



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Pollution

Dr. Abeer Khalid Yaseen

Environmental Pollution



- **Pollution is the introduction of contaminants into a natural 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***

- **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.
- **Environment** is the land, water and air in which people, animals and plants live. Simply what is around us. The air we breathe, the soil on which we stand and walk and the water we drink are all parts of the environment.

- **Dump** is a place where unwanted waste is taken and left.
- **To endanger** means to put someone or something in a dangerous or harmful situation.

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- **Different kinds of pollution are found. In this section we will discuss:**
 - **Air Pollution.**
 - **Water Pollution.**
 - **Land Pollution.**



Air Pollution

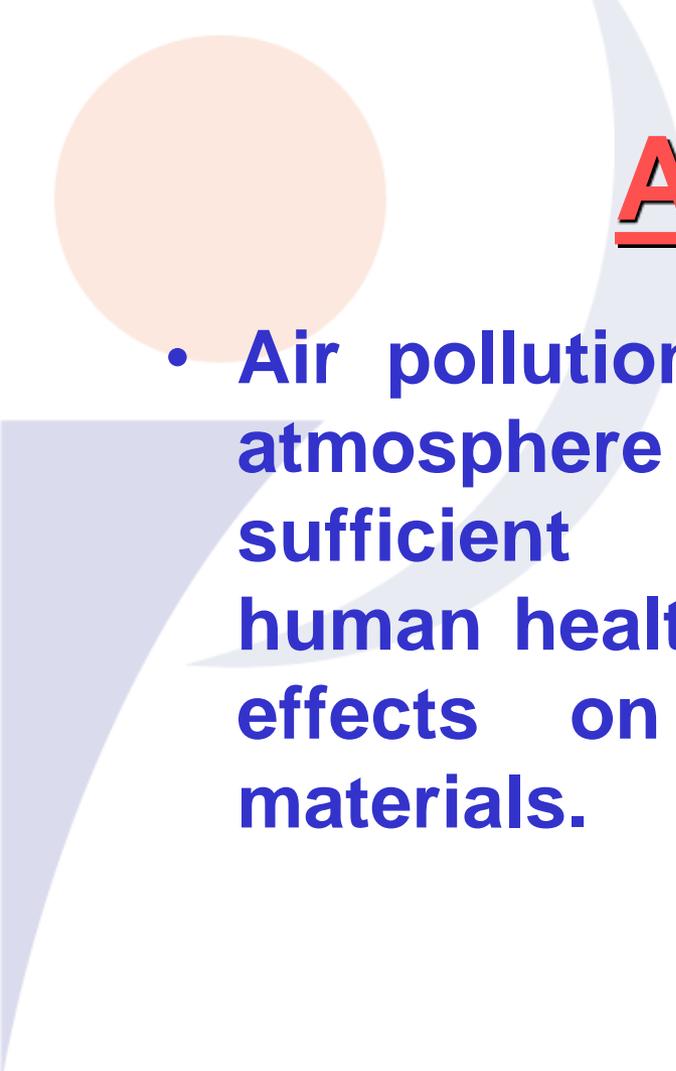
Air Pollution



What is air pollution?

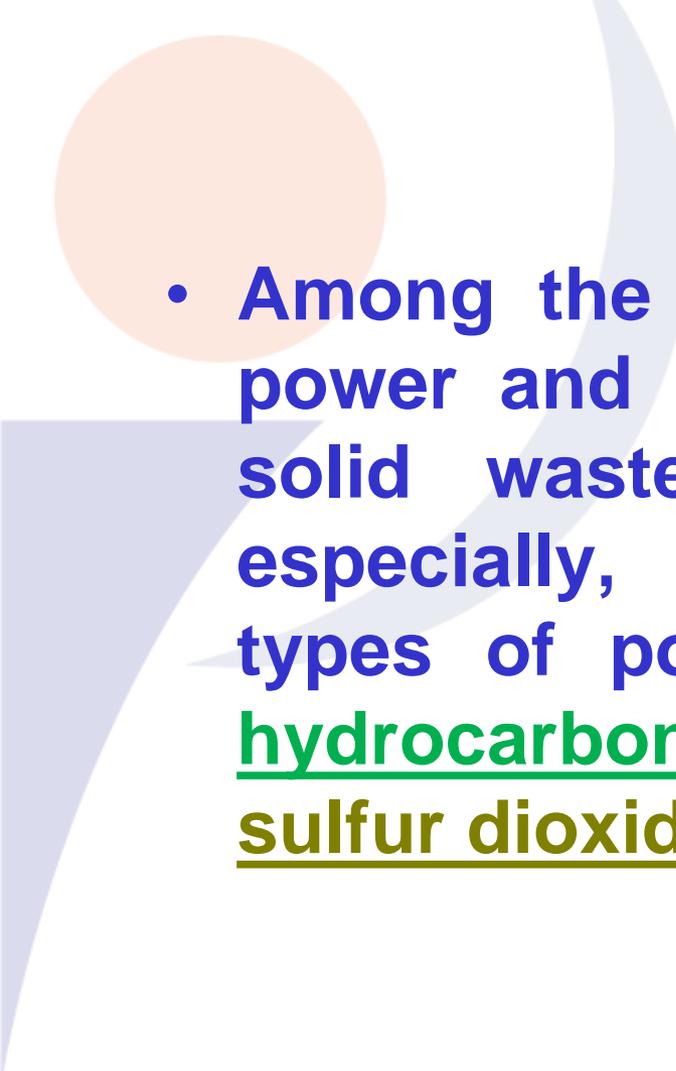
- contamination of the air by noxious gases and minute particles of solid and liquid matter (particulates) in concentrations that endanger health
- Air pollution only occurs outdoors





Air Pollution

- **Air pollution is the accumulation in the atmosphere of substances that, in sufficient concentrations, endanger human health or produce other measured effects on living matter and other materials.**

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- Among the major sources of pollution are power and heat generation, the burning of solid wastes, industrial processes, and, especially, transportation. The six major types of pollutants are carbon monoxide, hydrocarbons, nitrogen oxides, particulates, sulfur dioxide, and photochemical oxidants.

