Unique characteristics of environmental problems

Each environmental issue contributes to a host of interconnected challenges facing the Earth and human beings.

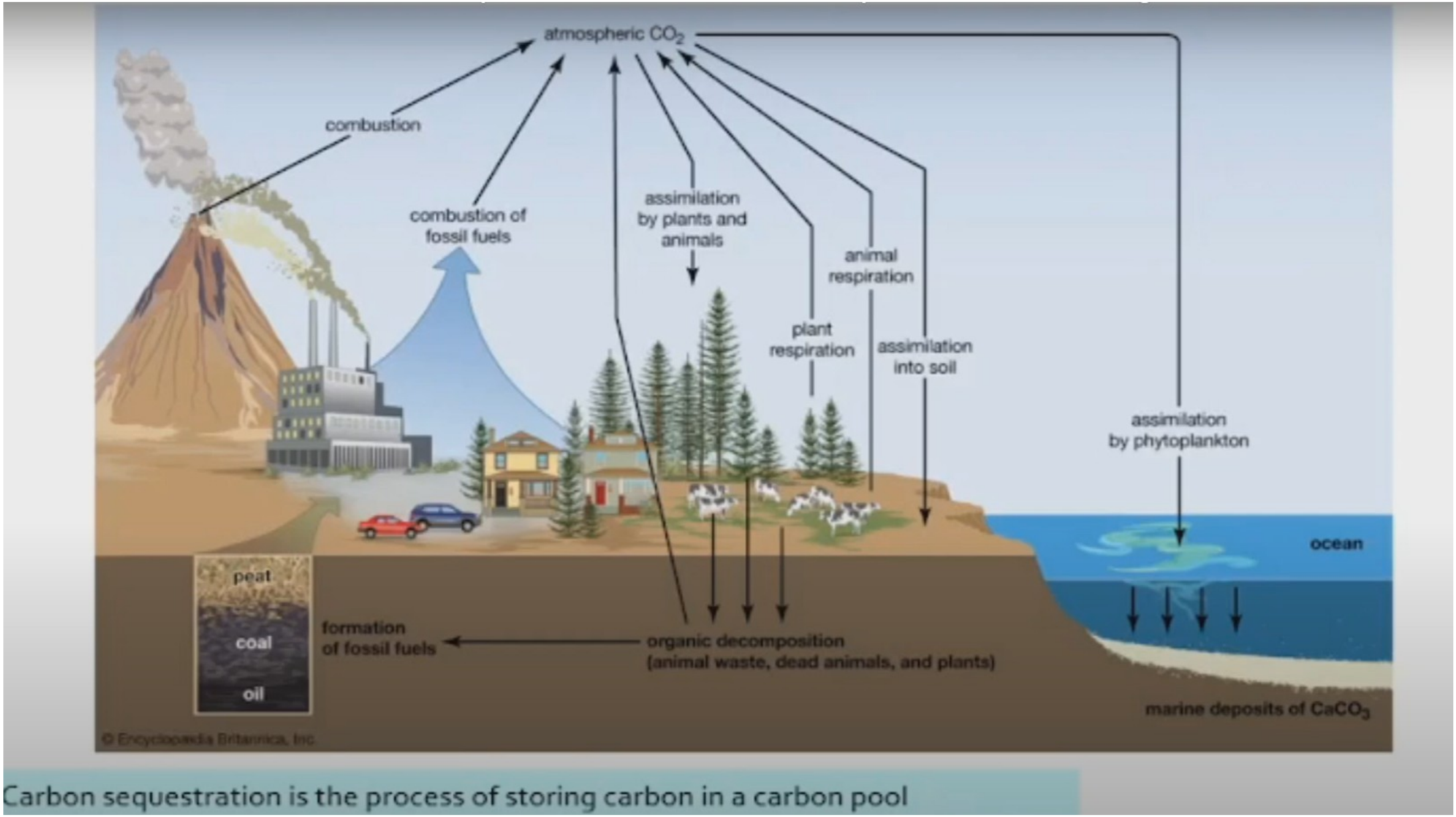
1. Climate change
2. Loss of biodiversity
3. Air pollution
4. Ocean health
5. Water pollution
6. Overpopulation
7. Energy use
8. Weather events

