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Coal Mining and Indigenous Communities: A Case Study of Jharia Coalfields

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Abstract

Mining is indispensable for the individual, for the society, and for the development of the nations. Unfortunately, mining procedures and operations are often associated with health hazards and environmental deterioration. Present study has been attempted from a socio-economic point of view and the dynamics of the environment of the coal-mining region has been focused upon while keeping in mind what Gerasimov has said, "The purview of ecological approach has been enlarged to digest relevant information and results of studies in biology, sociology and anthropology etc. under such a changed set-up, Geography has equally emphasized aspects of spatial variation and relationship and biological science are no more the sole custodian of ecological approach it has rather displayed a well-marked tendency to become in other fields of science". This study has come up with issues related to harmful effects of mining and how trace elements influence the local environment and may affect human health in the vicinity of the mining area.

Keywords: coal mining, health hazard, environment, respiratory diseases.

Introduction

The mining industry is one of the three basic industries in the primary sector, the other two being agriculture, and wildlife and fisheries. Unfortunately, the general opinion of the mining industry is often associated with the accidents: disasters and environmental degradation related to mining and particularly coal mining. Certainly, there are reasons based on incidents for such opinions expressed by the people. Mine disasters receive wide coverage from the media, whether it is an explosion or mine fire or inundations, the lives of people are touched by the personal and societal impacts of these events. In most of the cases enquiries, after these disasters happen, do not deny the fact that the disaster situation was present and could have been detected with thoughtful search. In many cases human error has been found to be the immediate cause, but it could have been avoided, if the management and planning had been more efficient in their approach. In June 2005 it was reported in a national newspaper' that fourteen miners were trapped inside a mine at the central *Saunda* colliery in *Hazaribagh* in Jharkhand after water gushed in and roof collapsed. About three million gallons of water rushed into the mine of the Central Coalfields Limited (CCL). Any rescue operation could be carried out only when water was thoroughly pumped out, which took almost a week. The outcome was absolutely no chances of rescuing the trapped miners back, alive.

Apart from the mining disasters, coalminers too are subjected to certain potential health hazards, such as dust, gas, noise, vibration which may not manifest in the form of any immediate

danger but sooner or later it may cause grave negative impacts on human health as many studies and researches have shown. Our detection of the potential health hazards for the mineworkers in the mine area is limited only to the extent of present level of medical advancement. As the new studies come up, they reflect certain new perspectives about influences of mine environment on mineworker's health. Of course human civilization has come a. long way from the past when technological advancement was less and so were the medical facilities particularly in the last two centuries. The health effects due to breathing high concentrations of respirable dust in coal mines are slow to develop and can only be controlled by checking high dust concentrations in the mine and making changes in the method and planning for the coal extraction procedure. Professor Ramani, the Head of the Department of Mineral Engineering in Pennsylvania State University holds the view that "The adverse health impacts in coal mines can be slow and long term in developing but once afflicted, debilitation can be progressive and horrific. The specific conditions are most important in determining and controlling the health hazard."(Ramani, 1995)

Mechanization of mining process has not contributed significantly in reducing the risk of health hazards to the mine workers and has resulted in upsetting the environment in our coalmines. "Mechanized mining systems offer high production and high percentage of recovery with improved productivity. But they produce gases and dust at higher rates. Employees of such mining systems are exposed to many health hazards due to high dust concentrations. Even in underground coal mines an airborne dust survey showed that the dust concentration levels at, many places, such as where blasting is done, are beyond statutory limits (Sastry, *et al* 2000). The coal mining process affects adversely not only its immediate environment but through river channels and air transportation, dust particles can travel quite a distance from the mine area. According to Jones (1993) "The majority of coal-related projects have the potential to affect the environment to a significant degree. Open cast methods of coal extraction can directly affect terrestrial and aquatic ecosystems."

Objectives of the Study:

a. Societal impact of coal mining techniques in India
b. Environmental impact of coal mining
c. Impact of coal mining on human health

Methodology

The present study is an empirical research conducted in one major coalfield namely Jharia Coalfields in India. Jharia coalfield has two subsidiaries, BCCL (Bharat Coking Coalfield Ltd) and CCL (Central coalfields Ltd). The methodology of the present study includes collection of research material over the field study and direct observation methods. The present research is based on both primary as well as secondary data. Primary data have been collected from a structured interview schedule with the officers and workers of Coal India Ltd. and secondary data have been collected from CMPDI (Coal Mining Planning And Design Institute) records, monthly journals of IICM (Indian Institute of Coal Management) , books and research paper related to coal mining. The field study was conducted from the Coal India Headquarters in the year of 2014.

