## Environmental Engineering and Environmental Challenges



#### The Global Context: Globalization and the Environment Introduction

Two aspects of globalization that have affected the environment are

1. The permeability of international borders to pollution and environmental problems.

 Growth of free trade and transnational corporations – Globalization of Economy.

### what are the 3 biggest environmental problems today?

- The UN system has adopted international frameworks for environmental issues in three key issues, which has been encoded as the "triple planetary crises": climate change, pollution, and biodiversity loss.
  - What is the biggest environmental challenge?
- 20 Biggest Environmental Problems of 2024 | Earth.Org
- 20 Biggest Environmental Problems of 2024
- Global Warming From Fossil Fuels. ...
- Poor Governance. ...

- Food Waste. ...
- Biodiversity Loss. ...
- Plastic Pollution. ...
- Deforestation. ...
- Air Pollution. ...
- Melting Ice Caps and Sea Level Rise.
- Ocean acidification
- Agriculture

- Food and water security
- Fashion and textiles wastes
- Over fishing
- Cobalt and other metal mining
- Soil degradation
- Electronic and solar energy including battery industry wastes

- Biomedical wastes
- Municipal and hazardous wastes
- Industrial wastes
- Animal and Plant wastes and over population
- Allergens and microbial wastes e.g., Corona-19
   Sars 2 Virus etc.

#### The Global Context: Globalization and the Environment Permeability of International Borders

- Environmental problems such as climate change and destruction of the ozone layer extend far beyond their source to affect the entire planet.
  - For example, toxic chemicals (such as polychlorinated biphenyls [PCBs] i.e., dioxins from the Southern Hemisphere have been found in the Arctic. Hg from coal burning.
- Another environmental problem involving permeability of borders is bioinvasion; the intentional or accidental introduction of organisms in regions where they are not native.

#### The Global Context: Globalization and the Environment Permeability of International Borders



#### **Bioinvasion:**

- Red fire ants, known for their painful sting, are an example of bioinvasion.
- They came from Paraguay and Brazil on shiploads of lumber to Mobile ( Port City ), Alabama, in 1957 and have spread throughout the southern states.
- Parthinium in wheat US.
- Loccust from Pakistan ?
- Corona 19 SARS 2 Virus
- Immigration forms declarations?

#### The Global Context: Globalization and the Environment The Growth of Transnational Corporation and Free Trade Agreements

- The World Trade Organization (WTO) and free trade agreements such as the North American Free Trade Agreement (NAFTA) and the Free Trade Area of the Americas (FTAA) allow transnational corporations to pursue profits, expand markets, use natural resources, and exploit cheap labor in developing countries while weakening the ability of governments to protect natural resources or to implement environmental legislation.
- Transnational corporations have influenced the world's most powerful nations to institutionalize an international system of governance that values commercialism, corporate rights, and "free" trade over the environment, human rights, worker rights, and human health.

#### Sociological Theories of Environmental Engineering Problems

#### **Structural-Functionalist Perspective**

- The structural-functionalist perspective raises our awareness of latent dysfunctions; negative consequences of social actions that are unintended and not widely recognized - Dams
- For example, the more than 840,000 dams worldwide provide water to irrigate farmlands and supply some of the world's electricity.
- Yet dam building has had unintended negative consequences for the environment.

#### Sociological Theories of Environmental Problems Conflict Perspective

- The conflict perspective focuses on how wealth, power, and the pursuit of profit underlie many environmental problems.
- To maximize sales, manufacturers design products intended to become obsolete. As a result of this planned obsolescence, consumers continually throw away used products and purchase replacements. Industry profits at the expense of the environment, which must sustain the constant production and absorb ever-increasing amounts of waste,
- Weak TVS, New models of cars, Products having shorter lives?

#### Sociological Theories of Environmental Problems Conflict Perspective

- Industries also use their power and wealth to influence politicians' environmental and energy policies as well as the public's beliefs about environmental issues.
  - In 2009, oil and gas industries spent \$175 million on lobbying—nearly eight times what pro-environmental groups spent.
- The conflict perspective is also concerned with environmental injustice (also known as environmental racism)—the tendency for marginalized populations and communities to disproportionately experience adversity due to environmental problems Vehicular Pollution, back flow of sewage, industrial wastes entering houses, export of toxic wastes/papers/plastics / computers to other countrues etc.

