

An introduction to coal mining

A fuller briefing on coal is available at <http://www.minesandcommunities.org/article.php?a=10299>

Coal Mining – Who wants it?

“We are poor and where shall we stand if they snatch the land away from us? We don't want the open coal mine even at the cost of our blood.”

This statement was made by Srimati Murmu, from the Indigenous Santal community of [Phulbari](#), Bangladesh on the 26 November 2007. Along with other land based communities, the Santal find themselves facing a threat to their livelihoods from a planned massive open cast coal mining project owned by Asia Energy, owned by GCM Resources, a mining company listed on the London Stock Exchange.

The industrial world is dependent on coal. Just over [40% of all electricity](#) used worldwide is generated from coal. This 'steam coal' accounts for [70% of all coal](#) extracted from the ground. The [remaining 30%](#) - known as 'coking coal' - is largely used in the production of steel and cement. The demand for coal continues to grow. Between 2000 and 2008 there was a 54% increase in all traded coal and a 60% increase in traded steam coal*.

Both the mining of coal and its use as fuel are highly problematic. This introduction, however, is concerned only with coal mining. The burning of coal in power stations is only mentioned in passing.

Coal is concentrated solid carbon. It was formed when rotting vegetation from peat mires was rapidly buried and preserved beneath layers of other sediments. As the temperature and pressure increased with depth, this rotting organic matter became compacted and 'coalified'*. This coal is extracted from the earth from underground mines and now more commonly from opencast mines. Both types of mining are highly destructive to the environment and as a consequence devastating to local communities, bringing in their wake massive health and social problems. The damage inflicted by coal mining alone, without even considering the enormous problem of coal burning as a major contributor to man-made climate change, begs the question – is it sustainable?

Despite pressure worldwide to cut carbon emissions, British investors are committed to expanding the coal sector both here in the UK and overseas, and companies listed on the London Stock Exchange continue to explore and develop coal mining on a global scale. If the [Phulbari](#) mine in Bangladesh goes ahead, a major rice growing area will be at risk, and tens of thousands of people will be impoverished, including the Indigenous Santal people. The rights of the Indigenous Santals to free prior and informed consent to mining projects on their traditional lands, as set out in the UN Declaration of the Rights of Indigenous Peoples, is not being upheld.

There has been massive opposition to the Phulbari mine. In 2006, the Bangladesh Rifles, a paramilitary organisation, opened fire on a crowd of 50,000 demonstrators in [Phulbari](#) killing three, including a 14 year old boy, and wounding over 100 others. Following the takeover of a military backed interim government in 2007 and what was in effect the suspension of the rule of law, community leaders, NGO workers and others actively opposed to the mine were subjected to harassment, intimidation, arrest and torture. On Phulbari Day in 2009, the third anniversary of the killings another demonstration was held in which activists called for the expulsion of GMC Resources from Bangladesh.

[Indonesia](#) is now the world's top producer of steam coal. In Kalimantan, the main mining region, the coal may have brought wealth to a small political and business elite but according to *Deadly Coal*, a recent report published by JATAM, the Indonesian Citizens' Mining Advocacy Network, for

most ordinary Indonesians living there it has blighted previously sustainable livelihoods and health and exacerbated poverty while bringing very little benefit. Local community members opposed to mining here too have been threatened, injured and killed.

Britain is a major foreign investor in [Indonesia](#) and is involved in the coal sector. BHP Billiton, the world's largest mining company, listed on the London Stock Exchange, holds a number of mining concessions in Kalimantan, some of which are in the Heart of Borneo Conservation area. The company claims that it will mine responsibly and protect the biodiversity of the region. However, [Undermining the Future](#), an 'alternative annual report' on BHP Billiton's activities describing the company's poor track record in corporate social and environmental responsibility, leaves its trustworthiness open to question (Marr,C. 2010)

