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MINING & ENVIRONMENT

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Abstract:-Global greenhouse pollution is on the rise – and therefore coal consumption – must be reduced radically. In case, we fail to stop pollution, then catastrophic climate change impacts such as major sea-level rise, agricultural collapse, massive species extinction and social upheaval will become unavoidable.

Keywords: Resources Development. Environment, Women Livelihoods , Human Health, , Coal mining

INTRODUCTION:

The mining industry has enormous impact on the environment and on local communities. Local and regional effects of coal mining includes conversion of vast swathes of land into desolate wastelands; habitat loss and species extinction; cracked river beds; waterways polluted with salt and sediment; air, noise, and visual pollution resulting in negative health impacts on local communities; exploitative workplace practices; displacement of alternative industries, and more. In developing nation as over 90% of electricity is generated from coal the environment from coal the environmental impacts due to coal mining are far greater.,

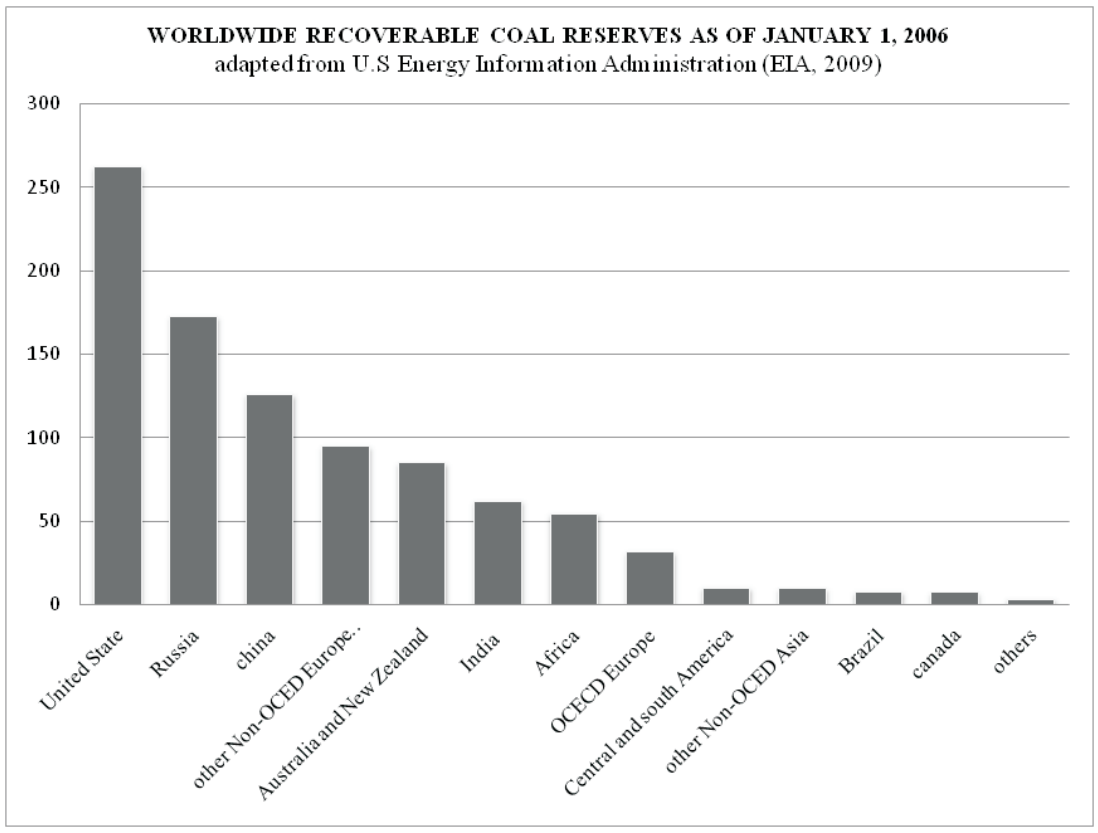
Mining is predominantly a primary activity revolving round the extraction of minerals for various developmental processes. Mining involves huge digging process altering surfacial Strata causing huge pits and dumping yards thereby altering not only all the physiographic and biotic environment but also the air and water surround the region. Of all the mineral resources, coal which has a wider usage is rained elaborately leads to mine subsidence, land disturbance, water Pollution, acid mine drainage, dist & noise pollution, altered rehabilitation, Global warming and ennumerous healthproblems like respiratory effects [Cardiovascular, Oxidative stress] etc. the land Transformation from open and green fields to mining fields result in large scale displacement of people who have to struggle hard to re-establish their livelihoods. In the case of women, this has been more heinous [torturing] due to multiple socio-economic compulsions which they have to undergo

