ENVIRONMENTAL IMPACT OF STONE CRUSHER QUARRY: A CASE STUDY OF SOLAPUR DISTRICT MAHARASHTRA.

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Abstract:
Solapur is a city located in the south-western region of the Indian state of Maharashtra Solapur is located on major road and rail routes between Mumbai and Hyderabad, with a branch line to the cities of Bijapur and Gadag in the neighbouring state of Karnataka. Solapur, which has a flat or undulating terrain in general, has no important hill system. Solapur falls under the category of dry (arid and semiarid) climate conditions. More than 300 stone crushers quarry and crusher machine plants in Solapur most of them are illegal and beyond rules and regulations of environmental clearance of Ministry of Environment and Forest. Concerns due to quarrying activities i.e. blasts, noise, vibrations, dust, increase in siltation, stone missiles, environmental degradation, landslides, run off, Air pollution problems due to hot mix plant, stone crusher and ready mix plant in the vicinity of housing societies. During the study following observations were made intermittent noise of drilling and chiselling operations was also noted. This part of the hill has observed large landslides and segregation of the loose soil. This may further lead to increased siltation rate in the catchments of Hipperga Lake. The stone quarrying activities, on a large scale can have several environmental impacts such as effects of blasts, vibrations, stone missiles, loosening of earth thereby increasing the chances of landslides and siltation rates, aesthetics etc.

Keywords: *stone crusher quarry, impact on environment, effects.*

1. Introduction

Environmental impacts of the mineral extraction have been a public concern. Presently, there is widespread global interest in the area of mining and its sustainability that focused on the need to shift mining industry to a more sustainable framework. The aim of this study was to systematically assess all possible environmental and climate change related impacts of the limestone quarrying operation in south-western region of the Indian state of Maharashtra Solapur district. Mineral exploitation contributes significantly to economic growth and development in most world economies. This study provides an exposition on the environmental impacts of mining activities in Solapur district. The data collection involved both primary and secondary sources. These included research tools such as review of relevant literature including policies and legal documents, participant observation, in-depth interviews with mining communities and government officials, environmental assessments of various mining sites in the study area. The study concluded that major rivers in the region have been heavily polluted, especially by illegal small-scale mining; land in areas surrounding mines has been rendered bare and susceptible to increased erosion and loss of viability for agricultural purposes, among other uses; increased clearing of vegetation for mining areas has adversely altered the hydrological regimes and/or patterns in the Solapur district.

Solapur, which has a flat or undulating terrain in general, has no important hill system. Solapur falls under the category of dry (arid and semiarid) climate conditions. More than 300 stone crushers quarry and crusher machine plants in Solapur most of them are illegal and beyond rules and regulations of environmental clearance of Ministry of Environment and Forest. Concerns due to quarrying activities i.e. blasts, noise, vibrations, dust, increase in siltation, stone missiles, environmental degradation, landslides, run off, Air pollution problems due to hot mix plant, stone crusher and ready mix plant in the vicinity of housing societies. The study recommended that there should be effective community participation in environmental decision making to ensure sustainable mining activities; easing of the registration process for small-scale mines; addressing the various weaknesses in the policies and their enforcement in the mining sector; establishment of environmental oversight groups in mining communities; and create environmental awareness campaigns and/or education in mining communities.

To maintain a sustainable ecosystem there is a need to maintain the homeostasis of all the environmental factors (a biotic and biotic) and any change in this would lead to stress on the ecosystem. Due to direct influence of mining there would be variation in biotic factors like air, water, soil, temperature; humidity etc. and it would lead to change in composition of the species. Hence in this region, in the near future the composition of natural species would definitely get altered and slowly some exotic would replace the natives. The mining activities disturb the natural settings mainly induced by machinery used in mining, transportation, blasting, soil and water erosions etc. Due to increased mining activities the disturbances in natural settings have already been set in motion and it would be too late to control the damage if it is not stopped forthwith.

