3** The larger particulate matter (PM₁₀) is eliminated through coughing, sneezing and swallowing.
- 4** PM_{2.5} can penetrate deep into the lungs. It can travel all the way to the alveoli, causing lung and heart problems, and delivering harmful chemicals to the blood system.

DELHI LUNG

What would you do if you realised that an idle State and an aggressive market economy had found their way into your lungs?

We fought for clean air

and inflexible legal injuries is unknown to most of us. Surgeons who have the privilege of seeing inside us have a funny story to tell. They can tell, just by looking at the colour of the lungs, whether the person is from a dirty big city or not.

HIMACHAL LUNG

Actually a shocking tale!

Look at the spotless lung below. The fortunate owner comes from a relatively cleaner place.





Road accident due to loaded truck

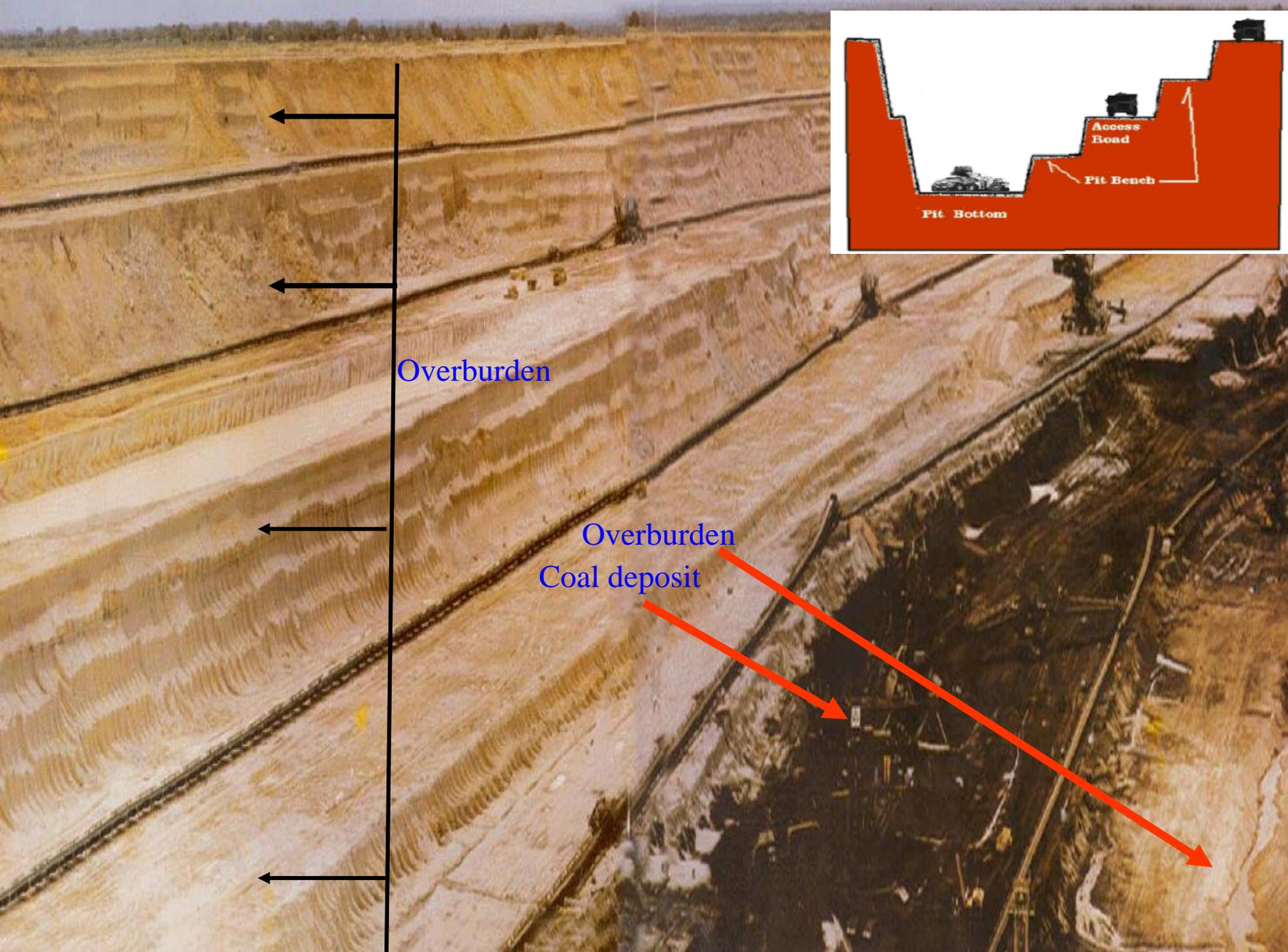






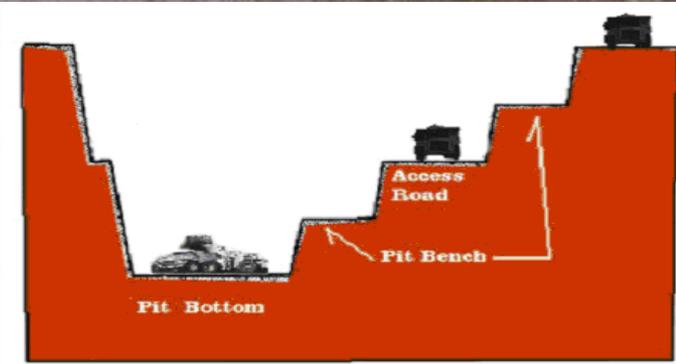






Overburden

Overburden
Coal deposit







OB Dump →



27 1:59PM

Facts - Waste

- A weak area. Topsoil mostly dumped with overburden with no reuse.



Environmental Impacts – Noise & Vibration

Noise

- Cumulative effect of mining activities produces considerable noise.
- Some sources of noise – blasting, drilling, crushing, material handling and movement of vehicles

Vibrations

- Blasting results in ground vibrations and if there are human habitation nearby, it can destroy property and houses





RELATED KEYWORDS: [Rajesh-Karan-Lamba](#) | [Friends](#) | [Chikkajala-Police](#) | [Arun-Chandra-Shetty-Khem-Patalim-Nanda](#)

Five Bengaluru students drown in abandoned quarry

TNN | Apr 24, 2015, 02:22AM IST

