

Destruction of Aravalli and Its Human Impacts

Research project submitted to the Central university of Punjab

For the award of

Master of Arts

In

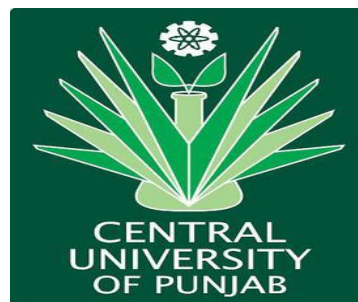
Geography

By

Shiva

Supervisor

Dr. L.T. Sasang Guite



Centre for Geography and Geology
School of Environment & Earth Sciences
Central university of Punjab, Bathinda

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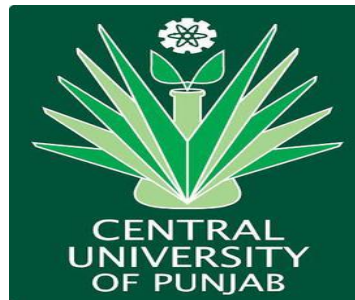
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Declaration

I, Shiva, declare that the project report entitled “Destruction of Aravalli and its human impacts” has been prepared by me under the guidance of Dr. L.T. Sasang Gite, Assistant professor, centre for Geography and Geology, School of environment and earth science, Central university of Punjab, Bathinda. No part of this dissertation has formed the basis for the award of any degree or fellowship previously.

Shiva

Registration no. 16mageog09

Centre for Geography & Geology

School of environment and earth science

Central university of Punjab

Bathinda- 151001

Date- 30/05/2018

Certificate

I certify that, Shiva, has prepared his project report entitled “Destruction of Aravalli and its human impacts” for the award of M.A (Geography) degree of the Central university of Punjab, under my supervision. He has carried out his work at the centre for Geography and Geology, school of Environment and Earth Science, Central university of Punjab, Bathinda.

Dr. L.T. Sasang Guite

Assistant professor

Centre for Geography & Geology

School of Environment and Earth science

Central University of Punjab

Bathinda- 151001

Date- 30/05/2018

Abstract

Destruction of Aravalli and its human impacts

Name of the student	: Shiva
Registration no.	: 16mageog09
Degree for which submitted	: M.A Geography
Research supervisor	: Dr. L.T. Sasang Guite
Centre	: Centre for Geography and Geology
School of studied	: School of Environment and Earth science
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Mining is carried out all over the world for mineral excavations. It is very important for the economic and social development of the region. This study focuses on different literatures on impacts of mining in Pali area of Haryana. The study has been carried out for Pali region that shares a very little part of Aravali range. Maps have been prepared for years 2004, 2010 & 2017 locating the mining sites of the regions and the change in landuse patterns of the particular region at different temporal intervals. Field visit has been carried out to verify the result and the ground reality of the study area. The main focus of this work is to demarcate the area of mining and study the landuse change through GIS.

Shiva
(Name and Signature of student)

Dr. L.T. Sasang Guite
(Name and signature of supervisor)

Acknowledgement

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Shiva

Registration no. 16mageog09

CONTENT

Sl.no.	Content	Page no.
	Declaration	ii
	Certificate	iii
	Abstract	iv
1	Chapter 1: Introduction	1-5
1.1	Introduction	1
1.2	Relationship of mining and its impacts on landuse	2
1.3	Statement of the problem	3
1.4	Objectives	3
1.5	Study area	4-5
2	Chapter 2: Literature review	6-8
3	Chapter 3: Methodology	9
4	Chapter 4: Mapping of mining sites and landuse change in Pali area	10-17
4.1	Mining 2004	10
	Land use 2004	11
4.2	Mining 2010	12
	Land use 2010	13
4.3	Mining 2017	14
	Land use 2017	15
4.4	Field survey of the area	16-17
5	Chapter 5: Conclusion	18-19
6	References	20-21

List of Tables

S.no	Table	Page no.
1.	Indian minerals yearbook 2013	6

List of Maps

S.no	Maps	Page no.
1.	Area of interest	5
2.	Mining location 2004	10
3.	Landuse pattern 2004	11
4.	Mining location 2010	12
5.	Landuse pattern 2010	13
6.	Mining location 2017	14
7.	Landuse pattern 2017	15

List of Figures

S.no	Figure	Page no.
1.	Mining site in action	16
2.	Transportation at mining site	16
3.	Condition of people near mining sites	16
4.	Condition of houses near mining sites	16

Chapter 1

Introduction

1.1 Introduction: Mining is a process in which different valuable minerals are extracted from the bottom of the earth. Usually these minerals are mined from ore body, lode, vein, seam, reef or placer deposits. The first mine in the world excavated in China during the period of 3490BC. The process of mining started from that period in the world and played a major role for development in the 20th century during the time of industrial revolution. Industrial revolution was the time when different types of minerals were extracted from different sites. One of the major drawbacks that due to reckless mining certain minerals were over extracted without any government permission (Agricola, 1550).

Positive aspects of mining: Creates employment, Spurs technological development, Creates economy. Negative effects of mining: Siltation, Formation of sinkholes, Loss of biodiversity, Contamination of ground water, soil and surface water, Soil erosion, Spread of diseases (Mondal, 2014)

Mining in India is a major economic activity. Not just in providing employment and becoming self-sufficient for obtaining the finished products by itself but also by earning valuable foreign exchange by exporting the minerals and mineral produced products. States like Bihar, Jharkhand, Rajasthan and Madhya Pradesh are high dependent upon the export of these mined products to earn the revenue for their development. (Sehgal, 2018)

As for the area of interest the mining activities in Pali region that comes at the boundary of 2 districts Faridabad and Gurgaon which come under the state of Haryana had its mining started in 1985 for the mining of stones and sand. The reason was the development of national capital Delhi. Mining changed the landscape as well as the lives of people, changing their lives from animal herders to miners and then to rural poor. Mining activities in Pali distinctively had negative impacts both on the environment and on the population (Behl, 2018).

