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Impact of Mining on the Water Scarcity And Food security in Jharkhand : A Case Study of Freshly Mined Zones of Hazaribag and Chatra Districts



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Abstract

India is witnessing the new heights of developmental changes in the present era. These developmental plans could only be fuelled by the mining resources and Jharkhand is a state which is rich in mineral resources and a major supplier of various mining ores which serves as a platform for major infrastructural plans for India. These mining activity had several side effects on the whole ecology of this region. The Dhanbad and Jharia coal mines are the live examples of the ill effects of mining witnessing several issues related to environmental degradation, pollution of air water and soil, and poor health conditions. The state has now opened up new channels and the exploration of natural resources has begun in new areas of Chatra and Hazaribag Districts. The present study focuses on highlighting the problems in Jharia and Dhanbad mines and to emphasize on learning from past lessons and avoiding and not repeating the mistakes in the freshly mined areas of Chatra and Hazaribag . The mining has poorly effected the environment specifically the water bodies which is causing severe damage to water quality in the area and continuous dewatering by underground mines also affects water resources in the area of study. The scarcity of water is not only a problem of water shortage rather it's also pointing out the problem of food security as water depletion are causing less crop production and causing threat to food security too. Mining along with the apparent climate change problem is a threat to the water resource which is needed to be addressed before it's too late.

Keywords: Water Scarcity, Food security, Sustainable Development, Climate change

Introduction

The changing India with enormous infrastructure , the index of high infrastructural development which India is planning to go through, the mega cities and model towns and tech equipped offices and mechanized life style. All these are the depiction and the signs of development which west has gone through and now it is our time to go through it but our path of development is more challenging than the west due to changing climate and depleting natural resources.

Jharkhand is one of the states of India with green identity and tribal culture. It is also known for its rich mineral deposits. Mining in Jharkhand forms an integral part of the economy. In Jharkhand, the districts of Bokaro, Dhanbad, Hazaribag, Singhbhum, Jamshedpur etc. are known for their rich mineral reserves. Some of the important minerals mined in these area that forms a basis for mining at Jharkhand are Coal, Iron Ore, Asbestos, Mica, Bauxite, Magnnese, China Clay's, Fire Clay, Graphite, Gold, Kyanite, Chromite etc. Therefore we can see that Jharkhand is the store house of various metallic, non metallic, fuel, atomic and minor minerals.

The Damodar Valley region is repository of coal resources. Singhbhum is one of the world's richest iron ore deposits and country largest copper and uranium deposits. The state holds the world's largest deposit of Kyanite and Mica. It also owns the deposits of Bauxite, Dolomite, Cobalt, Nickel, Rock Phosphate, Lime stone, Fireclay, Feldspar etc.

If we compare it with the overall country's production of minerals, we find that Jharkhand holds: 45% of the country's Mica, 48% of the

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Mining Has Adversely Effected The Water Source In Many Ways

country's Bauxite, 48% of the country's Coal, 90% of the country's Apatite, 100% of the country's Kyanite, that places Jharkhand as the mineral rich state where other resources like water and soil are vulnerable to the changes being made due to process of mining. This state is the major supplier of essential mineral resources needed to fuel the dream of development for India. We have to be cautious and effective in our planning as we have started witnessing the changes in the climate by facing the rise in temperature which has started to make our life more challenging day by day. These climatic changes and mechanized path of development are further adding up to the problem of water scarcity and depleting natural resources. The problem of water crisis is looming ahead of us putting our existence into question which is needed to be dealt with before it's too late. The water crisis further worsens the problem of food security as the food production will be adversely effected by the non availability of water resource.

Groundwater in Jharkhand is affected in many districts with excess fluoride, iron, nitrate, and arsenic. Bacterial contamination is found in surface water in many places in Jharkhand, in addition to increase in turbidity levels due to mining activities. About 80% of rural areas in Jharkhand suffer water quality problems. All the 24 districts of Jharkhand are affected by drought as per 2010 report of Water Board, Jharkhand govt. There is a predominance of cereal crop in the state. About 92% cropped area is under cash crops 40% of the total cropped area remains largely mono cropped under rice, 49% of the soils have high concentration of toxicity. Therefore the productivity of soil is very low. Agriculture is basically dependant on rain. The state does not have a perennial river system. All rivers are seasonal and receive water during monsoon. 80% of the rainfall is received during monsoon (June-September). Due to undulating topography, the water run-off rate is very high.