Climate change

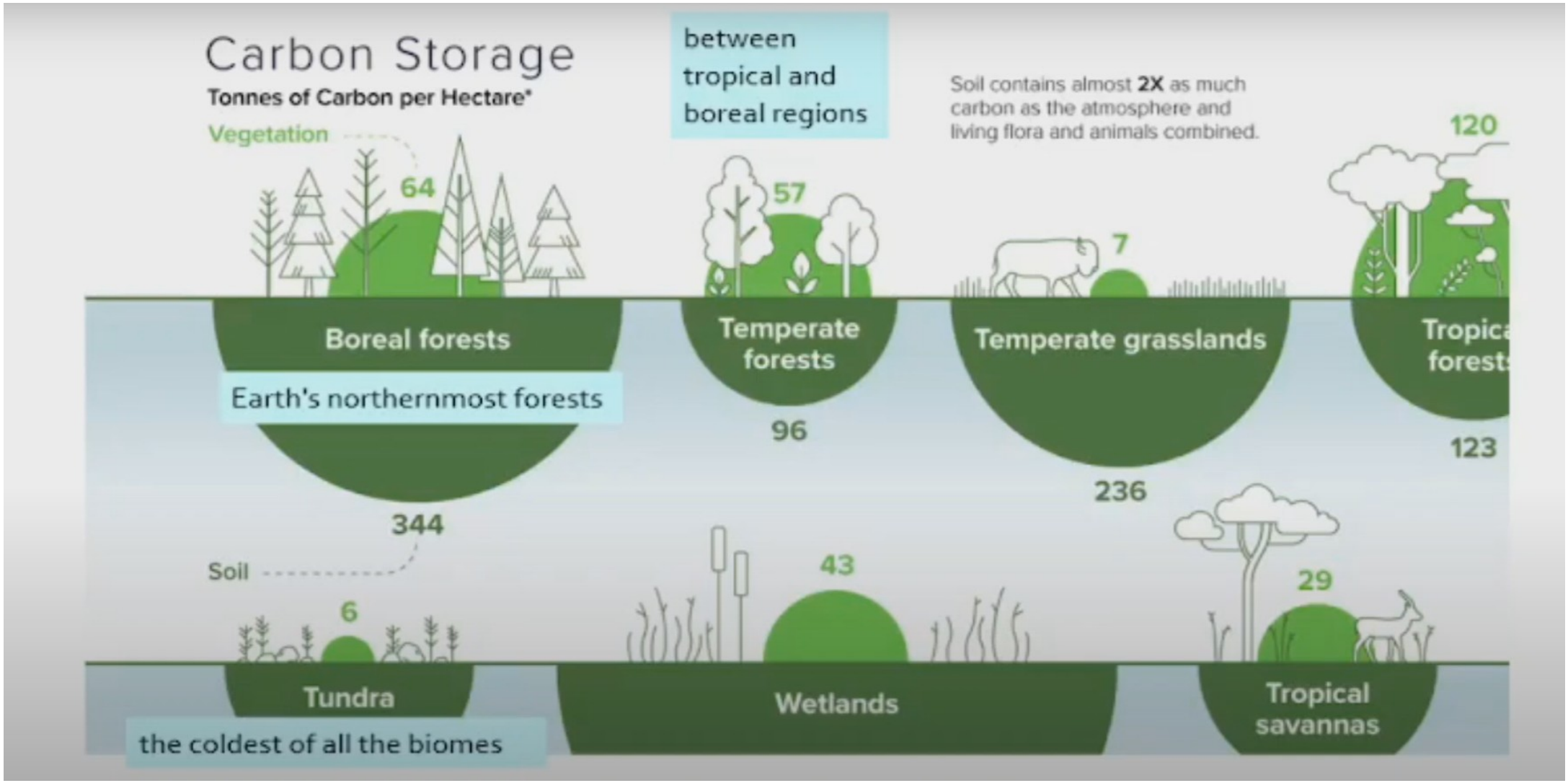
- Climate change refers to the long-term changes in temperature, precipitation, and other weather patterns caused by human activities such as burning fossil fuels.
- These activities have increased the number of greenhouse gas emissions released; these emissions trap heat within Earth's atmosphere, leading to increasing global temperatures.
- According to NASA, the Earth's average surface temperature has risen by about 1.7°C since the late 19th century.
- The results include melting glaciers, rising sea levels, disrupted ecosystems and an increase in severe weather events such as droughts, floods, heat waves and wildfires.
- Which is directly linked to a reduction in Arctic ice of 13.3% per decade.

Loss of biodiversity

- Biodiversity refers to the variety of life on Earth, including animals, plants, and microorganisms.
- From the Amazon to the tundra, biodiversity is essential to the ecological balance of the planet.
- A loss of biodiversity can lead to species extinction, put food and water supplies at risk and reduce carbon sequestration (the natural process of removing carbon dioxide from the atmosphere, which is essential to reducing climate change).
- Human activities, such as deforestation, agricultural expansion, land use changes and pollution, contribute to the overall loss of biodiversity.
- The use of pesticides can also harm non-target species and disrupt ecosystems.
- According to the World Wildlife Fund, the Earth has lost 69% of its wildlife populations since 1970.