BENGALURU: Five engineering students drowned at an abandoned quarry at Chikkajala, off Ballari Road, on Thursday afternoon. The students were part of an eight-member group - all fourth-semester students of electrical and communication at Revana Siddeshwara Engineering College, Chikkajala - who had gone for a swim at the prohibited quarry [f](#) [t](#) .

The students were fascinated by photographs on social media. On Thursday, the group walked to the quarry, just 3 km from their college, and reached the place around 12.30pm.

By Thursday evening, police recovered the bodies of Arun Chandra Shetty, Khem Patalim, Nanda Kumar KR and Rajesh Karan Lamba, all 19. The body of



Five engineering students drowned at an abandoned quarry at Chikkajala, off Ballari Road, on Thursday afternoon.



Police recovering body of students from quarry



Mine closure coal mining

- In 2009, the **Ministry of coal**, issued guideline for preparation of mine closure plan for coal and lignite mine, which was further modified in 2009, 2012 and 2013.
- Mine closure cost - (9 lakh/ha open cast & 1.5 lakh/ha underground mine)

Source: office memorandum 29 May 2020

CSR - Companies Act, 2013

- In India, the concept of CSR is governed by clause 135 of the **Companies Act, 2013**
- The Act encourages companies to spend at least 2% of their **average net profit** in the previous three years on CSR activities

As per Company Act, 2013

- Applicability of CSR, **if any company has**
 - Net worth of rupees 500 crore or more
 - Turnover of rupees 1000 crore or more
 - Net profit of rupees 5 crore or more during any financial year



यो.सी.एल.संगठ परिषद
के CSR-2015-16 के तहत न्यु
मार्किंग में चेक डैम का
निर्माण किया गया।





सी.सी.एल. मगध परियोजना
से CRS स्कीम के तहत
ग्राम - आरा में चेकडेम का
निर्माण कराया गया।







सी.सी.एन. मगध परियोजना से
CRS स्कीम के तहत
ग्राम चमालू में कुएँ का
निर्माण कराया गया

07-02-17 14:45

शुद्ध
सौजन्य
सी० एस०
मगध-आम्रपाली
चातर

पेयाजल
से
आर० - 2017
क्षेत्र, सी० सी० एल
(राहम)



