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Land degradation due to coal mining in and around Manuguru, Bhadradri Kothagudem District, Telangana, India

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ABSTRACT

Coal is the most polluting source which creates many environmental problems at various stages of its procurement from mining, transportation, stock piling, coal preparation and utilization stages of operation. Huge quantities of waste material are produced by several mining activities in the coal mining region. The study area has enormous resource of coal catering to the needs of thermal plants and cement industry in the State. Mining practices are opencast and underground and all mining operations are mechanized. Mining leads to Land degradation and has adverse impact on environment, whether it is opencast or underground. The study reveals that the land degradation is inevitable due to mining operation.

Keywords— *Coal Mining, Mining Operations, Mechanized Land Degradation*

1. INTRODUCTION

Coal is the most important and abundant fossil fuel in India. It accounts for 55% of the country's energy need. The country's industrial heritage was built upon indigenous coal. Driven by the rising population, expanding economy and a quest for improved quality of life, energy usage in India is expected to rise. 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 319.02 billion tons of Geological Resources of Coal have so far been estimated in the country as on 1.4.2018. All India production of coal at 675.40 million tons in 2017-18 (Provisional). The all-India Production of coal during April–March 2018-19 were 730.354 million tons (Provisional) with a positive growth was 8.1%. The Singareni Collieries Company Ltd (SCCL) has been mining coal for the past 123 years. Over the years, the Company had expanded its mining activities in Adilabad, Karimnagar, Warangal and Khammam districts of Telangana.

2. GEOLOGY

Pranhita- Godavari basin, is an NNW-SSE trending basin deposit, covering an area of 17000 sq.km is on Pre-Cambrian platform following the course of Pranhita and Godavari rivers over a strike length of 470 km. The south eastern sector over 350 km length lying in the districts of Adilabad, Karimnagar, Warangal and Khammam of Telangana state is referred as Godavari Valley Coalfield. The continuity of coal seams is broken and missing at places due to faulting and therefore different coal bearing areas occurring are generally treated as different coal belts. Manuguru-Cherla Coal Belt is located at the eastern margin of the basin.
The sediments of Pranhita Godavari basin called the Godavari Super Group by Choudhuri (2003), are divided into four major groups, namely Mallampalli, Mulugu, Penganga and Sullavai, separated by three regional unconformities. The sediments of the basin are deposited with a profound unconformity on the Archean basement and are overlain by the Gondwana sediments with a regional unconformity, and covered by the Deccan trap in the Northwest. Generalised lithostatigraphic succession of the Gondwana sediments includes Talchir, Barakar, Barren Measures, Kamthi (Lower Gondwana Group), Maleri, Kota, Gangapur and Chikaila formations (Upper Gondwana Group).

Mining operations in Manuguru area commenced in 1974. Mining leads to environmental degradation and has adverse impact on environment, whether it is opencast or underground. In opencast mines, the coal is excavated after the removal of overlying strata by blasting and lifting with heavy earth moving machinery. The overlying strata is stacked separately as overburden dump, till sufficient decaled area is available for backfilling. The excavated coal is transported to a crushing plant through dumpers. Subsequently the crushed coal is transported to coal screening / handling plant by using trucks / belt conveyor. The final dispatch is done from Coal Handling Plant after grading into different sizes to various customers.

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Stratigraphic Succession of Manuguru Coal Belt

Geological Age	Group	Formation	General Lithology	Thickness (m)
-	-	-	Soil cover and alluminium	-
Permean	Lower Gondwana	Kamthi	Coarse to pebbly, ferruginous sand stones with clays/and few thin coal seams/bands.	250m+
		Barakar	Medium to coarse grained feldspathic sandstones, shales /clays and regionally persistent coal seams.	300m+
		Talchir	Boulder bed, pebble beds, green sand stone, greenish shales etc.	130m+
----- Unconformity ----				
Pre-Cambrian	Pakhal		Shales, Quartzites, dolomites etc.	-

Land degradation is an unavoidable consequence of any type of mining, notably opencast mining, which modifies the physical, chemical, and biological characteristics of the soil as well as the socioeconomic characteristics of the area. In India, land is degraded to varied degrees and types, owing primarily to unreliable use and poor management techniques. Deforestation, cut beyond the agro - forestry permitted limit, excessive firewood and feed extraction, shifting agriculture, encroaching into forest lands, forest fires, and overgrazing are all factors that contribute to land degradation.

