

Project *Garbage* - Plastic



Advice

- If you're a shopper, it's easy - just Say NO to Plastic Bags when you go shopping, take your reusable bags and use them at every shop, not just the supermarket.

Questions

What happens to recycled plastic bags?

Plastic bags are recycled to make garden stakes, garden furniture, garden sleepers, flower pots and new plastic bags.

Should I use biodegradable plastic bags?

A biodegradable product is one that breaks down safely, by biological means, into the raw materials of nature and disappears into the environment.

There is no guarantee that bags will completely break down as claimed by their manufacturer. There are many other reusable bag options such as recycled paper, polypropylene, calico, string and jute.

Newspaper articles – India (and Nepal)

Plastic bags to be binned

(...)According to the report, plastic is not biodegradable and releases harmful dioxins into the air. Besides, people who work in plastic industries are at a greater risk for cancer and other diseases, it said. Discarded plastic bags are a notorious clogger of sewage lines and drains. "Because it doesn't rot and turn into compost, plastic bags discarded in fields decrease the productivity of arable land," Sharma said. The most dangerous feature of plastic is its toxicity, with black colored polythene bags the worst offenders, say environmentalists. Several cities in neighboring India have banned black plastic bags because of their toxicity. In fact, entire Indian states like Himachal Pradesh and Sikkim, which border Nepal and depend on tourism for revenue, strictly enforce bans on plastic bags and even fine shopkeepers if any are found on

their premises.

In Bangladesh there have been a chorus of demands for a complete ban on plastic bags ever since they contributed to the severity of floods in Dhaka two years ago by clogging drains.

Colored plastic bags contain harmful toxic metals like chromium and copper which can cause allergies, according to activists in India who prevailed on their environment ministry to encourage the use of virgin transparent plastic.

Activism in favour of banning plastic bags has not gone down well with dozens of plastic industries which recycle them and provide employment to hundreds of poor people who collect them for a living. Currently there are 179 plastic factories operating in the towns of Nepal engaged in turning plastic bags into tubs, buckets, containers and more polythene bags. The industry is a source of revenue for the government. Earlier, the problem was dealt with by recycling. Discarded plastic bags were picked up by rag pickers and migrant workers from the streets of the capital and sold to plastic industries. The city corporation also bought them up as landfill material. But these days, intense market competition in the plastic industry and better technology have led to ever-thinner bags which are uneconomical to recycle.

Fearing ban, plastic bag-makers ready to abide by pollution

(...)It also insists on recycled bags having a thickness of not less than 25 microns and they should not have any colour pigments, which are considered harmful to health.

"For this we have asked manufacturers to increase the thickness of the plastic bags so that they cost more, become durable and are put to multiple use thereby reducing consumption," he adds. "Plastic has pervaded all aspects of our life. We cannot ban it with the stroke of a pen. What we can do is create awareness among the people so that it is not misused thereby reducing consumption."

On the issue of plastic waste management, as the CPCB chairman emphasises the need for participation of the manufacturers in the process, Gupta agrees.

Interestingly, most manufacturers blame people for environmental and health problems created by the recycled bags. Most of them are unaware of the fact that the coloured plastic bags made from recycled waste and used for carrying food items are a major health risk.

While they agree that these plastic bags are dangerous because they end up creating environmental problems, most of them feign ignorance of the fact that eatables carried in them get contaminated and can cause misshapen limbs or affect kidneys. "Recycled plastic bags are cheap so they are much in demand," points out Garg. As they are available at a rate as low as Rs 35 per kilogram or at the most Rs 40, these bags are popular among shopkeepers who hand them over to their customers. On the other hand, bags made of virgin plastics cost around Rs 70 per kilogram.

Packaging accounts for 52 per cent of 1.88 million tonnes of plastic applications in the country.

Biswas, however, has word of warning. "If things show no signs of improvement, ban of plastic products will be considered as a last resort."

Dioxins

Office of Communications and Public Affairs: *What are dioxins?*

Rolf Halden: Dioxins are organic environmental pollutants sometimes referred to as the most toxic compounds made by mankind. They are a group of chemicals, which include 75 different chlorinated molecules of dibenzo-p-dioxin and 135 chlorinated dibenzofurans. Some polychlorinated biphenyls (PCBs) also are referred to as dioxin-like compounds. Exposure to dioxins can cause chloracne, a severe form of skin disease, as well as reproductive and developmental effects, and more importantly, liver damage and cancer.