1.2 Relationship of Mining and its impact on Land Use: According to Kitula (2004), Mining has direct relationship with the land use. Mining activities directly depend on the land and for them to carry out the first thing that is to be done is to clear the land of vegetation resulting in loss of vegetation, the second step is creating depressions in the earth creating soil erosion as well as contaminating soil and ground water. The dump that is created if not dumped properly create slurry zones. Settlement patterns are disturbed as unplanned settlements form near these mining sites for the employment reason. Another change on land use that is noted is the change in water bodies, in some cases mining creates depressions that are filled with water during rainfall and create unnecessary water bodies that spread diseases and in some cases the waste dumped in the existing bodies dries them up resulting in loss of useful water bodies. Mining sites are preferred to be located near a city or its surroundings so that it becomes easier to transport the heavy minerals.

Background of the study: Around 90 villages are located between Gurgaon and Faridabad that are located in core of Aravali hills Pali being one of them, and 150 in the foothills and catchment areas. During the 25 years of mining villagers turned into transporters, contractors and labor suppliers. Village economies changed very fast and every family in the core of the mining area developed a stake in the industry. Before the mining began about 30% of the population was engaged in animal husbandry, according to the survey in 2015. The region played a massive role as milk supplier to nearby districts like Faridabad and even served areas of Delhi. Villagers also earned their income by selling the forest products like Dhak, Ber and Krail. All these activities have now vanished from the region. Their wealth increased as they joined the mining business, their lifestyles scaled up and most of the youth left education to work in mining sector. In 2002 almost 35-40% population in the core areas were engaged in the mining activities. Almost 90% village youth did not study over class 10th during this time. Only 5% had passed class 12th and less than 1% youth were graduates. Villagers took loans to buy heavy machinery for the mining industry but as all the mining activities were banned in 2009 those loans turned into liabilities for there was no more work for those machineries. (Nathia, et.al, 2017)

Ban on the mining in 2009 had direct impact on the income of the villagers as they lost their only source of income. Families that became and rich and prosperous faced a sharp decline in their fortunes. Now over 3000 youth in Pali and Pakhal villages are struggling to get married as they do not have any sustainable source of income. The boys were never encouraged to focus on education as their parents never thought that mining could end one day. The same situation is faced by every other village on the hills. Villagers before mining had considerable landholdings but after the mining stopped they had to sell off those landholdings for there was no other source of income. Almost 48% of villagers had landholdings of 2-5 acres before 2002 that dropped by 30% in 2015. Less than 18% families now earn more than 15000 per month, these numbers were very different before the ban on mining. Although the ban on mining had its own natural benefits as well. People claim that the diseases that were rapidly spreading during the active mining years like lung diseases, hearing loss, respiratory issues, tuberculosis and skin allergies have gone down. But water borne diseases spread during a decade or more ago still plagues the area with diseases like Malaria, cholera, bone problems. Air pollution still continues due to still functioning crusher zones. (Behl, 2018)

1.3 Statement of problem:

The mining in pali region has changed over time and disrupted the lives of residents of the area along with influencing the landuse change. The particular area is chosen for the study because the area lies between 2 economically important districts Faridabad and Gurgaon Pali region in the past was able to supply milk and forest products to these regions. The report directs to locate the sites of these mining's that changed over time and to study the landuse change that happened along with them. This is done by using GIS techniques and field survey.

