

UNDER-MINING AGRICULTURE: How the Extractive Industries Threaten our Food Systems (2014)

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Registered Charity no: 327412

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This report has been produced with the financial assistance of the European Union. The contents are the sole responsibility of The Gaia Foundation and the project "Strengthening African CSO networks to respond to rapid growth of extractive industries", and can in no way be taken to reflect the views of the European Union.

Front Cover and Infographic by Kate Maxwell Crooks.
Report design by Fiona Wilton.

ABOUT THIS REPORT

UnderMining Agriculture alerts us to the impact that the extractive industries are having on our capacity to feed ourselves and the health of our planet's ecosystems.

Case studies from around the world, accompanied by a bold infographic, illustrate how mining – a major polluter of ecosystems, water and air, and a driver of climate change – is destroying the conditions necessary for healthy agriculture and food sovereignty. The mining industry promotes myths of job creation, economic growth and wellbeing whilst *undermining* sustainable, resilient and localised food production.

'UnderMining Agriculture' is the third in a trilogy of reports on the devastating impact of extractive industries on the Earth.

The first, *'Opening Pandora's Box'* (2012), highlights the converging factors that have led to a dramatic increase in the rate and scale of growth of the extractive industries. More communities and ecosystems are affected by mining than ever before, and mining activities are projected to triple worldwide by 2050 if we refuse to change course. *'Short Circuit'* (2013), the second report, zooms in on one of the major drivers of mining – electronic gadgets, smartphones and laptops. Their lifecycle – which sees land irreversibly scarred and communities displaced, whilst citizens are duped into a desperate chase for the latest model – is also the subject of our darkly comic *'Wake-Up Call'* animation and growing campaign.

The research and publication of both *'Opening Pandora's Box'* and *'Short Circuit'* documents the growing challenges faced by local and indigenous communities. This report raises the alarm on how the extractive industries threaten our food systems.

'UnderMining Agriculture: How the extractive industries threaten our food systems' encourages those concerned about food sovereignty to work together with those resisting mining – for land, water and food justice.

Please note:

- Throughout 'UnderMining Agriculture', we use the term "mining" and "extractive industries" interchangeably to mean all types of extraction – minerals, metals and fossil fuels.
- Data and case studies are referenced in footnotes, and we provide pointers for more information at the end of the report.

ACKNOWLEDGEMENTS

This report is dedicated - in solidarity - to the growing number of farming, fishing and pastoralist communities who are resisting efforts by the extractive industries to undermine their agriculture, food sovereignty, land and water systems.

UnderMining Agriculture has been produced by the team of the Gaia Foundation, with input from colleagues in partner organisations - African Biodiversity Network, CIKOD (Ghana), MELCA-Ethiopia, Mupo Foundation (South Africa), and NAPE (Uganda).

Special thanks to Teresa Anderson for drafting and compiling the report; to Lara Montesanto Shirley for her diligent research; to Hannah, Rowan, Hal, Fiona and Liz of the Gaia Foundation for editing and proofing. Plus, our congratulations to Kate Maxwell Crooks for her creative and bold infographic to illustrate the key messages about UnderMining Agriculture.

We are grateful to a host of advisors for their generous feedback, comments and enthusiasm - especially Jamie Kneen (Miningwatch Canada), Andrew Whitmore (Mines and Communities), Richard Solly (London Mining Network), Cesar Padilla (OCMAL, Chile), Samantha Hargreaves (WoMIN, South Africa), Henk Hobbelen (GRAIN, Spain), Million Belay (AFSA) and Elisabeth Mpofu (Via Campesina).

This report has been made possible thanks to a project financed by the European Union. We are also grateful to other funders, such as The Christensen Fund, Swift Foundation, the A Team and JJ Trust, for their support to grassroots work that enables and encourages indigenous and local communities to revive and secure land, seed, food and water sovereignty, and our efforts to communicate these positive stories of change. Together, we believe, we can restore a respectful relationship with the Earth.

UNDERMINING AGRICULTURE:

How the Extractive Industries
threaten our food systems

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Photo credit: Close-up of a backloader in a lignite (browncoal) mine / claffra / Shutterstock.com/190826828

At all stages of mining - from exploration and operations through to closure - the impacts on land, water, air and climate are destroying the essential elements needed for food production. (see Appendix 1: The Stages of Mining)



Full size photo:

INTRODUCTION

UnderMining Agriculture looks at the real impact of mining - from prospecting and operations through to closure - on agriculture, food production, soil fertility, fresh water systems, the air that we breathe, and our already challenged climate. Without healthy ecosystems there can be no healthy food. Without water there can be no life.

The boom in mining and extractive industries continues to penetrate into the farthest reaches of our planet with devastating impacts. Mining is no longer taking place in isolated pockets of concentrated deposits. It has become so widespread that it threatens the integrity of ecosystems on our already fragile Earth.

This report highlights how the accumulative effects of the boom in mining are already evident. The extraction of minerals, metals and fossil fuels, pollutes areas far wider than the actual mining sites and for many years after the closure of operations. Meanwhile, governments promote mining and provide incentives, arguing that it is in the "national interest" and "contributes to economic growth", with little evidence of either. In fact evidence shows that most profits go to the mining company, and little remains in the source country; jobs promised are always less in reality and few go to locals; and the host country not only gives incentives, but tends to bear many associated costs, such as infrastructure to serve the mine, not to mention dealing with the impacts to ecosystems and communities when the mine closes. There is also scant recognition of the true costs to the conditions of life for present and future generations of all species, including our own.

We argue that enough minerals and metals have been mined already. If we use them responsibly, changing the way we design, make and sell products, closing the loop to ensure zero waste, investing in a circular economy, we could supply enough energy for our needs - saving energy and using renewable energy, rather than subsidising the fossil fuel industry.

UnderMining Agriculture shows that national priorities need to be re-evaluated, and governments and citizens need to protect the conditions of life for food production now and for generations to come. Agricultural and food producing areas, and the water systems they depend on, should be recognised as "no-go areas" for mining and extraction and critical ecosystems should be protected - as a matter of urgency.



Photo credit: Damien Prestidge for The Gaia Foundation

1. LAND & ECOSYSTEMS

“For us, land is life. It is an expression of our existence and is integral to our ecosystems on which we survive as a species – the water, seeds, plants and animals. Our culture and humanity is deeply rooted in the land and how we use it. For us land is the basis for the future of our children and the restoration of our dignity and hope.”

Extract from the Southern Africa Rural Women's Assembly Declaration, 2009

Land is a **living system** in which plants, animals, ecosystems, water systems, humans and their agriculture, can thrive together. Despite what industrial society narratives may want us to believe, land is not a commodity to be bought and sold. Land sustains the very fabric of life, of which humans are a part.

Humans need healthy soils, forests, grasslands and water, to enjoy healthy crops. In addition, and oft ignored, ecosystems provide habitat for wild biodiversity, which is critical for healthy food systems. For some communities, 35% of their nutrition comes from wild foods – especially in the season before crops are ready for harvest, or in times of drought.¹ Wild biodiversity is a critical part of the food system, and wild relatives of agricultural crops are a vital source of new traits to enrich the genetic diversity and resilience of traditional crops. This is especially important for small farmers and diversity-based agriculture, when faced with increasing climate instability.

1 Wachiira, K.K. (1987) Women's use of off-farm and boundary lands: agroforestry potentials. Final report. Nairobi, ICRAF.



The Millennium Ecosystem Assessment (2005) warned that the Earth's biodiversity is facing such rapid rates of species extinction that genetic diversity has declined globally, many ecosystems have been lost entirely, and *“the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted.”*² The Planetary Boundaries study (2009) confirmed these fears, finding that global biodiversity loss has already transgressed the *“safe operating space for human development”*³ – meaning that our precious home, the Earth, faces potential tipping points and catastrophic ecological collapse.

Given the Earth's current ecological fragility, any further devastation and 'toxification' of lands, soils, waters and biodiversity by mining would be planetary suicide. Life as we know it cannot continue if the fundamental conditions of life are destroyed.

LAND GRABBING & ECOSYSTEM DESTRUCTION

The report *“Opening Pandora's Box: The New Wave of Land Grabbing by the Extractive Industries and the Devastating Impact on Earth”* (2012) exposes how land grabbing by the extractive industries has dramatically increased worldwide over the last decade.

This has been exacerbated by high commodity prices and more investment in “real things” like mining, since the 2008 global economic crisis, and the development of more destructive and extreme energy extraction technologies, such as fracking.

2 <http://www.unep.org/maweb/en/About.aspx#2>

3 Rockstrom et al. (2009) Planetary Boundaries: exploring the safe operating space for Humanity, <http://www.ecologyandsociety.org/vol14/iss2/art32/>

An overall trend is that the world's most concentrated and easily accessible deposits with the highest quality of materials have already been extracted. Attention has turned to the extraction of less concentrated deposits, which require the removal of more soil, sand and rock, and therefore the excavation and 'toxification' of larger areas of land, resulting in the destruction of whole ecosystems.

Despite these materials being harder to access, the rising prices of metals, minerals, oil and gas have incentivised further the exploitation and financial investment. New technologies have made it possible to extract materials from areas that were previously inaccessible, uneconomic or of lower quality.

As a result, the extractive industries have been expanding rapidly into new landscapes, affecting ecosystems and communities previously unscathed. Across Latin America, Asia and Africa, community lands, rivers and ecosystems are being despoiled by mining activities at an alarming rate.

Farming and indigenous communities are increasingly displaced in the race to grab land and water, and to lay claim to the minerals, metals and fossil fuels beneath the soil.

In some cases "compensation" packages are promised, which adds insult to injury, as ancestral lands, seascapes and traditional livelihoods are irreplaceable. Research shows that cash compensations bring impoverishment for indigenous and rural communities.⁴

The loss of ancestral territory and biodiverse ecosystems, the loss of traditional knowledge and connection to sacred landscapes, and the fragmenting of cultural and social cohesion when a community is uprooted, cannot be quantified, replaced or compensated for financially.



GIANT OPEN-CAST MINES

Another trend is that there is an increase in open-cast, or open-pit mining because deposits of minerals are more dispersed. This affects vast areas of land, biodiversity, water tables and ecosystems, and particularly fertile soils crucial to agriculture.

The landscapes are dramatically transformed into toxic wastelands through the excavation of metals, minerals and fossil fuels. Soils, grasslands and forests are gouged from the surface of the Earth, along with huge volumes of the subsoil and bedrock beneath them. This results in open pits and heaps of waste rock standing in the place of farmland, forests and grazing lands. Open-cast mines can be huge (some are even visible from space).⁵

These ecosystems and farmlands can never return to their original state once they have been carved up through this operation. By reducing the amount of fertile land that can be farmed, and destroying the wider ecosystems, mining reduces capacity for food production and denies communities of any hope of food sovereignty (see page 28).

4 Cernea, Mathur (2008) "Can Compensation Prevent Impoverishment?"

5 <http://www.mining.com/worlds-biggest-open-pit-mines-66335/>

Herding culture and way of life threatened by Sweden's mining boom



The livelihoods and culture of northern Europe's indigenous people – the Sami – are based on reindeer herding. In Kallak, Sweden, this involves the annual migration of herds, between the mountains in the summer and the lowlands in the winter, for the reindeer to be able to graze on lichen.

The Sami enjoy a close connection to nature and the ancestral lands where they have lived for 9,000 years, but their territories and their traditional livelihoods are under increasing pressure. The town of Kiruna, in the Arctic Circle, is already home to the world's largest underground iron ore mine, and Australian, British and Swedish companies plan to develop a series of open-cast mines (for iron, copper, gold and nickel extraction) stretching across the reindeer migration paths.