#### Sociological Theories of Environmental Problems Symbolic Interactionist Perspective

- Greenwashing: Refers to the way environmentally and socially damaging companies portray their corporate image and products as being "environmentally friendly" or socially responsible.
- Although greenwashing involves manipulation of public perception to maximize profits, many corporations make genuine and legitimate efforts to improve their operations, packaging, or overall sense of corporate responsibility toward the environment.

#### Sociological Theories of Environmental Problems Symbolic Interactionist Perspective

- Pinkwashing: the practice of using the color pink and pink ribbons and other marketing strategies that suggest a company is helping to fight breast cancer, even when the company may be using chemicals linked to cancer.
- Attractive Packing and Slogans
- Advertisement by Popular Players, Actors,
   Singers etc. Involvement in other social benefits and not essentially through this?

#### **Environmental Problems: An Overview**

- Ecosystems are the complex and dynamic relationships between forms of life and the environments they inhabit
- Over the past 50 years, humans have altered ecosystems more rapidly and extensively than in any other comparable period of time in history.
- Several species have vanished from the face of earth and become extinct and may not be recreated now?

### **Environmental Problems: An Overview Energy Use Worldwide**

- Until we experience a prolonged power outage, most of us take the availability of electricity for granted, and do not think about how dependent we are on energy.
- Most of the world's energy comes from fossil fuels, which include petroleum (or oil), coal, and natural gas.
- The next most common source of energy is hydroelectric power (6.2 percent), which involves generating electricity from moving water; while it is considered clean and renewable, it is criticized for affecting natural habitats.

#### **Cleaner Energy Sources**

- The share of renewables in global electricity generation reached 28.7% in 2021.
- India's installed renewable energy capacity has increased 396% in the last 8.5 years and stands at more than 174.53 Giga Watts (including large Hydro), which is about 42.5% of the country's total capacity (as of February 2023). India saw the highest year on year growth in renewable energy additions of 9.83% in 2022.

### **Environmental Problems: An Overview Depletion of Natural Resources:**

- Freshwater resources are being consumed by agriculture, by industry, and for domestic use.
- More than 1 billion people lack access to clean water.
- The demand for new land, fuel, and raw materials resulted in deforestation, the conversion of forest land to nonforest land.
- Desertification is the degradation of semiarid land, which results in the expansion of desert land that is unusable for agriculture.

### **Environmental Problems: An Overview Air Pollution – Stubble Burning**

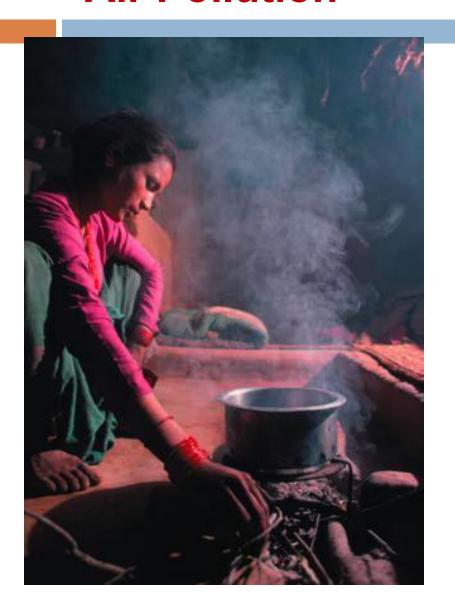
- Transportation vehicles, fuel combustion, industrial processes (such as burning coal and processing minerals from mining), and solid waste disposal have contributed to the growing levels of air pollutants, including carbon monoxide, sulfur dioxide, arsenic, nitrogen dioxide, mercury, dioxins, and lead.
- Air pollution, which is linked to heart disease, lung cancer, emphysema ( lung problem), chronic bronchitis, and asthma, kills about 3 million people a year.
- In the United States, about half of the population lives in areas where they are exposed to unhealthy levels of air pollution Environmental Impact Assessment Environmental Clearance are important..

### **Environmental Problems: An Overview Air Pollution Control Engineering**

#### Indoor Air Pollution

- Exposure to this indoor smoke increases risk of pneumonia, chronic respiratory disease, asthma, cataract, tuberculosis and lung cancer and is responsible for up to 1.6 million deaths a year (World Health Organization 2010).
- Exposure is particularly high among women and children, who spend the most time near the domestic hearth or stove.

