

## A Historical Study of Coal Mining of Raniganj-Jharia Area of India and the Current Environmental Problems

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### Abstract:

Raniganj and Jharia are coal mine areas in the eastern part of India. Raniganj is situated in the west Bardhaman district of West Bengal. The area is bounded between latitude 23°25'N to 23°55'N and longitude 86°45'E to 87°25'E. Jharia is situated in the Dhanbad district of Jharkhand. The area is bounded between latitude 23°42'N to 23°49'N and longitude 86°08'E to 86°19'E. The early history of coal mining in India can be traced back to 1774, when the collector of Chotonagpur, Grant Hitley, discovered coal in the Raniganj area. He and Mr. Jhon Sumner applied for a license from the Governor General of East India Company to do mining activity in the Raniganj area. In the same year, the Sumner-Hitley firm opened the first coal mine near Sitarampur. The big agency houses of Calcutta were involved in mining activity in the Raniganj area in 1820. Messer's Alexandar and Company were first involved in the coal mining industry. After that, various private companies had done mining activity in the Raniganj area since independence. In the Jharia area, mining activity started in 1894. After independence, the government of India nationalised the coal sector in 1974. ECL (Eastern Coal Field Ltd.) and BCCL (Bharat Cooking Coal Ltd.) are the two major public sector companies involved in coal mining in the area after the nationalisation of coal fields. Local people, syndicates of local people, and mafias all engage in illegal coal mining in the same areas. These two types of mining activities put tremendous pressure on the environment and human society in these areas. The present paper focused on the history of coal mines in the Raniganj-Jharia area, the total environmental degradation of the aforesaid areas, and its effect on human society in the areas.

**Keywords:** Coal, mining, involved, industry, environment, society

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### Introduction:

Coal is a huge source of energy for human needs fossil fuels, which are available throughout the world. So it is called 'Black Diamond'. Coal is a sedimentary rock. The primary composition of coal is carbon, with a secondary composition of hydrogen, sulphur, oxygen, and nitrogen [1]. There are four types of coal available throughout the globe. They are peat, lignite, bituminous, and anthracite. The classification does on the basis of carbon composition. Coal is a fossil fuel that forms when dead plant matter is converted into peat by high temperatures and pressure throughout the years [2]. Peat is converted into lignite coal. After that, lignite transforms into bituminous coal and, lastly, anthracite. This geological and biological process

takes place over millions of years. Anthracite is the most valuable coal, with carbon content between 92 and 98%. Anthracite coal is used mainly in power generation, and it is also used in the metallurgy sector. Bituminous coal is less valuable than anthracite coal. The carbon content of bituminous coal is around 60–80%. It is used in both the thermal and metallurgy sectors. Lignite is often referred to as brown coal and is considered the lowest rank of coal due to its low heat content. The carbon content of lignite coal is around 60–70%. Basically, it is used in the thermal sector to produce electricity. Peat is low-grade coal. It is the first step in the geological formation of coal. The carbon content of peat coal is less than 60%. It is used for cooking and heating in rural areas [3]. The USA, India, China, Australia,

Indonesia, Japan, and South Korea have large sources of coal. India possesses the world's fifth largest coal reserve. India is a big preserver of lignite coal. The estimated total reserves of lignite coal as of March 31, 2017 were 44.70 billion metric tons [4]. In India, coal deposits are mostly found in the eastern and south-central parts. Jharkhand, Odisha, Chhattisgarh, West Bengal, Madhya Pradesh, Telengana, and Maharashtra are famous for coal reserves in India. 98.20% of the total is reserved in the states. Apart from that, Uttar Pradesh, Meghalaya, Assam, Nagaland, Bihar, Sikkim, and Arunachal Pradesh have little coal reserves in India. The major coal fields in India are: Raniganj coal field in West Bardhaman district of West Bengal; Jharia coal field in Dhanbad district of Jharkhand; Korba coal field in Korba district of Chhattisgarh; Talcher in Angul district of Odisha; Singareni collieries in Bhadradi district of Telengana; Nagpur and Chandrapura coal fields in Maharashtra; Neyveli lignite mines in Cuddalore district of Tamilnadu; Singrauli coal field; and Umaria coal field in Madhyapradesh [5]. The present paper focused on the history of coal mining in the Raniganj coal field area of West Bengal and the Jharia coal field of Jharkhand, the environmental degradation of the area due to mining, and its effect on human society. Raniganj coal field area is situated in Asansol and Durgapur subdivisions of west Bardhaman district of West Bengal, 125 km away from the state capital Kolkata. The area is bounded between latitude 23°25'N to 23°55'N and longitude 86°45'E to 87°25'E. The total area of the Raniganj coal field is about 443 sq km. Jharia is situated in the Dhanbad district of Jharkhand. The coal field area is nearby Dhanbad town and 160 km away from State Capital Ranchi. The area is bounded between latitude 23°42'N to 23°49'N and longitude 86°08'E to 86°19'E. The total area of the Jharia coal field is about 280 sq km. Raniganj coal field is famous for low-quality lignite coal, which is a non-cooking coal. It is used in the thermal sector to produce electricity. Jharia coal field is famous for good-quality bituminous coal, which is a cooking coal. It is used in the metallurgy sector. Raniganj area has a long history of coal mining, dating back to 1774, when collector of Chotonagpur Grant Hitley discovered coal in Raniganj area. Grant Hitley and

