Global Environmental Threats and Responses

- **The Environment as a Collective Good**
- The global threats to the natural environment are a growing source of collective concern due to the nature of interdependence that characterizes the environment.
- The actions of a state regarding pollution, conservation, and natural resources routinely affect other states.
- Because environmental effects tend to be *diffused* and *long term* and because such effects easily spread from one location to another, international environmental politics creates difficult collective goods problems.
- A **collective good** is one shared by everyone but owned by no one.
- The collective goods problem arises in each issue area concerning the environment, resources and population.

- The technical, scientific, and ethical aspects of managing the environment are complex, but the basic nature of states' interests is not.
- A sustainable natural environment is a collective good, and states bargain over how to distribute the costs of providing that good.
- The fundamental dilemma that confronts the environment is the **tragedy of the commons.**
- (Centuries ago, the commons were shared grazing land in Britain. Too many people kept too many sheep which led to overgrazing. While it was profitable for the sheep owner to add one more sheep, it had effect on the grazing capacity of the land. Britain solved the problem by enclosure of the commons.)

- According to the economic theory of the "tragedy of the commons", the earth's natural resources become overexploited when they are considered free.
- The earth's stock of resources is limited – finite resources such as oil can be used up, living resources such as forests and fish can be overused and depleted.
- As the tragedy of the commons explains, such goods are prone to abuse because of the selfish character of human nature.
- Actions such as industrial production and the overconsumption of manufactured goods and services that abuse the environment benefit the individual but may harm the community.

- This tragedy can easily be seen in the current concern over the depletion of the atmospheric layer of ozone that protects the earth from harmful solar radiation.

- Each time someone uses the chemicals that are responsible for ozone depletion – in a refrigerator, for example, or in an aerosol spray – that person gets a direct and immediate benefit.

- Yet the harm to the environment is shared by all the inhabitants of earth and may not become apparent for years to come.

- In weighing costs and benefits, we find that the benefits are clear and immediate while the indirect costs (to the person making the choice) are negligible, diffused, and hard to evaluate.

- For example, the world's major fisheries in international waters are not owned by any state; they are a collective good.

- The various fishing states must cooperate (partly by regulating non-state actors such as MNCs) to avoid depleting the stocks of fish.

- If too many states fail to cooperate, the fish populations decline and everyone's catch drops.

- And indeed, in 1997-2007, catches worldwide declined by about 15 percent. Further declines are projected.

- Because the world's states did not solve the collective goods problem of world fisheries, they are paying $20 billion a year in subsidies to bankrupt fishing industries in their respective countries.

- **The Environment and the Prisoners' Dilemma**
- Many argue that the state should play a role in preventing or correcting the environmental tragedy of the commons.
- If society values the environment, but individuals abuse it, the state is left to take corrective action.
- State environmental regulations are prevalent in many countries. In some countries, political green parties have been formed to influence state environmental policy in this direction.
- When environmental problems become global, the state's ability to deal with them breaks down.

- Even environmentally concerned governments fall victim to a prisoners' dilemma when it comes to global environmental problems.

- The prisoners' dilemma occurs when self-interest becomes a barrier to the cooperation that is necessary to achieve collective benefits.

- The environmental prisoners' dilemma is created by the nature of the costs of environmental improvements relative to the benefits.

- Consider the example of global ozone depletion. Scientists are fairly clear about what is necessary to reduce or reverse ozone depletion: an expensive change in how some goods and services are produced.

- If all nations were to adopt policies to regulate ozone-depleting industry, the problem could be significantly reduced. Cooperation, with everyone sharing the cost, is necessary here.

- Suppose that all nations have adopted the necessary regulation. What would happen if a single nation, say South Korea, were to "defect" from the group and begins once again to use cheaper industrial processes that harm the ozone layer?

- The effect on the global ozone problem would be small – no single country has that much impact on a global problem.

- The benefit to South Korea would be relatively large and quite positive.

- South Korea would suddenly be relieved of a costly burden; its products, because they would be cheaper , would have a competitive advantage on world markets.

- South Korea, the environmentally unfriendly defector, would gain wealth and perhaps power at the expense of other countries, while hardly harming the ozone layer at all.

- If a nation can achieve competitive benefits with little cost from "defecting" from an environmental agreement, then some nations will be tempted to do so. If one nation defects, others may follow.

- The prisoners' dilemma explains why it is so much harder to address global environmental problems than those problems that are confined to a single nation or locality.

- This insight is critical because of the changing nature of environmental problems today.

- Because states are usually more interested in generating wealth and power than they are in saving the planet, many look past the nation-state for solutions to global environmental problems that are becoming more severe every day.