2. Review of literature

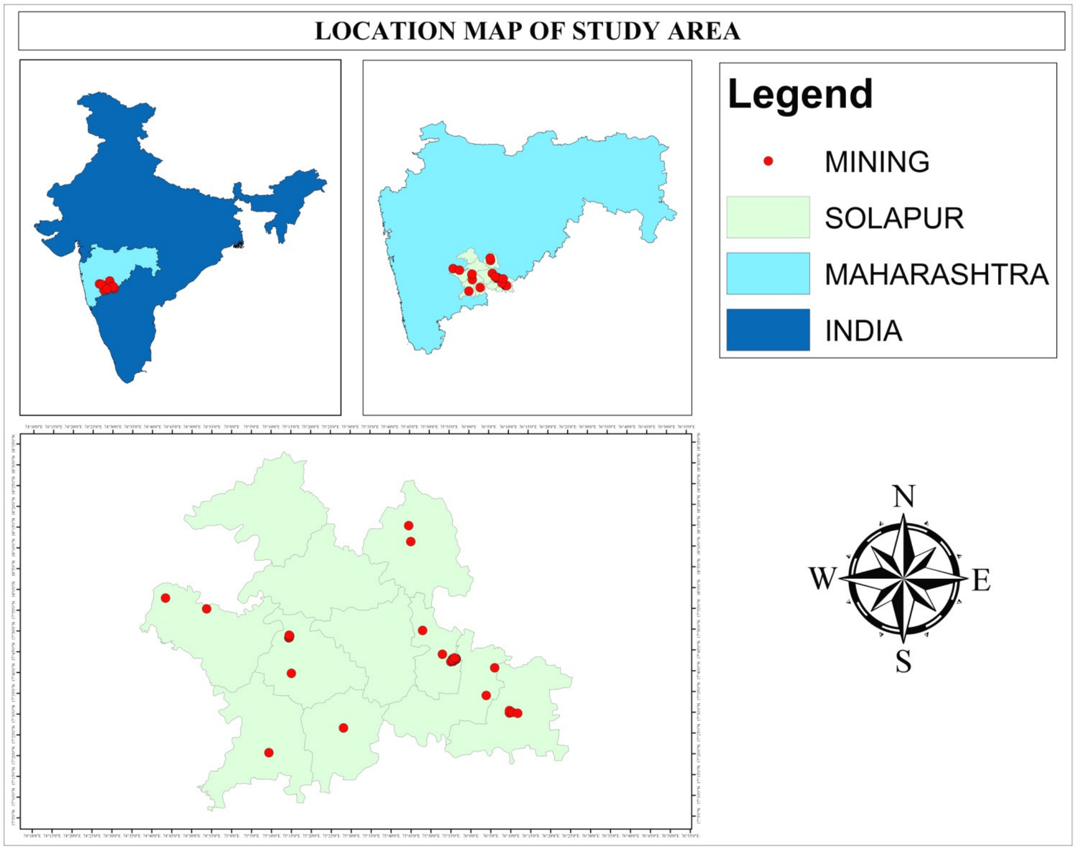
Minerals are valuable natural resources. They constitute the vital raw materials for many basic industries and are a major resource for development. The history of mineral extraction in India dates back to the days of the Harappan civilization. The wide availability of the minerals provides a base for the growth and development of the mining sector in India. The country is endowed with huge resources of many metallic and non-metallic minerals. Mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 95 minerals, which includes 4 fuel, 10 metallic, 23 non-metallic, 3 atomic and 55 minor minerals (including building and other materials).

Maharashtra is the sole producer of corundum and is the second largest producer of manganese ore after Odisha. The principal mineral-bearing belts in Maharashtra are Vidarbha area in the East and Konkan area in the West. Important mineral occurrences are bauxite in Kolhapur, Raigad, Ratnagiri, Satara, Sindhudurg and Thane districts; china clay in Amravati, Bhandara, Chandrapur, Nagpur, Sindhudurg and Thane districts; chromite in Bhandara, Chandrapur, Nagpur and Sindhudurg districts; coal in Nagpur, Chandrapur and Yavatmal districts; dolomite in Chandrapur, Nagpur and Yavatmal districts; fireclay in Amravati, Chandrapur, Nagpur and Ratnagiri districts; fluorite and Shale in Chandrapur district; iron ore (hematite) in Chandrapur, Gadchiroli and Sindhudurg districts; iron ore (magnetite) in Gondia district; kyanite in Bhandara and Nagpur districts; laterite in Kolhapur district; limestone in Ahmednagar, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Sangli and Yavatmal districts; manganese ore in Bhandara and Nagpur districts; corundum, pyrophyllite and sillimanite in Bhandara and Chandrapur districts; quartz and silica sand in Bhandara, Gadchiroli, Gondia, Kolhapur, Nagpur, Ratnagiri and Sindhudurg districts and quartzite in Bhandara, Gadchiroli Gondia and Nagpur districts. Other minerals that occur in the State are barytes in Chandrapur and Gadchiroli districts; copper in Bhandara, Chandrapur, Gadchiroli and Nagpur districts; felspar in Sindhudurg district; gold in Bhandara and Nagpur districts; granite in Bhandra, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Nasik, Sindhudurg and Thane districts; graphite in Sindhudurg district; lead-zinc in Nagpur district; marble in Bhandara and Nagpur districts; ochre and tungsten in Nagpur district; silver and vanadium in Bhandara district; steatite in Bhandara, Ratnagiri and Sindhudurg districts; and titanium minerals in Gondia and Ratnagiri districts.