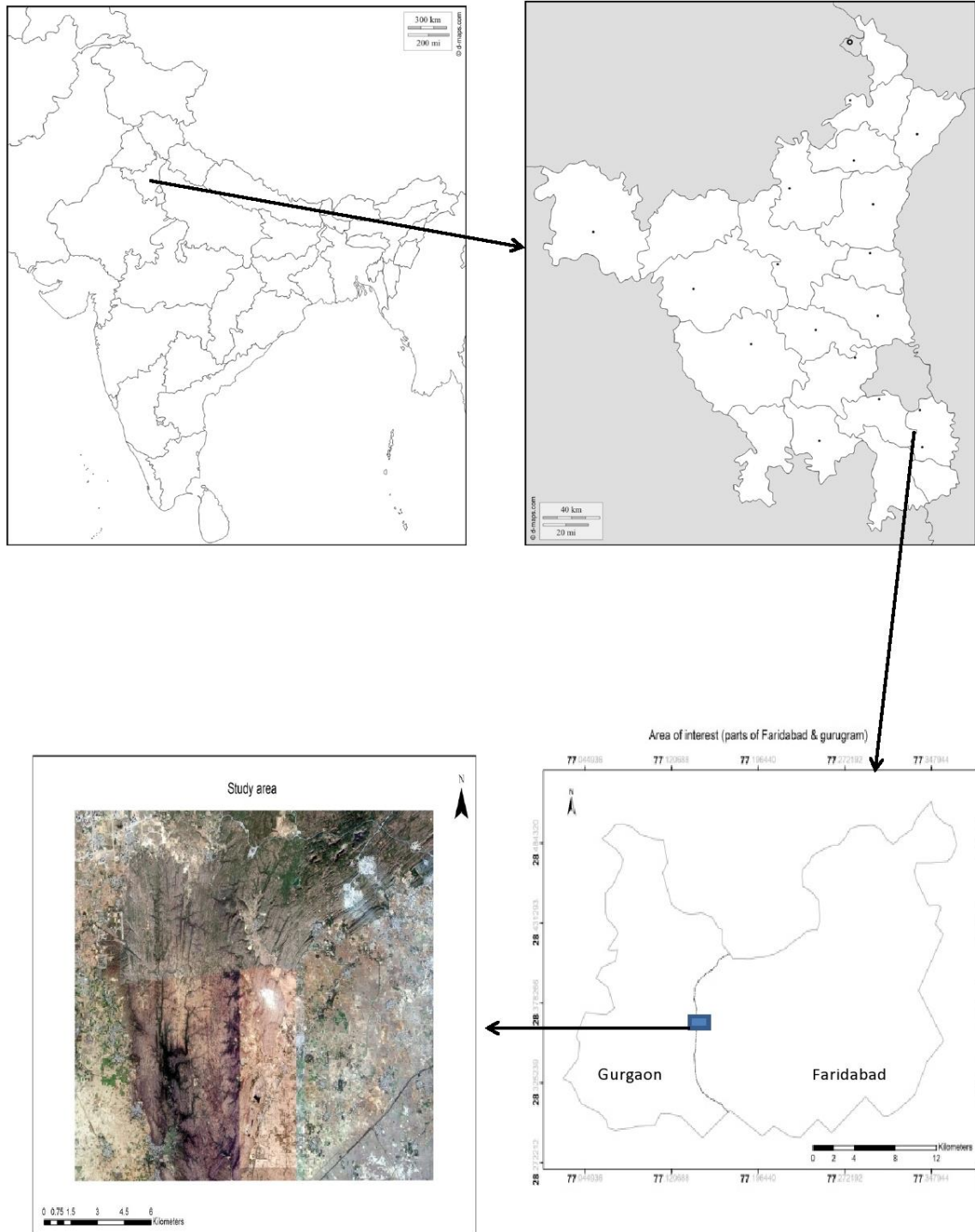
1.4 Objectives:

- To identify mining locations of the years 2004, 2010, 2017
- To study the land use change of the years 2004, 2010, 2017

1.5 Study area: Located in the state of Haryana between the districts of Faridabad and Gurgaon, 18 Kms away from Faridabad and 37 Kms from Gurgaon, with the exact location of 28.380637, 77.244826°. The area has uneven terrain and patches of vegetation. The soil is loose and slight movements of the wind result in movement of dust particles in the air. Having large and small depressions created due to mining now act as artificial lakes.

The area is significant for the study as it is located between 2 developing districts which are Gurgaon and Faridabad. The area was once the supplier of milk to these nearby districts and even to the national capital Delhi.

Map 1.1 Location map of Pali village of Haryana



Chapter 2: Literature review

Case study Bijolia (Rajasthan)

India is a country that is very rich when it comes to mineral deposits. Rajasthan being India's largest state ranks only second to Bihar when we consider mineral deposits. Very rare minerals like Wollastonite and Jespar are only found in Rajasthan. Being rich in many more significant minerals Rajasthan is very rich in minerals like –

Sr.no	Minerals	Total Share in India (Percentage)
1.	Zinc	97
2.	Gypsum	93
3.	Fluorite	96
4.	Sandstone & Limestone	70
5.	Asbestos	89
6.	Marble	90
7.	Calcite	70
8.	Lead	80
9.	Tungsten	56
10.	Soapstone	75

(Source: Indian minerals yearbook, 2013)

By the end of the March 1994 there were around 1324 mining leases for major minerals and 10521 licenses quarry for the building of stones which signifies the extent of mining in Rajasthan. Mining leases cover an area of about 900000 hectares out of which 100000 hectares is covered by forest land which definitely is a cause for environmental concern. However mining provides employment to about 325000 people in the state. In 1993-94, 645 crore rupees worth minerals were mined from Rajasthan out of which the state received 161 crore rupees as revenue. If we take into account illegal mining then these figures could be much higher. Even though Rajasthan is home to so many minerals there are not much industries located in Rajasthan and most of the minerals mined from Rajasthan are exported to other states. The mining activities in Bijolia have increased at a progressive rate. In 1971 nearly 0.84km² was covered under mining activities. That increased to nearly 12.045 km² in 1984 and 30.839km² in 1991. The number of workers that were just a few hundreds increased to 50000 mine workers in 1991. Mining activities destroyed

the prime forest land and contributed in the development of wasteland in the region. (Chauhan, 2010)

Case study: Keonjhar (Odisha)

Industrialization have been very crucial for the development of this nation. Mineral resource development have been very important for the growth of economy of the nation. Just like any other industrial project mining creates development of infrastructure and development of market in the region while providing employment. Not just limited to that mining provides income to state and foreign exchange to the mineral producing nation. Even with so many benefits we can see the similar effects of mining all over the globe that is excluding the meticulously planned and carefully executed mining. The effects of the mining range from devastated land, polluted and depleted water, denuded forests, wiped out wildlife and defiled air. Odisha is one of the most mineral rich state of the country having a wide variety of minerals such as Coal, Chromite, Iron ore, Bauxite. Unfortunately all these mineral enriched regions are covered by dense forests that are not just home to wildlife but also to many scheduled tribes. These tribes heavily depend on forests and their resources for their survival. Mining in Orissa is therefore is not just limited to stay as an economic challenge but it also creates social and environmental challenges for the state. (Priyambada, et.al, 2014)