Environmental issues related to coal mining:

How important are the environmental concerns can be judged by that many scientists associated the recent Tsunami tragedy to global climatic change. Depletion of our forest cover and burning of fossil fuel has a significant role in increase in CO_2 levels and the resultant global warming. Coal mining and its use in allied industries has a major contribution in increase in CO_2 levels in the atmosphere. It is being said that recent tsunami tragedy is a window to what earth can do with its devastating capacities and it is well known what can be the repercussions of an unchecked global warming. In the Indian context the fragility of the environment can be judged from the following facts: a) Carbon dioxide emission from India are over 3% of global equivalent emissions of which about 55% are from the energy sector (road transport, burning of biomass fuels, coal mining and fugitive emissions from oil and gas). b) The Industrial sector generates about 100 million tones of non - hazardous solid waste and 2 million tons of hazardous 'waste annually, c) Nearly 23% of India's animal species have become extinct. d) Over 24000 hectare of India's forest

cover is lost every year and 25% of the country's area is under threat of desertification." (TERI, 2001, 2002).

Human beings are a very powerful agent of Geographical dynamics and more effective than the collective strength of rest of all the erosional or degradational forces of nature. Coal now faces increasing environmental constraints in all facets of the fuel cycle. Furthermore, the business of coal is compounded by alternatives which are gaining ascendancy in world energy scenarios. It is a formidable task to ensure that coal is mined and used in an economically efficient and ecologically sustainable manner, particularly in those countries and regions which cannot presently meet the costs of environmental protection. On one hand, the future of coal looks bright in India as we have vast resources which can enhance the steel industry and power generation which are two major coal consuming sectors of our economy. On the other side, we cannot afford to ignore another aspect which needs to be addressed equally and urgently and that is coal mining associated with the environment. Not only for India but globally coal is the most important extractive industry. "Worldwide, about 4.5 billion tones coals, all types, are mined annually with a net value of approximately £175 billion. The worlds coal industry is large and expanding, with an average growth rate of about 21.4 % p.a. throughout the

1980s. There is a significant export trade in hard coal, totaling around 0.4 billion tones p.a. which is increasingly influenced by requirements for low ash and sulfur content. The value of UK mineral production in 1988 was £15.3 billion, or a little under4%of gross domestic product (GDP). Coal dominates with some £4.3 billion in value. For the next decade and beyond, ecological sustainability will be one of the principal measures against which economic activities, including the mining of coal and its subsequent utilization, will be assessed. This will pose considerable challenges to those involved in the extraction and consumption of coal and other fossil fuels (Crowson, 1992).

Environmental aspects of coal mining:

Coal Mining has multiple adverse impacts on the environment: disturbance of the land resource, adverse effect on river channels and aesthetical deterioration of the landscape. Mine fire occurring mainly in underground coal seams and the effect on the land, water and air due to refuse created from mining and coal preparation units. The environmental implications of energy use arise from the fact that nearly 90% of the primary energy consumption comes from combustion of fossil fuels. The most direct environmental impact of fossil fuel use is an increase in air pollution levels and production of Green house gases increasing the threat of global warming and this is besides the land degradation due to mining, water pollution, and vibrations due to blasting adverse impact on the health of the mineworkers and of the people living in the adjoining areas. In Jharkhand Coal bearing area is spread over a vast geographical extent. Practically all coalfields are located in major river basins. Damodar river basin shares almost 65 % of the coal reserves located in the river basins. It is estimated that the washery and beneficiation activities amount to dumping of 10-15% of coal into rivers such as Damodar (Kadekodi, 1988)

There are two methods mainly adopted for opencast mining:

a) Area strip mining:

It is done in relatively flat areas. By this method overburden is removed and piled alongside the depression until the coal seam is reached. Then progressing further next portion of overburden is removed and filled in the initial depression. This operation is repeated and unless corrective measures are taken land stripped by this method leaves valleys and ridges.

b) Contour mining:

