

Environment and Occupational

Dr. Hamza

**Lecture of 6th of October.
Section 1+3**

Done By: Ruby Abu Nassar

Note: Dr. Hamza mentioned that for his lectures - numbers (even Jordan numbers) are not for memorize. But don't follow this rule for the other lecturers (for Dr. Samar they are for memorize).

Environmental Health

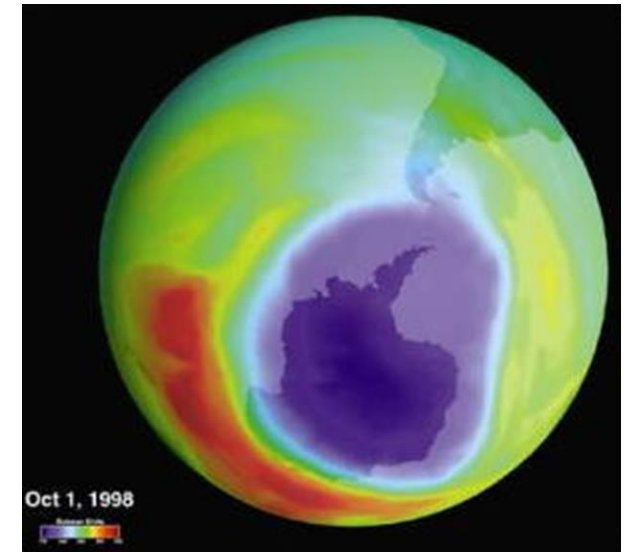
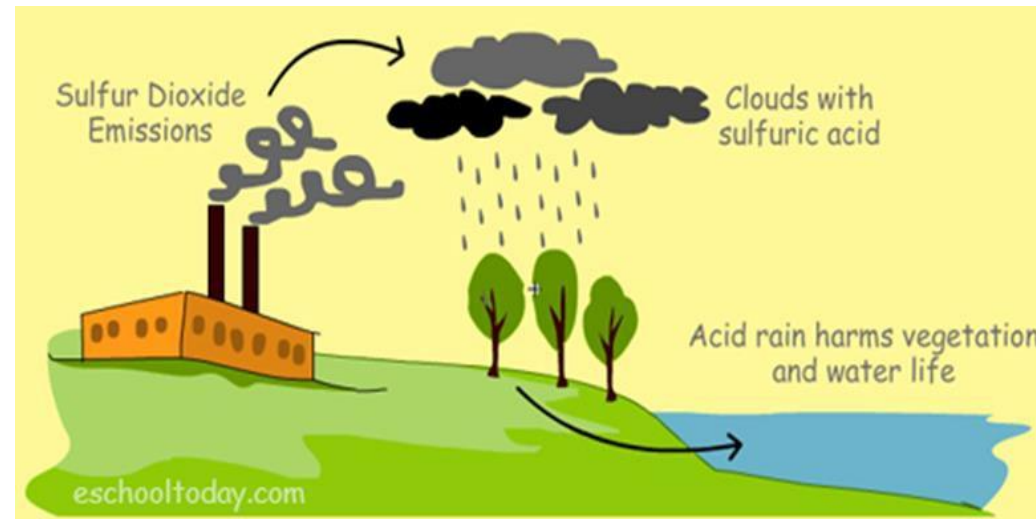
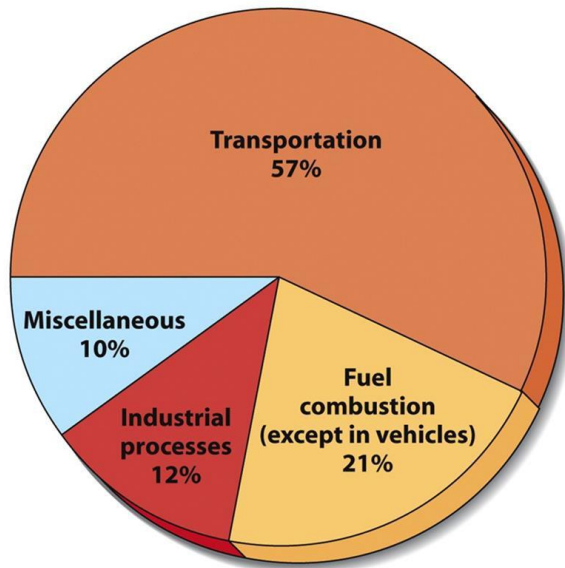
Pollution = Contamination

- **Air Pollution**
- **Water Pollution**
- **Food Pollution**

Also we are going to discuss in this chapter: * Modern environmental problems (e.g. Global warming)

**Dr. Sireen Alkhaldi, DrPh •
Community Medicine, First semester 2018/ 2019 •
Faculty of Medicine/ The University of Jordan •**

Air Pollution



Textbook: Frumken, H., Environmental Health (from global to local)
3rd edition (2016); Wiley, San Francisco, CA.

Air is composed of gases surrounding us, that we breath from.

7 shocking facts about air pollution

Air Pollution is a very serious worldwide problem.

