

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

حبيبي

يا رسول الله

صلى الله عليه وسلم

www.ayyub.org

# Environmental Pollution

*Prof. Gharib Fawi*  
*Professor of Neurology*  
*Head of Neuropsychiatry*  
*Department*



- ***"The earth has become a very sick planet and urgently needs a cure.***
- ***A disaster is looming around.***
- ***Unless otherwise checked, the whole planet would become uninhabitable."***

- Environmental pollution is one of the most serious worldwide problems that affects various aspects of human health.

- Environmental pollution is not restricted to the classical types of pollution, air and water, but includes various aspects of pollution such as traffic pollution, political pollution, & cultural pollution which affects psychological, mental, and social health besides physical health effects.



# Water pollution



**A large set of adverse effects upon water bodies such as lakes, rivers, oceans, & groundwater caused by human activities.**



# Sources of water pollution

1. **Industrial** discharge of chemical wastes and **byproducts**
2. discharge of poorly-treated or **untreated sewage**
3. surface runoff containing **pesticides**
4. **slash and burn farming** practice ( within shifting cultivation agricultural systems)
5. surface runoff containing **spilled petroleum products**



# Sources of water pollution

6. **surface runoff from construction sites**, farms, or paved and other impervious surfaces e.g. silt
7. **discharge of contaminated and/or heated water** used for industrial processes
8. **acid rain** caused by **industrial discharge** of sulfur dioxide .
9. **excess nutrients** added by runoff containing detergents or fertilizers
10. **underground storage tank leakage**, leading to **soil contamination**, thence **aquifer contamination**







# Waterborne diseases

- According to the WHO, **waterborne diseases** are those which generally arise from the **contamination** of water by feces or urine, infected by **pathogenic viruses** or **bacteria**, and which are directly transmitted when **unsafe water** is drunk or used in the preparation of food.

# Common waterborne diseases



Disease and Transmission	Microbial Agent	Sources of Agent in Water Supply
<u>Amebiasis</u> (hand-to-mouth)	Protozoan ( <i>Entamoeba histolytic</i> ) (Cyst-like appearance)	Sewage, non-treated drinking water, flies in water supply
<u>Cryptosporidiosis</u> (oral)	Protozoan ( <i>Cryptosporidium parvum</i> )	Collects on water filters and membranes that cannot be disinfected, animal manure, seasonal runoff of water.
<u>Cyclosporiasis</u>	Protozoan parasite ( <i>Cyclospora cayetanensis</i> )	Sewage, non-treated drinking water
<u>Giardiasis</u> (oral-fecal) (hand-to-mouth)	Protozoan ( <i>Giardia lamblia</i> ) Most common intestinal parasite	Untreated water, poor disinfection, pipe breaks, leaks, groundwater contamination,
<u>ascariasis</u>	ascaris lumbricoides	contaminated drinking water with eggs
<u>enterobiasis</u>	Entrobious vermicularis	contaminated drinking water with eggs

<u>Schistosomiasis</u> (immersion)	Schistosoma	Contaminated fresh water with certain types of snails that carry schistosomes
<u>dracunculiasis</u>	dracanculus medinensis	drinking water containing infective cyclops
<u>taeniasis solium</u>	taenia solium	contaminated drinking water with eggs
<u>fascioliasis</u>	fasciola	contaminated drinking water with encysted metacercaria
<u>hymenolepiasis</u> <u>nana</u>	hymenolepis nana	contaminated drinking water with eggs
<u>hyatidosis</u>	echinococcus granulosus	contaminated drinking water with eggs



- **BACTERIA**

- **Cholera** - Vibrio cholerae bacteria - gastro-intestinal often waterborne
- **Botulism** - Clostridium botulinum bacteria - gastro-intestinal food/water borne; can grow in food
- **Typhoid** - Salmonella typhi bacteria - gastro-intestinal water/food borne
- **Dysentery** - Shigella/Salmonella bacteria - gastro-intestinal food/water
- Legionellosis
- Leptospirosis



- **VIRUSES**

- **Hepatitis A** - Hepatitis A virus - gastro-intestinal water/food borne
- **Polio** - polioviruses - gastro-intestinal exposure to untreated sewage; may also be waterborne
- **Rotaviruses**
- Norwalk-like agents
- Caliciviruses
- Astroviruses
- Small Round Structured Virus (SRSV)
- **Enteric Adenoviruses**

# Thermal pollution

- **Thermal pollution** is a **temperature** change in natural water bodies caused by human influence.
- **The main cause** of **thermal pollution** is the use of water as a **coolant**, especially in **power plants**. Water used as a coolant is returned to the natural environment at a higher temperature.
- **Effects**; Increases in water temperature can **alter aquatic** organisms by
  - (a) decreasing **oxygen** supply,
  - (b) killing fish juveniles which are vulnerable to small increases in temperature, and
  - (c) affecting **ecosystem** composition.