Case study: Indonesia

Mining has been practiced in Indonesia even before it became a democratic nation. The mining for the minerals was so high that the country had to finally introduce laws to stop illegal mining in 2009. From 1997-2000 mining employed nearly 10 times more people than it does today in the mining industry. The problems occurred by mining have reduced but not stopped that is because the big mining companies do not need to take permission from the central government and also require the consent for the regional government. For the purpose of employment and tax revenue many regional governments give authorization to such exploitive mining. (Bernadetta Devi, Dr. Dody Prayogo, 2017)

Case study: South Africa

Mining existed in Africa since it was first explored. Initially for rare and expensive minerals like gold and then for other minerals as well. Much of the vegetation in Africa has been cleared for mining activities. Along with the wildlife and the tribes living in Africa facing this problem, the rivers of the Africa experience the adverse effect of mining as well. Much of the waste in restricted regions like Gauteng and Limpopo have their rivers exploited because of the mass dumping of mining waste into them. These rivers carrying the slurry along them harms the organisms in the river as well as making the water useless and depositing the slurry on the shores of other regions. Unlike Indonesia Africa has been very strict with its mining laws. There is a constant check on the mining activities, dumping sites are regularly checked and controlled by government authorities, the Angola government has started tree planting so that to increase the amount of trees by 50% to make up for the deforestation done during mining. (Steve North, 2012).

Case study: Mongolia

The grasslands of Inner Mongolia are the most important source for the survival & development of herdsman also they provide a significant ecological barrier in North China. Coal mining production is very significant for Mongolia. However over-exploitation of mines has created problems like pollution and significant decrease in grassland ecosystem services. Coal exploitation in the grasslands does not leave a positive effect on the income of herdsman. These activities increasing are continuously harming the life style of the herdsman. The natural ecosystem is changing into the barren and wasteland. (G.S Dai, et.al, 2014)

Chapter 3: Methodology

Data sources and Methodology: The study is based on the Primary and secondary data collected by field surveys and from Journals, Articles, newspapers and books.

Primary Source: To see the ground reality of the mining sites in the Pali region several mining sites were visited to see the mining sites still in action after the ban by the Supreme Court in 2009. First hand photographs were taken of the machineries and sites operating along with the photographs of the labor force living near these mining sites. This was very important to verify the reality of the region at the present.

Secondary Sources: Secondary sources here include the sources that provide the already existing information about the topic or related to the topic. These sources are books, journals, newspapers, articles etc. These sources were accessed by accessing the university library.

Remote sensing and GIS: Google earth images of mining region where a boundary was selected. The selected area downloaded in KML format and then converted into layerfile where the colors were given to the features.

Selection of mining sites and digitization: mining sites were selected from the google earth imagery by studying the feature of the topography, the depressions that could be observed along with the change in color of that specific area. What make the mining sites different from natural depression are the tracks running along these sites. Tracks of transportation can be observed as the minerals from these sites are transported from these sites. The mining sites were marked using the point tool on google earth. Each site was given a different name to avoid any confusion and the point marked mining sites showed the area that was most heavily experiencing mining activities.

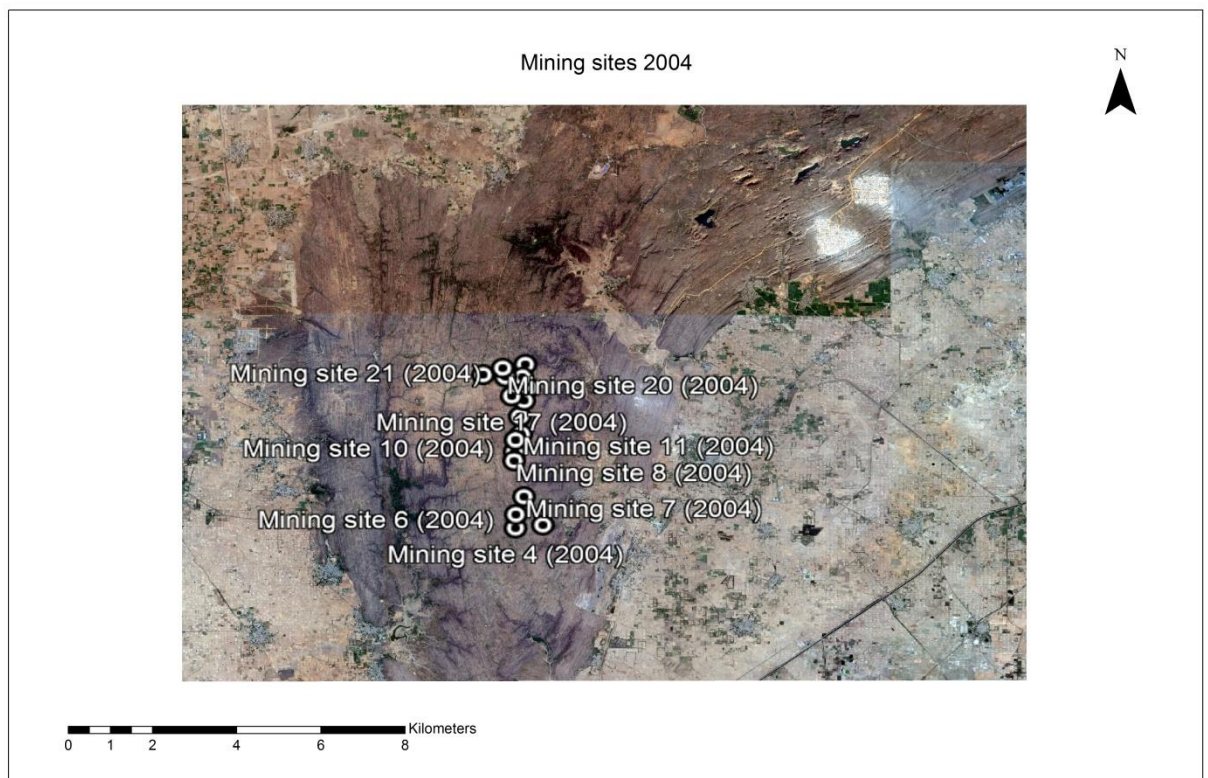
Field Survey: Field was visited to check the ground reality of the area. To verify the location of the active mining sites along with the condition of workers living near those mining sites.

