De-plasticize Your Life

Chemistry Research

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Pollution

Pollution is the introduction of contaminants into an environment that causes instability, disorder, harm or discomfort to the ecosystem i.e. physical systems or living organisms . Pollution can take the form of chemical substances, or energy, such as noise, heat, or light energy. Pollutants, the elements of pollution, can be foreign substances or energies, or naturally occurring; when naturally occurring, they are considered contaminants when they exceed natural levels. Pollution is often classed as point source or nonpoint source pollution.

Forms of pollution

The major forms of pollution are listed below along with the particular pollutants relevant to each of them:

- Air pollution, the release of chemicals and particulates into the atmosphere. Common gaseous air pollutants include carbon monoxide, Sulphur dioxide, chlorofluorocarbons (CFCs) and nitrogen oxides produced by industry and motor vehicles. Photochemical ozone and smog are created as nitrogen oxides and hydrocarbons react to sunlight. Particulate matter, or fine dust is characterized by their micrometre size PM_{10} to $PM_{2.5}$.

- Water pollution, by the release of waste products and contaminants into surface runoff into river drainage systems, leaching into groundwater, liquid spills, wastewater discharges, eutrophication and littering.

- Soil contamination occurs when chemicals are released by spill or underground leakage. Among the most significant soil contaminants are hydrocarbons, heavy metals, MTBE, herbicides, pesticides and chlorinated hydrocarbons.
- Littering
- Radioactive contamination, resulting from 20th century activities in atomic physics, such as nuclear power generation and nuclear weapons research, manufacture and deployment. (See alpha emitters and actinides in the environment.)
- Noise pollution, which encompasses roadway noise, aircraft noise, industrial noise as well as high-intensity sonar.
- Light pollution, includes light trespass, over-illumination and astronomical interference.
- Visual pollution, which can refer to the presence of overhead power lines, motorway billboards, scarred landforms (as from strip mining), open storage of trash or municipal solid waste.
- Thermal pollution, is a temperature change in natural water bodies caused by human influence, such as use of water as coolant in a power plant.

Pollutants

Main article: Pollutant

A pollutant is a waste material that pollutes air, water or soil. Three factors determine the severity of a pollutant: its chemical nature, the concentration and the persistence

Sources and causes

Air pollution comes from both natural and manmade sources. Though globally manmade pollutants from combustion, construction, mining, agriculture and warfare are increasingly significant in the air pollution equation.

Motor vehicle emissions are one of the leading causes of air pollution. China, United States, Russia, Mexico, and Japan are the world leaders in air pollution emissions. Principal stationary pollution sources include chemical plants, coal-fired power plants, oil refineries, petrochemical plants, nuclear waste disposal activity, incinerators, large livestock farms (dairy cows, pigs, poultry, etc.), PVC factories, metals production factories, plastics factories, and other heavy industry. Agricultural air pollution comes from contemporary practices which include clear felling and burning of natural vegetation as well as spraying of pesticides and herbicides.

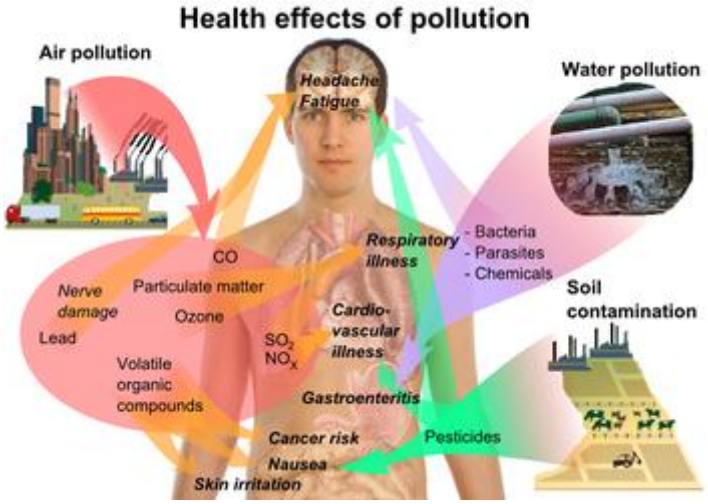
Some of the more common soil contaminants are chlorinated hydrocarbons (CFH), heavy metals (such as chromium, cadmium--found in rechargeable batteries, and lead--found in lead paint, aviation fuel and still in some countries, gasoline), MTBE, zinc, arsenic and benzene. In 2001 a series of press reports culminating in a book called *Fateful Harvest* unveiled a widespread practice of recycling industrial by products into fertilizer, resulting in the contamination of the soil with various metals. Ordinary municipal landfills are the source of many chemical substances entering the soil environment (and often groundwater), emanating from the wide variety of refuse accepted, especially substances illegally discarded there, or from pre-1970 landfills that may have been subject to little control in the U.S. or EU. There have also been some unusual releases of polychlorinated dibenzodioxins, commonly called *dioxins* for simplicity, such as TCDD.

