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Regional environmental assessment status of granite mining in Karimnagar districts

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ABSTRACT

Granite is a minor mineral; it is a major contributor in foreign exchange earnings. India is the second largest exporter of raw granite after China and ahead of Brazil and South Africa. India ranked fifth in the export of processed (value added finished) product. Granite contributed 4.51% exports value of all ores and minerals in 2007-08. The exports value of granite was next to diamond and iron ore during 2007-08. (IMYB-2010). Telangana State is one of the important Granite producing states unique varieties are Jet black granite of Warangal and Khammam districts and Tan brown variety of Karimnagar district. Mining operations are Manual, Semi-Mechanised and Mechanised. Dimensional stone mining generates enormous waste, sometimes upto 75% to 85%. Land degradation is due to voids created by mining; Creation of external waste dumps, areas covered by site services, plant and colony etc.

Key words: *Granite; Dimensional stone: Karimnagar; Mining; Land degradation;*

INTRODUCTION

Granite is a minor mineral; it is a major contributor in foreign exchange earnings. India is the second largest exporter of raw granite after China and ahead of Brazil and South Africa. India ranked fifth in the export of processed (value added finished) product. Granite contributed 4.51% exports value of all ores and minerals in 2007-08. The exports value of granite was next to diamond and iron ore during 2007-08. (IMYB-2010). Telangana State is one of the important Granite producing states unique varieties are Jet black granite of Warangal and Khammam districts and Tan brown variety of Karimnagar district. Around 300 quarry lease are in operation as on date. The present study is confined to Karimnagar district (Fig. 1.

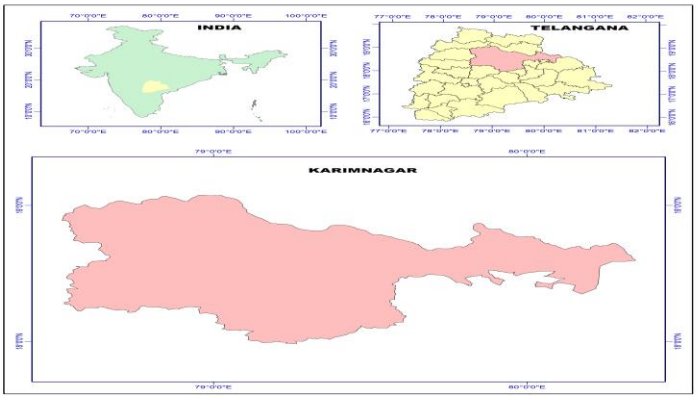


Fig.1. Location Map of the study area

Geology

The investigated area covering more than 340 sq kms north-west of Karimnagar town, district Karimnagar, Telangana lies between the 78˚50'E & 18˚10'N to 79˚00'E & 18˚28'N (SOI toposheet no.56J/15 and 56J/16). Karimnagar lies in NNE direction of Hyderabad at a distance of about 150 kilometers and is well connected to nearby areas both by road and train routs. The country rocks comprising Precambrian Karimnagar granulites contain quartz-free sapphirine-spinel bearing granulites, kornerupine-bearing granulites, mafic granulites, orthopyroxene-cordierite gneisses, charnockites, amphibolites, dolerite dykes, granite gneisses, quartzites and banded magnetite quartzite. Unfortunately however, metamorphic rock exposures in the area are scanty and normally found in the form of isolated hillocks or discrete blocks Fig. 2.