Mr. Jhon Sumner applied for a license from the Governor General of East India Company to do mining activity in the Raniganj area. In the same year, the Sumner-Hitley firm opened the first coal mine near Sitarampur [6]. The big agency houses of Calcutta were involved in coal mining in 1820. Messer's Alexandar and Company were first involved in the business. Erikson and Company, Carr Tagore and Company, Messer's Gilmore, Homfray and Company, Messer's Jesop and Company, and many other private companies have been involved in coal mining at Raniganj since independence [7]. In the Jharia area, mining activity started in 1894. But the monopoly of the coal trade lay in the hands of European companies. The first Indians to arrive and break the British monopoly in coal mining were Gujrati railway contractors from Kutch [8]. In the Jharia area, Seth Khora Ramji Chawda, an Indian businessman, purchased two collieries. After Independence, the government of India nationalised the coal sector in 1974. ECL (Eastern Coal Field Ltd.) and BCCL (Bharat Cooking Coal Ltd.) are the two major public sector companies involved in coal mining in the area after the nationalisation of coal fields. Illegal coal mining has also been done simultaneously by local people, syndicates of local people, and mafias in the areas. Legal and illegal coal mining put tremendous pressure on the environment and society in the area [9]. The effects of mining on groundwater levels and the silting of surrounding water bodies and land are also a great concern. The burning of coal releases harmful substances such as sulphur dioxide, carbon dioxide, and nitrogen dioxide. Noise pollution is a prevalent issue in the Raniganj-Jharia coal area. Climatic change can be easily visible in those areas. Acid mine drainage, lack of drinking water, pollution, and deforestation are common features of the regions. Landslides and underground fires create phobias among common people. Due to land slide, underground fire, lack of drinking water, and lack of cultivation land, thousands of people migrated to the Asansol-Raniganj-Dhanbad city area. It is also a cause of the rapid urbanisation of those areas. The mining activity has effects on public health too [10]. It is very essential to know the historicity of coal mining in the Raniganj-Jharia area and the adverse

impact of mining on the ecosystem as well as on human society.

### **Objectives of the Study:**

The objectives of the study are: 1) to know the historical background of coal mining in the Raniganj-Jharia area. 2) To know the impact of coal mining on the environment as well as human society.

### **Methodology of the Study:**

To do the study, various primary and secondary sources were used. Primary data was collected through an oral interview with the people of the study area. Secondary data was collected from books, articles, internet sources, and news paper cutting. The historical method, descriptive method, field survey method, and observational method were used to do the study.

### **Study Area:**

Raniganj and Jharia are two major coal mine areas in the eastern part of India. Raniganj is situated in the Asansol-Durgapur subdivision of the west Bardhaman district of West Bengal, 125 km away from the state capital Kolkata. The whole area lies on the bank of the Damodar River. The area is bounded between latitude 23°25'N to 23°55'N and longitude 86°45'E to 87°25'E. Jharia is situated in the Dhanbad district of Jharkhand. The area is bounded between latitude 23°42'N to 23°49'N and longitude 86°08'E to 86°19'E. The coal field area is nearby Dhanbad town and 160 km away from state capital Ranchi.