- **Emerging Issues Of Concern in our Global Environment**
- The UNEP Year Books 2014 and 2016 identified emerging issues of concern in our global environment to include:
- *i) Excess Nitrogen in the Environment*
- Nitrogen is an essential nutrient for plant growth.
- The discovery a century ago of an industrial process that converted nitrogen in the air to ammonia made the manufacture of nitrogen fertilizers possible.
- This discovery was followed by a spectacular increase in global food production.

- There is an abundance of nitrogen in the atmosphere, but this nitrogen exists almost entirely in a form that is unusable by most organisms.
- As nitrogen moves through the environment, the same nitrogen atom can contribute to multiple negative effects in the air, on land, in freshwater and marine systems, and on human health.
- This sequence continues over a long period and is referred to as the 'nitrogen cascade'
- Excess nitrogen in the environment contributes to many health and environmental problems, including:
  - Coastal dead zones and fish kills due to severe eutrophication (**depletion of oxygen in water**) or hypoxia resulting from nitrate run-off and leaching into river systems

- Biodiversity loss in terrestrial, freshwater and coastal water systems due to eutrophication and acidification
- Groundwater pollution by nitrates
- Freshwater pollution due to eutrophication and acidification
- Human health impacts resulting from the formation of aerosols and ground-level (tropospheric) ozone, a main component of smog, causing respiratory diseases
- Reduced crop, forest and grassland productivity due to nitrogen deposition and over-fertilization, as well as ground-level ozone exposure
- Global climate change and the depletion of stratospheric ozone, which protects life on Earth from harmful ultraviolet (UV) rays

- *ii) The Emergence of Infectious Diseases*
- Environmental change plays a major role in the emergence and re-emergence of infectious diseases.
- For example, the deterioration or destruction of natural habitats can reduce the number of natural predators, change the dominance of species, or create favourable conditions for disease hosts.
- Infrastructure, such as dams and irrigation channels, creates ideal environments for mosquitoes, which are the vector responsible for diseases like malaria and dengue fever.

- Human infectious diseases are caused by pathogenic microorganisms such as bacteria, viruses, parasites and fungi that spread directly or indirectly via a vector from one person to another or from an animal to people.
- Many people worldwide lack adequate sanitation, waste management or vector control.
- In 2012, 863 million people lived in slum-like conditions.
- Overcrowding provides a breeding ground for infectious diseases like influenza, malaria and West Nile virus that are carried by water, air, food, mosquitoes or rodents.

- Over the last few years, several emerging zoonotic diseases made world headlines as they caused, or threatened to cause, major pandemics.

- These include Ebola, bird flu, Middle East respiratory syndrome (MERS), Rift Valley fever, sudden acute respiratory syndrome (SARS), West Nile virus, and Zika virus disease.

- The pathogens causing these diseases have wildlife reservoirs that serve as their long-term hosts.

- In the last two decades, emerging diseases have had direct costs of more than US$100 billion; if these outbreaks had become human pandemics, the losses would have amounted to several trillion dollars

- ***iii) Fish and Shellfish Farming in Marine Ecosystems***
- Today, aquaculture provides half of all fish for human consumption and the sector is expected to grow.
- Aquaculture production has increased since the 1950s from 650 thousand tons to almost 67 million tons. In the same period, the total marine catch has increased from 20 million to about 80 million tons.
- While significant progress has been made over the past decades towards making marine aquaculture more sustainable, environmental concerns remain.

- Broadly speaking, fish farms can release nutrients, undigested feed and veterinary drugs, and other biocides to the environment.

- They can also create conditions that increase risks of diseases and parasites and of harmful algal blooms. In some countries certain forms of shrimp farming have destroyed large areas of coastal habitats, such as mangrove forests.

- Farmed fish and shellfish can escape to surrounding waters, which may have negative impacts on ecosystems through genetic regression or introduction of invasive species.

- Use of fish-based feeds in aquaculture can put additional pressures on poorly managed wild fish stocks and on the marine environment

- ***iv) Illegal Trade in Wildlife***
- Illegal trade in wildlife has high environmental, social and economic costs
- At the start of the 20th century, Africa was home to an estimated million black rhinos belonging to four sub-species.
- By 2007 there were fears that the Western black rhino had become extinct and the number of wild northern white rhino had drastically reduced.
- This is due to rise in the levels of poaching and illegal trade in ivory targeting elephant tusks and rhinoceros horns.