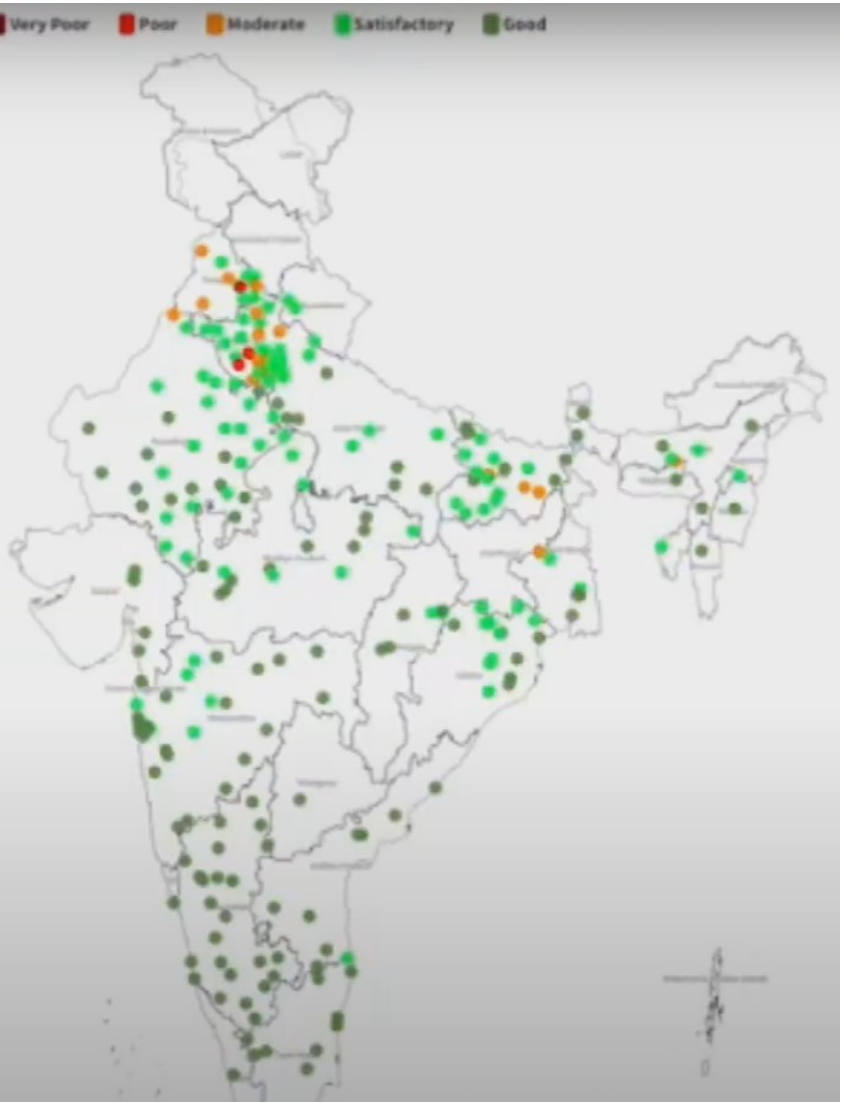


Carbon sequestration is the process of storing carbon in a carbon pool


Carbon Storage
Tonnes of Carbon per Hectare*
Vegetation
64
Boreal forests
Earth's northernmost forests
344
Soil
6
Tundra
the coldest of all the biomes
between tropical and boreal regions
57
Temperate forests
96
Soil contains almost 2X as much carbon as the atmosphere and living flora and animals combined.
7
Temperate grasslands
236
43
Wetlands
120
Tropica forest
123
29
Tropical savannas

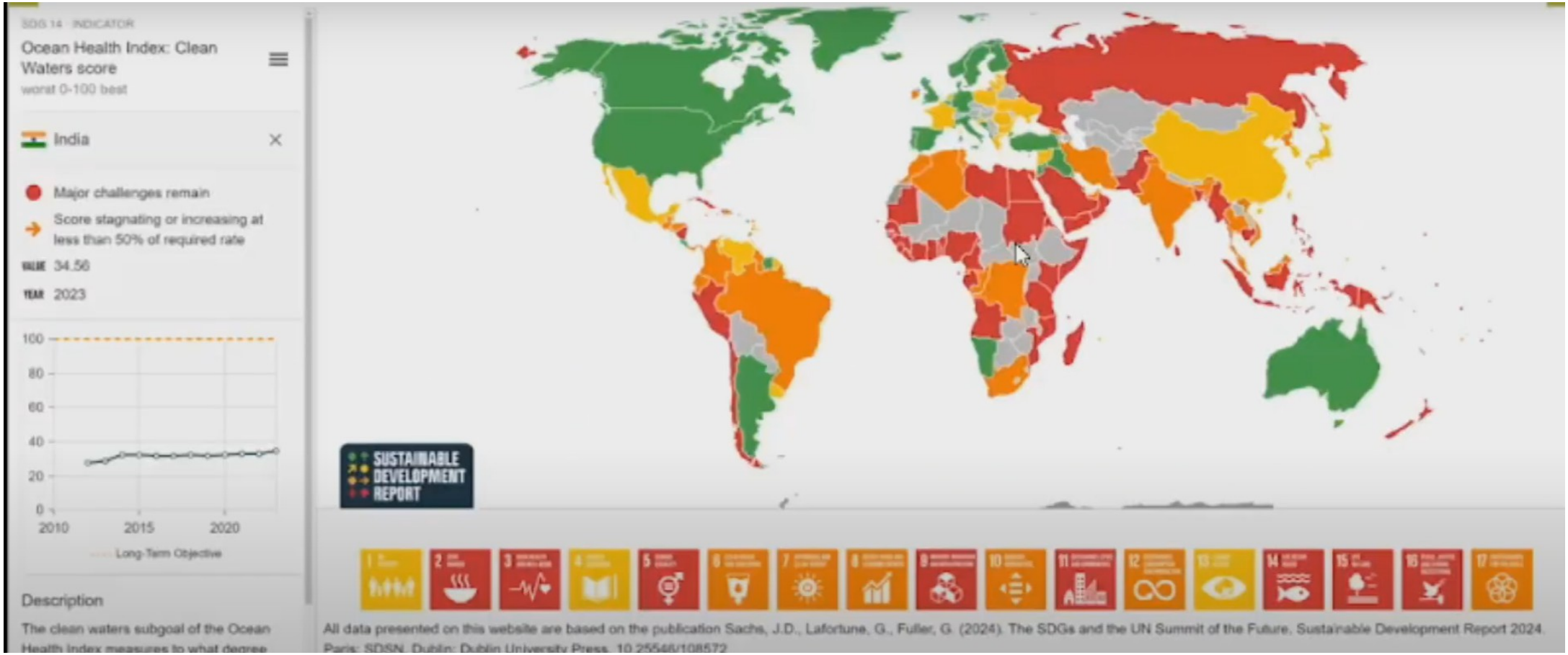
Air pollution

- Air pollution refers to the presence of harmful substances such as carbon dioxide, methane, and nitrogen dioxide in the air that people breathe.
- The burning of fossil fuels, industrial processes, transportation, and wildfires can have a negative impact on air quality.
- Exposure to fine particles, ground-level ozone, and other pollutants can cause respiratory problems, heart disease, cancer, and other health conditions.
- According to the World Health Organization, outdoor air pollution causes 42 lakhs premature deaths every year.



Ocean health

- Oceans absorb almost a third of the carbon dioxide that is released into the atmosphere; as global carbon emissions rise, so does the amount that is absorbed by oceans, leading to acidification.
- It is estimated that ocean acidity will increase by 150% by 2100 if efforts aren't made to halt it.
- Ocean acidification can harm marine life, disrupt ecosystems, and impact global food security.
- Pollution also puts the oceans at risk: the United Nations estimates that 1.1 Crore metric tons of plastic enter the water each year.
- While wastewater, oil spills, chemicals, and other pollutants cause harm to living organisms and their habitats.