- Fish kill in receiving waters

# Soil Pollution

- As the human population increases rapidly. Many highly urbanised cities are faced with acute space problems, as in Calcutta ,Bombay & Cairo.
- Besides the limited availability of land, 175 million hectares of land are becoming less productive every year.

**This scenario of desertification** is associated with pollution which includes

- Indiscriminate discharge of industrial effluents on land and into water bodies
- An increase in the use of fertilisers for agriculture
- Open defecation by animals and human beings
- Accumulation of solid waste; this is a major problem in developed countries like India where the garbage and refuse products are not degraded
- Radioactive substances from nuclear plants which are released into the soil

# Major soil pollutants and their effect on human health

Metal	Source	Effects
Arsenic	occurs naturally	chronic poisoning leads to <b>anorexia and weight loss, diarrhoea, alternating with constipation, peripheral neuritis, conjunctivitis</b> and sometimes <b>skin cancer</b>
Cadmium	mining, metallurgy chemical industry and electroplating	leads to chronic poisoning and affects the proximal <b>tubules of the kidney</b> , causing formation of <b>kidney stones, bone changes</b>
Lead	lead smelters storage battery	lead poisoning can lead to <b>severe mental retardation , neuritis or death</b>
Mercury	industrial wastes	methyl mercury compounds are much more toxic than other forms of mercury, causes <b>neurological problems and damages renal glomeruli and tubules</b>
Cyanides	wastes from heat treatment of metals, etc.	<b>rapid death</b> may follow due to exposure to cyanide as a result of inhibition of cellular respiration

# Air pollution



- **Air pollution** is a **chemical, physical or biological** agent that modifies the natural characteristics of the **atmosphere.**

# Sources of Air Pollution



# Sources of Air Pollution

- Combustion-fired power plants
- Controlled burn practices used in agriculture and forestry management
- Motor vehicles generating air pollution emissions.
- Marine vessels, such as container ships or cruise ships, and related port air emissions
- Burning fossil fuels
- Burning wood, fireplaces, stoves, furnaces and incinerators









# Other sources

- **Oil refining, power plant** operation and industrial activity in general.
- **Chemicals**, dust and crop waste **burning in farming**,
- **Fumes** from **paint, varnish, aerosol sprays** and other solvents.
- **Waste deposition** in **landfills**, which generate **methane**.
- **Military uses**, such as **nuclear weapons, toxic gases, germ warfare** and **rocketry**.
- **Natural Sources**
- **Dust** from natural sources, usually large areas of land with little or no vegetation.
- **Methane**, **emitted** by the **digestion** of food by **animals**, for example **cattle**.
- **Pine trees**, which emit **volatile organic compounds** .
- **Radon gas** from radioactive decay within the Earth's crust.
- **Smoke** and **carbon monoxide from wildfires**.
- **Volcanic activity**, which produce **sulfur, chlorine**, and ash **particulates**.

# MORBIDITY & MORTALITY

- The **W H O** estimates that 4.6 million annual deaths from causes directly related to air pollution.
- Many of these mortalities are attributable to **indoor air pollution**
- Worldwide more deaths per year are linked to air pollution than to **automobile** accidents
- 310,000 Europeans die from air pollution annually , **2005 report**.
- Direct causes of air pollution related deaths include: aggravated **asthma**, **bronchitis**, **emphysema**, lung and heart diseases, and respiratory allergies.

# Indoor air pollution



- The lack of ventilation indoors concentrates air pollution where people have greatest exposure times

# SOURCES OF INDOOR AIR POLLUTION

- Building materials including **carpeting** and **plywood** emit **formaldehyde** , Paint and solvents give off **volatile organic compounds** as they dry
- Lead paint can degenerate into **dust** and be inhaled.
- Intentional air pollution is introduced with the use of **air fresheners**, **incense**, and other scented items.
- Controlled **wood** fires in **stoves** and **fireplaces** can add significant amounts of smoke particulates into the air, inside and out.
- Indoor pollution fatalities may be caused by using **pesticides** and other chemical sprays indoors without proper ventilation
- The extensive use of **asbestos** in industrial and domestic environments
- Biological sources of air pollution are also found indoors, as gases and airborne particulates

# MORBIDITIES & MORTALITIS

- Carbon monoxide poisoning is a quick and silent killer
- Cmoke inhalation is a common cause of death in victims of house fires.
- long-term, heavy exposure to asbestos, e.g. in mining Sufferers have severe dyspnea, and are at an increased risk regarding several different types of lung cancer.
- Pets produce dander
- Air conditioning systems can incubate Legionnaires' disease and mold
- Toilets can emit feces-tainted mists
- Houseplants, soil and surrounding gardens can produce pollen, dust, and mold

# Smog

- **Smog** is a kind of air pollution; the word "smog" is a smoke and fog. Classic smog results from large amounts of coal burning in an area and is caused by a mixture of smoke and sulphur dioxide.