Evidence of this can be seen in Colombia where the Cerrejon mine is one of the largest open-cast coal mines in the world and is jointly owned by BHP Billiton, Anglo-American and Xstrata; the latter two also companies listed on the London Stock Exchange. Fifteen [years ago, small communities in the area were hubs of rural activity](#) where people were able to live off the fertile land. Now many agricultural livelihoods have been lost as land has been swallowed up by the mine and water sources destroyed. Communities have been obliged to move away. In the early days of the mine, many small farmers were intimidated into moving. Company behaviour has improved after a sustained campaign of resistance by members of the community of Tabaco, supported by groups in Britain and elsewhere. The company is now negotiating relocation arrangements with other communities as the mine expands, but there are continuing tensions. Local community members are aggrieved that not only have the representatives of the Cerrejon mine failed to consult with them adequately but that the company is [claiming publicly](#) on its website that it has. It is possible that Cerrejon contains another 30 years worth of coal. When that is used up, its legacy is likely to be a landscape dried out by the disappearance of many streams and damage to ground water and a rural population that is less healthy and self-sufficient.

Indonesia, Bangladesh and Colombia are countries troubled by political instability and the associated breakdown of civil society and the rule of law. It is perhaps to be expected that citizens will struggle to uphold their rights to consultation and consent to mining. However even in places like the UK, communities are in conflict with local government over unwanted coal mines. Massive expansion of opencast coal mining is taking place in Scotland. In the past 18 months, 14 companies have applied to dig 60 million tons of coal from 58 new or enlarged opencast mines in the face of considerable opposition from local communities. [Coal Action Scotland](#) published a link on their website to an article accusing members of South Lanarkshire Council of preventing members of the Douglas and Glespin Community Council from speaking about their concerns about proposed open cast coal mining at a Douglas Valley community liaison meeting with Scottish Coal. The article accused the South Lanarkshire council representatives of effectively acting in the interests of Scottish Coal and being virtually indistinguishable from company employees. In response South Lanarkshire Council have now issued every member of the Douglas and Glespin Community Council with notice that legal action for libel will be taken against them which, not surprisingly, is taken as an attack on their freedom of speech.

What about the workers?

"The employment and food security of millions of people are currently linked to coal mining and carbon-fuelled electricity. ... Historically, coal mineworkers were the driving force behind the winning of trade union rights in several countries (including the US, Russia and the UK). Should all coal mining cease within the next few years, hundreds of thousands of them would be thrown out of work." ([Dark Materials: the consequences of clinging to coal](#) Moody, R. 2010) Coal mining unions have [called for an end to criticisms of the coal industry](#) and have placed their faith in the dubious and unproven technology of [carbon capture and storage](#).

A planned transition away from coal would provide time for alternative livelihoods to be created for mine workers, particularly in 'sustainable energy' generation. However, given the pressing issue of climate change, this would need to happen quickly. Employment in coal mining has already

“markedly decreased during the past 20 years. Companies have resorted to non-union and sub-contracted labour and replaced workers by machines - especially in open-cast mining which now dominates coal extraction in many countries” (Moody,R. 2010). However it remains a highly dangerous occupation. Underground “mine workers are more susceptible than those in any other industrial sector to fatal accident, serious injury, or occupational disease (pneumoconiosis, emphysema, black lung et al). Far from diminishing, workplace accidents appear to be on the increase in a significant number of countries (e.g. China, Kazakhstan and Colombia).”(Moody,R. 2010)

Coal Mining - Can we afford it?

It is not without good reason that ordinary people around the world are concerned about the enormous and accelerating expansion of coal mining on their lands. The second part of this introduction is a brief overview of the impacts of coal on those two resources vital to life – water and air.

Coal Mining and Water

Water is a finite resource which is easily depleted, disrupted or contaminated by mining. Coal mining in the US uses an estimated [70-260 million gallons of water/day](#). This has a significant drawdown impact on the water table. Aquifers near the surface may be reduced by several hundred feet, resulting in the drying up and disappearance of streams, lakes, wells and boreholes. In Arizona, Peabody Coal has for over forty years pumped millions of gallons of water out of the ground and mixed it with pulverised coal, which is then transported to a power station 270 miles away in Nevada. A recent [Natural Resources Defense Council report](#) has found significant damage caused by Peabody Coal to the Navajo Aquifer, a pristine source of potable water for the nearby Navajo and Hopi communities.