Mining significantly ruined the area; opencast mines formed massive holes, and overburden and waste generated during the course of mining stacded separately and sometimes indiscriminately leading to land degradation. The most valuable top soil has not been stacked separately which is lost forever. The waste dumps are not stabilised, resulting in runoff and degradation of nearby fields. Farmers have shifted from farming to labour jobs in mining and manufacturing, changing the land use pattern.

Whether opencast or underground mining, land degradation is inevitable. Changes in topography and land situation, land-use pattern, drainage pattern, topsoil composition, run-off from overburden dumps, vegetation removal, and other factors all have an impact on the landscape. Mining is a short-term usage of the land. Not only is land necessary for the mining pit excavation and the construction of approach/haul roads, but it is also required for the beneficiation plant, ore handling and dispatch units, waste dumps, tailing ponds, and other facilities. Auxiliary facilities and statutory buildings (workshops, stores, offices, canteen, and crèche) also require land. Furthermore, infrastructural facilities such as a residential areas, school, hospital, recreation centre, and so on.

Mining and post-mining operations, changes in landscape take place, viz., soil erosion, loss of top soil, creation of waste dumps and voids, disposal of wastes, etc. The study of land use/land cover (LU/LC) changes is very important to have proper planning and utilization of natural resources and their management (Asselman and Middelkoop et al., 1995). Traditional methods for gathering demographic data, censuses, and analysis of environmental samples are not adequate for multi complex environmental studies (Maktav et al., 2005), since many problems often presented in environmental issues and great complexity of handling the multidisciplinary data sets, we require new technologies like satellite remote sensing and Geographical Information Systems.

The present study makes an attempt to quantify land use/land cover change in Manuguru mining area using multitemporal remote sensing data, support by topographical maps, Census of India, Revenue records and ground truth data as other inputs. The main objective of present study is to understand the dynamics of land use/land cover changes in time and space, in the back drop of coal mining activities.

The methods and Techniques used to assess the land use\land cover change include visual interpretation and change detection analysis. The image of both the years (2009 and 2017) the false colour composite (FCC) for visual interpretation which led to the identification and delineation of 6 classes of land use\land cover namely Forest, Tanks, cropland, Scrub, Village, Mining and Overburden. The change in the extent of different land use categories during the period from 2009-2017 was analysed and computed.

The land use\land cover categories delineated in the study area are Agricultural land, Build up area, Forests, Waste lands and Water bodies. Land use\land cover details of the area as obtained from IRS LISS III Satellite data of 2009 and IRS P6 LISS III data 2017. Table 1. Shows the change in land use\land cover statics in (km2) that have taken place during the period between 2009-2017. The analysis of land use\land cover change that has been taken place under different land use categories from 2009-2017 due to expansion of mining area. Present study area witnessed rapid development during past decades in terms of urbanization, and also population increased substantially.

