About coal mining impacts

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Background - 1 July, 2016

Mining is the first step in the dirty life cycle of coal. When coal mines move in, whole communities are forced off their land by expanding mines, coal fires, subsidence, and overused and contaminated water supplies. Mines are quick to dig up and destroy forests and soils. But once the coal is gone, the problems they leave behind, like acid mine drainage, can persist for decades. Around the world, Greenpeace campaigns to help communities stop coal mines, and speed up the shift to 100 percent clean, safe renewable energy.

Underground mines, which provide the majority of the world's coal, allow coal companies to extract deep coal deposits. About 40 percent of the world's coal mines are the more damaging strip mines (also called open cast, open pit, mountaintop or surface mining).

Strip mining impacts

Strip mining is highly destructive. Yet the industry often prefers to strip mine because it takes less labour and yields more coal than underground mining. In some countries, such as Australia, strip mines make up 80 percent of mines.

Strip mining damages and pollutes ecosystems

Strip mining clears trees, plants and topsoil. Mining companies scrape away earth and rocks to get to coal buried near the surface. Mountains may be blasted apart to reach thin coal seams within, leaving permanent scars on the landscape.

In this way, strip mining destroys landscapes, forests and wildlife habitats. It leads to soil erosion and destruction of agricultural land.

When rain washes topsoil disturbed by mining into streams, these sediments pollute waterways. This can hurt fish and smother plant life downstream. It can also disfigure river channels and streams, which leads to flooding.

Strip mining also causes noise pollution and dust as heavy machinery disrupts topsoil and mining activity creates coal dust.

Strip mining contaminates water

When miners upturn earth, minerals and heavy metals within it can dissolve into mine wastewater and seep into the water table. This increases risk of chemical contamination of groundwater and acid mine drainage (see below).

Strip mining also lowers groundwater levels around the mine. This is because, in order to remove coal, vast quantities of groundwater must be pumped out of the mine. As a result, surrounding ecosystems and farmland may become drier, and erosion may start to change the landscape. Strip mining also uses significant amount of water to suppress dust.

When mines lower groundwater levels, this also affects local people, who must continually drill deeper wells to get water.

Washing coal (to remove unwanted materials) creates a toxic waste slurry that can threaten surface waters or leak into groundwater.

Coal power plants also strain precious global water supplies.

Strip mines leave lands barren

Coal mining is land disturbance on a vast scale.

- In the US, from 1930 to 2000, coal mining altered about 2.4 million hectares (5.9 million acres) of natural landscape, most originally forest.

This mining activity leaves behind barren lands that stay contaminated long after the mine shuts. Although many countries require coal mines to have reclamation plans, it is a long, difficult task to undo all their damage to water supplies, habitats and air quality. Re-seeding plants is difficult because mining thoroughly damages soil. If coal companies go bankrupt, costly rehabilitation may be left undone.

- In China, coal mining degraded the quality of 3.2 million hectares of land, according to a 2004 estimate, but total mine wasteland was restored at a rate of only 10 to 12 percent.

- In Montana, US, replanting projects were only 20 to 30 percent successful. In Colorado, even lower survival (about 10 percent in some locations) was seen for oak aspen seedlings.

Underground coal mining impacts

Although seen as less destructive than strip mining, underground mining still causes widespread damage to the environment.

Subsidence

Collapse of earth into underground mines, or subsidence, is a serious problem.

In room-and-pillar and long-wall mines, columns of coal and other structures are used to support the ground above. Later in the mining process, they are often taken out. The mines are left to collapse. The land above starts to sink, seriously damaging buildings and entire landscapes. Subsidence can also cause farmland to fill with water and become wetland or lakes.

Underground mine water drained away

Underground mining lowers the water table, changing the flow of groundwater and streams.

In Germany, the mining industry pumps over 500 million cubic meters of water out of the ground every year. Only a small percentage of this water is used by industry or local towns — the rest is wasted. What's worse, removing so much water creates a kind of funnel that drains groundwater from an area that is much larger than the immediate coal-mining environment.

Underground mines bring toxins to surface

Underground mining also brings huge amounts of waste earth and rock to the surface. This waste often becomes toxic when it contacts air and water.