### **History of Coal Mining at Raniganj-Jharia Coal Field:**

Coal is a very important fossil fuel for human society. Coal produces the highest source of energy. Many people believed that coal was used by ancient Indian people, but there were no such references in any ancient Indian text that showed the use of coal. Kautilya, in his book 'Arthashastra', mentioned different types of minerals but couldn't mention coal. Some scholars have mentioned the names of some places and rivers, like 'Kali Pahari' (the

mound of coal), Damodor (the fire in its bay), or Barakar (the big mines area), to suggest their linkage with coal [11]. These names are not so ancient, which suggests that coal was known to the ancient Indian people.

The early history of coal mining in India as well as the as the Raniganj coal field may be traced back to 1774, when collector of Chotonagpur and Palamu, Grant Hitley, first discovered coal in the Raniganj area. He, along with Mr. Jhon Sumner, applied for permission from the governor general of East India Company for the mining activity in the Raniganj area. They got a license to do the mining activity. In the same year, Messer's Sumner and Hitley firm opened their first coal mine near Sitarampur [12]. The Sumner and Hitley firm opened six mines at that time. Out of six, there were three in Aituria, Chinacury, and Damuria, and the other three were in the west, near Barakar [13]. Several thousand tons of coal was extracted from the mines. In the year 1975, a total of 2500 mounds were delivered to the British government. The coal of Hitley and Sumner was rejected because it was very low-quality, it burned quickly, and it destroyed the iron. The coal returned to Hitley's firm [14]. After a long time, in 1804, an officer of a regiment discovered coal in Burdwan district. They discussed with Major General Hardwicke their discovery. After a long series of examinations, English authorities concluded that Indian coal is not as good as English coal. Every time the authorities examined surface coal, not deep ground-level coal. At that time, the East India Company imported coal from Britain. Napoleonic warfare and the Continental system applied by Napoleon to England changed the scenario. The British maritime trade is very much hampered by the continental system. The British coal merchants were much afraid of losing profit in the coal export business to India. So the East India Company authority thinks to re-examine Indian coal, which may be a substitute for English coal. In 1814, Governor General Lord Moira and other officials of the company appointed Rupert William Jones to examine the quality of Indian coal and coal areas in Bengal. Rupert William Jones got a lease of land from Rani of Burdwan for his exploration [15]. Mr. Jones experimented at a depth of 39 feet under the ground for a long time. At last, he and company

officials came to understand that Indian coal is as good as English coal. In Egra village, which is close to Raniganj, he also opened a mine. He also did his mining activity on the abandoned mines of Mr. Heatly. Mr. Jones got Rs. 40,000 in advance from the company for his mining activity. He got 133 bighas patta from Rani of Burdwan. Raniganj emerged as a coal mine area in the eastern part of India. Jones achieved success in transporting coal to Calcutta. He made some boats and, using the River Damodor, sent the coal to Calcutta. The coal was unloaded at Amtah Ghat. From 1818–20, there were 71,000 tons of coals sent to Calcutta. The river transportation is very hazardous because it depends on only the water level of Damodor. In 1820, a big agency house in Calcutta, Messer's Alexandar and Company, got the lease of Mr. Rupert Jones and continued their mining activity in Raniganj, area [16]. The company is already involved in banking, indigo cultivation, and shipping. Another company, Messer's Jessop, started mining in Narayankuri and Damulia in 1824. The Sumner-Hitley firm owned the Damuliya coal mine area at one point. They closed the mines in 1815. Jessop and company bought the Damulia coal field. Mr. Bates bought the property of Heatly at Chinakuri and again started in 1823. Alexandar and Company sold all their property in the coal business in 1832. The proprieties of Alexandar and Company were bought by Prince Dwarakanath Tagore, the grandfather of famous Rabindranath Tagore. He joined with a British partner and formed Carr, Tagore, and Company [17]. The company purchased the Chinakuri coal mine in 1837. Messer's Jessop and Company sold their entire property in Narayankuri and Damulia. The mine areas of Narayankuri and Damulia were bought by Messer's Gilmore, Homfray, and Company in 1839. At that time, another private company entered the coal business, Messer's Erskine and Company. They started mining activity near Mangalpore in Raniganj. In 1839, 36000 tons of coal from Raniganj coal region were sent to Calcutta and in 1846, 91500 tons. Dwarakanath Tagore bought Gilmore, Homfray, and Company in 1843. Carr, Tagore, and Company, and Gilmore, Homfray, and Company merged and formed Bengal Coal Company [18]. The Bengal Coal Company had 50,000 vessels and 5000