Pollution can also be the consequence of a natural disaster. For example, hurricanes often involve water contamination from sewage, and petrochemical spills from ruptured boats or automobiles. Larger scale and environmental damage is not uncommon when coastal oil rigs or refineries are involved. Some sources of pollution, such as nuclear power plants or oil tankers, can produce widespread and potentially hazardous releases when accidents occur.

In the case of noise pollution the dominant source class is the motor vehicle, producing about ninety percent of all unwanted noise worldwide.

Effects

Human health



Overview of main health effects on humans from some common types of pollution.

Adverse air quality can kill many organisms including humans. Ozone pollution can cause respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion. Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries. Oil spills can cause skin irritations and rashes. Noise pollution induces hearing loss, high blood pressure, stress, and sleep disturbance. Mercury has been linked to developmental deficits in children and neurologic symptoms. Lead and other heavy metals have been shown to cause neurological problems. Chemical and radioactive substances can cause cancer and as well as birth defects.

Ecosystems

- Sulphur dioxide and oxides of nitrogen can cause acid rain which reduces the pH value of soil.
- Soil can become infertile and unsuitable for plants. This will affect other organisms in the food web.
- Smog and haze can reduce the amount of sunlight received by plants to carry out photosynthesis.
- Invasive species can out compete native species and reduce biodiversity. Invasive plants can contribute debris and bio-molecules (allelopathy) that can alter soil and chemical compositions of an environment, often reducing native species competitiveness.
- Biomagnification describes situations where toxins may pass through trophic levels, becoming exponentially more concentrated in the process.
- Ocean acidification, the ongoing decrease in the pH of the Earth's oceans.
- Global warming.

Regulation and monitoring

Main article: Regulation and monitoring of pollution

To protect the environment from the adverse effects of pollution, many nations worldwide have enacted legislation to regulate various types of pollution as well as to mitigate the adverse effects of pollution.

Pollution control

Pollution control is a term used in environmental management. It means the control of emissions and effluents into air, water or soil. Without pollution control, the waste products from consumption, heating, agriculture, mining, manufacturing, transportation and other human activities, whether they accumulate or disperse, will degrade the environment. In the hierarchy of controls, pollution prevention and waste minimization are more desirable than pollution control.

Pollution control devices

- Dust collection systems
  - Cyclones
  - Electrostatic precipitators
  - Baghouses
- Scrubbers
  - Baffle spray scrubber
  - Cyclonic spray scrubber
  - Ejector venturi scrubber
  - Mechanically aided scrubber
  - Spray tower
  - Wet scrubber
- Sewage treatment
  - API oil-water separators[18][12]
  - Sedimentation (water treatment)
  - Dissolved air flotation (DAF)
  - Activated sludge biotreaters
  - Biofilters
  - Powdered activated carbon treatment
- Vapor recovery systems

Water Pollution

What is water pollution?

One of the reasons that the water pollution problem is so severe is that it is not actually illegal to dump pollutants into water bodies.