OC&PA: *Where do dioxins come from?*

RH: We always thought dioxins were man-made compounds produced inadvertently during the bleaching of pulp and manufacturing of pesticides like Agent Orange and other chlorinated aromatics. But dioxins in sediments from lakes and oceans predate these human activities. It is now generally accepted that a principal source of dioxins are various combustion processes, including natural events such as wild fires and even volcanic eruptions.

Today, the critical issue is the incineration of waste, particularly the incineration of hospital waste, which contains a great deal of polyvinyl chloride plastics and aromatic compounds that can serve as dioxin precursors. One study examined the burning of household trash in drums in the backyard. It turns out that these small burnings of debris can put out as much or more dioxins as a full-sized incinerator burning hundreds of tons of refuse per day. The incinerators are equipped with state-of-the-art emission controls that limit dioxin formation and their release into the environment, but the backyard trash burning does not. You set it ablaze and chemistry takes over. What happens next is that the dioxins are sent into the atmosphere where they become attached to particles and fall back to earth. Then they bind to, or are taken up, by fish and other animals, where they get concentrated and stored in fat before eventually ending up on our lunch and dinner plates. People are exposed to them mostly from eating meat and fish rich in fat.

OC&PA: *What about cooking with plastics?*

RH: In general, whenever you heat something you increase the likelihood of pulling chemicals out. Chemicals can be released from plastic packaging materials like the kinds used in some microwave meals. Some drinking straws say on the label “not for hot beverages.” Most people think the warning is because someone might be burned. If you put that straw into a boiling cup of hot coffee, you basically have a hot water extraction going on, where the chemicals in the straw are being extracted into your nice cup of coffee. We use the same process in the lab to extract chemicals from materials we want to analyze.

If you are cooking with plastics or using plastic utensils, the best thing to do is to follow the directions and only use plastics that are specifically meant for cooking. Inert containers are best, for example heat-resistant glass, ceramics and good old stainless steel.

OC&PA: *Is there anything else you want to add?*

RH: Don't be afraid of drinking water. It is very important to drink adequate amounts of water and, by the way that's in addition to all the coffee, beer and other diuretics we love to consume. Unless you are drinking really bad water, you are more likely to suffer from the adverse effects of dehydration than from the minuscule amounts of chemical contaminants present in your water supply. Relatively speaking, the risk from exposure to microbial contaminants is much greater than that from chemicals.

And here's one more uncomfortable fact. Each of us already carries a certain body burden of dioxins regardless of how and what we eat. If you look hard enough, you'll find traces of dioxins in pretty much every place on earth. Paracelsus the famous medieval alchemist, used to put it straight and simple: it's the dose that makes the poison.--
Tim Parsons

General

Burning was once considered the most effective method for disposing waste materials. However, since industrialisation the nature of waste has changed dramatically. Mass production of chemicals and plastics means that burning or incinerating today's waste is a complex, costly and highly polluting method of disposal.

The myth that burning makes waste disappear has led to incineration emerging as a widely used method for disposing many kinds of waste, including hazardous wastes.

Rather than making waste disappear, incinerators create more toxic waste that pose a significant threat to public health and the environment.

Incineration is often touted as an alternative to land filling. However, what many people do not realise is that incinerator ashes are contaminated with heavy metals, unburned chemicals and new chemicals formed during the burning process. These ashes are then buried in landfill or dumped in the environment.

Incineration is a method where industry can break down its bulk waste and disperse it into the environment through air, water and ash emissions. It is a convenient way for industry to mask today's waste problems and pass them onto future generations.

Incineration impacts - emissions

Existing data shows that burning hazardous waste, even in "state-of-the-art" incinerators, will lead to the release of three types of dangerous pollutants into the environment:

- 1 - Heavy metals;
- 2 - Unburned toxic chemicals; and
- 3 - New pollutants - entirely new chemicals formed during the incineration process.

Toxic Metals

Metals are not destroyed during incineration and are often released into the environment in more concentrated and dangerous forms.

High temperature combustion releases toxic metals such as lead, cadmium, arsenic, mercury and chromium from waste products containing these substances, including batteries, paints and certain plastics.

These metals are released as tiny gas particles, which increase the risk of inhalation. An average-sized commercial incinerator (32,000 tonnes per year) burning hazardous waste with average metals content, emits these metals into the air at the rate of 92 tonnes a year. This is the total amount permitted annually for metals (including lead, cadmium, arsenic, mercury and chromium), and yet a further 304 tonnes a year will be found in residual ashes and liquids.

Pollution control equipment can remove some but not all heavy metals from stack gases. However, the metals do not disappear; they are merely transferred from the air into the ash, which is then land filled.

Subsequently, metals in the ash may leach into and contaminate soils and potentially groundwater. Presently, ash from incinerators is sometimes used in construction material such as asphalt and cement.