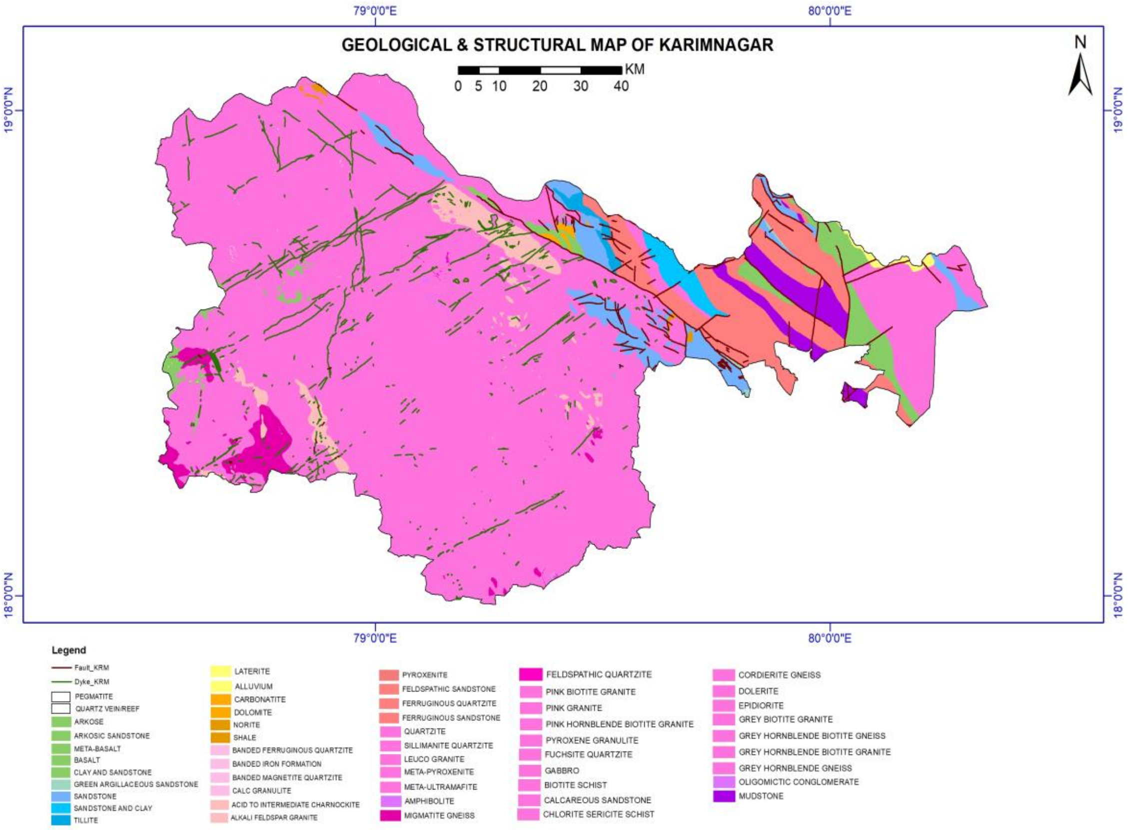


Fig.2. Geological map of the study area

Mining

Production of blocks of considerable size and weight is a special feature of granite mining. The process and equipment used for granite mining differ considerably from those used for mining other minerals. The mining of granite involves two important stages of operation: one is actual block splitting either from sheet rock or boulder and the other operation involves many items of works, such as removal of weathered zone or overburden, opening of faces, lifting of cut blocks, transportation and many other ancillary works before and after the block splitting. The actual block splitting from the sheet rocks or boulders is mainly done manually or in some cases by semi-mechanised methods whereas the other operations, such as removal of overburden, lifting and transportation of cut blocks, etc. are carried out by mechanised method.

There are a very few mines which adopt the modern method of block splitting by using flame-jet burner and diamond wire saw for cutting. Heavy-duty derrick cranes of capacity to handle.

Environment

Environmental problems are similar to any opencast mining operations. The general degradation of land due to unscientific and selective mining is a common feature. Because of paucity of suitable land in leased area, the overburden, consisting of soil and weathered material, is being dumped in a disorganised manner in nearby fields, waterways, etc., creating hindrance to cultivation and natural waterways; besides, air pollution causing breathing problems. Further, the blasting and movement of heavy vehicles generate dust and aggravates air pollution in addition to noise pollution.