employees in 1844. [19]. It was Raniganj's biggest coal firm prior to the nationalization of the coal field. Later, it came under the management of Andrew Yule and Company. Many small private companies were also involved in mining activity in 1835 in the Raniganj coal area. Baboo Govinda Prasad Pandit opened six pit mines at Searsole. Erskine and Company opened a mine near Raghunathganj. Other coal mining companies in Raniganj were Messer's Apcar and Company, Messer's Grob Durrshmiett and Company, Beerbhum Coal Company, Barakar Coal Company, Messer's Madhu Roy and Company, Barboni Coal Company, Jagdish Coal Company, Old East India Coal Company, etc [20]. In 1858, 1860, and 1868, the coal produced in the Raniganj area was 293,000 tons, 285,850 tons, and 459,000. From 1850 on, coal production grew rapidly because the East India Railway connected Raniganj to Howrah. The railway connectivity made the transportation of coal to Calcutta easy. On February 3, 1855, the East India Railways started rail service between Raniganj and Howrah. In the month of March 1855, twenty-six goods trains that carried 187 tons of coal reached Howrah and Ranigan. The railways also had a huge demand for coal for their engines. The East India Railway opened its mines in Giridih, modern Jharkhand. From 1860 to 1890, four big companies were engaged in coal mining activities in 890 four big companies were engaged in coal mining activities in Raniganj coal field: the new Beerbhum Coal Company (1861), the Equitable Coal Company (1864), the Raneeganj Coal Company (1873), and the Barakar Coal Company. The Four Company and Bengal Coal Company produced 80% of the total production of coal in 1890. The period is the boom phase of the coal industry in Raniganj [21]. An American company, Messer's Apcar and Company, joined in coal production in that phase. The company opened its mines at Sitarampur, Lachipur, and Barachuk. Boria Coal Company, Birds and Company, and South Barakar Coal Company and other private companies are among those operating during that phase. In 1881, there were 37 collieries in the Raniganj Coal Field. At the end of 1908, there were 274 collieries in that area. The increase in collieries indicated a rising level of coal production in that phase. At the end of the 19th century, the

Jharia coal field produced good-quality coal, so the production in the Raniganj area became less. On the eve of the First World War or during the First World War, increased demand for coal led to an increased level of coal production. Some notable Indians, like Nibaran Chandra Sarkar and K.B. Seal, are involved in the coal mining business. After 1920, coal production in the Raniganj coal field decreased because of the global depression of 1929. Many coal companies closed down at that time. Their mines are never open again. Some Gujrati and Marwari businessmen bought some collieries at that time. At the time of the Second World War, the demand for coal was cited, but production of coal in the Raniganj area did not increase due to a shortage of manpower and the socio-economic conditions of the war. After independence, the government of India took some important steps in the coal sector.

Jharia coal field is the main centre of bituminous coal in India, which is generally used in making iron. The coal field consists of 23 large underground and nine large open-cast mines. The mining activities in these coal fields started in 1894. At an early stage, the monopoly of mining activity in the Jharia area was dominated by Europeans. A Gujrati railway contractor from Kutch, Seth Khora Ramji Chawda, was the first Indian to break the monopoly of Europeans in the Jharia area. He purchased two collieries in the Jharia area. Between 1894 and 1910, he founded Khas Jharia, Fatehpur, Golden Jharia, Balihari, Khas Jeenagora, and East Bagatdih collieries. His four brothers, Teja Ramji Chawda, Jetha Lira Jethwa, Akhoy Ramji Chawda, and Panchan Ramji Chawda, are involved with him in the business. In the Pure Jharia colliery, Khora Ramji and his brothers were partners with Diwan Bahadur D.D. Thacker [22]. Gomal Jivan Chauhan, another Indian, founded collieries at Teesra, Pandabbera, and Budroochuck around 1908–10. Indian-owned collieries were cited in the Jharia area at the time in Kujama, Fettehpur, Katrasgarh, Akashkinari, and Khas Joyrampur. There were more than 50 mine owners from the Mistri community of Kutch who started collieries in various places in the Jharia coal field. They grant leases for coal fields from the Raja of Jharia. The locations of collieries are Khas Jaria, Jamadoba, Balihari, Mohuda, Bhaga, Vhirkunda, Bhowrah, Govinpur, Loyabad, etc [23].