# Areas affected

- Smog can form in almost any climate where industries or cities release large amounts of air pollution
- Worse during warm summer months
- Especially prevalent in geologic areas encircled by hills or mountains
- often stays for an extended period of time over densely populated cities or urban areas, such as London, Los Angeles, Mexico City, Houston, Toronto, Athens, Beijing, Hong Kong, .
- Can build up to dangerous levels.
- New unusual phenomna in **cairo** in last few years



- **London**; known for smog since Roman times
- The **Great Smog of 1952** darkened the streets of London and killed approximately 4,000 people in the short term (a further 8,000 died from its effects in the following weeks and months).
- **December 1957** smog killed many elderly persons in the capital and suburbs.
- **Mexico City**; Within one generation, the city has changed from being known for some of the cleanest air of the world into one with some of the worst pollution,
- **Tehran** In December 2005, schools and public offices had to close in **Tehran**, 1600 people were taken to hospital, in a severe smog weather



# Photochemical Smog

- photochemical smog is considered to be a problem of modern industrialization.
- Photochemical smog is the chemical reaction of sunlight, nitrogen oxides and volatile organic compounds in the atmosphere, which leaves airborne particles (called particulate matter) and ground-level ozone.



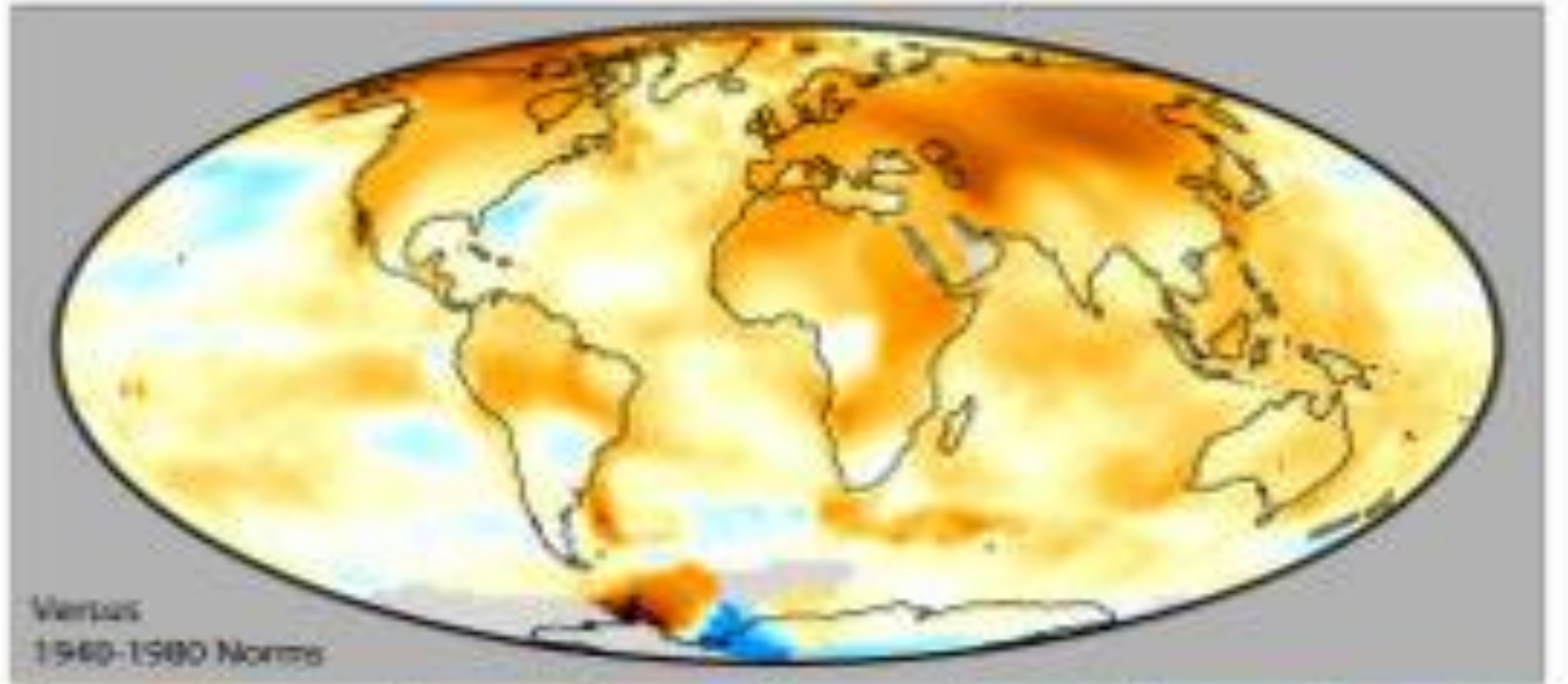
- A comparison of [Beijing](#) air on a day after rain and a sunny but smoggy day