This practice can also have implications for the environment and for human health, as metals can leach out of these construction materials. Ash from a municipal waste incinerator in Newcastle, UK, was used on local allotments and paths between 1994 and 1999. Recently, it was removed, as was found to contain unacceptably high levels of heavy metals and dioxins.

Unburned toxic chemicals

No incineration process operates at 100 percent efficiency. Unburned chemicals are emitted in the stack gases of all hazardous waste incinerators. They also escape into the air as fugitive emissions during storage, handling and transport.

While incinerators are designed to burn wastes, they also produce more waste in the form of ash and effluent from wet scrubbers and/or cooling processes.

Incinerator ash carries many of the pollutants that are emitted as stack gases. Studies have identified up to 43 different semi-volatile, organic chemicals in incinerator ash, and at least 16 organic chemicals in scrubber water from hazardous waste incinerators.

Ash is commonly buried in landfill, while effluent is often treated before being discharged into rivers or lakes.

New pollutants - dioxins and furans

One of the most insidious aspects of incineration is the new and highly toxic chemicals formed during combustion.

Fragments of partially burned waste chemicals recombine within incinerator furnaces, smokestacks, and/or pollution control devices. Hundreds, possibly thousands, of new substances are created, and many of these substances are more toxic than the original waste.

Very little research exists on the multitude of pollutants emitted from incinerators. One study identified 250 volatile organic compounds, many of which are known to be highly toxic or carcinogenic. It is likely that many other compounds are emitted during incineration that are yet to be identified.

Among the possible compounds are dioxins and furans, often referred to as just dioxins.

Dioxins are created when materials containing chlorine are burned. They have no useful purpose and are associated with a wide range of health impacts including, cancer, altered sexual development, male and female reproductive problems, suppression of the immune system, diabetes, organ toxicity and a wide range of effects on hormones.

Dioxins – global killers

Once emitted into the environment, dioxins can travel vast distances via air and ocean currents, which makes them a global contaminant.

Dioxins are distributed into the environment as part of incinerator stack gases, bottom ash, fly ash and in the effluent of pollution control devices.

The main route of exposure to dioxins in humans is through food intake. Once in the body they are only excreted very slowly and build up in fatty tissues. Studies suggest that people in the US and some European countries now carry dioxins and furans at or near those levels suspected of causing health effects in humans.

Dioxins released from an incinerator can be readily consumed by grazing animals and fish. In 1989, 16 dairy farmers downwind of a Rotterdam incinerator in the Netherlands were banned from selling their milk because it contained dioxin levels three times higher than anywhere else in the country.

Residents of a property downwind of a chemical waste incinerator in Pontypool, South Wales, UK, were advised not to consume duck or bantam eggs from their property.

Incinerator ash is hazardous waste

Leftover incinerator ash is extremely toxic, containing concentrated amounts of lead, cadmium and other heavy metals. It can also contain dioxins and other toxic chemicals.

Toxic ash disposal in an environmentally sound manner is problematic and expensive. If handled properly, ash makes incineration prohibitively expensive for all but the wealthiest communities.

If handled improperly it poses short and long-term health and environmental dangers. The better the pollution-trapping device in an incinerator smokestack, the greater the quantity and toxicity content of the residues.

A hundred times more dioxin may leave an incineration facility via ash, than in air emissions.

Incineration in Asia

Developing countries in Asia are being swamped with proposals for waste incinerator plants. Faced with shrinking markets in pollution-conscious northern countries, incinerator companies are turning to Asia where they see a lucrative market for their out-dated and poisonous technology.

Today, incinerators are sold under a variety of guises. Some of these include fluidised bed incinerators, thermal treatment plants or waste-to-energy systems.

Yet in countries, such as the Netherlands and Germany, where pollution regulations are stringent, incinerators continue to incur monumental costs to clean up the pollution they cause.

Many industrialised countries cited by incinerator salespersons as proponents of incineration technology, are rapidly shutting down their incinerators. By the end of 1998, over 2000 industrial waste incinerators were closed in Japan, either permanently or temporarily.

This was a direct result of tougher limits on the emission of cancer causing dioxins introduced by the Japanese Government.

However, following developments in technology for controlling emissions to air, new incinerators are again being proposed in some European countries. Governments charged with managing industrial waste stand at a critical juncture.

They can continue to approve and promote incineration, or they can encourage the development and use of clean production methods that eliminate toxic processes, products and waste.

Impacts of incineration - health and environment

Increased cancer rates, respiratory ailments, reproductive abnormalities and other health effects are noted among people living near some waste-burning facilities, according to scientific studies, surveys by community groups and local physicians.