#### **Environmental Problems: An Overview Air Pollution**



- Indoor air pollution is a serious problem in developing countries.
- As this woman cooks food for her family, she is exposed to harmful air contaminants from the fumes.

#### **Environmental Problems: An Overview Air Pollution**

- Destruction of the Ozone Layer
  - The ozone layer of the earth's atmosphere protects life on earth from the sun's harmful ultraviolet rays.
    - Stratosphere- 20 25 kms above.
  - Yet the ozone layer has been weakened by the use of certain chemicals, particularly chlorofluorocarbons (CFCs), used in refrigerators, air conditioners, spray cans, and other applications.
  - The depletion of the ozone layer allows hazardous levels of ultraviolet rays to reach the earth's surface and is linked to a variety of problems.

#### **Environmental Problems: An Overview Air Pollution**

#### Acid Rain

- Air pollutants, such as sulfur dioxide and nitrogen oxide, mix with precipitation to form acid rain. Polluted rain, snow, and fog contaminate crops, forests, lakes, rivers and oceans.
- For example: As a result of the effects of acid rain, all the fish have died in a third of the lakes in New York's Adirondack Mountains.

### **Environmental Problems: An Overview Global Warming and Climate Change**

- Global warming refers to the increasing average global air temperature, caused mainly by the accumulation of various gases (greenhouse gases) that collect in the atmosphere.
- Causes of Global Warming: The prevailing scientific view is that Greenhouse Gases, primarily carbon dioxide (CO2), methane, and nitrous oxide, accumulate in the atmosphere and act like the glass in a greenhouse, holding heat from the sun close to the earth.

### **Environmental Problems: An Overview Global Warming and Climate Change**

- Effects of Global Warming and Climate Change Climate change kills an estimated 30,000 people per year, mostly in the developing world (Global Humanitarian Forum 2009).
- The majority of these deaths are attributed to crop failure leading to malnutrition and water problems such as flooding and drought.
- Recent Problems ? Dubai ?

### **Environmental Problems: An Overview Global Warming and Climate Change**

The effects of global warming and climate change also include the following:



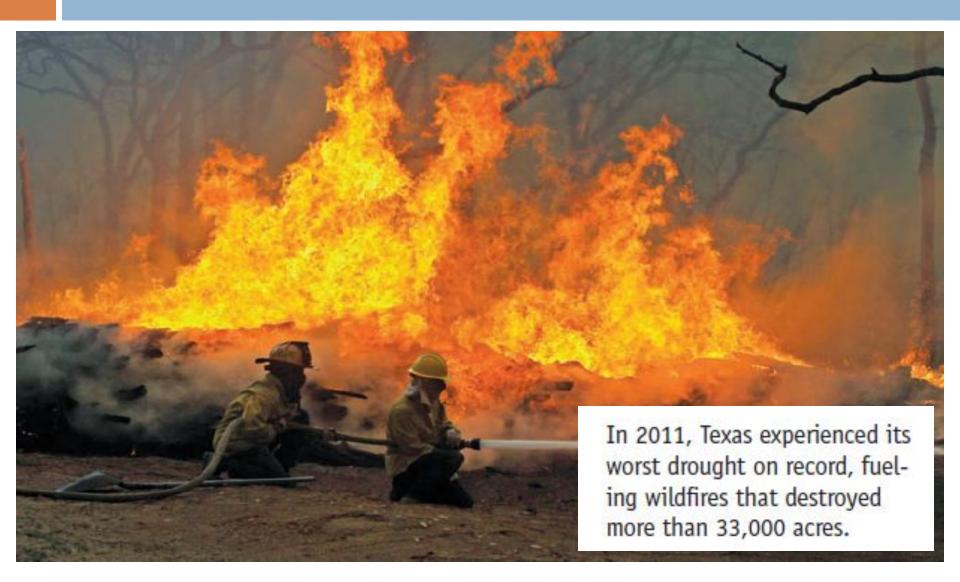








### **Environmental Problems: An Overview**Global Warming and Climate Change



#### **Environmental Problems: An Overview Land Pollution**

- About 30 percent of the world's surface is land, which provides soil to grow the food we eat.
- Increasingly, humans are polluting the land with nuclear waste, solid waste, and pesticides.
- In 2011, 1,287 hazardous waste sites (also called Superfund sites) were on the National Priority List in US.