*It is the deadliest form of pollution, killing millions of people each year. **Premature deaths causes huge money loss.**

□The Cost of Air Pollution: premature deaths linked to air pollution cost the global economy **\$225** billions of dollars in 2016 in lost labor income.

□More than **nine** out of 10 of the world's population (92%) live in places where air pollution exceeds safe limits, according to research from the World Health Organization (WHO).

7 shocking facts about air pollution

Air pollution is the **fourth-largest threat** to human health, after high blood pressure, dietary risks and smoking.

❑ 4.2 million deaths every year as a result of exposure to ambient (**outdoor**) air pollution

❑ 3.8 million deaths every year as a result of household (**indoor**) exposure to smoke from dirty cookstoves and fuels (in 2012, WHO).

Together they are a total of 8 million people, and that number is larger than the number of deaths due to HIV aids.

❑ That's 11.6% of all global deaths – more than the number of people killed by HIV/AIDS, tuberculosis and road injuries combined.

Significance of the Problem

- Almost all deaths (94%) linked to air pollution occur in low- and middle-income countries, the WHO says.
 - Around 3 billion people (more than 40% of the world's population) still do not have access to clean cooking fuels and technologies in their homes.
- Parts of Africa, Eastern Europe, India, China and the Middle East are the biggest regional danger spots.
 - WHO estimates that some 80% of these deaths were due to **ischemic heart disease** and strokes, while 14% of deaths were due to **chronic obstructive pulmonary disease (COPD)** or acute lower respiratory infections; and 6% of deaths were due to lung cancer.

These diseases that were mentioned earlier in red are associated with air pollution and are not mainly caused by it.

What is Air Pollution?

Air pollution occurs when gases, dust particles, smoke, or odors are introduced into the atmosphere in a way that makes it harmful to humans, animals and plants.

What is the Atmosphere?

It is a gaseous coat that engulfs our planet.

The Earth is surrounded by a blanket of air (made up of various gases) called the atmosphere.

The atmosphere helps protect the Earth and allow life to exist. Without it, we would be burned by the intense heat of the sun during the day or frozen by the very low temperatures at night.

What is the Atmosphere?

These percentages of gases that are mentioned below must be kept in balance, so if any percentage went up or down, it is harmful.

*Atmospheric Composition:

0.93%, 20.95%, Argon Nitrogen 78.08%, Oxygen

Carbon dioxide 0.04%.

CO₂ percentage is so small, so if it goes up it is so harmful.

If we calculate these percentages above, we would deduce that they do not add up to 100%. That is because of the small percentage of gasses that is left and not mentioned in the slide, till we reach 100%.

*Benefits: (of Atmosphere)

1) Blocks UV radiation (Sun).

2) Moderates the climate (Protects from extreme hot or cold weather).

3) Redistributes water in the hydrologic cycle

(Water needs to be maintained clean and available as possible).

Definitions

(الملوثات)

Air pollutants are airborne gases, particles, and aerosols that are added to the atmosphere by natural events or human activities in concentrations that threaten the well-being of organisms or disrupt the orderly functioning of the environment.

***Primary air pollutants** pollute the air when emitted **directly** into the atmosphere.

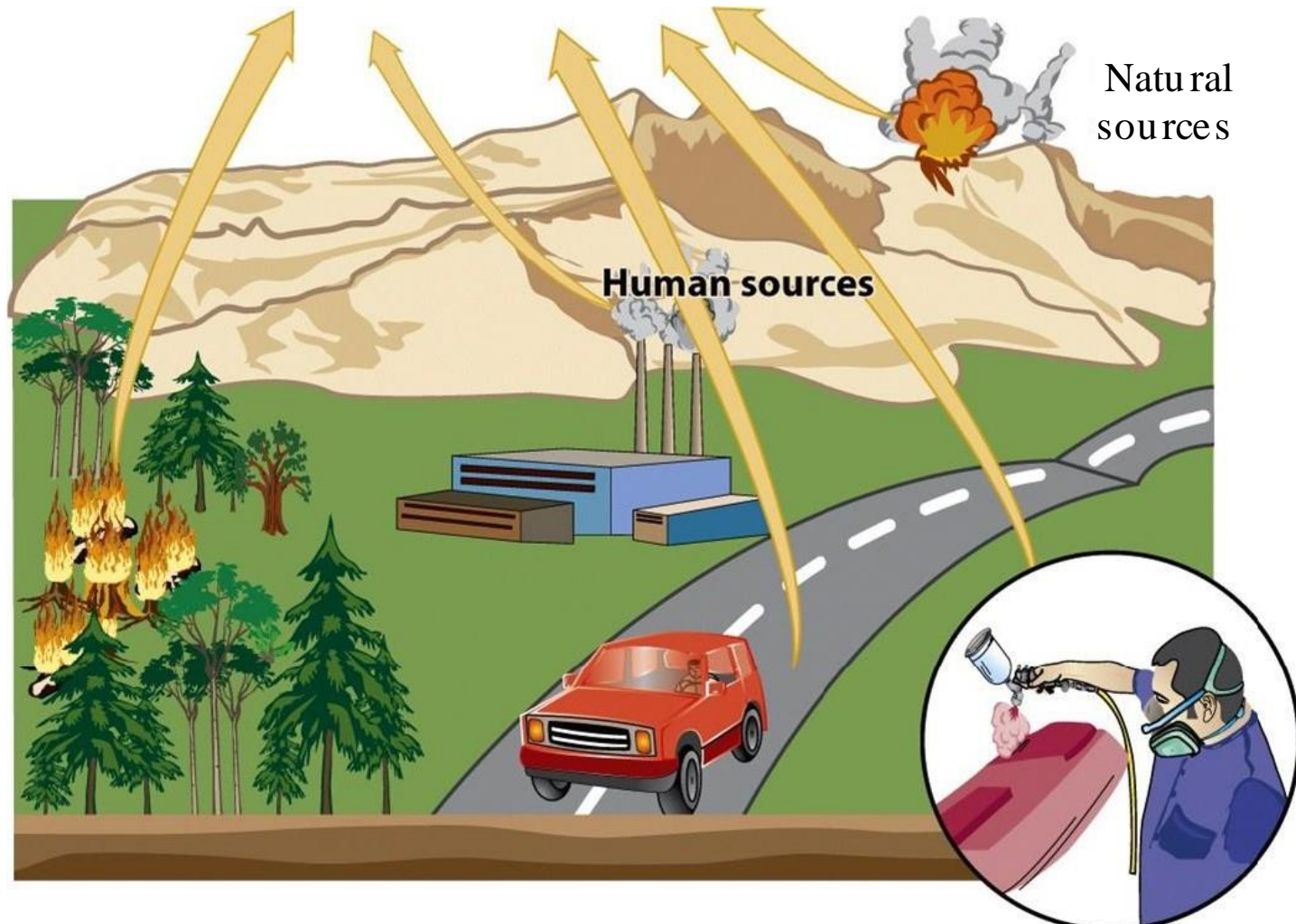
***Secondary air Pollutants** are created by chemical reactions between primary air pollutants in the atmosphere.