Air Pollution

Though the Granite mining practices are manual and semi-mechanised except few mechanized mines, dust generation is inevitable. Mining operations such as drilling, blasting, loading and movement of dumpers on haul road, dumping of material will release dust in to the ambient environment has adverse effect on the people working in the mines people living in the vicinity and also on the plant and cattle. Ambient Air samples collected on Millipore 8" X 10" Glass fiber filter paper using Respirable Dust Sampler (RDS) and High Volume Sampler (HVAS). Workplace air samples have been collected in the breathing zone using Personal Samplers (PS) using 25 mm dia Cellulose Membrane Ester Filter paper.

S.No.	Sampling Date	Sample Location	Duration of Sample	Season	SPM
1	Aug, 2013	Over burden Bench	24 hours	Monsoon	255 µg/m^3
2	Aug, 2013	View Point	8 hours	Monsoon	275.52 µg/m^3
3	Aug, 2013	Near Rest Shelter	8 hours	Monsoon	236.45 µg/m^3
4	Aug, 2013	Near The Generator	8 hours	Monsoon	229.92 µg/m^3
5	Aug, 2013	Over burden Bench	8 hours	Monsoon	1025.64 µg/m^3

Sampling and analysis was carried out as per the

National Standards. Suspended Particulate Matter (SPM) in the mines exceeding the National Standards. (Table-1.)

Table-1. Ambient air quality data form the granite mines

S.No.	Sampling Date	Sample Location	Duration of Sample	Season	SPM
1	Feb, 2014	Over burden Bench	24 hours	Winter	950 µg/m3
2	Feb, 2014	Mine View Point	8 hours	Winter	455 µg/m3
3	Feb, 2014	Rest Shelter	8 hours	Winter	762 µg/m3
4	Feb, 2014	Near The Generator	8 hours	Winter	680 µg/m3
5	Feb, 2014	Over burden Bench	8 hours	Winter	825 µg/m3
6	Feb, 2014	First Bench Operation	8 hours	Winter	485 µg/m3

Water Pollution

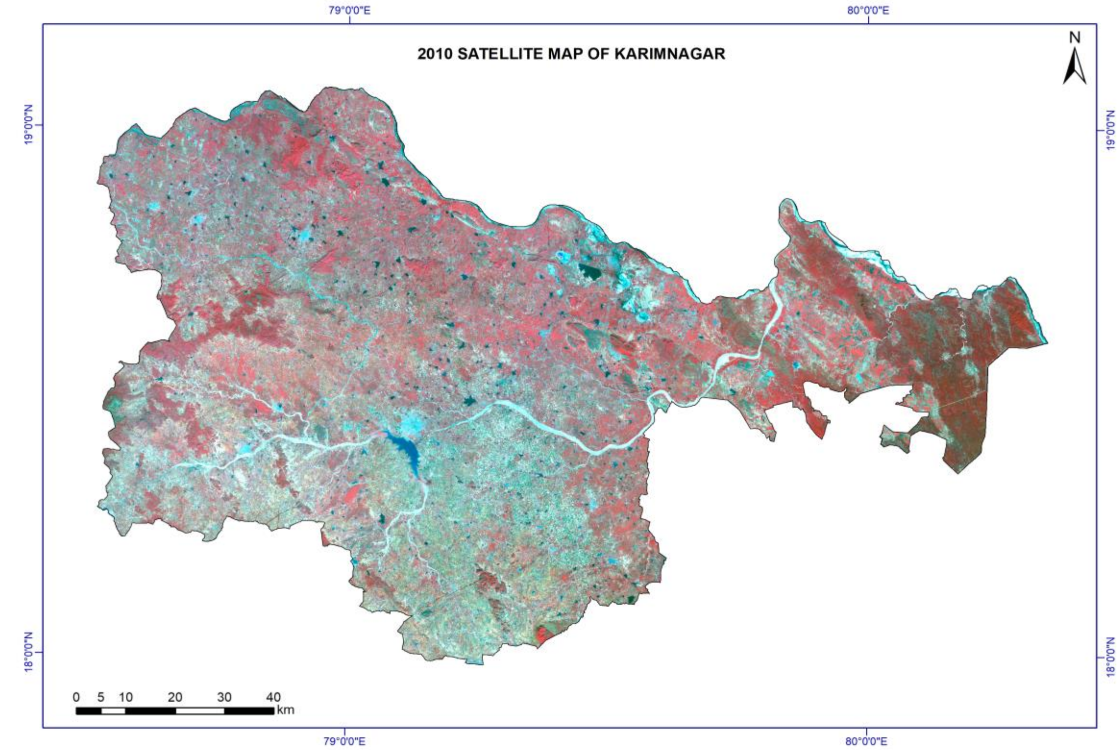
The sediments discharged into the surface courses by the mine discharging waters and the drainage from the plant and dumps are the chief sources of water pollution. It also increases the hardness of water. The other pollution effects normally found in the mine discharge water from limestone mines are:-