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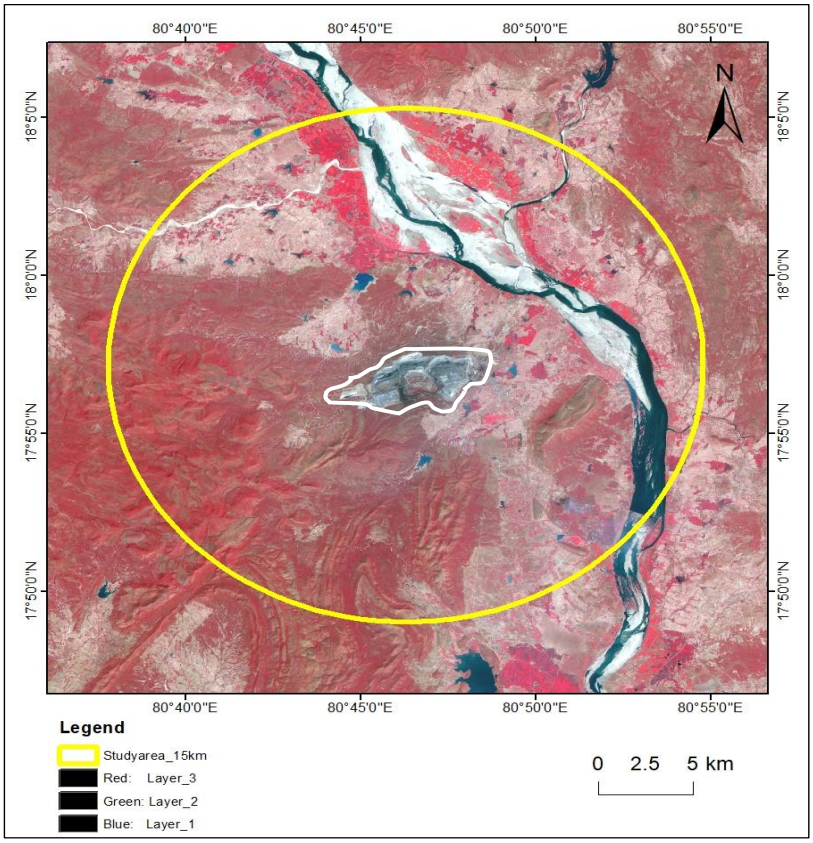
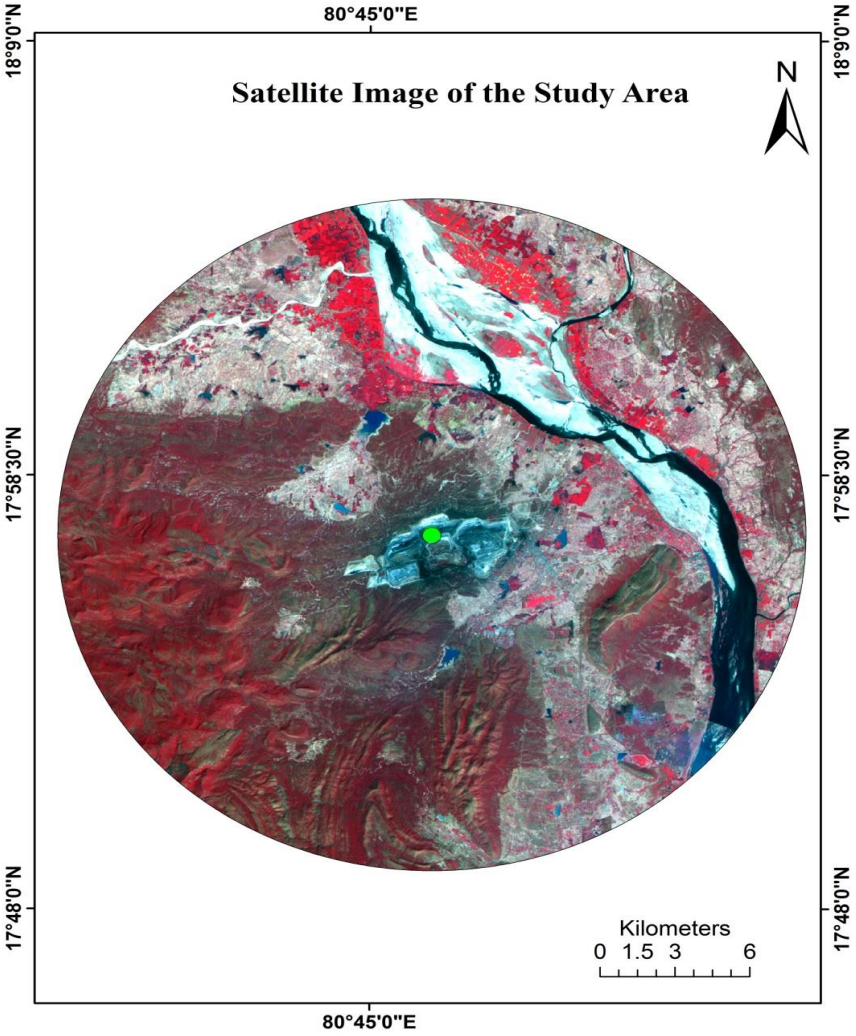