Cancer, birth defects, reproductive dysfunction, neurological damage and other health effects are also known to occur at very low exposures to many of the metals, organochlorines and other pollutants released by waste-burning facilities.

Many pollutants released in incinerator air emissions have been shown to accumulate in and on food crops. This is most notable on crops where the edible portion is exposed such as leafy vegetables. While thorough washing of produce may remove a portion of pollutants on crop surfaces, a significant amount (typically from 15 to 50 percent) will remain.

Incineration - theory versus practice

In theory, a properly designed incinerator should convert simple hydrocarbons into nothing other than carbon dioxide and water.

Practical experience, however, has shown that even the best combustion systems usually produces Products of Incomplete Combustion (PICs), some of which highly toxic.

Even under the most stringent standards, incinerators emit chemicals that have escaped combustion as well as newly-formed PICs. Newly formed products refer to the thousands of different chemicals, which only a small fraction has been identified.

Different countries monitor and measure incinerator performance in various ways and to different degrees. Actual incinerator performance can deviate radically due to combustion upsets such as:

- Equipment failure;
- Human error; and
- Rapid changes in the type of waste fed to an incinerator.

Only a small fraction of the waste needs to experience a combustion upsets for there to be significant deviations from the targeted destruction efficiencies.

Medical waste - useful waste into hazardous waste

Only 10 percent or less of a typical hospital's waste stream is potentially infectious. It is possible to sterilise this waste with heat, microwaves and other non-burn disinfection technologies.

The remaining waste is not infectious and is similar to the same waste generated by hotels, offices or restaurants because hospitals serve all of these functions.

By burning medical waste in an incinerator, the basic biological problem of disinfecting infectious material, which can be dealt with by various other technologies, becomes a formidable chemical pollution problem that is costly to manage and difficult to contain.

Incineration removes the incentive to recycle and reuse

Incinerators with pollution control equipment are prohibitively expensive, and once authorities have invested in incineration they often do not have the money to invest in waste reduction. In this way, incineration directly competes with efforts to reduce and recycle waste.

Incineration actually perpetuates the use of landfills because of the large quantities of leftover ash produced by incinerators.

It is estimated that for every three tonnes of waste that is incinerated, one tonne of ash is generated. This ash is very toxic, containing concentrated amounts of heavy metals and dioxins which, when buried, will eventually leach into the soil, potentially polluting groundwater.

Very few jobs are created in return for the huge economic investment in incineration. Most of the jobs are temporary, created during the building of the plant.

A large incinerator may employ about 100 workers. Whereas, community efforts into waste separation, reuse and repair as well as recycling and composting, can create more jobs, both in the handling of the waste and in secondary industries using recovered material.

Also, most of the money invested in the incinerator leaves the community. The huge engineering firms that build incinerators are seldom located within a community and so most of the money invested does not benefit the local community.

In comparison, money invested in the low-tech alternatives stays in the community, thereby creating local jobs and stimulating other forms of community development.

Recycling saves more energy than incineration yields. For instance, if the US burned all its municipal waste in incinerators, it would contribute less than one per cent of the country's energy needs.

Two studies performed in the US in 1993 and 1994 show that if the current recyclable material were recycled instead of burned in an incinerator, some three to five times as much energy would be saved.

The reason for this is that incineration can only recover some of the calorific value contained in the waste.

It cannot recover any of the energy invested in the extraction, processing, fabrication and chemical synthesis involved in the manufacture materials present in the waste stream.

However, re-use and recycling can do this. In fact, a cost-benefit study conducted for the European Commission in 1997 concluded that even land filling was better and more energy efficient than incineration, for managing household waste.

PVC

PVC (polyvinyl chloride), often called 'vinyl', is the second most commonly used plastic in the world. It is also the most harmful to the environment.

PVC production is increasing, particularly in Asia and Latin America. Today more than 30 percent of the world's chlorine production is used to make PVC.

PVC has displaced a broad range of other, less problematic materials such as glass, metal, paper, ceramics, and wood and it obstructs the use of chlorine-free plastics.

The largest use of PVC is in building materials such as cables, window frames, doors, walls, panelling, water and wastewater pipes. It is also used in home products - such as PVC flooring, PVC wallpaper, window blinds and shower curtains.

PVC is used for consumer articles such as credit cards, records imitation leather, garden furniture and toys. It is also used in the office for furniture, binders, folders, and pens. The car industry uses PVC, especially as underseal, and it can be found in hospitals for medical disposables, and as cable and wire insulation.