Sustainable Mine management Practices

Best practices in OB stabilization: Jayant Project of North coal field Limited



Best practices in OB stabilization



BIOLOGICAL STABILIZATION

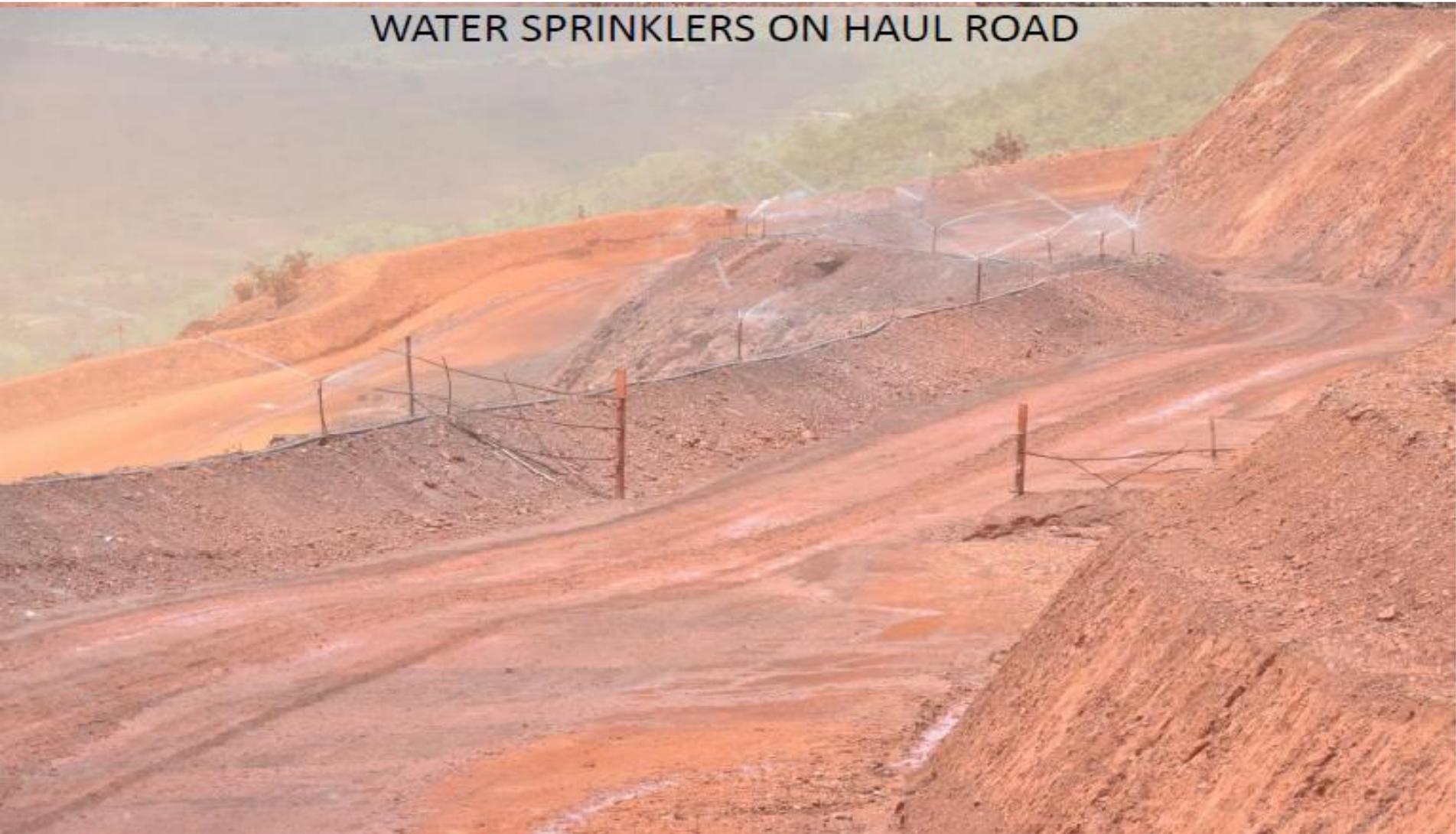








WATER SPRINKLERS ON HAUL ROAD









Innovative strategies for restoration of mine dumps



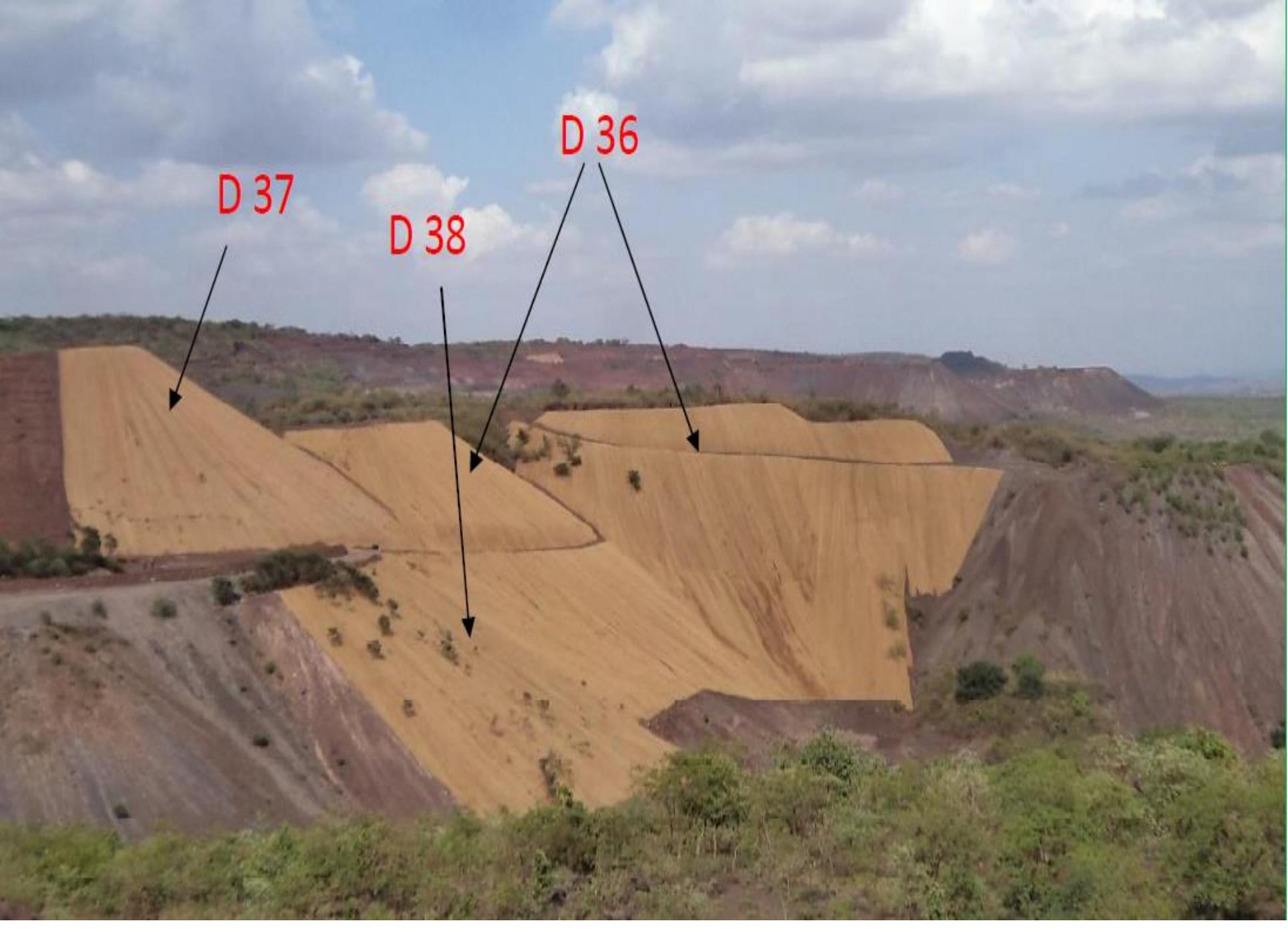






