A CHINA ENVIRONMENTAL HEALTH PROJECT RESEARCH BRIEF

Coal Mining and Environmental Health in China

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China is one of the largest coal producers, exporters, and consumers in the world. Abundant natural coal reserves have fueled China's booming economic development; however, pollution problems both from burning and mining coal have created serious environment and public health problems, which may nullify much of China's GDP growth.

MAGNITUDE OF COAL PRODUCTION

Coal accounts for approximately 74 percent of China's primary energy consumption. China consumes more coal than Europe, Japan and the United States combined, which make up 40 percent of the world's total. [1] China's coal use continues to grow every year, and it is estimated that 90 percent of the rise in world coal consumption is from China. [2] Despite investments into other forms of energy, coal is still likely to occupy about 70 percent of China's energy consumption over the next 20 years. [3]

Coal production in China has increased about 66 percent over the past 5 years from 1.38 billion tons in 2001 to 2.3 billion tons in 2006.[4] China has approximately 30,000 coal mines—24,000 of these are small mines, which are responsible for one-third of the nation's total coal production. [5] Not all mines are legally registered, which underscores the broader challenge of regulating the mining industry in China. For example, according to the Ministry of Land and Resources, 64,661 of all mines in China do not have licenses. There are 1,316 mine industry cases involving illegal trading and 4,383 cases of illegally mining across China's border. [6]

China's huge coal mining sector is strikingly antiquated when compared to the industry in developed countries. Besides having old equipment, few Chinese mines use mechanized excavation and investments in scientific research and miner training are quite low. [7]

ENVIRONMENTAL AND HEALTH PROBLEMS FROM COAL MINING

Small coalmines—80 percent of the total—are the major source of the environment, safety, and public health problems in China's coal-mining industry. Besides air pollution, degradation of water and land are growing environmental effects. About 70 percent of the people killed in coal mine accidents in 2003 worked in small coal mines. [8] Enforcement

of laws to limit these problems is weak and mines are thus not pushed to internalize the costs of their production.

Crippling Air Pollution

Coal mines in China release about 395.43 billion $m^3$of gasses (e.g., methane, SO2, and soot) annually. With a global warming potential 23 times greater than CO2, methane is a potent greenhouse gas (GHG) that makes up 16 percent of all global, human-induced GHG emissions. [9] A reduction in methane emissions would have a rapid and significant effect on the atmosphere's warming potential. Methane in mines is also responsible for many explosions. Besides methane, 731,300 tons of SO2 and soot are emitted each year from Chinese coal mines. These two kinds of emissions produce many serious environment problems—SO2 is the main contributor to acid rain that plagues two-thirds of China; and soot emissions contribute to local and global climate change. Coal mine fires are also a growing source of air pollution that have been particularly damaging to air quality in local communities.

The World Bank has dubbed Linfen—a major coalmining city in Shanxi Province—the most polluted city in the world. [10] The coal industry has greatly boosted the city's economic development; however, it led to the dramatic deterioration of the environment and major health problems. Crops are covered in grey dust and considered toxic, and the coal pollution dust is so great that cars must use headlights during the day. City residents suffer from respiratory illnesses from the severe pollution of dozens of coal mines surrounding the city. Linfen is one extreme example of a Chinese city polluted by coal mining; however, many other cities face similar problems.

Dangerous Water Pollution and Shortages

A large amount of toxic wastewater from mines is discharged without any treatment in China. The discharged wastewater combined with runoff from mine tailings has greatly polluted surface water and groundwater in mine areas, often contaminating soils and crops. Official figures show that coal and iron mines in karst regions of north China discharge 1.2 billion tons of wastewater every year, and about 70 percent of that wastewater drains untreated into rivers. [11] The need for water to wash coal has stressed already water-scarce regions in northern China, particularly Shanxi, the largest coal-producing province. [12] In some mining areas, the underground water level has dropped considerably because of coal exploitation. [13]

Expanding Wasteland and Desertification

China has about 13.3 million hectares of wasteland, and each year coal mining destroys approximately 46,667 hectares of land; 66.7 percent of which is arable land. [14] Mining is also one of the factors exacerbating desertification in northern China. It is estimated that about 8 percent of China's territory is affected by desertification, with an annual expansion rate of 210,000 hectare. Some estimates cite about 0.8 percent of the desertification in northern China can be attributed to industry construction, including mines, and urban development projects. [15]