#### **Environmental Problems: An Overview Land Pollution**

- Nuclear Waste: Nuclear waste, resulting from both nuclear weapons production and nuclear reactors or power plants, contains radioactive plutonium, a substance linked to cancer and genetic defects.
- Radioactive plutonium has a half-life of 24,000 years, meaning that it takes 24,000 years for the radioactivity to be reduced by half.

#### **Environmental Problems: An Overview Land Pollution**

- Solid Waste: In 1960, each U.S. citizen generated 2.7 pounds of garbage on average every day.
  - This figure increased to 3.7 pounds in 1980, and to 4.3 pounds in 2009. and to about almost 5 pounds in 2017.
  - This figure does not include mining, agricultural, and industrial waste; demolition and construction wastes; junked autos; or obsolete equipment wastes.
  - Just over half of this waste is dumped in landfills; the rest is recycled or composted.
  - E-waste: Discarded electrical appliances and electronic equipment PVs also in future.
  - MSW 62 mT in India per annum.

### What Do You Think? Single use Plastics in India – Micro or nanoplastics

What Do You Think? Plastic bags, commonly used in grocery and retail stores, are associated with a number of environmental problems. In the United States, most plastic shopping bags, which contain toxic chemicals, end up in landfills where it takes 1,000 years for them to degrade (Cheeseman 2007). Plastic bags also end up in oceans, where marine life can choke or starve after swallowing them. Some countries, such as South Africa, China, Thailand, and Bangladesh, have banned plastic shopping bags. In 2007, San Francisco became the first U.S. city to ban plastic bags from supermarkets and chain pharmacies. Other municipalities, including Westport, Connecticut; Brownsville, Texas; and North Carolina's Outer Banks region have also banned plastic shopping bags. Would you support a ban, or a tax, on plastic bags in your community?

#### **Water Pollution Control Engineering**

- Our water is being polluted by a number of harmful substances, including pesticides, vehicle exhaust, acid rain, oil spills, sewage, and industrial, military, and agricultural.
- In the United States, one indicator of water pollution is the thousands of fish advisories issued by the U.S. Environmental Protection Agency (EPA) that warn against the consumption of certain fish caught in local waters because of contamination with pollutants such as mercury and dioxin waste Minamata

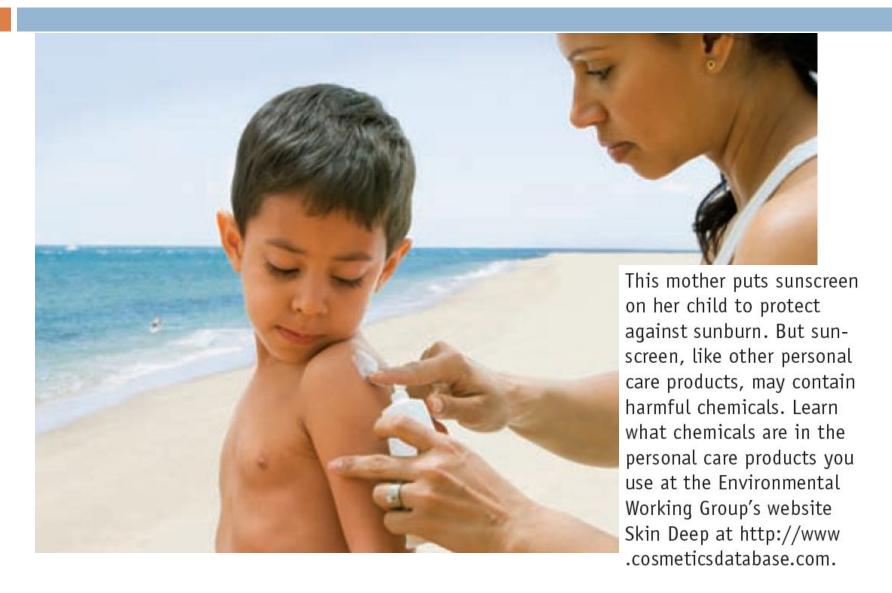
#### **Environmental Problems: An Overview Water Pollution**

- Water pollution also affects the health and survival of fish and other marine life. In the Gulf of Mexico, as well as in the Chesapeake Bay and Lake Erie, there are areas known as "dead zones" that—due to pollution runoff from agricultural uses of fertilizer—have oxygen levels so low they cannot support life.
- In recent years, there has been increasing public concern about the effects of hydraulic fracturing, or "fracking"— a process used in natural gas/ shale gas production that involves injecting at high pressure a mixture of water, sand, and chemicals into deep underground wells to break apart shale rock and release gas.