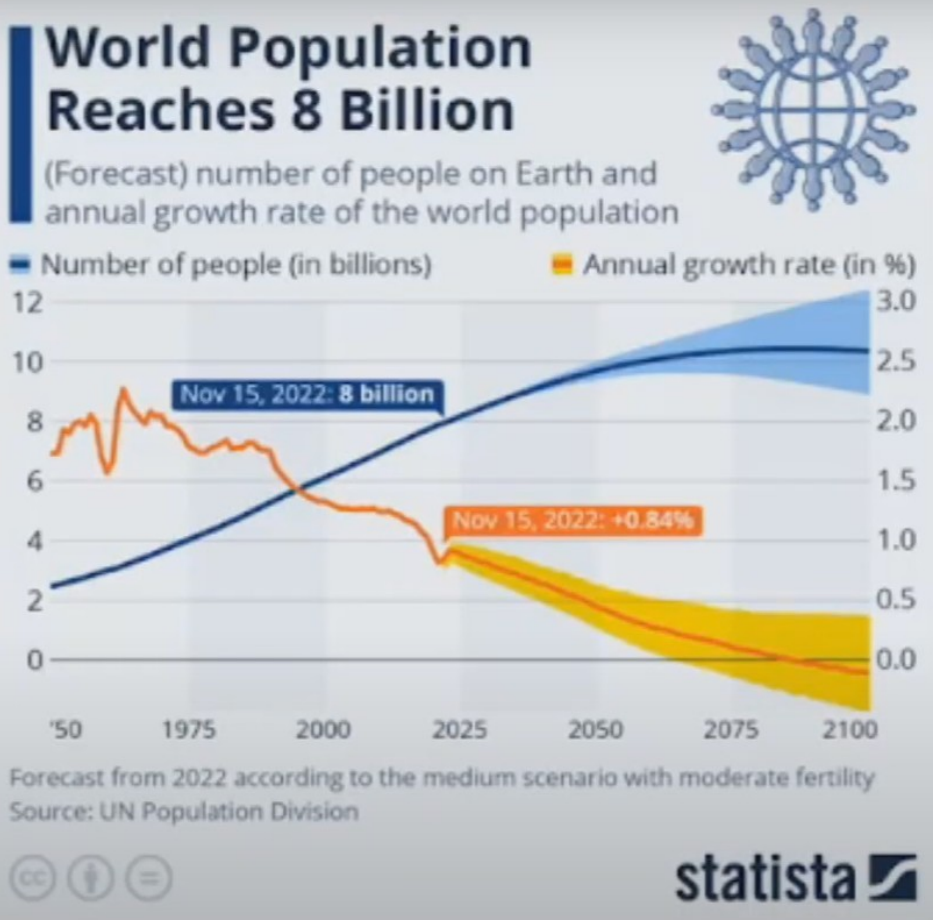

SDG 14 · INDICATOR
Ocean Health Index: Clean Waters score
worst 0–100 best
India
Major challenges remain
Score stagnating or increasing at less than 50% of required rate
VALUE 34.56
YEAR 2023
100
80
60
40
20
0
2010
2015
2020
Long-Term Objective
Description
The clean waters subgoal of the Ocean Health Index measures to what degree
SUSTAINABLE DEVELOPMENT REPORT
All data presented on this website are based on the publication Sachs, J.D., Lafortune, G., Fuller, G. (2024). The SDGs and the UN Summit of the Future. Sustainable Development Report 2024.
Paris: SDSN, Dublin: Dublin University Press. 10.25546/108572

Water pollution

- Beyond the ocean, Earth's other water supplies are also facing challenges.
- Safe drinking water is critical for human health; however, industrial waste, pesticides, and agricultural processes can pollute water sources.
- The presence of the resulting bacteria and chemical concentrations in drinking water can cause digestive problems, neurological illnesses, skin infections and more.
- More than a billion people worldwide do not have access to clean water.
- 20 lakh tons of sewage, agricultural and industrial waste enters the world's water every day.
- As climate change and human actions shrink the available water supply, two-thirds of the world's population may face water shortages by 2030.

Overpopulation

- According to the United Nations, the world's population is expected to reach 970 crore by 2050. (820 crore – 2024)
- As the global population grows, so does demand for natural resources, as well as human impact on the environment. The planet is now losing 30,000 species per year.
- Without sustainable development, overpopulation can lead to shortages in food, water and other resource depletion.
- It can also exacerbate issues like waste disposal, pollution, and deforestation that can contribute to public health problems.

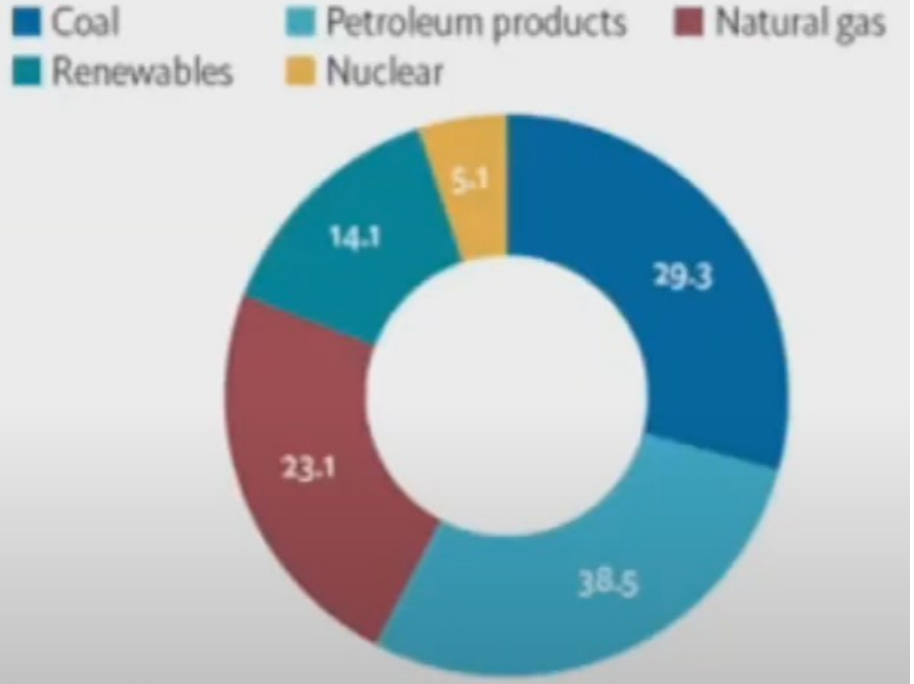


Energy use

- Today, fossil fuels are the primary source of energy for most individuals, businesses, and industries.
- Their combustion is a significant source of greenhouse gas emissions and may contribute to other environmental problems such as acid rain.
- Renewable energy sources such as solar, wind, and hydropower may offer ways to reduce carbon emissions but come with potential environmental impacts of their own.