Land Subsidence and Seawater Intrusion

Water being pumped out of mines sometimes leads to land subsidence, particularly in karst areas. For example, over the past few years 500 hectares of land subsided near the Fankou mine area in Guangdong Province; 2,000 hectares of land collapsed in the Enkou mine area in Hunan Province. Buildings, roads, and croplands are seriously damaged by such major incidents of land subsidence. According to a report from Xinhua News Agency, in Shanxi Province about one million people have been affected by land subsidence. The head of the Energy Economics Institute of Shanxi Academy of Social Science reports that there were 294,000 hectares of sinking land in Shanxi in 2004 and an additional 9,400 hectares has been affected each subsequent year. [16]
Seawater intrusion has occurred in some of China's coastal mine areas due to pumping of water from mines, which can lead to contamination of surrounding freshwater resources and cropland.

GROWING HEALTH THREATS

Occupational Diseases

Mine workers face many health risks, such as dust-related lung diseases, hearing loss, neuromuscular disorders, and rheumatism. Pneumoconiosis—a deadly respiratory disease, also known as "black lung," caused by inhaling coal dust—is one of the most serious occupational diseases facing coal miners. According to China's Ministry of Health figures, of the approximately one million people in China suffering from this disease, 600,000 are miners. The number of miners falling ill from pneumoconiosis increases by approximately 70,000 every year. [17] In 2002, 2,343 Chinese minders died of pneumoconiosis, which is nearly half the number of those who die from coal mine accidents in China. [18]

Coal Mine Accidents

Every year, nearly 80 percent of the world's total deaths in coal mine accidents occur in China, underscoring the poor state of safety measures and regulation of Chinese mines. [19] In 2003, the fatality rate per million tons of coal mined in China was about 4, while that in the United States was only 0.04. [20] Chinese officials have begun tightening regulation of mines and China's State Administration of Work Safety reported that from 2005 to 2006 there was a drop in coal mine accidents (2,456) and subsequent deaths (4,746) of 12.8 and 21.7 percent, respectively. While the general safety situation improved somewhat in 2006, the number of fatal accidents (3 to 9 deaths per accident) has increased by 3.9 percent. [21]

The main causes of coal mine accidents are gas leaks, roof cave-ins, fires, transportation mishaps, blasts, and floods/water bursting. In 2006, roof cave-in accidents accounted for the largest portion (42.3 percent) of the total coal mine deaths. [22]

Official statistics show that over the last 30 years water bursting led to about 58 instances of full mine submergences and 64 partial ones. Deadly water bursting accidents happen frequently in coal mines because coal deposits usually contain vast amounts of water. For example, CNN reported that a state-owned coal mine flooded on March 10, 2007 in Fushan, Liaoning Province, killing at least 22 people. [23] According to BBC news, a fatal mine flood accident in Shanxi Province in 2006 killed 56 coal miners. [24]

EFFORTS PROMOTING SAFER MINING

Over the past few years, coal mine safety has become a larger central government priority and the target of stricter policies.

Prioritization

China's National People Congress (NPC) Standing Committee has organized more than 60 forums and conducted field studies in over 70 enterprises and 30 coal mines to investigate solutions to safety problems in China's coal production. [25] The head of China's State Administration of Work Safety (SAWS) declared coal mine safety the top priority in the government's fight against fatal accidents after the Liaoning flood accident in March 2007. [26] The central government announced in 2007 that it is going to invest $375 million to upgrade safety technology in major state-owned mines between 2007 and 2009. Moreover, SAWS will build 26 national-level bases for dangerous chemical accident rescues. [27]

Crackdowns and New Regulations

According to one China Daily report, from January 2005 to June 2006, the Chinese central government fined or closed about 70,000 illegal mines. [28] In 2005, the central government also issued a ban on local officials investing in mines in order to prevent corruption in the mining industry and to strengthen regulation to help lessen the number of accidents. Following this ban, the central government implemented an investigation into the involvement of government officials in coal mines. By September 25, 2005, 497 government officials and state-owned enterprises leaders have withdrawn their investments in coal mines. [29]

In order to improve coal industry safety, the government plans to close about 5,000 unsafe small coal mines by the end of 2007 and bring the number of small mines below 10,000 over the next few years. [30]

Currently, mining areas are often exploited by several companies leading to overexploitation, which causes frequent accidents, excessive pollution and resource waste. By the end of 2008, the government is requiring that one mine can only be exploited by one company in order to reduce the accident rate and control mining pollution. [31]

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