- Demand for illegal wildlife products is based on their use in traditional East Asian medicine and a desire for status symbols, among other factors.
- Illegal trade in animals, plants (including timber and charcoal) and fish is one of the largest sources of criminal earnings in the world – ranking alongside trafficking of drugs, people and arms.
- Today illegal wildlife trade is estimated to be worth US$50- 150 billion per year.
- The global illegal fisheries catch is valued at US$10-23.5 billion a year and illegal logging, including processing, at US$30-100 billion.
- The environmental, social and economic costs of illegal wildlife trade could be seen in the threats to the ecosystems resulting in the destruction of biodiversity.

- Loss of species can have devastating consequences.

- As an example, elephants are 'ecological engineers'. They change the landscape by uprooting grasses and trees, stripping bark and dispersing the seeds of the forage they eat, helping to create rich and diverse environments.

- The resulting biodiverse ecosystems not only support humans with food and other resources – and make environmentally sustainable tourism activities possible –they are also more resilient in the face of threats from e.g. diseases or extreme weather.

- ***v) Air Pollution: World's Worst Environmental Health Risk***
- Millions of people in both developing and developed countries die prematurely every year because of long-term exposure to air pollutants.
- The health of many more is seriously affected.
- The World Health Organization (WHO) estimated that in 2012 around 7 million premature deaths resulted from air pollution.
- Sources of air pollution include traffic (especially diesel vehicles), industrial sectors (from brick making to oil and gas production), power plants, cooking and heating with solid fuels (e.g. coal, wood, crop waste), forest fires and open burning of municipal waste and agricultural residues.

- Between 2005 and 2010, the death rate rose by 4% worldwide.

- Cost of air pollution to society in 2010 was estimated at US$1.4 trillion in China and US$0.5 trillion in India according to a recent study by the Organisation for Economic Co-Operation and Development (OECD).

- In Europe, exposure to air pollution from road transport costs about US$137 billion per year and harm caused by air pollution from the 10,000 largest polluting facilities in 2009 – including through lost lives, poor health and crop damage – was about US$140-230 billion.

- ***vi) Plastic Debris in the Ocean***
- Every year large amounts of plastic debris enter the ocean from both land- and sea-based activities, such as fisheries and tourism, and poor waste management.
- While the total amount in the ocean is unknown, plastic is found all over the world including in the polar regions, far from its source.
- Floating plastic can be transported great distances by ocean currents.
- Although plastic debris is most commonly observed on shorelines, it also accumulates in mid-ocean 'gyres', natural circulation features that tend to trap floating material.

- Some of the material sinks to the ocean floor, where they remain out of sight.

- Environmental damage due to plastic debris is well documented. It includes:

  ❖ Mortality or sub-lethal effects when plastic is ingested by animals such as turtles, small-toothed whales and seabirds

  ❖ Entanglement of animals such as dolphins and large whales in nylon fishing gear (like nets) and other plastic debris

  ❖ Damage to critical ecosystems such as coral reefs and smothering of sediments

- ❖ Chemical contamination of marine organisms through ingestion of small plastic particles

- ❖ Potential changes in biodiversity due to the transport of invasive species on plastic fragments

- In addition, the fishing and tourism industries in many countries are economically affected by the presence of plastic debris, which can enter nets, foul propellers and litter beaches.

- A growing concern is the possible contamination of fish and other marine organisms that ingest plastic debris and the possible adverse impacts on ecosystems and human health.

- ***vii) Rapid Change in the Arctic***
- Global climate change is emerging as the most important stressor for Arctic biodiversity.
- Rapidly changing ice conditions due to Arctic warming affect life on land and in the sea.
- In particular, iconic animals that live on the ice such as polar bears, walruses and seals are at risk.
- The Arctic Ocean is especially prone to ocean acidification, as colder waters can hold more carbon dioxide (CO_2) than warmer ones.

- Arctic warming also could also have far-reaching consequences for global ocean circulation and weather patterns, migratory species that visit the Arctic, and potential greenhouse gas emissions from the thawing of permafrost.

- Permafrost thawing and the loss of snow and ice on land both contribute to global sea level rise.

- Permafrost is a layer of frozen soil at some depth below the surface, where the temperature has continuously been below 0°C for at least several years.

- It has been retreating northwards in many places in the Arctic as the climate warms.

- Permafrost soils often contain large volumes of organic carbon.

- As these soils thaw, irreversible releases of some of the carbon in the form of greenhouse gases (CO_2 and methane) will occur, thereby reinforcing climate change.

- ***Global Responses***
- There is no single, overarching solution to environmental challenges. Yet many environmental problems, particularly those pertaining to the global commons, can only be addressed through collective action.
- Responses at national and global levels interact and generate incremental, structural and transformational change (Putnam 1988).
- The engagement of non-state actors at different levels has, for example, fostered knowledge exchange and strengthened capacities.