A Case Study of Mine Land Reclamation Sankhali iron ore Mine, Goa

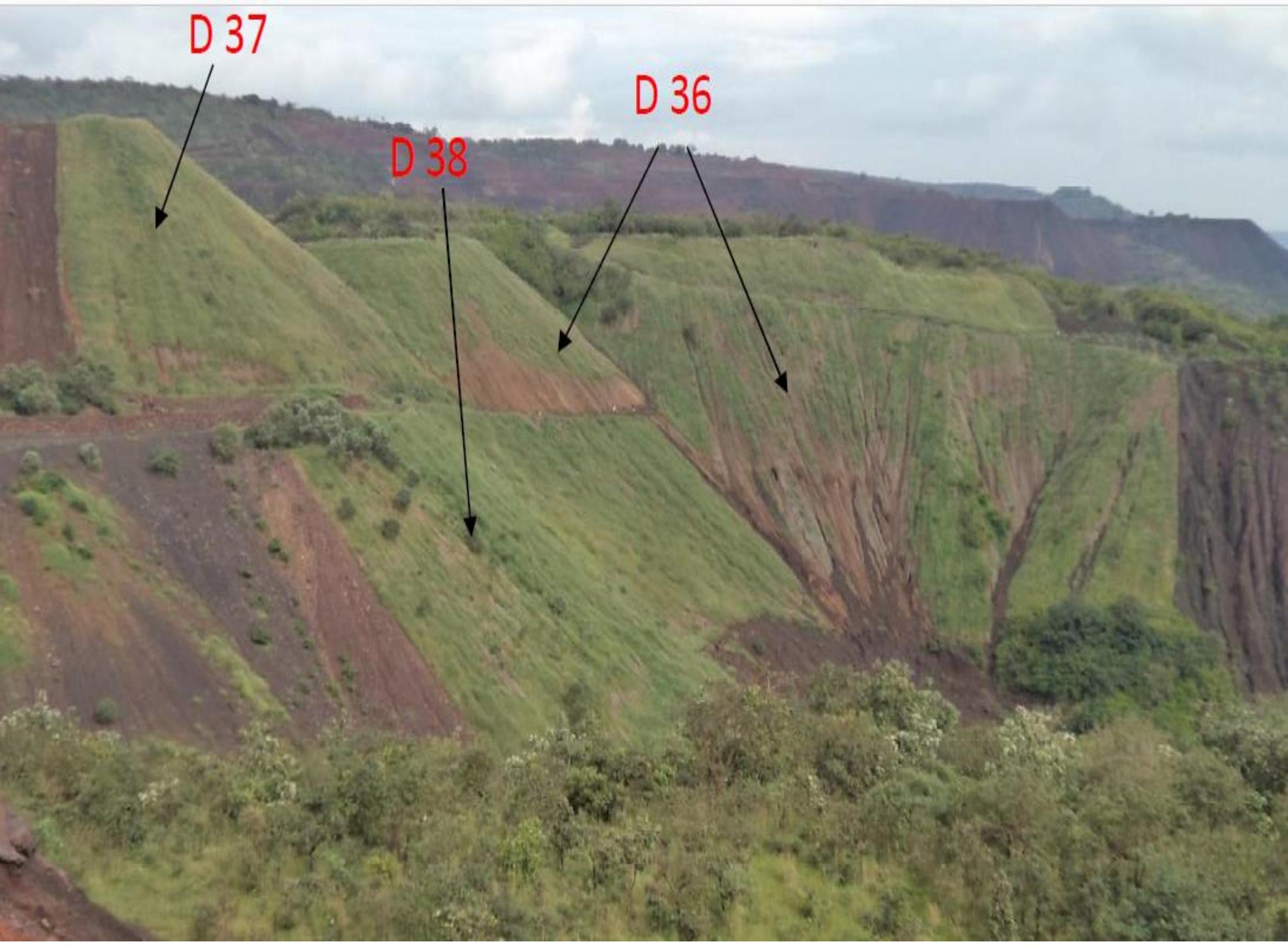




D 37

D 38

D 36



D 37



D 36



D 38





















BIOLOGICAL ENGINEERING IN OB DUMPS AT PK OC.IV, MANUGURU, KHAMMAM DISTRICT



VIEW OF MINE SURFACE OPENING AT PK OC.IV, MANUGURU, KHAMMAM DISTRICT









Soil conservation and management

- ❑ To store the topsoil for reuse is a good practice
- ❑ Scrap the topsoil prior to drilling and blasting
- ❑ Immediately used for plantation work
- ❑ If topsoil is not used immediately, then it should be staked at a designated area
- ❑ Embankment to prevent erosion and its height should not exceed more than six meter