Fossil fuels will still dominate energy consumption

(% of total; 2024)



Source: EIU.

Weather events

- Extreme weather events—such as hurricanes, floods, wildfires, droughts, and snowstorms—are becoming more frequent and severe due to climate change.
- These events pose a threat to both the environment and human populations, and can cause significant damage to infrastructure, homes and ways of life.
- Rising temperatures and rising sea levels, among other factors, contribute to the increase in extreme weather conditions.
- According to the World Meteorological Organization, extreme weather and climate events were responsible for 20 lakhs deaths and 3.6 lakh crore INR in economic losses between 1970 and 2021.

2023 - A Summer of Extreme Weather

The summer of 2023 saw record breaking weather events across the world with much of the Northern Hemisphere being battered by extreme weather events.

June

United Kingdom
Temperature records were broken in June 2023.

July

Italy
Extreme heat alerts as temperatures exceeded 40°C.

North Africa
Temperatures in Tunisia and Algeria reached 48°C.

Greece
Devastating wildfires released record-breaking volumes of CO2

East Asia
Typhoon Doksuri caused an estimated $15 billion damage.

August

Hawaii
Deadly wildfires caused devastation on the island of Maui.

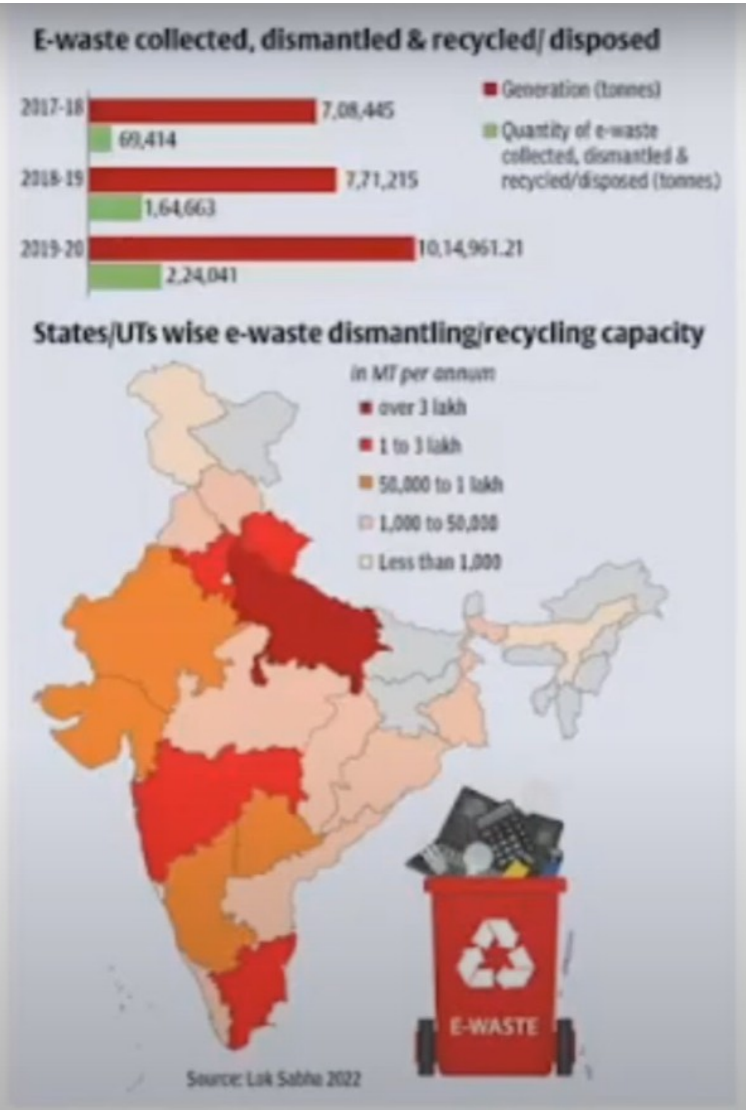
Canada
Eastern Canada experienced its worst August wildfire season.

California, USA
California experienced its first hurricane in 84 years.

Pakistan
Heavy rainfall caused flooding and the evacuation of 100,000 people.