PVC is one of the world's largest dioxin sources. This group of chemicals is some of the most toxic chemicals ever released into the environment. Dioxins are created when PVC plastic is burned in incinerators, household stoves, open rubbish (trash) burning, and accidental fires in buildings and vehicles. Dioxins are created during the manufacture of PVC so that production wastes are rich with dioxins and other highly toxic contaminants.

Toxic chemical additives are incorporated within PVC products. PVC production is increasing worldwide and is now the world's single largest use of industrial chlorine.

PVC lifecycle

Of all the plastics, PVC plastic or vinyl is the most environmentally damaging. Throughout its lifecycle it requires hazardous chemicals for production, releases harmful additives and creates toxic wastes. The disturbing fact is that its production is increasing worldwide despite the fact that safer, more feasible alternatives currently exist for almost all PVC products.

Production

The production of PVC powder involves the transport of dangerous explosive materials such as vinyl chloride monomer (VCM) and the creation of toxic waste, notably ethylene dichloride (EDC) tars. Tar

wastes in particular, contain huge quantities of dioxins that are then incinerated or dumped, spreading dioxins into the wider environment.

Previously these tar wastes were burned on ocean incineration vessels until a worldwide ban was imposed in 1991. The ban was due to their toxic emissions and threat to the marine ecosystem. These wastes are now burned in land incinerators or dumped into deep wells.

Then, numerous additives are incorporated into the PVC to make a wide variety of products. Some of these additives are softeners (plasticisers) to make it soft and pliable, heavy metals as stabilisers or to give it colour, and fungicides to stop fungi from eating the other additives. So the production of PVC also involves a huge secondary toxic manufacturing industry.

PVC manufacturing and dioxin

In 1989, it was discovered that dioxins were generated in the process of manufacturing PVC. The dioxins end up in some of the process wastes and, in some instances, in the PVC itself.

The wastes produced at ICI's plant contain high levels of dioxins. Greenpeace found a similar picture in 1994 and in 1996 when it investigated the PVC industry in the US.

In The Netherlands, the manufacture of vinyl chloride monomer (VCM) caused extensive dioxin contamination of Rotterdam Harbour. See the [Hotspots map](#).

In Venice, Greenpeace analysed sediment from the Porto Marghera. It clearly showed contamination of the lagoon with dioxin by the Enichem plant, where VCM is among the chlorinated chemicals manufactured. See the [Hotspots map](#).

In 1998, a judge ordered the closure of the main waste pipe discharging waste from PVC production from two companies, Enichem and EVC. The order was lifted after discussions with the companies.

The Environmental Ministry of Lower Saxony found extremely high levels of dioxins in sludge from the waste water treatment plant for European Vinyls Corporation's PVC production at Wilhelmshaven, Germany in 1994. Dioxin was also found in a dump where these sludges were disposed of.

Use

As well as environmentally damaging, PVC consumer products also present a hazard to consumers. Plasticisers are not bound to the plastic and can leach out over time. For instance, plasticisers in PVC flooring will evaporate into the room. The most common plasticiser (phthalate DEHP), is a suspected carcinogen. Phthalate softeners are global contaminants and over 90 percent are used solely to make soft PVC plastic.

Recently, many governments have banned soft PVC baby toys and teethingers because of the risk of softeners leaking into infants' mouths, when sucked or chewed.

Disposal

The disposal of PVC creates more environmental problems. If burned (either in open fires or incinerators), PVC will release an acidic gas along with dioxins, due to its chlorine content. If landfilled, it eventually releases additives, which can then threaten groundwater supplies. Landfill fires involving PVC are a further source of dioxin. For more information see PVC waste and recycling.

Recycling

PVC recycling is neither technically nor financially feasible. Currently less than 1 percent of PVC is materially 'recycled'. Post-consumer products or PVC waste products cannot be recycled into the same quality, as PVC requires virgin PVC to make a product of similar quality. The majority of this collected waste is 'downcycled' or used to manufacture 'inferior' products such as garden benches and sound barriers along highways.

Many recycled PVC products have to be restabilised with toxic heavy metal compounds or other stabilisers. This further increases the range of hazardous components in the secondary product.

For more information on the problems of recycling PVC see 'waste and recycling'.

PVC and dioxin

Dioxins are created when PVC is produced, recycled and disposed of in incinerators, and when PVC products burn in accidental fires such as landfill fires.

Dioxins are now present throughout the environment and the food chain. Everyone is exposed to them in their diets, particularly through fatty foods such as dairy, meat, fish and eggs.

Even during small house fires considerable amounts of dioxin can form because PVC is present in interior furnishings and products such as floorings and wallpapers, and electrical equipment such as cables. The hydrochloric acid formed when PVC is burned, can lead to life threatening lung damage and causes serious corrosion to buildings.

