

I. NATURAL CAUSES OF CLIMATE CHANGE

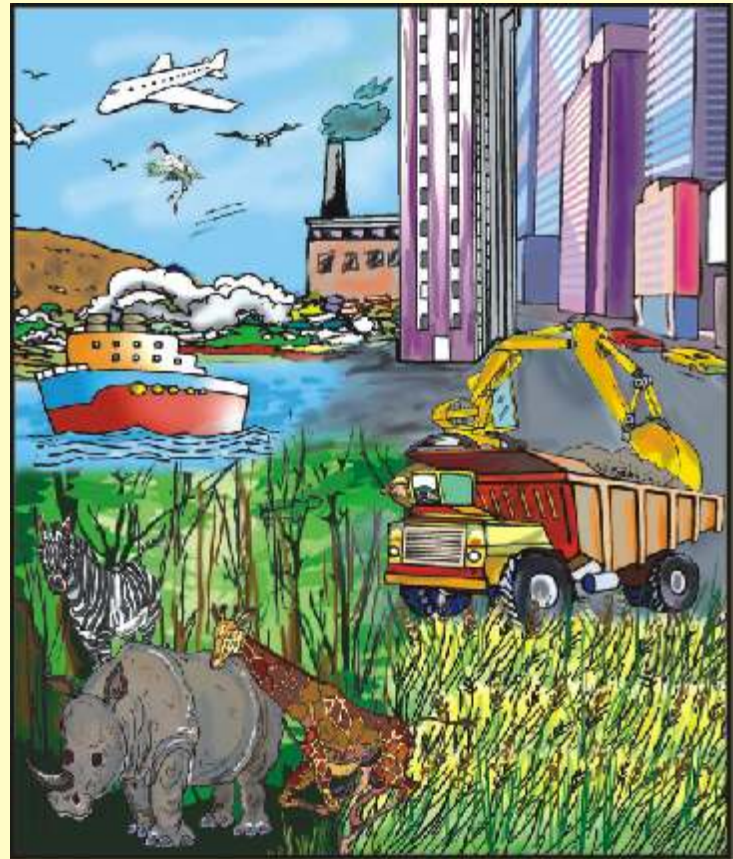
- **Continental Drift**
- **Earth's tilt**
- **Ocean current system**
- **Volcanic eruptions**
- **Solar flares and sunspots**



- **Continental drift** theory states that a large land mass called Pangea broke up into 2 – Laurasia in the northern hemisphere and Gondwana land in the southern hemisphere.
- **The earth's axis** tilts away from the perpendicular at about $23\frac{1}{2}^{\circ}$. This tilt is responsible for our seasons. Variations in the pattern of earth's orbit around the sun, leads to variations in the incoming solar radiation.
- **Ocean currents** – The currents in the oceans flow near the surface and also deep below, thus transferring heat all over the earth. Some currents are warm and some are cold. Warm current raise temperature and bring moist winds cold currents have dry winds.
- **Volcanoes** – These eruptions cause large volumes of SO_2 (sulphur dioxide), water vapour, dust, and ash to escape into the atmosphere. These partially block the incoming rays of the sun, leading to cooling.
- **Solar flares and sunspots** – Actually huge storms on the sun, sunspots can impact the climate of the earth. It is believed that every 11 years, the sun goes through a period of activity known as the 'solar maximum' and then a period of quiet called the 'solar minimum'.

2. HUMAN INDUCED CAUSES OF CLIMATE CHANGE

- **Fossil fuel consumption**
- **Industrialization**
- **Agriculture**
- **Change in land use pattern**
- **Change in lifestyle**
- **Waste generation**



- **Fossil fuel consumption** – oil, coal, and natural gas – all fossil fuels – most of the energy needed to run vehicles, and generate electricity for industries, households, etc. This causes about 3/4 of CO₂ emissions, 1/5 of CH₄ emissions, and a large quantity of N₂O. It also produces NO_x (nitrogen oxides) and CO (carbon monoxide).
- **Industrial process** – the Industrial Revolution saw large-scale onset of industrialization. Industries create jobs and people move from rural areas to the cities.
- **Agriculture** – clearing of land for crops, use of chemical fertilizers etc. growing of paddy are some of the problems.
- **Change in land use pattern** – urbanization, food requirements, growing population, industrialization have all put pressure on land.
- **Change in lifestyle** – consumerism has made humans very acquisitive and increase in wants have caused major environmental problems.
- **Waste generation** – consumerism, changing lifestyles have caused the generation of large quantities of waste which the world is unable to handle and has become a major cause of concern.