Designated soil stacking



Technical Reclamation: laying of top soil layer over backfilled material



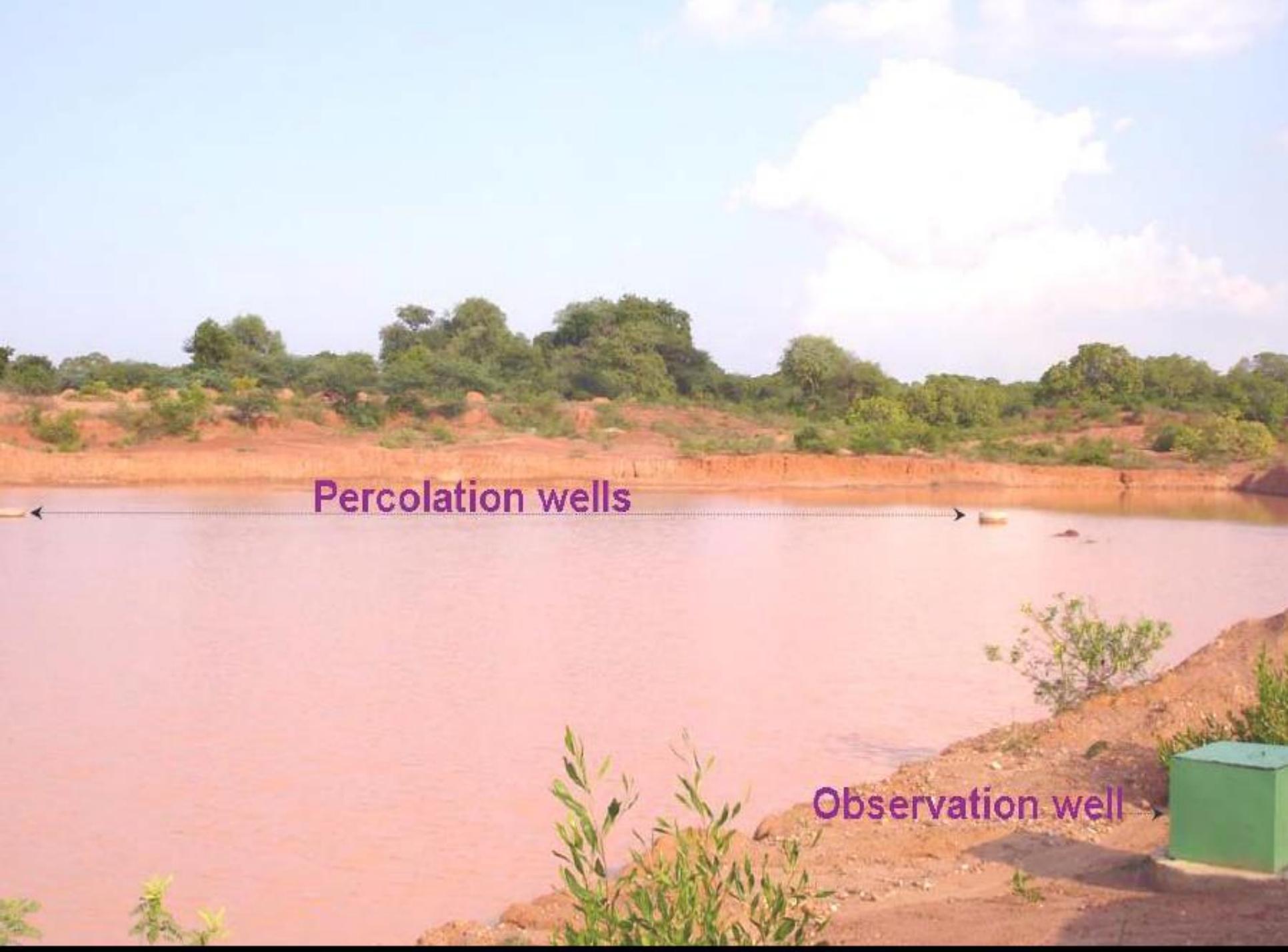


Safe stacking of topsoil



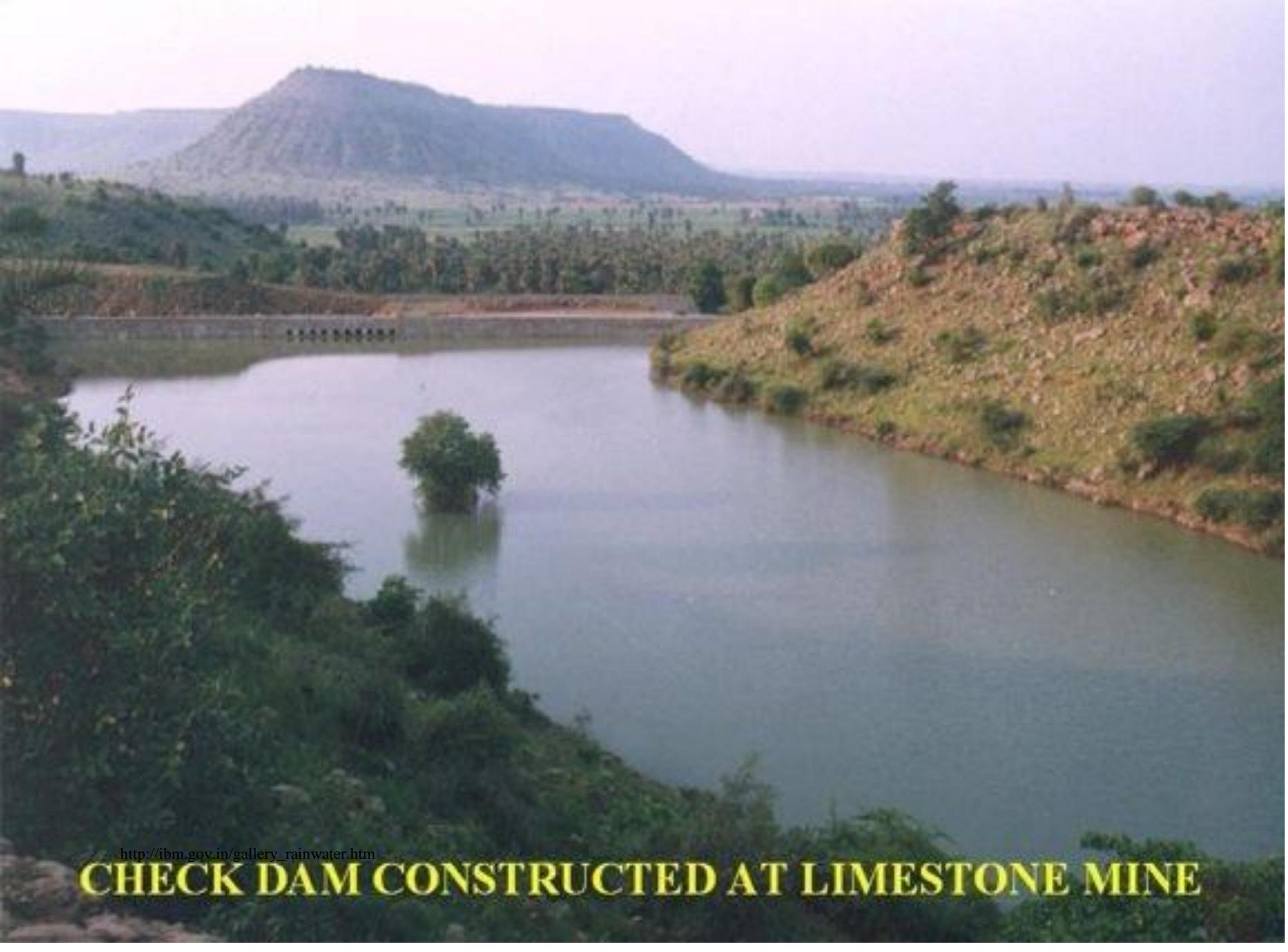


Recharge well



Percolation wells

Observation well



http://ibm.gov.in/gallery_rainwater.htm

CHECK DAM CONSTRUCTED AT LIMESTONE MINE

Restoration of seasonal river – with water of underground mine











वेस्टर्न कोल
जल शुद्धीकरण संयंत्र
पाटनवावणी स्थान, नागपुर जिल्हा

शुद्ध पेय जल
DRINKING WATER
पिण्याचे शुद्ध पाणी
RO WATER













Water Spraying Arrangements at Feeder Breaker of BPA OC II Extn. BPA Area





Fixed sprinkler – railway siding















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8169

सावधान अग्नि
केन्द्र है।

सावधान अग्नि
केन्द्र है।

सावधान अग्नि
केन्द्र है।

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SOUTH EASTERN COALFIELDS LTD
KUSUMONDA CHP
TANJUNG PUNDA DISTRICT
N/S/SK SANANTA S CO. P LIMITED
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TRANSFER HOUSE-1

CONVEYOR 35-36









Ambient Air Quality Monitoring

1	Total No. of ambient air quality monitoring stations & frequency of monitoring	04 Nos.; Fortnightly Monitoring
2	Ambient Air Quality Monitoring Stations Locations	<ol style="list-style-type: none">1. Near Substation- NGOA-12. Near GhatRohna -NGOA-23. Gondegaon Village-NGOA-34. Guest House/Filter Plant-NGOA-4