GLOBAL COAL RESERVES

Amongst the major energy sources, coal is the most rapidly growing fuel on a global basis. While questions regarding the size and location of reserves of oil and gas abound, coal remains abundant and broadly distributed around the world. Economically recoverable reserves of coal are available in more than 70 countries worldwide and in each major world region with authorities reporting some 850 billion tonnes of Coal as currently recoverable [the geological resource is far larger]. It is clear that coal will be with us for many decades, if not centuries to come. Al the current rate of production, global coal reserves are estimated to last for almost another 150 years. Worldwide recoverable coal reserves as on 1st Jan 2006 reveal hat United State of America stands 1st with 262.7 billion short tonnes followed by Russia [173.1 BST], China [126.2 BST] and other Non-OECD Europe and Eurasia [95.3 BST], Australia and New Zealand [85.1 BST], India [62.3 BST], Africa [54.76], OECD Europe [31.7 BST] and Others [3.4 BST] – (source : Integrated Energy Outlook-IEO), EIA, Office of integrated Analysis and Forecasting, USDE May 2009).

Through United State stands tall in terms of Coal Reserves, but recent data (2009) reveal that China surpassed US as the world's largest user of Coal and is Projected to increase coal use by 271% over the next 20 years in the form of increased coal fired electrical generating capacity from 250 Giga Watts [Billion Watts] annually in 2006 to 950 G.W by 2030.

It is also observed that renewable energy cannot exist without coal, natural gas or nuclear energy- not unless we intent to ration energy or live with frequent; power black-outs as part of our energy strategy. Coal power is needed for backup for the periods when the wind not blowing or the sun isn't shining.



Adapted from, International energy outlook: Energy information Administration (EIA), Office of integrated Analysis and forecasting, U.S. Department Of Energy, May, 2009.

From the view of projected energy consumption among the various countries and regions worldwide; China is projected to be far the largest consumer if power in the world and they will do this with coal. The United State is distant 2nd & OECD Europe and India tied at a Close 3rd.

COAL MINING IN INDIA

India has a long history of commercial coal mining covering nearly 220 years starting from 1774 by M/s Sumner and Heatly of East India Company in the Raniganj Coalfield along with Western bank of River Damodar. However, for about a century the growth of Indian coal mining remained sluggish for want of demand but the introduction of steam locomotives in 1853 gave a fillip to it. Within a short span, Production rose to an annual average of 1 million tonnes (MT) and India could produce 6.12 MTS. Per year by 1900 and 18 MTS per year by 1920. The production got sudden boost from the First World War but went through a slump in the early thirties. The production reached a level of 29 MTS by 1942 and 30 MTS by 1946.

With the advent of Independence, the country embarked upon the 5-year development plans. At the beginning of the 1st plan, annual production went up to 33 MTS. During the 1st Plan period itself, the need for increasing coal production efficiently by systematic and scientific development of the coal industry was being felt. Setting up of the National Coal Development Corporation (NCDC), a Government of India Undertaking in 1956 with the collieries owned by the railways as its nucleus was the first major step towards planned development of Indian Coal Industry. Along with the Singareni Collieries Company Ltd. (SCCL) which was already in operation since 1945 and which became a Government company under the control of Government of Andhra Pradesh in 1956, India thus had two Government coal companies in the fifties. SCCL is now a joint undertaking of Government of A.P and Government of India sharing its equity in 51:49 ratios.