Chapter 4

Mapping of Mining Sites and Land Use Change in Pali Area

4.1 The study areas lying in north-west part of India and south of Haryana state. According to the Census of India the total areas of Gurgaon and Faridabad Area. Total no. of houses in the area are 1258, population being 7767 with 4090 males and 3677 females

Map 4.1 Mining sites 2004

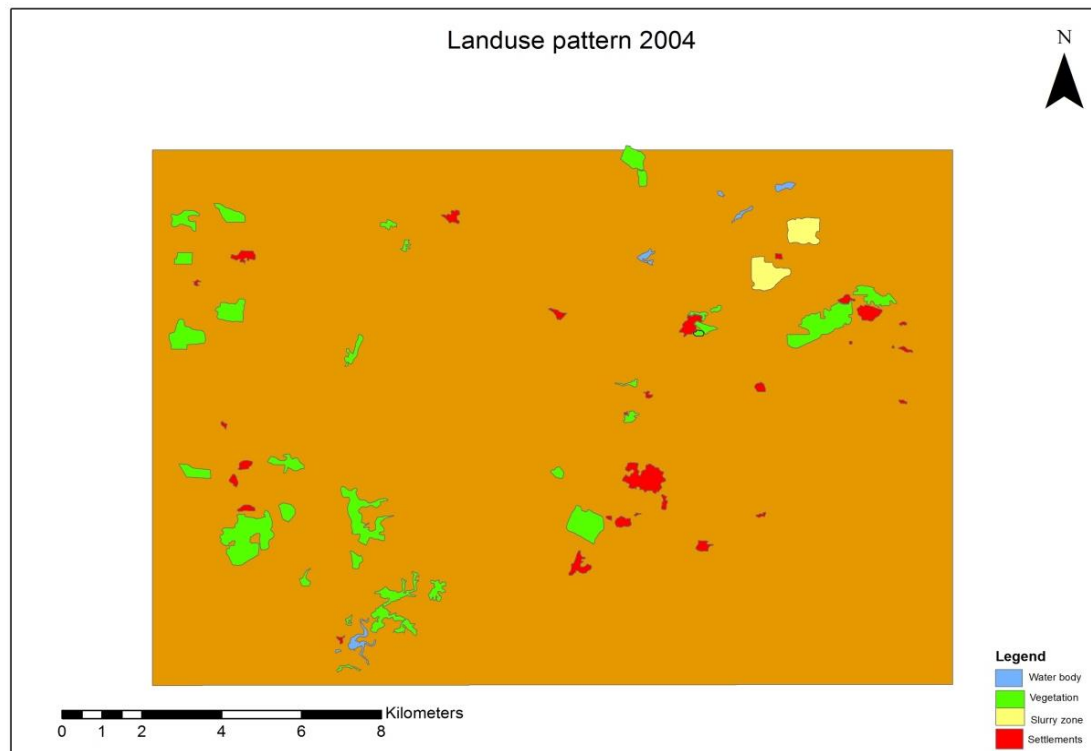


(Source: Google earth imagery)

The map given above showing locations of different mining sites in Pali region of the year 2004 in the Pali district during the period of 2004 whereas total mines were 57 that decrease up to 7 based upon present mapping. The major reason for decline in total mines is Supreme Court ban after 2009. During this year people were all totally dependent on the mining activities for their source of income so mining sites were high in number, all the villagers and even people from nearby villages were involved in mining activities. We can see a chain of mining sites in the center so the workers didn't

have to travel much. Constant mining activities during this time period were not only degrading the quality of land but also making people dependent on a temporary source of income.