Ground subsidence of up to several metres caused by mining (problematic in and of itself) can also result in disruption to water drainage patterns resulting in the disappearance of water features and sometimes, their unexpected reappearance elsewhere causing flooding of the mine itself and farmland etc. In New South Wales alteration of habitat due to subsidence of longwall mines and the subsequent changes in water flow patterns was named as a key threatening process in the [Threatened Species Conservation Act of 1995](#).

In Samarinda, the provincial capital of Kalimantan in [Indonesia](#), flooding has become a routine occurrence since the coal mining started. This is thought to be linked to deforestation to make way for mining, which has resulted in poor drainage. In a six-month period between 2008 and 2009, four major floods affected over ten thousand families each time and all the main streets, disrupting the local economy, transport, employment and earnings. Income from coal mining only constitutes 4% of the town's total regional revenue (399 million Rupiahs, or \$37,000, out of a total 112.5 billion Rupiahs, in 2008). The cost of flood prevention measures is far greater than the town's income from coal. The city has already spent 63 billion Rupiahs on a flood polder and is planning to build five more (JATAM 2010).

When coal is extracted from the ground it is usually washed with a mixture of water and some of 60 different chemical additives, such as flocculants and surfactants. The environmental and health impacts of many of the chemicals used are not fully understood but some have been shown to be harmful to aquatic life. Residents in US coalfield areas where [slurry waste from the washing](#) of coal has been used to fill old mines have experienced contamination of their water supplies and have observed an increase in skin, kidney and liver diseases and cancers.

In Shanxi Province in [China](#), rural villages have been increasingly surrounded by large opencast mines. The villagers complain that the water in their wells has become contaminated and is no longer fit for use.

"Before, every family got drinking water from the well in the courtyard...But now the water in the well is so polluted by the coal mines and washeries around our village, we cannot drink it any more."

The waste from this washing of coal is usually stored in a tailings dam near the mine. There is a serious risk that the dam will collapse, inundating the surrounding area.

On October 11 2000, in Inez, Martin County Kentucky, this is exactly what happened. *"According to the company, the [failure of the dam](#) was caused by the 'sudden and unexpected' collapse of an abandoned underground coal mine next to the impoundment. The bottom of the slurry pond collapsed, allowing its contents to pour into the mine tunnels. The slurry then poured out of two mine entrances, about two miles apart, into two different watersheds. The state had last inspected the impoundment on Sept. 22 and found no problems. 120 km of rivers and streams turned iridescent black, causing fish kills. Towns along the Tug River were forced to turn off their drinking water intakes. Martin County Coal Corp., who owned the mine, claimed on Nov. 29, 2000, in a court document, that the massive spill was '**an act of God**', the occurrence of which was not within the control of the company. It moreover claimed that any alleged negligence by the company occurred more than five years ago, which therefore is barred by applicable statutes of limitation."*

It should be mentioned briefly here that ash from coal fired power stations is also stored in slurry dams, that this too is a highly toxic mixture and that there is a high level of risk of dam failure.

Acid mine drainage is one of the most pernicious environmental problems associated with mining of coal and other minerals and metals. Metallic sulphide minerals (eg iron sulphide) present in the mine oxidise when exposed to water and oxygen for example in tailings ponds, waste dumps and so on. The oxidation reaction produces acids which then release dissolved metals into the water. Sulphide oxidation is a positive feedback reaction – as it proceeds, the fluid becomes more acidic, more heat is generated and so the reaction is speeded up producing more acid and more heat. It only stops when either the sulphide or oxygen present is used up*.

Acid mine drainage disperses acidic waters and heavy metals into the wider environment when water drains through sulphide-rich oxidising waste dumps, leach heaps and tailings dams, when release of uncontrolled or improperly treated process waters into surface drainage systems takes place, or when erosion of waste dumps and tailings dams result in sulphide minerals being transported into soils and water courses*. It is a problem also associated with waste from coal fired power stations.