NATIONALISATION OF COAL MINES

Right from its genesis, the commercial coal mining in modern times in India has been dictated by the needs of the domestic consumption. On account of the growing needs of the steel industry, a thrust had to be given on systematic exploitation of coking coal reserves in Jharia Coalfoeld. Adequate capital investment to meet the burgeoning energy needs of the country was not forthcoming from the private coal mine owners. Unscientific mining practices adopted by some of them and poor working conditions of labour in some of the private coal mines become matters of concern Government. On account

of these reasons, the Central Government took a decision to nationalize the private coal mines. The nationalization was done in two phases, the first with coking coal mines in 1971-72 and the non-coking coal mines in 1973.

Inventory of Coal Resources of India: As a result of exploration carried out up to the maximum depth of 1200m by the GSI, CMPDI, SCCL and MECL etc., a cumulative total of 285862.21 Million Tonnes of Geological Resources of coal have so far been estimated in the country as on 1.4.2011. the details of state-wise geological resources of coal are given as under:

A: GONDWANA COAL FIELDS	Geological Resources of Coal			
State	Proved	Indicated	Inferred	Total [Million Tonnes]
Andhra Pradesh	9296.85	9728.37	3029.36	22054.58
Assam	0	2.79	0	2.79
Bihar	0	0	160	160
Chhattisgarh	12878.99	32390.38	4010.88	49280.25
Jharkhand	39760.73	32591.56	6583.69	78935.98
Madhya Pradesh	8871.31	12191.72	2062.70	23125.73
Maharashtra	5489.61	3094.29	1949.51	10533.41
Orissa	24491.71	33986.96	10680.21	69158.88
Sikkim	0	58.25	42.98	101.23
Uttar Pradesh	866.05	195.75	0	1061.80
West Bengal	11752.54	13131.69	5070.69	29954.92
Total	**113407.79**	**137371.76**	**33590.02**	**284369.57**

B:TERTIARY COAL FIELDS:	Geological Resources of Coal				
State	Proved	Indicated	Inferred (Exploration)	Inferred (Mapping)	Total [Million Tonnes]
Arunachal Pradesh	31.23	40.11	12.89	6.00	90.23
Assam	464.78	42.72	0.50	2.52	510.52
Meghalaya	89.04	16.51	27.58	443.35	576.48
Nagaland	8.76	0	8.60	298.05	315.41
Total	**593.81**	**99.34**	**49.57**	**749.92**	**1492.64**

CATEGORIZATION OF COAL RESOURCES

The coal resources on India are available in order Gondwana Formations of peninsular India and younger Tertiary formations of north-eastern region. Based on the results of Regional/ Promotional Exploration, where the boreholes are normally placed 1-2 Km apart, the resources are classifies into 'Indicated' or 'Inferred' category. Subsequent Detailed Exploration in selected blocks, where boreholes are less than 400 meter apart, upgrades the resources into more reliable 'proved' category. The formation-wise and category-wise coal resources of India as on 1.4.2010 are given in table below:

Formation	Proved	Indicated	Inferred	Total [Million Tonnes]
Gondwana Coals	113407.79	137371.76	33590.02	284369.57
Tertiary Coals	593.81	99.34	799.49*	1492.64
Total	**114001.60**	**137471.10**	**34389.51**	**285862.21**

*Includes 749.92 M.T of Inferred resources established through mapping in North-Eastern region.

Type and Category-Wise Coal Resources of India: The Type and Category-Wise Coal Resources of India as on 1.4.2011 are given in table below:

Type of coal	Proved	Indicated	Inferred	Total [Million Tonnes]
(A) Coking:-				
-Prime coking	4614.35	698.71	0	5313.06
-Medium Coking	12572.52	12001.32	1880.23	26454.07
-Semi Coking	482.16	1003.29	221.68	1707.13
Sub-Total coking	**17669.03**	**13703.32**	**2101.91**	**33474.26**
(B)Non Coking	**95738.76**	**12368.44**	**31488.11**	**250895.31**
(C)Tertiary Coal	**593.81**	**99.34**	**799.49***	**1492.64**
Grand Total	**114001.60**	**137471.10**	**34389.51**	**285862.21**

*Includes 749.92 M.T. of Inferred Resources established through mapping in North-Eastern region.