# Environmental Problems: An Overview Chemicals, Carcinogens, and Health Problems – Biomedical Engineering Approaches

- About 3 million tons of toxic chemicals are released into the environment each year.
- Chemicals in the environment enter our bodies via the food and water we consume, the air we breathe, and the substances with which we come in contact.
- The 12th Report on Carcinogens lists 240 chemical substances that are "known to be human carcinogens" or "reasonably anticipated to be human carcinogens," meaning that they are linked to cancer.

### **Environmental Problems: An Overview Chemicals, Carcinogens, and Health Problems**



# What Do You Think – Perfumes are pleasant or can also cause neurological problems, cancer or respiratory etc. problems?

What Do You Think? Some businesses and local governments are voluntarily limiting fragrances in the workplace or banning them altogether to accommodate employees who experience ill effects from them. What do you think about banning fragrances in the workplace or other public places?

## **Environmental Problems: An Overview Chemicals, Carcinogens, and Health Problems**

Multiple chemical sensitivity (MCS) also known as environmental illness, is a condition whereby individuals experience adverse reactions when exposed to low levels of chemicals found in everyday substances (vehicle exhaust, fresh paint, housecleaning products, perfume and other fragrances, synthetic building materials, and numerous other petrochemical-based products).

#### **Environmental Problems: An Overview**

#### Chemicals, Carcinogens, and Health Problems

TABLE 13.1 Threatened Spe	cies Worldwide, 2011
CATEGORY	NUMBER OF THREATENED* SPECIES IN 2011
Mammals	1,134
Birds	1,240
Amphibians	1,910
Reptiles	664
Fishes (bony)	1,816
Invertebrates (insects, snails, mollusks, etc.)	3,394
Plants	9,098
Other (fungi, lichens, brown algae)	9
Total	16,617

<sup>\*</sup>Threatened species include those classified as critically endangered, endangered, and vulnerable.

Source: IUCN 2011.

NoYWxsa2VuZ2VzMgcQIRigAR gKMgcQIRigARgKMgUQIRifBUj WjAFQAFjThQFwAXgBkAEAm AG4AqAByi2qAQgwLjI4LjUuMb gBA8gBAPgBAZgCI6AC-S6oAh TCAgcQIxgnGOoCwgIUEAAYgA QYkQIYtAIYigUY6gLYAQHCAh QQABiABBjjBBi0AhjpBBjqAtgB AcICCxAAGIAEGJECGIoFwgIIE AAYgAQYsQPCAgsQABiABBix AxiDAcICDhAAGIAEGLEDGIM BGIoFwgIIEC4YgAQYsQPCAgg QLhiABBjlBMICCxAuGIAEGLE DGOUEwgIEECMYJ8ICChAAGI AEGEMYigXCAg0QABiABBixA xhDGIoFwgIREC4YgAQYsQMY pAMYqAMYiwPCAgUQABiAB MICCxAAGIAEGLEDGIsDwgIK EAAVGAOVAhil ACICCRAAGIA

#### Top 10 Major Global Environmental Issues In The World

YouTube

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Business Upside

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25 May 2022

## **Environmental Problems: An Overview Chemicals, Carcinogens, and Health Problems**



Many personal care products contain chemicals with known or suspected adverse health effects.

# **Environmental Problems: An Overview Threats to Biodiversity**

- There are an estimated 8.7 million species of life on earth (some scientists believe the number is much higher), 1.3 million of which have been named and catalogued.
- This enormous diversity of life, known as biodiversity, provides food, medicines, fibers, and fuel; purifies air and freshwater; pollinates crops and vegetation; and makes soils fertile.

# **Environmental Problems: An Overview Light Pollution**

- Light pollution refers to artificial lighting that is annoying, unnecessary, and/or harmful to life forms on earth – Allergy even.
- The United States like much of the rest of the world, has become increasingly "lit up" with artificial light.
- Almost all people in developed societies use artificial light, reducing the natural period of darkness at night – sparrows, fish etc.