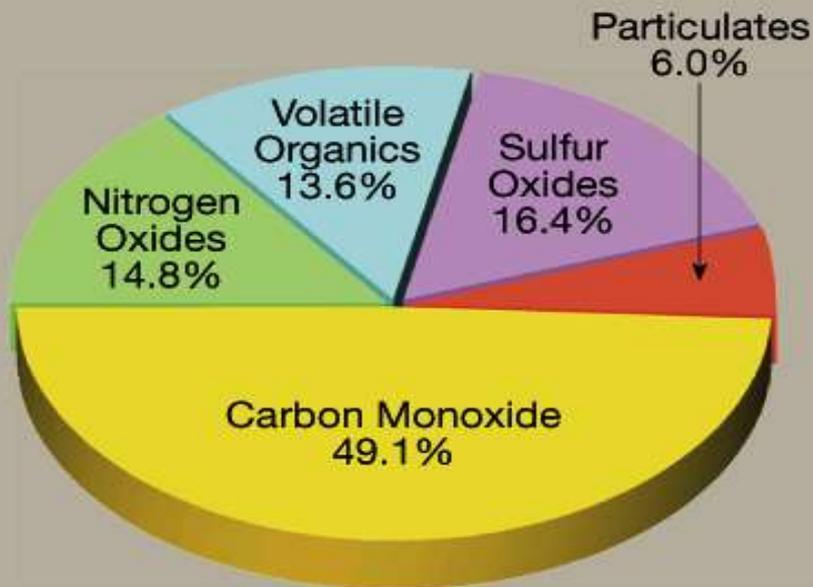


Primary Pollutants

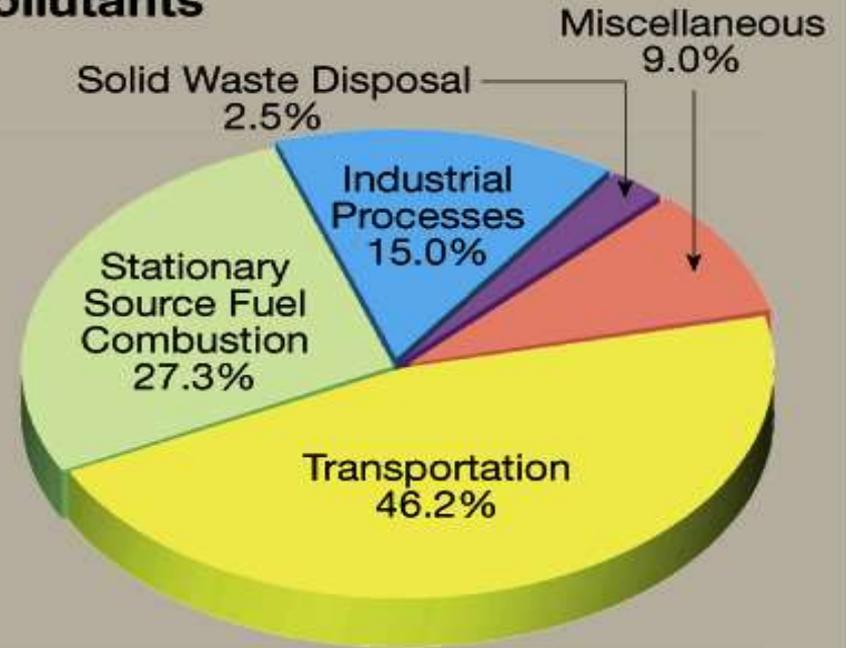
The major primary pollutants include:

- particulate matter (PM),**
- sulfur dioxide,**
- nitrogen oxides,**
- volatile organic compounds (VOCs),**
- carbon monoxide, and**
- lead.**