# Health effects

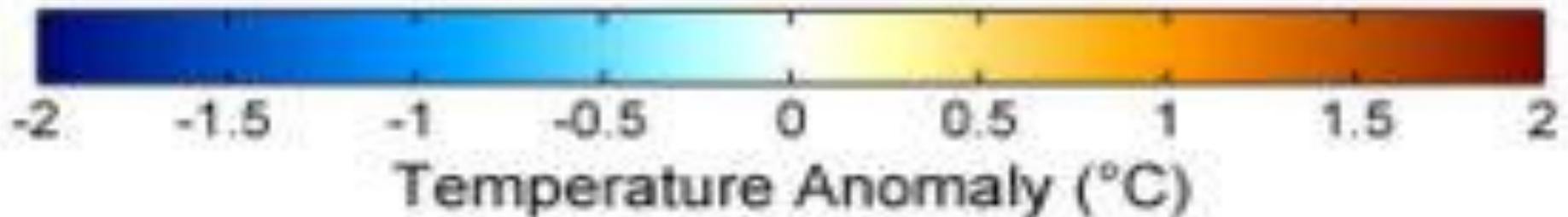
- Ground-level ozone is especially harmful for senior citizens, children, and people with heart and lung conditions such as emphysema, bronchitis, and asthma
- cause **eye and nose irritation** and it dries out the protective membranes of the nose and throat
- interferes with the body's ability to fight infection, **increasing susceptibility to illness**

# Global warming

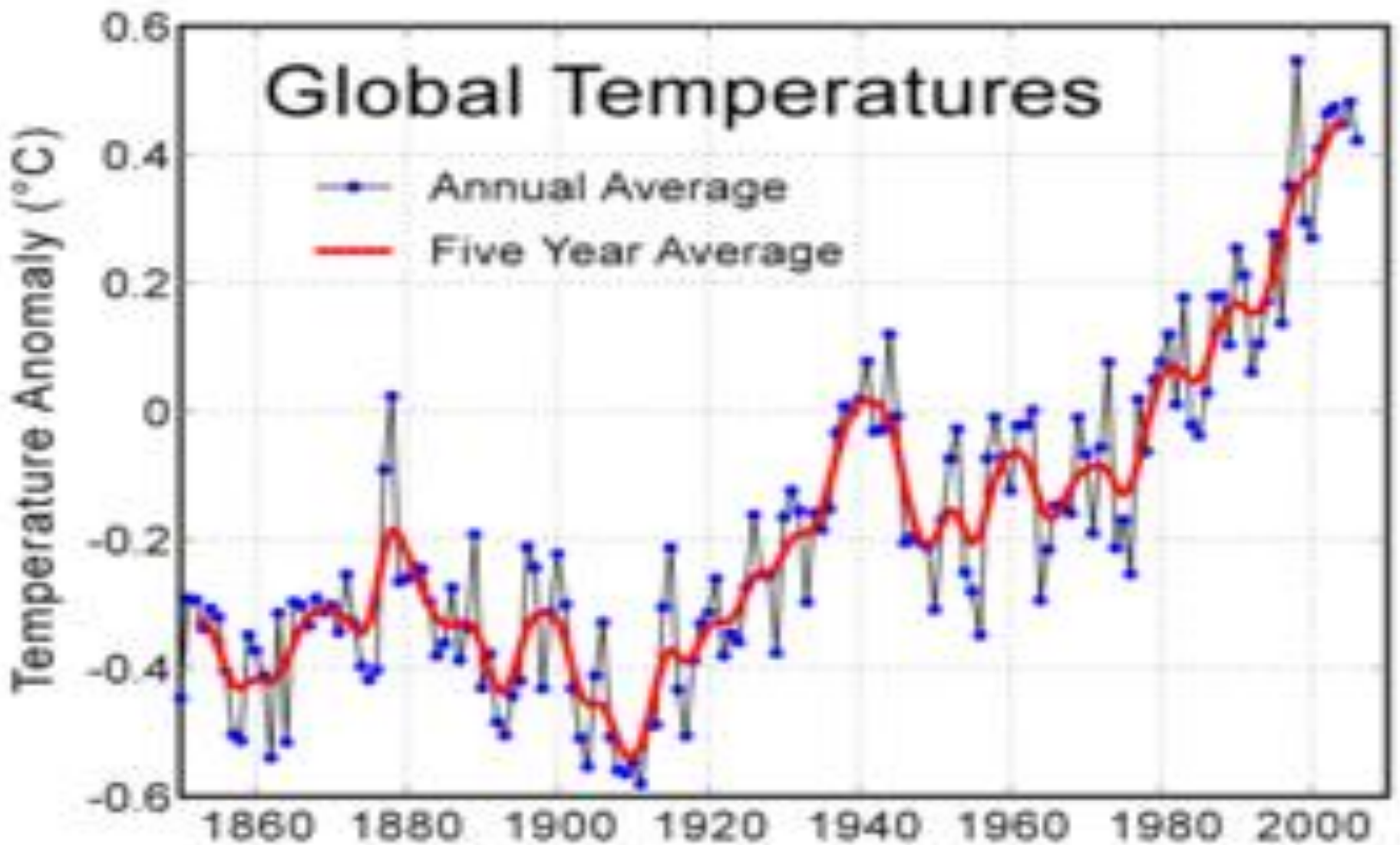
1995-2004 Mean Temperatures



Veritas  
1960-1980 Norms



- **Global warming** is the observed increase in the average temperature of the Earth's atmosphere and oceans in recent decades and its projected continuation.
- Intergovernmental Panel on Climate Change (IPCC) predict that global temperatures are likely to increase by 1.1 to 6.4 °C (2.0 to 11.5 °F) between 1990 and 2100