Matthias Åhrén, a law professor from Tromsø University and member of the Sami Council, says of plans by Australian mining company Hannans Reward Ltd, *"the site is so huge it cuts the Sami communities in half. It's directly on the reindeer migration path."* *"Traditional cultures depend on the land for their livelihoods"*, he adds. The mines would make reindeer herding in the area impossible by preventing reindeer from passing and by destroying autumn and spring pastures. The mine sites would be particularly damaging as they are in the area where the reindeer cows give birth.⁶

Nickel Mountain, a Swedish company looking to develop nickel mining in Rönnebäcken, has been challenged for its potential to damage migration routes and pastures. Additionally, British company Beowulf Mining plc's proposed plans for iron mining in Kallak have been the subject of fierce protests by Sami and activists from across Scandinavia, citing the damage caused to reindeer pastures, waterways and local forests that would be caused by the mine.

"Kallak symbolises the mining boom in Sweden at the moment" says Eric Blomqvist, co-chair of Friends of the Earth Sweden. *"If Kallak is approved it will send a signal to the international mining community that Sweden is an open door."*⁷

Lichen species are highly sensitive to pollution.⁸ Lars Jon Allas, a reindeer herder near Kiruna, says that mine dust carries for kilometres and kills the reindeer food source.⁹ Herder Jonas Vannar adds that the reindeer need every patch of their grazing ground to get enough food.¹⁰

Herders are also concerned that the mining would bring an increase in the movement of materials across the region, affecting the reindeer ability to migrate and to move safely. In 2013, 1,200 reindeer were killed by a single train line.¹¹ The impacts of vast toxic tailing ponds, as well as mountains of waste rock, are also a threat.

Sweden is not a signatory to the International Labour Organisation (ILO) Convention 169 that recognises indigenous peoples' legal rights over their traditional lands. The Sami community has lodged a complaint with the United Nations Committee on the Elimination of Racial Discrimination (CERD) concerning the Nickel Mountain development, and have warned that they will do the same about the Hannans project.

6 <http://www.theguardian.com/world/2014/jan/02/reindeer-herds-in-danger-mining-sweden>

7 <http://barentsobserver.com/en/business/2013/09/mine-dispute-intensifies-arctic-sweden-30-09>

8 http://www.theecologist.org/campaigning/cleaner_air_water_land/363298/using_lichen_as_indicators_of_air_quality.html

9 <http://www.theguardian.com/world/2014/jan/02/reindeer-herds-in-danger-mining-sweden>

10 <http://bigstory.ap.org/article/swedens-indigenous-sami-fight-against-miners>

11 *ibid*

The mines will make reindeer herding in the area impossible by preventing reindeer from passing and by destroying autumn and spring pastures.

2. WATER

“When the water’s gone, that’s it. We’re gone.”

Buck Owens, Rancher, Texas

Water is essential for life. Without it there can be no ecosystems, biodiversity, no agriculture, and no human survival. From the ground up – from the bacteria and fungi that form healthy soil, to the crops, plants, insects, animals, trees, fish and marine life that are part of an interconnected web of life – nothing can survive without water.

In many parts of the world, fresh water scarcity is making livelihoods and existence increasingly difficult. Climate change affects rainfall patterns, lowering water tables and drying up streams. Many predict that competition for this precious element of life may lead to “water wars” as a likely source of conflict in the near-to-mid term.¹²

One of water’s key biological functions, its ability to transport nutrients across landscapes, also means that, when polluted, it can rapidly (and invisibly) spread into neighbouring ecosystems, soils, crops, livestock and communities. Water’s flowing nature means that containing water pollution can prove an impossible challenge.

The increasing scarcity of fresh water for healthy ecosystems, food production and human needs in the face of climate change means that this precious element is more threatened than ever by the intense use and pollution inherent to mining.



12 Shiva, V., (2002) Water Wars: Privatisation, Pollution and Profit. Cambridge, Mass: South End Press

WATER USE

All types of mining and extraction, whether for metals, minerals, coal, shale gas or tar sands, use excessive amounts of water.

Water is used for processing, dust suppression, slurry transportation and waste disposal. The depletion of supplies or lowering of the water table has obvious implications for local communities and their ability to grow food or pick wild crops in the ecosystems they depend on for life.

Processing of bitumen from the Tar Sands in Alberta, Canada for example, uses between 2 and 4.5 barrels of water for every barrel of oil produced. The water is drawn from rivers and deltas, affecting fish and wildlife populations in areas far beyond the mining site. This in turn affects the livelihoods and food sovereignty of the First Nations peoples in the whole area.¹³

Hydraulic fracturing, or fracking, for shale gas and oil, also uses vast amounts of water: **between 1 and 8 million gallons of water are used each time a well is fracked.**¹⁴ In Michigan State in the US, Encana Corporation’s planned fracking operations require the equivalent of 16 days worth of the entire state’s public water supply¹⁵ – or 4 billion gallons of groundwater.¹⁶

In some mines, minerals are below the level of the water table. Breaching the water table causes the mine to fill with water, which must be pumped out. This in turn lowers the water table, depleting wells and river flow, affecting ecosystems, agriculture and livelihoods over a vast area.¹⁷

13 <http://www.foei.org/en/resources/publications/pdfs/2011/erratum-to-the-shell-annual-report/view>

14 <http://www.dangersoffracking.com>

15 TransNational Institute (2013) “Fracking: Old story new threat” http://www.tni.org/sites/www.tni.org/files/download/fracking_old_story_new_threat_0.pdf

16 Council of Canadians (2013) “Encana to use 4 billion gallons of groundwater for fracking in Michigan”, <http://www.canadians.org/content/encana-use-4-billion-gallons-groundwater-fracking-michigan#.UdLgMW10SZQ>

17 Ground Water International, (2014) “Managing Environmental Impacts of

Fossil fuel extraction, processing and conversion to electricity are particularly water-intensive, and the International Energy Agency (IEA) recognises that water is an increasingly critical factor in assessing the viability of fossil fuel extraction projects.

The IEA predicts that water needs for energy consumption will grow at twice the rate of energy demand, by 85% up to 2035.¹⁸ The energy sector is the largest consumer of water in the industrialised world, and the development of non-renewable "alternatives" (such as electricity derived from nuclear power, shale oil and gas), will increase water use still further.¹⁹

WATER POLLUTION



In addition to competing with ecosystems, agriculture and other livelihood needs for water use, the pollution of water systems will affect a far greater area than the parameters of the mine site itself.

The numerous processes carried out for just one mining operation can create multiple sources of water pollution and toxic waste – affecting agricultural lands and capacity for food production (not to mention foraging and fishing).

Acid Mine Drainage (AMD)

Rock that is dug up from deep underground contains sulphides, and becomes acidic when exposed to air. This so-called "overburden" waste rock is usually left in heaps of rubble in the vicinity of the mine site. **Rainfall that passes through these rock heaps is turned acidic, and then enters into soil and water systems.** This phenomenon is known as "acid mine drainage" (AMD) and is a common result of mining. It leaves soil and water systems acidic, and reduces soil fertility.

AMD continues long after a mine has closed, and can render agricultural lands acidic and infertile for hundreds of years.

“My first clue...was that I would visit farms in this community, and I would wash my hands and notice that there were no suds from the soap. The water was too acidic to make suds. This is how we first made the link between the mining and the water.”

Father Lorenzo, in the province of La Union, northeast El Salvador, where acid mine drainage has been linked to high incidence of kidney failure, cancer, skin problems and nervous system disorders.²⁰

In South Africa, the old gold mines in Johannesburg have created a growing problem of rising acid waters that threaten to flood parts of the city, contaminating water supplies more than a century after the mine's closure.²¹

Heavy Metal Leaching

Waste rock brought up from deep underground and then discarded contains significant levels of heavy metals such as iron, nickel, copper, lead, arsenic and aluminium. AMD dissolves and leaches these metals from the rock. **These toxic metals then enter water systems and contaminate food production.** They can continue to leach into water systems for as long as AMD takes place, which can be decades or even hundreds of years.

Leakages and Spills from Tailings

To extract metals from rock, companies use highly toxic solutions of chemicals such as cyanide. Rocks are broken up into smaller pieces, and kept in a cyanide solution so that the metal dissolves. The metal is then extracted from the solution using electrolysis.

Storage or disposal of the chemical waste is a challenge for mining companies. The company may choose to build a "tailings dam" to store the waste cyanide solution. Leakages are common. Dams are also known to burst, especially during

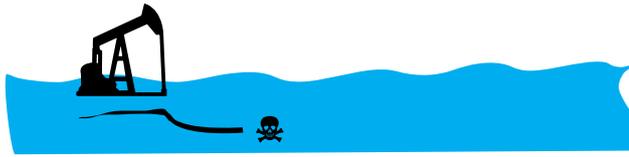
Dewatering' <http://www.groundwaterinternational.com/blog/2014/02/managing-environmental-impacts-of-dewatering>

18 International Energy Agency (2012) "World Energy Outlook" <http://www.worldenergyoutlook.org/publications/weo-2012/>

19 The Corner House (2012) "Energy Security: For whom? For what?" <http://www.thecornerhouse.org.uk/resource/energy-security-whom-what>

20 Extract from 'Food Sovereignty: A Critical Dialogue. Gold for Export? Or Water and Food for Life?', Robin Broad and John Cavanagh

21 Bloomberg (31 July 2013) "S. Africa to Start Pumping Acid Water from Johannesburg Mines" <http://www.bloomberg.com/news/2013-07-31/south-africa-to-start-pumping-acid-water-from-johannesburg-mines.html>



or after heavy rainfall. When this happens, **highly toxic cyanide enters the soils, water systems and ecosystems.** With climate change bringing more extreme weather events, such incidents are likely to become more frequent.

Tailings Disposal

Of the world's 10 largest mining companies, only one has adopted policies against dumping their chemical waste in rivers and oceans. None have policies against dumping tailings in lakes.²² **As mining expands globally, the deliberate dumping of toxic chemical waste into water systems will only increase unless action is taken urgently.**

Mercury Disposal

Artisanal small-scale metal miners tend to use mercury to extract metal from rock (instead of cyanide). These miners often focus their activities along rivers, releasing mercury into water systems. **Mercury is a persistent pollutant that remains in the environment, travelling far downstream and accumulating in fish, livestock, soil, vegetation and humans.**

Fracking Chemicals & Radiation

As of 2010, it has been estimated that 60% of all new oil and gas wells worldwide use hydraulic fracturing or "fracking" to extract shale gas or oil.²³ A well can be fracked 10, or even up to 18 times. **Each time a well is fracked, up to 40,000 gallons of chemical "frac fluid" are combined with water and sand to shatter and dissolve shale rock,** and to encourage methane or oil to migrate to the well to be collected.

