

JHARIA COAL MINE FIRE AND ITS IMPACT

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Dhanbad, the second largest town in Jharkhand is known as the Coal Capital of India, thanks to the 110 sq. km. stretch of undulating land with mines all around and villages surrounding it. Famous for its underground coal mine fire raging for the last 100 years, it has the capacity to power the economic development of the country (Prakash, Gens, Prasad, Raju, & Gupta, 2012).

Jharia, home to around 23 large underground mines and 9 opencast mines has around 70 underground mine fire burning in its belly, engulfing coal at the rate of 12-15 million tons per year (Ferris, 2015). These fires compelled the people to leave their abode since it becomes very difficult to live in a place where one is in constant dilemma about the roof collapsing down due to the intense heat of the fire, ground at times becomes so hot that the soles of the shoes start to melt down, water resources gets dried up, people face livelihood issues and all this factor together cash in for the people to move to other nearby place and leave their houses which their ancestors have built and made them homes over the years.

In this paper, an attempt has been made to show the displacement of the people and the impact of the fire in the lives of the locals and also in the environment. The paper is based on secondary data collected from various sources. It shows how the fire is having an impact on the lives of the people and also hindering the development of the area. The government should try not only to resettle the entire people from the area but also go for providing some alternative livelihood opportunity in their new place.

Keywords : *Coal Mine Fire, Impact, Livelihood, Migration, Jharia*

Introduction

Jharia, one of the eight-blocks in the periphery of Dhanbad district of Jharkhand is known as Coal Capital of India and is at a distance of 160km from the State capital Ranchi. It is known for its massive, oldest and widespread fire which is raging in its mines since 1900's. A total of 70 underground mine fire, spread over an area of 100 sq. km is eating away the 4.6 billion tons of country's only source of best coking coal and as a result, India has to import coal worth of \$4 billion annually (Sindhuja, 2015). Seeing the reserves of the coal and its utility to the steel industry and to the country, the government of India has an ambitious plan of doubling the current 1.5 million tons of coal produced by 2020 (Roy, 2017). These fire which can reach to a height of 20 ft., has eaten away 37 million tons of coal and made 220 billion tons of coal inaccessible (Roy, 2017). This has been so far

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at the rate of 10-12 million tons a year. The mines which inherit the fuel to drive the economic development of the country is posing the threat of global warming because of the fire. The COP 21 climate summit in Paris dealt with the scenario of rising temperature of the earth surface because of the continuous rise in the greenhouse gases. These fires spit out 1.4 billion tons of gases annually and are the 4th biggest producer of greenhouse gases in the world (Sindhuj, 2015).

On the face of environmental impact, the locals are also equally feeling the heat of the fire in their lives. The temperature of the fire which can go up to 80 degree Celsius is making the life of the local inhabitants very difficult and miserable (Sindhuj, 2015). The intensity of the heat is so high that the nearby infrastructure like roads, houses, railway lines are getting damaged. The houses have developed cracks and there is always a fear that the roof of the houses can collapse any day because of the heat. The railway lines are getting damaged and the underground water aquifers are shrinking day by day making the availability of water to the locals more difficult day after day. The fire is making the 7 lakhs people around it sick because of the gases emanating from the fire (Pandey, 2014). But the people are reluctant to leave their place in fear of loss of daily source of livelihood opportunities since mining is the main source of livelihood. Now, the fire is making mining inaccessible which is around worth \$220 billion and unsafe for the workers to work (Roy, 2017). This has compelled many of the workers to migrate to the city as daily wage earners. Also, because of the intense heat of the fire, there have been cases of creation of sinkholes which swallowed entire families and workers. And then there are the gases resulting in various skin and lung diseases particularly affecting the health of the children. All these factor has resulted for an increase in migration.

The government along with the State government had many unsuccessful attempts to address the issue. Currently, there is the project of relocating the families to a safer area away from the fire. This is being done through the Jharia Rehabilitation and Development Authority (JRDA) established in 2004 for implementation of Rehabilitation and Resettlement of people who are not related with BCCL, residing in fire-affected areas and the Bharat Coking Coal Limited (BCCL), a public sector undertaking engaged in mining of coal and allied activities, engaged into the relocation of only it employees. The government is considering to go for open cast mining so that India's economic wheel is not disturbed as open cast mines are cheaper than the underground mine fire and also has a slightly higher productivity. After relocating the entire people the government will be able to tap the huge reserve of 4.6 billion tons of high-quality coal (Biswas, 2015).