Sewage, sludge, garbage, and even toxic pollutants are all dumped into the water. Often, governments either do not care or simply look the other way.
Across the world, about half of all sewage is dumped into water bodies in its original form. No efforts are made to disinfect the sewage or to remove especially harmful pollutants.

Even if sewage is treated, problems still arise. Treated sewage forms sludge, which is sent out into the sea and dumped.

Many cities and countries dump sewage out at sea. Often, they place it not far from their own coastline, often killing all the sea wildlife in the dumping area.
In addition to sewage, chemicals dumped by industries and governments are another major source of water pollution.

How is Water Pollution Caused?

Although certain natural processes may cause some of the water pollution, however, human activity is the largest cause of our seas, rivers and lakes getting polluted. We need to use water everyday both in our industries as well as our homes. We get this water from groundwater sources, rivers, and lakes, and after using it, and often contaminating it, most of this water gets back into the rivers, lakes, and oceans.

The used water from agricultural and industrial practices, and household use create wastewater, also referred to as sewage. If this is allowed to flow back into water systems without being treated, it causes pollution, which results in harming both humans as well as animal life. Water also gets polluted when there is a runoff of rainwater from industrial, agricultural, and urban areas, which flow directly through storm water drains into

water systems without any treatment.

The disposal of sewage is a major problem in developing countries where there isn't adequate sanitation in large areas, thus carrying disease causing bacteria and viruses into sources of water. In countries that are developed, people often flush pharmaceutical and chemical products into their toilet.

Some of the other causes of pollution are oil spillages and dumping in oceans, dumping litter into streams, rivers, and oceans such as cardboard, newspaper, foam, Styrofoam, plastic packaging, aluminum, glass, and so on. Some of these take a very long time to degrade, e.g., plastic packaging can take 400 years, Styrofoam takes 80 years, foam takes 50 years, and aluminum takes 200 years.

Nuclear waste, atmospheric deposition, and underground storage leakages are some of the other causes of water pollution.

In Qatar ...

In our region, we suffer from what is known as "Slow Water Cycle": the process by which water in a specific area goes out and new fresh water goes in take a long time, in the Mediterranean Sea and the Arab Gulf it takes nearly 180 years for this process to happen.
Another thing that makes it worse, all of the countries on the costs of the Mediterranean Sea and the Arab Gulf are industrial countries and they throw tons of wastes into the water at once. We then come to talk about Qatar which is one of the countries on the Arab Gulf. The wastes thrown by Qatar and other countries kill the fish supplies that Qatar use for food. And so Qatar is directly harmed by the water issue the region is suffering. And, if laws are not passed that ban the throwing of wastes into water we will suffer from a mass ecological crisis and lack of fresh water and fish supplies.

How does it infect our environment?

Oil, such as that spilled by transport ships, has been dumped into the water since the US Civil War. Every year, between 1 and 10 billion tons of oil are spilt, killing many species and destroying the ecosystem in the area. Cleanup efforts have been weak, as only about 10% of the oil is removed by the most successful efforts.
The effects of water pollution are varied and depend on what chemicals are dumped and in what locations.

Boston Harbour is a strong example of how badly pollution can damage bodies of water. The water is filled with toxic waste and sewage, and routinely receives more waste when rainfall pushes it into the harbour. Many bodies of water near urban areas are highly polluted. This is the result of both garbage dumped by individuals and dangerous chemicals legally or illegally dumped by industries.

The main problem caused by water pollution is that it kills life that inhabits water-based ecosystems. Dead fish, birds, dolphins, and many other animals often wind up on beaches, killed by pollutants in their habitat. Pollution disrupts the natural food chain as well. Pollutants such as lead and cadmium are eaten by tiny animals. Later, these animals are consumed by fish and shellfish, and the food chain continues to be disrupted

at all higher levels.
Eventually, humans are affected by this process as well. People can get diseases such as hepatitis by eating seafood that has been poisoned.

Ecosystems can be severely changed or destroyed by water pollution. Many areas are now being affected by careless human pollution, and this pollution is coming back to hurt humans.
Many laws have been created to restrict industries from dumping materials into the water. However, many laws remain weak, and many countries do not restrict water pollution.