Operators keep secret the exact mix of chemicals used in their fracking processes. However over 600 different chemicals are known to be used in shale gas production, including toxic and carcinogenic chemicals such as radium, methanol, hydrochloric acid, formaldehyde, lead, uranium, mercury and ethylene glycol.²⁴

- 22 Mining Watch Canada & Earthworks (2012) "Troubled Waters: how mine waste dumping is poisoning our oceans, rivers and lakes" http://www.miningwatch.ca/sites/www.miningwatch.ca/files/Troubled-Waters_Full.pdf
- 23 Montgomery, Carl T.; Smith, Michael B. (2010-12-105). "Hydraulic fracturing. History of an enduring technology" (PDF). JPT Online (Society of Petroleum Engineers): 26-41. Retrieved 13 May 2012.
- 24 US House of Representative Committee on Energy and Commerce (2011) "Chemicals used in hydraulic fracturing", [http://democrats.energycommerce.](http://democrats.energycommerce.house.gov/sites/default/files/documents/Hydraulic-Fracturing-Chemicals-2011-4-18.pdf)

Studies show that the amount of frac fluid that is recovered from underground can be anywhere from 80%, to as little as 15%, while one report suggests that on average only 8% is recaptured.^{25, 26} The rest (up to 92%) is left underground, where it is likely to contaminate the water table and local water systems.^{27, 28}

When the wastewater from fracking (known as "produced" or "flowback" water) comes up from being underground, it is contaminated with low levels of naturally occurring radiation. European regulations that came into force in 2011 now classify flowback water as radioactive waste.²⁹

Flowback water is supposed to be kept in tanks or recycled. However few water treatment facilities have the capacity to handle fracking wastewater and it is commonly left in tailings ponds, from where it can leak into local water systems. **Rivers downstream from water treatment plants that receive fracking wastewater can have 200 times the radioactivity levels found upstream.**³⁰

Fracturing of the cement casings used in horizontal boreholes for fracking is another risk for water pollution, and experts believe the problem may be far more common than is admitted by the industry.^{31, 32}

In addition, drinking water from water wells near fracking sites has been found to contain methane concentrations 17 times higher in than in normal wells.³³

- house.gov/sites/default/files/documents/Hydraulic-Fracturing-Chemicals-2011-4-18.pdf
- 25 http://www.earthworksaction.org/issues/detail/hydraulic_fracturing_101#.UcAdL5x05Z
- 26 Downstream Strategies (October 2013) "Water Resource Reporting and Water Footprint from Marcellus Shale Development in West Virginia and Pennsylvania" http://www.downstreamstrategies.com/documents/reports_publication/marcellus_wv_pa.pdf
- 27 Earthworks "Hydraulic Fracturing 101", http://www.earthworksaction.org/issues/detail/hydraulic_fracturing_101#.UcAdL5x05ZQ
- 28 Downstream Strategies (October 2013) "Water Resource Reporting and Water Footprint from Marcellus Shale Development in West Virginia and Pennsylvania" http://www.downstreamstrategies.com/documents/reports_publication/marcellus_wv_pa.pdf
- 29 <http://www.bbc.co.uk/news/uk-england-25902272>
- 30 <http://www.businessweek.com/news/2013-10-02/radiation-in-pennsylvania-creek-seen-as-legacy-of-fracking-waste#p2>
- 31 Smith-Heavenrich, S. (2011) "Expert: drilling impact two orders of magnitude bigger - with no regs", <http://newyork.sierraclub.org/SA/Vol41/impact.htm>
- 32 TNI (2012) "Fracking: Old story, new threat" http://www.tni.org/sites/www.tni.org/files/download/fracking_old_story_new_threat_0.pdf
- 33 <http://www.dangersoffracking.com>

Coal in Bangladesh creating food insecurity...

Bangladesh is a low-lying nation that is highly vulnerable to floods. However, the fertile region of Phulbari, in the northwest of the country, is elevated and uniquely protected from flooding.



Phulbari acts as Bangladesh's rice bowl, an important food production region for the whole country. Here, 80% of households depend on land-based livelihoods such as farming. Local inhabitants, from 23 different indigenous tribal groups, can trace their ancestry in the region back for 5,000 years.³⁴

Their lands and rice-growing livelihoods are under threat from a huge coal mining development. So too is the food security of an entire nation. Asia Energy Company/GCM Resources have applied for permission to develop a deep open-cast coal mine on 14,660 acres, 80% of which is considered to be Bangladesh's best farmland, displacing at least 50,000 farming families.

The proposed land grab is only part of the story. The deepest parts of the mine would hit the local water table. To remove the coal that is below this level, the company proposes to pump out up to 800 million litres of water each day from the pits. This process, known as 'dewatering', would lower the local water table by 15-25 metres.³⁵

The lowering of the water table seriously threatens food production in the whole region where nearly half of the people already struggle to meet their needs. It would deprive a total of 220,000 people of their access to water and thus farming livelihoods, over more than 190 square miles.³⁶

As Olivier de Schutter, UN Special Rapporteur on the Right to Food has said, "Nearly half the Bangladeshi population is food insecure, and nearly one quarter is severely food insecure. Local food production should be strengthened, not sacrificed for industrial projects." Seven human rights experts from the United Nations have called for a halt to the project.³⁷

The stakes are so high that 70,000 people have marched against the development, with protests and clashes delaying the mine's implementation for the last 7 years. Nevertheless, the company continues to aggressively push the project forward. Paramilitary troops have opened fire on demonstrators, killing three and injuring 200. Despite this aggression, locals vow to keep resisting the mine and its far-reaching devastation. "We will give our lives, but we will not leave this place. We will not allow the mine to happen. The government can take as many dead bodies as they want, we won't leave the village," says one woman.

GCM's proposed plans for Phulbari illustrate two trends with the extractive industries: firstly that mining can and does have devastating impacts on the farmland and livelihoods of huge numbers of people; and, secondly that companies are increasingly ruthless in their efforts to mine.

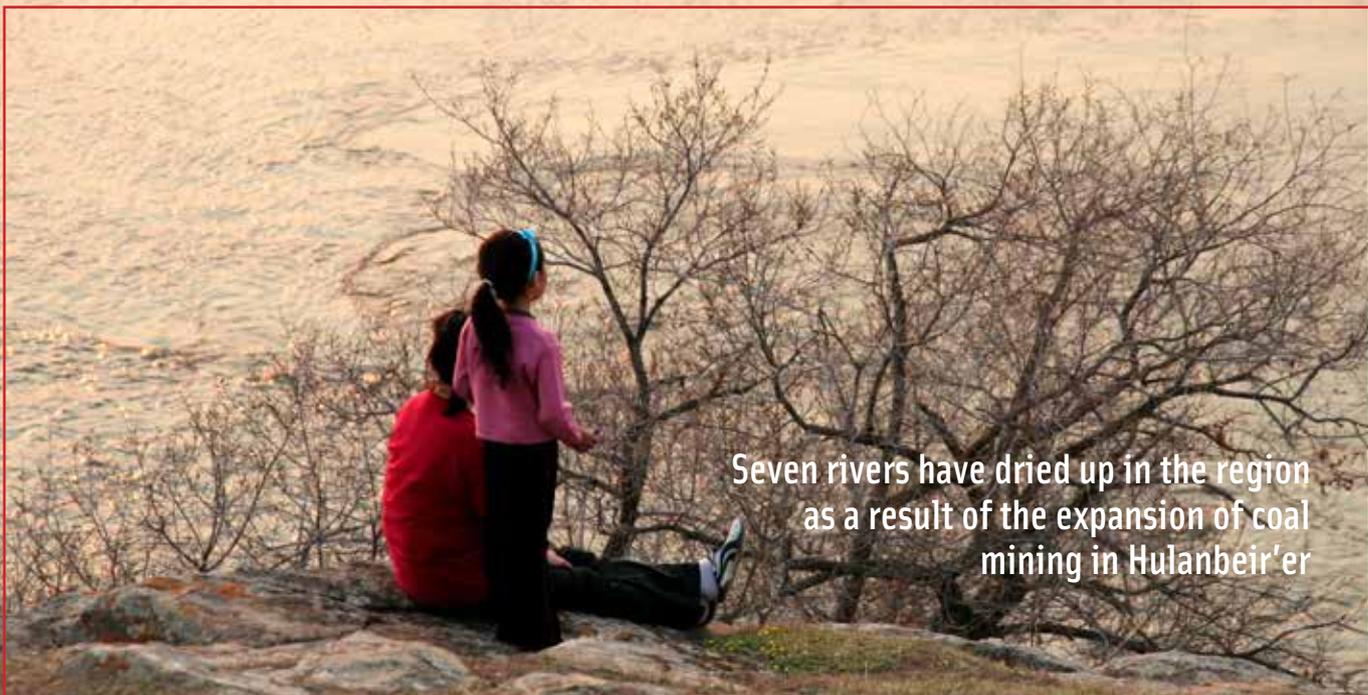
The lowering of the water table seriously threatens food production in the whole region ...It would deprive a total of 220,000 people of their access to water and thus farming livelihoods.

34 International Accountability Project Phulbari Coal Project Fact Sheet <http://accproject.live.radicaldesigns.org/downloads/Phulbari%20Factsheet%20with%20Footnotes.pdf>

35 Ibid

36 (2007) "Summary of the Report of the Expert Committee (REC) to Evaluate Feasibility Study Report and Scheme of Development of the Phulbari Coal Project"

37 UN Human Rights Office of the High Commissioner Press Release (28 February 2012) "Bangladesh open-pit coal mine threatens fundamental human rights, warn UN experts" <http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=11878&LangID=E>



Seven rivers have dried up in the region as a result of the expansion of coal mining in Hulanbeir'er

Desertification of grazing lands from coal mining in Inner Mongolia³⁸

The extensive Hulunbeier grasslands of China's province of Inner Mongolia have provided the homeland and livelihoods of traditional nomadic tribes for centuries. But these grasslands, once one of the most fertile regions in the world and famous for animal herding, also sit on top of vast coal reserves. These coal reserves – and the 40 billion tons of brown coal that have been uncovered so far – now form an integral part of China's Five Year Plan for the country's economy.

Hulunbeier is a relatively lush area with good water systems compared to the generally arid landscape of Inner Mongolia – although it is still dry compared to national averages. Water has been key to the success of Mongolian herding of cattle, sheep, goats, yaks, horses and camels, and to Mongolian nomadic culture and livelihoods in this region.

This same, relatively plentiful supply of water, has encouraged the coal mining industry to target the area. They require vast amounts of water for coal extraction and processing, particularly for the coal washing and dust suppression.

Seven rivers have dried up in the region as a result of the expansion of coal mining in Hulanbeier. Local water tables are dropping so much that villagers in Dongming have been forced to jointly invest in a 100 metre-deep well instead of relying on their household wells of 30 metres.

Desertification is expanding into the pasturelands, with approximately two percent of the grasslands disappearing each year. Reduced grassland size and competition for water are affecting the size and health of herds, and result in the loss of livelihoods for the farmers and herders. Additionally, farmers report that their animals are falling sick, and it is strongly suspected that this is caused by toxins from wastewater and dust from the mine.

The government claims that the coal has brought economic growth to the region. However, most mineworkers are recruited from other provinces, as the local herders do not have the technical training. The actual income of the local population is dropping in spite of the apparent economic growth of the region.

(This case study has been extracted with permission from the article "Green vs Black – How Coal Mining is Changing Inner Mongolia and the Hulunbeier Grasslands" by Jost Wübbeke, published in the Heinrich Böll Foundation's 2013 publication Copper, Coal and Conflicts – Resources & Resource Extraction in Asia)

38 Jost Wübbeke for Heinrich Böll Foundation (2013) "Green vs Black – How Coal Mining is Changing Inner Mongolia and the Hulunbeier Grasslands"

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Oil mining toxins in Peru's Rivers

Communities living along the Corrientes, Pastaza, Tigre, and Marañón Rivers in Loreto, Peru, have joined forces to put pressure on the Peruvian government after testing showed shocking levels of toxins and heavy metals in their drinking water as a result of oil exploitation in the region.

