

Glossary

10-mile radius The evacuation zone of Limerick Nuclear Power Plant in **Pennsylvania**. 257,625 people lived in that zone in 2011, when the U.S. directed Americans within 50 miles of the Fukushima reactors to evacuate. Over 8 million people currently live within 50 miles of Limerick. The artist who made *Vantage Point* grew up inside the 10-mile radius of Limerick.

2048 The number of bombs deployed and nuclear tests conducted on the planet. 1,030 of these were by the US, followed in numbers by **Russia, Britain, France, China, India, Pakistan, and North Korea**.

acetic anhydride A chemical harmful to aquatic life at very low concentrations; used to make pesticides, plastics, pharmaceuticals and in the synthesis of heroin. In October 2014, the Eastman Chemical Company reported a 'brief accidental discharge' of this chemical into the Holston River in Tennessee.



Researchers take samples from Lake Taihu in China, when it was heavily contaminated with toxic algal blooms that turned the surface water green.
Credit: Oregon State University

algae Overabundant amounts of algae in the environment are often signs of nutrient pollution. Algal blooms can be toxic. This is a problem in all 50 states of the U.S. according to the EPA.

anthracite A hard, compact variety of mineral coal that has a high luster; cleanest fossil fuel known to man.

anoxia Lacking oxygen; aquatic anoxia can result from fertilizer runoff and subsequent algae bloom, death and decomposition. See **eutrophication** and **hypoxia**.

antimony trioxide A flame retardant used in many industrial and household goods. The CDC states that this substance is harmful to humans and very toxic to aquatic organisms and strongly advises that this substance does not enter the environment. **Bioaccumulation** of this chemical may occur in crustaceans.

ASARCO LLC A mining, smelting, and refining company based in Tucson, Arizona, which mines and processes primarily copper. It operated a lead smelter in East Helena, Montana for over 100 years. In 1984, the **EPA** named East Helena a Superfund

cleanup site. An estimated 16 million tons of **slag** remain at the site. In 2016, the EPA and DOJ reached an agreement with **American Chemet** to clean up the site.

ash An ash cloud from the 2010 eruptions of the volcano Eyjafjallajökull in Iceland grounded flights across northern Europe and elsewhere for 6 days; 20 countries closed airspace, affecting 10 million travellers.

asbestosis A chronic lung disease caused by inhaling asbestos fibers. See **mesothelioma** and **Libby, MT**.

asteroid Small, airless rock orbiting around the sun that does not have enough mass to be considered a planet. Once an asteroid or meteoroid enters the Earth's atmosphere it is considered a meteor. The Chelyabinsk meteor of 2013 was the largest natural space object to enter the atmosphere in the last century. See **impact**.

asthma Chronic long term lung disease that is often aggravated and caused by low air quality. See **particulate**.

atrazine One of the most widely used pesticides in the US; has feminized male frogs and other animals in some scientific studies.

balloons Balloons have been used in nuclear bomb testing, as well as towers and underground shafts and tunnels. Operation Plumbbob at the Nevada Test Site employed balloons to raise the bombs into the atmosphere.

beef Cows emit between 250 and 500 liters of **methane** gas every day. There are about 1.5 billion cows farting and burping today.

bees Essential for the pollination of many crops, bees have faced a rapid decline; causes may have been pesticides, particularly **neonicotinoids**, infections, malnutrition, and other factors. After bee populations dropped 23% in 2013, the EPA and Dept. of Agriculture formed a task force to address the issue.

benzene One of the volatile organic compounds (VOCs); is released in auto exhaust and from industry; a known **carcinogen**.

benzyl butyl phthalate (BBzP) Plasticizer found in many children's toys. BBzP was listed as a developmental toxicant under California's Proposition 65 in 2005.

Bikini Atoll Located in the Marshall Islands, used for nuclear bomb testing.

bioaccumulation Occurs when an organism absorbs a toxic substance at a rate greater than the substance is lost. Toxins enter a creature and ulete in its fat over time until they reach a harmful level. This can then lead to **biomagnification** of toxins.

biomagnification An increase in exposure to toxins through the food chain. Methymercury accumulation is a example: Coal plants release mercury into the atmosphere, it transforms into methymercury, plants and plankton absorb it, fish eat the plants and plankton, birds and mammals and humans eat the fish. Mercury poisoning causes neurological disorders, reduced reproduction and death in raptors and mammals. Humans are susceptible to mercury poisoning by eating too much contaminated fish.

biocides A pesticide (fungicide herbicide, insecticide, etc) or an antimicrobial (antibiotics, germicides, antivirals, etc).

birds The single most significant threat to bird population is habitat destruction. Pesticides, **oil spills**, oil and wastewater pits, lead poisoning and contact with high tensions lines, windows and communication towers kill millions of birds each year.

bollworm Larva of a moth that attacks particular crops, especially cotton. See **Bt cotton**.

border fence The existing and proposed 670 mile U.S.-Mexico border fence that stretches across Texas, New Mexico, Arizona and California poses many environmental and humanitarian problems.

Boreal Forest Also known as the taiga, these large areas of forest located in the Northern Hemisphere beneath the Arctic Circle, account for about 1/3 of the world's forest. **Oil** exploration and development is the biggest threat to these forests.

BP Referred to by its former name British Petroleum, is one of the world's six supermajor oil and gas companies. The 2010 Deepwater Horizon **oil spill** is recognized as the worst in U.S. history, releasing 3.19 million barrels of oil into the Gulf.



The second atomic bomb test at Bikini Atoll on July 25, 1946. Credit: Anonymous/AP

Brazil In 2012, more than 745 Magellanic **penguins** washed up dead on the beaches of Southern Brazil

brine Water containing high levels of salts used in oil extraction; has been found to contain **benzene**, lead, chromium, **carcinogens** and **radioactive** materials. See **lightning**.

Bt cotton A genetically modified variety of cotton containing the soil-dwelling bacterium *Bacillus thuringiensis*; the plant produces insecticidal proteins to kill **bollworms** and tobacco budworms reducing the need for external pesticides. More than 500 species of insects and mites have developed resistance to insecticides, including Bt cotton. It is produced by **Monsanto**.

butterflies Exposure to radioactive material released by the Fukushima Daiichi nuclear power plant accident in March 2011 caused mutations in butterflies found in Japan. The link between the mutations and radioactivity was shown by lab experiments.