The world has spent tremendous sums of money trying to clean up water. From 1972-1990, the US spent over $250 billion.
Many non-governmental projects are also being carried out in an effort to clean up the water. Industries are beginning to reduce the amount of chemicals they dump into water, and environmental groups are participating in cleanup projects.
The plastics industry, blamed for some of the worst pollution of the water, is making its products degradable. However, many environmentalists think this is hardly enough.
Public reaction to the water pollution problem has also been influential. Governments have responded when public anger has risen, such as after the *Exxon Valdez* accident.

What are the Ways to Prevent Water Pollution?

While we need to see to it that the government is stringent about seeing to it that there are adequate treatment plants to treat sewage, and seeing to it that industries have treatment plants and nuclear plants have proper waste storage systems for radioactive material, and so on, there are many things that we can do individually to prevent water pollution. Given below are a few ways to prevent water pollution:-

- Conserve water by turning off the tap when running water is not necessary. This helps prevent water shortages and reduces the amount of contaminated water that needs treatment.

- Be careful about what you throw down your sink or toilet. Don't throw paints, oils or other forms of litter down the drain.

- Use environmentally household products, such as washing powder, household cleaning agents and toiletries.

- Take great care not to overuse pesticides and fertilizers. This will prevent runoffs of the material into nearby water sources.

- Don't throw litter into rivers, lakes or oceans. Help clean up any litter you see on beaches or in rivers and lakes, make sure it is safe to collect the litter and put it in a nearby dustbin.

- Try to use natural cleaners - e.g. bicarbonate of soda, lemon and vinegar.

- Floating plastic and other solids are ugly as well as harmful – they may suffocate birds, animals and fish, and reduce the amount of light and oxygen available to aquatic life. Plastic is not biodegradable and persists for a long time in the environment.

- Use a sink strainer to prevent rubbish going down the sink.

- Collect fats and oils and put them in the rubbish, not down the sink. They can block the system, as well as polluting waterways and oceans.

- Do not pour poisons down sinks or drains.

- Find out where to dispose of paint solvents, car oil and poisonous products – your Council can tell you about hazardous waste collection centres.

- A single litre of motor oil down the drain can pollute 9,500 litres of water, as well as contaminating waste treatment plant sludge. Some service stations collect used motor oil to reuse and recycle them.

- Never pour leftover paints or solvents down the sink or drain, or on the ground (where they can contaminate groundwater).

- Return unwanted medicines to the pharmacy.

- Your toilet is not a rubbish bin. Don’t dispose of tissues, cotton buds, tampons, sanitary products in the toilet.

- Septic systems can pollute streams, lakes and groundwater if not properly maintained.

- Use less fertilisers and pesticides on lawns and gardens. These can seep into groundwater or get washed into local waterways. Nutrients from fertilisers are a major cause of blue green algae. High levels of pesticides in waterways can result in the death of fish and other aquatic life.

- Clean up after your pets. Pet waste contains nutrients and pathogens that can contaminate surface water.

- Drive only when necessary. Cars deposit toxic metals and petroleum products into the environment, especially through contamination of storm water / runoff.

Although it covers more than 70 percent of the surface of the Earth, water is one of the most precious natural resources of our planet. The reason being that about 97 percent of it is salty, and therefore undrinkable, a further 2 percent is locked in glaciers and polar ice caps, thus leaving just about 1 percent of it useful for drinking and cooking. Apart from clean drinking water, we also need to keep the waters in the oceans, rivers, and lakes unpolluted because otherwise it harms the very planet we survive on. With human populations increasing rapidly it has resulted in us polluting all the water resources of our planet, so much so, precious and unique organisms and ecosystems are being harmed and are even dying at an alarming rate.

Plastic Bags

The Issue

Plastic bags are widely used in Qatar, they **need oil** (which is a non-renewable source of energy and is highly demanded these days) to be produced, Once they are used they get thrown away in the sea and **kill** thousands of **animals**. Another negative aspect of using plastic bags is that they need over **1000 years to be decomposed**, thus, it is extremely hard to get rid of these bags. The only way to get rid of these bags is to burn them, but **burning these bags will make toxic fumes** that will be harmful.