Primary Pollutants

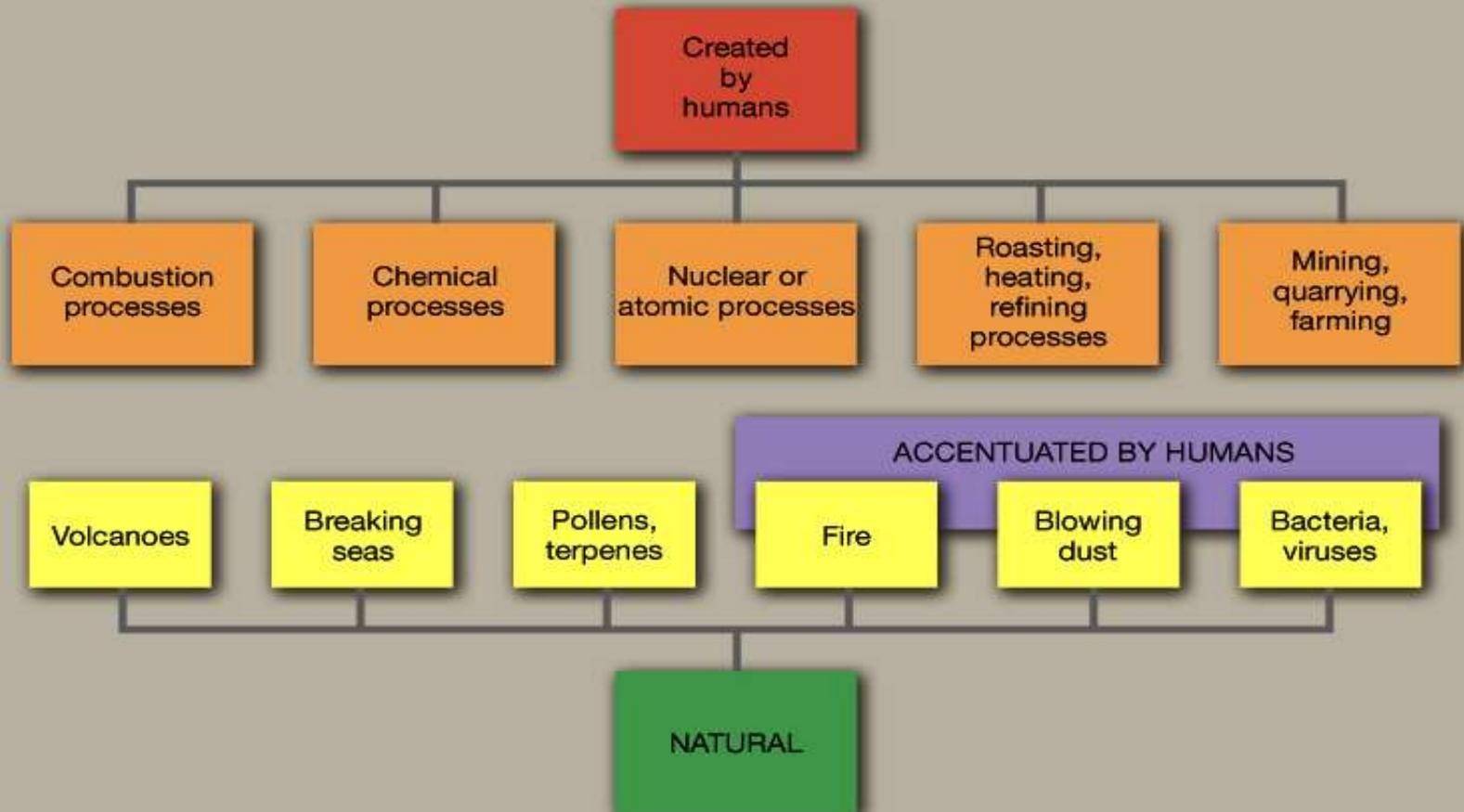


What They Are



Where They Come From

SOURCES OF PRIMARY POLLUTANTS



ORGANIC AIR POLLUTANTS

Acrylonitrile, Benzene, Butadiene, Carbon disulfide, Carbon monoxide, 1,2-Dichloroethane, Dichloromethane, Formaldehyde, Polycyclic aromatic hydrocarbons (PAHs)

Polychlorinated biphenyls (PCBs),

Polychlorinated dibenzodioxins Styrene,

Tetrachloroethylene, Toluene, Trichlorethylene, vinylchloride

INORGANIC AIR POLLUTANTS

Arsenic, Asbestos, Cadmium, Chromium, Fluoride, Hydrogen sulfide, Lead, Manganese, Mercury, Nickel, Platinum, Vanadium

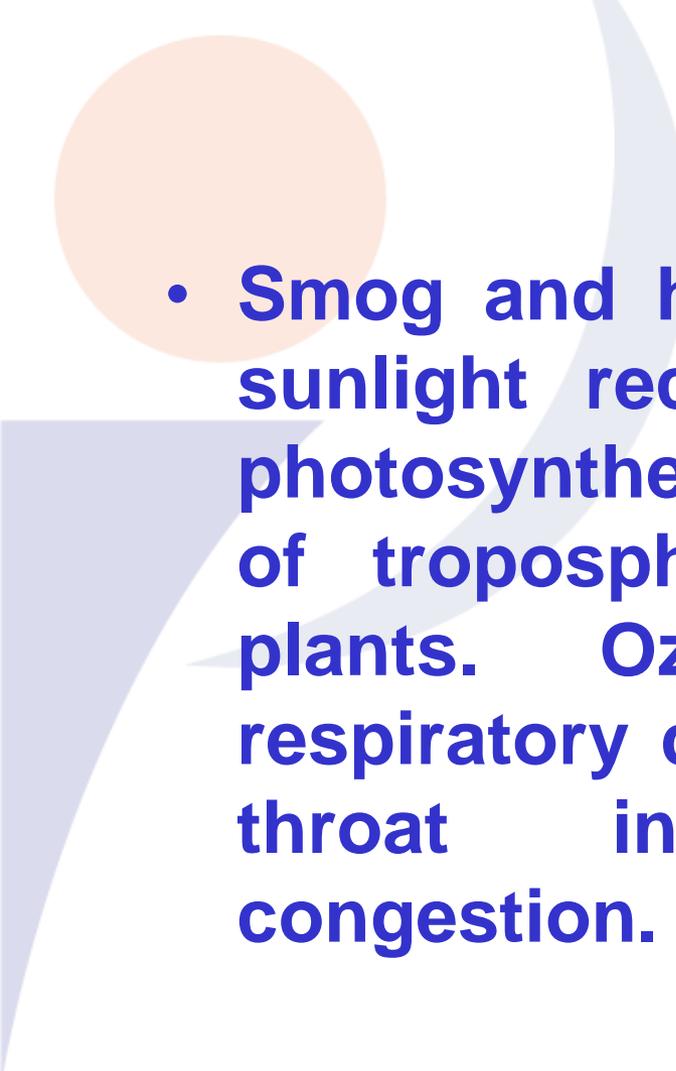
CLASSICAL AIR POLLUTANTS

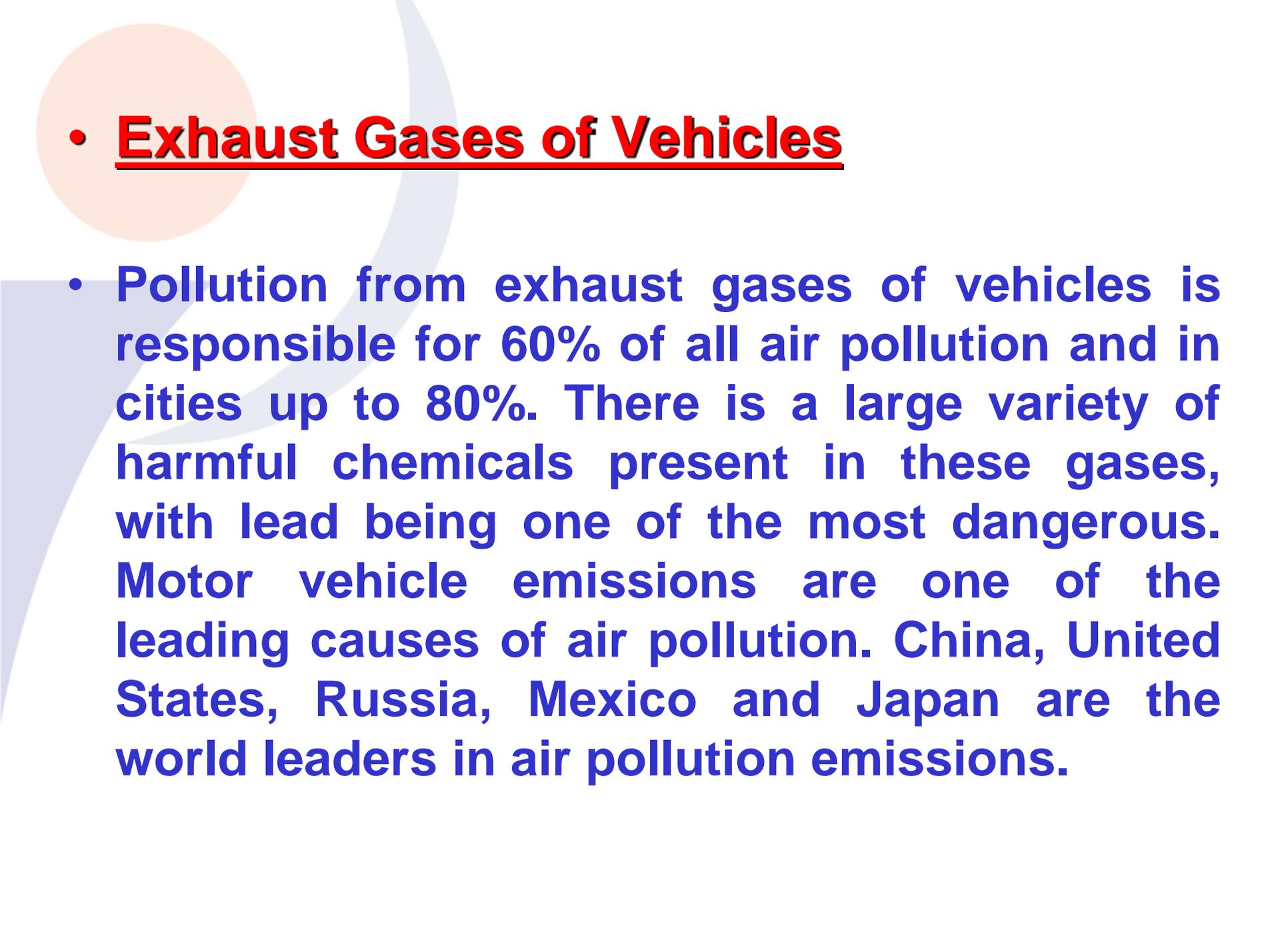
Nitrogen dioxide, Ozone and other photochemical oxidants, Particulate matter, Sulfur dioxide