The Peruvian government first declared the Pastaza river basin to be an environmental crisis zone in March 2013, with all four rivers officially declared as severely contaminated within a year. Yet they have failed to act to tackle the pollution or provide humanitarian relief to the affected communities. The levels recorded surpassed legal and safe limits by hundreds of times. Findings in one report stated that hydrocarbon levels (TPH) in the Ullpayacu stream surpassed legal limits by 222 times, whilst in the Chirunchicocha Lake they surpassed by 382 times.³⁹

Nearly \$3 million worth of oil is extracted from these territories every month but the needs of the indigenous peoples and their basic human rights – access to clean water and safe food – have been ignored. This has taken its toll on the health of the communities, with a noticeable rise in the number of children being born with birth defects, horrific skin rashes becoming common, and thousands of stories of family members dying prematurely of unknown diseases.⁴⁰

Sarah Kerremans from Alianza Arkana stated *"President Ollanta Humala has the power to provide immediate relief to the affected communities. We must stand in solidarity with the people of the four river basins by calling international attention to these blatant violations—of both Peruvian law and basic human rights—and demand immediate humanitarian relief be delivered until tangible environmental remediation efforts can be effected."*

Despite an unsuccessful hunger strike and weeks of community mobilisations, the only tangible results of these declarations have been long meetings and empty promises.⁴¹ The federations representing the Quechua, Achuar, Urarina, Kichwa, and Kukama Kukamiria people are showing their resilience and determination by continuing the dialogue with government officials to find a way through this crisis. In the words of the Kukama's elected spokesperson for the strike, Monsignor Miguel Olaortuo, *"We cannot remain impassive in the face of human suffering. We must stand in solidarity with our brothers and sisters. This is not a matter of faith, but of human solidarity and social responsibility!"*

Their demands for justice are simple and overdue. This story is far from over.

39 Page 10. <http://observatoriopetrolero.org/wp-content/uploads/2013/02/SOURCE-Informe-sobre-los-reportes-de-calidad-ambiental-en-la-zona-de-extracción-petrolifera-del-r%C3%ADo-Pastaza.pdf>

40 http://alianzaarkana.org/images/assets/Pluspetrol_Deception.pdf.

41 <http://alianzaarkana.org/media-room/blog-latest-news/entry/kukamas-end-mobilization-after-announcing-a-hunger-strike>

Acid waters for agriculture, from gold mining in Peru

The Yanacocha Mine in Peru is the largest gold mine in Latin America, spreading over 25,000 hectares. It is sited in Cajamarca, the primary dairy producing area for the country, where more than 70% of the local population rely on agriculture for their livelihoods.

For generations, the nearby snow-capped mountains have provided Cajamarca's farms with a plentiful supply of meltwater and rainwater. This natural cycle is now interrupted by the Yanacocha gold mine, which is directly in the path of meltwater that travels from the mountains to the farming communities below.

The processing of gold ore uses vast amounts of water for dust suppression and slurry transportation, and creates huge tailings ponds. This means that less water is available for local agriculture, affecting farmers' yields.⁴² About 1026 hectares of agricultural land suffers from reduced irrigation, and more than 1,000 families have lost their irrigation systems altogether.^{43, 44}

The gold mining process at Yanacocha involves blasting rock with dynamite, spraying cyanide onto rock piles, then collecting the run-off.⁴⁵ Unsurprisingly, extremely high levels of heavy metals have been found in Cajamarca waters by the municipal water company (SEDACAJ): cyanide at 8 ppm (40 times the normal level), chrome VI at 375 ppm (7500 times the normal level), iron at 5900 ppm (17700 times the normal level), and manganese at 1750 ppm (3500 times the normal level). Acid mine drainage has also seriously acidified local rivers and streams, which were found to have a pH of 3.3 – similar to that of orange juice.⁴⁶

Fish breeding (rainbow trout in particular) is another important livelihood for the people of Cajamarca, and has been especially hard hit. Mass fish deaths have occurred many times as a result of acid mine drainage. Local waters have also been contaminated by mine waste being deposited directly into water systems from the sewage and rubbish generated dumped by mineworkers, and from multiple spills of exploration chemicals – mercury, ammonium nitrate and petroleum, among others.

Tens of thousands of peasant farmers have risen up in protest over the years. In 2004, resistance to a proposed expansion of operations to Cerro Quilish, a sacred mountain, was so strong that the Newmont Mining Company decided not to go ahead with their plans. In 2012, credit analysts noted that anti-mining protests are a significant hurdle against further planned mining expansion in Peru.⁴⁷

Nonetheless, a new mining proposal is underway for Cajamarca. The \$5 billion Conga gold-copper mine would cover 3069 hectares, draining four lakes in order to process and extract the ore, and destroying a water basin that sustains 30,000 people.^{48,49} Local families refuse to sell their land in spite of pressure and harassment, but while protests have stalled the Conga project, the national government aims to press ahead. Already 48% of Cajamarca region is under concession to mining companies, and nearly 20% of Peru's entire territory.⁵⁰ However, the protests and resistance continue to grow.



70% of people in the region make a living through agriculture. Local waters have been contaminated by mine waste and multiple spills of exploration chemicals.

42 http://www.sarpn.org/documents/d0002569/10-WRI_Community_dev_May2007.pdf

43 Marco Arana Zegarra (2012) "Peru: el derecho al agua en comunidades afectadas por actividades mineras"

44 *ibid*

45 Project Underground (2000) "Peru's Yanacocha Gold Mine: the IFC's Midas Touch?" http://www.ciel.org/Intl_Financial_Inst/ifccaseperu.html

46 *ibid*

47 Mineweb.com (29 August 2013) "Anti-mining protests biggest hurdle for Peru's mining growth" <http://www.mineweb.com/mineweb/content/en/mineweb-political-economy?oid=2028586sn=Detail>

48 Reuters (18 June 2013) "Peru Protesters push to stop Newmont Mine" <http://www.minesandcommunities.org/article.php?a=12347>

49 <http://congaconflict.wordpress.com/conga/>

50 <http://www.regioncajamarca.gob.pe/noticias/cajamarca-ingemmet-contin-tr-mites-para-otorgar-concesiones-mineras-en-cabecera-de-cuenca>

Photo credit: Golda Fuentes, some rights reserved
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Photo credit: Tailing pond from copper mine (Romania) / Cristian Victor Rete / Shutterstock.com



3. AIR

“The land is sick here. The people are sick from polluted air, water and food.”

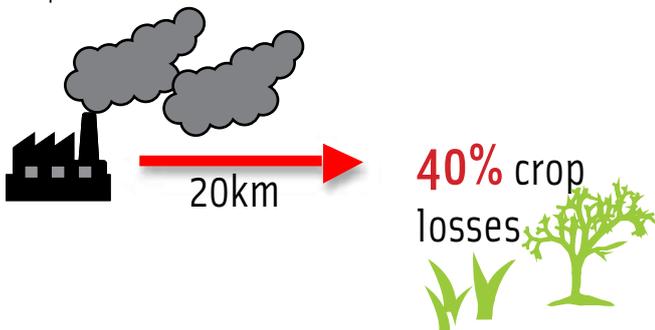
Jesse Cardinal, Keepers of the Athabasca, Alberta, Canada

Air, another essential element for life, knows no boundaries. It can carry and spread pollution for many miles, depositing chemicals, dust and particles on plants, crops, soils and water and in the lungs of people, livestock and wildlife. **Air pollution is invisible but extremely costly to clean up.**

To give an indication of its impact on human health and the environment, the European Environment Agency (EEA) calculated that in 2009 air pollution from Europe's industrial facilities cost approximately €200-330 for each EU citizen.⁵¹

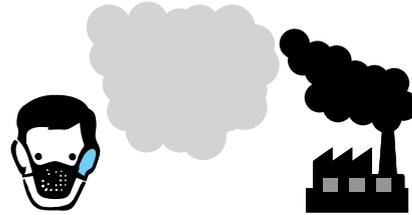
AIR POLLUTION

Recent research concludes that air pollution resulting from gold mining operations in Ghana may lead to crop losses of up to 40% in an area surrounding each mine site, for a radius of up to 20km.⁵²



51 European Environment Agency (2009) "Revealing the Cost of Air Pollution from Industrial Facilities in Europe" <http://www.eea.europa.eu/publications/cost-of-air-pollution>

52 Aragon, Rud (2013) "Modern Industries, Pollution and Agricultural Productivity: Evidence from Ghana" http://personal.rhul.ac.uk/uute/103/wp/master_ghana_SEP13.pdf



Air pollution has significant impacts on food production and quality, yet neither local nor national governments take these impacts into account.

Mining creates several different types of air pollution, all of which can travel large distances to settle on soils, biodiversity, waterways and crops. Dust, particles, fumes and toxic emissions can impact on agriculture in a number of ways: They can impact the health of farmers and thereby reduce their ability to farm; dust and particles can suppress pollination and therefore lower crop and wild food yields; and toxic emissions from machinery and fossil fuel extractives can affect the health and yields of livestock and crop production.^{53, 54}

Metals, Minerals and Coal Dust

During mining, rocks, ore and coal are blasted, drilled, crushed, ground and cleaned. Materials are transported in open trucks. Tailings dams and waste rock heaps release large amounts of dust, containing heavy metals and other contaminants. **Extremely small particles and liquid droplets are especially dangerous to health if they are less than 10 micrometres in diameter,** as they can pass through the nose and throat, and enter into the lungs of humans and animals.

Emissions from Diesel Machinery and Smelting

Large-scale mining operations involve constant use of diesel engines for drilling, hauling, heating, cooling and transporting. The giant drills, mass excavators, electric shovels, bulldozers, scrapers, diggers, earthmovers and trucks used in surface mining can be enormous. Some have buckets that are capable of moving 160 cubic yards (or 122.3 cubic metres) of earth in one scoop.⁵⁵

53 Graff Zivin, Joshua S. and Matthew J. Neidell (2011) "The Impact of Pollution on Worker Productivity," NBER Working Paper No. 17004.

54 PIPLINKS (2012) "Pitfalls and Pipelines: Indigenous Peoples and Extractives Industries"

55 <http://www.heavyequipment.com/heavy-equipment/earthmoving-mining>

The constant use of multiple giant diesel engines on a mining site generates large amounts of diesel emissions, including Nitrogen Dioxide (NO₂). Smelting operations release particles of zinc, arsenic and lead that settle on soils, water and biodiversity, far beyond the site of operation.⁵⁶

VOCs and BTEX compounds

Activities involved in oil and gas production such as flaring and venting lead to the release of a wide spectrum of highly toxic volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene and xylene (known as BTEX compounds).

The volatile nature of BTEX compounds means they readily convert from liquid to gas, and can easily contaminate air, water, plants, soils and crops as well as livestock and people.

They can be absorbed by humans and other living organisms through inhalation, water, crops, through skin, and from soil vapours.

Shale gas and tar sands production are particularly associated with BTEX compounds. These chemicals occur naturally in crude oil, and are released during processing. Wastewater from shale gas and tar sands has high BTEX and other VOCs levels. The VOCs evaporate from this water, which is left in tailings lakes, causing highly toxic air pollution.