Map 4.2 Landuse pattern 2004



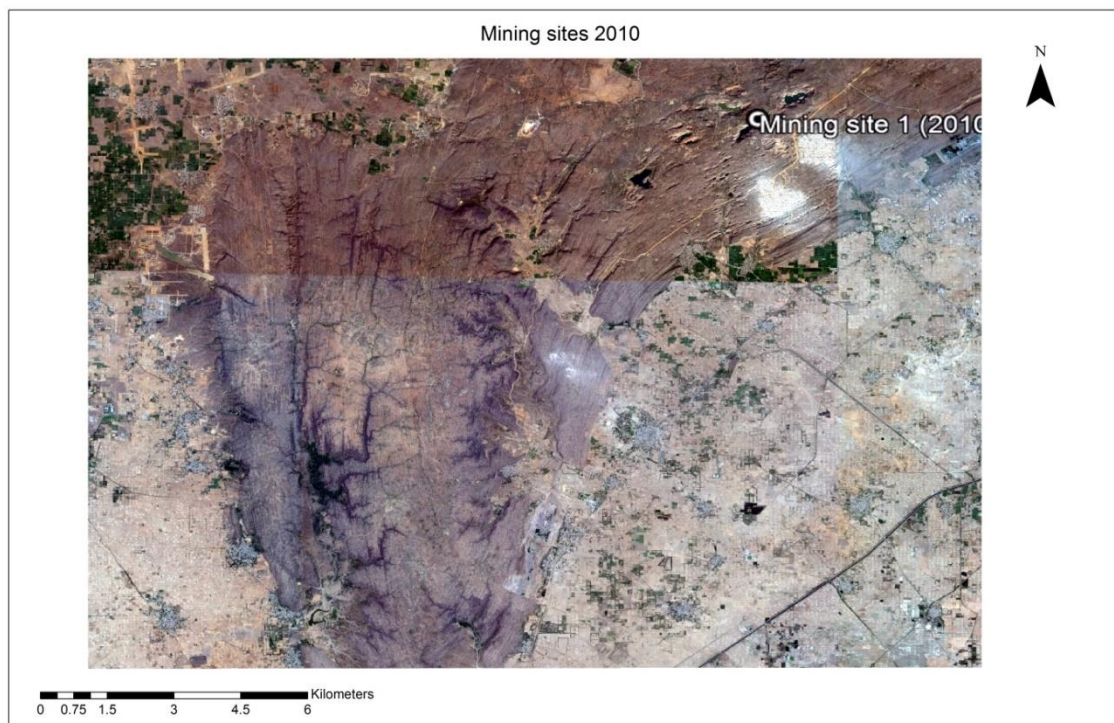
(Source: Author)

The map is digitized using Arc GIS. The image was first obtained from google Earth and then processed in Arc GIS. Polygon feature is used to represent different ground features on the map as waterbody, settlements, slurry zones, vegetation. Most of the land in the area is barren because of its topography. There are nearly 7 major water bodies in the region Very little area is covered under vegetation. This is not just because of the mining activities but also because the topography of the land contains dry arid soil and very limited vegetation can take place in the region, although mining is responsible for the low cover of it as it harms the vegetation nearby by creating slurry zones that are harmful for vegetation cover, creating non metalled kacha roads to destroy the existing vegetation cover and also by building

the little infrastructure for the mining sites. Settlement pattern is unevenly distributed because of the topography of the region and the constant mining activities in the region. Covering some of the central part, slight Eastern and a very little Northern region of the area. While observing deeply we can understand that the area doesn't have much basic facilities and is rather on a terrain that makes the life hard for its residents so people opt to live away from these hills.

4.2 The mining sites in the year 2010 reduced which affected the landuse pattern of the area and harmed the disturbed the economic activities of the villagers living in that area.

Map 4.3 Mining 2010

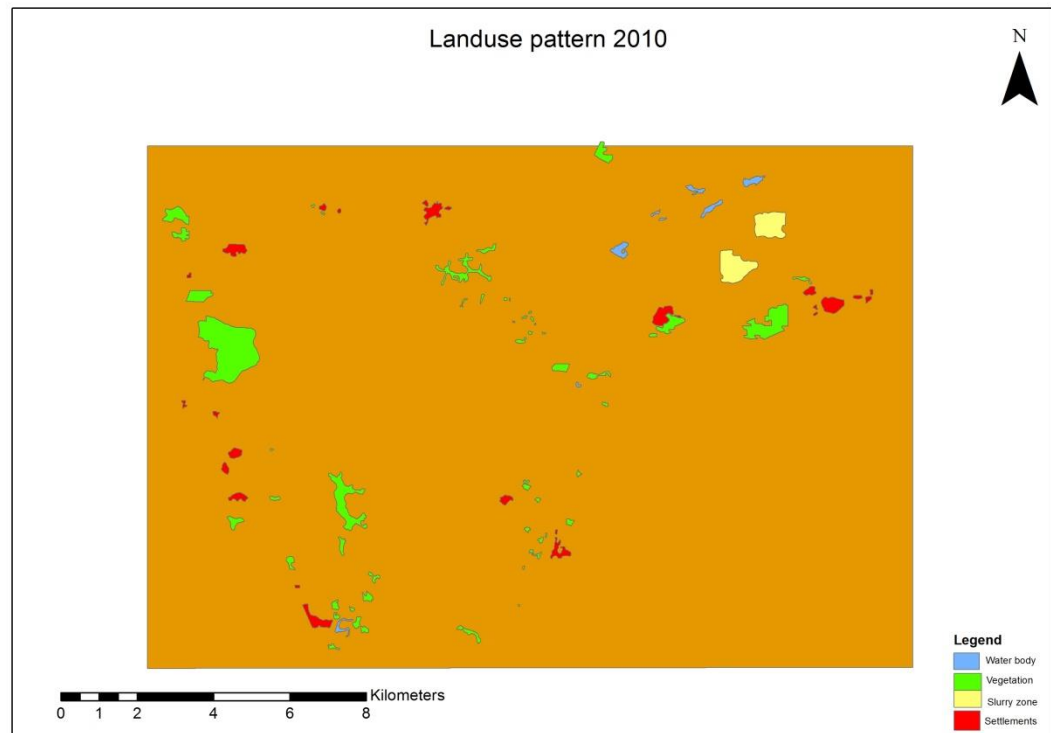


(Source: google earth)

After the ban by supreme court on mining activities on May 8 in 2009. All the mining sites closed except for one and there remained only one active mining site in 2010. Just one mining site is active in this period and that is located in the North Eastern part of the region. Highly dependent people on the mining for their source of income

became unemployed as the mining activities in the region stopped more or less completely now. The region doesn't have any other industry so that the labor workforce could shift to them resulting in unemployment all over the region. Because of the formerly existing mining sites it became impossible for the population to practice agriculture in that area.