What's in smog

- **particulates
(especially lead)**
- **nitrous oxides**
- **potassium**
- **Carbon monoxide**
- **Other toxic chemicals**

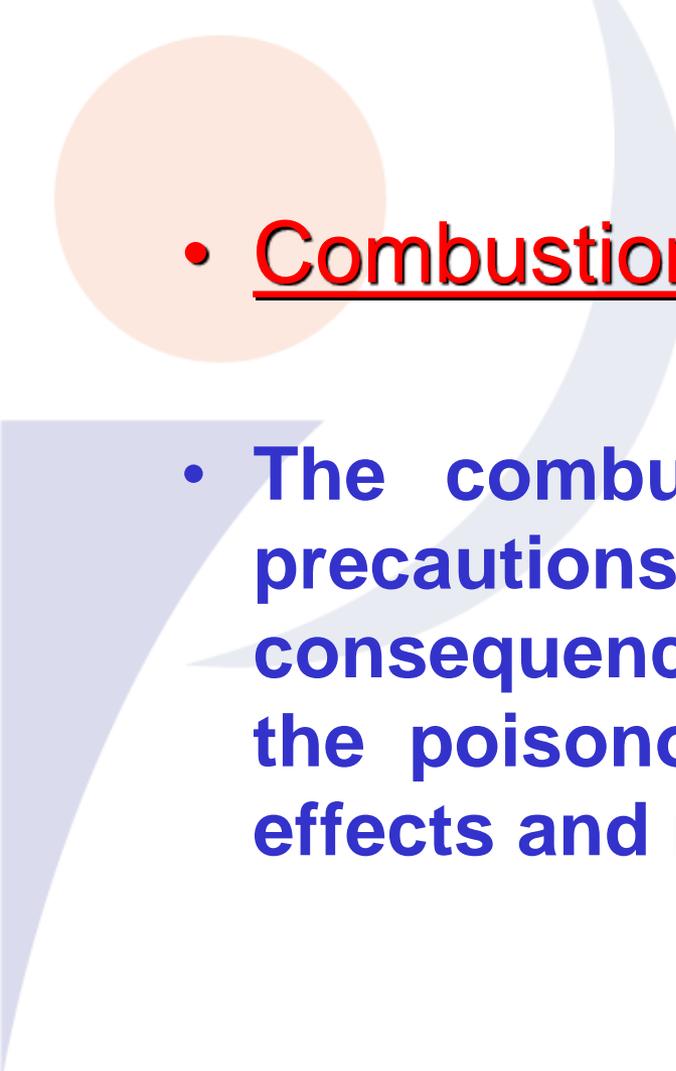


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- **Smog and haze can reduce the amount of sunlight received by plants to carry out photosynthesis and leads to the production of tropospheric ozone which damages plants. Ozone pollution can cause respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion.**



- **Exhaust Gases of Vehicles**

- **Pollution from exhaust gases of vehicles is responsible for 60% of all air pollution and in cities up to 80%. There is a large variety of harmful chemicals present in these gases, with lead being one of the most dangerous. 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.**