⁵⁶ Earthworks & Oxfam America (2004) "Dirty Metals: Mining, communities and the environment" http://nodirtygold.earthworksaction.org/library/detail/dirty_metals#.UupRF6VNwpE

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US Shale Gas: Unexplained Deaths of Animals

Shale gas extraction, or fracking, has been underway in the United States for some years now. There are important lessons to be learned from the farmers and communities where these operations take place.⁵⁷

Cases of livestock sickness, and death in animals raised in shale gas areas, are backed up by a peer-reviewed study which looked at 24 livestock farmers in six North American states where shale gas is produced.⁵⁸ Farmers reported neurological, reproductive and acute gastrointestinal problems among their animals, or sudden and otherwise unexplained deaths. These animals were constantly exposed to the soil, water and air that carry the toxic compounds from fracking. In some cases where cows were in the vicinity of frac fluid or wastewater for just a few hours, significant numbers died.

Jacki Schilke, a farmer raising cattle in North Dakota, is one farmer affected by this. Soon after fracking rigs appeared in view of her land, her cattle began unexpectedly limping, stopped producing milk, their tails dropped off, and five of them fell dead. Several cats and two dogs on the farm also died. Jacki herself began to suffer from respiratory sickness and kidney ailments, losing her teeth, and feeling lightheaded when she went outside.

Tests showed Jacki's blood to have elevated levels of arsenic, acetone and germanium. Her water well was contaminated with sulphates, chromium, chloride and strontium. Testing of ambient air revealed high levels of benzene, methane, chloroform, butane, propane, toluene and xylene. The creek running through her land was found to have sulphate levels 16 times that of the Environmental Protection Agency's safe limit.

The study also raises the concern that animals that do not die on-farm still go for slaughter and sale as food. There are no requirements for farmers to prove that the animals are free of fracking contaminants. The chemicals that the livestock are exposed to may therefore be making their way into the US food system through meat and dairy products. Customers are largely unaware of the issue, and unable to choose safe alternatives.

The fracking industry denies any connection between their operations and the death of animals, but some insurance companies and banks can see the impending risks. Nationwide Mutual Insurance for example no longer covers agricultural damages related to fracking. Meanwhile the world's largest agricultural bank, Rabobank, reportedly no longer sells mortgages to farmers with gas leases.

Here we see that animals, farmers and consumers are paying for the profiteering of the 'frackers'. What legacy we are leaving for the next generations of all species?



... where cows were in the vicinity of frac fluid or wastewater for just a few hours, significant numbers died.

⁵⁷ The Nation (28 November 2012) "Fracking our food supply" <http://www.thenation.com/article/171504/fracking-our-food-supply#>

⁵⁸ Bamberger, Oswald (2012) "Impacts of gas drilling on human and animal health" <http://www.ncbi.nlm.nih.gov/pubmed/22446060>



Photo credit: Jess Phillimore for The Gaia Foundation

4. CLIMATE

*“Leave the oil in the soil,
the coal in the hole and the tar
sands in the land!”*

Nnimmo Bassey, Nigerian activist and poet

In 2013, atmospheric carbon dioxide levels hit 400 parts per million – far exceeding the planet’s safe boundaries for climate stability.⁵⁹ As all continents have recently experienced, the incidence of extreme weather events is becoming ever more frequent as a result of climate change. 2012 saw record-breaking melting of Arctic sea ice. 2013 saw Australia’s hottest month on record, the strongest typhoon in history hitting in the Philippines, and one of the fastest recorded temperature rises (from -40.8C to +7.7C in Northern Sweden in just a few hours). The start of 2014 saw an unprecedented Polar Vortex that drove temperatures into extreme sub-zeros across the whole of the United States.

As the Earth’s climate becomes unstable, low yields, crop failures and hunger will increase. The Intergovernmental Panel on Climate Change (IPCC) gives the stark warning that climate change is having – and will have – increasingly catastrophic impacts around the world, particularly on food production.^{60, 61, 62} It is widely recognised that all countries, regions, industries and individuals need to make every effort to reduce greenhouse gas emissions and climate change impacts. The reduction of climate change’s impact on global food systems is one of the principle objectives of the United Nations Framework Convention on Climate Change (UNFCCC). We need to act urgently, and, to do so, we need policies that move us away from harmful greenhouse gas emissions, from fossil fuels in particular, towards resilient energy systems.

59 <http://www.350.org>

60 IPCC (2014) “5th Assessment Report Working Group 2 Summary for Policy Makers” http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Aproved.pdf

61 IPCC (2012) “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” <http://www.ipcc-wg2.gov/SREX/>

62 Campaign to Demand Climate Justice (2014) “Highlights of the IPCC AR5 Working Group 2 Report” http://climatejusticecampaign.org/images/ipcc/DCL_Food_and_Climate_Change.pdf



GREENHOUSE GAS EMISSIONS

Mining operations contribute significantly to climate change. Extensive deforestation and destruction of vegetation from mining developments removes trees that would absorb carbon dioxide and solar heat. With the rise of open-cast mining, more drilling, haulage and transportation is needed because so much more rock is extracted from a pit than from underground mining. The use of diesel machinery involves intensive fuel consumption and greenhouse gas emissions that cause climate change.⁶³ Machinery also creates volatile organic compounds (VOCs), which form ground-level ozone – a significant greenhouse gas – under sunlight.⁶⁴

The extraction and combustion of fossil fuels are a particular threat to climate change. In 2010, 43% of global emissions from fuel combustion came from coal, 36% came from oil, and 20% from gas.⁶⁵

International reports show that, in recent years, it is the combustion of coal that has driven the growth in global emissions. This alarming trend was interrupted briefly in 2009, due to the financial crisis, but has since returned to its previous trajectory.⁶⁶

“Brown coal” is considered the main culprit, as its lower carbon and higher water content means that it produces 37% more CO₂ per unit of electricity than conventional coal. However, shale gas (promoted as being a “cleaner” or “transition” fuel) makes a significant, and perhaps the biggest contribution to climate change among fossil fuels. It is a particularly energy intensive process, combined with methane leakage at the drilling pads. Some researchers suggest that its total greenhouse gas contributions could be greater than that of coal.⁶⁷

63 IIED (2002) “Breaking New Ground: Mining Minerals and Sustainable Development”

64 <https://www.elaw.org/files/mining-eia-guidebook/Chapter1.pdf>

65 IEA (2012) “CO₂ emissions from Combustion: highlights” <http://www.iea.org/co2highlights/CO2highlights.pdf>

66 Ibid

67 Howarth et al (2011) Methane and the greenhouse-gas footprint of natural gas from shale formations, *Climate Change* 106:679

We must move our fuel focus away from fossil fuels, to renewable energy and energy-saving systems.

Despite this obvious urgency, according to the International Energy Agency (IEA) **the fossil fuel industry received six times as many subsidies as the renewable energy sector in 2011**. In 2012, \$0.5 trillion was spent on subsidies for coal, oil and gas.⁶⁸

It is estimated that the global South needs between \$0.6tn and \$1.5tn per year to address climate change and mitigation, but the money is not being made available.⁶⁹ The same governments that refuse to put the necessary funding towards addressing climate change, continue to subsidise the fossil fuel sector that perpetuates the problem.

ADAPTATION UNDERMINED

Mining reduces the ability of local communities, and the ecosystems they depend on, to adapt to the impacts of climate change. With climate change leading to the increasing evaporation of water as well as changing rainfall patterns, water scarcity is on the rise. **Mining competes with ecosystems and agriculture for increasingly precious water**, which could push drought-struck communities over the edge. When water availability is already reduced by drought, the pollution caused by mining – toxic tailings leakages, heavy metal leaching or acid mine drainage – will be more concentrated in the little water that is left.

Climate change will also bring with it more extreme weather, such as heavier rain, storms and flooding – leading to more toxic and acid run-off from mine sites. Heavier rain will also mean an increased likelihood of tailings dams bursting, putting downstream communities at risk from flooding by heavily toxic waste. Abandoned coastal mines may be inundated, causing water pollution and acid mine drainage.

The displacement of farming communities by land grabbing, water depletion or pollution, means that communities will be forced to relocate. They tend to be moved to less fertile and well-watered lands, or to areas that are already farmed,

finding themselves in competition and possible conflict with the existing local community. Both displaced and existing communities thus put an even greater burden on the local ecosystem, with less land and water available with which to adapt to the multiple challenges of climate change.

Oil and Water in Texas: to drink or to drive?⁷⁰

In Barnhart, Texas, local water systems are already under pressure from drought and climate change. But the community was shocked when fracking for oil in the area drained their local water systems until their taps ran completely dry.

A single well may be fracked up to 18 times in total, using up to 8 million gallons of water each time. Local resident Beverly MacGuire can see nine wells just from her back porch. Now, not only has the well on her property dried up, but the town's public water supply that she then hooked up to is going dry too.

Barnhart is a farming community, and the oil companies' use of the scarce local water in the midst of drought meant that cotton farmers lost up to half of their crops this year. Buck Owens, a local rancher who had up to 500 cattle and 800 goats is now down to just a few hundred goats.

Locals are angry with the oil companies. And they are angry with their water-well owning neighbours, who chose to sell water to the companies, thereby draining the local aquifer. The irony is that even the famously pro-oil Texans are now questioning the value of fracking for oil. *"I'm Texan. Oil is our industry."* Says Glenda Kuykendall. *"But getting one oil well fracked takes more water than the entire town can drink or use in a day."*

"I may have to go without a bath, but do you want your grandchild not to be bathed, or your mother not to be bathed?" says MacGuire, choking back tears. *"It hurts you, like nobody understands. When the water's gone then that's it."*

68 <http://www.theguardian.com/sustainable-business/fossil-fuel-subsidies-bad-example-business>

69 ODI (2013) "At cross-purposes: subsidies and climate-compatible investment" <http://www.odi.org.uk/publications/7343-subsidies-climate-compatible-investment-fossil-fuel-private-finance>

70 <http://www.theguardian.com/environment/2013/aug/11/texas-tragedy-ample-oil-no-water>

Photo credit: NAIROBI, KENYA- FEBRUARY 6, 2014: Ripe fruits stacked at a local fruit and vegetable market on February 6, 2014. Nairobi, Kenya./ Aleksandar Todorovic / Shutterstock.com



5. FOOD SOVEREIGNTY & LIVELIHOODS

“Our heritage as food producers is critical to the future of humanity. But this heritage and our capacities to produce healthy, good and abundant food are being threatened and undermined.”

Declaration of the Forum for Food Sovereignty, Nyéléni 2007

We look here at the claims by corporations and governments that mining brings economic development, jobs and prosperity to a region.

A closer examination of the real winners and losers (short- and long-term) shows that mining undermines the conditions for producing food, leads to the loss of more livelihoods than it creates, and weakens local, regional and national economies - for generations.

LOSS OF FOOD SOVEREIGNTY

When communities lose their ability to grow food (and forage), they not only lose their livelihoods, but also the certainty of having enough to eat.⁷¹ This is especially acute in the global South, where rural communities are largely subsistence farmers, growing much of the food that they and their families rely on to survive.

⁷¹ The term food sovereignty is used, rather than food security which is often misused to justify industrial agriculture and the provision of genetically-modified seed. <http://afsafrica.org/wp-content/uploads/2014/05/AFSA-Documents.pdf>



Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers. Food sovereignty prioritizes local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal-fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability.

(Nyéléni Declaration).

When a mine displaces a farming community, reduces and contaminates surrounding water sources, pollutes the air and has an impact on the health and ability of communities to grow food, this will affect the food sovereignty of a whole region. Not only is their ability to grow food undermined, but their ability to earn income to purchase food will also be severely reduced.

FOOD SYSTEMS & FOOD SOVEREIGNTY

70% of the world's people are fed by small-scale agroecological food producers. The planet's peasant farmers, artisanal fisherfolk and pastoralists are feeding the majority of the world using only 30% of the world's land and few external inputs.⁷² They are part of a lineage of guardians and custodians of the world's crop and livestock biodiversity, water systems and soils. They are the most efficient food producers on the planet.