A mutated adult pale grass blue (*Zizeeria maha*) butterfly from Fukushima prefecture, Japan Credit: Newsy/BBC

CAFO (concentrated animal feeding operation) Industrial farms with over 1000 animal feeding units—that equates to over 1000 head of beef cattle, 700 dairy cattle, 2500 swine, 125,000 broilers chickens or 82,000 laying hens in one lot. Bacteria-laden manure sludge from CAFO waste **lagoons** has escaped during **floods**. **E.coli** from a CAFO in Arizona contaminated fields of romaine lettuce and resulted in a FDA recall in 2018. The contaminated lettuce sickened 210 people in 36 states and killed five.

caldera A large basin-shaped depression formed by the collapse of a **volcano**. Volcanic activity in the Yellowstone caldera has led to public fear of an upcoming eruption. A Yellowstone supereruption's ash cloud would smother vegetation (and other life) within a 75 mile radius with about 10 feet of **ash**, pollute the air and the water supply and change the composition of the Earth's atmosphere.

cancer The uncontrolled growth of malignant cells. See **carcinogenic**.

carbon Carbon pollution is the main contributor to climate disruption, making extreme weather worse. Coal and gas-fired power plants and oil refineries emit more than 2.3 billion metric tons per year of carbon pollution.

carcinogenic Substances known to cause cancer; some examples of environmental carcinogens are arsenic, asbestos, **benzene**, BisphenolA (BPA), **dioxins**, formaldehyde, polybrominated diphenylethers(PBDEs) and vinyl chloride.

CCD Colony Collapse Disorder, disorder amongst **bees** in which the population has dramatic decreases in adult honeybees. Pesticides, primarily **neonicotinoids**, are a suspected cause.

Centralia A town in **Pennsylvania** with an underground coal fire burning since 1962. **China** and **India** have persistent coal fires as well.

Chernobyl In 1986, this nuclear power plant located in the Ukraine melted down released radioactive material into the ground and air. Illness and death were caused by acute radiation syndrome, thyroid cancer, leukaemia, solid cancers and birth defects. A 70 square kilometer exclusion zone, known as 'Death Valley' can never be inhabited again.

chlordane A pesticide widely used between 1948 and 1988; it was banned by the EPA in 1988. It is a persistent organic pollutant; traces of this chemical are found in the environment and in the bodies of humans and animals.

chlorofluorocarbons CFCs- a group of manufactured chemical compounds that contain chlorine, fluorine, and carbon used in refrigeration, air conditioning, and other industrial processes. The Montreal Protocol banned CFS in 1987 due to their effect on the ozone layer.

chlorpyrifos An insecticide severely restricted in the U.S. in 2000 after extensive review by the EPA over effects of the chemical on the nervous system, particularly in children. It is one of the most frequently detected residues in food in 12 European countries, including the U.K. **Dow Chemical Company** is the main producer of chlorpyrifos in the U.S.

cyanobacteria Blue-green algae frequently found in freshwater systems. The algae can produce toxins that are deadly to humans and animals. **Climate change, CAFO** and agricultural runoff, and alteration of water flows increase cyanobacteria production. Many bodies of water are marked with warning signs (**Danger-Peligro-NGUY-HIEM**) to keep potential swimmers and fisherman away.

chytridiomycosis An infectious disease that affects amphibians worldwide. Caused by the chytrid fungus (*Batrachochytrium dendrobatidis*), it is capable of causing sporadic deaths in some amphibian populations and 100 per cent mortality in others.

Clean Water Act Establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.

clear cut An area of forestland where most of the trees are logged in a single operation. It creates habitat disturbance, increased stream flow and riparian erosion.

clouds **Water vapor** condenses to form clouds; water vapor is a greenhouse gas that traps heat in our atmosphere

CO2 (carbon dioxide) The primary greenhouse gas emitted through human activities. In 2012, CO2 accounted for about 82% of all U.S. greenhouse gas emissions from human activities.

coca Cocaine production damages the environment through deforestation, soil erosion and the leaching of chemicals such as kerosene, sulfuric acid, ammonia, hydrochloric acid and solvents into the soil and water. Eradication of coca crops has resulted in aerial-spraying of large parts of the Amazon River Basin with **glyphosate**.

copper The foundations of the Arizona economy are the 5C's: cattle, copper, citrus, cotton and climate. The production of copper is a major source of pollution; copper tailings expose soils, rock and water to radioactive uranium, thorium and radium. See **TENORM** and **open pit**.

Cuyahoga River A river in Cleveland, Ohio that was polluted with oil from an industrial accident in June of 1969. The river then caught on fire; however, this was not the first or only fire that occurred on the river from industrial problems.

cyanide Cyanide extraction of gold creates tailings ponds and puddles that are hazardous to wildlife especially waterfowl, bats and aquatic life. Hydrogen cyanide gas was reported to have been used in the Iran-Iraq War in the city of Halabja.