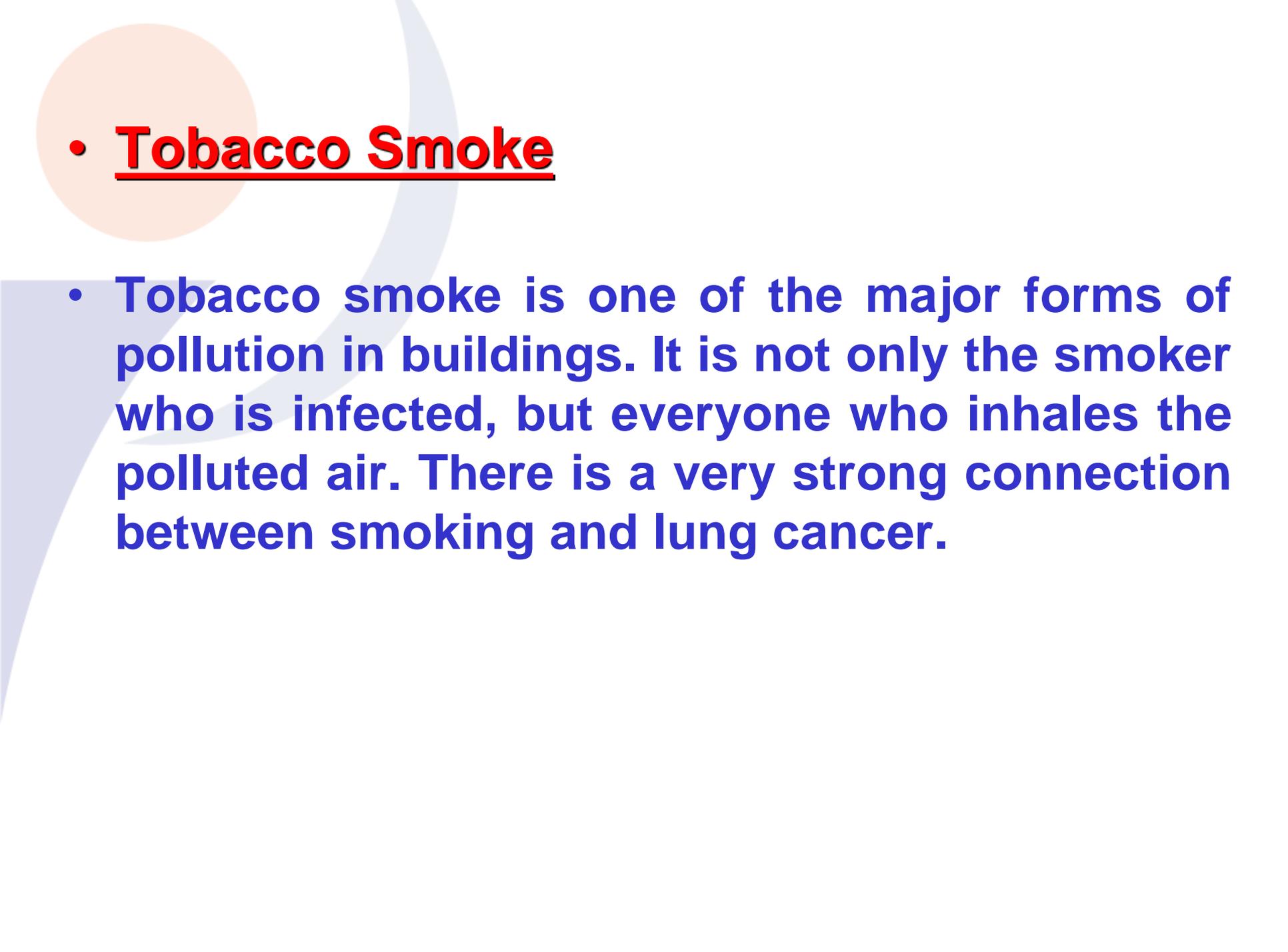
- **Combustion of Coal**

- **The combustion of coal without special precautions can have serious consequences. If winds do not blow away the poisonous gases, they can have fatal effects and may lead to death.**

Others Examples of Air Pollution

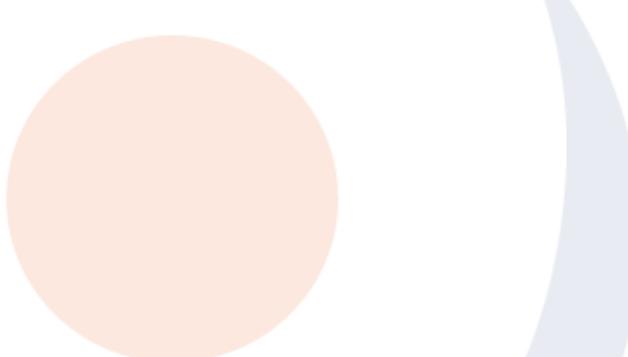
- **Noise Pollution**

- Noise pollution or unwanted sounds that are carried by the air, have an irritating and detrimental effect on humans and other animals. Careful planning of streets and buildings in towns and better control over noisy vehicles may add to the control of noise pollution. *Noise pollution induces hearing loss, high blood pressure, stress, and sleep disturbance.*



- **Tobacco Smoke**

- Tobacco smoke is one of the major forms of pollution in buildings. It is not only the smoker who is infected, but everyone who inhales the polluted air. There is a very strong connection between smoking and lung cancer.



Acid rain

- **Acid rain is the term for pollution caused when sulfur and nitrogen dioxides combine with atmospheric moisture to produce highly acidic rain, snow, hail, or fog. The acid eats into the stone, brick and metal articles and pollutes water sources. Carbon dioxide emissions cause ocean acidification, the ongoing decrease in the pH of the Earth's oceans as CO₂ becomes dissolved**

Acid rain

- contains high levels of sulfuric or nitric acids
- contaminate drinking water and vegetation
- damage aquatic life
- erode buildings
- Alters the chemical equilibrium of some soils



Figure 1: trees badly damaged by acid rain

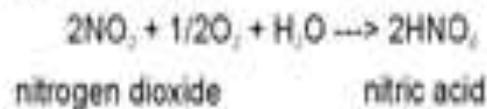
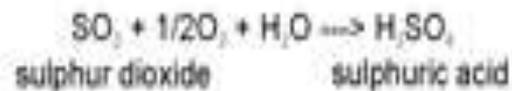


How acid rain affects stonework.
The picture on the left was taken in 1908.
The picture on the right was taken in 1968

Sun's Energy

photochemical reactions are driven by the sun

Oxidation



Acid Rain

Acid-forming gases and particles have been linked to a variety of impacts, including forest decline, accelerated leaching of metals from rocks and soils, the decay of limestone, marble, and other building materials, and damage to the human respiratory system.