These agroecological, small-scale food producers have an intimate relationship with the land on which they depend, in many cases having nurtured it for generations. They understand that healthy soils, biodiversity, clean water, fresh air, a stable climate and healthy farmers are all essential for food production. Thus they recognise that it is their role to enhance the diversity of their crops and livestock, to preserve and protect their ecosystems – their soils, water and biodiversity – to create the conditions for healthy food production for generations to come.

Despite all this, it is precisely these food producing communities and their food systems that are the most threatened by the aggressive expansion of the mining and extractive industries. The world's small-scale food producers are generally part of communal land systems, and are the most vulnerable in the face of government priorities. They are usually the first to be displaced by large-scale land grabs such as mining projects.

The "Food Sovereignty" movement was developed by the world's largest peasant movement, La Via Campesina, which recognises the critical importance of small-scale food producers, and their right to determine their own agriculture and food systems. Food Sovereignty is about ensuring their control and rights over land and water, so that they may continue to produce food for themselves and for us all to eat. Food Sovereignty systems work with nature, appreciating that healthy ecosystems are essential in supporting the health of animals, fish, pollinators, crop diversity and farmers.

There is growing global recognition that in order to ensure that we can feed ourselves, and future generations, we must promote and support the principles of Food Sovereignty. Without the farmers and the soils, biodiversity, crop diversity and water that they tend, our planet's food systems are at risk. Now, in the face of increasing climate instability, diversity-rich agriculture that helps farmers to spread their risk and adapt to new challenges is more critical than ever for food production.

72 ETC report (2009) "Who will feed us?" http://www.etcgroup.org/sites/www.etcgroup.org/files/ETC_Who_Will_Feed_Us.pdf

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NATIONS BECOME DEPENDENT AND FOOD INSECURE

Reducing local and national food production leaves nations dependent on food imports and communities vulnerable to rising local and global food prices, and with a greater risk of poor and narrow diets that increase malnutrition. Nations that are overly dependent on food imports are also more politically vulnerable to pressure from other, more powerful nations and corporations.

The proposal for a massive coal mine in Bangladesh's region of Phulbari, for example, is projected to affect the food production and livelihoods of 220,000 people (see page 15). Phulbari is Bangladesh's principle rice-growing area, and is critical to capacity to feed itself.

In South Africa, it is calculated that 12% of the country's high potential arable land is threatened by coal mining, which would mean losing 284,844 tons of maize per annum. A further 13.6% of land is under prospect, with a further 162,736 tons of maize potentially lost. This has long-term implications for local and national food insecurity, as well as maize prices in South Africa. Over the long-run, the reduction of 447,581 tons of maize per year from the market would result in an average annual price increase of R300/ton (over and above projected average maize price of R2,090/ton).

Coal mining in South Africa is projected to increase maize prices by 14% in the long-term, causing maize meal prices to increase by approximately 5%.⁷³ Given that maize and maize meal are the staple food of the majority of people in the country, this will have significant implications for food sovereignty.

73 Bureau for Food and Agricultural Policy (2012) "Evaluating the impact of coal mining on agriculture in the Delmas, Ogies and Leandras districts with a specific focus on maize production"

“We don't want jobs for 15 years; we want livelihoods for thousands of years!”

Member of Dzomo la Mupo, Venda, South Africa⁷⁴

MORE LIVELIHOODS LOST THAN JOBS CREATED

Once mining begins, the livelihoods that the land provides are destroyed altogether.

In Venda, in South Africa's Limpopo province, Australian mining company Coal of Africa Ltd (CoAL) promised that the Vele coal mine would provide 826 jobs.⁷⁵ In reality, they provided 342 jobs before closure in 2011. The Venda Mineral Resources Stakeholders' Forum calculated that 11,000 people in total would lose their livelihoods due to the diversion of water sources from agriculture and tourism to coal production in the region.

In Romania, at the site of the proposed Rosia Montana gold mine, local people are fighting a bitter battle against the government's efforts to force them to make way for Europe's largest gold mine. It has led to protests by over 200,000 people across Romania and in cities around the world.⁷⁶ The company, Gabriel Resources, claim that the mine will create 900 jobs. However the mine, which will use 40 tonnes of cyanide per day, and 13,000 tonnes per year (13 times the total amount currently used across Europe) will destroy at least 20,000 jobs in agriculture, tourism and other services due to the effects on the landscape, cultural heritage and biodiversity.⁷⁷

The exceptionally diverse habitats of the Bristol Bay watershed in Alaska, home to the world's largest salmon run, have sustained Native communities for 4,000 years. The sustainable livelihoods of more than 14,000 people are

74 Dzomo la Mupo are a group of community members and sacred site custodians in Venda, Limpopo province, South Africa who are defending their local sacred sites against threats.

75 "Macroeconomic Impact Assessment of the Proposed Vele Colliery near Musina, Limpopo – Final Report", Annexure M (29 April 2009)

76 CNN iReport (21 October 2013) "Romania on fire: the Romanian Autumn expands" <http://ireport.cnn.com/docs/DOC-1051083>

77 <http://www.romania-insider.com/study-romanas-rosia-montana-mining-project-could-negatively-impact-more-than-20000-jobs-in-farming-tourism-and-wood-processing/107661/>

under threat from Northern Dynasty Minerals' plans to build Pebble Mine - a 'development' that only promises 1,000 jobs during mine operation. Conservative estimates suggest that, even without accidents or spills, the gold, copper and molybdenum mine will destroy 151km of waterways, 4,900 acres of wetlands and 450 acres of ponds and lakes.⁷⁸ Due to the connectivity of water systems, Pebble Mine will dramatically undermine key spawning habitats for fish, the source of thousands of livelihoods in Bristol Bay and the cornerstone of Alaskan Native Culture.

At any one time, livelihoods lost are greater than jobs provided. And when the total livelihoods lost over the long-term are compared to the few jobs provided during the years that the mine is operational, the full picture is even worse.

The impact on jobs and livelihoods continues even after a mine closes. Most mines may stay open for between 5-30 years, sometimes longer. However, the long-term management of waste and mine infrastructure is costly and rarely done well. The pollution of water and ecosystems, the disruption to rock and land stability, will continue to affect the local environment for many (possibly hundreds) of years.

Full restoration of soils, water, biodiversity and livelihoods to their former state is impossible. Productive farmland and ecosystems are left diminished or destroyed, with the surface and ground water acidified and polluted with heavy metals for hundreds of years to come - long after the mine has stopped providing any jobs.

THE FALSE ILLUSION OF ECONOMIC GROWTH

In most countries of the global South, a high percentage of people are dependent on agriculture for their livelihoods. The economies of these countries are highly vulnerable to destruction of the ecosystems on which their agriculture depends. Other livelihoods that make an important contribution to local and national economies, such as secondary agricultural products and tourism, are also impacted.

Local communities who lose their land and livelihoods from farming are rarely able to take on the few jobs available

78 United States Environmental Protection Agency (2014), "An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska"

in the mine. Such jobs usually require a level of technical skill or education that few local farmers, pastoralists or indigenous peoples have been trained to develop. It is also not in the investors' interest to dedicate the time and money needed to train people into these jobs if national or provincial/ state governments won't do so. Mining companies tend, therefore, to bring employees from outside the region. For this reason, local incomes will decrease as a result of mining, even though figures that include the incomes of mining employees who have been brought in, may give the illusion of local economic growth.

“The fields are now fenced in for the mine... we have no way to go and plough the land. If we do try to grow food or collect firewood, we are told we are trespassing and confronted by a [security] convoy. We have no food, water or electricity.”

Magdalene, mother and former farmer, Mokopane, Limpopo Province, South Africa⁷⁹

A study by the World Bank showed that mining of metals, minerals and fossil fuels has actually slowed down African countries' efforts to reduce poverty.⁸⁰ The 2012 Africa's Pulse report admitted *“Despite years of significant oil revenues, the central African countries have some of the lowest human development indicators in the world. The tragedy is that these countries have not been able to use their oil revenues to significantly improve the welfare of their poor citizens.”*⁸¹

A New Zealand study found that mining could reduce the national GDP from tourism by 1%, roughly equivalent to mining's entire contribution to the economy. This means that the mining profit is entirely cancelled out by the loss in tourism incomes⁸² - without even factoring in ecological and social costs.

79 IWMN/RIMM (2010) <http://www.womin.org.za/images/papers/4.%20Paper%20Three.pdf>

80 http://siteresources.worldbank.org/INTAFRICA/Resources/Africas-Pulse-brochure_Vol6.pdf

81 Ibid

82 <http://www.forestandbird.org.nz/files/file/Mining's%20Impact%20on%20Tourism.pdf>

Nigeria: Oil vs. Agriculture

Nigeria is famous for being an oil-exporting African country. Tales of colossal wealth and extreme poverty, conflict and corruption, as well as ecological devastation have accompanied Nigeria's oil boom. But it was not always this way.

In the 1960s, Nigeria was fêted as one of the most promising agricultural producers in the world.⁸³ Its successful economy was based on agriculture, providing 64.1% of the country's Gross Domestic Product (GDP). Export crops such as groundnut, cocoa, cotton, rubber, palm oil and palm kernel, formed 65 -75% of the country's foreign earnings, and domestic agriculture fed as much as 90% of the population.⁸⁴

The arrival of Nigeria's oil boom in the 1970s transformed the country's agriculture and food sovereignty. The activities of Shell and other oil companies have effectively destroyed the fertile farmlands and fishing ecosystems of Ogoniland in the Niger Delta for generations to come. Water and soil pollution from oil spillages, pipeline explosions and toxic waste dumping, air pollution from gas flaring, ecosystem destruction from dredging, as well as flooding, erosion and land degradation have all resulted from the oil companies' activities.⁸⁵ *"The once beautiful Ogoni countryside is no more a source of fresh air and green vegetation. All one sees and feels around is death,"* reads a statement by Movement for the Survival of the Ogoni People (MOSOP).

When agriculture and fishing became increasingly unviable in Ogoniland, many communities became environmental refugees, increasing the pressure on the scarce fertile lands elsewhere in the country, or leaving agriculture and fishing altogether to seek out urban employment. An FAO study showed that the majority of farming households that chose to remain in the oil producing regions were obliged to diversify into non-farming activities to survive.⁸⁶

In 1981 the Central Bank of Nigeria annual report admitted that petroleum exploration and production had had adverse effects on the country's fishing and farming. In 2000, agriculture made up just 5% of the country's total foreign exchange earnings. In 2013 the Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA) admitted that instead of benefiting the country, oil was in fact killing the economy and the country's agriculture sector in particular.⁸⁷

Margaret Amos, a farmer in Imiringi, states *"When Shell came and situated their facilities here and invaded us, our crop yields started depreciating. As a young girl, our crops – cocoyam, cassava, plantain, and more – grew more luxuriantly. When we harvested them, we got bountiful yields. But all that now is history. What we get these days could be likened to [a] skeleton of those days... This gas flare is responsible for the decline in crop yield!"*⁸⁸

Nigeria's reduction in agriculture is not just in relative terms compared to oil income. Oil extraction has directly undermined the country's agriculture through the impacts of oil pollution. Other African countries such as Uganda, where oil development is also in the pipeline, would do well to learn from this experience.