Satellite Image IRS LISS III Satellite data of 2009



Satellite Image IRS P6 LISS III data 2017.

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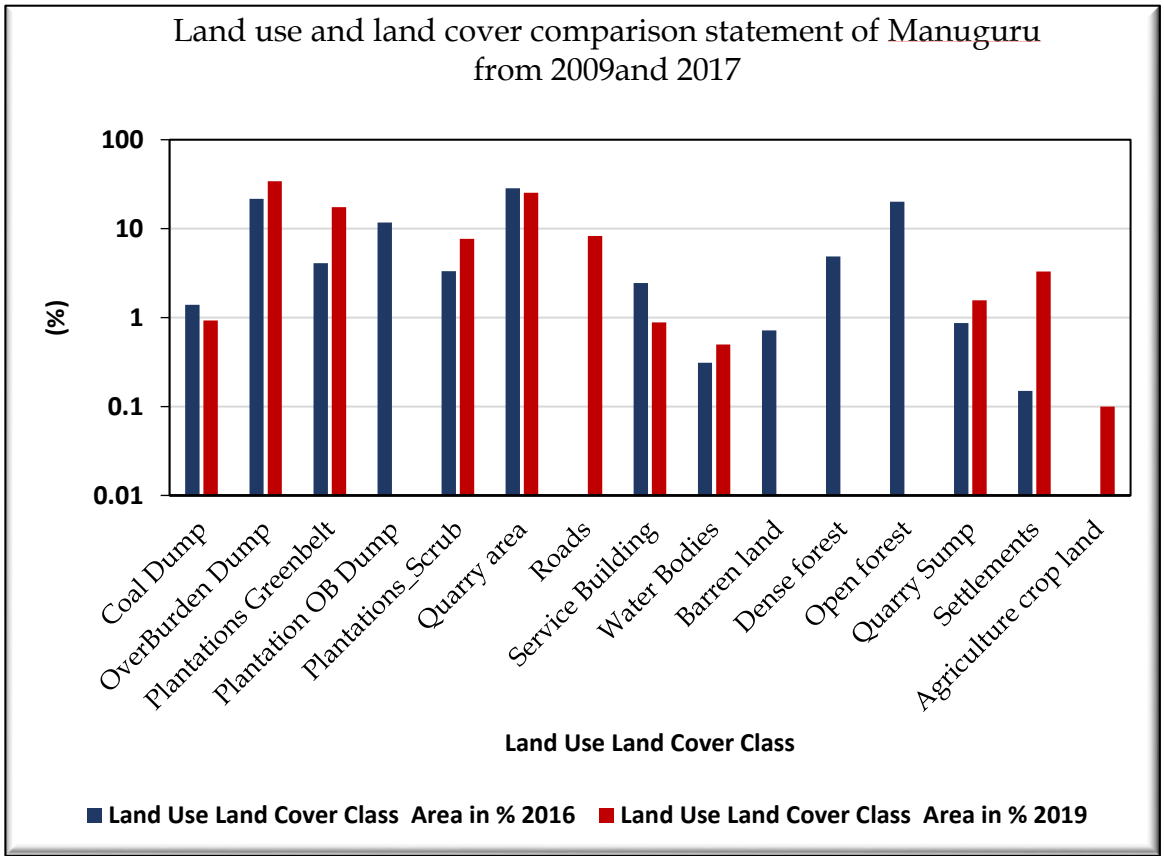
Land use and land cover comparison statement of Manuguru from 2009-2017				
Land Use Land Cover Class	**2009**		**2017**	
	Area in Ha	**Area in %**	**Area in Ha**	**Area in %**
Coal Dump	10.18	1.39	6.82	0.93
OverBurden Dump	159.22	21.67	250.89	34.15
Plantations Greenbelt	30.08	4.1	127.95	17.42
Plantation OB Dump	85.74	11.67	0	0
Plantations Scrub	24.4	3.32	56.55	7.7
Quarry area	208.57	28.39	185.35	25.23
Roads	0	0	60.53	8.24
Service Building	18.03	2.45	6.47	0.88
Water Bodies	2.29	0.31	3.69	0.5
Barren land	5.32	0.72	0	0
Dense forest	35.86	4.88	0	0
Open forest	147.39	20.06	0	0
Quarry Sump	6.4	0.87	11.45	1.56
Settlements	1.13	0.15	24.14	3.29
Agriculture crop land	0	0	0.77	0.1
Total area	734.61	100	734.61	100