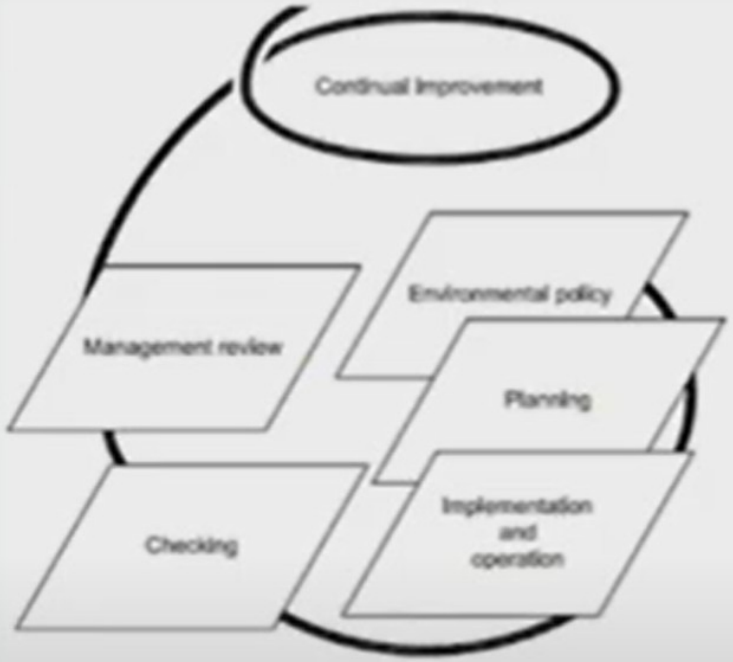
Waste Production

- The average person produces 4.3 pounds of waste per day, with the United States alone accounting for 220 million tons per year.
- Much of this waste ends up in landfills, which generate enormous amounts of methane.
- Not only does this create explosion hazards, but methane also ranks as one of the worst of the greenhouse gases because of its high global warming potential.

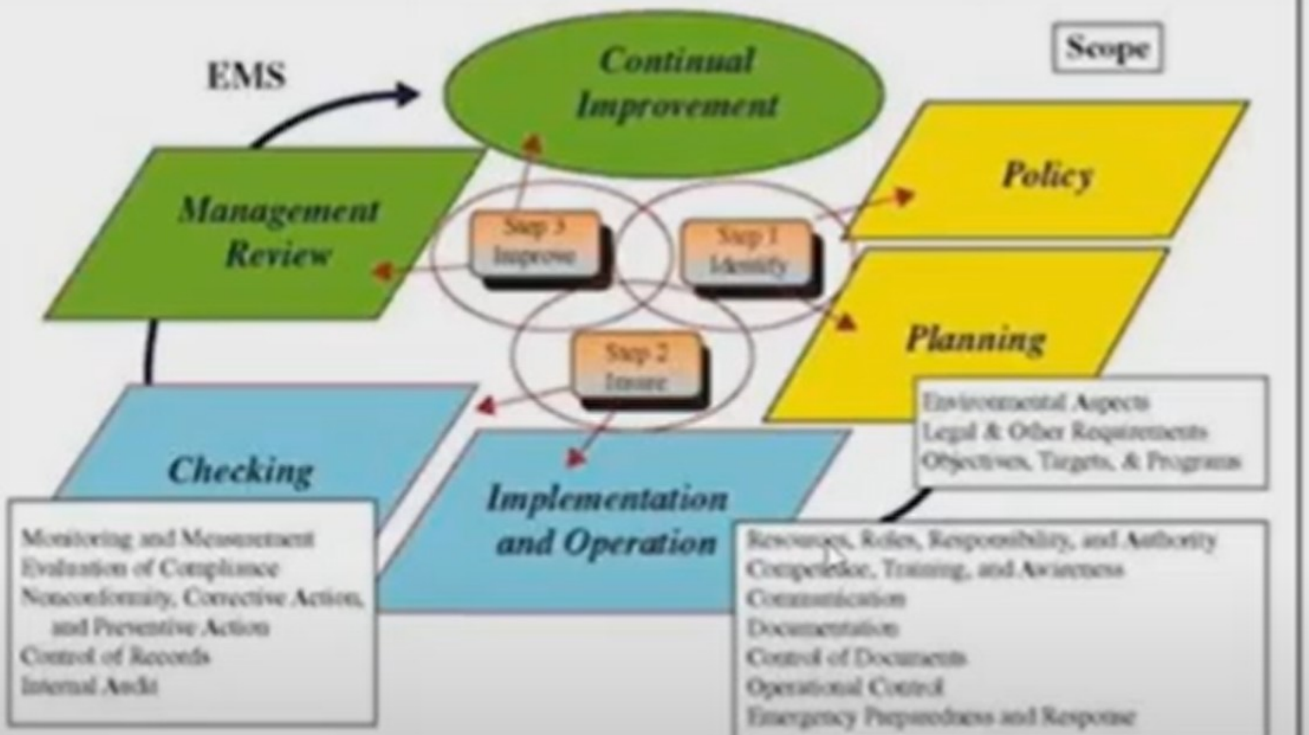


Systems Approach to corporate environmental Management

- This International Standard specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organization subscribes, and information about significant environmental aspects.
- It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence.
- A system approach is identifying, understanding, and managing integrated and interdependent processes and their risks that contribute to the organization's environmental management system effectiveness.