## Social Causes of Environmental Problems Population Growth

- The world's population is growing; in 2022 world population reached the 8 billion mark.
- China, India, USA, Indonesia, Pakistan,
   Nigeria, Brazil, Bangladesh,
- Russia, Japan, Europe ?
- Population growth places increased demands on natural resources and results in increased waste.
- Urbanisation is increasing (About 34 % in India as against 56 % world over).

## Social Causes of Environmental Problems Industrialization and Economic Development

- Many of the environmental problems confronting the world are associated with industrialization and economic development.
- Industrialized countries, for example, consume more energy and natural resources and contribute more pollution to the environment than poor countries.
- The relationship between level of economic development and environmental pollution is curvilinear rather than linear.
- Chemicals manufacturing also shifted to Asia/ China?
   India is worlds 6<sup>th</sup> largest producer of chemicals, while China, the United States, and Germany take the lead.

#### Strategies for Action: Responding to Environmental Problems Environmental Education

 One goal of environmental organizations and activists is to educate the public about environmental issues and the seriousness of environmental problems.

- Being informed about environmental issues is important because people who have higher levels of environmental knowledge tend to engage in higher levels of pro-environment behavior.
- Educating the students about environment,
   ecology biodiversity and ithe dire need for

"Green" Energy

- Increasing the use of green energy; energy that is renewable and nonpolluting—can help alleviate environmental problems associated with fossil fuels.
- Also known as clean energy, green energy sources include solar power, wind power, biofuel and hydrogen.
- E Vehicles, Fuel cells, Maglev trains create no direct pollution emissions and are significantly quieter than traditional transport methods when operating at the same speed.

"Green" Energy



"Green" Energy Technologies

- Solar and Wind Energy: Solar power involves converting sunlight to electricity through the use of photovoltaic cells. China, USA, India are the main nations.
- Biofuel: Biofuels are fuels derived from agricultural crops. Two types of biofuels are ethanol and biodiesel. CBG, Bioethanol, Biodiesel, Green diesel etc.

Modifications in Consumer Behavior



#### **Green Building**

The Adam Joseph Lewis
Center for Environmental
Studies, on the Oberlin
College campus, Ohio, USA
is among the most
environmentally friendly
buildings in the world. The
building resulted from the
vision of David Orr,
professor of environmental
studies at Oberlin.

## Maglev (derived from magnetic levitation)- 603 kms/hr- China, Japan and Korea



#### **Hazardous Wastes**

- PRODUCTION, USE AND DISPOSAL OF CHEMICALS INCLUDING PESTICIDES
- GENERATION, TRANSPORTATION AND DISPOSAL OF HAZARDOUS WASTES.
- IRRESPONSIBLE INTERNATIONAL TRADE IN HAZARDOUS
   CHEMICALS AND WASTES PRODUCTION AND USE OF PERSISTENT ORGANIC
- POLLUTANTS POPs (Organochlorine pesticides, such as DDT, industrial chemicals, polychlorinated biphenyls (PCB) / dioxins etc. such as DDT, industrial chemicals, polychlorinated biphenyls (PCB) as well as unintentional by-products of many industrial processes, especially polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF), commonly known as dioxins.

#### **NATIONAL MEASURES**

- Effective implementation of National Policies and Legislation
- Effective management of production,
   transport, storage and use of chemicals
- Effective disposal of hazardous wastes (HW) HW
   Sanitary Landfills sites, Incineration etc.
- Phasing out production and use of persistent organic pollutants.
- Development of alternative feedstocks
   and disposal options Green Chemistry.

### Hazardous Waste Management

- INTERNATIONAL ACTION :
- BASEL CONVENTION ON THE
- CONTROL OF TRANSBOUNDARY
- MOVEMENTS OF HAZARDOUS WASTES AND THEIR DISPOSAL.
- ROTTERDAM CONVENTION ON THE
- PRIOR INFORMED CONSENT
- PROCEDURE FOR CERTAIN
- HAZARDOUS CHEMICALS AND PESTICIDES IN
- INTERNATIONAL TRADE.

 CHEMICALS PROGRAMMES OF UN Environment Program (UNEP)

AND UN Food & Agricultural Organization (FAO)

STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS :

Organochlorine pesticides, such as DDT, industrial chemicals, polychlorinated biphenyls (PCB) as well as unintentional by-products of many industrial processes, especially polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF), commonly known as dioxins.

