GEO ENVIRONMENTAL IMPACT ASSESSMENT OF COAL MINING IN LODNA AREA OF JHARIA COALFIELD

ABSTRACT

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Introduction

The most important event of current period is perhaps the people's concern about environment. Never before the people were so much alarmed about the deteriorating environment that is the storehouse of all living organisms.

Environmental awareness has reached at the doorsteps of common people by crossing conference halls and auditorium of five star hotels. Environment is the union of living and non-living components of our Nature. Environment is an external factor, which influences our activity upto a great extent. To maintain the ecological balance, it is necessary to conserve the environment. In ancient times our ancestors lived in the jungles. Due to progress of the civilisation several changes occurred in the human lifestyles. We invented new types of food to satisfy the hunger and new types of drinks to satisfy the thirst.. Huts and cottages turned into huge mansions and buildings. These activities are creating huge problems in front of us. Dimensions of pollution have been changing day by day. Last decade of this century is telling the facts of the coming decade of next century.

We are drifting away further and further from beautiful Nature with the development and induction of modern technologies in every field. We are horrified to be in a situation rather than satisfied. To break the umbilical chord with our Mother Nature is a heinous crime against her. Thank to our ancestors who lived with harmony among themselves and there was no question of conflict between man and nature.

Mining an important activity

Mining, the second only to agriculture, is world's oldest and most important industry. The dependence of the primitive societies upon mined products is illustrated by the nomenclature of these words "Stone Age, Bronze Age, Iron Age and now Atomic age", a sequence showing increasing complexity of social relationship with mining.

Mining is a devastating operation that not only destroys the natural ecosystem particularly if it is a surface mining but also produces tremendous distortions in social fabric. The associated problems of deforestation, waste disposal, air pollution, vibration, room blasting, land collapse and drop in water tables are of course marked perhaps to be expected in mining operation. But like information has been paid to the fact that most mining is done in remote tribal areas. Mining has its impact on health, hygiene, nutrition, sanitation, accidents, and increased intensity of work and market of an area.

History of mining in India is the history of civilisation. Khetri and Dariba in Rajsthan, various coal and iron ore mines in Bihar and Madhya Pradesh vividly display the mining activities of ancient times.

Coal mining had received its impetus in England in wake of the Industrial revolution from middle of the eighteenth century. According to the literature available in this subject, the first attempt of mining for coal in India dates back to 1774. About 92.9 tonnes of coal was brought to Calcutta by country boats in 1775 from Raniganj, which was not considered suitable for bunkers by the shipmasters. Acceleration in coal mining activity started only after introduction of Railways in India (1853). Indian coal first used by rail in 1855. Although the production of coal in the country had commenced as early

as 1775, the output was small and remained at about 404 tonnes a year during the period 1815 to 1823. But by 1857, an annual production of 50,500 tonnes had been achieved.

Statement of the Problem

Coal mining plays a major role in our economy. On the other side it causes serious environmental problems. It affects the vegetation, forest area and soil also. Coal excavation mainly by surface mining causes serious impact on land. It affects the land twice, firstly by removing topsoil at the site and secondly at the place of dumping. After removal of surface soil from one place to other place, it decreases the soil fertility due to erosion and other fluvial activities.

Air pollution is one of the major problems that is associated with coal mining. Air quality near coal mining areas is very much affected. It not only increases Suspended Particulate Matter (SPM) of the area but also other gases (Sulphur Oxides, Nitrogen Oxides). Concentration of SPM is very high in coal washery unit where coal is washed for better calorific value. Mine fire is very common in Jharia coalfield. Mine fire results in the release of carbon monoxide, sulphur dioxide and nitrogen oxide.

Impact of coal mining on water quality has been also observed during the study. Surface coal mining decreases the water table of the area. Underground mining result in the accumulation of water under mine. Due to presence of sulphur in coal lumps, it forms sulphuric acid, which produces acidity in water systems. Nitrogen oxide after reaction with water forms nitric acid which also decreases the pH value of water present in the mine. Acidity of mine water discharge may affect the aquatic life in a receiving system. It destroys eggs of fishes present in the aquatic systems

Land degradation is mainly due to surface mining. Underground mining also plays a vital role in this activity. Over burden removal is the result of surface mining. It also degrades the land to a great extent. Major portion of land is occupied by over burden. It has been estimated that one tonne of coal excavation results in three tonnes of over burden.