Using secondary sources of data, this paper is an attempt to discuss the problems relating to migration and displacement, health hazards, damage to the infrastructure and the loss of livelihood of the locals because of the adverse effect of the fire.

Literature Review

Jharia, one of the eight blocks in Dhanbad can be termed as the powerhouse of the country since its mines are the only source for the best quality coking coal required by the steel industries and others in the country (Taylor, 2007). It has a total of 23 large underground and 9 open cast mines which are in contractual terms with fire since 1916 and has a total of 70 such fires raging within it (Prakash, Gens, Prasad, Raju, & Gupta, 2012). Bharat Coking Coal Limited (BCCL), a public undertaking engaged in mining is responsible for the relocation of the people safely to another place. According to BCCL, 37 million tonnes of coal has been destroyed and 220 billion tons of good quality coking coal is inaccessible because of the fire (Michalski, 2004). This has forced our country to spend around \$65 billion in importing that grade of coal only and a total of \$1.5 billion annually (Roy, 2017).

The underground coal mine fire in Jharia has led to many near by problems in the areas and to the locals. The intensity of the fire is so high that the walls of the houses in the area develops cracks and the roofs fall down (Kuenzer, Zhang, Tetzlaff, Van Dijk, Voigt, Mehl, & Wagner, 2007). Therefore, often the locals have to invest their savings in rebuilding them time and again and they don't receive any help from the government also. According to Sinha (1986), it is one of the main factors of people migrating from the area.

The heat from the fire also dries up the nearby water bodies and underground water aquifers (Sinha, 1986). This has led to shortage of water in the area and the hand pumps have dried up. There have been serious public health issues in the area because of the air pollution. Various harmful gases are released which seriously takes a toll on the health of the locals. According to Singh (2016), water gets polluted from the fire whose fumes gets trapped in the land and gets dissolved in the underground fires and nearby water bodies causing various water-borne diseases like diarrhea and gastritis.

The fire poses a huge threat to the nearby infrastructure also. Recently, Indian Railways have taken the decision to close the 41 km long rail route between Dhanbad to Chandrapura, thus cancelling 19 trains consisting of 6 passenger trains (Pandey, 2017). The Indian railways are expected to suffer a loss of around INR 2500 crore

(Pandey, 2017). This has been the second such decision by Indian Railways after it closed down the Dhanbad-Patherdih railway line in 2007 (Biswas, 2015).

These are some of the pertinent issues related to coal mine fire that need immediate attention. Therefore, the need of the hour is to address these issues and relocate the people from the area before any disaster occurs and also tap the potential of these mines.

Objective

The purpose of this paper is to provide some insights about the impacts of the coal mine fire on migration and displacement of the people and its implication on their livelihoods, health hazards faced by them. This paper is also an attempt to understand the repercussions of the fire on the nearby resources.

Methodology

To study and understand the impact of the coal mine fire, secondary data were collected from journal articles, newspapers, research papers and various internet sources, etc. In addition, a report consisting of some vital data and information was also extracted from the office of the Bharat Coking Coal Limited (BCCL). The author has also included some of his observations and experiences since he is a resident of Dhanbad which is nearby to Jharia.

Findings and Analysis

Jharia Coal Mine Fire

Jharia saw its dawn of mining in the year of 1894 and the first fire broke out at Bhowrah in 1916 and has been active since then. Coal fire refers to a burning or smoldering coal seam, coal storage pile or coal waste pile (Kuenzer, Zhang, Tetzlaff, van Dijk, Voigt, Mehl, & Wagner, 2007). Sometimes it remained dormant for years and then again rises from sleep engulfing hundreds of tonnes of coal at a time. By 1960 it has spread to other coalfields and flames could be seen as high as 20 meters.