STATUS OF COAL RESOURCES IN INDIA DURING LAST FIVE YEARS:

As a result regional, Promotional and Detailed Exploitation by GSI, CMPDI and SCCL etc., the estimation of coal resources of India has reached to 267.21 Bt. the estimates of coal resources in the country during last 5 years are given below:

Geological Resources of Coal				
As on	Proved	Indicated	Inferred	Total [Million Tonnes]
1.1.2006	95866	119769	37666	253301
1.4.2007	99060	120177	38144	257381
1.4.2008	101829	124216	38490	264535
1.4.2009	105820	123470	37920	267210
1.4.2010	109798	130654	36358	276810

COAL MINING AND ENVIRONMENT:

Mining in general has a wide ranging environment impact either due to:

1.Release of methane, a greenhouse gas causing climate change
2.Waste products including Uranium, Thorium and Radioactive & Heavy metal contaminants.

3.Acid Mine Drainage [AMD].
4.Interference with Ground water and table levels.
5.Impact of water use on flows of rivers & consequential impact on other land uses.
6.Dust nuisance.
7.Tunnels, sometimes damaging infrastructure.
8.Rendering land unfit for other uses

Through these are the general problems encountered with all mining activities but many of them are also commonly witnessed in coal mining. Coal miming either as surface mining or underground surface mining causes a lot of harmful effects.

COAL MINING PROCESS & ITS IMPACT ON ENVIRONMENT:

Coal is mined either through underground or surface mining. Underground mining is more dangerous and expensive. The primary risk occur when improperly supported walls collapse or when aquifers-breach, flooding the mine. It can also be detrimental to the health of miners. The notorious health problem is black bug or coal workers pneumoconiosis, a huge disease contracted from prolonged exposure to coal dust.

Surface mining either through open pit or strip mining is less dangerous than Underground mining, but has greater impact on surfaces landscapes. Surface mining requires the removal of massive amounts of top soil [or overburden] in order to gain access to coal seams; which can cause erosion, loss of habitat & dust pollution.

The overburden removed is usually dumped into low lying areas, often filling wet-lands or other sources of water. Mining can also cause heavy metals to dissolves & seep into ground & surface water which can disrupt marine habitats and deteriorate drinking water sources. Pyrite, found in rocks containing coal seams can form sulphuric acid and iron hydroxide when exposed to air and water. When rain water washes over these rocks, the runoff can become acidified; affecting local soils; rivers and streams. This phenomenon is called AMD. Abandoned mines are also an equal threat to environment by both AMD as well as leakage of Methane a greenhouse gas. Mountain top removal for coal mining will also have an impact on landscape & surrounding eco-system.

If the coal is strip mined, the entire exposed seam leaches sulphuric acid, leaving the subsoil infertile on the surface and begins to pollute streams by acidifying and killing fish, plants and aquatic animals which are sensitive to drastic pH shifts.

Coal mining produces methane, a potent greenhouse gas. Methane is the naturally occurring product of the decay of organic matter as coal deposits are formed with increasing depths of burial, rising temperatures and rising pressures over geological time. A portion of the methane produced is absorbed by the coal and later released from the coal seam and surrounding disturbed strata during the mining process. Methane accounts for 10.5% of greenhouse gas emissions created through human activity.