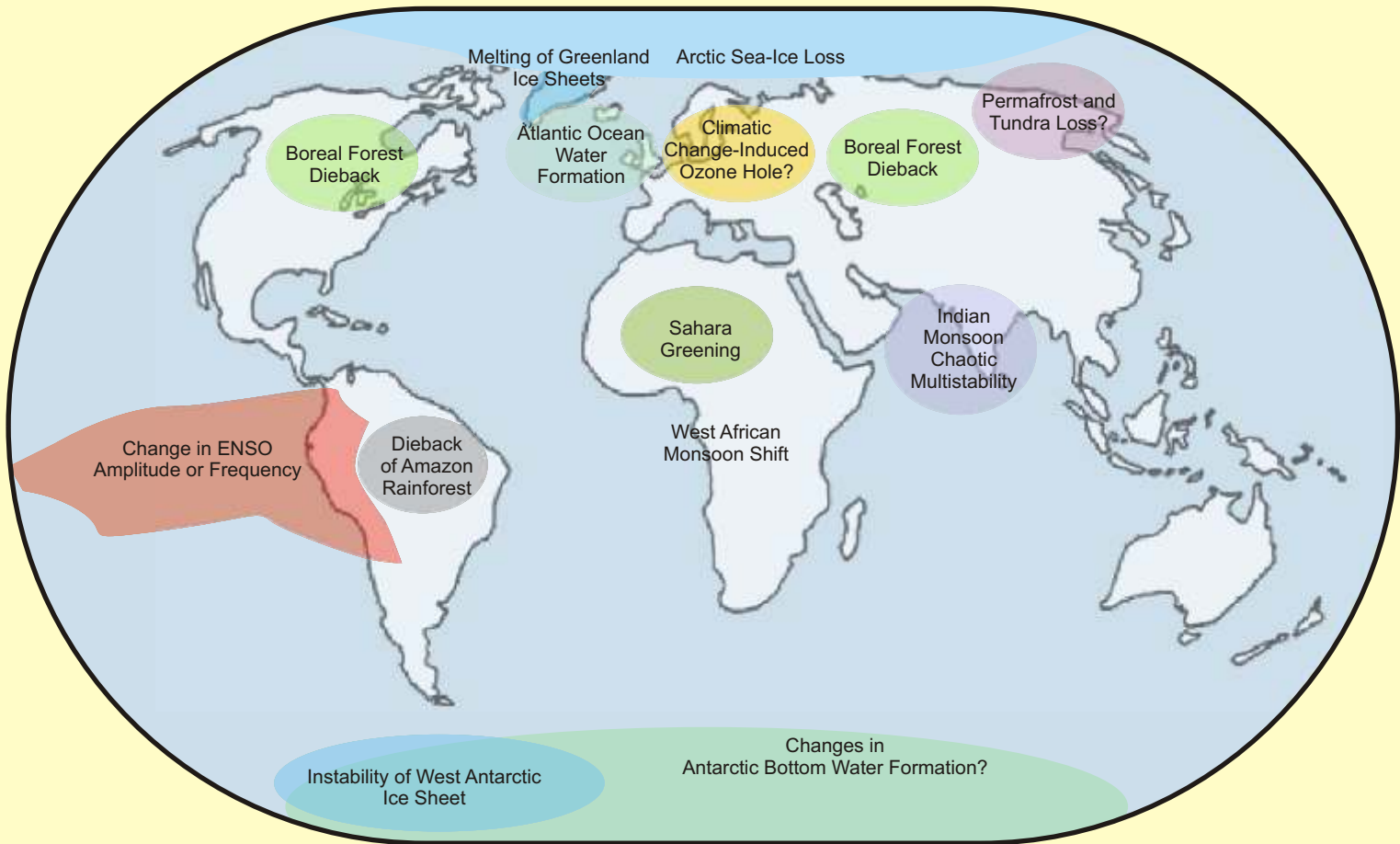
3. IMPACTS OF CLIMATE CHANGE

- **Increase in frequency, intensity and impacts of weather anomalies**
- **Changes in land use patterns**
- **Increase in water borne and vector borne diseases**
- **Depleting resources**
- **Ecosystems**
- **Rise in sea level**