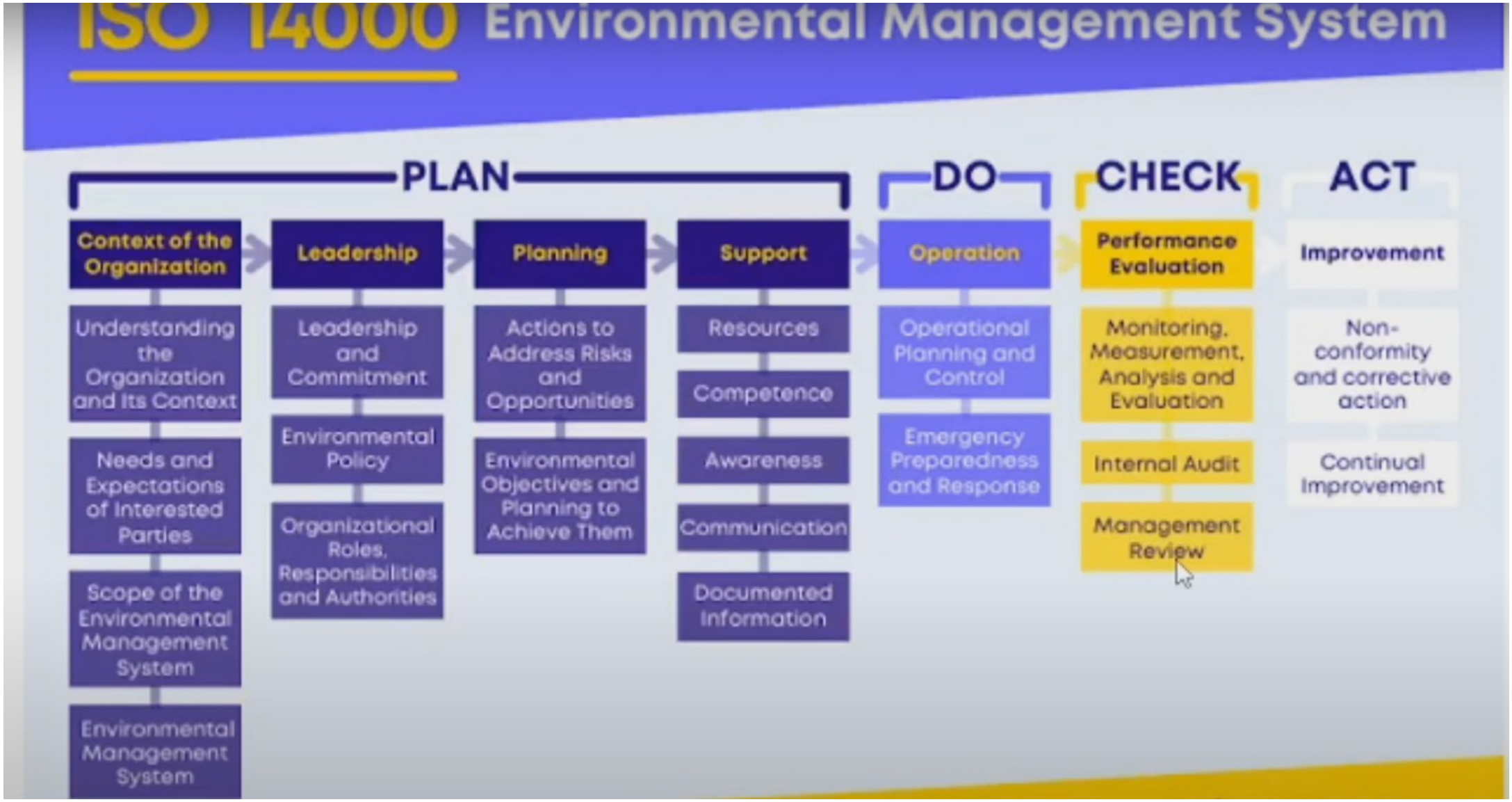


ISO 14001 Management System



Source: Pilot Performance Resources Management Inc.

Note: ISO 14001:2004 will be revised in 2015 updated to the Annex SL (refer to Part 3 in the book)


ISO 14000 Environmental Management System
PLAN
DO
CHECK
ACT
Context of the Organization
Understanding the Organization and its Context
Needs and Expectations of Interested Parties
Scope of the Environmental Management System
Environmental Management System
Leadership
Leadership and Commitment
Environmental Policy
Organizational Roles, Responsibilities and Authorities
Planning
Actions to Address Risks and Opportunities
Environmental Objectives and Planning to Achieve Them
Support
Resources
Competence
Awareness
Communication
Documented Information
Operation
Operational Planning and Control
Emergency Preparedness and Response
Performance Evaluation
Monitoring, Measurement, Analysis and Evaluation
Internal Audit
Management Review
Improvement
Non-conformity and corrective action
Continual Improvement

1.	Frame/backside	27 g (mainly plastics)
2.	Metal sheets	15 g
3.	Display	21 g (facing down, not visible)
4.	Battery	48 g
5.	PBAs/ICs	13 g
6.	Flex-films	6.5 g
7.	Cameras	1.5 g
8.	Other components	11 g