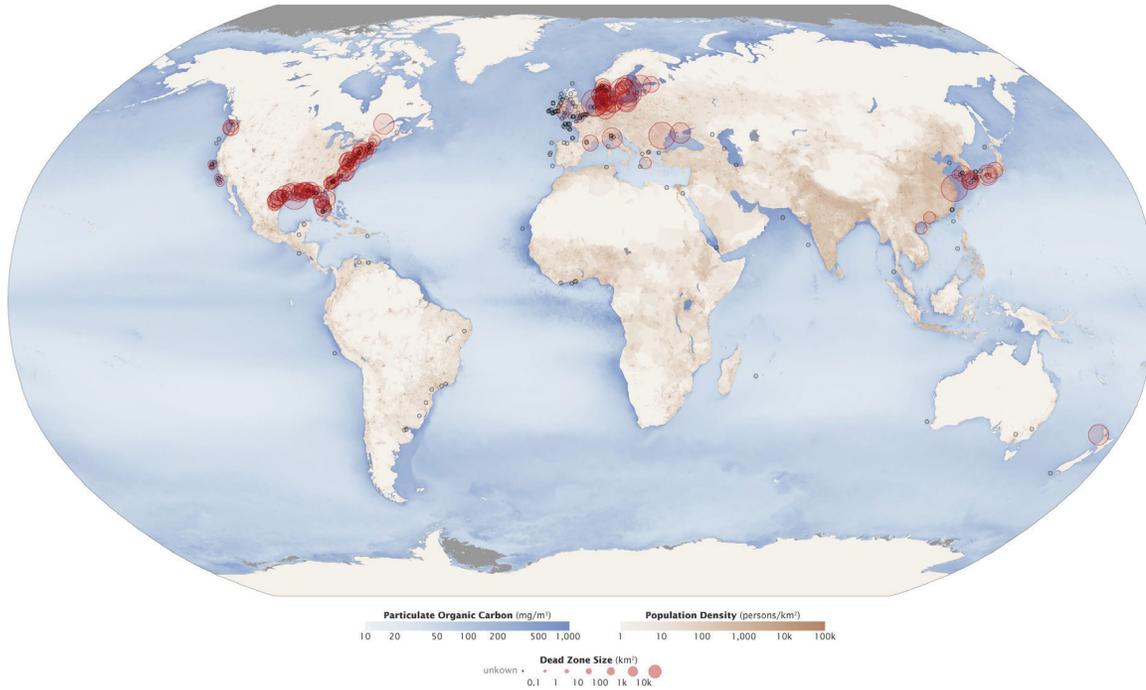
Clearcutting near Eugene, Oregon Credit: Clearcutting-Oregon by Calibas - Own work. Licensed under CC BY-SA 3.0 via Wikimedia

cyanazine An herbicide sold by DuPont described as atrazine with cyanide attached to it. One of the most toxic herbicides found in drinking water. Banned in the U.S. in 2003, this is a possible carcinogen and endocrine disruptor.

DAPL (Dakota Access Pipeline) 1,172-mile-long underground oil pipeline that moves crude oil from the Bakken shale oil fields in **North Dakota** to an oil terminal in Illinois. It faces tribal opposition from the Meskwaki tribe, the Cheyenne River Sioux, and the **Standing Rock Sioux**; protests in 2016 drew national and international support and attention.

DDT Dichloro-diphenyl-trichloroethane- an insecticide. Rachel Carson's book *Silent Spring* highlighted the dangers of DDT. This chemical harms wildlife and has many risks to humans such as breast and other cancers, male infertility and nervous system and liver damage. DDT is linked to thinning eggshells in birds. DDT was banned in the U.S. in 1972.

dead zone A common term for hypoxia, a reduced level of oxygen in the water. Animal life suffocates and dies in a dead zone; one of the largest dead zones forms in the Gulf of Mexico every spring due to fertilizer runoff.



Red circles on this map show the location and size of many of our planet's dead zones. Black dots show where dead zones have been observed, but their size is unknown. Darker blues in this image show higher concentrations of particulate organic matter, an indication of the overly fertile waters that can culminate in dead zones. Credit: NASA Earth Observatory

DEHP (Bis(2-ethylhexyl)phthalate) Plasticizer and an endocrine disruptor that mimics the female hormone estrogen. It has been strongly linked to asthma and allergies in children. It may cause certain types of cancer and it has been linked to negative effects on the liver, kidney, spleen, bone formation, and body weight. In Europe, DEHP has been banned since 1999 from use in plastic toys for children under the age of three.

diatom A kind of micro-algae that are bioassessment indicators for water pollution.

dioxins A group of chemically-related compounds that are persistent environmental pollutants (POPs). Dioxins are found throughout the world in the environment and they accumulate in the food chain, mainly in the fatty tissue of animals. Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer.

dieldrin An organochlorine originally produced in 1948 by J. Hyman & Co, Denver, as an insecticide. Banned in the U.S. in the 1980's, this pesticide is a persistent organic pollutant.

dilbit Bitumen diluted with one or more lighter petroleum products, called diluents and often including **benzene**, a **carcinogen**. Bitumen is the crude oil found in oil sands, it has the consistency of peanut butter. Diluting it makes it easier to transport. More than 1 million gallons of dilbit leaked into Michigan's Kalamazoo River in July 2010.

dinosaurs It is a common misconception that oil comes from dinosaurs. Oil was most likely formed from the remains of mats of microscopic bacteria. Coal was formed from the remains of dense jungles and forests in the Carboniferous period. A very small number of dinosaur and vertebrate animal remains contributed to oil, coal and natural gas deposits.

dolphins Oil, chemical and **heavy metal** pollution manifests itself in dolphin illness, death and high infant mortality rates. In 2013, over 300 dolphins washed up dead on the East Coast of the U.S. due to a cetacean morbillivirus outbreak; environmental factors, such as **heavy metal** pollution and surface temperature changes were thought to have contributed to this outbreak.

Dow Chemical Company An American multinational chemical corporation headquartered in Midland, Michigan, United States. The EPA detected the highest known level of **dioxin** pollution in the Saginaw River downstream from these facilities. See **Union Carbide India Limited** and **chlorpyrifos**.

EMF Electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of EMF, and the levels will continue to increase as technology advances. Non-ionizing forms from sources such as microwaves, radios, cell phones and power lines are low-level **radiation** and are generally perceived as harmless to humans. Ionizing sources such as UV light, X-rays and **gamma rays** are high-level **radiation** and have potential for cellular and DNA damage.

EMP Electromagnetic Pulse **Lightning** is a natural form; a burst of electromagnetic radiation occurring after high altitude nuclear explosion could disrupt electrical equipment over a large area.

EPA U.S. Environmental Protection Agency

eutrophication Excessive nutrients (phosphates and nitrates) in water lead to excessive algae growth. When the algae die, the decomposition leads to a loss of oxygen called **hypoxia** and eventually **anoxia**.

expanded polystyrene (Styrofoam) Pervasive in the marine environment, it breaks down into smaller and smaller pieces and sea creatures and birds mistake it for food. Expanded polystyrene is made with Styrene, a lab-animal **carcinogen** and neurotoxin. It used to be made with **CFCs**, but that practice was banned in the 1980s to address the growing hole in the ozone layer. See **CFCs** and **stratosphere**.