3	Ambient air quality status for the parameters prescribed by state pollution control board. (Average 95% time weighted value)	All parameters are within permissible limits.

Sewage Treatment Plant in Srirampur Area









Water Quality Monitoring

1	No. of Water quality monitoring stations & frequency of monitoring	02 nos.; Fortnightly Monitoring
2	Monitoring stations	1. Mine water Discharge-NGOW-1 2. Workshop water (treated) discharge-NGOW-2
3	Average concentrations of major pollutants prescribed by State Pollution Control Board	All parameters are within permissible limit.
4	Quantity of effluent discharge to Local Water source	After primary settling in the central quarry, the Mine water discharge is passed through 2 nos. of sedimentation tank for further settling / sedimentation of the discharged water.



AREA: MINES WORKSHOP(HEMM) TEAM NO.: 102

(हरे रंग के पात्र में)	(लाल रंग के पात्र में)
सक्रियता के अनुपयोगी टूटने, क्षति के फिल्टर, अर्थ के फिल्टर, लाल कागज का पाउडर, लीक के रेजे, सड़क हुआ कागज, इट्टीकागज अवशेष	प्लास्टिक कीलियां/कागज प्लास्टिक, निलंबन, प्लास्टिक की बोलों जैव के कपड़े, कपड़े, पीपीई के टूटने, सड़क लकड़ी अवशेष

आवक्या कभी टूटने में अक्षत बर्तन, कपड़े आदि का उपयोग न करें।

Way for Inspection Check Point Way for Inspection

- Equipment and Fixtures (White)
- Aisle ways & Traffic Lanes (Yellow)
- Keep Clear - Operational (Black/White Zebra)
- Inspection Lane (Green)
- Keep Clear - Safety (Red/White Zebra)