Map 4.4 Land-use Pattern 2010



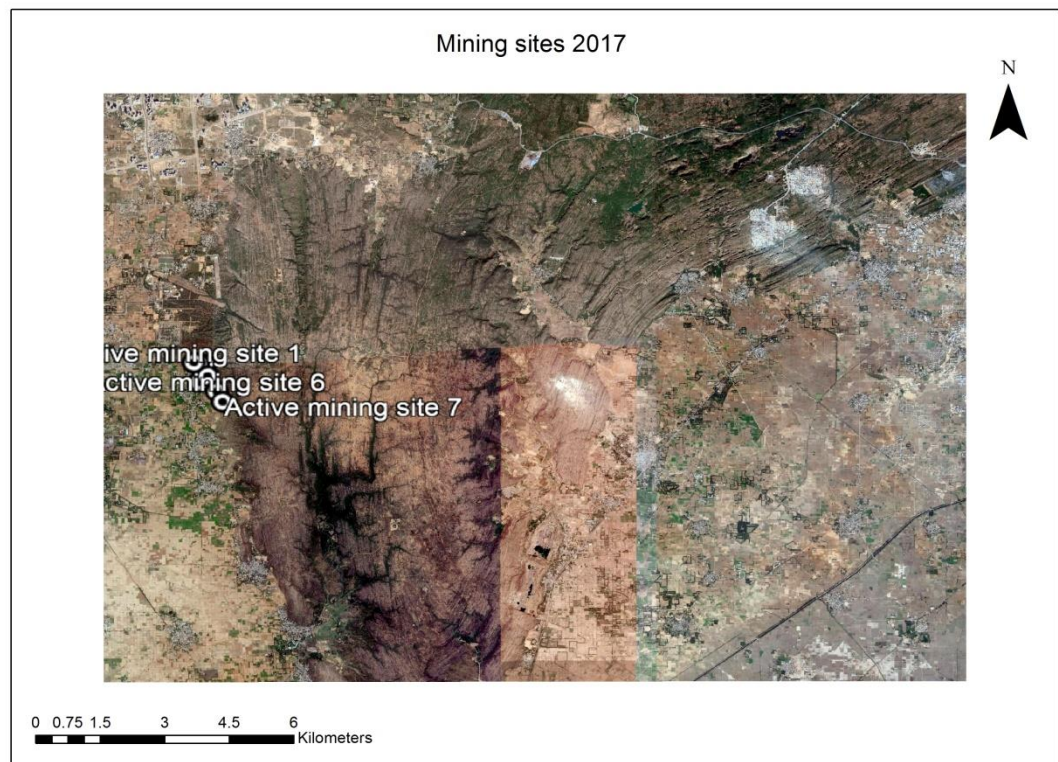
(Source: Author)

After the ban of mining activities in 2009 we can see a slight change in the vegetation pattern spreading through the region. Although the land does not encourage much of the vegetation because of its topography. Even the settlement patterns have shown a slight increase and movement towards the south western region. As people now moved away from the center, this happened because the mining sites were no longer active to work as a magnet for attracting population to reside near them. The number of slurry zones still remaining to be 2. That is what

happens everywhere in the world even when the mining stops. The exploitation done by mining can stop when the mining activities themselves stop but slurry zones once created keep harming the environment even when the mining stop. The slurry dumped in those areas make the life in any near area difficult to exist.

4.3 Again rising mining activities are done illegally after the ban by supreme court in the year 2009. There is a shift in mining sites towards the western part of the region so as to have the easy transportation route.