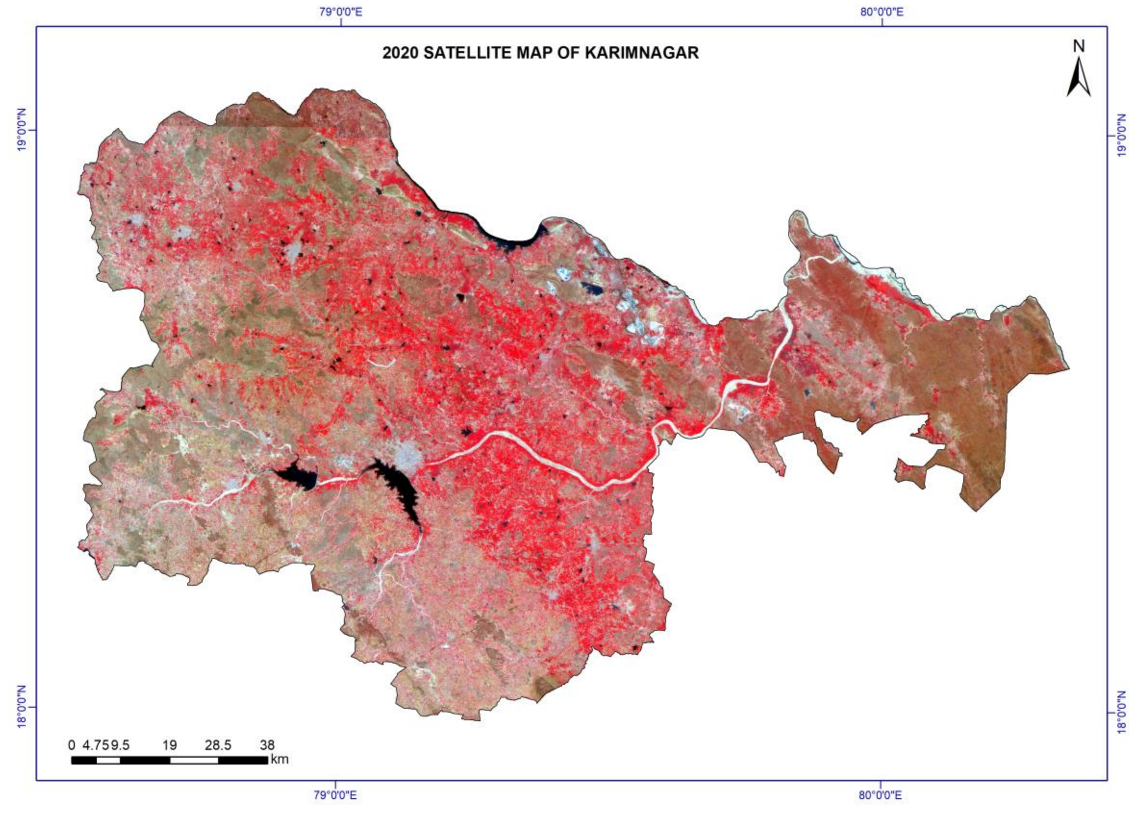
(a) Increase in electrical conductivity
(b) Increase in calcium content
(c) Increase in magnesium content
(d) Increase in sulphate ions.