Burning Plastic

Question - What toxic substance is produced that is harmful to our health when a plastic material is burned?

Hi Alvin!

Many plastics, particularly PVC when burned results in emissions of the deadly poison named dioxin.

Dioxin is a toxic organic chemical that contains chlorine and is produced when chlorine and hydrocarbons are heated at high temperatures. To inhale dioxin or to be exposed anyway to its fumes can cause many deadly results.

Dr. Mabel R.

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There are lots of them. Any carbon-based material produces hazardous products under most combustion conditions, mostly due to incomplete combustion. For instance, burning gasoline can produce carbon monoxide and hydrocarbons, burning charcoal can produce carbon monoxide, and burning methanol can produce formaldehyde.

Some types of plastic contain elements besides the standard carbon, hydrogen, and oxygen. Nylons contain nitrogen, and polyvinyl chloride contains, of course, chlorine. These constituents also find their way into the combustion products. Probably the particular component you have heard about most is TCDD, which is an abbreviation for the chemical name tetrachloro-dibenzo-dioxin. This compound contains four chlorine atoms, and is inevitably formed when polyvinyl chloride plastics are burned. (Complete combustion of PVC would yield only water, carbon dioxide, and hydrogen chloride; in practice, some incomplete combustion products such as TCDD are always formed, if at low levels.) TCDD is also formed when wood burns, because wood also contains small amounts of chlorine. Because of the much higher proportion of chlorine in PVC, however, it is the material leading to the highest levels of TCDD.

The toxicity of TCDD to animals is well-established. It is often considered to be the man-made compound most toxic to animals. Its toxicity to humans, however, is not as well-established. The only absolutely confirmed human health effect from exposure to TCDD is a skin rash called chloracne. Other health effects are suspected. It is considered a carcinogen on the basis of animal studies.

TCDD is also an unwanted by-product of the manufacture of the herbicides 2,4-D and 2,4,5-T. A manufacturing accident at a plant manufacturing these chemicals occurred near Sevesto, Italy in 1976 released an estimated 1-10 lb of TCDD into the surrounding countryside, killing many farm animals and causing chloracne. Since 2,4-D and 2,4,5-T were components of the defoliant "Agent Orange" used in Vietnam, many U.S. servicemen (and of course Vietnamese) were exposed to elevated levels of TCDD. TCDD is thus suspected as the cause of the symptoms attributed to "Agent Orange" exposure.

Why be concerned about trash and wood burning?

When wood, household garbage, plastic, or leaves are burned, they produce smoke and release toxic gases. The smoke contains vapors and solid compounds suspended in the air called particulate matter. The particulate matter and toxic gases released during burning can be very irritating to people's health.

People who are exposed to these air pollutants can experience eye and nose irritation, breathing difficulty, coughing, and headaches. People with heart disease, asthma, emphysema, or other respiratory diseases are especially sensitive to air pollutants. The chance of human health effects occurring depends mostly on the concentration of air pollutants in people's breathing zone (the air that's breathed around the nose and mouth).

Typically, no adverse health effects are expected, unless people are very close to the source of smoke or the smoke isn't diluted enough with clean air.

The toxic chemicals released during burning include nitrogen oxides, sulfur dioxide, volatile organic chemicals (VOCs), and polycyclic organic matter (POMs). Burning plastic and treated wood also releases heavy metals and toxic chemicals such as dioxin.

Trash burning

Before scientists learned about the dangers of burning trash, it was commonly burned at homes and landfills. Because of the smoke, air pollution, and odor complaints of backyard burning, many local governments prohibit residential trash burning. Wisconsin state law also restricts certain types of open burning.

Backyard trash burning is especially harmful because it releases chemicals that are persistent in the environment, polluting our air, food, lakes and streams. A recent study found that residential trash burning from a single home could release more dioxin into the air than an industrial incinerator.

How does trash and wood burning cause health problems?

The gases released by trash and wood burning can cause breathing irritation. Some of these gases are called aldehydes, which cause strong irritation when they contact the eyes, nose, and throat. Aldehyde and other organic gases are the reason why smoke is irritating to the eyes.

Smoke from wood and trash contains very small particles that can be breathed deep into the lungs. Once trapped in the lungs, these particles can cause cell damage. The cell damage can eventually make breathing difficult. In general, the health risk posed by smoke is small if the smoke is mixed with plenty of outdoor

air. However, smoke from burning trash and wood can still be harmful if the smoke accumulates near homes.