Effects on the environment

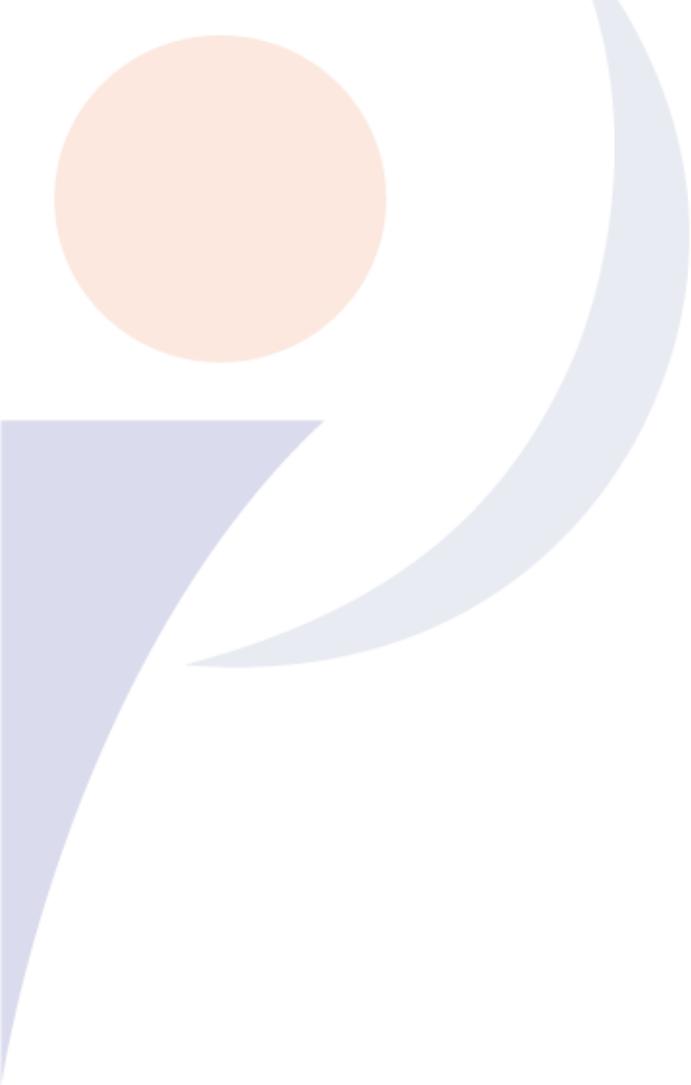
- Acid rain
- Ozone depletion
- Global warming
- In human population-
respiratory problems,
allergies, strengthens
lungs, and a risk for
cancer



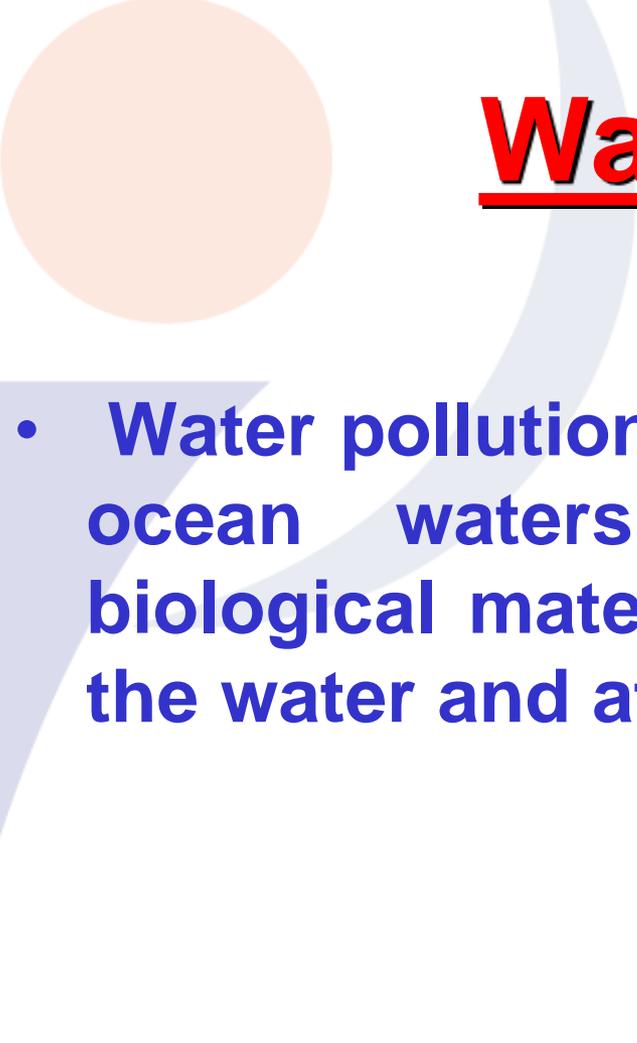
Other Health Effects

- **Coughing**
- **Nose and throat irritation**
- **Chest pain**
- **Reduced lung function**
- **Increased susceptibility to respiratory illnesses**
- **Aggravation of asthma**