Others Indians involved in coal mining business before the First World War were Jharia-Kesabji Pitamber, Hatibhai Patel, Chaturbhai Singjibhai, and Kalyanji Mavji. The domination of Indians is still sustained in Jharia. Domination of Indians still sustained in Jharia coal field area till nationalisation of coal field.

Illegal coal mines are a common feature of the area. Illegal coal mining is done by the mafia, the local people, or the syndicate of the local people. Illegal coal mining occurs on private land, abandoned government collieries, and leasehold land of official operating mines. Coal is extracted through a series of small open-cut holes, which may extend underground [24]. In the Raniganj coal field area, Jamuria, Mejia, Satgram, Sripur, Sonepurbazar, Kunstoria, Saltora, Kunustoria, and Mahavir colliery are the main places where illegal coal mining happened openly. Illegal coal mine areas of the Jharia coal field are Mohuda, Lodhna, Murilidih, Bhatdih, Katras, Tetulia, Kasunda, Kustaur, Mourigram, etc [25].

### **Environmental issues in Raniganj-Jharia Coal Field Area:**

These two types of mining activities have a tremendous impact on the environment as well as the human society in the area. The soil, air, ground water and surface water are all impacted by coal mining. The burning of coal releases harmful substances such as sulphur dioxide, carbon dioxide, and nitrogen dioxide. Sound pollution is a common feature in the Raniganj-Jharia coal area. Climatic change can be easily visible in those areas. Acid mine drainage, lack of drinking water, pollution, and deforestation are common features of the regions. Landslides and underground fires create phobias among common people. Surface mining completely removes land from its normal uses. Total environmental degradation effects on human society in the areas.

### **Noise Pollution:**

A regular occurrence in the Raniganj-Jharia coal field is sound pollution. Basically, cutting, blasting, drilling in underground or opencast mine areas, and transportation activities create noise pollution.

Depending on the operation in an underground or opencast coal area, the noise level varies within 80–1040 DB. The high noise level creates several health hazards. It occurred as a as a partial hearing loss problem. High blasting creates vibration, which creates cracks in the soil or the walls of houses. The high noise level creates disturbances in sleep or damages the water supply [26].

### **Air Pollution:**

Dangerous levels of air pollution have been found in the Raniganj-Jharia coal area. The burning of coal produced harmful substances like sulphur dioxide, nitrogen oxide, and carbon dioxide, as well as dust and ash. Coal bed methane is a very dangerous gas. It is a much more powerful greenhouse gas than carbon dioxide and others. Lung cancer and respiratory diseases are very common in these areas. Coal mining thus adversely impacts the air quality standards in these areas [27].

### **Under Ground Fire:**

Underground fire is a very dangerous problem in the two major coal fields in the eastern part of India. Underground fires occurred due to spontaneous hitting, drilling, blasting, cutting, welding, or other human activity. In 1865, the first underground fire was detected in the Raniganj coal area. According to the CMPDIA report, the fire-affected areas of the Raninanj coal field are Sanctoria, Disergarh, Jaykay Nagar, Damogoria, Barabani, etc [28]. A mine fire caused loss of life, property, and coal resources. It has also caused a land slide. Underground fire is a major problem in the Jharia coal field area. In the Jharia coal field, the first fire broke out at Bhowrah in 1916. 70 mine fires were detected at Jharia. Mohuda, Katras, Kendua, Bhowrah, and Lodna are mine-fire-detected areas of Jharia. 37 million tonnes of coal have been lost due to the mine fire. People migrated from the fire-affected areas. It causes various health hazards and pollution. People in Dhanbad are extremely afraid of underground fires [29]. The Indian Rail stopped train service between Dhanbad and Chandrapura on June 15, 2017 because of an underground fire under the railway track [30].