ExxonMobil Owner of the **Silvertip Pipeline**. A 2011 rupture spilled more than 42,000 gallons of oil into the **Yellowstone River**. Another spill in 2015 released 30,000 gallons into the Yellowstone from the **Poplar Pipeline** (owned by Bridger Pipeline, LLC).

Exxon Valdez An oil tanker notorious for spilling 11 million gallons of Alaskan crude oil into the Prince William Sound in 1989. 1300 miles of shoreline were effected; the carcasses of 35,000 birds and 1000 sea otters were found right after the spill. An estimated 250,000 seabirds, 2800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 orcas and billions of salmon and herring eggs were killed due to the spill.

Fat Man Code name for the atomic bomb that was detonated over the Japanese city of Nagasaki. 40,000 people died instantly. Thousands would die later from radiation exposure.

FDA U.S. Food and Drug Administration

FEMA (Federal Emergency Management Agency) Trailers provided after Hurricane Katrina in 2005 sickened many and were found by OSHA to have high levels of off-gassed formaldehyde. The Department of Health and Human Services (HHS) determined in 2011 that formaldehyde is **carcinogenic** based on sufficient human and animal inhalation studies.

flotsam and jetsam Floating and sinking debris.

fracking Also known as hydraulic fracturing; the process of extracting natural gas from shale rock layers deep within the earth. Some fracking concerns are contamination of groundwater, methane gas and other air pollution, silicosis, and “induced seismic events” or **earthquakes**.

frogs Fertilizer pollution from farming increases parasite infections in frogs and causes deformities.

Fronteras: cicatrizes en la tierra ‘Borders: scars on the land’; graffiti on the U.S. border wall in Nogales, Mexico.

Fukushima Following a major **earthquake**, a **tsunami** caused a nuclear accident on March 11, 2011. The three Fukushima Daiichi reactors melted down releasing high levels of radioactivity. Residents fear increased cancer rates, especially **thyroid cancer**.

gamma rays Exposure to gamma rays can cause radiation sickness and cancer. Ingested or inhaled **uranium** due to mining, munitions and meltdowns are linked to gamma ray exposure.

glyphosate A broad-spectrum systemic herbicide used to kill weeds, especially annual broadleaf weeds and grasses known to compete with commercial crops grown around the globe, it is the active ingredient in **Monsanto’s** Roundup, and has been used to eradicate **coca** and poppy fields. Over-reliance on glyphosate has resulted in “superweeds” that are glyphosate-resistant.

Green Economy An economy that results in reducing environmental risks and ecological scarcities, and aims for sustainable development without degrading the environment.

gyre A naturally occurring vortex of wind and currents. These create a whirlpool effect, and marine plastic debris collects at the center. There is an estimated 11 million tons of floating plastic in the 5 major gyres in the oceans worldwide.

HDPE (high-density polyethylene) Used in opaque milk, water, and juice containers, bleach, detergent and shampoo bottles, garbage bags, yogurt and margarine tubs, and cereal box liners, it is considered a safer plastic. Research on risks associated with this type of plastic is ongoing.

heavy metals Any metal or metalloid of environmental concern. Examples are mercury, cadmium, arsenic, chromium, thallium and lead. They tend to **bioaccumulate**. **Sandoz AG** polluted the Rhine with 440 pounds of mercury in 1986, raising concerns about eating the fish.

HFCS (high fructose corn syrup) Almost all corn is grown as **monoculture**, and this farming practice requires a high level of fertilizer and **pesticides**. Runoff from the Corn Belt contributes to the **dead zone** in the Gulf of Mexico.

Horizon Oil Spill Often referred to as the Gulf of Mexico oil spill. The oil spill was caused by an explosion on a British Petroleum Horizon oil rig. The oil spill was 5,000 feet deep and spread along the shore of most of the Gulf of Mexico.

horses A ‘mystery’ illness in 2014 caused horses in California to have swollen eyes and lips and skin sloughing off. Tainted hay and fallout from Fukushima have been blamed.



Farming nutrients drive parasitic infections that in turn cause frog leg deformity.
Credit: Courtesy Pieter Johnson, University of Colorado at Boulder

Huangpu River 16,000 dead pigs were removed from this river in China in March 2013. The river supplies drinking water to the city of Shanghai.

hypoxia Declining of oxygen saturation in water, often caused by fertilizer runoff entering into rivers. See **anoxia** and **dead zone**.

Iceland Location of high volcanic activity. See **Katla**.

impact Asteroid impacts have caused huge environmental changes in the past, including the K-T event that led to the extinction of about 70% of all species on Earth. NASA's Near Earth Object Program monitors potential future Earth impact events.

IPCC Intergovernmental Panel on Climate Change.

iron Iron and steel smelting are major causes of air, soil and water pollution. **China's** Hebei Province, home of the area's vast steel industry, has some of the worst air pollution in that country: **soot, sulphur dioxide, carbon dioxide, heavy metals** and **dioxins** are released.

IUCN The International Union for Conservation of Nature is the global authority on the status of the natural world and the measures needed to safeguard it. It publishes the Red List of Threatened Species that includes the **Amur Leopard**, the **Javan Rhinoceros**, and **Vaquita** porpoise.

KH-11 (KENNAN) A military spy satellite monitored by the National Reconnaissance Office (NRO).

Katla A large volcano located in Southern **Iceland**. The ash cloud from this volcano's eruption is predicted to be even more disruptive than the 2010 eruption of Eyjafjallajokull that grounded flights across northern Europe and elsewhere for 6 days.

Keystone Pipeline Part of a 2,687-mile system that also is to include the proposed **Keystone XL pipeline**, which has faced persistent opposition from environmental groups, American Indian tribes and some landowners. A November 2017 Keystone leak in South Dakota was the seventh-largest onshore oil or petroleum product spill since 2010. The pipeline is owned by TransCanada and carries crude oil more than 2,600 miles from eastern Alberta, Canada, to Oklahoma and Illinois.

Kyoto Protocol An international agreement linked to the United Nations Framework Convention on Climate Change, which sets internationally binding emission reduction targets.

Las Paredes vueltas de lado son puentes 'Walls turned on their sides are bridges'; spraypainted on border wall between El Paso, Texas and Ciudad Juarez, Mexico.

landmine There are an estimated 110 million landmines in 64 countries causing 800 deaths a month, mostly civilians, with thousands more maimed.