About Plastic Bags

A plastic bag is a type of flexible packaging made of thin, flexible, plastic film. Plastic bags are used for containing and transporting foods, produce, powders, ice, chemicals, waste, etc.

The plastic bag is an icon of convenience culture, by some estimates the single most ubiquitous consumer item on Earth, numbering in the trillions. They're made from petroleum or natural gas with all the attendant environmental impacts of harvesting fossil fuels. One recent study found that the inks and colorants used on some bags contain lead, a toxin. Every year, Americans throw away some 100 billion plastic bags after they've been used to transport a prescription home from the drugstore or a quart of milk from the grocery store. It's equivalent to dumping nearly 12 million barrels of oil.

History of Plastic Bags

1957 The first baggies and *sandwich bags* on a roll are introduced.

1958 Poly *dry cleaning bags* compete with traditional brown paper.
1966 Plastic bag use in *bread packaging* takes over 25 to 30 percent of the market.

1966 Plastic *produce bags* on a roll are introduced in grocery stores.

1969 The New York City Sanitation Department's "New York City Experiment" demonstrates that *plastic refuse bag* curbside pickup is cleaner, safer and quieter than metal trash can pick-up, beginning a shift to plastic can liners among consumers.

1974/75 Retailing giants such as Sears, J.C. Penney, Montgomery Ward, Jordan Marsh, Allied,

Federated and Hills make the switch to plastic *merchandise bags.*

1973 The first commercial system for manufacturing plastic grocery bags becomes operational

1977 The plastic *grocery bag* is introduced to the supermarket industry as an alternative to paper sacks.

1982 Kroger and Safeway start to replace traditional craft sacks with polyethylene *"t-shirt" bags.*

1990 The first *blue bag* recycling program begins with curbside collection.

1990 Consumer *plastic bag recycling* begins through a supermarket collection-site network.

1992 Nearly half of U.S. supermarkets have recycling available for plastic bags.

1996 Four of five *grocery bags* used are plastic.

How are plastic Bags made?

Plastic bags are often made from polyethylene, which consists of a long chain of ethylene monomers. Ethylene is derived from natural gas and petroleum, and it wasn't until 1977 that polyethylene was used in forms of plastic grocery bags.

Where do Plastic Bags go after Usage?

After the usage of plastic bags , since it needs more than 1000 years to decay then it cannot be getting rid of unless it gets burned and releases toxic gases that threaten our Environment which is not a good option , then its either thrown in the sea and kills thousands of sea animals or it gets recycled.

How do Plastic Bags effect the Environment?

More and more people around the world are becoming aware of the environmental issues surrounding plastic bags. Considering their somewhat placid appearance, the impact of plastic bags on the environment can be devastating.

Here are some facts about the environmental impact of plastic bags:

- Plastic bags cause over 100,000 sea turtle and other marine animal deaths every year when animals mistaken them for food
- The manufacture of plastic bags add tonnes of carbon emissions into the air annually
- In the UK, banning plastic bags would be the equivalent of taking 18,000 cars off the roads each year
- Between 500 billion and 1 trillion plastic bags are used worldwide each year
- Approximately 60 - 100 million barrels of oil are required to make the world's plastic bags each year

- Most plastic bags take over 400 years to biodegrade. Some figures indicate that plastic bags could take over 1000 years to break down. (I guess nobody will live long enough to find out!). This means not one plastic bag has ever naturally biodegraded.
- China uses around 3 billion plastic bags each day!
- In the UK, each person uses around 220 plastic bags each year
- Around 500,000 plastic bags are collected during Clean Up Australia Day each year. Clean Up Australia Day is a nationwide initiative to get as many members of the public to get out and pick up litter from their local areas. Unfortunately, each year in Australia approximately 50 million plastic bags end up as litter.