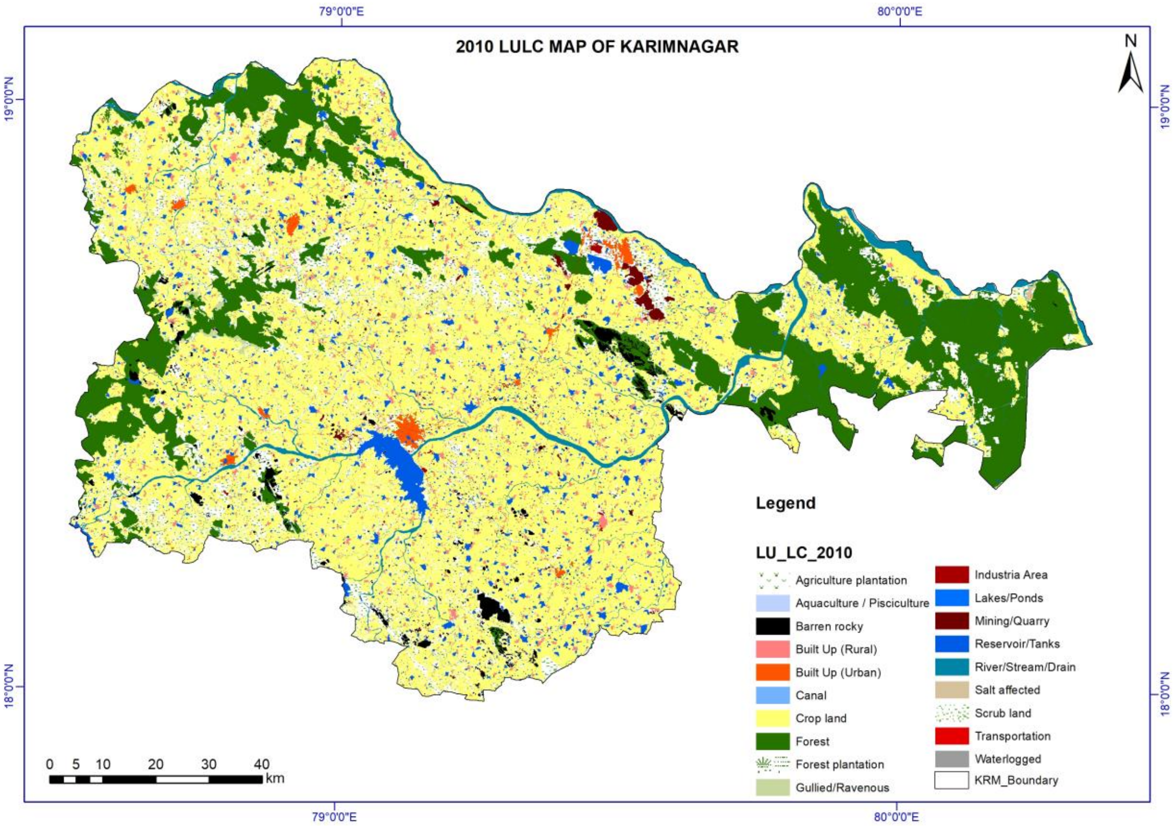
Land Degradation

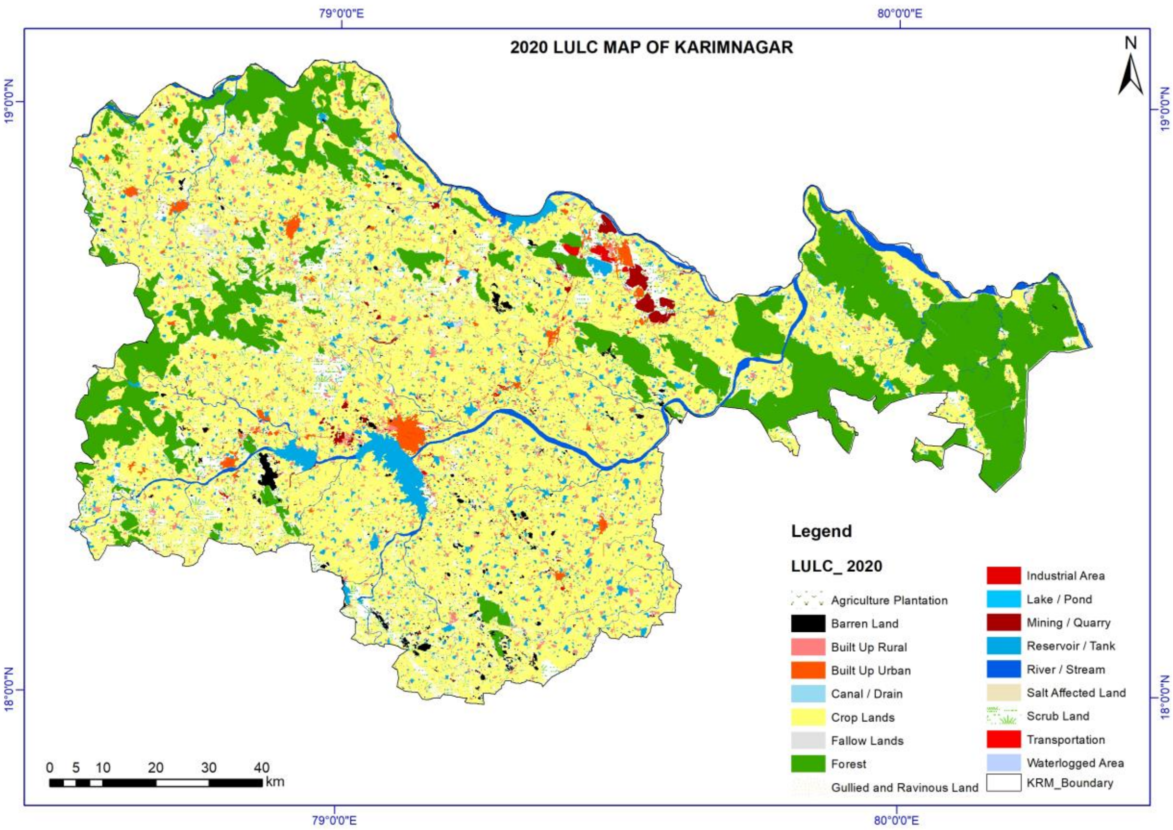
Land in India suffers from varying degrees and types of degradation stemming mainly from unstable use and inappropriate management practices. Loss of vegetation occurs due to deforestation, cutting beyond the silviculturally permissible limit, unsustainable fuelwood and fodder extraction, shifting cultivation, encroachment into forest lands, forest fires and over grazing all of which subject the land to degradational forces. Other important factors responsible for large-scale degradation are the extension of cultivation to lands of low potential or high natural hazards, non-adoption of adequate soil conservation measures, improper crop rotation, indiscriminate use of agro-chemicals such as fertilizers and pesticides, improper planning and management of irrigation systems and extraction of ground water in excess of the recharge capacity. Land-use/ Land –cover changes over a period of 10 years i.e., 2010 and 2020 has been studied. Change Detection Analysis carried out as detailed below:

Land degradation was considerable as seen from the satellite data and change detection analysis which has been quantified and presented. (Table-2)






79°0'0"E
80°0'0"E
19°0'0"N
18°0'0"N
2010 LULC MAP OF KARIMNAGAR
N
Legend
LU_LC_2010
Agriculture plantation
Aquaculture / Pisciculture
Barren rocky
Built Up (Rural)
Built Up (Urban)
Canal
Crop land
Forest
Forest plantation
Gullied/Ravenous
Industria Area
Lakes/Ponds
Mining/Quarry
Reservoir/Tanks
River/Stream/Drain
Salt affected
Scrub land
Transportation
Waterlogged
KRM_Boundary
0 5 10 20 30 40
km