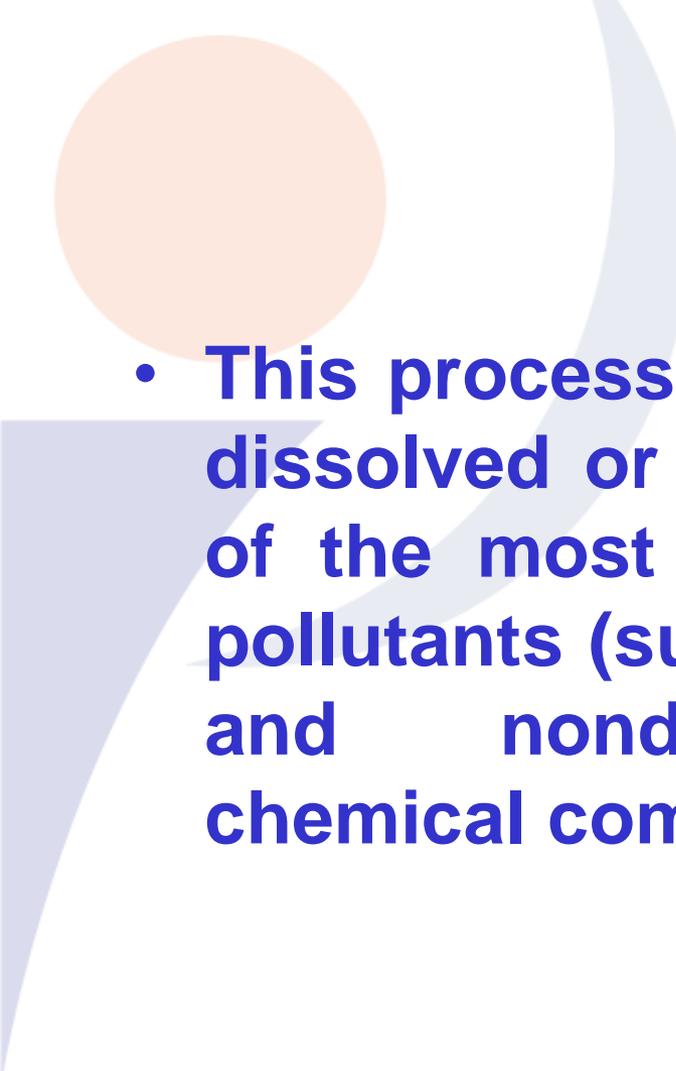


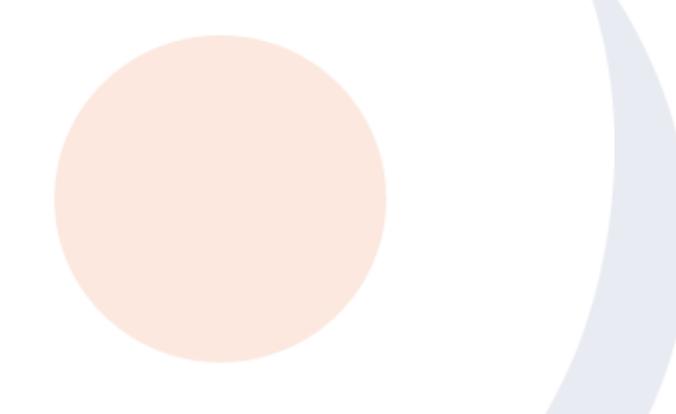
Water Pollution



Water Pollution

- **Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it.**

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- **This process ranges from simple addition of dissolved or suspended solids to discharge of the most insidious and persistent toxic pollutants (such as pesticides, heavy metals, and nondegradable, bioaccumulative, chemical compounds).**

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- **Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage.**

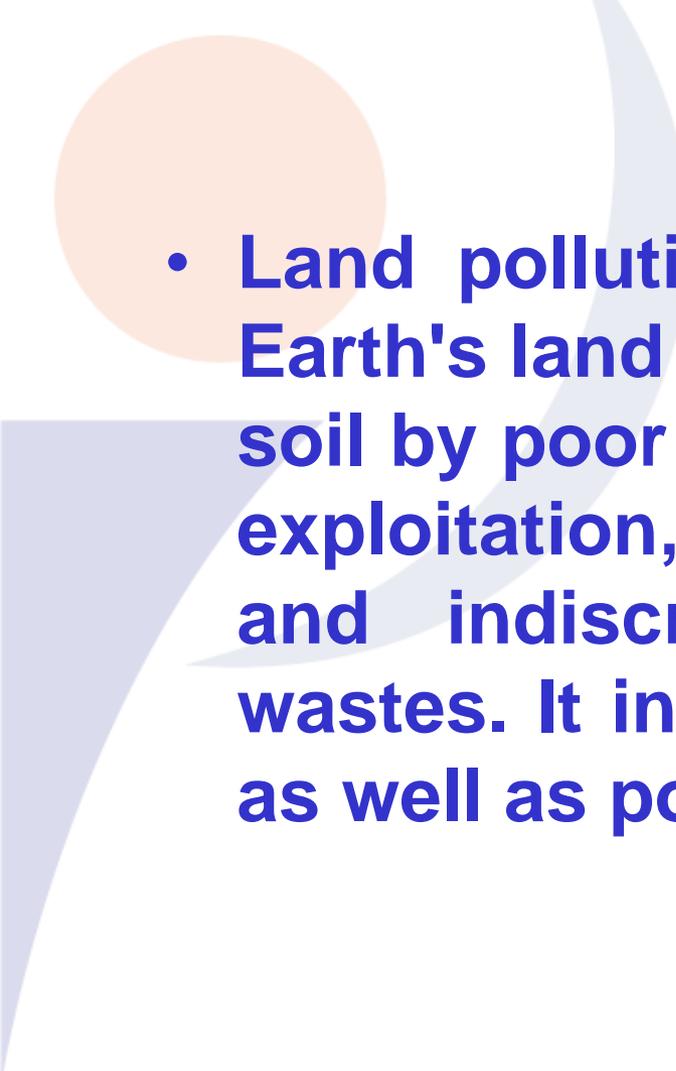


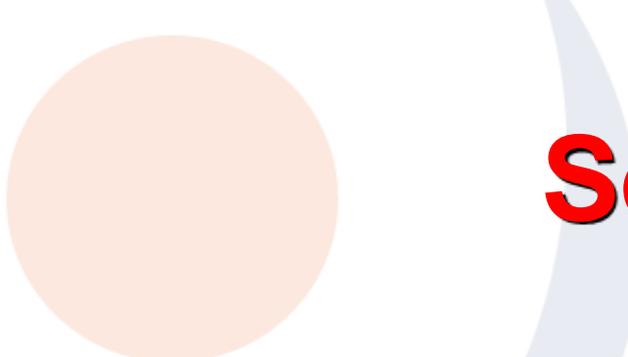
Kinds of Water Pollution

- **Inorganic Pollutants**
- **Organic Pollutants**
- **Biologic Pollutants**



Land Pollution

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- **Land pollution is the degradation of the Earth's land surface through misuse of the soil by poor agricultural practices, mineral exploitation, industrial waste dumping, and indiscriminate disposal of urban wastes. It includes visible waste and litter as well as pollution of the soil itself.**