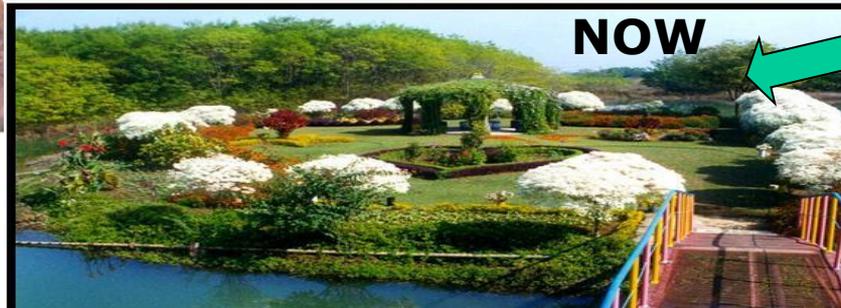
PEER ORCHARD DEVELOPED OVER RECLAIMED AREA

View of abandoned mine converted into agriculture land





REHABILITATION AT JAMUL MINES



ACC Jamul limestone mine - Reclamation of exhausted mines as a Picnic Spot



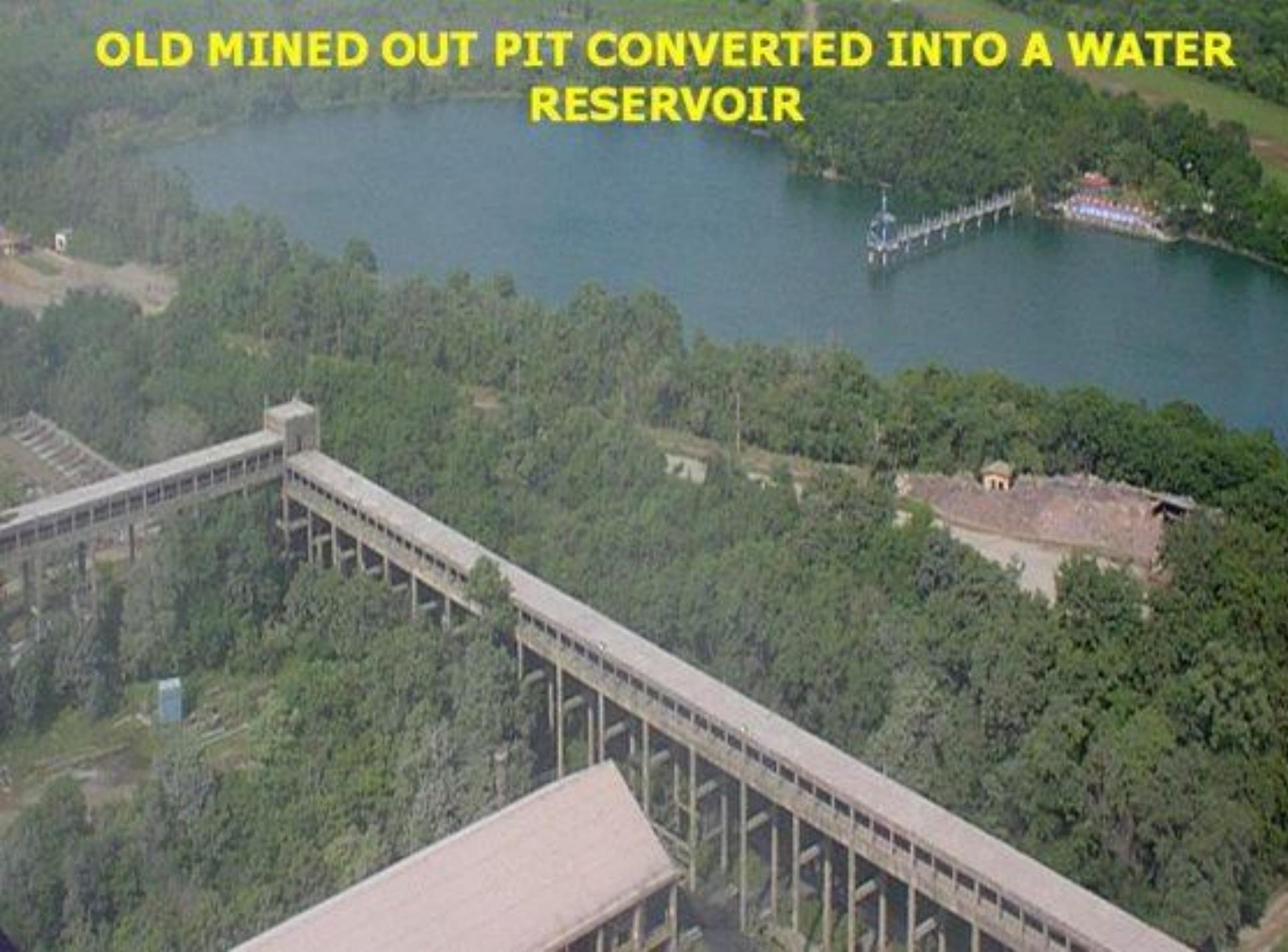
Plantation of horticultural species on restored overburden dumps



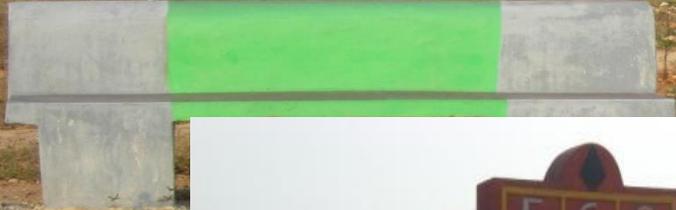
OLD MINE PIT CONVERTED IN TO WATER RESERVIOR



OLD MINED OUT PIT CONVERTED INTO A WATER RESERVOIR



Eco-Park on Reclaimed Land at Piparwar



Piparwar mine - View of reclaimed voids

Water body developed in reclaimed voids



Migratory birds in the reclaimed voids





In water scarce area - convert abandoned mine into water reservoir

Internal Best Practices – Mine Closure

Flambeau Copper Mine

- Flambeau Mine orebody contained copper with trace amounts of gold.
- Mine operated for four year - 1993 - 1997.
- Open pit was backfilled and the site returned to its original contours.
- At the request of local governments, 32 acres of reclaimed land were leased for industrial development cooperation



Before.



After

Krughütte Solar Park in Germany, constructed on the site of a former copper mine in Saxony-Anhalt. (image: Parabel