Coal mining has brought changes in the landuse pattern of the area. Drastic change has been observed between 1925 to 1993. Coal dust causes negative impact on human health. Lung cancer or pneumoconiosis is caused due to settling of the dust particles in the lungs.

Location and Extent

The study area (Lodna area) is a part of Jharia Coalfield and this coalfield is the part of Dhanbad district ((Bihar) which forms a part of the Chhotanagpur plateau. Lodna area comprises about 11450 hectares of land. Jharia Coalfield lies between latitude 23° 39' to 23° 48' North and longitude 86° 11' to 86° 27' East. The ground elevation of the area generally ranges between 240 m in the western part to 140 m in southeastern part above mean sea level having the general slope toward south and southeast. This coalfield measuring length of 40 Km. and width of about 12 Km., covering an area of 450 sq. Km. The Jharia Coalfield has been divided into many parts for the administrative control. Actual study area is Lodna that is named as area no. X , covering an area of 1447 Ha. It is a sickle shaped coalfield present in the form of basin and trenched with a major fault on the southern part.

Methodology and Research Design

To study the impact of coal mining, scientific and methodological information is necessary. Literature survey has been done in the libraries of different universities and institutions. Various information and data have been collected through field work and topographical maps. In present study special emphasis has been given on the analysis of the pollution level in the area. Base map have been prepared by using Survey of India topographical sheets on the scale 1: 50,000. Another map has been prepared with the help of maps provided by the controlling body of Bharat Coking Coal Ltd. a subsidiary of Coal India Ltd.

Data Source and Research Material

For the present study, Survey of India topographical sheets number 73 I/5 and I/6 have been used, which were surveyed in 1973 and published in 1976 on the scale 1:50,000. The extensive fieldwork has been carried out for collecting first hand data near pollution prone areas. Studies of the nature of soil and measurement of air quality have been done during research work. Water samples have been collected from different mines, river spot and handpumps located in and around the area during fieldwork. The measurement of stream length and mine area have been done in laboratory from toposheets by using rotameter. Similarly the area has been calculated with the help of curvimeter.

Chapter-II (Physical Settings)

The Jharia Coalfield, located in the Damodar valley, is the most important coalfield both in regard to its potentiality and development. It has about 380 collieries out of the total

900 in India. The exact date of discovery of Jharia Coalfield is uncertain. Strangely enough, the lists of coal exposures from different Coalfields prepared by the Coal Committee of East India Company in 1837 and 1845 didn't contain any reference to this field which has since proved to be premiere coalfield of the country and veritable storehouse of the best quality coal.

Geology

The lower formattion of the Jharia coalfield lies unconformably on the Archaean and consists of rocks of the Talchir and Damuda Series. The Damuda Comprises the Barakar Measures, the Barren Measures and the Raniganj Measures. An area of about 54 sq. Km. is occupied by rocks of Raniganj Measures and about 218 sq. Km. by those of Barakar Measures. The rest of 181 sq. Km. comprise rocks of the Barren Measures and Talchir series.

Topography

The general altitude of the Coalfield varies from about 240 m in the northwest to about 98 m in southeast after the confluence of the Damodar and Barakar rivers. General slope is from northwest to southeast and east.

Climate

The climate of the area is generally dry. Rainfall generally occurs between July to October. Maximum temperature ranges between 24.5°C to 35.2°C. Sometimes it may be 40° C.

Soil Characteristics

Here soil is sandy and sandy loam. Some fertile soil is found on the other side of the river. Physical and chemical characteristics of different soil samples have been studied in detail.

Chapter-III (Nature and Methods of Coal Mining)

Both types of mining operations exist in the area, i.e., surface and underground mining. In early period underground mining was more pronounced. After 1989 more thrust has been given to surface mining. This is due to high production cost of coal by underground method. Coal seams used for coal excavation are very deep in the earth. Underground mining causes release of methane gas from the mines. Methane gas causes fire in mine, that is due to sparking of electric current. About 0.01 million tonne of methane was emitted during coal production in ten years span.