Fig 4.5 Mining location 2017

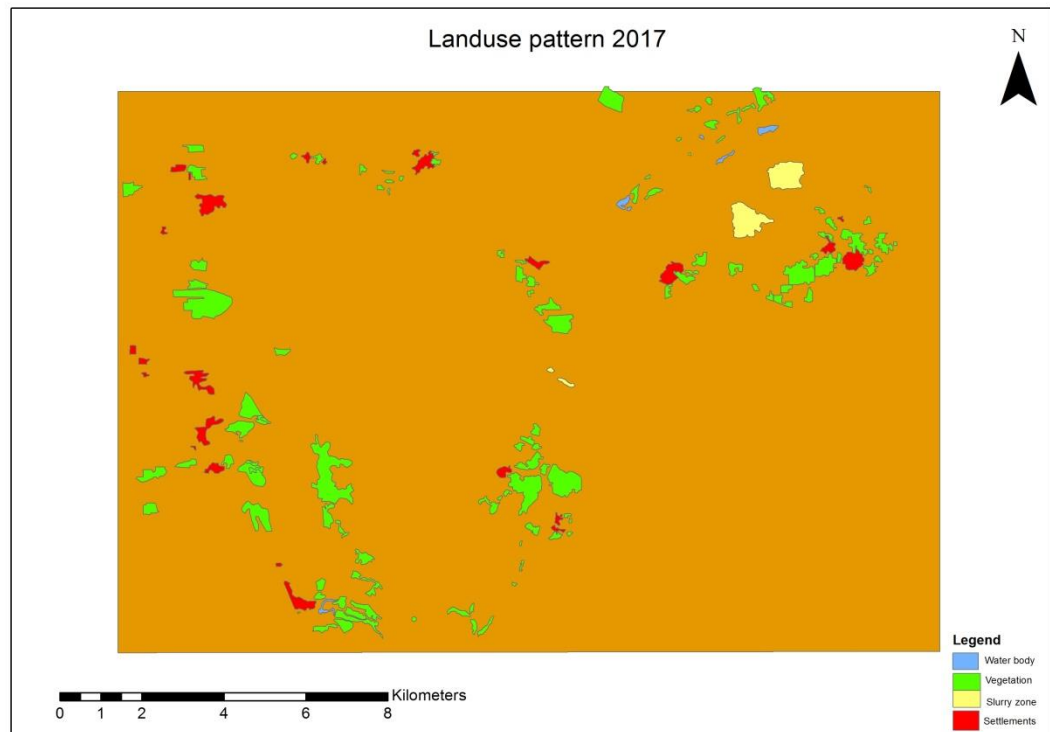


Source: google earth

Mining sites in 2017 increased once again. An year after the ban the region had only one mining site but in 2017 the region had 7 active mining sites. These sites are not legal anymore and are operated illegally. The sites shifted to the western part of the region for one very specific region that is to make the transport quicker a comparatively dense settlement exist in the western part of the region which means

better transport facilities as metalled roads exist in that area. Little labor force existing in the area also find it convenient to have a dense settlement nearby that they can approach in the time of need.

Fig 4.6 Landuse pattern 2017



Source: Author

Vegetation increased in even more in 2017. There was no more mining in the center of the region so the vegetation flourished in the area, spreading as much as it can in the arid region. The settlement patterns are however more or less the same as they were in 2010. People are not much engage in mining activities a small labor force work in the active mining sites but it is not much compared to the population that was engaged in mining activities before the ben. One change to note is that the number of slurry zones increased. From 2 to 4. 2 new slurry zones were created in the middle of the region because the mining sites shifted totally towards the west.

Due to this shift to the west it became difficult for the newly created mining sites to transport the slurry to the formerly used slurry zones so they created 2 new slurry zones in the center to shorten the time and economy on dumping waste.

Field Survey

Fig 4.1 Mining Sites in Action



Fig 4.2 Transportation at mining Sites



Fig 4.3 Condition of Residents at Mining



Fig 4.4 Condition of Houses at Mining



Interpretation of Figures:

Fig 4.1: When the area was visited it could be seen that the mining sites were still in operational after enquiring in the nearby area the workers informed that out of 7 mine sites 2 were operational on that day and all these mining sites worked on alternative days so that they could be easily shut down at the time of checking.

Fig 4.2: For easy transport the trucks were parked inside the mining facility so that they can move easily and do not require any other build up for parking. There are no metalled roads so it is very hard to drive and light motor vehicles in the area.

Fig 4.3: There are slums developed near these mining sites where the workers live. There are no basic facilities in the area like electricity or water supply. Traveling around is done by either on foot or by bicycles. Every mining site has a small settlement around it and all these small slums share the same living conditions.

Fig 4.4: The conditions of the houses near these mining sites are very poor. They are Kacha houses built without any proper plan, they are not even properly cemented. Without any facilities of water supply, electricity or sewage these houses can be well considered as slums.

Chapter 5

Conclusion

Geospatial technology has become an important field in carrying out study on mapping and assessment of mining areas because it has immense potential integrate, analyze and display spatial data. The technology consists of Geographic Information System (GIS), remote sensing and Global positioning system. The data used in the study are taken from Google Earth for 3 different years (2004, 2010, 2017). Mapping was done on google earth to locate the mining sites of these time periods and also the landuse features were marked on Google Earth.

Mining has been active in this area since 1985 and got to its peak in 2002-2006. When it was banned by Supreme court in 2009 it resulted in decreasing in mining activity and change of landuse of the region. The lives of the people were heavily effected by them as well. People lost their source of income and became unemployed. The people who were heavily dependent upon mining for their source of income lost their wealth and income sources. Once landholders turned into villagers with debt as many of them purchased expensive machinery by taking loans from the banks during the active mining years. The mining sites left their mark after they were gone as the sites where infrastructure existed could not be used for agriculture anymore and the slurry zones were created to constantly harm the population of the region, causing many health problems for them. Even effecting their economic standards as very limited vegetation can grow near the slurry zones.

In India mining takes place in almost every mineral rich state. It existed since the British period before the independence. Now the mining takes place to satisfy the increasing demand of the population as well as to earn the foreign exchange. Providing limited time temporary benefits mining industry is not a permanent industry and should be done with proper measures. We can see so many regions like a few that were focused upon during the literature review in this report that faced so many problems because of the mining activities. The locational change of mining sites explained in chapter 4 informs about how the mining constantly shifted from one part to another in the Pali region after the change in government policies. The change in

landuse pattern explained in chapter 4 addresses the issue that how the mining activities effect vegetation, settlement patterns, water bodies and waste disposal zones of the Pali region.

In this case the Pali region and its surrounding villages lost their livelihood because of the mining activities that happened in the region. First providing alternate employment because now after the banned on mining has stopped providing employment to the villagers who were now totally dependent upon these activities for their income. The land was turned into mining zones and the villagers could not go back to animal herding as the landuse of the region changed. Giving them permanent loses like in built lakes, water spread diseases and air born diseases villagers now face the challenges even when the mining around them stopped so once again they were unemployed but this time it became hard for them to shift to any other source of income. Not just stopping on that mining activities put debts on them as they had to purchase machinery for these mining activities by taking loans from the banks. It is important that government take steps regarding all the mining activities, they should be in the check of government and over mining should be avoided. Areas should be categorized considering its topography, population and value of the mineral mined so that a maximum mining limit can be set. Another important problem to deal with is the problem of the slurry zones created so that they cannot harm the life in the region for years to come.

Thus it is important for policies by governmental agencies in providing alternative source of income for the displaced labourers. Proper measures are required in implementing over all social development for proper source of income.

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