79°0'0"E
80°0'0"E
19°0'0"N
18°0'0"N
2020 LULC MAP OF KARIMNAGAR
N
Legend
LULC_ 2020
Agriculture Plantation
Barren Land
Built Up Rural
Built Up Urban
Canal / Drain
Crop Lands
Fallow Lands
Forest
Gullied and Ravinous Land
Industrial Area
Lake / Pond
Mining / Quarry
Reservoir / Tank
River / Stream
Salt Affected Land
Scrub Land
Transportation
Waterlogged Area
KRM_Boundary
0 5 10 20 30 40
km

Land-use / Land-cover	2010_Area (sq.km)	2020_Area (sq.km)	Variation (sq.km)
Agriculture plantation	187.06	215.76	28.69
Aquaculture / Pisciculture	0.036483438	ND	-0.036483438
Barren rocky	158.0942647	92.85190416	-65.24236052
Built Up (Rural)	340.6509107	398.3266378	57.6757271
Built Up (Urban)	65.42892189	113.5468138	48.11789189
Canal	30.63054792	45.22809604	14.59754812
Crop land	6699.911346	6788.911129	88.99978383
Forest	2072.040372	2074.033455	1.993083527
Forest plantation	47.58151133	22.60699787	-24.97451346
Gullied/Ravenous	23.69479045	8.707680332	-14.98711012
Industrial Area	18.16473513	34.16815142	16.00341629
Lakes/Ponds	0.248438317	1.570872394	1.322434077
Mining/Quarry	58.81654473	70.59534392	11.77879919
Reservoir/Tanks	514.9151341	552.6142944	37.69916026
River/Stream/Drain	319.5402713	312.6796387	-6.86063267
Salt affected	10.80797113	9.010502207	-1.797468928
Scrub land	1278.459871	1082.386483	-196.0733884
Transportation	10.99957904	14.22362012	3.224041082

Table-2. Land-use/Land-cover changes as quantified from the satellite data

In addition, there are a few underlying or indirect pressures such as land shortage, short-term or insecure land tenancy, open access resource, economic status and poverty of the agriculture dependent people, which are also instrumental to a significant extent, in the degradation of the land. Land degradation manifest itself chiefly in the form of water erosion, followed by wind erosion, biophysical, and chemical deterioration.

Land degradation is the inevitable result of any form of mining, particularly opencast mining, which thoroughly disturbs the physical, chemical, and biological features of the soil and alters the socioeconomic features of the area. Although there are no data available for the area actually affected by mining and quarrying, mining lease area is approximately 0.8 mha, which may be taken as degraded directly due to mining activities in addition to the areas affected indirectly.

Exploitation of mineral resources creates huge waste/sub grade material dumps. A waste is a waste as long as it is unused. Waste dumps all along the mining belt for various minerals reveal necessity of attention to be paid for its utility for prosperity of human kind by way of creation of large scale employment in rural areas This would form as best environmental mining planning practice.

Noise Pollution

The noise generated by the heavy earth moving machinery like dozers, haulers, dumpers exceeds 90 dB. Within the cement plant various processing operations using the varied machinery contribute to noise pollution. The impulsive noise generated and the ground vibration during blasting is highly dangerous to the fauna and also causes annoyance to the public. (Table- 3.).

Table-3. Permissible Sound Level for Occupational Noise exposure

Duration Per Day / Hours	Sound Pressure Level db (A) Allowed response
8	90
6	92
4	97
2	100
1.5	102
1	105
0.5	110
0.5 or Less	115

Table-4. Observed Sound Levels

Sampling Location	Sound Pressure Level db (A)
Mines	78-92
Hauler	92
Dumper	94
Crusher	115
Dozer	108
Ramp	92
Haul Road	85-92
Rest Room	85

In many areas, we may find lot of mineral waste. If extensive studies are made the said waste also can be put to use and it adds to the growth of the Nation by conserving the valuable and exhaustible mineral resource.