Chapter-IV

Landuse pattern is studied from toposheets, field survey and other maps of the area, showing changes in landuse pattern in the area. In 1973, there was about 195.58 hectares of land utilised for settlement purposes, but that became 242.21 hectares in 1993. Major change is found in mining sector. Only 3.99 hectares land was utilised for mining and quarrying (it is measured in context of surface mining) in 1973 while this became 119.65 hectares in 1993. Only 0.275 % land was used for mining purposes in 1973 while this became 8.268% in 1993. No major change has been observed in other activities.

Chapter-V (Environmental Degradation)

(A) Deforestation

In the study area there is no natural forest is found so, there is no question of deforestation. However, social forestry division of Bharat Coking Coal Ltd. has afforested 10.63 hectare land upto 1994-95.

(B) Water Pollution

For the study of water pollution, coal washery effluent and mine water of different colliery units and different water samples of Damodar river have been collected and analysed.

Coal Washery Effluent of Lodna Coal Washery

1. Huge amount of pine oil and grease is released into coal washery effluent. The oil and grease increases the level of pollutant in running water systems.
2. Biological Oxygen Demand value of coal washery effluent is very high while Dissolved Oxygen (DO) is zero. Sometimes BOD value goes upto 350 mg/l.
3. Chemical Oxygen Demand value is also very high in the effluent. It also represents the pollution level in the water systems.

Physico - Chemical characteristics of Damodar River water at different points

(1) BOD found within the permissible range.

(2) COD value is very high at all points

(3) Nitrogen as Nitrate found under permissible limit

(4) Total Suspended Matter (TSM) and Dissolved solids are also under limit.

(5) Fluoride as F is beyond the permissible limit at two points

(6) Copper, Iron and Magnesium are found within permissible limits.

Mine Water Samples

Mine water of different colliery unit has been analysed quarterly viz., Jan-March, Apr-June, Jul-Sep and Oct. - Dec. and so on.

January – March

1. pH in the range of 6.50 to 8.13
2. Hardness of mine water found in the range of 320 - 620 mg/l as calcium carbonate.
3. Calcium in the range of 40- 76 mg/l.
4. Magnesium as Mg found in the range of 68- 100 mg/l
5. Concentration of chloride in various water samples estimated between 30 - 72 mg/l .
6. Iron as Fe found in the range of 0.28 to 0.6 mg/l.
7. Sulphate as SO_4^{--} ranges between 170- 240 mg/l.
8. Conductivity of different water samples are in the range of 970 - 1480 micro mho/cm.
9. Total Dissolved Solids (TDS) are present in the range of 514 - 1250 mg/l in different water samples

April - June Period

(1) pH between 6.5 to 8.17

(2) Hardness found in the range 356- 626 mg/l as Calcium carbonate

(3) 42 -77 mg/l calcium estimated in water samples.

(4) Magnesium as Mg in the range 70 -105 mg/l

(5) Potassium in the range between 15 -27 mg/l

(6) Chloride concentration is 32 - 140 mg/l as Cl

(7) Sodium found in the range between 18 - 38 mg/l

(8) Sulphate as SO_4^- in the range between 190 - 244 mg/l

(9) Special conductivity observed between 900- 1500 micro mho/cm

(10)Total dissolved solids estimated 678 -1258 mg/l in mine water samples

July - September

(1) pH between 6.65 to 8.2

(2) Hardness found in the range 320- 558 mg/l as Calcium carbonate

(3) 40 -72 mg/l calcium as Ca estimated in water samples

(4) Magnesium as Mg in the range 66-102 mg/l

(5) Potassium in the range between 11 -26 mg/l

(6) Chloride 32 - 72 mg/l as Cl

(7) Sodium found in the range between 15 - 30 mg/l

(8) Sulphate as SO_4^- in the range between 180 - 220 mg/l

(9) Special conductivity observed between 990- 1640 micro mho/cm

(10)Total dissolved solids estimated 710 -1260 mg/l in mine water samples

(11)Iron found in the range 0.3 - 0.55 mg/l.

October -December

(1) pH between 6..85 to 7.50

(2) Hardness found in the range 330- 540 mg/l as Calcium carbonate

(3) 42 -72 mg/l callcium estimated in water samples.