It is preferred and practiced in a rather undulating, hilly or mountainous region. In this type of mining at the coal outcrop in the hillside, the overburden is removed and coal is extracted by following the contour of the hillside and follows till the proportion of the overburden to coal seam thickness makes it uneconomic to mine. In this type overburden is disposed of by casting it down the hillside below the coal seam. Unless the discarded material stabilizes there are chances of erosion and landslides and also it may damage the flora and fauna downwards. "Primarily, the concern of all geographers is with the environment of man. But man cannot exist or be understood in isolation from the other forms of life and from plant life". (Strahler, 1976). "Environment refers to the sum total of conditions which surround man at a given point in space and time". (Park, 1980). Development of coalfields is essential in providing fuel for electricity generation and coke

for steel making. Exploitation of shallow coal reserves using open-cast mining techniques in this area involves removing the soil and rock (overburden) from the top of the coal seams by drilling and blasting, followed by removal using large earth – moving equipment (dumpers and dozers). The exposed coal is broken or directly trucked away.

Land degradation:

Open cast mining has a large footprint. A mine producing 40 million tons of coal in its lifetime (approximately 15 years) will leave a scar of about 25 sq km in area."(Herbert and Dutt, 2004). Surface Mining has more potential impact on land than underground mining. More than 80.000 hectare of land in India are affected by various mining activities (Valdiya, 1988)102.It is estimated that a total land of 539 Sq Km is expected to be disturbed through opencast coal mining during the tenth Plan period (L.K. Bose, 2003)103 There are large voids and mountains of overburden and the land is scarred and destroyed unfit for any productive use. The excavations have formed pits typically a few hundred meters long, more than 50 meters wide and up to 80 meters deep, depending on the depth of coal and the thickness of the seam. These pits are usually left as such by the mining company after the coal is exhausted. Most of these pits are filled with water. Near *Religada* worker's colony there are several such waterlogged pits. The water from these quarries is pumped from these quarries is pumped and supplied directly to the worker's houses. It was complained by many worker's here that there has been no filtering of the supplied water for last several years. There have been instances of dumping dead animals also in these waterlogged pits.

Environment Management plans (EMP) are part and parcel of all projects now and it would be imperative for the project officials to strictly adhere to all the stipulations as per the approved EMP's to safeguard environment in terms of land degradation, water, air, noise pollution and socio-economic issues.

Rehabilitation of mine sites:

Rehabilitation of mined areas is a key phase of open cut mining and involves the use of overburden to refill mined areas, reshaping these areas, replacing top soil, and finally sowing and nurturing vegetation. Inadequate vegetation on rehabilitated areas may result in dust generation, and also water pollution due to soil erosion and the discharge of suspended solids from the premises. Selection of vegetation species will depend on intended land use. Biodiversity of species, if local native flora and fauna are to be a feature of the rehabilitated site, 'will require vegetation to be based on seeds collected from appropriate local species. On the policy level CIL has always maintained its conviction with clarity regarding reclamation in the post mining period but it is seldom done with efficacy. "The commitment to reclamation of mined land in CIL's environmental policy is clear and unambiguous. The policy includes a commitment to progressive reclamation to achieve a post- mine land form and use consistent with the EMP, maximizing backfilling, preservation and re-use of top soil. "(Herbert and Dutt, 2004) The Environmental and Social Review Panel (ESRP 2000) says about Parej East mine (CCL) in Jharkhand, "At present virtually no effort is being made to reclaim mined land ... all the top soil resources of the mined land are being destroyed through burial in overburden dumps ... we have seen little evidence of any fundamental change in attitude to overburden management and reclamation since our first visit"

In *Religada* Underground mine (Argada Area, South Karanpura) which is under Central Coalfields Limited (CCL) there was underground mine fire and the mine had to be closed down due to this reason on 3151 May 2004.

Air quality:

Air quality status at the coalmine site and health of the mineworkers: Sources of emissions effecting air quality in the area are as follows: 1) Dust from opencast mining operations, for example movement of heavy earth moving machinery, drilling and blasting, etc 2) Exhaust from trucks, dumpers, dozers and shovels. 3) During loading and unloading operations of the coal and dump materials. 4) Dust generation from waste dumps and coal dumps due to wind erosion, and 5) Dust emission due to movement of trucks and vehicles in public roads.