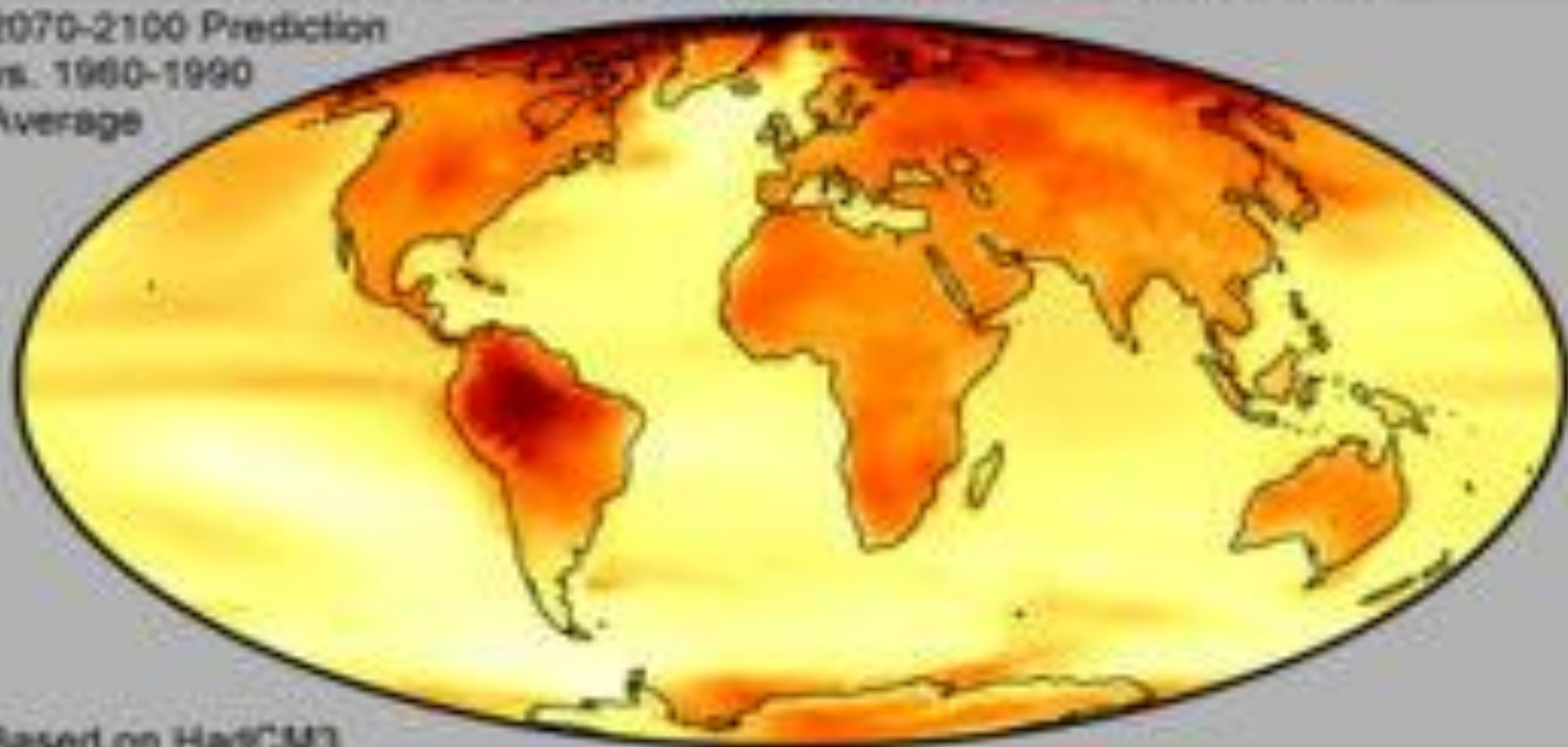
- Global mean surface temperatures 1850 to 2006

# Causes

- Greenhouse gases. the scientific consensus identifies greenhouse gases as the main influence.
  - The major natural greenhouse gases are
    - water vapor, which causes about 36-70% of the greenhouse effect on Earth (not including clouds);
    - carbon dioxide, which causes 9-26%;
    - methane, which causes 4-9%, and
    - ozone, which causes 3-7%.
- Solar activity,
- Volcanic emissions,
- variations in the earth's orbit (orbital forcing)