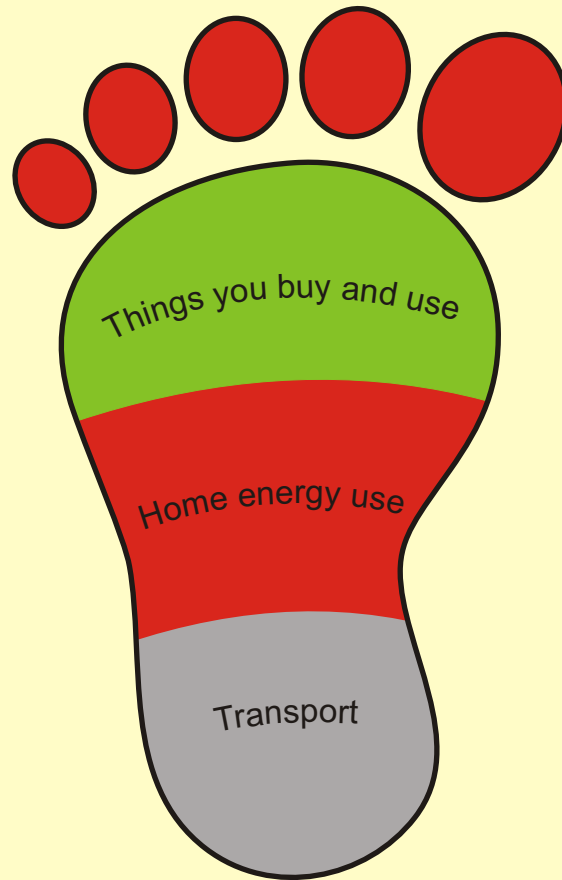
- **Increase in frequency, intensity and impacts of weather anomalies** – Developing countries located in the arid and semi-arid zones along the tropics are highly vulnerable to changes in the climate and will feel the impact of droughts, floods, storms, etc.
- **Changes in land use patterns** – With a rapid rise in population, demand for food is expected to double in the next few decades. This leads to clearing of large tracts of land, felling of forests, etc.
- **Increase in water borne and vector borne diseases** – Mosquito-borne diseases are generally associated with warm weather, intestinal diseases such as cholera and typhoid with rains, flu or influenza with cold weather, and viral fever with seasonal change. Floods and droughts lead to varied health problems, including epidemics.
- **Depleting resources** – Pressure on natural ecosystems is rising. Fossil fuel stock on the earth is depleting at a fast rate as also other minerals and timber.
- **Ecosystems** – habitat destruction and pollution threatens the very existence of natural ecosystems which are very sensitive to changes in the climate.
- **Rise in sea level** – Expected increase in the melting of icebergs, ice sheets, glaciers, and ice caps will add to this rise, which will increase salinity in the estuaries, and other fresh water sources, cause erosion and flooding along the coast.

4. TIPPING POINTS



- **Boreal or Tundra Forest depletion** – there is general consensus that climatic changes will have the greatest impact on boreal forests; their unique adaptation makes them more sensitive to temperature fluctuations than temperate or even tropical forests
- **Melting of ice-sheets** – the Greenland ice sheet is melting at a very rapid rate causing worry to scientists
- **Arctic sea ice loss** – as sea-ice melts, it exposes a much darker ocean surface, which absorbs more radiation–amplifying the warming.
- **Melting of permafrost** – the melting of permafrost has led to the release of tons of methane, carbon, etc., into atmosphere
- **Monsoon instability** – the monsoons have been very unstable either too heavy or too weak leading to floods or drought
- **Antarctic problems of ice instability** – this could impact all forms of life as ice shelf could break away
- **Depletion of Amazon rain forest** – the largest forest sink for carbon is disappearing fast
- **ENSO factor instable** – the El Nino in the Pacific Ocean had a cycle of 4 years. This is now happening faster – every 2 years and impacting the climate all around the earth

5. PERSONAL RESPONSIBILITY - YOUR CARBON FOOTPRINT



6. WHAT YOU CAN DO AT THE SCHOOL LEVEL

- **Tree Plantation drives–herbal nurseries, etc.**
- **Garbage segregation, disposal–composting**
- **Energy conservation–switch off lights and fans in classrooms**
- **Encourage students to carpool or take the bus, cycle or walk to school**
- **Paper recycling units**
- **Solar lights for outdoors**
- **Waste water–grey water to water play ground, etc.**
- **Water harvesting system**