Mining operations use large quantities of water. The discharged water, due to lack of treatment facilities invariably flow back into rivers, causing chemical pollution since mining has been going on in this state for several decades, the quality of water of all its rivers has constantly been deteriorating.

The condition even worsens further as its estimated that a significant portion of Jharkhand's population i.e 44% is below poverty line and more than 6% is still unable to get sufficient food. The poverty ratio in the state is much higher than that of the country. Jharkhand has been witnessing gigantic industrialization for the exploitation of its natural and human resources which has caused impact on forest and led to soil erosion, formation of sinkholes and land subsidence, loss of biodiversity and crisis of water. Micacious soil (containing particles of mica) is found in Koderma, Jhumeritilaiya, Barkagaon and areas around Mandar Hill. Sandy soil is generally found in Hazaribag and Dhanbad.

The quality of water is very poor where occurrence of iron, fluoride, arsenic, turbidity, nitrated, manganese and zinc is beyond permissible limits. (i) occurrence of radioactivity effects water quality (ii) occurrence of biological pollution also effects the quality of water (iii) short life of hand pump and tube wells because of lowering of discharge is very common in mining area (iv) failure of tube wells is very common because of absence of water bearing strata. (v) failure of tube wells is also common because of caving in of assembly.

Statement of the Problem

Some areas of mining are facing acute water scarcity mainly during summer and winter seasons. Dug wells and tube wells generally get dried up in these two seasons. Natural drainage system is obstructed and divided due to dumping of over burden and expansion of opencast mines. This water crisis has been severely deepened by the basic techniques of mining in the state. Souring temperature, altering climate condition and depleting water, these are the signs that are more than enough for us to rise and raise our concern before it's too late.

In this research paper I have tried to explain the affects of mining at other coal mines like Jharia, Dhanbad and its possible effect on mining in Hazaribag and Chatra specifically on the effect of water availability and water quality. This relative assessment is further used to analyze the severity of problems to be faced in the freshly mined zones of Hazaribag and Chatra Districts of Jharkhand. The problem of water stress has started to give its visible signs and act wisely to save the basic resources of survival like water and soil. It should be realized to ensure the food security too.

Objective of the Study

The objective of the study is to analyze the

1. Basic technique of mining in the state
2. To study the impact of mining on the water availability and water quality that further raises the economic problems in the region
3. To study the impact of mining on the food security

Hypothesis

1. The basic technique of mining is not supporting the sustainable development
2. The mining has affected the water availability and water quality in the study area forcing the population to rely on buying drinking water or on the supply of water tanks by the Government.
3. The mining has caused in the damage of top soil and water crisis resulting in food shortage.

Methodology

The present study is based on primary data supplemented with secondary data collected from articles, journals, magazines, book and periodicals to obtain information on the area of study.

Data Collection : Data was collected for the research work using two collection methods

1. Narrative inquiry
2. Personal observation

Sampling

Five village in total were selected for study, two village (Tandwa and Masilaung) from Tandwa Block of Chatra District and three village (Bukru, Karali, Chattipetu) from Keredari Block of Hazaribag District. 15 households from Karali, 15 households from Chattipetu, 10 households from Bukru, 10 households from Tandwa 10 and 10 from Masilaung were selected.

In total 60 households were selected for the study. The size of the sample has been selected on the basis of size of population of the respective districts and on the severity of problem of water scarcity.

A pretested structured interview schedule in 60 households out of 5 village were selected.

Community level assessment including focused group discussion and participatory Rural appraisal tools and techniques were carried out. It included local villager, PRI representative and line department staff. The public focus group discussion included representatives of target population and informed public was done. They were briefed on the objectives and purpose of the study and their queries were answered.