According to the inter-government panel on Climate change, methane has a global warming potential 21 times greater than that of carbon dioxide on a 100 year time line. While burning coal in power plants is most harmful to air quality, due to the emission of dangerous gases, the process of mining can release pockets of hazardous gases. These gases may pose a threat to coal miners as well as a source of air pollution. This is due to the relaxation of pressure and fracturing of the strata during mining activity, which gives rise to serious safety concerns for the coal miners if not managed properly. The build-up of pressure on the strata can lead to explosions during or after the mining process if prevention methods, such as “methane draining”, are not taken.

Wherever it occurs in the world, strip mining severely alters the landscape, which damages the values of the natural environment in the surround land. Strip mining, or surface mining of coal completely eliminates existing vegetation, destroys the genetic soil profile, displaces or destroys wildlife and habitat, degrades air quality, alters current land uses, and to some extent permanently changes the general topography of the area mined. The community of micro-organisms and nutrient cycling processes are upset by movement, storage and redistribution of soil.

Generally, soil disturbance and associated compaction result in conditions conducive to erosion, Soil removal from the area to the surface mined alters or destroys many natural soil characteristics, and may reduce its productivity for agriculture or biodiversity. Soil structure may be disturbed by pulverization or aggregate breakdown.

Removal of vegetative cover and activities associated of haul roads, stockpiling of topsoil, displacement of overburden and hauling of soil and coal increase the quality of dust around mining operations. Dust degrades air quality in the immediate area, can have adverse impacts on vegetative life and may constitute a health and safety hazard for mine workers and nearby residents. The land surface, often hundreds of acres, is dedicated to mining activities until it can be reshaped and reclaimed. If mining is allowed, resident human populations must be resettled off the mine site and economic activities such as agriculture or hunting and gathering food or medicinal plants are displaced, at least temporarily. What becomes of the land surface after mining is determined by the manner in which mining is conducted.

Surface mining can adversely impact the hydrology of a region. Deterioration of quality can result from acid mine drainage, toxic trace elements , high content of dissolved solids in mine drainage water and increased sediment loads discharges into steams. Waste piles and coal storage piles can yield sediment to streams and leached water from these piles can be acid and contain toxic trace elements. Surface waters may be rendered unfit for agriculture, human consumption, bathing, or other household uses. Controlling these impacts requires careful management of surface water flows into and out of mining

operations.

Besides the danger to life property, large amounts of sediment and poor quality water may have detrimental effects many miles downstream from site after a flood. Overall, it will cause a lot of pollution in drinking water. Open cut Coal Mining requires large amounts of water for the operation of coal washing process as well as the suppression of dust. To meet this requirement Mines acquire and remove surface or groundwater supplies from the nearby agricultural or domestic pursuit which greatly reduces the productivity of these operations or effectively halts them. These water resources once separated from their original base pursuits are rarely returned after mining, creating a permanent degradation to agricultural productivity. Underground Mining has a similar but lesser effect due to a much lower need for dust suppression water but still requires sufficient water to operate washery processes.

Ground water supplies may be adversely affected by surface mining. These impacts include drainage of usable water from shallow aquifers; lowering of water levels in adjacent areas and changes in flow directions within aquifers. Where coal or carbonaceous shales are present, increased infiltration may result in increased runoff of poor quality water and erosion from spoil piles. Lakes formed in abandoned surface mining operations are more likely to be acid of there is coal or carbonaceous shales present in spoil piles, especially if these materials are near the surface & contain pyrites.

CONCLUSION:

Through mining is an age old practice but the way and the intensity with which the mining activity has been operating has under gone a sea of change in the context of population growth, demand and technological innovations. The meaning of true resource is being exemplified in the way the new resources are being mined as alternative sources of development and livelihood means.

The present world economy is entirely centered around power generation. Population and energy sources are of imminent importance as the lifestyle are intricately linked with energy consumptions. The demand for energy sector too has been widely debated in view of not only its impact on global climates but also in view of its exhaustible nature which seeks alternative source of energy. In spite of this wide ranging debate, still the conventional sources of energy is being derived from fossil fuels – out of which coal forms [remain] the major source. Coal is formed from ancient plant material accumulating over long periods due to partial & incomplete oxidation.

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