In 1971, Indian coal industry was nationalized under Coal India Limited (CIL) and Bharat Coking Coal Limited, a subsidiary of CIL was formed. Bharat Coking Coal Limited showed interest in working within the 450 square kilometer but suffered huge losses due to the fire. There has been a loss of 4065 crore to Bharat Coking Coal Limited, 37 million tonnes of coal has been lost and 220 billion tonnes are locked up or inaccessible due to fire (Stracher & Taylor, 2004).

Jharia alone has 70 mine fires of the total 163 fires identified across the nation (Stracher & Taylor, 2004). This fire has not only resulted in the loss of the coal but also made a dent in the country's budget because now India has to import coal from other countries in spite of the fact that it is the 3rd largest coal producing country in the world (Sinha, 1986). There have been efforts by the government to know the causes of the fire and extinguish it but all such efforts till date have been in vain.

Causes of Fire

Natural Factors

The temperature in the coal accumulated within the mines rises because of adsorption of oxygen due to exothermic reaction and when this temperature crosses over 80 degree Celsius, it results into ignition within the mines and burning of coal (Sindhuja, 2015). Then, there are other factors like thunderstorm, lightning, bushfires, forest peat fires and surface fire being transmitted to culm banks. Added to this, there are other reasons like spreading of fire due to heavy wind. The wind acts as a conductor and enhances the fire which keeps on enlarging during windy days. During summers, due to the excess temperature and exothermic reaction, coal catches fire very easily and spreads to nearby mines due to the fast burning nature of the coal.

Man-made factors

There are numerous man-made factors responsible for this. To name a few it can be mining-related activities such as cutting of the mines through machines, sparks from welding, blasting which catches fire easily in the coals, electrical works which produces sparks and makes the coal combustible, mining accidents, throwing away of cigarette butt near the mines, ignition of reactive gases like methane and hydrogen from the mines which results in fires upon reaction, burning trash near the mines which results in fire, if not extinguished completely and oil-soaked rags, lumber, hay or manure in culm banks which acts as a reactive agent for fires. These actions can also be unintentional because of the lack of awareness.

Impact of Fire

Migration and Displacement

Migration means to move from one country/region/place to another in search of food, shelter etc. The most important aspect of migration is that the migrant can return to their original habitat as and when they wish. According to UNESCO, the displacement of people refers

to the forced movement of people from their locality or environment and occupational activities. People are moving out of Jharia because of the fire which not only has an economic impact but it also has a physiological effect on the people. People are in constant fear that because of the high intensity of the fire their houses can may collapse any day and thus they are forced to displace from their place.

People are migrating because the fire is hindering in the process of mining. Mining is the source of livelihood in the region along with daily wage earners and other labour works. The livelihood of the people has been greatly reduced because of the fire. Now the fire has made the working condition very difficult in the mines. This made the collection of coal very difficult and which reduced the coal production significantly.

People are being relocated to a safer place from the fires but the livelihood opportunity still remains a hurdle in the lives of the people. This has resulted in more illegal mining in the areas where they fill 4-5 sacks of coal consisting of 45kg of coal in each. These are sold off with the price of 200/- kilogram and but receive only 1/- for 1kg of coal since there is value added in the raw coals at every level (Singh, 2016). Now, even this income is hard to earn. Even though people have been relocated to Belgaria, a township 20 km from Dhanbad but no one goes there to live since they face major livelihood hurdle in their new place (Ferris, 2015).

Environment and Health Hazards

The fumes emanating from the notorious fire not only adds to the global warming but also poses a great risk to the lives of the locals. This coal fire is contributing enormously to the global greenhouse effect releasing around 1.4 billion tons of carbon dioxide into the atmosphere making it the 4th biggest producer of greenhouse gas (Ghose & Majee, 2000). Along with carbon dioxide, sulphur dioxide, carbon mono-oxide and suspended particles etc. are also released which causes many health problems to the locals like skin and health diseases, chronic bronchitis, asthma and pneumoconiosis (caused by coal dust). These gases get trapped in the land eventually contaminating the underground water and nearby surface water bodies resulting in sulphur poisoning causing diseases like diarrhea and gastritis (Singh, Mahato, Neogi, Tewary, & Sinha, 2012).