LDPE (low-density polyethylene) Used in grocery store, dry cleaning, bread and frozen food bags, most plastic wraps, and squeezable bottles. Research on risks associated with this type of plastic is ongoing, but it is considered a safer plastic.

leachate Caused principally by precipitation percolating through waste deposited in a **landfill**, this liquid contains large amounts of organic and



16,000 dead pigs floated in Shanghai's main waterway, the Huangpu River. Credit: AP

inorganic contaminants as well as **heavy metals**.

leukemia A type of blood cancer that begins in the bone marrow; a 1979 study associated residential proximity to power lines and their **EMFs** (electric and magnetic fields) and childhood leukemia, these health risks have not been scientifically substantiated.

Libby, MT An EPA Superfund site due to asbestos pollution from a vermiculite mine. The contaminated vermiculite was given away for free and spread all over town for years. More than 400 people have died from **asbestosis** and **mesothelioma** there, and more than 2000 are sick.

lightning There were 3 lightning-related oil spills in **North Dakota** in 2014. The June 1 strike spilled or burned 630 gallons of oil and spilled 50,400 gallons of **brine**, and the July 7 strike spilled 118,146 gallons of **brine** and spilled or burned off 27,258 gallons of oil.

Limerick (Generating Station) A nuclear power plant located next to the Schuylkill River northwest of Philadelphia, PA. In November 2014, the County Health Department distributed potassium iodide pills to people within a 10-mile radius of the Limerick Power Plant to be taken as directed in an emergency to prevent thyroid cancer. The artist who made *Vantage Point* grew up inside the 10-mile radius of Limerick.

Little Boy Code name for the atomic bomb that was detonated over the Japanese city of Hiroshima. 80,000 people died instantly. Thousands would die later from radiation exposure.

Love Canal An EPA Superfund site near Niagara Falls, New York. A dry canal dug in this neighborhood was filled with barrels of hazardous waste chemicals that eventually leaked into the surrounding basements and soil. Children of that era told stories of playing with 'blue goo' and 'pop-rocks' on the contaminated playground. Residents reported miscarriages, birth defects (including 3 ears), nervous breakdowns, and urinary tract disorders.

Malmstrom AFB One of three US Air Force bases that maintains and operates the Minuteman III intercontinental ballistic missile. Located near Great Falls, Montana, it houses 150 underground silo sites.

mass mortality event (MME) An incident that kills a vast number of a single species in a short period of time. In 2015, the sudden death of over 200,000 saiga antelope in Kazakhstan was caused by an overgrowth of bacteria triggered by unusually warm and humid conditions.

MATS (Mercury and Air Toxics Standards) In 2000, after years of study, EPA issued a scientific and legal determination that it was "appropriate and necessary" to control **mercury** emissions from power plants.

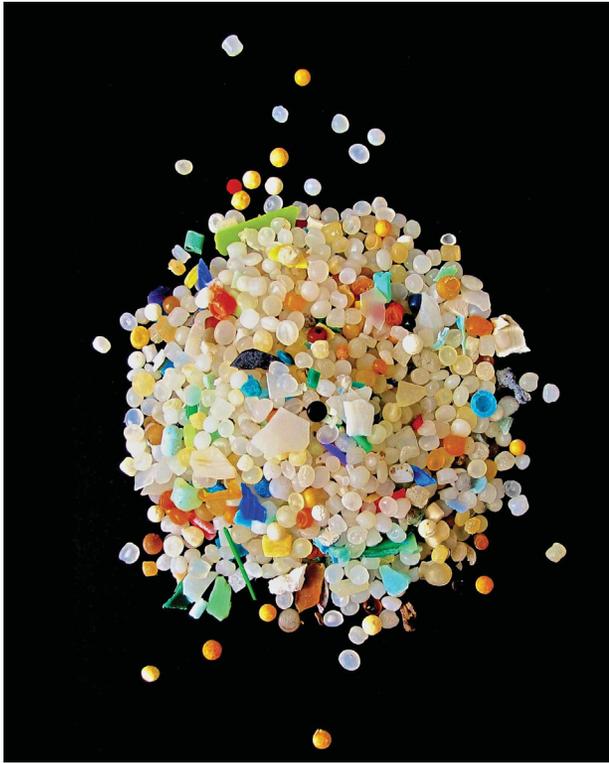
mercury (Hg) and methylmercury are toxic to the central and peripheral nervous systems. To reduce exposure to mercury, the World Health Organization recommends using clean energy sources that do not burn coal. See **biomagnification**.

methane The second most prevalent greenhouse gas emitted in the United States from human activity, either from agricultural or industrial emissions. It is released from natural processes as well.

methemoglobinemia Blue baby syndrome; high concentrations of nitrate in drinking water can inhibit the ability of infants to incorporate oxygen into their blood. See **eutrophication**.



The Limerick Generating Station. Credit: The Victory Report



This image shows microplastic fragments and pre-production pellets collected from a sandy shoreline in Europe. Credit: Current Biology

mesothelioma A cancer of the lung lining caused by exposure to asbestos. See **Libby, MT**.

microcystin Toxins produced by blue-green **algae** (cyanobacteria). The algae grows in warm wet weather and is fed by fertilizer runoff. An algae bloom on Lake Erie in 2014 poisoned the water supply of Toledo, Ohio. See **eutrophication**.

microplastics Microscopic fragments of plastic, less than 5 mm in diameter, a global marine pollutant. See **gyre**.

monoculture The cultivation of a single crop in a given area. Monoculture can easily cause mass destruction if something goes wrong in the single crop being farmed. This intensive farming method requires higher levels of pesticides and fertilizers. Corn, soybeans, wheat, cotton and rice are commonly grown this way in the U.S.

Monsanto A publicly traded American multinational agrochemical and agricultural biotechnology corporation headquartered in Creve Coeur, Missouri. The herbicide **glyphosate** (Roundup) is marketed by Monsanto. The town of Anniston, Alabama was polluted with **PCBs** by a Monsanto plant for 40 years.

mutagens A physical or chemical agent that changes the genetic material, usually DNA, of an organism and thus increases the frequency of mutations above the natural background level.