Impact of coal mining on water resource:

The drainage pattern map shows 'sub-parallel' trend in the northern, eastern and south - eastern parts, but absence of drainage in the western part. Results of morphometric analysis indicate low topographic relief and high infiltration. For the environmental impact study, coal dumps, overburden dumps, fire zones, subsidence, forest, wasteland, agricultural land, water bodies and built-up areas have been selected as land degradational features. These features have been identified and delineated from individual imagery and compared with the land use/cover map. "The static ground reservoir in the whole south *Karanpura* Coal field is 97.60 million cubic meters. The impact of mining on hydro geo-logical regime has been assessed to be within 200 meters of the mining activities. The drying of a well beyond this distance is because the wells have been constructed up to the desired depth where aquifers are occurring." (CMPDI, 2013).

Impact of coal mining on forest resource the study reveals large number of coal and overburden dumps causing decrease in forest as well as agricultural lands, increase in waste lands, pollution and shrinkage of water bodies, rapid increase in built-up areas, subsidence, numerous fire zones and wide-spread coal dust deposits on the main drainage, Damodar River. The topsoil of the area has is formed out of outwashes products of the metamorphic gneiss (forming the high altitude hill range around the coalfield area). There are red gravelly and sandy red and yellow soils and at places there is old alluvium occurs in small patches at some places.

Impact of coal mining on land resource:

River Damodar is the main source of water for cultivation and sustaining underground water table. Pumped out water with suspended coal dust from the coalmines may cause phenolic (a toxic organic chemical) contamination to both surface and underground water. Due to coal mining the geomorphological, hydrological and land use pattern has changed. Vast areas have turned into hillocks of overburden all around the abandoned quarries due to unplanned dumping of OB materials. These practices choke the drainage flow and are responsible for partial blockade of nail a and rivulets at many places. If continued for a long time it also may cause change in the original course of the rivers this further upsets the ecological balance and hamper settlements. In many of the streams of Damodar, the surface run has decreased over the years. Surface rainwater at present, transports extensive sand /silt material to the river due to sheet erosion instead of gully erosion, causing geometric changes to the riverbeds.

Workers health and safety concerns:

Globally, mining remains a difficult and hazardous job and there have been concerns related to negative health impacts related to the mineworker." Mining remains one of the most difficult, dirty and hazardous occupations - causing more fatalities than other occupations even in United States or in Europe (2001). In terms of scientific evidence, despite studies showing long term historical improvements, particularly in the middle of the last century, the bulk of the literature focuses on the continued burden of largely preventable health impacts that mine workers sustain not just in their working life but beyond into their old - age.". Mining has been a primarily male dominated profession, needing to employ principally able-bodied individuals to undertake arduous risky work. In the study area for the present study also, there have been all male workers involved in the direct operations related to coal extraction. Though women are employed by CCL but they are either engaged in official work or at the lower level they are engaged in petty cleaning/sweeping work.

There are many potential hazards which can be perceived and their realization will take a longer course, but they definitely have an adverse affect on human health which may take from years to decades to realize. One such example is coal dust affecting human lungs and expressing much later in form of pneumoconiosis or other respiratory ailments. Similarly noise and vibration beyond acceptable limits can be annoying and it may do some harm to health. An accident can be considered as an abrupt realization of a potential hazard. If the hazard is of a larger intensity then it may be said to have' disaster potential'. For example overburden dumps in the mine may let's itself loose or its movement/displacement during rains may cause some accident, or due to air movement can cause a lot of air pollution etc. Therefore the location and the dumping site condition need to be chosen carefully and close monitoring and control is also required. Inundation and Mine fire are some of the realizations of the potential hazards. Various studies show that it is difficult to detect the ailments during the period of working years and mariy ailments are detected

after decades. Therefore this study looks into the perception of the mineworkers about their exposure and awareness about various health hazards associated with coal mining. As studies have shown that, there are occupational health hazards in coal mining and there is an association between dust and gas emissions in the coalmines and several respiratory and other forms of ailments. Though situation may differ from place to place, depending on whether sufficient steps have been taken by the mining company to ameliorate any situation of health hazard and adverse impact of coal mining on the local environment. Many a times, there is sheer neglect as far as the implementation of the EMP (Environment Management Plan) in the project area is concerned. Steps taken in accordance with the EMP may transform the coalmining a better work option for various skilled and semi-skilled workforces. Therefore, adopted methodology in this study is to identify the awareness level of the mineworkers to various physical and mental health hazards for that purpose, a perception based analysis based on a field survey of *Argada* area in South *Karanpura* Coalfield (SKCF) is incorporated.