Primary air pollutants

CO		CO ₂
SO ₂	NO	NO ₂
Most hydrocarbons		
Most particulates		

Secondary air pollutants

HN0 ₂		SO ₃
HN0 ₃		H ₂ SO ₄
H ₂ O ₂	O ₃	PANs
Most NO _x and SO _x salts		



The most common air pollutants



CO is more toxic than CO₂, and CO₂ is needed in small percentages in air.

1. Oxides of Carbon (CO, CO₂)

2. Volatile Hydrocarbons (VOC's)

It is Methane (CH₄), and it comes from Human beings and Livestock). => The main reason of Global Warming.

3. Oxides of Nitrogen

4. Sulfur Compounds

5. Photochemical Smog

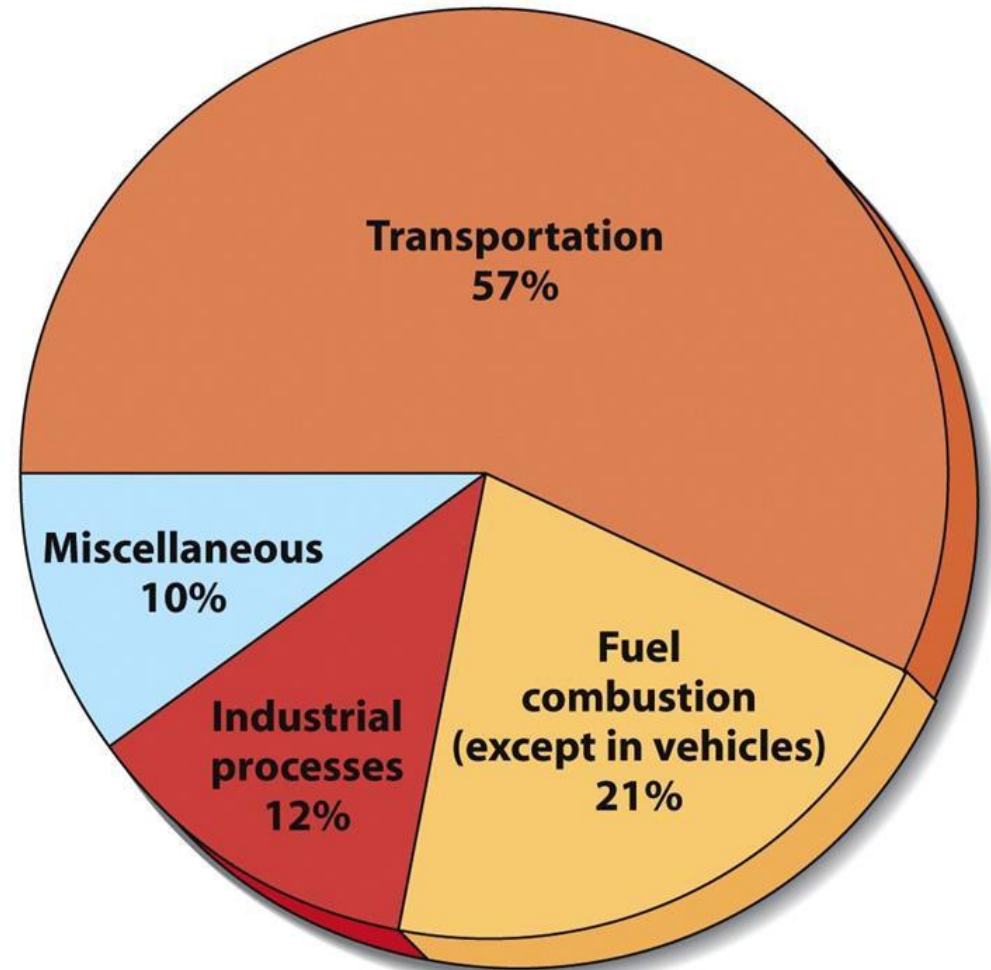
6. Suspended Particulates (عوالق بالهواء)