Coal mine methane

Coal mining releases methane into the atmosphere. Formed during the geological process that creates coal, methane is 84 times as powerful as carbon dioxide at disrupting the climate over a 20-year timespan.

Globally, about six percent of methane emissions due to human activity come from coal mining.

Most coal mine methane comes from underground mines. This methane is often captured and used as town fuel, industrial fuel, chemical feedstock and vehicle fuel. Methane is also used in power generation projects.

The process to extract this methane, coal seam gas fracking, creates large amounts of waste water, risking surface and groundwater sources. It also increases the risk of uncontrolled methane leaks, contaminating water sources and destroying climate. Yet coal bed methane projects have been increasing rapidly globally.

Coal fires smoulder and pollute

Coal fires can burn for decades or even centuries, releasing fly ash and smoke laden with greenhouse gases and toxic chemicals. These fires are a significant environmental problem in China, Russia, the US, Indonesia, Australia and South Africa.

Coal fires occur when coal seams burn or smoulder, or when coal storage or waste piles burn. Lightning, forest fires and peat fires can start coal fires. But they are often caused by mining accidents and bad mining practises. In Indonesia, the same fires used to clear large tracts of rainforest ignited over 300 coal fires since the 1980s.

Underground coal fires can release smoke laden gases including carbon monoxide (CO), carbon dioxide (CO_2), methane (CH_4), and sulphur dioxide (SO_2). Coal fires also cause fly ash to release from mine vents and fissures.

Coal fires can cause temperatures to rise at the surface, and contaminate groundwater, soil and air.

China has the world's most coal fires. Between 20 and 200 million tons of coal burn uncontrollably each year. This accounts for 0.5 to 5 percent of China's national coal consumption and related carbon dioxide emissions. (Although coal fires are significant, emissions from China's power plants are far higher.) India, on the other hand, has the world's greatest concentration of coal fires.

Acid mine drainage

When coal and other rocks unearthed during mining mix with water, this creates acid mine drainage. The water takes on toxic levels of minerals and heavy metal and leaks out of abandoned mines. From there it contaminates groundwater, streams, soil, plants, animals and humans.

Taking on an orange colour, it can blanket rivers, estuaries or sea beds, killing plants and making surface water unusable for drinking. Acid mine drainage can continue for decades or centuries after a mine closes unless costly reclamation projects are done.

- Greenpeace documented massive open-cast coal mines' harmful effects in Kalimantan, Borneo. The mines cause widespread water pollution when they discharge toxic waste into rivers and leave acid mine drainage to collect in artificial lakes.

Coal mining harms workers' and residents' health

Mining coal, the dirtiest fossil fuel on the planet, exposes both miners and local populations to health hazards.

Threat to mine workers

When people who work in mines, or live close by them, inhale coal dust and carbon, this hardens their lungs, leading to black lung disease (also called pneumoconiosis or CWP). An estimated 1,200 people in the US still die from black lung disease annually. The situation is even worse in developing countries.

Mine collapses and accidents kill over a thousand workers around the world every year. Chinese coal mine accidents killed more than 900 people in 2014 alone.

Threats to local populations

People living near coal mines have higher-than-normal rates of cardiopulmonary disease, chronic obstructive pulmonary disease, hypertension, lung disease, and kidney disease.

Local communities also suffer when coal fires occur. These fires emit toxic levels of arsenic, fluorine, mercury and selenium, contaminants that can enter the air and food chain of local communities.

What is Greenpeace doing?

Greenpeace documents harm caused by the coal mining industry around the world. We help energise and boost people-powered movements as part of our tireless global campaign to stop the dirtiest coal, oil and gas projects.

We also campaign to stop the flow of investment to coal and other fossil fuel projects. At the same time, we work to speed up the shift to 100 percent clean, safe and secure renewable energy.

What can you do?

- Explore ways to power up your life with renewable energy.
- If you have investments, make sure they are coal and fossil fuel free.
- Find out what Greenpeace is doing to campaign against coal where you live.

More information

- Learn how coal deepens the global water crisis.
- Read about air pollution from coal power plants.
- Read about clean, safe renewable energy and other climate change solutions.