Numerous studies have revealed that dust, gas, noise and vibrations in the industries or coalmines do have adverse affects on health. The coal mines are risky and hazardous, this also has been studied by many scholars and scientists and all this has been discussed in detail in the previous chapters, and there is no doubt about it. We have to see what is felt by the mineworkers of the studied coalmines. The idea behind perception based analysis is that, it is believed that risk perception or hazard perception is most essential and a prerequisite for taking actions or safeguards such as identification and elimination of the potential health hazard before its realization. There are several studies which reveal that in the Indian households, a reason of poor health, related to respiratory system especially, is the use of solid fuel and bio-fuel. It is a fact that, in the rural Indian household, bio-fuel is the main fuel for cooking purposes. In the mine areas, most of the workers households use coal as a household fuel. During the survey it was observed that, in the morning and evening the workers colony is totally engulfed in smoke emanating from burning of coal. Most of the officer's households use LPG Stoves or other electric cooking appliances. Use of Coal has been prevalent in the area among the D.R & P.R workers Household. They have been provided with LPG stoves by the company but workers prefer coal as household fuel because it comes free for them as it can be picked up from anywhere in this area. Various studies have correlated bad health conditions with the use of biomass or coal in the developing countries. "National surveys, including the 1991 national census, show that nearly 80% of Indian households use biomass as their primary cooking fuel. As a result, a large portion of the Indian population is potentially exposed to indoor and outdoor levels of pollution produced by cooking stoves."(Smith et al, 2000) Based on risks derived solely from studies of the health effects of individual diseases occurring in biomass-using households in developing countries, many in India itself, it is possible to estimate the total national burden of disease in India from use of these fuels: "Acute respiratory infection: Many studies around the world have found that household use of solid fuels is associated with acute respiratory infection in young children (although, as with all the diseases discussed here, there are other important risk factors, including malnutrition and crowding). Lung cancer, which is also dominated by smoking in industrialized countries, has been found to result from long-term experiment sure to cooking with coal in more than 20 studies in China. No such effect has been shown or biomass fuels, however. In India 400-800 women under 45 suffer from lung cancer linked to solid fuel use; the number is small because households rarely use coal."(Smith, 2000) Disorders of respiratory system among Indian children are also associated with solid fuels like coal. "Acute respiratory infection is the leading cause of death of the world's children and the largest category of ill health in the world in terms of disease burden. Almost 9 percent of the global burden of ill health and 12 percent of India's is due to acute respiratory infection. Acute respiratory infection linked to solid fuel use is estimated to cause 290,000-440,000 premature deaths a year in Indian children under 5." (Murray, et al, 1996) Tuberculosis has been associated with household solid fuel use in a national survey in India involving nearly 90,000 households as well as in smaller studies. Although this relationship is not yet established with complete certainty, it would be highly significant because tuberculosis is on the rise in many developing countries due to HIV infection and the increase in drug resistant strains. In India 50,000-130,000 cases of tuberculosis in women under 15 years, are associated with solid fuel use. Chronic respiratory disease, such as chronic bronchitis, is almost entirely due to smoking in the industrialized world. But studies in Asia and Latin America have found the chronic respiratory

disease develops in omen after long years of cooking with solid fuels. In India 19,000-34,000 women under 45 years suffer from chronic respiratory disease linked to solid fuel use e.g. cardiovascular disease. Although there are apparently no studies biomass-using households, studies of urban air pollution suggest that in India 50,000-190,000 women less than 30 years suffer from pollution-related heart disease, adverse pregnancy outcomes. Stillbirth and low birth weight have been associated with solid fuel use by pregnant women in Latin America and India. Low birth weight is a big problem in developing countries because it is a risk factor for a range of health problems.