The once beautiful Ogoni countryside is no more a source of fresh air and green vegetation. All one sees and feels around is death

83 <http://www.forbes.com/sites/skollworldforum/2013/08/08/agriculture-is-the-future-of-nigeria/>

84 <http://www.slideshare.net/bolawafadoju/discovery-of-crude-oil-in-nigeria-a-blessing-or-a-curse>

85 http://www.academia.edu/1226374/effect_of_petrolium_on_agricultural_development_in_nigeria

86 http://www.fao.org/fileadmin/templates/ess/pages/rural/wye_city_group/2010/May/WYE_2010.4.3_Apata.pdf

87 <http://allafrica.com/stories/201302130929.html>

88 International Women in Mining Network (2010) "Women from Mining Affected Communities Speak Out: Defending land, life and dignity"

WOMEN FACE ADDITIONAL HARDSHIPS

It is generally women who are more affected than men by the impact of mining on agriculture. According to the FAO, peasant women in developing countries produce 60 to 80% of food consumed within rural households.⁸⁹ While the food produced by women and eaten by families may not appear in government economic figures for Gross Domestic Product (GDP), it is nonetheless critical to the wellbeing of these rural communities. In fact, it is critical to their very existence, and should be given greater weight than GDP figures would otherwise suggest.

In most countries in the global South, land on which women grow and harvest food is communally owned. Indigenous communities have managed their territory together for generations, because they have developed responsible ways to steward the larger ecosystems on which agriculture depends. Cultural norms enable the community to observe, access and manage the complex ecological interactions between forests, waterways and agricultural soils over a large territory.

Women are generally the primary custodians of seed diversity and wild biodiversity, and therefore play a critical role in maintaining the health and resilience of the local ecosystems. When they are marginalised, this knowledge and the role they play is also undermined.

In Ghana, 95% of the 9,500 people forced to leave their land for gold mining between 1990 and 1998 were subsistence farmers, the majority women. Compensation deals, if made, did not allow for a comparable quality of life, as they involved inferior land, cash settlements, or nothing at all.^{90, 91} According to the FAO, women farmers in Ghana produce 80% of agricultural output.

There are also cases where mining companies prevent farmers from growing particular crops that women use to ensure a diverse and healthy diet for their families. In Tanzania, farmers relocated by a mining company were forbidden from planting perennial crops or trees, as the

company did not want to have to pay compensation for these in case they wished to relocate the community again in the future.⁹² In Hoima, Uganda, a community facing possible relocation for oil extraction was forbidden from growing the staple crop, cassava, as it takes a full year to grow. The women reported food shortages and lack of money to pay for school fees or essentials.⁹³

“The (mining) industry glorifies a few women working within the sector while it displaces millions of women from their homes and their ancestral lands, and makes us impoverished.”

Mupo Foundation, South Africa, 2013.

Women are more affected by mining for several reasons:

- 1) They are more dependent on the land itself for their food and livelihoods;
- 2) They tend to be the primary guardians of crop and wild biodiversity and gatherers of wild foods;
- 3) Being unable to put food on the family table is extremely distressing and disempowering for women as primary keepers of the home and family;
- 4) Women who undertake bathing, laundry and food preparation are more exposed to polluted water systems contaminated by mining discharge;^{94, 95}
- 5) Male mine workers may migrate for work, leaving behind wives and children to carry out their husbands' agricultural responsibilities in addition to their own.⁹⁶

89 FAO "Women and Sustainable Food Security" (no year given) <http://www.fao.org/sd/fsdirect/fbdirect/fsp001.htm>

90 Earthworks (2010) "Wassa District, Ghana: Ahafo Mine" http://www.nodirty-gold.org/wassa_district_ghana.cfm

91 International Alliance on Natural Resources in Africa (IANRA) / WoMin (2013) "Land and Food Sovereignty Undermined: impacts on peasant women"

92 International Alliance on Natural Resources in Africa (IANRA) / WoMin (2013) "Land and Food Sovereignty Undermined: impacts on peasant women"

93 National Association of Professional Environmentalists (NAPE) (2013 article) "Women affected by the oil refinery project in Uganda query resettlement plan"

94 Rio Tinto (2009) "Why Gender Matters: a resource guide for integrating gender considerations into communities' work at Rio Tinto"

95 Journal of Cleaner Production, (2006), AGN Kitula "Notes from the field: the environmental and socio-economic impacts of mining on local livelihoods in Tanzania: a case study of Geita District"

96 International Alliance on Natural Resources in Africa (IANRA) / WoMin (2013) "Land & Food Sovereignty Undermined: impacts on peasant women"

Women who Stand Up in Defence of Mother Earth

Mariana Gómez Soto, activist, Doima, Colombia

"I grew up in the countryside, watching the rice fields change colour over the horizon, and beautiful spectral sunsets over the 'cordillera', the Andes Mountain Ranges.

My father has worked the rice fields his whole life. The sense of belonging to this land marked my heart since I was a little girl.

At the end of last year 2012, Anglo Gold Ashanti, a huge gold mining corporation arrived in the Piedras region, and my heart felt a deep commitment in defence of my roots and beliefs.

Local women also heard the call of their territory within their hearts, and have risen to defend it and proclaim their right to continue to live from what the Earth produces and gives them. Their land, rich in waters that create the fertile Earth used for food production, has been the central inspiration of their defence."

Anglo Gold Ashanti (AGA) arrived in the town of Doima bent on installing a tailings dam to hold the toxic wastes produced from potentially one of the largest gold mining projects in the world: La Colosa. Five years previously, the Colombian government had granted the company the extraction permits for mining gold in an area of a forest reserve. The site for La Colosa, in Cajamarca, some 100 kilometres away from Doima, is a region of steep mountains, rich forests and abundant natural water supplies. However, the preferred site for the tailings dam was in the Piedras region, around Doima, on the Ibagué plateau. Here, the flatter terrain is embraced by mountains that would serve as a barrier for the toxic sludge to be contained in the tailings dams.

On January 31st 2013 the inhabitants of Doima, peasants and farmers, rallied together and blocked the only bridge over La Opa River, denying access to the AGA workers. Over 500 people created a human blockade. At dawn, when the men had to go to work in the fields, the women continued the blockade. The local governments supported the protest, even though the company sued the Mayor of the municipality for allowing this alleged violation to their transit right.

Farmers in the Piedras region grow rice, plantain, manioc and maize. They are worried about the future of this region, for local agriculture and their livelihoods - especially with the Colombian Government's favourable attitude towards foreign companies and extraction projects rather than supporting small-scale agriculture.

The Doima community made a formal request to local authorities for a 'popular consultation' on whether mining activities should take place in their locality. Of the 3,007 voters, 2,971 voted against mining. However, a national decree passed on 9 May 2013 that effectively distances municipal governments from decisions on mining zones in their territorial jurisdiction. In July 2013, a resolution was passed that declares some mining projects as being "of national interest".

Mariana says that she, and the people of Doima, know that this will be a long fight. It has also been a lesson of resistance and solidarity that she wants to extend to other communities around the world, from the women of Doima who stand up in defence of their land, their children, their future and the Great Mother Earth.

"Our duty to life, as women, means we can never give up". (Mariana Gómez Soto)



We know this fight will be a long one. It has been a lesson of resistance and solidarity ... women who stand up in defence of their land, their children, their future and the Great Mother Earth

Photo credit: Mariana Gómez Soto, Doima, Colombia

UnderMining Agriculture

How the extractive industries threaten our food systems

EXPLORATION
1-3 YEARS

DEVELOPMENT
3-5 YEARS

OPERATION
5-25 YEARS

CLOSURE
UP TO 1000 YEARS

CLIMATE

AIR

WATER

LAND & ECOSYSTEMS



Co2 EMISSIONS from machinery



Some DEFORESTATION

In some areas FIRES may be set to clear forest for ease of access

DEFORESTATION



Digging up of soils & ecosystems releases Co2



Drillers, excavators, bulldozers, scrapers, diggers, trucks & other heavy machinery constantly running on diesel, PRODUCING Co2

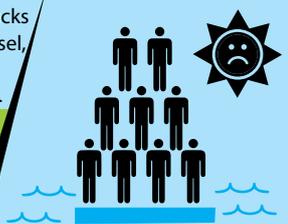
METHANE LEAKS from shale gas, oil & coal production

Transportation of vast amounts of ore RELEASES Co2

LIMITED WATER available for agriculture & ability to adapt to climate change



Burning FOSSIL FUELS for electricity generation



LESS LAND & WATER available for communities to adapt to climate change



DUST



DUST

DUST & METALS from blasting pollute air

DUST from dry tailings if not properly rehabilitated

Emissions from machinery operation POLLUTE AIR

Volat organic BTEX compounds from oil & gas production POLLUTE AIR



Dust from mine dumps can continue to be a problem for DECADES



DRILLING: opens aquifers, contaminates or dries up wells & streams

Drilling mud CONTAMINATES water

STREAMS & RIVERS DIVERTED

MASSIVELY REDUCES WATER available for agriculture

WATER SYSTEMS CONTAMINATED by tailings leaks, Acid Mine Drainage, heavy metal leaching, frac fluid, methane or oil leaks, & radioactive fracking wastewater



ACID MINE DRAINAGE continues for hundreds of years, acidifying soil & water

HEAVY METAL LEACHING continues in water & soil systems

RADIOACTIVE WASTE e.g. from shale gas waste water takes hundreds of years to break down

Fuel spills CONTAMINATE water



GROUNDWATER PUMPED OUT

Toxic tailings & slurry DUMPED into rivers, lakes & sea

Landscape scarred & toxified by pits, tailing ponds & huge piles of acidic waste rock, ON WHICH NOTHING CAN GROW

ROADS BUILT



Drilling installations pads, wastewater/drilling mud ponds

LAND GRABBED from communities



HUGE CRATERS in the earth

DEFORESTATION

Digging up of soils & ECOSYSTEMS



Huge piles of overburden WASTE

Topsoil removed, mixed up with acidic rock so THAT NOTHING CAN GROW.

Toxic tailings dams threaten contamination, leakage & COLLAPSE

EXPLORATORY MINING



CONSTRUCTION of camps



POWER LINES BUILT



Further Roads built & construction of camps

Abandoned pits, contaminated lands are a THREAT if not rehabilitated

CONCLUSION

UnderMining Agriculture alerts us to the impact that the extractive industries are having on the health of our planetary ecosystems and thereby our capacity to feed ourselves.

National priorities need to be urgently re-evaluated in recognition that the extent, scope and impact of the extractive industries have changed over the last decade.

Mining is no longer taking place in isolated areas, extracting pockets of concentrated materials. It has become so widespread that it threatens the integrity of ecosystems, especially water availability and quality, and our already fragile Earth.

This means we have to make conscious choices, as the growing resistance movements across our planet Earth are showing us: love water not oil; farming not fracking; yes to life no to mining. The choices we make today will affect the viability of our children's future and those of the other species with whom we share this planet.

Without healthy ecosystems there can be no healthy food. Without water there can be no life. We need to take action to ensure that small farmers and the food they produce - also pastoralists, fisherfolk and their food systems - are protected from the disastrous impacts of mining.

From a planetary perspective, mining must stop. We need to responsibly and consciously use the minerals and metals already mined - changing the way we design, make and sell products, and above all reducing our patterns of consumption. Likewise we need to minimise our use of energy and produce it through diverse, local and renewable systems. The time has come to be responsible citizens of our living Earth.

As an immediate step, all food growing areas, the ecosystems and water that support them, must be "no-go" areas for mining, extraction and any destructive activity - to protect the foundations of life for and for future generations.