### **Water Pollution:**

Water pollution is a major concern in coal mining areas. Rainwater is the main source of underground water. The main causes of water pollution in those areas are drainage from mining areas. Acid mine drainage contains chlorides, magnesium, iron, manganese, sodium, and calcium that are introduced into the water. The water is very unfit for drinking or irrigation. The sulphur content of the water in Jharia is 8% and that in Raniganj is 9%. The ph value of the water in these regions is very high. The contamination of water broke down the aquatic ecosystem of the area [31].

### **Soil Pollution and Loss of Agriculture:**

In both coal mine areas, soil is polluted by various mining activities. Soil is polluted by opencast mining, removal of top soil, deforestation, coal heaps, coal dust, burning of coal, machinery used for mining, etc. Soil pollution changed the land pattern or land topography of the whole area. The vegetable world suffered from land degradation. Thus, the soil in the area is not so good for plantation or plant growth. In the Raniganj coal belt area, a total 34.75% of people suffered from land degradation. Their cultivated land transformed into non-cultivated land. Kalipahari, Fatehpur, Barachak, and Ratibati villages in the Raniganj coal area are very much affected by soil pollution and land degradation [32].

### **Land Slide:**

Land slide is a major problem in coal mining areas. Several incidents of land slide occurred in both the Raniganj and Jharia regions. Jamuriya, Mahavir colliery, Barabani, and Samdih areas of Raniganj coal field land slide-affected area. Samdih, a village in Asansol, was where an underground fire was detected. A land slide occurred in Samdih. In 2016, Asansol-Durgapur Development Authority wanted to shift 139 families from Samdih to Bijaynagar, Jamuriya [33]. In an interview with Mr. Sumanta Das, a steel plant worker in Jamuriya on August 1, 2018, he shared his personal experience about the land slide in the Jamuriya area. He talked about the phobia among the people of Jamuriya due to the land slide [34]. In another interview with Mr. Jayanta Kumar Mandal, Assistant Professor of Political Science at Raniganj T.D.B. College, on July 27,

2018, he expressed the same view about the land slide in the Raniganj area. He thinks that one day the whole city of Raniganj dropped into the underground [35]. In the Jharia coal field area, Mohuda, Katras, Kendua, Bhowrah, and Lodna are land slide-prone areas. In 2016, at Bhowrah, two houses went inside the earth. In the same year, a land slide occurred in Mohuda [36]. In the month of March 2017, a severe incident of land slide occurred in Boka Pahari Basti, where a 75-square-foot area slid into the earth [37]. Due to the land slide, people from the affected area migrated to various nearby places.

The scarcity of drinking water is very common in coal mining areas. Due to underground mining, the water level of the pond and wells went down. The underground water level dried up. The scarcity of drinking water was found in both coal mine areas. Fatehpur, Barakar, Kalipahari, Damra, and Narsamuda of Raniganj and Mohuda, Bhowrah, Bhajudi, and Sudamdih of Jharia found the scarcity of drinking water [38].

### **Conclusion:**

Coal mining is an important subject matter for economic development and power generation. Coal mining has a significant impact on social and economic activity in mining areas. No doubt, coal mining benefited some sections of society, but it adversely affected the environment of the area. These environmental problems hamper the total ecosystem of the area. It contributes to health problems and infrastructure problems. Coal mining totally hampers human society. Some sections benefited from it, but some became refugees. The state government, the central government, or local authorities cannot take suitable action on that. The coal companies cannot give them suitable compensation. Sometimes the house allotted for them is of very poor quality. They lost their cultivated land too. Sometimes they are relocated to another place, which they did not demand. The Asansol-Durgapur development authority took some action on that, but some problems remained. The same problem was cited in the Jharia region too. The government-affiliated coal companies cannot follow the mining rules or environmental protection laws. Generally, abandoned collieries should be filled up

with sand or bags of sand, but the companies cannot do that. Sometime, the officials of the companies took money from the mafias and ordered them not to fill the collieries with sand, so the mafias extracted coal from the abandoned collieries. The companies used very old machines to extract or transport the coal, which creates noise pollution. Deforestation is very much done by the companies, but they cannot take any major action on plantations. The laws should be revised to curtail illegal coal mining, and some new laws should be enacted. For example, there is no specific legislation in India concerning subsidence. The adverse impact should be identified at the planning stage so the proper action may be taken in advance [39]. So it is very necessary to do more and more research on the adverse impact of coal mining in the Raniganj-Jharia area so that the central or state government, local bodies, or mining companies take proper measures on that.

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