The effects are highly damaging to aquatic life, which is very sensitive to changes in the pH levels of water, and enable heavy metals in potentially toxic amounts to enter the food chain, including the food eaten by people. These heavy metals are linked to serious health problems including an increase in birth defects. [Mercury](#) in particular, which also finds its way into water from atmospheric pollution produced by coal fired power stations, is linked to problems in the development of the brain and neurological system in babies. In [Shanxi province](#), a study done by Beijing University has linked the 40% increase in birth defects between 2001 and 2006 with the environmental pollution caused by the rapidly expanding coal mining and coal fired power generation in the region.

Coal Mining and Air

[Air pollution](#) is a major environmental hazard associated in particular with open cast mining. It is well known that underground mineworkers suffer an increased risk of lung disease and related health problems caused by coal and other dust. Open cast mining extends this risk to the entire community. Surface mining of coal creates dust or particulate matter which is carried by wind or trucks and trains into the surrounding area where it settles on land and buildings used by local people. Diesel powered mining equipment and construction vehicles also emit particulate matter. Particles less than 10 micrometres in diameter cause the most concern as they can penetrate deep

into the lungs and can even enter the bloodstream, causing serious respiratory and cardiovascular problems, cancers and other health problems

Some research has begun into the nature of [particulates](#) from open cast coal mines in India and comparative studies in the United States have demonstrated unusually high mortality rates for respiratory, cardiac, and kidney diseases in counties with open-cast coal mines, with the worst effects manifesting in populations near mines with extraction rates of greater than or equal to 4 million tonnes over a 4-year time period. However, despite the massive scale of open cast coal mining globally, there is relatively little peer reviewed research into the health impacts on local people of long term, large scale opencast coal mining projects. In [Australia](#), for example, where 400 million tonnes of coal is mined annually, much of it from open cast mines, and where concern has been expressed with regard to the effects of particulates, to date no peer reviewed studies have been done on the health effects on the local population.

Air pollution is of course an enormous problem associated with coal fired power stations where particulates, non combustible components of coal, acid rain forming gases and greenhouse gases are released into the atmosphere and produce potentially toxic ash which enters the soil and water systems causing acidification and heavy metal pollution.

This problem is also found in [spontaneous combustion](#), another serious environmental hazard associated with coal mining. This is caused when underground and surface mine and coal dump fires are ignited by natural causes or human error. Coal seams contain sulphide minerals. Both coal and sulphides oxidise when exposed to oxygen and in the process generate heat. If the heat cannot dissipate, temperatures will rise until the coal bursts into flames. These fires can rage for decades, causing an actual 'hell on earth' for those who live above and in the vicinity of the coal mines. As with coal burning power stations, they emit major atmospheric pollutants such as nitrogen and sulphur dioxides, particulates and carbon dioxide, adding to the problem of global warming*.

Disconnected from the Earth

Coal mining wrecks the landscape and in the process the spiritual and psychological connection that people have to the land. Underground mining, although largely invisible at the surface, can result in subsidence and collapse of land, which substantially alters its features. Open cast mining, even more dramatically, simply removes vast areas of land reducing countryside to industrial wasteland, and even where 'restoration' is carried out, the landscape and people's activities within it are changed forever. As well as livelihoods and communities, what disappears are those familiar features of the land with which people have connected over the centuries; a familiar hillside, scene of an historic event or a favourite tree whose changes signal the cyclical changes in season, a rocky outcrop believed to be the dwelling place of spirits. These intimate connections protect the land. For many Indigenous people, this relationship with the land is bound up with their religious and moral world view. Perhaps the last word should go to the late [Roberta Blackgoat](#), Dine (Navajo) Elder who until the end of her life defended her People's land against Peabody Coal, formerly owned by the British company Hanson, in Arizona.

"I know each tree, each plant that grows right there. And they know me. The children, grandchildren, great grandchildren need to be right there. We need them to get back to the land and live on our ancestors' land. ... Relocatedees die of 'worryness,' ...missing their traditional food and not knowing where to go to pray...." As long as she lived she continued to demand that Peabody "stop destroying the Mother Earth's liver and blood: the coal and the water."

Notes

* Unpublished paper, *Coal exploitation and its risks to society*, Mark Muller, February 2010

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