These are very tiny particles that are found in polluted air from Asbestos/ Coal Mines/ Concrete Factories...

What are the sources of air pollution?

Three main sources:

- 1) Transportation**
- 2) Power plants**
- 3) Industry**



Urban Outdoor Air Pollution

Smog is a combination between Smoke and Fog.

Photochemical Smog
(eg: Los Angeles)

- Brownish-orange haze formed by chemical reactions involving sunlight, nitrogen oxide, and hydrocarbons

Clear skies are not seen because of Smog.



Air Pollution in Beijing and Mexico City



***Beijing (left)** No sun is seen because of Smog. => SO BAD!

***Mexico City (above)**

Children and Air Pollution

- **Greater health threat to children than adults**
 - * Air pollution can restrict lung development
 - * Children breath more often than adults
-
- Children who live in high ozone areas are more likely to develop asthma

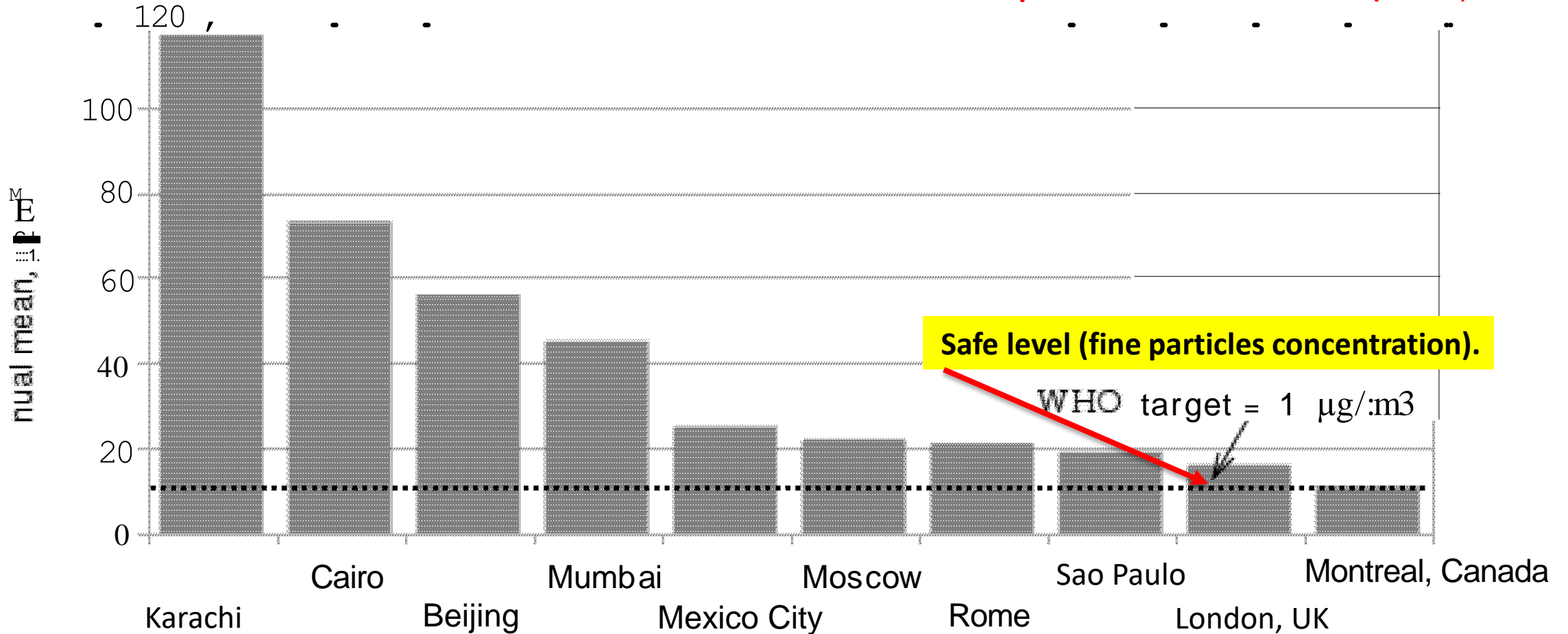
Population Density is the variable that is making the huge difference between Karachi and Montreal.

Conclusion: When Population Density goes up, Pollution concentration goes up too.

alstuff.com

Note: Montreal is the only city who's achieving the WHO target, but also it is barely achieving it.