The value of mineral production in Maharashtra during the year 2010-11 at ` 5917.29 crore got decreased by 2.82% as compared to that in the previous year. Maharashtra accounted for about 2.78% of the total value of mineral production in the country during the year under review. It was the major producer of fluorite (graded) in the country during the year 2010-11. The State was the major producer of manganese ore and kynite accounting for 21.63% and 36.31% respectively of total production of the mineral in the country. Among other important minerals, the State reported higher production during the year 2010-11 in respect of Kyanite by 88%, iron ore by 431.10% manganese ore by 1.56% and bauxite by 7.5 % and fall in production was reported in respect of fireclay by 54.57%, fluorite by 48.25% and sillimanite by 62.07 %. During the year under review no production of chromite, corundum and lateite was reported. The value of production of minor minerals was estimated at ` 317.31 crore for the year 2010- 11. The number of reporting mines was 157 in the year 2010-11 as against 158 in the previous year. The index of mineral production in Maharashtra (base 1993-94 = 100) in 2010-11 was 193.3, as against 200.09 in the previous year. (By Ministry of Mines)

3. Methodology

The data collection involved both primary and secondary sources. These included research tools such as review of relevant literature including policies and legal documents, participant observation, in-depth interviews with mining communities and government officials, environmental assessments of various mining sites in the study area included field observations, photo documentation and mapping and quarry area measurement on Google Earth Satellite images, to assess the change and status of environmental impacts of quarrying. Solapur is located at 17.68°N 75.92°E. It has an average elevation of 458 metres (1502 feet). It is bordered by Ahmednagar district on the north; Osmanabad district on the north and northeast. Solapur is at a distance of 245 km (152 mi) from Pune and 305 km (190 mi) from Hyderabad. Solapur is situated on the Deccan plateau. Solapur falls under the category of dry (arid and semiarid) climate according to the Koppen climate classification. The city experiences three distinct seasons: summer, monsoon and winter. Typical summer months are from March to May, with maximum temperatures ranging from 30 to 40 °C (86 to 104 °F). The warmest months in Solapur are April and May. The typical maximum temperatures being 40 °C (104 °F) or more