(4) Magnesium as Mg in the range 66 -104 mg/l

(5) Potassium in the range between 12 -26 mg/l

(6) Chloride 32 - 76 mg/l as Cl

(7) Sodium found in the range between 18 - 32 mg/l

(8) Sulphate as SO_4^- in the range between 184 - 220 mg/l

(9) Special conductivity observed between 980- 1400 micro mho/cm

(10)Total dissolved solids estimated 514 -1254 mg/l in mine water samples

(11)Iron 0.28 - 0.50 mg/l as Fe

Land Degradation

In study area land has been degraded by following three activities:

(1) ***Mine fire activities*** – In Jharia it is not water but fire which causes the problem of land subsidence. Underground fire which first broke out in 1920s is still burning. It is now posing a major threat to Jharia Town itself. Fire hazard is associated with

underground excavation of coal. It occurs due to oxidation of sulphur minerals, which produces intense heat and release of large amount of toxic gases, fumes and smokes. Sometimes coal mine or water damp fire burns uncontrolled for years together. Area affected by mine fire is 313.12 hectares. Therefore, proper precautions to prevent the fires have to be taken throughout coal mining operations. Mine fire has been divided into three main areas:

(A) Lodna Bagdigi Fire – Here fire took place in the XV seam in 1935. Seams XV, XIVA, XIV, XIIIB and XIIIA are on fire.

(B) Jeenagora Joyrampur fire – Fire first started in 1944 and extended upto new Jeenagora in north and upto the boundary of south Jeenagora in the south. Joyrampur fire was first reported in XIIIA seam in 1965.

(C) South Tisra – North Tisra fire- Here fire started in the year 1964 from 9 seam of North Tisra Colliery. It reached the X seam of South Tisra Colliery in 1973.

Impacts of Mine fire

(a) Release of noxious gases viz., Sulphur dioxide, and Nitrogen oxides into the environment. Concentrations of these gases are more than permissible limits. Concentration of sulphur dioxide in winter mornings and late evenings varies between 88.22 micro gm per cubic metre to 212.20 micro gm per cubic metre. Ambient air quality standard for this gas is 90 micro gm per cubic metre.

(b) Nitrogen oxide ranges between 22.77 to 45.99 micro gm per cubic metre in day hours. Carbon monoxide concentration found between 71.38 to 131.30 micro gm

per cubic metre during early morning and late evening respectively. But air quality standard for this gas is 80 micro gm per cubic metre. Carbon monoxide concentration is very high near mine fire area.

(c) Branch Railway line feeding to Joyrampur is endangered.

(d) Dhanbad Bailliapur road, which is passing through Jeenagora, suffers from severe threat to fire.

(e) Endangered surface structure of the 400 residential houses, office store and hospital of BCCL have to be rehabilitated.

(2) Subsidence - Subsidence is the striking or lowering of the land surface. It is a slow process. It takes place gradually, almost unperceptibile or it may occur quite suddenly. It affects the area from few square metres to as large as thousands of square kilometres. Sometimes it occurs due to natural phenomena, in other it is induced by withdrawal of fluids or by the mining or dissolution of solid materials. Coalmine subsidence is the local lowering of ground surface caused by underground extraction of coal. Total subsided area is 12.68 hecttares.

(3) ***Quarry and external overburden*** – As it is has been stated that coal is excavated both from surface and underground mining, surface mining degrades the land twice. In excavation, the top fertile soil is removed from one place to other place. But overburden may be more or less depending on the depth of coal seam in the earth surface. Land degraded due to existing quarry in the area is 38.51 hectares. Area which

will degrade in near future due to overburden dumping is 13.35 hectares. Area degraded due to abondoned quarry is 55.11 hectares.

Air Pollution

Air pollution is the excessive concentration of foreign matters in the air which adversely affects the well being of the individual or cause extensive damage of the environment as whole.

Jeenagora Open Cast Project

(1) Concentration of SPM (Suspended Particulate Matter) – It ranges between 243.33 to 608 micro gm per cubic metre . Highest in January – March period and lowest in July – September.

(2) Sulphur dioxide ranges between 8.66 to 19.32 micro gm per cubic metre . Highest in January – March period and lowest in July – September.

(3) Concentration of Nitrogen oxides varies between 8.16 to 26.74 micro gm per cubic metre .

North Tisra Area

(1) SPM ranges between 301.66 to 643.06 micro gm per cubic metre.

(2) Sulphur dioxide ranges between 14.78 – 24.21 micro gm per cubic metre. Highest in October – December period and lowest in July- September period.

(3) NOx ranges between 23.8 to 39.7 micro gm per cubic metre. Highest in October – December period and lowest in July- September period.