Radiation and DNA reactive chemicals such as **benzene** are mutagens. See **carginogenic**.

mutualism The ideology that mutual dependence is necessary to social well-being.

neonicotinoids Systemic insecticides that impair the central nervous system; some have been banned in Europe for fear of their effect on **bees**. See **CCD**.

Nevada Test Site A United States Department of Energy Reservation located in southwestern Nye County, Nevada; a testing site for nuclear bombs in the early 1950's. See **balloons**.

nitrate contamination High levels of nitrates can be caused by overuse of fertilizers and improper disposal of human and animal waste; can cause **methemoglobinemia** and spontaneous abortions in livestock and humans. See **eutrophication**.

North Dakota Known for Bakken Oil Fields located in Williston. Mass oil production began there in late 2010. See **lightning**.

Ogalalla Aquifer Also known as the High Plains Aquifer. One of the largest underground freshwater sources in the world. Farmers are depleting this vast underground resource at a rate faster than nature can replenish it.

oil spill The release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity; a form of pollution. Two of America's largest oil spills were **Exxon Valdez** Oil Spill and the Deep **Horizon Oil Spill**, both caused by reckless human behavior.

open pit This form of mining destroys habitats, pollutes waterways with **sediment**, contaminates groundwater and creates dust that contains heavy metals and other pollutants. 40% of all mines are open pit or strip mines. The Morenci open pit complex in Arizona is the largest copper mine in North America.

opium Codeine, morphine, heroin and oxycodone are all drugs derived from the dried latex of the opium poppy. Environmental effects of opium



Arizona open pit copper mine. Credit: Arizona Department of Mines and Mineral Resources

production include deforestation, wildlife loss, and soil and water pollution.

glyphosate is used to eradicate these crops, and it indiscriminately kills other plant life; surfactants in Roundup effect animals and humans as well. Illegal drug production releases toxic chemicals such as acetone, **sulfuric acid**, ether, toluene and anhydrous ammonia into the soil and groundwater. See **coca** and **weed**.

orange snow This phenomenon occurs about every five years and is caused by sand from storms in the Sahara mixing with snow and rain. It blanketed Eastern Europe in March of 2018.

orbital debris Satellite explosions and collisions are the principal source of orbital debris. Over 21,000 man-made objects over 10 cm are orbiting the Earth, with millions more smaller objects as well. In the last 50 years, an average of one object per day falls out of orbit, mostly to burn up upon reentry.

ORS-1 Operationally Responsive Space-1 Launched in 2011, this reconnaissance satellite circles the globe every 90 minutes providing visible and infrared imagery to U.S. forces operating in the Middle East and Southwest Asia.

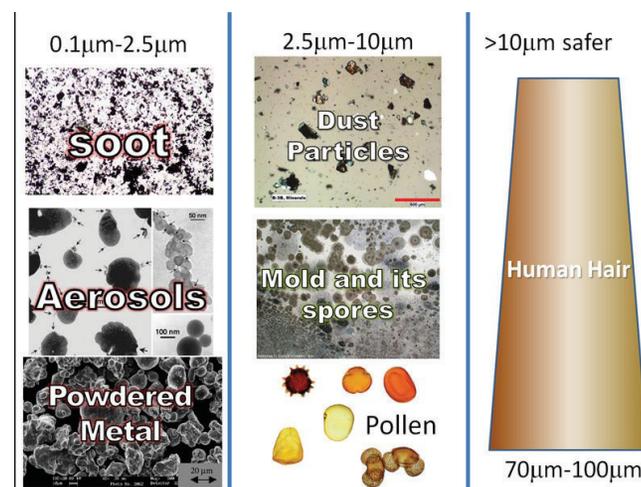
overpopulation Can lead to food shortages and starvation, easily spread disease, water supply contamination, desertification, environmental damage, unemployment, conflict between territories and peoples, and disappearance of nonrenewable resources. The 10 most populous cities in the world are Tokyo, Jakarta, Seoul, Delhi, Shanghai, Manila, Karachi, New York, Sao Paulo and Mexico City.

owls Pesticides kill owls due to **biomagnification**: rodents eat poisoned insects and grains, the owls eat the rodents, the toxins accumulate in the owl. Light pollution and habitat destruction also harm owls. The Ferruginous Pygmy Owl is threatened by the U.S.-Mexico **border fence**.

Paraquat An herbicide, primarily for weed and grass control; if ingested, person will show symptoms of swollen mouth and throat. If poisoning goes untreated, the person may develop lung scarring, heart, kidney, and liver failure. It was promoted by the U.S. in Mexico to kill marijuana plants. The leading manufacturer of Paraquat is **Syngenta**.

particulate matter Also known as **PM** or **soot** - can cause lung irritation, aggravation of lung diseases such as asthma, greater susceptibility to viral and bacterial infections of the lungs, and changes in blood chemistry that lead to heart attacks. See **petcoke**.

PCBs polychlorinated biphenyl Used as cooling fluids, banned in the US in 1979. The major sources of PCBs in drinking water are runoff from landfills and discharge of waster chemicals. The Housatonic River and New Bedford Harbor in Massachusetts have high contamination of PCBs. They effect development in humans and are probable carcinogens.



Particulates between 10µm and 2µm get past the nasal passage defenses and can irritate the lungs and cause severe reactions. Credit: Chemistryland

Pegasus Gold Used open pit methods that produced sulfuric acid pollution and a **cyanide** leaching process to extract gold from the ore. State and federal taxpayers have spent at least \$40 million in Montana to clean up environmental problems caused by their four gold mines that shut down in the 1990s.

penguins In 2012, more than 745 Magellanic penguins washed up dead on the beaches of Southern Brazil. Oil pollution, plastic debris, DDT, PCBs and other pesticides are threats to penguins.

