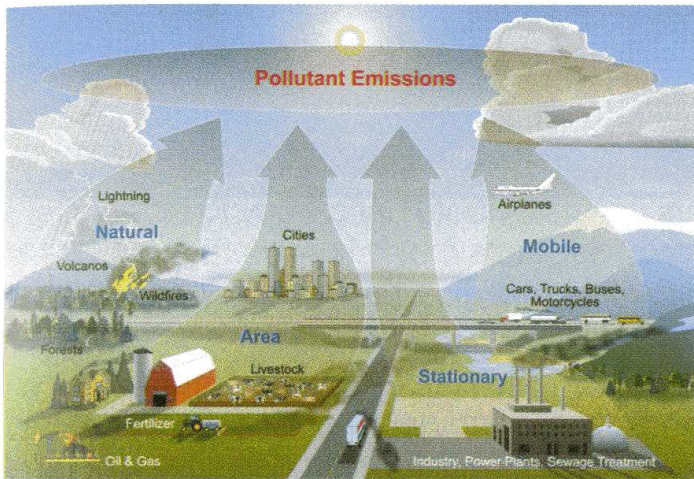


**K P Prematilleke**

Program Assistant, Policy Planning & Monitoring Division  
Ministry of Mahaweli Development & Environment

**Biodiversity, Air Quality and Human Health**



Air pollution impacts our health, environment and economy. Air pollutants come from multiple sources and significant problem in cities across the world. Major causes of gaseous and particulate **outdoor air pollution** with a direct impact on public health include the combustion of fossil fuels associated with transport, heating and electricity generation, and industrial

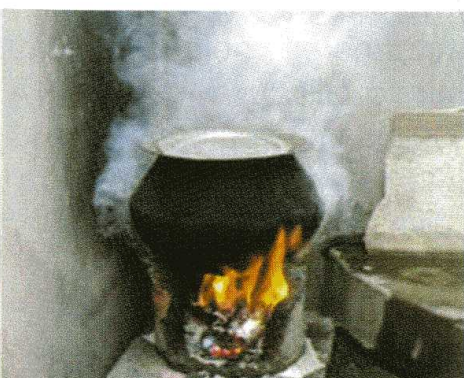
processes such as melting, concrete manufacture and oil refining. Other important sources include ecosystem degradation (including deforestation and wetland drainage) and desertification.



Vehicle Emission

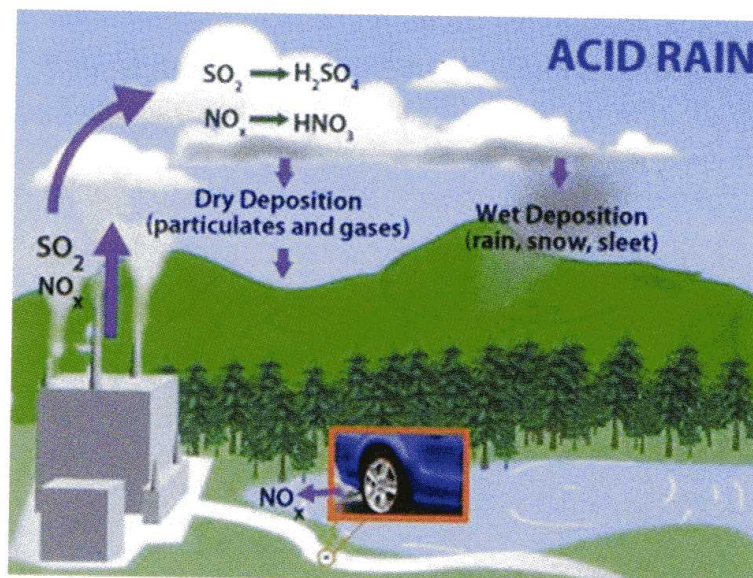


Deforestation



**Indoor air pollution** is primarily associated with particulates from combustion of solid fuel (wood, coal, turf, dung, crop waste, etc.) and oil for heating and cooking, and gases from all fuels (including natural gas) in buildings with inadequate ventilation or smoke removal.

Ecosystems are obstructed by air pollution. Mainly Sulphur (S) and Nitrogen(N) emissions, and ground-level Ozone (O<sub>3</sub>) as it affects their ability to function and grow. Emissions of both sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides(NO<sub>x</sub>) deposit in water, on vegetation and on soils as “acid rain”. Thereby increasing their acidity with adverse effects on flora and fauna. Finally, acidification



affects the ability of ecosystems to provide “ecosystem services”, such as for example nutrient cycling and carbon cycling, but also water provision, on which the planet and human life is dependent.

Increased ground-level ozone also causes damage to cell membranes on plants, inhibiting key processes required for their growth and development. The loss of plant cover affects us all. There are three main ways in which plants affect local air pollution levels: via effects on local microclimate and energy use, removal of air pollution, and emission of chemicals.

Air pollution also affects the earth's climate by either absorbing or reflecting energy, which can lead to climate warming or cooling, respectively.

Plants provide an important ecosystem service through the regulation of air quality. However, air pollution affects tree health and plant diversity. Trees and



other vegetation absorb pollutants such as excessive nitrogen dioxide, ozone and particulate matter and volatile organic compounds (VOC) through their leaves and needles and thereby help to improve air quality. Most of the pollution is removed via leaf stomata. Healthy trees in cities can remove significant amounts of air pollution. Areas with a high proportion of vegetation

cover will remove more pollution and have the potential to effect greater reductions in air pollution concentrations in and around these areas. Less plant cover thus means less filtering capacity to clean our air. Although the effects of plants on air quality are generally positive, they can also to some degree be negative. Likewise, air quality can have both positive and negative impacts on plant populations. These various impacts are partially dependent upon the diversity of the plant species, vegetation assemblages and size classes.

**Bioindicators** can be useful for **monitoring air quality** and indicating environmental health. Lichens were first described as “health meters for the air” in 1866. While many organisms exhibit a measurable response to pollution, lichen and bryophytes (i.e. mosses and liverworts) are the most widely utilized bioindicators in both environmental and human health studies. Understanding the impacts of vegetation biodiversity on air quality and air quality on vegetation biodiversity is essential to sustaining healthy and diverse ecosystem, and for improving air quality and consequently human health and well-being.

Even worse, ultimately human populations are also affected. Harmful concentrations of pollutants may directly enter our drinking water, notably through ground water seepage. Equally, water quality may be deteriorated as air pollution negatively affects vegetation which helps to naturally filter our water systems. Affected vegetation also has negative consequences on another important ecosystem service: that of capturing carbon and thereby reducing the impacts of climate change.

The **World Health Organization (WHO)** reports that over 4 million people die prematurely from illness attributable to household air pollution from cooking with solid fuels. More than 50% of premature deaths among children under 5 years of age are due to pneumonia caused by particulate matter (soot) inhaled from household air pollution. It is estimated that 3.8 million premature deaths annually from non-communicable diseases (including stroke, ischemic heart disease, lung cancer etc.) are attributable to exposure to household air pollution. Some pollutants, both gaseous and particulate, are directly emitted into the atmosphere and include sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO), carbon monoxide (CO), particulate matter (PM) and volatile organic compounds (VOC).

#### **Reference :**

Connecting global priorities: biodiversity and human health: a state of knowledge review, World Health Organization and Secretariat of the Convention on Biological Diversity, 2015.