Lodna Area

(1) SPM ranges lbetween 306.36 – 975.76 micro gm per cubic metre. Highest in January – March period and lowest in July – September.

(2) Sulphur dioxide ranges between 32.86 – 94.62 micro gm per cubic metre. Highest in January – March period and lowest in July – September.

(3) NOx ranges lbetween 10.04 to 49.5 micro gm per cubic metre. Highest in October – December period and lowest in July- September period.

Dust Pollution

Jharia coalfield iis the prime source of coking coal in the country. It causes negative impact on humain health. In physical appearances about 70 percent of the population appeared either sick or in moderate state of health and by clinical examination 35 percent was found to be actually suffering from different ailments requiring treatment. A sample survey was conducted in the coal mining area to study diseases prevailing among persons associated with the coal mining activities, in which 10,000 persons were selected for the study About 10.8 percent persons out of total were suffering from pneumoconiosis. Dust fall rate in Jharia coalfield was 30.5 tonnes per sq. km per month in 1983 which increased upto 40 tonnes per sq. km per month in 1995. Level of dust fall rate is maximum in summer season and lowest in monsoon period Dust fall rate near Lodna colliery office was 58.67 tonnes per sq km per month in April 1989 The lowest was found in Indian School of Mines (Administration Block) was 7.2 to 18.34 tonnes per sq km per month. Dust fall rate near Lodna Colliery office was 65.0734 tonnes per sq. km per month for April 1996.

Ch. VI (Environmental Impact Assessment)

Climate

In mean maximum temperature no major change has been observed but slight deviation has been observed in mean minimum temperature after 1971, when nationalisation of coal industry begun and which ended in 1976. Except 1976 - 80 period declining trend of mean minimum temperature has been noticed. This may be due to coal mining and allied activities. An inverse trend against mean minimum temperature has been found. Upto 1970, relative humidity (RH) at 8.30 hours was under 70 % mark but after 1970 it followed an increasing trend. Relative humidity at 17.30 hours followed the increasing trend before 1951 - 1965. It has declined in 1966 - 70 period but after 1981 onwards it started increasing.

Hydrology

Evaporation or evapotranspiration, the combine loss from soil and vegetated surface, occurs when there is change of state of water from liquid to vapour. Water goes into the atmosphere through lower portion of the leaf. In many regions evaporation and transpiration are not measured separately and studied together as evapotranspiration. About 180 cm of water evaporated in a year near damsite (Dhanbad).

Hydrogeolgy

It can be defined as the study of groundwater with special emphasis given to chemistry. All the rivers either originate or flow through districts have an easterly or

southeasterly course. Physico-chemical analysis of groundwater of Jharia coalfield and its adjacent part is given below:

1. Calcium is 40 mg/l in dug wells of Jharia. Calcium content in various tubewells of Dhanbad town varies between 30 – 78 mg/l. Calcium content in different well of Lodna area ranges between 104 – 108 mg/l.
2. Magnesium content in groundwater of Dhanbad town (outside of JCF) ranges between 8-33 mg/l in different tubewells of the area. Well water of Lodna area shows magnesium concentration in the range of 32 – 96 mg/l.
3. Potassium concentration in different tubewells of Dhanbad town are in between 1.7 – 8.0 mg/l. Potassium content estimated in different wells of Lodna area ranges between 6.5 – 24 mg/l in different seasons of the year.
4. Sodium content in dug wells of Central Ground Water Board in Jharia and Dhanbad are 40 and 54 mg/l respectively. Sodium content in different tubewells of Dhanbad town ranges between 22 – 50 mg/l while this is found between 16 – 70 mg/l in different tubewells of Lodna area.
5. Bicarbonate and carbonate content or alkalinity of groundwater ranges between 135 – 430 mg/l in different dug wells and tubewells of the area.
6. Sulphate concentration is fairly low in dug well of Central Ground Water Board. It is also low in different tubewells of Dhanbad town. 136 – 260 mg/l sulphate as SO_4 found in wells of Lodna area.
7. Chloride as Cl in different wells and tubewells of the study area and its adjacent part found between 14 – 170 mg/l.