Pennsylvania The second leading U.S. state in air pollution. See **Centralia, Limerick, TMI** and **10 mile radius**.

pesticides Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, rodenticides and various other substances used to control unwanted flora and fauna. Many pesticides have been banned due to their effects on humans and animals. See **atrazine, chlorpyrifos, DDT, dieldrin, glyphosate, neonicotinoids, Paraquat, quizalofop**.

petcoke (petroleum coke) A solid carbon material that resembles coal; it is a product of oil refining. **Particulate** matter blown from piles of petcoke (controlled by the Koch Brothers) along the bank of Chicago's Calumet River has resulted in health concerns and federal law suits.

pigs 16,000 dead pigs were removed from the **Huangpu River** in China in March 2013. Pigs were used as blast test subjects at the **Nevada Test Site**. Hog farming pollutes the soil, air and water with parasites, viruses, hormones, pharmaceuticals, antibiotic-resistant bacteria, **methane, VOCs**, hydrogen sulfide and ammonia.

pine beetle More than 6 billion trees have been infested with mountain pine beetles since the 1990s. These damaged trees release high levels of **VOCs** and contribute to air pollution. Trees stressed by air pollution and drought may attract pine beetles.

plutonium A **radioactive** metal used in nuclear weapons, power reactors and satellites. The Savannah River Site in South Carolina is an EPA Superfund site. This facility produced plutonium metal and other nuclear weapon materials and has polluted groundwater, surface water, sediments and soils filled with radioactive waste and chemicals.

polyethelane The most popular plastic in the world. This is the polymer that makes grocery bags, shampoo bottles, children's toys, and even bullet proof vests. **polyethylene terephthalate (PET)** Plastic used in soft drink, juice, water, beer, mouthwash, peanut butter, salad dressing, detergent, and cleaner containers; it leaches antimony trioxide and (2ethylhexyl) phthalate (**DEHP**).

polypropylene (PP) Used in ketchup bottles, yogurt and margarine tubs, medicine and syrup bottles, straws, and Rubbermaid and other opaque plastic containers, including baby bottles. It is considered a safer plastic, however, research on risks associated with this type of plastic is ongoing.

polystyrene (PS) Used in Styrofoam containers, egg cartons, disposable cups and bowls, take-out food containers, plastic cutlery, and compact disc cases. It leaches styrene, an endocrine disruptor mimicking the female hormone estrogen, and thus has the potential to cause reproductive and developmental problems.

polyvinyl chloride (V or Vinyl or PVC) Used in toys, clear food and non-food packaging (e.g., cling wrap), some squeeze bottles, shampoo bottles, cooking oil and peanut butter jars, detergent and window cleaner bottles, shower curtains, medical tubing, and numerous construction products (e.g., pipes, siding). PVC has been described as one of the most hazardous consumer products ever created as it can leach **BBzP** and **DEHP**.

quizalofop An herbicide shown by the European Food Safety Authority to have effects on the thyroid system.

radiation Energy in transit as particles or electromagnetic waves. Radioactivity is the characteristic of materials to emit ionizing radiation. Ionizing

radiation sources are UV light, X-rays and **gamma rays** and have potential for cellular and DNA damage. Non-ionizing radiation comes from microwaves, radios, cell phones and power lines are low-level and are generally perceived as harmless to humans. See **uranium, plutonium, Fukushima** and **Chernobyl**.

radon A radioactive, colorless, odorless, tasteless gas, occurring naturally in certain soils as an indirect decay product of uranium or thorium; exposure most often occurs in the home or at mining sites; radon is the second leading cause of lung **cancer** in the U.S.

Red List A comprehensive inventory of threatened species. The IUCN Global Species Programme manages data on over 73,000 species and is seen as a 'barometer of life'.

Red Tide A common name for **algae** blooms, which are large concentrations of aquatic microorganisms. The upwelling of nutrients from the sea floor, often following massive storms, provides for the algae and triggers bloom events. These algal blooms are associated with potentially harmful toxins that kill sea life and are hazardous to humans; a more precise and favored terminology is "harmful algal bloom" (HAB).

refinery There are about 700 oil refineries worldwide; pollution from refineries includes **sulfur dioxide**, carbon monoxide, **particulates**, oxides of nitrogen, **VOCs**, **benzene**, mercury, hydrogen cyanide, hydrogen sulfide, and others.

right whales North Atlantic right whales are highly endangered: approximately 450 of the whales remain. They are at high risk for fishing entanglements and blunt-force ship strikes.

Same God On Both Sides [Graffiti on border fence in Friendship Park between San Diego and Tijuana.](#)

Sandoz Now known as Novartis, a parent company of **Syngenta**; a pharmaceutical company that also makes agrochemicals. In 1986, a fire at the Sandoz agrochemical storehouse in Switzerland released 30 tons of toxic chemicals including the pesticide **Atrazine** and 8 tons of mercury into the air and subsequently the Rhine River, making it red and killing thousands of fish and eels.

Sea Level Change Either a sea level rise or sea level fall due to tides or melting sea caps.

simazine A synthetic compound derived from triazine and used as a herbicide, especially to kill broadleaved weeds and grasses before they emerge.

slash-and-burn A method of agriculture in which existing vegetation is cut down and burned off before new seeds are sown, typically used as a method for clearing forest land for farming. This can quickly become a problem and cause deforestation.

soot A byproduct of burning fossil fuels, particularly coal. Soot can often cause tremendous health problems as it can easily enter the lungs because of its small size.

stratosphere Ozone in this layer of our Earth's atmosphere protects us from harmful UV radiation from the Sun. This natural shield has been depleted by manmade chemicals. See **CFCs**.



Graffiti on the Mexican border fence. Credit: Anon



Thilafushi, the garbage island. Credit: Jamie Cowan, Getty Images

subterranean Existing, occurring or done under the Earth's surface.

SO₂ Sulfur dioxide gas is released naturally by volcanic activity and is a major component of acid rain. See **sulfur dioxide**.

sulfur dioxide A toxic pollutant generated when coal or oil is burned. See **refinery**.

Supera Et Ultra 'Above and Beyond' - the motto of the National Reconnaissance Office, which monitors surveillance satellites.

tailings By-products left over from mining and extracting resources, such as extracting bitumen from the oil sands or minerals such as copper or gold from ores. Pollutants in tailings include acid-generating sulphides, **heavy metals**, and chemical agents from processing such as **cyanide** and sulphuric acid.

Talen Energy Owns 25% of Colstrip Power Plant east of Billings, Montana. In 2018, this coal-fired facility was cited for unsafe levels of hazardous air pollutants, including cadmium and chromium.