Agriculture increased from 0 percent to 0.10 percent of the total area, Quarry area decreased from 28.39 percent to 25.23 percent, Barren Land decreased from 0.72 percent to 0 percent of the total area, OB Dump increased from 21.67 percent to 34.15 percent, Coal Dump decreased from 1.39 percent to 0.93 percent, Settlements increased from 0.15 percent of the total area to 3.29 percent of the total area, and roads increased from 0 percent to 8.24 percent of the total area. Plantations Greenbelt represents 17.42 percent of the entire land, while water bodies have expanded from 0.31 percent to 0.50 percent of the total area.

3. CONCLUSIONS

The impacts of coal mining on land are Topography and land scenario change due to excavation of open pits and dumping of overburden includes sub-grade and waste coal. The land-use pattern undergoes a change due to the use of land for mining and other activities associated with mining. The land-use in the surrounding areas may get affected due to the impacts of mining on regional water regime and dust deposition. Leached materials from overburden dumps and other rock masses affect the characteristics of the topsoil affecting the land-use in the nearby areas.

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It is evident from the above that the mining and associated activities can significantly change the land use and drainage pattern of the region. These changes can be minimized by carefully planning the surface layout of the mining areas and by integrating the environmental aspects of each and every operation of mining activity

4. REFERENCES

[1] Geology and mineral resources of Telangana miscellaneous publication No. 30 Part - VIII A, First Edition
[2] Setti D.N., Badrinarayana, S. Appavadhanulu, K. 1969-70. Geology of Pakhals and associated rocks in parts of Khammam District. (GSI unpublished progress report).
[3] A. Narsing Rao (2010) Relevance of Environmental Health Impact Assessments in Mining & Processing of Asbestos Minerals. The IUP Journal of Environmental Sciences. Vol. IV No. 3; August 2010. pp. 27-34.
[4] A. Narsing Rao (2007) Environmental Degradation due to waste dumps in Asbestos mining belt, Cuddapah district, Andhra Pradesh. Journal of the Indian Academy of Geosciences, Vol. 50 No. 2 pp. 37-42 2007
[5] D. Purushotham, A. Narsing Rao & M.R. Prakash (2011) Groundwater depletion and quality deterioration due to environmental impacts in Maheshwaram watershed of R.R. District, A.P. (India) Environmental & Earth Sciences, Springer. (2011) 62: pp. 1707- 1721 (Published online: 28th July 2010)
[6] Environmental assessment guidelines by Asian development bank.
[7] Indian Mineral Year Book, Indian Bureau of Mines, Nagpur.

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