Soil Pollution

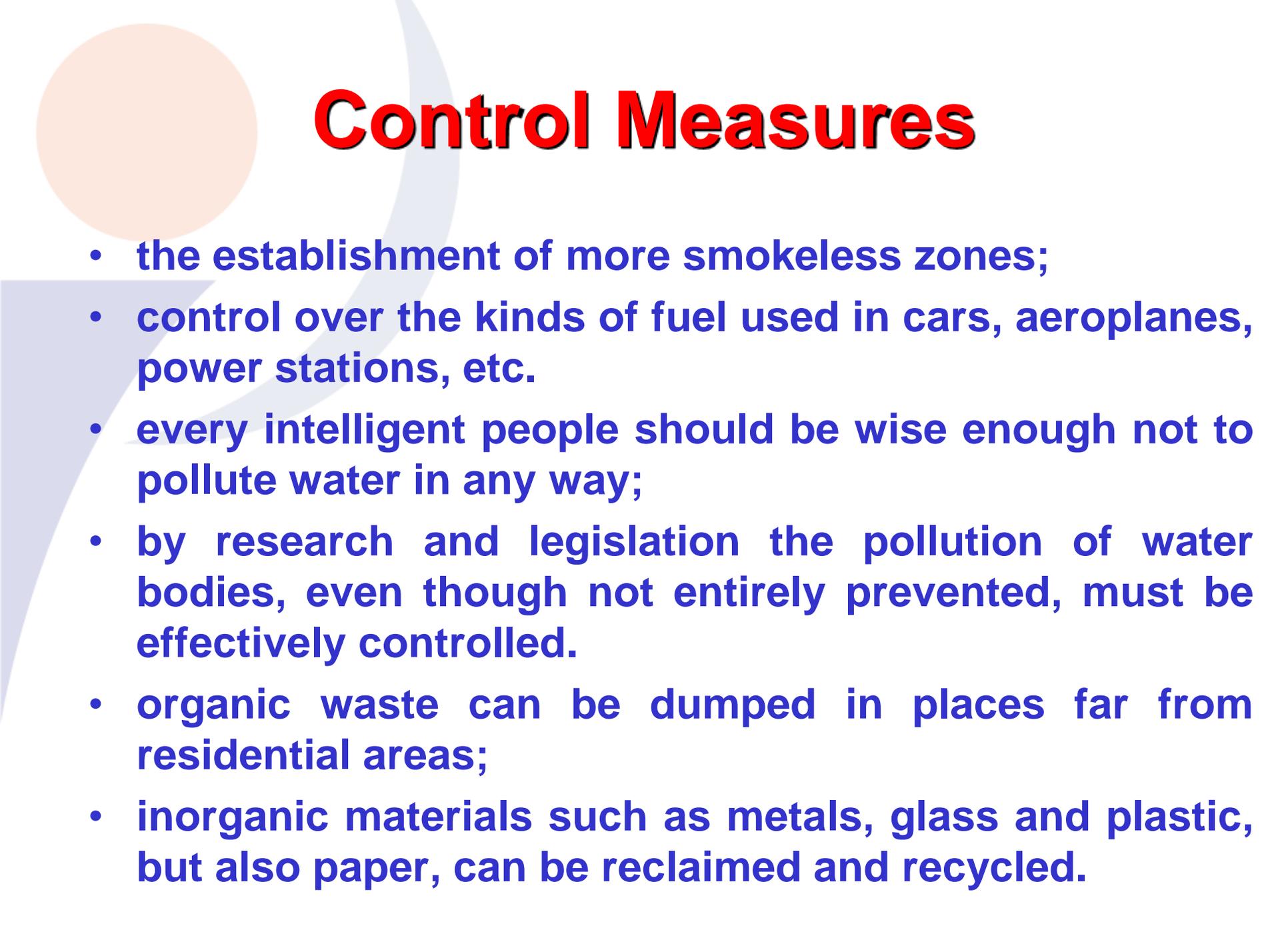
- **Soil pollution is mainly due to chemicals in herbicides (weed killers) and pesticides (poisons which kill insects and other invertebrate pests). Litter is waste material dumped in public places such as streets, parks, picnic areas, at bus stops and near shops.**



Waste Disposal

- **The accumulation of waste threatens the health of people in residential areas. Waste decays, encourages household pests and turns urban areas into unsightly, dirty and unhealthy places to live in.**

- **The most dangerous pollution in the 20th century is “Radioactive Contamination”, resulting from 20th century activities in atomic physics, such as nuclear power generation and nuclear weapons research, manufacture and deployment. also there is the thermal pollution which has relation with temperature changes in natural water bodies caused by human influence, such as use of water as coolant in a power plant.**



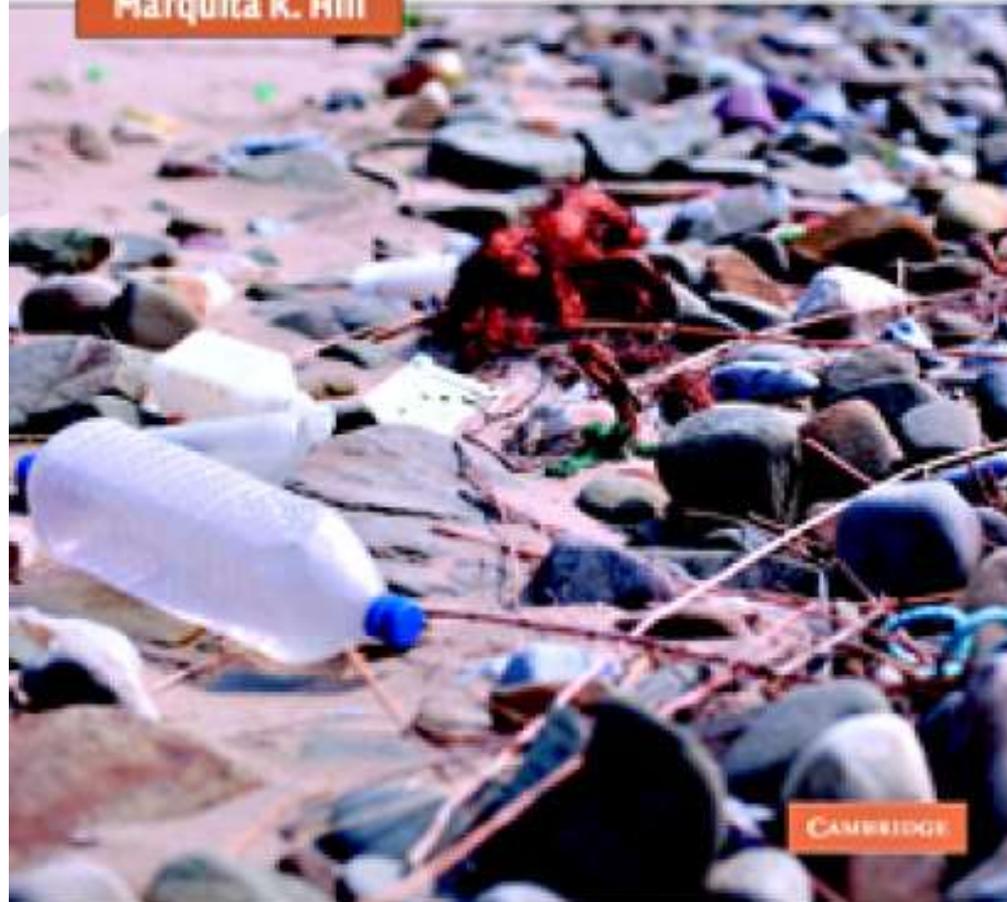
Control Measures

- the establishment of more smokeless zones;
- control over the kinds of fuel used in cars, aeroplanes, power stations, etc.
- every intelligent people should be wise enough not to pollute water in any way;
- by research and legislation the pollution of water bodies, even though not entirely prevented, must be effectively controlled.
- organic waste can be dumped in places far from residential areas;
- inorganic materials such as metals, glass and plastic, but also paper, can be reclaimed and recycled.

Second Edition

Understanding Environmental Pollution

Marquita K. Hill



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Thank you