# Global Warming Predictions

2070-2100 Prediction  
vs. 1980-1990  
Average



Based on HadCM3





# Radioactive contamination

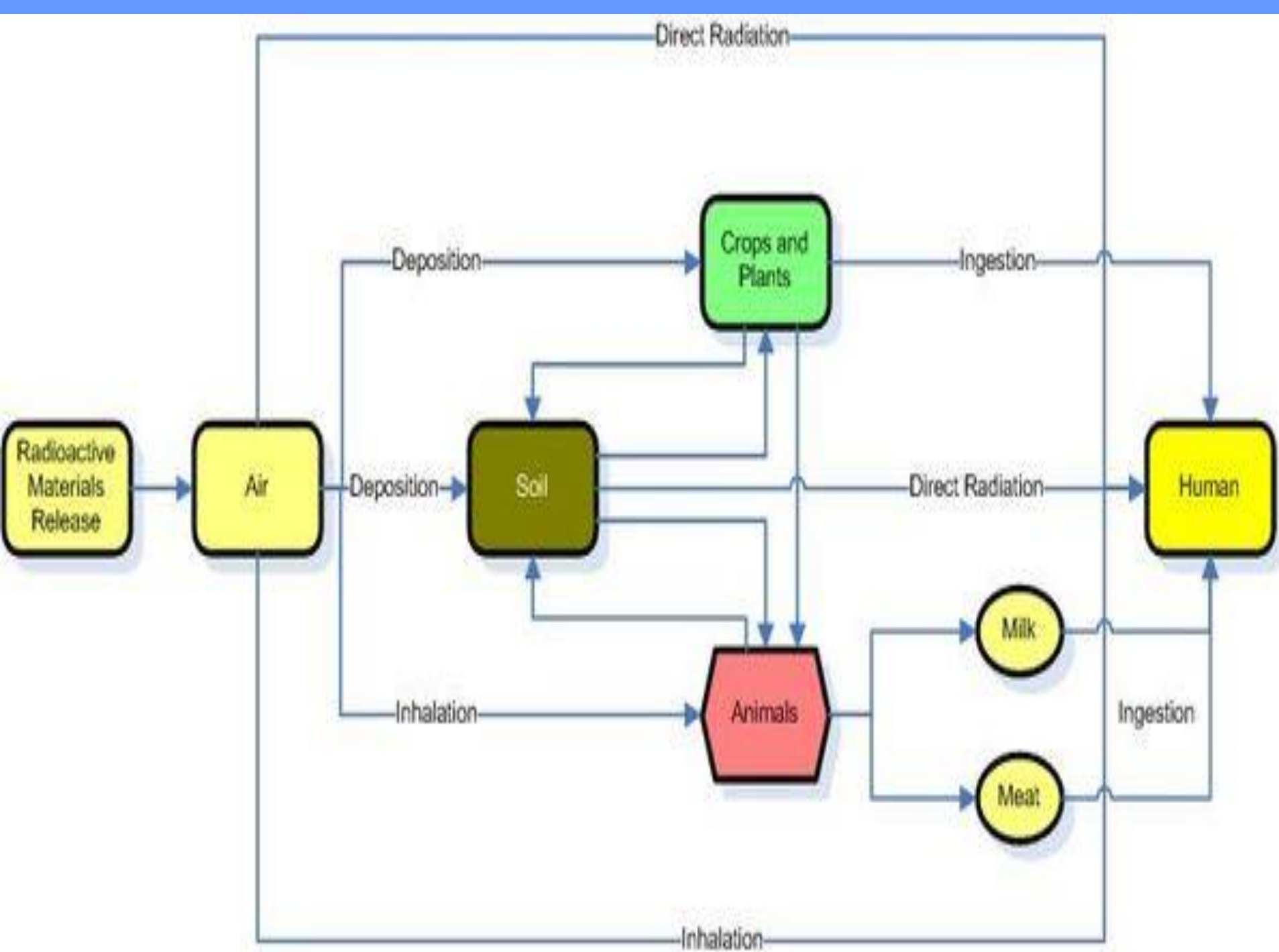
- **Radioactive contamination** is the uncontrolled distribution of [radioactive](#) material in a given environment.
- **Radiation poisoning**, also called "radiation sickness", is a form of damage to organ tissue due to excessive exposure to [ionizing radiation](#).



The radiation warning symbol

# Sources of contamination

- Typically the result of a loss of control of radioactive materials during the production or use of radionuclides (radioisotopes).
- Accidentally spilled radionuclide used in nuclear medicine, the material could be spread by people as they walk around.
- Inevitable result of certain processes, such as the release of radioactive xenon in nuclear fuel reprocessing
- Nuclear fallout is the distribution of radioactive contamination by a nuclear explosion