The participants opinions were solicited on the following main issues.

1. Sources of water supply
2. Quantity of water supply
3. Quality of water supply
4. Quality of water as per smell, taste, colour etc.
5. Prevailing diseases and
6. Expenditure borne on water and health.

Secondary Data Survey

The study based on the secondary data source done on Dhanbad and Jharia Districts of the state will be used to generalize the result on the freshly mined zones of Hazaribag and Chatra Mines. The results and data used for Dhanbad and Jharia Mines have already been empirically tested. The outcomes and findings of these two Districts will be analyzed further to be used as an instruction and guidelines to avoid the mistakes done earlier in order to reap the economic benefits of mining.

Impact of mining on water scarcity resulting to food security in Dhanbad and Jharia Districts would be studied to avoid the severity of impact of mining on water scarcity resulting to food security in newly mined zones of Hazaribag and Chatra Districts.

In Hazaribag and Chatra Districts CCL (Central Coalfields Ltd.) as a whole is dealing with the process of mining under various Projects. At present there are two Coal Projects running in the area (i) Amrapali and (ii) Magadha, running specifically in Tandwa Block of Chatra Districts.

In Hazaribag District the work is still going on to fulfill the prerequisites of mining in the area i.e of removing the hurdles before starting the projects.

Impact of mining on water resources occurs at different stages of mining. The mining process itself has a negative impact on water. The mineral processing operations via the dewatering which is undertaken to make mining possible. Seeping of

contaminated leachate from waste rock piles and tailings dams makes the water quality vulnerable to disease an unfit to drink. Through flooding of water after extraction has ceased. Discharge of untreated waters after flooding is complete.

The exploitation of mineral resources through surface and underground mining has caused wide ranging environmental problems such as land degradation, air, water, and noise pollution. According to the Chari Committee report 4,561.14 hectares in Jharia coalfields have been severely damaged due to subsidence, abandoned quarries and spoil dumps.

The mining causes potential threat to the water resource in many ways. It damages the aquifers, floods adjoining regions, lowers water table, contaminates the surface water and siltation of rivers. The excessive mining in Jharia Coal fields has led to decrease in length of natural surface drainage lines by 260 kms and have caused a decrease in the total forest cover by 28.83%. It has caused regional lowering of water table at average rate of 2 cm / year. Problem is more in open cast mines. Hence mining pushes the land degradation cycle towards desertification.

Worsening the situation this mining is causing deaths of rivers of Jahrkhand. Damodar a sacred river has changed into sewage canal. Total catchment areas is 23170 km and having 67 coalfields. Study reveals that a single washery discharges 40 tons of fine coal/ day and about 11 washeries are there with annual installed capacities of 20.52 million tons. Karo in West Singbhum is polluted with red oxide from iron ore mines, Swarnrekha river : contains metallic and dissolved toxic waste from TISCO, Jamshedpur.

Mining Is Done Through Two Process Surface Mining

When coal is less than 200 ft. below the surface. Top layers of soil and rocks are removed to expose the coal. After mining is complete area is re-vegetated and can be used as cropland wildlife habitat, recreation commercial and industrial use.

Underground Mining

Three different methods to asses coal deposits are used Slopes, Drifts and Vertical shafts.

Mine water is in mined ground (including waste rock/ tailings depositories) and/ or which is now flowing from mined ground into adjoining water bodies (such as streams, wetlands, lakes, aquifers and oceans). Mine waters are part of the water cycle but are rarely treated as such in regulatory frameworks. This is despite the fact that short and long term pollution from active and abandoned mines is still one of the most serious threats to the water environment. The concentration range of heavy/ trace metals analyzed in the acidified mine water samples of Jharia and West Bokaro coalfields. In these coal mines water concentration of Fe, Mn, Cu and Cr exceeded the WHO (1997) and BIS (1991).

In the coalfields of Hazaribag and Chatra the presence of higher concentration of heavy metals in discharged mine water may cause contamination of other resources in the area which would expose the

population to the health hazards like hypertension, cancer, and gastrointestinal disorder.