Our polluted cities
Fine particulate concentration (PM_{2.5})



Source: World Health Organization (WHO) Ambient (outdoor) air pollution in cities database 2014

Agricultural Effects of Air pollution

*Air pollution can seriously affect the growth of plants.

Because plants become less exposed to sun light.

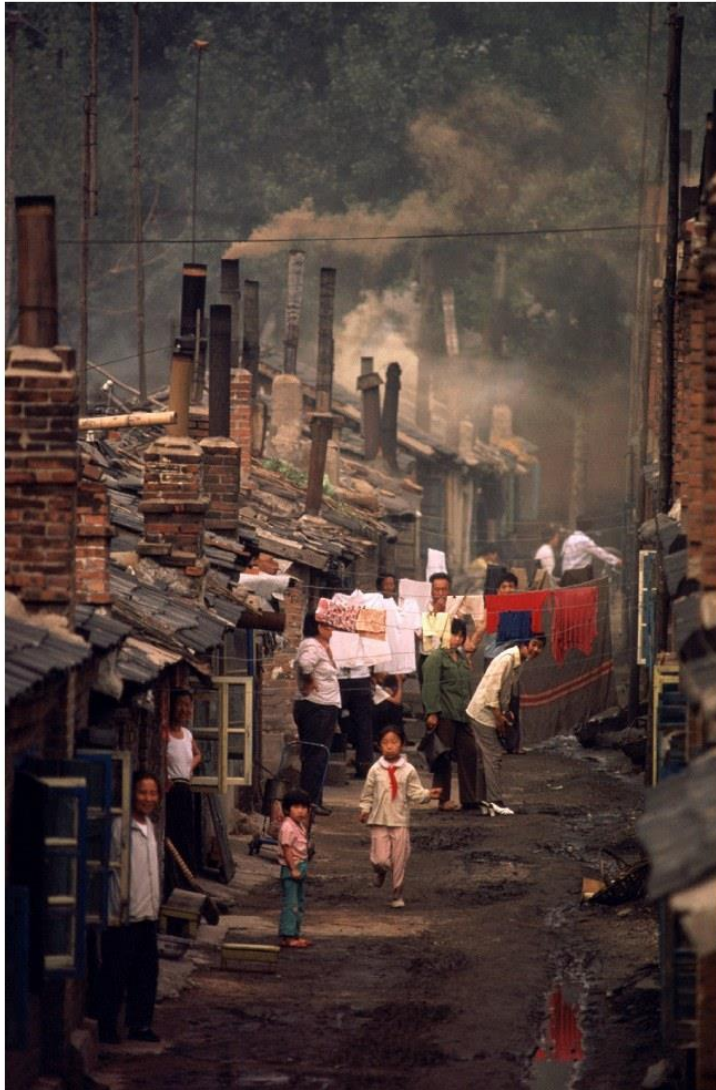
*It is easy to find chemical residues in plants that grow alongside highways.

*Also, the huge increase in atmospheric carbon dioxide now causing **global warming**, and climate change is expected to have a major impact on the world's agriculture (reducing crop yields in some places but potentially increasing yields elsewhere).

Note: Global Warming increases the average temperature level.

Air Pollution Around the World

Air Pollution is way more dangerous and seen in developing countries (rather than developed countries) because these countries' governments are not participating in "Protection of air" policies, like "The Policy Of Paris" for example.



- Air quality is deteriorating rapidly in **developing countries**

- Shenyang, China

Developing countries like:
China/ India/ Pakistan.