8. Specific Electrical conductance of dug wells of Central Ground Water Board observed between 450 and 766 micro mho per cm respectively. Well water of Lodna area shown electrical conductance in the range between 530 – 2360 micro mho per cm while this parameter ranges between 352 – 760 micro mho per cm.
9. Physico-chemical characteristics (pH, total hardness, alkalinity, calcium, magnesium, iron etc.) of handpumps (Chapakal) water found under permissible limit except nitrate whose value was more than permissible limit. In some samples nitrate value found upto 64 mg/l. Nitrate value more than 45 mg/l is injurious to health.

Edaphic aspects:

Soil is an essential component of the terrestrial ecosystem, which lies at the interface between atmosphere and earth's crust. The soil is exposed to input of trace elements from many sources in a coal mining environment. Concentrations of trace elements in the soil of the study area are under permissible limit. Only iron has higher concentration in respect of other trace elements. It may be due to deposition of coal dust on the earth surface.

Terrain:

Coal mining particularly open cast process, is vulnerable for the earth surface of the area. Underground mining also affects the surface. It causes sinking of land surface which is termed as subsidence. Surface mining causes overburden generation removal of overburden from the mine site and dumping at other places. This brings changes in the

land surface topography of the area. The site of mining is deep and overburden site is high, sometimes diifference between the two is 40 m.

Fauna (Animal species)

Human beings are the major component of the fauna of the area. Persons residing near mining area have poor health. Persons working in the mines are also having poor health. It may be due to dust particles which are the out come of coal mining operations prevailing in that area. Noxious gases are emitted by coal mass burning inside the earth. Coal mining is one of the major factors responsible for this matter. Respiratory and Gastro-enteritis disorders are more prevalent in the area. Gastro-enteritis is due to poor water quality used by local people. Water used in household activities is the mine water, which is generally hard in nature. Respiratory disorders occur due to settling of coal dust in the lungs. Transport velocity of coal dust is 25.3 metre per second in respiratory duct next to cement particles which is 25.5 metre per second

Flora (Plant species)

No rare plant species are found in the area. Mining does not causes extinction of such plant species. Plants generally found in the area are Bargad (Ficus bengalnesis), Mango (Magnifera indica) etc. Thick deposits of dust are found on the leaves of trees. It is evident from the dust fall rate which is quite high.

Conclusions

After analysing the information and data it can be concluded that coal mining has adverse impact on the environment by several ways. First it increases the air pollution which may produce adverse impact on the human health. High concentration of gases lead to death. During coal mining and transportation of coal dust releases into the surrounding atmosphere causes lung cancer to miners and inhabitants of the locality. Serious impact of coal mining on water bodies have been noticed. Mine water which is the result of the underground mining affects the water system of the area. In the study area mine water has been used for drinking with other allied works. This is causing gastrointestinal diseases in the locality. Underground mining has adverse impact on the water table of the area. Sharp decrease in ground water table has been noticed in the area due to coal mining. Huge amount of water (approximately 40-50 billion gallons annually) is pumped out from underground mines of Jharia Coalfield. Mine water has been used for coall washing to remove the impurities present in the coal. Washery effluent consists so many chemicals which is harmful to the aquatic organisms. Washery effluent has high value of BOD and COD but zero value of Dissolved Oxygen which is lethal to aquatic systems. Coal mining activity in the study area also causes land degradation by both opencast and underground mining. Here land is degraded by surface mining overburden removal, mine fire and subsidence. Due to mine fire hundreds of houses, railway lines, road and other cultural features fall in danger. Huge amount of dust is also generated by opencast mining and transportation of coal. Thick layer of dust can be seen on the leaves of the plants of the area. No major change in climatic conditions of the area is noticed due to coal mining. It has been seen that coal mining causes adverse

impact on the watter table. Terrain of the area has been badly affected by mining activities.

Recommendations:

From the analysis off the data of the study area it can be said that environment is severely affected by coal mining. Water produced by underground mining should be sprinkled on the road to minimise the dust pollution. Washery effluent which is the result of the coal washing should be treated before discharging into the river system. Gas masks should be provided to miners to minimise the incidence of lung cancer. Upper layer of the earth's crust should be preserved carefully so that it can be used at other place for afforestation and other agricultural activities. Suitable plant species have to be planted on the overburden sites. The excavated site of opencast mining should be used for recreational purposes. It can provide both employment opportunities and clean environment. Subsidence can be prevented by proper underground mining and strong support with subsequent backfilling of mine. More research work has been emphasised which can provide modern technology to overcome the problems caused by coal mining.