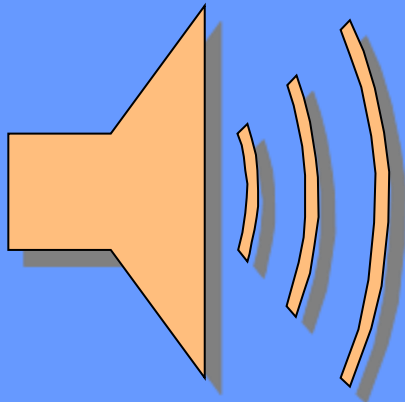
# Biological effects

## Depends on:

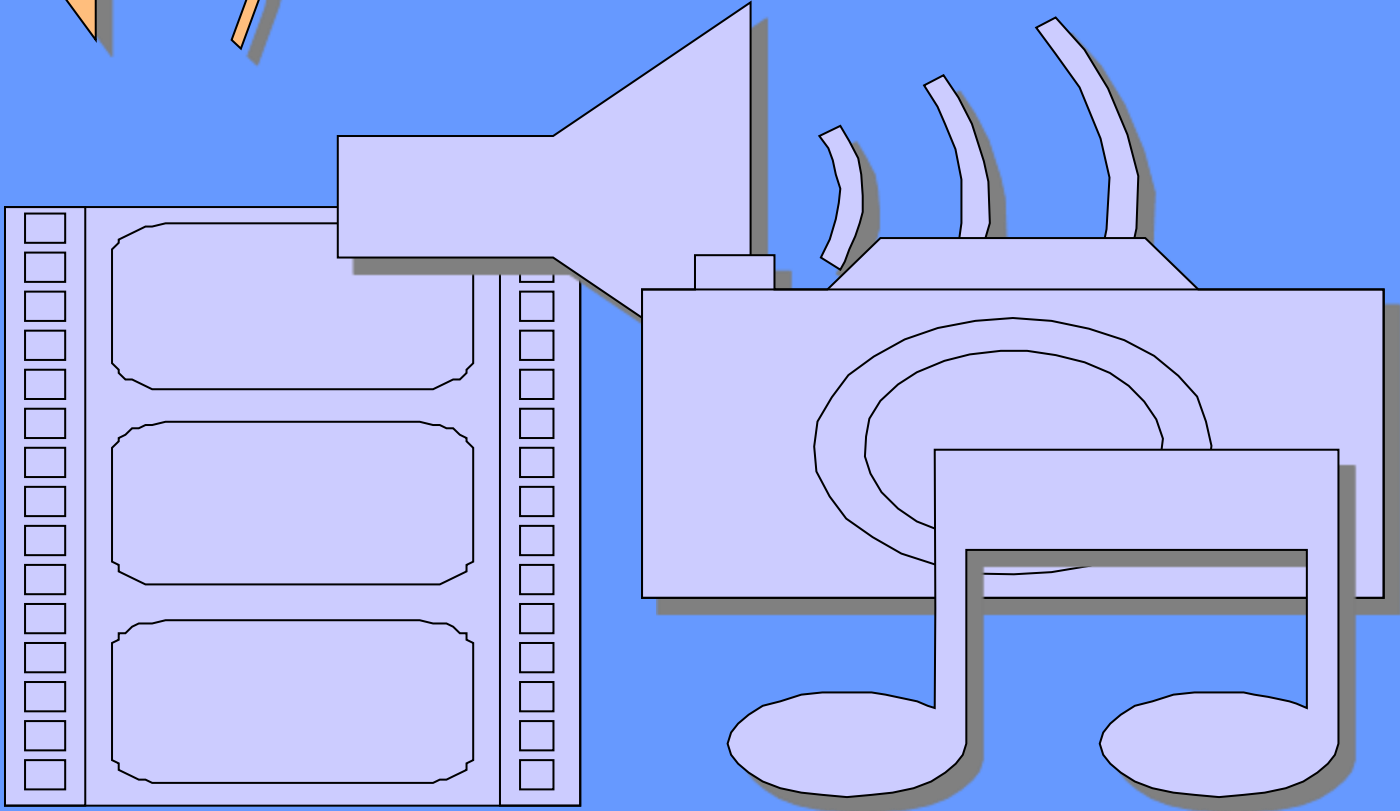
- **Duration and frequency of exposure**
- **Dose of contamination**
- **Method of contamination;** surface exposure vs ingestion vs inhalation
- **Type of radiation waves** emitted by radioactive materials (**alpha**(no tissue penetration), **beta,gamma**(deeply penetrating rays))

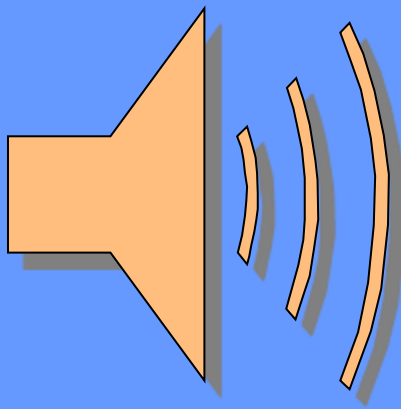
- **Cancers**
- **Bone marrow depression**
- **DNA mutations and Terratogenic effects**
- **Neurological dysfunctions** e.g; Deterioration in cognitive functions
- **burns**





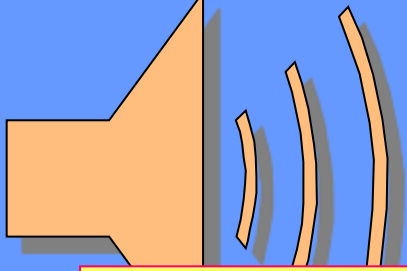
# Noise pollution





# Sources of noise

- Transportation systems, principally motor vehicle noise, but also including aircraft noise and rail noise.
- Poor urban planning may also give rise to noise pollution
- Other prominent sources are office equipment, factory machinery, appliances, power tools, lighting hum and audio entertainment systems.
- Popularity of digital audio player devices, individuals in a noisy area might increase the volume in order to drown out ambient sounds.
- Construction equipment also produces noise pollution.