Tambien de este lado hay sueños 'Also on this side there are dreams'; graffiti on border wall between the U.S. and Mexico.

tar sands, oil sands, bituminous sands A combination of clay, sand, water, and bitumen, heavy black viscous oil. Tar sands can be mined and processed to extract the oil-rich bitumen, which is then refined into oil. Alberta, **Canada** has large tar sands. See **XL pipeline**.

TENORM (Technologically-Enhanced, Naturally-Occurring Radioactive Material) Produced when activities such as uranium mining, or sewage sludge treatment, concentrate or expose radioactive materials that occur naturally in ores, soils, water, or other natural materials.

Thilafushi The 'Garbage Island' - an artificial island created as a municipal landfill situated to the west of Malé in the Maldives. 330 tons of trash were dumped and burned daily before it closed, now the waste from the resort area is shipped to India.

thyroid cancer Exposure to radiation can cause thyroid cancer; after the **Chernobyl** meltdown, about 6,000 children developed thyroid cancer.

TMI (Three Mile Island) A nuclear power plant near Middletown, **Pennsylvania** that partially melted down on March 28, 1979. This was the most serious accident in U.S. commercial nuclear power plant operating history. Though no injuries or adverse health effects resulted, much public debate over the safety of nuclear power ensued.

trichlorethylene (TCE) Used as a solvent for degreasing metal parts during the manufacture of a variety of products. It can be found in some wood finishes, adhesives, paint removers, and stain removers. TCE is a known carcinogen that can also affect the liver, the kidneys, the immune system and the central nervous system. In Northern Michigan, the Wickes Manufacturing TCE plume is an estimated 13 trillion gallons of groundwater laced with TCE.

tsunami A series of ocean waves that can reach over 100 feet high typically created by undersea **earthquakes**. They move at 500 miles an hour and 80% occur in the Pacific Ocean. Following an earthquake, a tsunami damaged the **Fukushima Daiichi** nuclear power plant in 2011.

turtles Slider turtles inhabiting a radioactive reservoir at the Savannah River Site - a nuclear weapons factory - tested positive for genetic damage.

Union Carbide India Limited A subsidiary of **Dow** Chemical Company. In 1984 the Bhopal Gas Tragedy killed over 10,000 people and injured over 500,000. Forty tons of toxic methy isocyanate(MIC) gas leaked from the plant that manufactured the pesticide Sevin.

underwater munitions From 1917 to 1972, when the US officially ended its practice of dumping munitions out to sea, tens of thousands of tons of chemical weapons, conventional munitions and radioactive wastes were disposed of in the Atlantic Ocean, the Pacific Ocean, and the Gulf of Mexico at sites up and down the nation's coastlines, including Alaska, Hawaii and the Caribbean. This was a worldwide practice.

uranium Depleted uranium (DU) is a waste product of the uranium enrichment process for nuclear reactors and weapons. It is heavier than lead and harder than steel and has 60% of the radioactivity of uranium. It is used in munitions and armor. Cancers and birth defects among soldiers and civilians are linked to its use.

vaquita The world's most rare marine animal, is on the edge of extinction. With as few as 15 left, the species will become extinct without a fully enforced gillnet ban throughout their entire range in the Gulf of California.

VOCs Volatile organic compounds - some common examples are acetone, **benzene**, toluene and xylene. Many products in our homes such as carpet, upholstery, vinyl floors, air fresheners and cleaning chemicals "off-gas" VOCs. They can worsen **asthma** symptoms and high or long-term levels can cause cancer, liver and kidney damage and central nervous system damage. Some are formed in natural processes. See **pine beetles**.

vog Air pollution that results when sulfur dioxide and other gases and particles emitted by an erupting volcano react with oxygen and moisture in the presence of sunlight. The word is a mashup of the words "volcanic", "smog", and "fog."

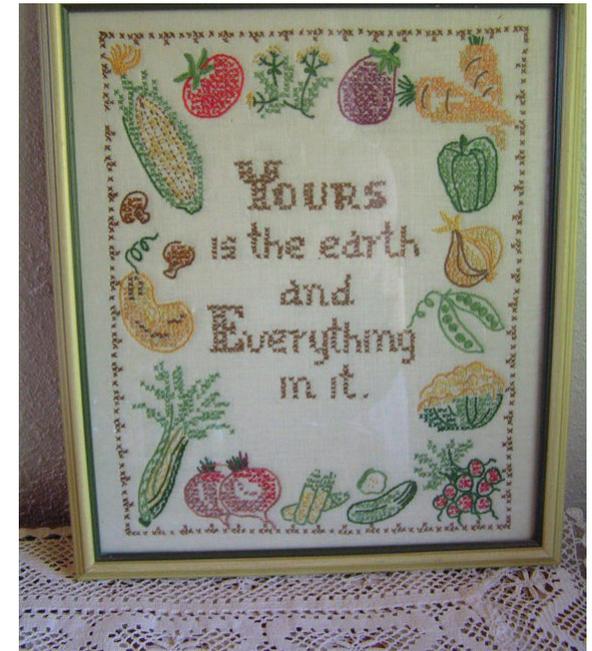
water vapor The most abundant greenhouse gas, water vapor condenses to form clouds.

war The environmental costs of war include water, air, and soil pollution from **uranium**, perchlorate (an ingredient in rocket propellant) and other chemicals, toxic dust containing **heavy metals**. War also accelerates the destruction of forests, wetlands and wildlife.

weed Marijuana cultivation diverts water sources, poisons wildlife and increases erosion. In 2011, 23 tons of trash, over 2000 pounds of fertilizer, 57 pounds of **pesticides** and herbicides, 22 miles of irrigation piping and 13 man-made dams were pulled out of Mendicino National Forest. See **Paraquat**, **coca** and **opium**.

XL Pipeline A controversial oil pipeline system commissioned since 2010. The pipeline would be about 2,000 miles long and would threaten water quality along its whole length as it crosses the Ogallala Aquifer and many wetlands. The Keystone XL Pipeline would move **dilbit** from Alberta, Canada to Texas.

Yours is the earth and Everything in it Cut from a popular 1970's kitchen sampler: a line is from Rudyard Kipling's poem 'If-' and also a reference to Psalm 24:1.



Embroidery of a line from the Rudyard Kipling poem *If-*
Credit: Anon