Location map of the study quarry sites

Location and area of the study quarry sites

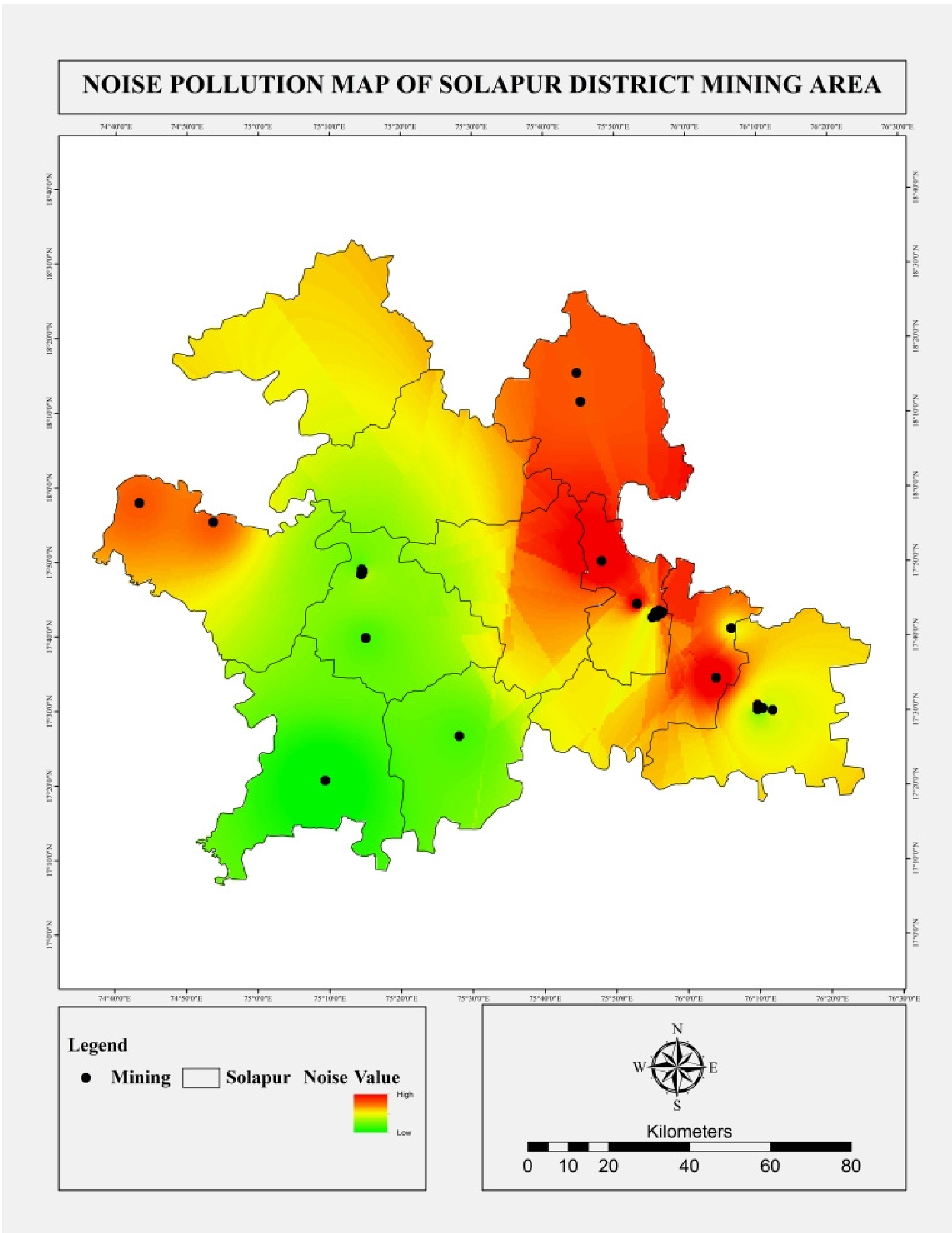
S. N.	Name of the Mining Lease site	Name of Village	Gut No	Location	Area In Ha	Year
1	Shivlingappa Sidhappa Chavalagi	Dodyal , Tal-Akalkot	66/2	17° 29'29.0754"N 76° 10' 32.664"E	0.4	2017
2	Baslingappa Shivsharanppa Khedagi	Dodyal, Tal-Akkalkot	895/2/B/2	17° 30' 46.944"N 76° 9' 49.7154"E	1.84	2017
3	Samad Hamid Pirjade	Dodyal, Tal-Akkalkot	825/2	17° 30' 18.792"N 76° 10' 32.664"E	1	2017
4	Ambika Narendra Kalyanshetti	Boregaon, Tal-Akkalkot	153/5 B	17° 40' 36.372"N 76° 6' 52.02"E	1	2017
5	Sanjay M Autade	Khomnal, Tal-Mangalwedha	37/1/2/3	17°26'44.29"N 75°28'7.01"E	1.20	2017
6	Somanath Kale	Dahigaon, Tal- Malshiras	1159/4 B	17° 58' 0.624"N 74° 43'21.5034"E	1.2	2017