Fig. 1 Smartphone composition and accessories

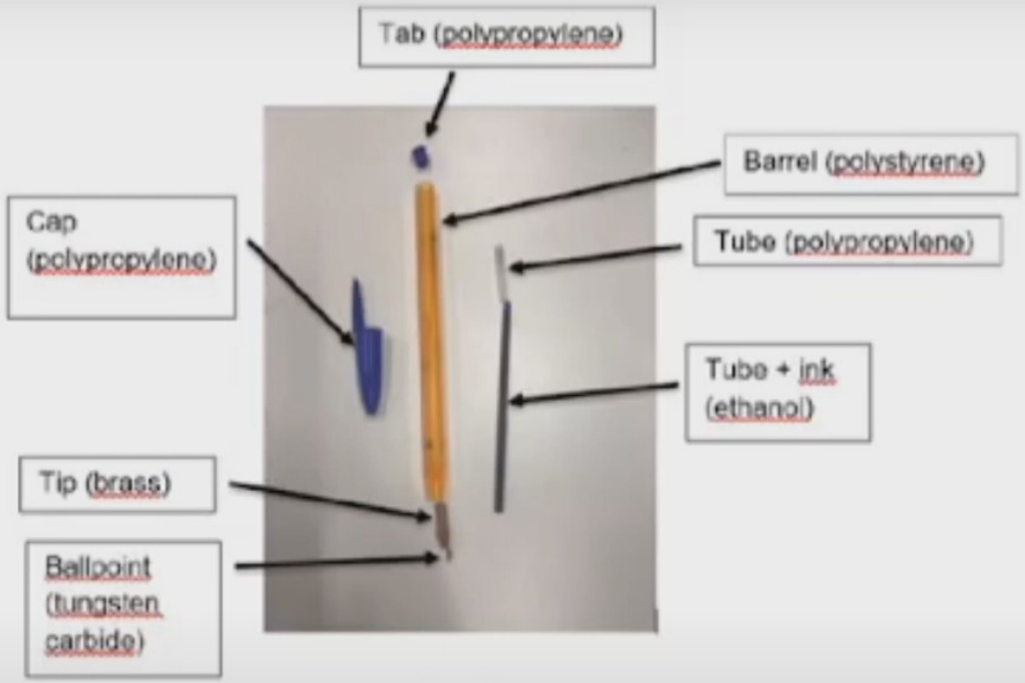
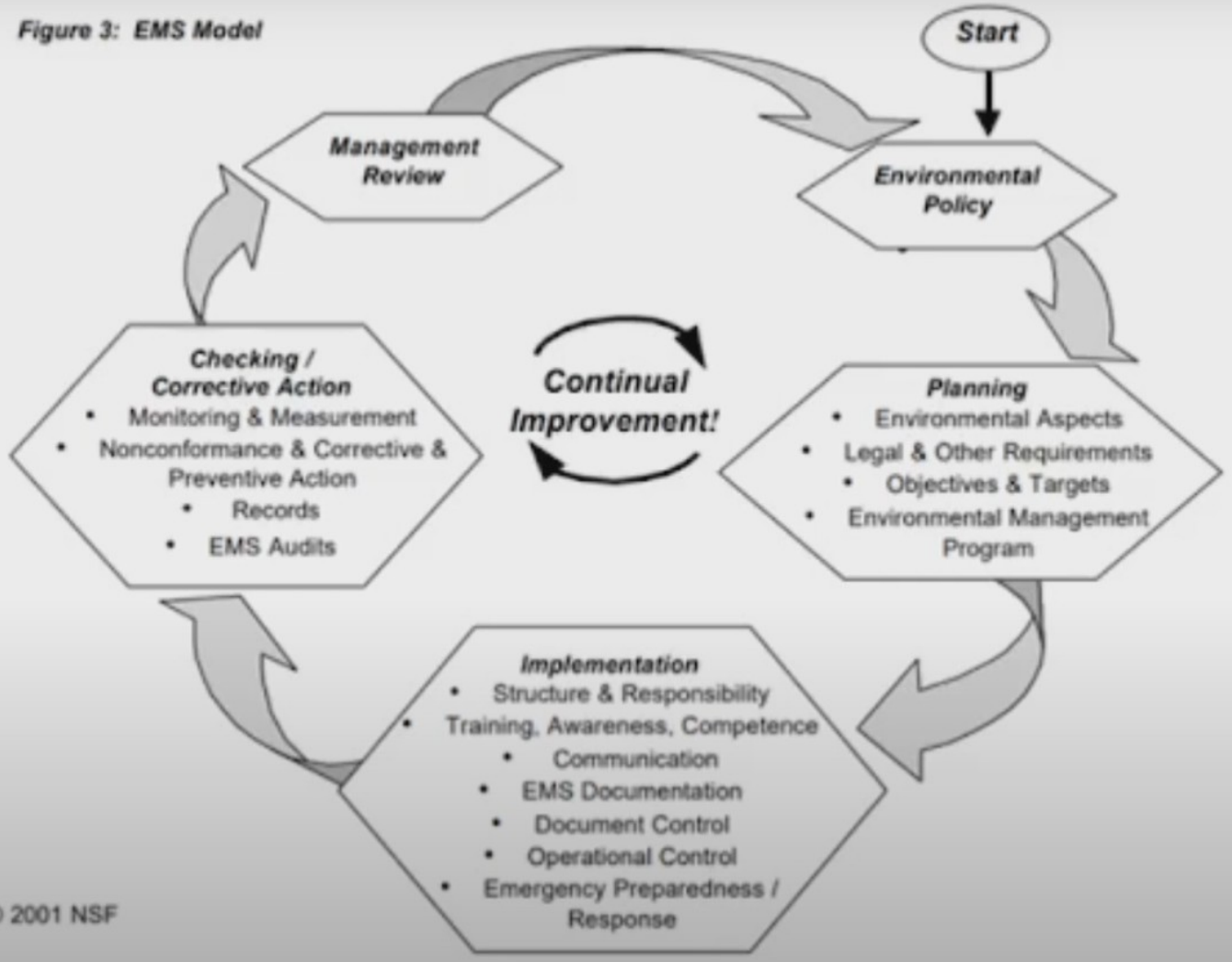


Table 4.3 Life cycle assessment (disposable ballpoint pen)

Activity	Environmental aspect	Environmental impact
Obtaining the raw materials	Extraction of oil	Natural resource depletion Potential water contamination Ecological habitat damage
Obtaining the raw materials	Extraction of metals	Natural resource depletion Potential water contamination Ecological habitat damage Visual intrusion
Manufacturing the plastic feedstock	Energy consumption	Greenhouse effect Local air quality Noise
Manufacturing the plastic feedstock	Use of chemicals, solvents, etc	Potential air and water contamination Local air quality
Manufacturing the pen	Energy consumption Paper and card	Greenhouse effect Local air quality Noise
Packaging the pen(s)	Energy consumption Paper and card	Greenhouse effect Local air quality Ecological habitat damage
Transporting the pens	Energy consumption	Greenhouse effect Local air quality Noise
Disposal of the pens	Landfill	Ecological habitat damage Visual intrusion Waste burden

Figure 3: EMS Model



- Reviewing the inputs and outputs of each process as only a section of the company as a whole contributes to understanding the effects on other processes within the organization.
- This approach helps managers avoid analyzing problems in isolation.
- The most common system model used for environmental management is the ISO 14001.
- There have been other models, such as the European Eco-Management and Audit Scheme (EMAS) and the Responsible Care model, developed by the American Chemical Council (ACC).
- Many organizations, when implementing their environmental management system (EMS) to ISO 14001 requirements, have used the PDCA methodology, based on Deming's "Plan-Do-Check-Act," implemented in post-WWII Japan.
- The focus in the twenty-first century has been on the environmental revolution, and the ISO management system's emphasis has been on continual improvement.
- In 1995, the Three-Step Process: Identify, Insure, Improve™ for management system implementation. These three steps can be applied not only to quality but also to implementation of an environmental management system