- *Residents only see sunlight a few weeks each year

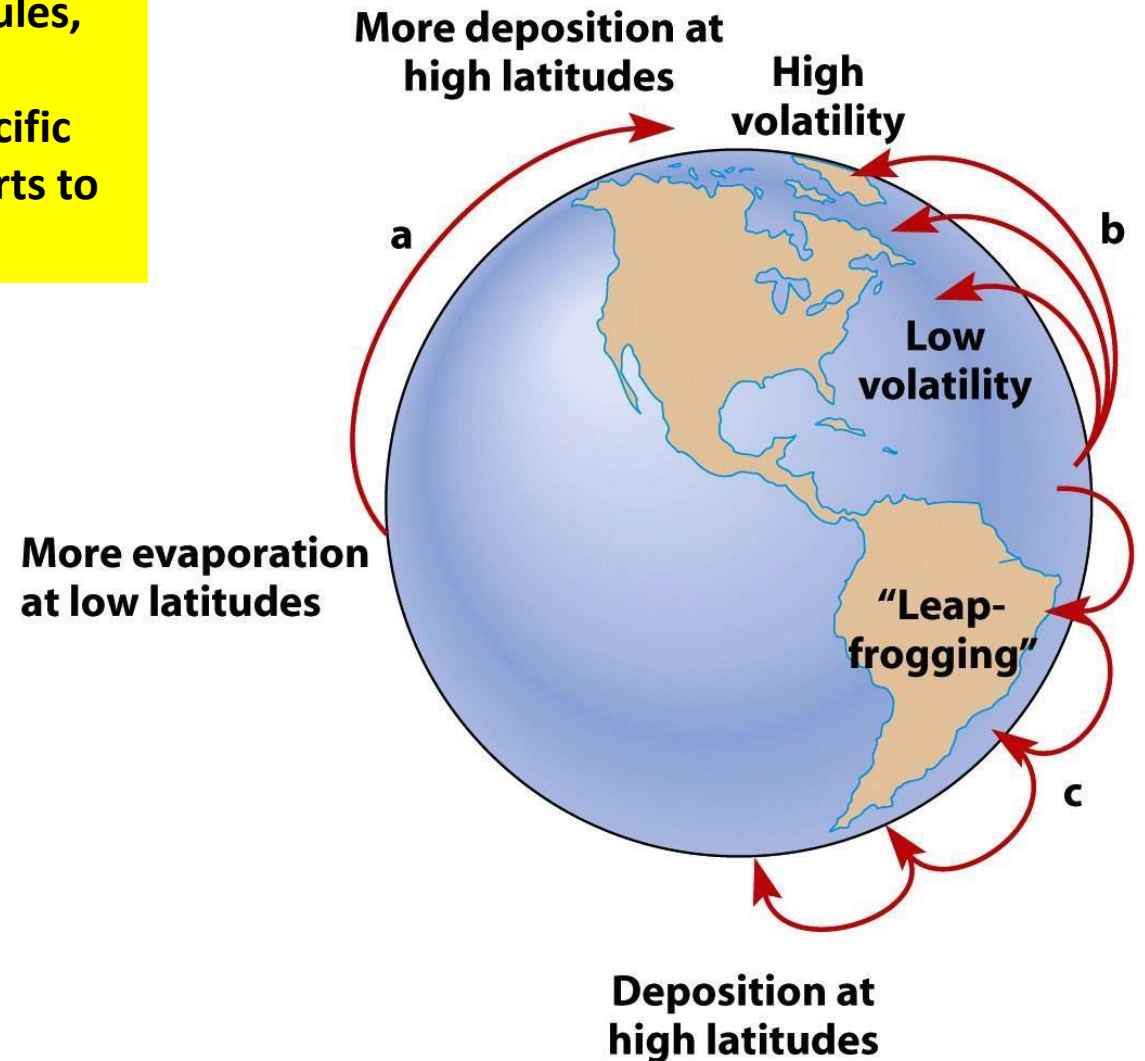
- Developing countries have **older cars**

- Still use **leaded gasoline**

Long Distance Transport of Air Pollutants

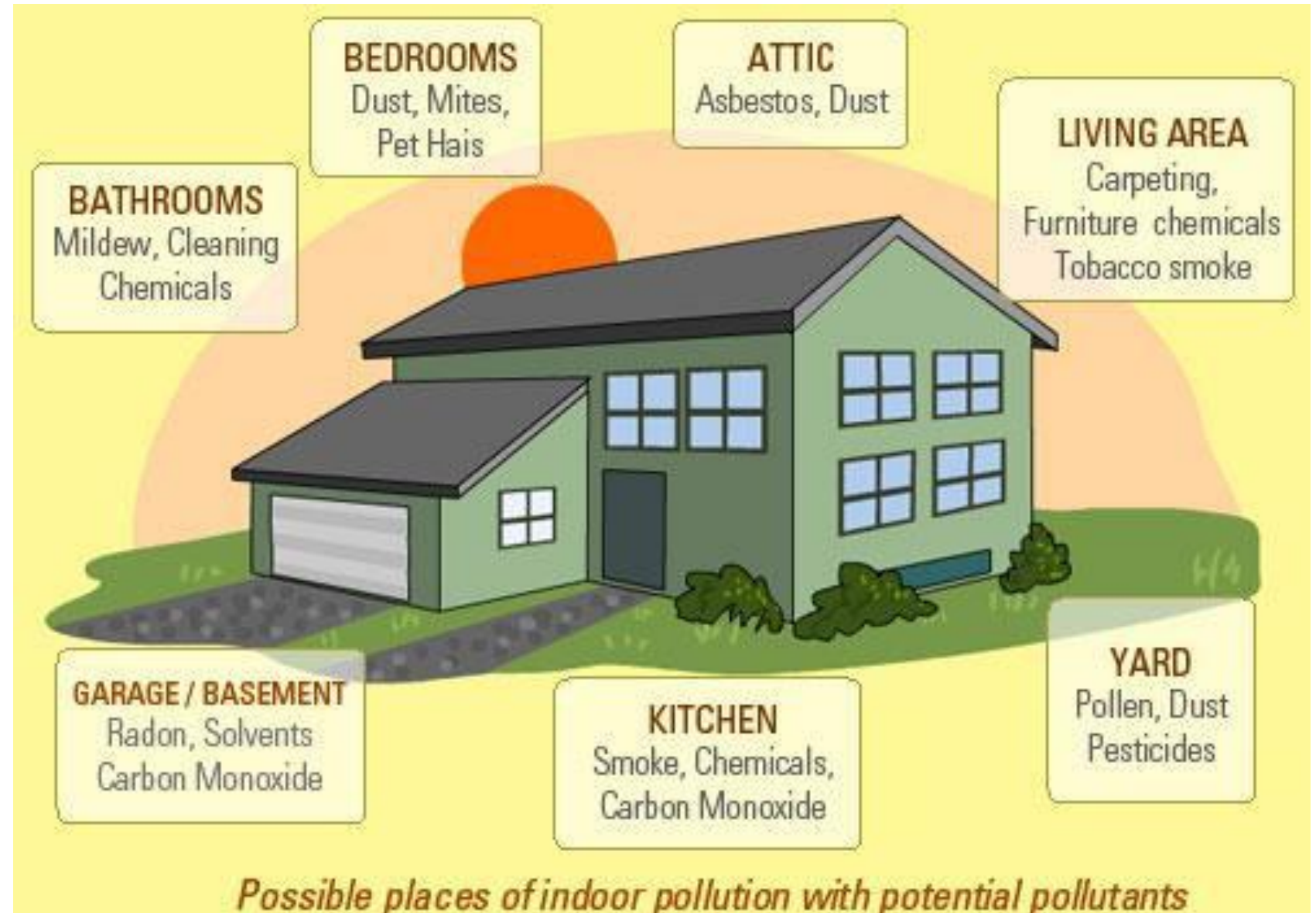
If a certain country produces lots of pollution and carbon molecules, we cannot control the polluted air mobility, which means that pollution is going to spread worldwide and not stay above a specific country. Also, the largest amount of polluted air usually transports to fragile areas of earth (e.g. South or North Poles).