Appendix 1: The Stages of Mining

When we talk about the extractive industries, it is often difficult to grasp the sheer scale or toxic legacy of mining operations. Here, we present a glimpse of the different stages - the 'lifecycle' of mining - from exploration to closure, and the irreversible impacts for ecosystems, agriculture and communities.

1 EXPLORATION

- Mining starts with exploration. Companies survey the area in order to determine whether or not it is worth mining.
- Surveys will include: taking samples, cutting lines through forest or bush to enable surveying and mapping, drilling boreholes, constructing camps and roads, and using helicopters.
- 'Test' or 'exploratory' mining has all the same effects of mining operations, but on a smaller scale.
- Exploration itself can be highly destructive. Unless the survey areas are cleaned up fully, the mess is left for communities and local governments to deal with.

3 OPERATION

- Once the mining operation begins, a typical process of extraction involves rocks being drilled and hauled out of the Earth, then crushed and fragmented.
- Large volumes of water, or chemical suppressants, are used to spray the material and reduce dust pollution.
- As the mining operation goes deeper it breaches the water table, and water that is pumped out, for extraction to continue, is now contaminated with heavy metals.
- Waste is created - and disposed of - during the mining process, as well as afterwards. Not to mention the human waste generated by mine employees. Open-pit mining, for example, produces:
 - **'Overburden'** - the dismissive name given to the precious topsoil and bedrock removed from above the ore during the development stage. It is usually piled in a heap near the mine.
 - **Waste rock** - removed at the same time as the ore, and discarded (considered 'barren', containing no or low-grade ore), unless it contains heavy metals or other dangerous elements that must be specifically managed.
 - **'Tailings'** - toxic chemicals leftover once the material has been processed, often in a slurry form - fine solids suspended in water and chemicals such as arsenic, cyanide and sulphuric acid. They are left in large ponds, contained by tailings dams, with a high risk of leakage and spills; or in dry areas, deposited in "dry stacks", from which acid and contaminants can leach out; or simply dumped into lakes, rivers or the sea.

2 DEVELOPMENT

- Development of a mining site involves both planning and construction.
- Typically, deforestation and destruction of ecosystems takes place at the mining site and in surrounding areas, to make space for the rock that is dug up, the processing and transportation facilities, as well as the accommodation areas for workers.
- For open-pit mining, surface rock and soil are removed, forming a crater in the Earth from which materials are then removed. (Copper mining now requires the digging up of ten times as much earth and rock to find the same amount of metal as 100 years ago).
- Mining companies are using ever more destructive, or extreme, approaches to extract materials.

4 PROCESSING

- The material that is mined needs to be processed. There are various methods, all water intensive and with a high risk of contamination.
- 'Heap leaching', one process, means spreading rubble onto a heavy plastic sheet and spraying it with toxic chemicals (cyanide, sulphuric acid) to extract the metals. The plentiful and highly toxic waste liquid frequently leaks into surface and ground water supplies.
- Another, 'in-situ leaching', involves pumping chemicals directly into the mine, then pumping them out with the dissolved ore. This is mostly used for uranium mining, and carries the obvious likelihood of contaminating water sources.
- If processing takes place off-site, then materials are transported (in open trucks, or in pipelines with the mineral in slurry form) to smelters, acid plants, coking factories or power plants.

5 CLOSURE

Even after a mine closes, the long-term management of waste and mine infrastructure is costly and rarely done well. Contamination of water and ecosystems, disruption to rock and land stability, will continue to affect the local people, environment and food production, for many (possibly hundreds) of years.

Full restoration of ecosystems, soils, water, biodiversity and livelihoods to their former state is impossible.

Photo credit: Brown coal open pit mine in Poland / New Punisher / Shutterstock.com



GROWING RESISTANCE

In response to the increasing rate and scale of devastation caused by the extractive industries, we are witnessing the emergence of a gutsy and committed anti-extractives movement across social, cultural and geographical boundaries.

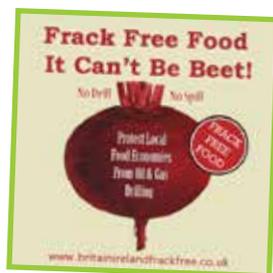
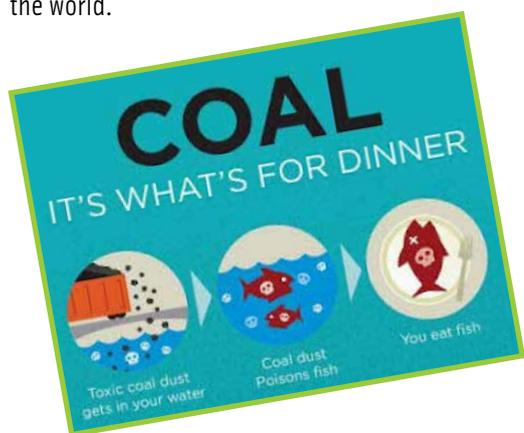
This diverse movement is made up of groups from all walks of life. Small-scale farmers, fishing communities, Indigenous Peoples, mining affected communities, environmentalists and concerned members of civil society in the Global North and South, are all joining one another to actively defend land, food and water, from the extractive industries. Their resistance is characterised by its creativity, strength and diversity; and it is growing. There is a deep sense of responsibility to protect the land, water and other species with whom we share our planet, from human excesses.

In Australia the Lock the Gate Alliance, a nation-wide movement, has brought together over 160 grassroots groups, including Aborigines, Torres-Straight Islanders and non-Indigenous Australians. Coal extraction licensing applications cover more than half of Australia, or 18 times the area of Great Britain, a significant amount of which is highly fertile food-producing land. This coalition is united in a common cause: to protect land, food and water from invasive coal and coal seam gas industries, to lock Australia's gates to the extractive industries.



In Colombia community members from Doima (see Case Study p. 33), who are fighting to protect their agricultural livelihoods from the La Colosa gold mining project, sparked a web of solidarity by sending inspiring letters to other communities resisting mining. Their efforts have united geographically disparate groups, from Alaska to South Africa, in their struggles and in the spirit of continued resistance in defence of Mother Earth - captured in a short film, *In Solidarity* (October 2014).

In Canada, Indigenous First Nations communities are mounting resistance to the gargantuan exploitation of Canada's Tar Sands. This catastrophic project is undermining constitutionally enshrined treaty rights, as well as the cultural heritage, ecosystems, and human health of First Nation communities. Toxins from the extraction process are contaminating wild-caught food, which is causing First Nations communities to turn away from their traditional diets. Despite living in the midst of what has been termed a 'slow industrial genocide', through their tireless efforts First Nations and their allies have made the Canadian Tar Sands a topic of national and international news, and an issue featuring highly on the radars of the media around the world.





Numerous campaigns have also brought agriculture to the fore. Food Not Fracking connects more than 30 organisations to protect New York's foodshed by raising awareness about the dangers that fracking in New York poses to the city's burgeoning local food movement. In the UK, The Frack Free Food Alliance is a community of concerned groups and individuals sharing information about the effect of unconventional oil and gas drilling on agricultural areas. These groups oppose fracking on the basis that it threatens the basic foundations of food production: pure water, clean air and uncontaminated soil. People are connecting over this issue because together, they have a stronger voice to defend the ecological conditions for life, against mining.

Through efforts like these, we are witnessing the emergence of a global network of growing resistance against the extractive industries. Together we are saying that enough is enough. We will no longer accept economic activities that undermine the ecological integrity of our planet's ecosystems.



Useful Links for More Information

- Farmlandgrab - website documenting the global rush for farmland and peoples' struggles against it.
- Food Not Fracking - New York based coalition raising awareness of and campaigning on the effects of fracking on food.
- Yes to Life, No to Mining - an emerging movement in solidarity with communities affected by mining - hosted by a network of organisations including OCMAL (Latin America), MiningWatch Canada, Health of Mother Earth Foundation (Nigeria), The Gaia Foundation (UK).
- La Via Campesina - an international movement which brings together peasants, small and medium-size farmers, landless people, women farmers, indigenous people, migrants and agricultural workers. It defends small-scale sustainable agriculture.
- Eject - environmental justice atlas providing a fully interactive map of ecological conflicts and resistance happening globally, including mining and land disputes.
- WoMin - a platform of solidarity and co-operation involving civil society organisations and movements working on, or with an interest in extractivism and women's rights in Africa.
- UnderMining Agriculture Infographic (2014) The Gaia Foundation.
- *Wake Up Call* animation and web pages (2014) The Gaia Foundation.
- *Opening Pandora's Box* (2012) The new wave of extractive industries and the devastating impact on Earth. The Gaia Foundation.
- *Short Circuit* (2013) The lifecycle of our electronic gadgets and the true cost to Earth. The Gaia Foundation.
- *Mining and its impacts on Water, Food Sovereignty and Sacred Natural Sites and Territories* (2014) The Gaia Foundation, NAPE Uganda.

"Peasant women in Africa produce anywhere from 60% to 80% of food consumed within rural households, and put on the rural table fruits, medicinal herbs and plants harvested from communal lands and forests. Threats to lands, forests and water supplies posed by the rapidly expanding and rapacious extractives industries and industrial agriculture are undermining the very survival of rural families, and placing food rights in jeopardy across the region. The costs and stresses are most significantly borne by women because of their critical role in food production, processing and provisioning." -

**Samantha Hargreaves, WoMin gender and extractives coordinator,
International Alliance on Natural Resources in Africa (IANRA).**

"UnderMining Agriculture is a clear call to action to bring the extractive industries under control, showing how they directly and indirectly threaten food security and food sovereignty, and even the survival of entire ecosystems. This important report puts the pieces together for campaigners, students, and the general public and makes it clear that better rules or practices are not enough; the entire extractivist economic model has to be turned around." -

Jamie Kneen, MiningWatch, Canada.

"This is a timely report and a critical message – What will people drink when their water is contaminated? How will people live when their air is polluted, their trees are gone, and their farmland is but a poisoned wasteland? As people around the world stand together to say Yes to Life, No to Mining, this report is an important wake up call for us all." -

Nnimmo Bassey, Founding Director, Home of Mother Earth Foundation (HOMEF), Nigeria.

"Here in Uganda, oil mining threatens the livelihoods of fishing and farming communities. This is our reality. We will use this report to support these brave communities in their fight for justice, and to put pressure on the government to re-think their commitment to this 'black gold', which only serves to line corporate pockets far away, whilst the local people pay the true price. The Rights of Nature – the unwritten laws which govern life – will prevail in the end. We will stand up for them, and for the communities who depend upon this land." -

Frank Muramuzi, NAPE, Uganda.

"The challenges that we face today in our dysfunctional food system will only truly be addressed when people start to connect the dots beyond agriculture per se. Mining can have a huge negative impact on food availability: when it removes productive farmland from farmers; when it consumes and contaminates vital water resources; when it works hand in hand with the corporations which control the industrial food system that places priority on the large-scale and global markets, not people, ecosystems and sustainability. The warnings of this report must be taken seriously. Organisations and groups of concerned citizens must work together to challenge the startlingly unsustainable growth of the mining industry that feeds avarice, undermining peoples food sovereignty". -

Patrick Mulvaney, Chair, UK Food Group.

"Across Africa, communities are facing the two-pronged threat of the extractive industries and the industrial agriculture lobby. Hundreds of thousands of people are being exploited, their land and water polluted and their livelihoods lost, all for the profits of a few. This report helps us to see the mounting pressure facing farming communities – the very people we depend on for our food. We must all stand in solidarity with the Food Sovereignty movement." -

Fassil Gebeyehu, Coordinator, African Biodiversity Network.