### Corporate Social Responsibility

- Environmental Impact Assessment
- NABET (National Accreditation Board of Education and Training) of QCI.
- MOEF CC Environmental Clearance
- CPCB
- □ SPCB
- Environmental, Social, and Governance (ESG)
   Practices PHDCCI, New Delhi Industries must
   come forward to conserve Environment.

# Environmental Impact Assessment Rule in India

- What is the EIA law in India?
- EIA has been made mandatory under the Environmental Protection Act, 1986 for 29 categories of developmental activities involving investments of Rs. 50 crores and above.

The Environment Impact Assessment (EIA)

Notification, 2006, is the governing legal
instrument to grant green clearance for the
establishment or expansion of an industry on the
basis of the potential environmental impact of the
project.

https://www.google.com/search?q=environmental+ challenges+of+the+world+in+2025+video&sca es v=11c15b9305e87a82&rlz=1C1YTUH enlN1045l N1045&sxsrf=AHTn8zpE7ghE\_IVfX3XpHRNjeSeyN Y5iXA%3A1745130496239&ei=AJQEalCvDo-sse MP4d Q6Q8&ved=0ahUKEwiAr8La eWMAxUPV mwGHeEvNP0Q4dUDCBA&uact=5&oq=environme ntal+challenges+of+the+world+in+2025+video& gs\_lp=Egxnd3Mtd2l6LXNlcnAiM2Vudmlyb25tZW5 0YWwgY2hhbGxlbmdlcyBvZiB0aGUgd29ybGQga W4gMjAyNSB2aWRlbzlFECEYoAFlqCRQkQhY2xx wAXaBkAEAmAHkAaAB-AiaAQUwLiQuMraBA8aBA

Environment in 2025: what to expect

- YouTube
- •
- Down To Earth
- \_ •
- □ 18 Jan 2025

- Simple and Solved Numericals on Carbon Managenent t and Engineering for self studies ?
- These solved problems (Emission Factor / Carbon emission and Carbon content in the air are self explanatory and are being uploaded on the Google Classroom and are part of the syllabus for the End Semester Examination as discussed in the class room and agreed by the students there. If any clarification is required please contact Prof.D.K.Sharma.

### Videos on visits

https://www.google.com/search?q=Humans%2C+B iodiversity%2C+and+Habitat+Loss+%E2%80%94 +HHMI+...&sca\_esv=d422ceb1a630167d&sxsrf= ACQVn08FyORICHd6RNm6gtTAgeTd2lg9Ow%3A 1712816034969&ei=on8XZsrbOqjXseMPxp2mgA M&ved=0ahUKEwjKtNH6wLmFAxWoa2wGHcaOC TAQ4dUDCBA&uact=5&oq=Humans%2C+Biodiver sity%2C+and+Habitat+Loss+%E2%80%94+HHMI +...&gs\_lp=Egxnd3Mtd2l6LXNlcnAiM0h1bWFucyw gQmlvZGI2ZXJzaXR5LCBhbmQgSGFiaXRhdCBMb3 NzIOKAICBISE1 JIC4uLjIGEAAYFhgeMggQABiABBiiB DIIEAAYaAQYoaQyCBAAGIAEGKIESMY9UABYvy5

- **2.**
- https://www.youtube.com/watch?v=MwTNNUudW hl

#### 3. VISIT TO YAMUNA BIODIVERSITY PARK:

https://www.google.com/search?q=video+on+a+v isit+to+biodiversity+site&rlz=1C1YTUH\_enlN1045I N1045&oq=video+on+a+visit+to+biodiversity+sit e&gs\_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRi gATIHCAIQIRigAdIBCjE4MTgwajBqMTWoAgiwAgE &sourceid=chrome&ie=UTF-8#fpstate=ive&vld=ci d:a749c67f,vid:MOMfi1FOOiQ,st:0

#### 4. Visit to Kuno Park - Return of Cheetahs:

https://www.youtube.com/watch?v=AXJxuyde5mY

#### ■Thank You All

- Best Wishes for Your Excellent
   Careers Ahead
- May God Bless All of You Always.
- You are always most welcome for any help or advice in future
- Prof.D.K.Sharma
- Formerly From IIT Delhi