There are open Cast mines in the mining areas of Hazaribag and Jharkhand with water body running alongside with it making the water quality negatively affected and causing health challenges. Drinking extremely hard water might lead to an increased incidence of Urolithiasis (Bokaiana 1965). High concentration of Nitrate contents can cause Methamoglobinemia in infants and Gastric Carcinomas.

Further this mine water is causing health hazard by following ways:-

1. The effects of untreated effluent of mining industries pumping into public water ways releasing harmful gas emissions into the atmosphere, uncontrolled toxic dust or dumping wastage which leeches dangerous chemicals into the groundwater table, has fatal implications to the people living in the surrounding areas.
2. High level of lead in the blood leads to central nervous system disorders, decreased vitamin D metabolism, anemia and cancer.
3. Diseases such as arthritis is normally an old age (after the age of 50) but in the Mica mining areas even 20 years old suffers the problem of arthritis. There is a definite correlation between Mica dust and the disorders.

Villagers have no alternative but to drink the water of the wells provided by the miners which people often complain of foulness in taste colour and with filth in the contents.

A large part of these mining areas are facing severe water crisis which worsens during summer season. Groundwater level in rural as well as urban areas in the area of study has decreased. The supply of water through water cans and water tanks, failure of boring and deep boring etc are the common occurrences in these areas both urban and rural. Sources of water available in the rural areas are open or dug wells, hand pump, tube wells, rivers, lakes, ponds or dams. Most of the area is depending on hand pump. There are few piped water supply channels. The tube wells and hand pumps fail very often.

Primary Data Survey Findings

Conducting the field survey with data size of 60 households from the five villages of Barkagaon and Tandwa block of Hazaribag and Chatra Districts it was found that :-

1. Almost all the families have to tread 1 -3 km and stand in a queue for hours every morning to get potable water. The well and hand pump in those areas almost run dry for 3-4 months every year.
2. There are three plants producing and marketing the packaged water in the freshly mining areas of Hazaribag and Chatra. During winter average daily sale of each plant is approximately 100 jars of 20 litres of capacity. So it comes around 6000 litres each day. During summer this sale goes up to 150 -200 jars each day that makes total daily sale comes around 9000-10000 litres every day.

The name of water industries are (i) Nirmal Jal (ii) Crystal water and (iii) Suresh Singh as the owner is running the company in his own name. Expenditure borne on buying water is replied with an assertive answer by 78 % and the remaining population manages the water shortage from one or the other alternative sources.

3. Main occupation is agriculture where the crop is rain-fed and agriculture is able to provide employment only up to 6 months. In the lean off agricultural season the villagers are forced to migrate to nearby towns in search of jobs as daily wage labourers or to work in mines as unskilled labour force.
4. Almost all the villagers have to face the problem of acute water shortage during 3-4 months (March- June) every year.
5. Dependency on water tanks is becoming the major source of water supply in these villages of Barkagaon and Tandwa Blocks, it takes 1/5th of their income to be spent on water. Water irrigates the fields so the production has come down to one harvest in an year especially during rainy season. The rest of the time the fields lie barren pushing them further into poverty and raising the issue of food security
6. Water crisis is also fuelling distress migration with no permanent source of income.
7. Sources of water for drinking in the area of study

Sources of Water	No of Households (%)
Borewell / Hand Pump	21.3%
Public Tap	17.6%
Community well / Personal well	10.4%
Household water supply (Piped)	12.4%
Other (Tanks, Buying water etc)	35%