Numbers

Up to 1000 - Estimated years for a plastic bag to decompose.
1460 - Plastic bags used in a year by an average family of four in the U.S.
12 million - Barrels of oil used to make the plastic bags that the U.S. consumes annually.
Less than 1% - Percentage of all plastic bags that get recycled in the U.S.
88.5 billion – Plastic bags consumed in the U.S. last year.
500 billion – Estimated plastic bags sold worldwide each year.

It takes about **430,000 gallons** of oil to produce 100 million non-degradable plastic bags. And we use 4 trillion to 5 trillion plastic bags worldwide annually. That's using up oil sources without recycling them.

Nearly **90%** of floating marine litter is plastic.

In June 2006 United Nations Environmental Program report estimated that there is an average of **46,000 pieces** of plastic debris floating on or near the surface of every square mile of ocean

Countries Actions

San Francisco has banned non-biodegradable plastic bags in large grocery stores.
Ireland has a $.20 tax per bag.
France is banning plastic bags starting 2010 and starting 2008 in Paris.
South Africa has banned thin plastic bags
Uganda has banned thin plastic bags and has taxes on thicker ones.
Kenya is banning plastic bags starting 2008.
Zanzibar Islands have banned all plastic bags.
Mumbai, New Delhi, and two states in India have banned all plastic bags.
Bangladesh has banned all plastic bags.
Taiwan has banned all plastic bags as well as disposable plastic plates, cups, and cutlery.

So Australia, Bangladesh, Ireland, Italy, Taiwan, Mumbai (formerly Bombay), Scotland, France, West Bengal, Zanzibar, Tanzania, Switzerland, Rwanda, Denmark, Germany, South Africa, California, Somalia, Botswana,

Philippines have already banned or discouraged the usage of the plastic bags **why not make Qatar one of them.**

Suggested Solution

THIS PROBLEM CAN BE SOLVED BY:

Discussing this issue with government officials and ask them to ban people from using plastic bags. This can done by making the government itself fund and establish an organization that will be specialized in collecting plastic bags from people after being informed by people who want to get rid of their plastic bags through a website which will be created to gather people's addresses in order for the organization to collect plastic bags from people's houses.

How will this website work?

When this website is opened it will play a video which will demonstrate all the negative effect caused by the usage of plastic bags.

After this video ends the website will automatically ask a question that says "Do you want to get rid of your plastic bags" if yes the following steps must be followed:

1-Give your Number

2-Give your phone number

3-Give your address

4-Tell when would you like the Organization Workers to come to your house and collect your plastic bags.

5- Tell the Organization if you want reusable bags instead.

This will help reducing the amount of plastic bags by people.

And the organization will use the plastic bags collected as shown in the video attached to the Research.

Motivation for making the Research

We are students like any other students, but we saw the problem before others.

We wanted to act and do something for our earth, and so came this research.

This pollution invasion had to stop and we saw that awareness through this project was

Part of spreading the word. it is only one earth we have, AND ITS DYING. If we don't act

And fast, its going to be a junkyard not our earth and we won't live in it

SAVE THE EARTH BEFORE IT'S TOO LATE

Resources:

http://en.wikipedia.org/wiki/Air_pollution

http://www.chintiminiwildlife.org/Education/LivingWithWild/Litter.htm

http://www.roscommoncoco.ie/services/environment/litter.html

http://www.utexas.edu/safety/ehs/water/pollution.html

http://en.wikipedia.org/wiki/Water_pollution

http://www.umich.edu/~gs265/society/waterpollution.htm

http://www.plasticbageconomics.com/index.php?option=com_content&task=view&id=21&Itemid=39

http://www.packagingknowledge.com/plastic_bags.asp

http://en.wikipedia.org/wiki/Plastic_bag

http://inventors.about.com/od/pstartinventions/a/plastics.htm

http://news.bbc.co.uk/cbbcnews/hi/teachers/pshe_11_14/subject_areas/confidence_responsibility/newsid_1857000/1857981.stm

http://www.midsussex.gov.uk/page.cfm?pageID=2435