The fire and its fumes are contaminating the land, water, air, trees, and vegetation, as a result, they are dying on this arid dystopian landscape. Recently there has been a death of a father and his son because of falling in the sinkholes while walking near to mines.

Damage to Infrastructure

The ever-increasing nature of the fire is posing a great threat to the nearby infrastructures like houses, roads, railway lines, electric poles etc. Roads are broken down, plants are either burned down due to the fire or covered with coal dust, electric poles are just standing audience, taps are thirsty and the locals are just hawkish about getting these problems fixed by the government. The railway tracks are also getting damaged because of the intensity of the fire. Dhanbad-Patherdih railway route has been closed in 2007 and the railway lines have also been uprooted and the stations are abandoned (Biswas, 2015). These have affected the locals since they were directly and indirectly affected by it. The 41km long Dhanbad- Chandrapura railway line was declared unsafe in 2005 but still, the line is in use. Recently again because of the adverse impact of the fire the line has been declared unsafe and closed from June 2015. This has affected on the lives of people, directly and indirectly, affecting their livelihood and the opportunities.

Government Efforts

Jharia's wholesale market along with its huge coal reserves is not only the backbone of Dhanbad but also holds a great potential for India. The reserve of around 4.6 billion tons of high-quality coking coal, India's only reserve has attracted the attention of the government (Pandey, 2017). The present government is planning to ride on this huge reserves of coal to drive the slowing economic engine of the country. Therefore, with the aim of doubling India's coal production to 1.5 billion tons by 2020, the government has to relocate the entire population to a safe place so that they are able to extract the coal through open cast mining when there wouldn't be any risk of human lives (Reuters, 2015).

Jharia Master Plan with a projected cost of around 25000 crores is being seen as the world's largest rehabilitation scheme. Jharia Rehabilitation and Development Authority (JRDA) identified 1 lakh families who need to be relocated, compensated and given housing and livelihood security. Of these, 4715 persons have been given employment and 2390 families have been resettled with a total compensation of INR 1621.26 lakh being given (Singh, Singh, Singh, Chandra, & Shukla, 2007). So far the master plan has failed to relocate 90% of the affected people. Government official says that the target is to construct 65300 houses.

Jharkhand is a tribal dominated state and therefore BCCL has taken special consideration in matters related to tribal. A number of Projected Affected Tribal Families (PATF's) in the area were 233 and out of which all of them had been compensated for their land

lost in mining or due to the fire. BCCL lacked in providing employment and to resettle them as only 48 of them were employed and 32 of the tribal were resettled (Dutta, 2006).

Table-1. Statistics of Rehabilitation and Resettlement under the Master Plan.

	No. of houses Endangered	No. of houses proposed to be evacuated	No. of houses proposed to be resettled
BCCL Houses	44155	36208	25000
Non-BCCL: Private Houses	29444	15571	29444
Non-BCCL: Unauthorized Houses	23847	12719	23847
Others (schools, hospitals etc.)	868	802	868
Total	98314	65300	79519

Source: Bharat Coking Coal Limited, 2008.

Table-2. Rehabilitation of inhabited sites from endangered areas

Sl. No.	Particulars	Master Plan 04	Master Plan 06	Master Plan 08
1	No. of sites proposed to be rehabilitated.	532	595	595
2	No. of house to be vacated	65300	79159	79150
3	No. of house proposed to be Resettled/ Constructed	65300	79159	79159
4	Phase wise no. of houses proposed to be resettled/Constructed	65300	79159	79159
5	Land required for rehabilitation (Hectares)	1780.64	1504.99	1504.99
6	Time frame for implementation (20 years)	20	10	10
7	Capital required(Cr.)	2446.91	4185.94	4780.60

Source: Bharat Coking Coal Limited, 2008.

Table 2 shows the BCCL's master plan for the resettlement and rehabilitation process. It gives the detail of the various aspects for the resettlement for the 4 years duration.