Air Pollution and Fire act as a cycle.
Air Pollution causes fire, and fire causes Air Pollution.
Example: Amazon Rainforest fires that occurred.



The main source of Indoor Air Pollution is: Cooking Stove, which is found in the kitchen.

Indoor Air Pollution



Indoor Air Pollution

- *Around 3 billion people cook and heat their homes using open fires and leaky stoves, and burning biomass (wood, animal dung and crop waste) and coal.**
- *Nearly 3.5 million people die prematurely from illness attributable to indoor air pollution from household solid fuel use (e.g. chronic obstructive respiratory disease).**
- *Nearly 50% of pneumonia deaths among children under five are due to particulate matter inhaled from indoor air pollution.**
- *Both women and men exposed to heavy indoor smoke are 2-3 times more likely to develop COPD**

Source: WHO: <http://www.who.int/mediacentre/factsheets/fs292/en/>

Most of the people around the world use the kind of Cooking Stove that is found in the picture, which is not a developed one, so it causes a lot of contamination and pollution.

Do you see this black smoke on the wall?
Just to mention that in your lungs there is much more.



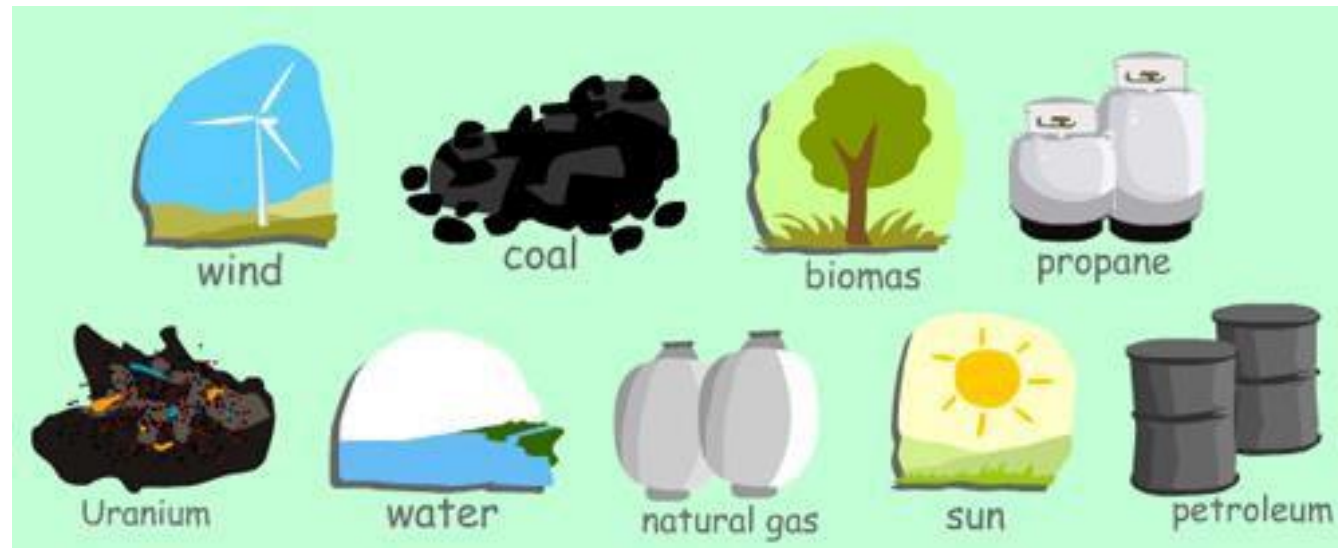
Indoor Air Pollution

Common indoor air pollutants include:

- * **Tobacco smoke:** This is smoke burning cigarettes or exhaled smoke by people smoking.
- * **Biological Pollutants:** These include allergens such as pollen from plants, hair from pets, fungi and some bacteria.
- * **Radon:** This is a gas that is naturally emitted from the ground. Radon can be trapped in basements of building and homes. The gas is known to cause cancer after exposure over a period.
- * **Carbon Monoxide:** This is a poisonous gas with no color or smell. Carbon monoxide is produced when fuels such as gas, oil, coal or wood do not burn fully

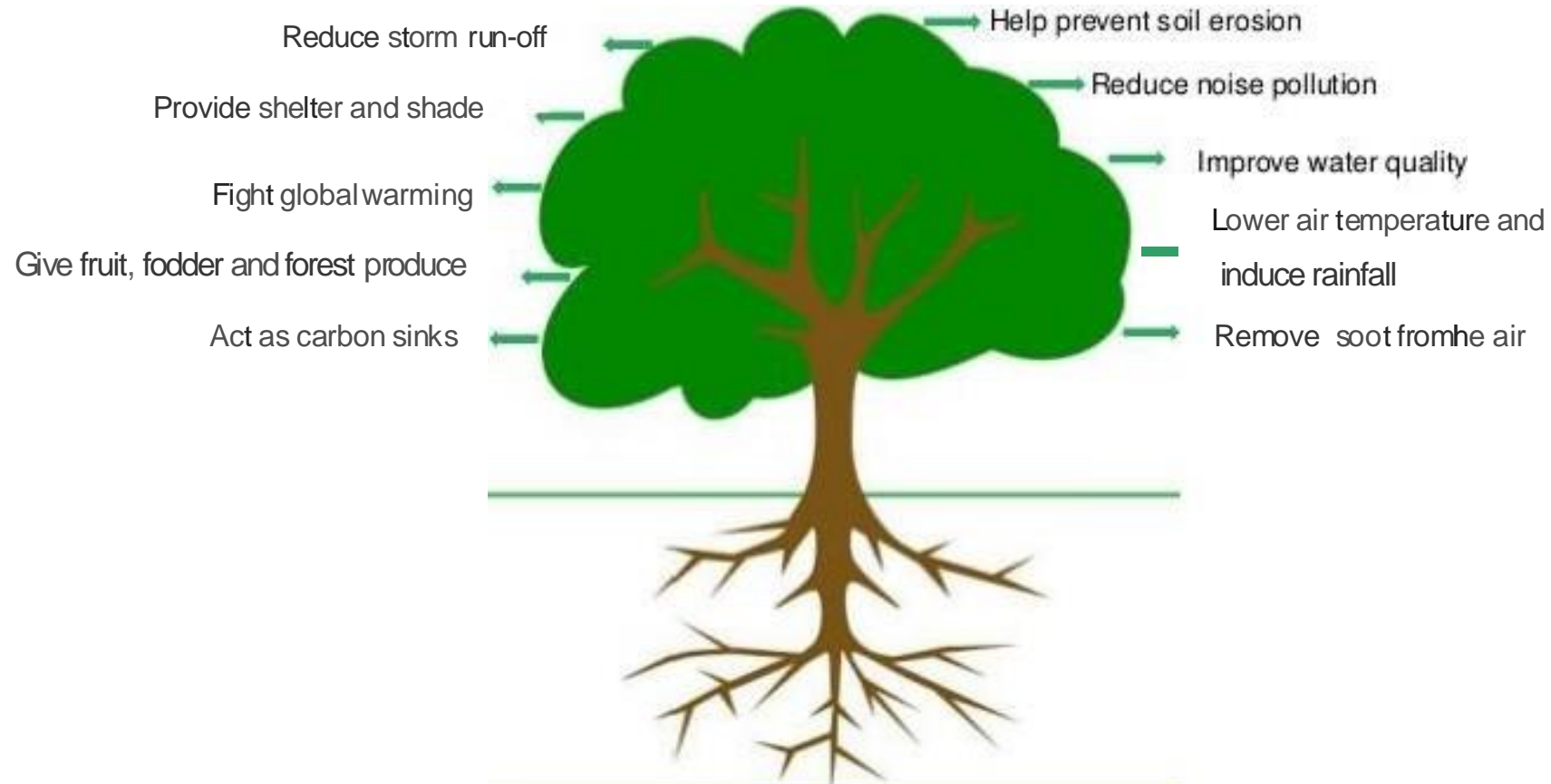
How can we solve the problem of air pollution?

1. Technological Solutions: cars and factories with less pollution, and using renewable energy.
2. Laws and Regulations
3. Raising awareness and changing behavior



Why Trees?

We need to PLANT MORE TREES to SAVE THE PLANET.



MOVE TO PAPERLESS EDUCATION! (which means that you should not print those slides).





Save the planet!

For our future generations

This is a young Swedish lady that's ~12 years old, who is very brave.

She refused to fly from Sweden to New York, on the other hand she sailed by a boat so she could reduce air pollution.