The small particles in wood smoke can worsen heart conditions by preventing oxygen from reaching tissues. Breathing difficulties such as asthma, may increase in adults or children, if they breathe too much smoke. Other health problems aggravated by burning include lung infections such as acute pneumonia and bronchiolitis. Allergies can be worsened. Burning trash can cause other long-term health problems.

What can be done to reduce air pollution from residential burning?

Do not burn residential trash, such as garbage, plastic, old furniture, or construction material, like treated wood products or particleboard.

Become aware of state and local burning laws, e.g. Wisconsin Administrative Code NR 429.04 prohibits burning:

- Wet cardboard, paper or other trash
- Plastics of any kind, including milk bottles and plastic bags
- Oily substances, such as greasy rags, oil filters
- Rubber products, including tires and hoses
- Asphalt, including asphalt roofing shingles or tarpaper.

Ensure that wood stoves are properly installed and swept regularly. Reduce pollution further by increasing chimney height, allow plenty of oxygen (keeping the flue open), and burn only clean, dry, and untreated wood.

Each time you throw something as garbage, think of where it will finally end up. Whether it is a plastic glass, your broken cell phone or the used up battery cells from your portable CD/MP3 player, they all contribute in some way to environmental pollution and are also hazardous to life. Not only are they biodegradable, but also disposing of them has their own risks as they release harmful toxins into the air and surrounding soil and ground water.

Disposal of waste has been a problem ever since civilization began. Did you know that the first landfill was built by the Greeks 2,500 years ago?

Apart from solid natural waste, there are other types of man-made wastes that are more hazardous to the environment. Cell phone, for instance are made of lead, mercury and plastic and so many millions of them get thrown as garbage. This kind of electronic garbage creates environmental problems.

Plastic and animals

Oceanic pollution by plastics is another cause of mortality. Phthalates, a chemical compound derived from plastics, have been found in leatherback egg yolk. Leatherback turtles sometimes mistake plastic bags for their favourite food of jellyfish, ingest the plastic bag and then suffocate.

Marine turtles can mistake floating plastic materials for jellyfish and choke to death when they try to eat them. Discarded fishing gear entangles marine turtles and can drown or render a turtle unable to feed or swim. Rubbish on beaches can trap hatchlings and prevent them from reaching the ocean. Oil spills can poison marine turtles of all ages.

Pollution the silent killer

Maui's inhabit shallow coastal waters and are vulnerable to marine pollution. Chemicals from industrial waste, storm water and agricultural runoff like PCBs, DDT, dioxins and metals have been found in Maui's dolphins. These pollutants bio-accumulate, which means they increase in potency as they move up the food chain.

Maui's dolphins are near the top of their food chain and these pollutants can be passed on to young dolphins through their mother's milk. High levels of exposure can cause loss of fertility and compromise immune systems in marine mammals.

Another form of pollution which threatens Maui's dolphins is solid rubbish such as plastic shopping bags which can be mistaken for jellyfish or squid and eaten, killing the dolphin. In New Zealand alone, 22 million plastic bags are used every week.

Elephant population in Asia dwindling

In this tropical island nation where 19 million people share space with about 3,000 wild elephants, forests are dwindling and the huge beasts are entering villages to forage in garbage dumps for food.

The sad state of Sri Lankan elephants is not unique. The elephant population in Asia has fallen from hundreds of thousands at the turn of the 20th century to only 16,000 in 11 countries today, according to the United Nations.

Recently, a 5-ton elephant, balancing on three legs, used its left front foot to kick a plastic garbage bag across the ground. Seeing it fall open, several other elephants, surrounded by dozens of cows, started to chow down.

The variety was good: curried rice, rotting bread, cooked vegetables, fruit and even green chilies, a must in Sri Lankan cuisine. Discarded flower garlands helped round out the menu.

"It is tragic, but true," said Edmond Wilson, deputy director at the state wildlife department. "Their habitat is shrinking, forcing them to seek food elsewhere."

The food, though, is often laced with danger.

The Polonnaruwa garbage dump is beside a highway that links central Sri Lanka with the eastern town of Batticaloa.

Plastic bags — a common cause of choking — are often consumed with the food. Since hospital waste is also dumped there, the beasts risk being hurt by syringes and glass bottles. Bloody discarded bandages also risk infection.

"The Polonnaruwa dump has become a regular stop for tourists who photograph herds of eight to 10 elephants eating garbage. Every morning, the elephants gather, growing attentive when they hear the tractors loaded with garbage approach. The real feast, though, starts around 10 a.m. when trash from the hotels arrive.

"They know what 'dishes' are in what trays, I mean trash tractors," said Salim, the villager.