Mining operations such as drilling, blasting, loading and movement of dumpers on haul road, dumping of material will release dust in to the ambient environment has adverse effect on the people working in the mines people living in the vicinity and also on the plant and cattle. Blasting fumes contain various noxious gases like SO_2; NO_2; NO; N_2O, NH_3. Ambient Air samples collected on Millipore 8" X 10" Glass fiber filter paper using Respirable Dust Sampler (RDS) and High Volume Sampler (HVAS). Workplace air samples have been collected in the breathing zone using Personal Samplers (PS) using 25 mm dia Cellulose Membrane Ester Filter paper.

The impacts of mining on environment due to granite mining and processing plants are many but a number of them can be mitigated more successfully and at less cost by prudent site selections and proper management plans. Depending on the type of facility and the medium being considered (air, water, plant, animal or human communities), the area that might be influenced by a mine/plant can extend beyond the site and its immediate environs. The characteristics of the natural resources and land use in the air its dispersion for long distances downwind are relevant and so are the environmental impacts along transportation corridors. Industrial growth is no longer a sole justification, increased knowledge of public health effects and experience with the degradation of air, water and land that can occur in the absence of sound planning in mining/industrial area is a major concern to be thought of. Most important aspect associated with this mining is the loss of topsoil. The soils in agricultural fields, forest lands, etc., will be lost forever unless it is properly recovered in advance, stacked and reused at an early period in the Reclamation of Mined out areas or afforestation work. The impact due to mining is not restricted to air, water and land but also on local population. There is a potential stress on the existing community infrastructure and especially medical facilities etc., due to the influx of workers in to mining industry. Similarly, the influx of workers from other localities or regions changing local demographic patterns and disrupting social and cultural values, as well as living pattern of the residents. It has now touched upon the social issues like health and safety of the population. All these contribute to environmental degradation and as such the issues are on regional scale rather project specific. Exploitation of mineral resources creates huge waste/sub grade material dumps. A waste is a waste as long as it is unused. Waste dumps all along the mining belt for various minerals reveal necessity of attention to be paid for its utility for prosperity of human kind by way of creation of large scale employment in rural areas This would form as best environmental mining planning practice.

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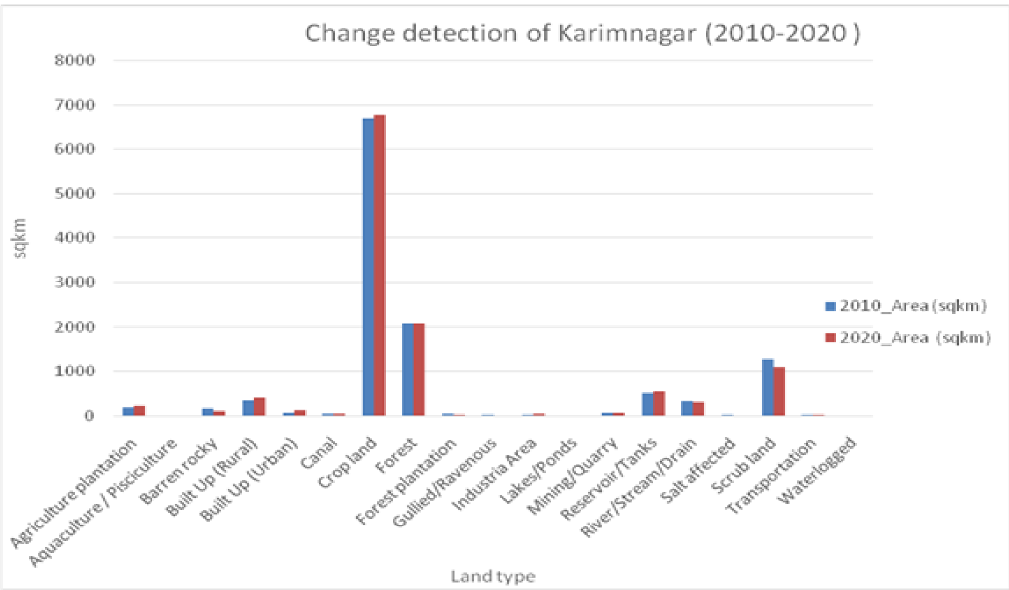

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