7	Arun Kadare	Shevate, Tal-Pandharpur	595/2	17° 48' 24.048"N 75° 14'28.1754"E	1.5	2017
8	Shivaji Yalmar	Shevate, Tal-Pandhapur	607/2/A	17° 48'58.5714"N 75° 14'37.6794"E	0.60	2017
9	Prabhakar Ramhari Bhosale	Shevate, Tal-Pandhapur	616/1	17° 48' 27.2"N 75° 14' 32.0"E	1.6	2017
10	Gangadhar Narayan Mohare	Shevate, Tal-Pandhapur	618/1	17° 48' 45.54"N 75° 14'40.3074"E	0.8	2017
11	Bharat Bagal	Gadegaon, Tal-Pandhapur	1125/1	17° 39' 53.136" N 75° 15' 4.212"E	1.45	2017
12	Laxman Vitkar	Dahitane, Tal-Uttar Solapur	64/1B	17° 43'13.3314"N 75° 56' 12.768"E	1.1	2017
13	Maruti Powar	Dahitane, Tal-Uttar Solapur	66/3b/2	17° 43' 5.412"N 75° 56' 25.836"E	1.21	2017
14	Maragu Nimbalkar	Hippargaa, Tal- Uttar Solapur	46/2/2	17° 43' 4.656"N 75° 55' 44.58"E	1	2017
15	Umesh Bandpatte	Hippargaa, Tal- Uttar Solapur	50/2/2	17° 43' 6.4914"N 75° 55' 39.252"E	1.6	2017
16	Ramlal Baburao Vitkar	Hippargaa, Tal- Uttar Solapur	53/3	17° 43' 13.548"N 75° 55' 36.336"E	0.82	2017
17	Rajabhau garad	Ranmasale, Tal- Uttar Solapur	367	17° 50' 08.15"N 75° 48' 08.79"E	1	2017
18	Sunil Maleshappa Gore	Akalkot, Tal-Akalkot	698/B	17° 30' 04.36"N 76° 11' 55.57"E	1.2	2017
19	Samadhan A Doiphode	Bavi, Tal-Barshi	662	18° 11' 34.7"N 75° 45' 10.9"E	0.81	2017
20	Mukund K. Vitkar	Shevate, Tal-Pandharpur	603/3/1	17°49'5.38"N 75°14'29.81"E	0.8	2017
22	Ashwini B. Asabe	Nijampur, Tal- Sangola	175/2, 173	17° 20'48.3792"N 75° 9'23.1228"E	1.4	2017
23	Mahadev Lakshaman Aanandkar	Dahitane, Tal-Uttar Solapur	68/1/A	17° 43' 12.792"N 75° 56' 32.892"E	0.8	2017
24	Suhas Jalindar Shelake	Jamgaon, Tal-Barshi	193/1	18° 15'23.7594"N 75° 44'43.5114"E	1.25	2017

25	Shree. Bapu Y Megeri	Hipparga, Tal-Uttar Solapur	43/2	17° 43' 12.234"N 75° 55'55.5126"E	0.8	2017
26	Rajesh R Karawa	Hippargaa, Tal- Uttar Solapur	33	17°43'18.01"N 75°55'42.71"E	1.2	2017
27	Vijay Narasu Manthakar	Hippargaa, Tal- Uttar Solapur	45/A	17° 42'56.7354"N 75° 56'17.2314"E	3.64	2017
28	Shankar Baburao Chuagule	Hippargaa, Tal- Uttar Solapur	42/2	17° 43' 0.77"N 75° 55' 53.47"E	0.6	2017
29	Shankar Sommanna Chuagule	Hippargaa, Tal- Uttar Solapur	38/2	17° 43' 18.48"N 75° 56' 1.3914"E	1.05	2017
30	Sharada Prabhakar Limbole	Hippargaa, Tal- Uttar Solapur	39/2/K	17° 43' 16.02"N 75° 56' 5.80"E	0.8	2017
31	Shankar Maruti Chuagule	Dahitane, Tal-Uttar Solapur	66/2A	17° 43'15.0594"N 75° 56' 23.424"E	1.2	2017
32	Sanjay Manik Kurnnaval	Dahitane, Tal-Uttar Solapur	64/5/D	17° 43' 7.9314"N 75° 56' 7.8714"E	0.8	2017
33	Hareshbhi Mahijibhai Patel	Dahitane, Tal-Uttar Solapur	67/1	17° 43'16.3554"N 75° 56' 29.724"E	0.81	2017
34	Shideshwar Aanandkar	Haglur, Tal-Uttar Solapur	150/1	17° 43' 29.67"N 75° 56' 3.83"E	1.91	2017
35	Gorakh Hanmantu Nimbalkar	Dahitane, Tal-Uttar Solapur	64/5	17° 43'11.9634"N 75° 56' 9.708"E	1.62	2017
36	Samadhan Mahadev Autade	Shelagi, Tal-Uttar Solapur	86/1	17°42'34.65"N 75°55'8.47"E	1.18	2017
37	Surykant Shivram Manhtalkar	Shelagi, Tal-Uttar Solapur	82/2/B /2A	17° 42' 43.38"N 75° 55' 35.04"E	0.4	2017
38	Shriniwas Mudholkar	Shelagi, Tal-Uttar Solapur	90	17° 42'40.6074"N 75° 55'48.8274"E	1.2	2017
39	Vimal Arun Chuagule	Shelagi, Tal-Uttar Solapur	85/1	17° 42'54.3594"N 75° 55'46.5954"E	1	2017
40	Manohar Shankarroa Mudholkar	Shelagi, Tal-Uttar Solapur	82/1/A	17° 42' 59.69"N 75° 55' 34.97"E	1.5	2017
41	Hemalata R Ingle	Valsang, Tal-Uttar Solapur	453/2	17° 34' 24.78"N 76° 4' 0.78"E	1	2017
42	Mallikarjun Kallapa Manjulkar	Haglur, Tal-Uttar Solapur	155/A/ 1	17° 42' 6.7354"N 75° 56' 21.192"E	1.8	2017