8. Effects of Mining on smell/ Taste, colour, quality and of water as answered by respondents:

Smell of Water

No smell - 33.6% ,
Foul Smell - 62.4% ,
No idea - 4 %

Colour of Water

Clear - 6.4% ,
Cloudy- 43.2% ,
Dirt in water - 46.4%

Taste of Water

No taste - 19.21% ,
Tastes Bad / Weird / Iron - 76.8%

Quality of Water

Poor - 36.8% ,
Very bad - 43.2% ,
Satisfactory- 16%

Medical Problems due to Poor Quality of Drinkable Water

Very Seldom- 3.2% ,
Quite often - 86.4% ,
Don't know - 6.4%

It's evident from the above study that situation and receiving less than normal rainfall These areas has been facing drought like for last 3 years and before that, it has been facing the problems of drought frequently. The water is not available

throughout the year from their main source of water supply. They have to rely very frequently on the alternative source of drinking water (like tankers supplied by Government or CCL or NTPC projects running in these areas) as whatever water is available is not safe for drinking. It also shows that the smell, taste and colour of water is badly affected by the mining activity and it's apparent to find dirt and filth settling at the bottom of the vessel in these areas. That definitely raises the question of water quality in these areas and justifies the common occurrences of medical issues pointing out at water borne diseases which is badly affecting the human health. The shortage of water supply has also led to decline in the food production in this area, land under cultivation has declined, water for irrigation is not available and the upper crust of soil is damaged due to open cast mines and pollution due to mining activities. This has apparently led to decline in vegetation and food production and at the same time mining has adversely affected the soil quality along with water quality in the area of study. The area is severely hit by drought very frequently and steep decline in food production and water availability is putting the pressure on existence of mankind. It's not only water scarcity but the food security too that is a major concern for these areas. As due to water shortage the villagers are not able to harvest more than one crop in a year. This way we find that all three hypothesis are justified after the outcome of the field survey.

Conclusion

Hazaribag and Chatra mining region is rich in terms of some key ores and minerals and its abundance in cheap labour force due to its backwardness pushes the population to work in these mines and to portray the economic paradox of region being economically rich and inhabitants being economically poor. It has brought with it the ill effects the worst of which is the devaluation of its environment in the name of the development large forests have disappeared in these areas. Water in these areas has been polluted to an extent that is beyond prescribed safety level. Mining wastes pollute streams and rivers which are carried by rain water into nearby water courses, alters their chemistry and often makes the water unfit for human use.

The water bodies in these areas are shrunken and filled with filth and rubbish, expanding obnoxious odor. The release of abundance of various toxic metals like arsenic, mercury, chromium, nickel etc from the coals and mines spoils the water quality to vulnerable level. The villages in these areas are mostly served by minor irrigation pipeline provided by the Government or CCL. Apart from this these areas which are basically served by agriculture as the main occupation is rain-fed with no proper and permanent source of irrigation in their village leading to threat to food security.

The challenges we are facing now are more serious and challenging. The temperature is expected to keep going up. The water shortage has also started showing its sign. Problem of energy, climate, food, economic pressure, depleting natural resource base

all these are happening simultaneously. It is very difficult to focus and cope up with the problem. It could only be done when we will learn to use these resources for our need and not greed. These are all man generated crisis that's going to be threatening for everyone in near future.

It's now the need of time to learn from our past experiences and not to repeat the same mistakes which we had been doing earlier. The condition of Jharia and Dhanbad mines, the effects of mining on the water bodies of those areas have given a clear picture to the organizers, planners and general masses that what could be the outcome of need converting into greed and today's delinquency would be tomorrow's disaster not only for the people of Hazaribag and Chatra but for the whole mankind. The irony of the situation is that the projects which are running in these areas are Government owned which are well aware of the environmental laws and limitations of working without effecting the environment but there is a difference between paper and practice. The effect of mining and its toxic effect are rapidly being carried out with the water body in these areas and effecting the water supply of nearby towns raising the question to the aspect of sustainable development.

Suggestions

There should be strict legislation and proper implementation of law to avoid the problem of illegal mining and the environmental considerations should be strictly implemented for adhering to the rule of sustainable development.

Government along with the companies responsible for carrying out mining in the area should take the responsibility of sticking to the law and to clean up the wastes and water bodies on regular basis.

General awareness campaigns and training regarding the importance of water and ways to conserve them should be imparted on a regular basis. The methods of conserving, purifying, and using water as a resource which is essential for ones survival is important which should be made a habit before it's too late.

Water is essential for survival, water is life hence it's everyone's duty to conserve water and maintain its quality and harvest rain.

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