Conclusion

Different regions/nations are reaping the adverse consequences of growth - generated activities in various forms as a result of modem technology based development. In many cases natural resources such as minerals are mined to the last limit: Mining is one of the chief economic activities in the *Chotanagpur* region. Though successive governments have been largely benefited from the abundant mineral resources of this region but little attention are paid to environmental considerations whose negligence often leads to degradation of the environment and sometimes directly and drastically affecting the surroundings. In *Dhanbad* "The reckless mining by the BCCL (Bharat Coking Coal Ltd.) which owns the right of mining in Jharia caused *Chasnala* or *Gajlitand* disaster. In this incident, land subsidence took place and Cracks developed in the houses of the entire area of *Husainabad* locality of Jharia". Though the finer points of the cause of such land subsidence could not ascertain, it is almost certain that it was caused due to the heavy underground blasting of coal in the Jharia coal field. There is certainly not unanimity as far as the ongoing discourse on economic and environmental sustainability of mining activities is concerned. The mining industry currently finds itself increasingly squeezed by environmental concerns, covering the whole range of operations from grass-roots exploration to final end-use of mineral products. This development may be inextricably linked to rising standards of living, and the associated trend towards paying more attention to the quality of life, as basic material needs gradually become satisfied. Rich societies can afford to minimize the disruptive impact of development on the environment, even to the extent of foregoing the financial benefits of that development. The same standards cannot, however, be applied in countries still blighted by poverty and disease; such impositions by well-meaning elements within rich countries are resulting in negative side effects, not only for the mining industry. The industry has to adopt the highest possible health, safety, and environmental standards that are consistent with its long-run viability, wherever it operates. It constantly has to distinguish between extreme views and reasoned legitimate concerns. It can, and should do no more.

References:

1. Biswas AK. Environmental Impact Assessment for Developing Countries. 1st ed. Tycolly International, London, 2007; 232.
2. Boliga BP. Challenges of environmental management. 4th ed. Indian Institute of Mines, Dhanbad, India, 2010;25.
3. Banerjee SP. Land Reclamation in Mined Areas. Gondwana. 2010; 63: 73.
4. Bose AK. Environmental Problem in coal Mining areas, Impact assessment and Management strategies- case study in India. Elsevier, Amsterdam,1989;4:243.
5. Chadwik MJ. Environmental impacts of coal mining and utilization. 1st ed. Pergamum Press Oxford, New Delhi, 2007-211.
6. Dhar BB. Environmental impact and abatement of noise pollution. 1st ed. ISM press, Varanasi, India, 2000; 168-204.
7. Ghose KM. Effect of opencast mining on soil fertility. Centre of mining environment, I.S.M, Dhanbad, India, 2004;12:255.
8. Goswami S. Need for Clean Coal Mining in India. Environmental Research, Engineering and Management, 2013; 4:66: 79-84.
9. Goswami S. Coal Mining, Environment and Contemporary Indian Society. Global Journal of Human Social Science. 2013; 13: 6:17-26.
10. Goswami S. Coal Mining, Communities and the Environment. 1st ed. New Delhi Publishers, New Delhi, 2014; 103.

11. Goswami, S. Impact of Coal Mining on Environment" published in European Researcher, Vol. 92, Is. 3, pp. 185-196, 2015.
12. Hill P. Improving Efficiencies of Coal Fired Plants in Developing Countries. 10th ed. Gemini House, London, 2003; 10-18.
13. Penz P. Displacement by Development. Ethics, Rights and Responsibilities. 1st ed. Cambridge University Press, Cambridge 2011;32.
14. Singh TN. Clean coal initiatives. 2nd ed. Scientific Publishers, Jodhpur, 2012;12.
15. Wathern P. An introductory guide to EIA in: Environmental impacts assessments. 2nd ed. London, U.K, 1988; 3-28
16. www.cea.nic.in. New Delhi, Central Electricity Authority, 11th Plan Shelf of Thermal Power Projects, Inc,; 2007-12 [updated 2014 April 02; cited 2014 May 10]. Available from – www.cea.nic.in

УДК 33

Добыча угля и коренные общины: социологическое исследование угольных месторождений Джахарии

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Аннотация. Горнодобывающая промышленность является неотъемлемой частью жизнедеятельности общества и развития наций. К сожалению, процесс добычи и последующих операций часто ассоциируется с опасностями для здоровья человека и ухудшением состояния окружающей среды.

Это исследование презентует вопросы, связанные с вредным воздействием добычи, влиянием микроэлементов на местную окружающую среду, а также на здоровье человека в непосредственной близости от горной области.

Ключевые слова: добыча угля, опасность для здоровья, окружающая среда, шахта пожар, болезни органов дыхания.