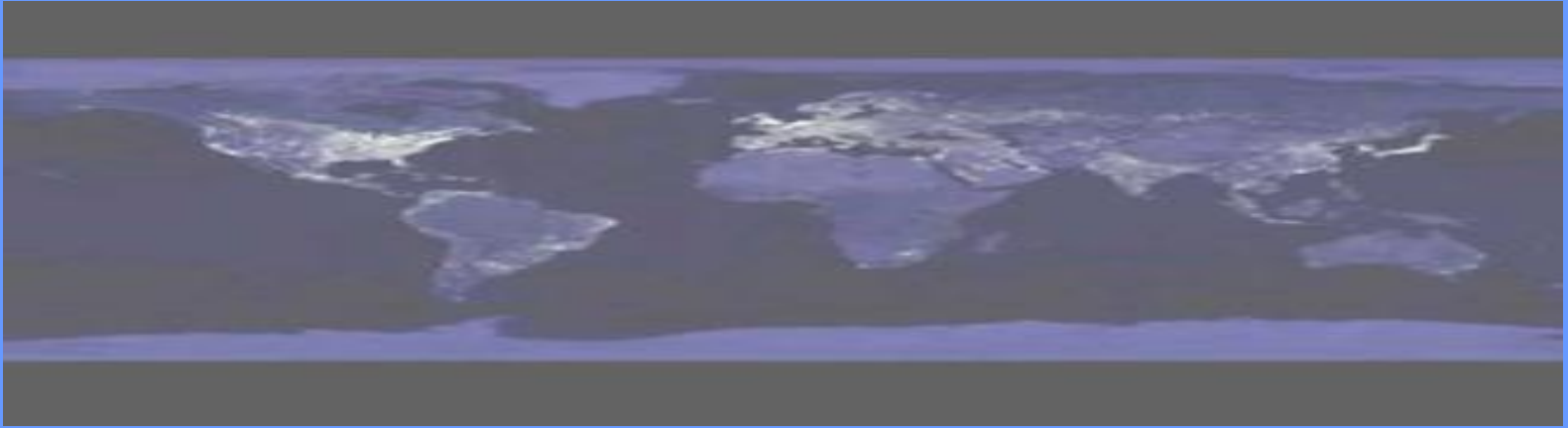


# Noise adverse effects

- **Hearing loss**
- **Cardiovascular effects :**
  - exposure to moderately high (e.g. above 70 dBA) levels during a single eight hour period causes a statistical rise in blood pressure of five to ten mmHg;
  - vasoconstriction leading to the increased blood pressure noted above as well as to increased incidence of coronary accedants
- **Psychological and behavioral disturbabces**
  - Annoyance, Increased tension and decrease threshold of anxiety
  - Decrease concentration abilities
  - Sleep disturbances
  - decrease productivity and increased worker errors
- **Environmental disturbances**
  - High noise levels may interfere with the natural cycles of animals, including feeding behavior, breeding rituals and migration paths.
  - Perhaps the most sensational damage caused by noise pollution is the death of certain species of beached whales, brought on by the extremely loud (up to 200 decibels) sound of military sonar.



# Light pollution





# sources

- Light pollution is a side effect of industrial civilization. Its sources include
- Building exterior and interior lighting.
- Advertising, commercial properties,
- Offices, factories,
- Streetlights, and
- Illuminated sporting venues.
- It is most severe in highly industrialized, densely populated areas of North America, Europe, and Japan.

# Consequences of light pollution

1. **Energy waste**
2. **Interference with astronomical observations**
3. **Effects on human health and psychology**
  1. increased **headache** incidence, worker **fatigue**, **medically defined stress**, decrease in **sexual function** and increase in **anxiety**
4. **Disruption of ecosystems**

can confuse animal navigation, alter competitive interactions, change predator-prey relations, and influence animal physiology.



# Visual pollution

- **Visual pollution** is the term given to unattractive visual elements of a vista, a landscape, or any other thing that a person might want to look at. Commonly cited examples are billboards, litter, graffiti, homeless people, telephone lines and poles, contrails, buildings, signs, weeds and advertisements.

# قاهرة المُعزُّ وعشوائية البناء و التخطيط ، من أعلى





# وعشوائية الحياة في الأسفل





- Visual pollution: Advertisements covering front of buildings in Hong Kong,



A vibrant photograph of a pond filled with green lily pads and several blooming pink lotus flowers. The scene is brightly lit, creating a lush and serene atmosphere. The word "THANKS" is overlaid in a large, bold, pink font with a white outline, centered across the middle of the image.

**THANKS**