Table-3. Table showing dealing with fire by the government under its Master Plan

Sl. No.	Particulars	Master Plan 04	Master Plan 06	Master Plan 08
1	No. of fires identified at the time of nationalization	76	77	77
2	No. of fires extinguished till date	10	10	10
3	No. of collieries affected by fires	40	41	41
4	Total surface area affected by fires	8.90 sq. km.	8.90 sq. km.	8.90 sq. km.
5	Total no. of action plan	66	67	67
6	Total fire projects implemented	40	45	45
7	Total duration proposed for implementation of fire projects.	15 years	10 years	10 years

Source: Bharat Coking Coal Limited, 2008.

Table 3 shows the effort of Bharat Coking Coal Limited in stopping the fire from spreading. The total surface area affected by the fire remains same over the years. Also, they took more time to implement the same projects. This shows that stopping the fire from spreading requires a lot of effort and time. Bharat Coking Coal Limited has failed to completely extinguish the fire as well as recognizing them. The table shows that the number of projects implemented has increased over the years, but its output is not seen in the field. This shows how the government has poured in the money for this, but it resulted in nowhere.

Discussion

Jharia coalmine fire has been living on for many years. What it requires now is proper attention and due seriousness by the government officials. Taking this into consideration, a recent experiment by Dr. C.R Babu from Delhi University in Bhurkhunda, Ramgarh proves out to be a great source of motivation towards addressing the problem. He along with his team has been able to extinguish the fire over an area of 50 hectares. The research work was carried out for 3 years from 2010 in 3 phases. In the 1st phase, *Thermo filling* bacteria were mixed with mud and cow dung and introduced in the cracks of the mines. On coming in contact with the fire the bacteria expanded exponentially and formed a coating around the burning coal which formed a barrier between the coal and the oxygen supply. This stopped the combustion process. In the 2nd phase, the grass was planted, roots of which blocked the air from going beneath the ground. This resulted in an increase in moisture and also the vegetation. This was the proof of the decrease in temperature beneath the ground and of the fire being extinguished. In the 3rd phase, trees were planted and *mangrove* bacteria (organic manure) was sprinkled in the roots. This resulted in the growth of the trees and providing nutrients to the soils. This experiment in 50 hectares of land proved successful and should be replicated in the other areas of the Jharia region supported by the government.

Relieving the locals of the impact of the fire could be done by collaborating with the government schemes and programmes so that the locals are benefited and also the objective of the programme is achieved.

Addressing the livelihood issue, the state government could team up with the National Skill India Mission and can go for imparting skill to the locals under the flagship programme of skilling India. This will not only address the unemployment issue but will also help the government in achieving its objective under Skill India.

The government can also address the issue of cracked walls and collapsed roofs of the houses through its programme Housing for all, providing houses to the urban poor by 2020. Under this programme, as the sum of INR 70000 is given for the construction of the house. This can at least save their saving which they have to spend in rebuilding their house. Similarly, roads can be constructed through National Highway Authority of India (NHAI).

All this can be possible if the governments give priority to the issues of the people of Jharia and not see them just as vote banks. Fire can be extinguished and its impact could be mitigated if the government together with the local agencies and the people works effectively and efficiently towards resolving the issue.

Conclusion

The fire at Jharia has become a bane for the people over the years. It is the view that mines and industries bring development to a place but Jharia stands here as an exception. With the presence of so many mines and industries, it still remained underdeveloped solely because of the fire. People here believe that mines have brought fire to their native places and hence poverty came in the area. Only they can understand the magnitude of loss caused by fire over the years. The people although are allegedly indulged in illegal coal trade but this didn't prove out to be a savior for them. The livelihood issue in the area could be resolved if the government can work proactively towards the well-being of the people.

Fighting with fire has been a challenge for the mining industry and the government. There has been a recent success in extinguishing and controlling the fire by scientists and their teams. What needs to be done is to scale up the experiment on a large scale with the help of the government so that the fire could be tackled and extinguished as soon as possible because it is not only eating away the country's best quality coking coal but also taxpayers money. The government needs to address the health problems being surfaced in the area because of the fire and take some remedial measure for the same.

It depends ultimately in the hands of the government on how they approach for solving the issue of fire in the region. Whether they take the larger concern of the nation and go for addressing it or just stick to their political agendas and use it to win elections? It remains to be seen in the near future.

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