43	Rohini Anil Pandhe	Haglur, Tal-Uttar Solapur	157/1 B/2	17° 43' 33.26"N 75° 56' 2.50"E	1.42	2017
44	Kamal C. Manthalkar	Bhogao, Tal-Uttar Solapur	107/2/ B106/ 2/2/2A	17° 44'21.8394"N 75° 53' 5.0994"E	2.42	2017

4. Result and discussion



Noise pollution map of Solapur district mining area

Photographs of actual site location of Solapur district mining area

5. Conclusion

The significant impacts are on land use, drainage, air quality, ecology, noise etc. Allied operations such as transport of materials, operation of workshop, drilling, blasting etc. affect the air, water and noise environment. Clearance of natural vegetation adversely affects the flora and fauna of the areas due to changed environment. Positive impacts on socio-economic environment are expected due to creation of employment opportunities and development of infrastructure such as roads, schools, hospitals etc. Mining activities are normally carried out over a long period about 30 yrs or more. This also encourages downstream industrial development in the area which adds to environmental degradation. The identified significant impacts require detailed analysis for decision- making and formulating adequate mitigation measures. The biggest impact of mining sector is land. If land use pattern in the core area consists of forest and agricultural land, the magnitude of impact on biodiversity would be significant. Similarly, if land is occupied by human habitation, their displacement would be a significant issue. So the impacts of mining on land are predominantly governed by the area acquired and land use characteristics. The topsoil in the active mining area gets adversely affected. The topsoil is separately kept. The soil quality of the surrounding area is also likely to get affected due to siltation and run off from waste dumps. The mine drainage, if it is acidic and containing toxic constituents, not adequately treated when discharged to nearby land would affect the soil quality adversely; when discharged untreated into streams effects the quality of water and make in unfit for agricultural use. Agriculture is also directly linked to soil. If soil quality deteriorates, the agricultural productivity of the land decreases. Mining operation and associated activities is potentially air polluting and the major air pollutant is the suspended particulate matter. Most of the air pollution problems are due to fugitive dust emission, which is more prominent in open cast mines in comparison to underground mines.

The intensity of dust generation in the mining is influenced by factors such as hardness of rock, mining technology and material handling etc Noise level increase due to mining activities such as excavation, drilling, blasting, handling and transportation of ore and overburden and operation of processing equipment

6. Recommendation

There is also positive impact of mining on agriculture, as sufficient water is discharged from the mine, which can be utilized for irrigation, increasing the productivity. Mine drainage water, in many mines, are not contaminated except high suspended solids, which can be removed by simple settling. Dust emissions from paved surfaces can be minimized by adopting measures like prevent spillages of materials on the paved surfaces during materials transportation, Minimize mud and dust track-out from unpaved areas by the use of wheel wash facilities, Regular cleaning of paved surfaces, using mobile vacuum sweeper or a water flushing system, Speed controls on vehicle movements and Wind reduction control by plantation. noise pollution controls however offer the most effective permanent solution which ‘prevents’ occupational heaving loss A few of the noise control measures that may be adopted are selection of new low-noise equipment from the manufactures failing which use of additional retrofits if available, Modifications of the older equipment or method by incorporating minor design changes, Implementation of an effective planned preventive maintenance which reduces noise level by more than 50 % Use of noise barriers and total enclosures to block, redirect or reduce the flow of sound energy from all equipments including DG set and compressor before it reaches the receiver.

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