Packaging

We have always been told that it is what's inside that counts. But when it comes to conservation, packaging deserves more attention than most of us would think. While packaging performs the key functions of protecting a product and providing information for buyers, what we tend not to think about is what happens to it later. Why, it has to be disposed of, of course.

Most packaging is made out of paper, plastic, glass, aluminium, steel and fibreboard. Just food packaging itself is a massive global business. When it comes to disposal, most packaging is not recycled, but dumped in landfills or burnt. This results in pollution in a number of ways. And, of course, we are not even counting the pollution caused by the manufacture and transportation of packaging in the first place.

What you can do

There are a number of things you can do to minimise packaging waste. By doing so, you will be reducing demand on resources needed for its disposal and also the pollution caused as a result.

Reusing and recycling packaging products, like paper and plastic bags, string and wrapping paper, are, of course, obvious options. Take a look around you and try to figure out what other ways there are to manage packaging waste. Here are a few hints:

- Buy in bulk. Buying lots of smaller packs generates more waste. Bulk purchasing saves money, too.
- Always carry your own bags while shopping.
- Try to buy loose products where available. For instance, in case of vegetables and fruits.
- Opt for brands that have less packaging.
- Avoid buying bottled water unless tap water in your area is unsafe for drinking.

Ooty - Towards a Plastic-free environment

The tourist invasion on Ooty has had its toll on the fragile eco system even while many other peoples' livelihoods are inextricably linked with the tourist influx. The hoards of garbage that tourists leave behind are destroying the peaceful, generally beautiful hillsides with plastic and foil plates; throw away cups, carrier bags and empty mineral water bottles.

Of late, Ooty shopkeepers have begun to wrap groceries in old newspaper and hand out purchases in eco friendly recycled shopping bags. The 'Say No to Plastics' campaign banning plastic in the district implemented by Nilgiris District Collector Supriya Sahu, is catching up. The tough stance adopted by the DC ensured that the ban was effective.

Well-known shops on the high street had been fined a thousand rupees for disregarding the plastic ban. This acted as a warning signal to the rest. Anti-Plastic Inspectors were conducting spot checks. Both shopkeepers and customers who violated the ban were being fined. In no time, the piles of plastic diminished. Violations now are mainly by tourists. Therefore, Ooty is not yet totally plastic-free, but locals have begun to appreciate the ban for purely practical reasons.

As one tea planter pointed out, everyone had become aware of the menace that plastic posed. The elephant dung on his estate too contained plastic bags. One can imagine the extent of damage plastic was causing. But now they had begun noticing a visible difference in the garbage they bought for compost. There was

hardly any plastic in it now.

Ms Sahu had achieved the impossible by shrewd, strategic planning and formidable energy. She combined her power as the District Collector quickly enacting local legislation to enforce the plastic ban, with a campaign to win over the entire district to her side. When the campaign first started, a year ago, there was tolerant amusement from most people, then hostility and anger when fines were imposed. Now everyone has been won over.

One of the sights that started the Collector off was that of a picture of the astounding amount of plastic waste extracted from a cow. Several local newspapers carried this, along with pictures of the post mortem of a leopard and elephant with plastic in their intestines. Now community participation is taking the campaign to new heights.

School children, teachers, college students, the Home Guards, Eco clubs, Rotary, Lions, NSS, NCC and social service organisations were convinced of the dangers of plastic. But convincing the business lobby needed threats and logic. When the not-amused traders fought the ban saying they could not continue their trade without plastic carrier bags, she organised an exhibition of alternative possibilities. Leaf cups and plates were displayed along with their manufacturers. Unemployed widows were inducted into recycling newspapers into shopping bags.

The logic and the solutions were unbeatable. There were no more arguments. All over the district, the ubiquitous traditional Tamil coloured cloth bag has made its reappearance. Meat and fish are wrapped in leaves as they used to be ten years ago. And school children frequently go on plastic picking treks, cleaning up their beloved Nilgiris.

This tourist season, at every Nilgiris entry point, eco-wardens will man the check-posts to weed out banned plastic carrier bags, plates, cups and bottles. As a courteous gesture, the offending tourists will be handed eco friendly cloth bags sponsored by the State Bank of India with pleasant green letters begging them to "Say No to Plastic."

Film shooting crews, the worst offenders, have been warned against littering. At the first instance of littering, fines will be issued. Three fines will mean shooting will be suspended.

The ban on plastics is a crucial step to unblock the river sources and springs. The Nilgiris' sholas, grasslands and swamps are precious. An intensive awareness campaign throughout the district has succeeded in changing attitudes. The Say No to Plastic Campaign has now become a People's Campaign.