- ***State Of Global Responses***
- Over the past 40 years a wide range of responses to environmental problems has been implemented as a set of interacting systems with multiple actors at different scales.
- Conventional responses at national and global levels include:
- the creation of rules, laws and institutions, with ***international organizations*** established to serve as conveners at the global scale;
  - as arbiters for exchange, sharing experiences, articulating interests and aggregating preferences;
  - as sources of expertise; and,
  - as enablers of a broader social dialogue.

- Global environmental issues can be divided into those that are common to many or most countries, including pollution of water bodies or solid waste disposal, and those that affect the global commons such as pollution of the global atmosphere or the open seas.

- Not all environmental issues require a global scale of governance.

- Some can be addressed through cooperation between a few countries, for example the trans-boundary water concerns of the Mekong or Zambezi rivers or networks of protected areas for endangered marine species with limited ranges.

- However, problems of the global commons – ones that cumulatively lead to negative global trends and/or whose drivers are essentially global – often require international treaties to ensure collective global action.

- The UN General Assembly formally initiated the international environmental agenda through Resolution 2398 (XXIII) on 3 December 1968, calling for the convening of the United Nations Conference on the Human Environment, the 1972 Stockholm Conference.

- The assembly framed the environmental challenge as an integral part of economic and social development, with UNEP established as the institutional mechanism to ensure follow-up to the environmental dimension of the conference outcome.

- The promotion and coordination of environmental activities within the whole UN system was one of the core functions governments delegated to UNEP.

- With environmental awareness on the rise, the new programme also initiated a number of new international agreements aiming to address emerging environmental issues.

- **Legal and policy framework**
- Environmental treaties form the core legal and policy framework for the global environment and aim to set appropriate goals for the international community.
- While environmental laws are legally binding, the lack of specific targets and timetables often implies that these are, in effect, soft law guidelines rather than hard law frameworks.
- Some treaties are also difficult to implement because of the lack of capacity in individual countries. In addition, verifying change in environmental quality and attributing changes to specific policy measures is challenging without robust and comparable data, especially at the global level.

- **Environmental Treaties**
- Today, there are more than 500 international treaties and other agreements that relate to the environment, of which 323 are regional and 302 date from 1972 and the early 2000s.
- The core of the global environmental legal framework, however, is made up of a more limited number of treaties with a growing number of ratifications.
- Most of the new agreements have established new, independent bureaucracies and this proliferation has fragmented authority in international environmental governance.

- **Environmental Conventions and Protocols**
- Thus, while the creation of the various environmental conventions and protocols can be viewed as an achievement, it also raises the need for continuing support in developing countries when national administrations become overloaded with reporting requirements and countless international meetings.
- A distinguishing feature of the more effective conventions and protocols is their development through the interplay of organized scientific communities and moderate to strong international institutions.

- The scientific community provides information about the problems and their solutions, while the institutions:
  - integrate the science into draft treaties,
  - help promote the ideas of the scientists,
  - coordinate meetings,
  - compile information repositories,
  - provide incentives to states to participate in negotiations and,
  - assist member states in complying with their obligations.

- ***Capacity Building and Diffusion of Policy Tools***
- To ensure a responsive and cohesive approach to meeting country needs and achieving environmental results and outcomes, developing and implementing a system-wide capacity-building framework is crucial.
- Studies from international organizations (Baser and Morgan 2008), academics (Eyben 2006), non-governmental organizations (Lipson and Warren 2006) and other practitioners (James and Wrigley 2007) suggest that capacity building:
  – is a complex human process based on values, emotions and beliefs;

- ✓ involves the main actors taking responsibility for the process of change;

- ✓ involves shifts in power and identity;

- ✓ involves changes in relationships between elements of human systems;

- ✓ is uncertain and unpredictable in its outcomes; and

- ✓ is strongly shaped by culture and values (Woodhill 2010).

- ***Financial Flows***

- Expanding the donor base, increasing the availability and accessibility of funds, and ensuring stable and predictable financial flows are among the top priorities in international environmental governance (UNEP 2010).

- The first financing mechanism designed explicitly and exclusively for global environmental purposes was the Environment Fund.

- Created in 1972 through the UN General Assembly Resolution 2997 as one of the core elements of the new environment programme, the **Environment Fund** was intended to finance new environmental initiatives within the UN system and to assist developing countries.

- Today, environmental financing comes in the form of environmental aid from bilateral and multilateral donors, including through funds dedicated to specific environmental concerns such as the Montreal Fund for the implementation of the Montreal Protocol to support ozone-related work, climate funds to support mitigation and adaptation, funds to combat deforestation, and others.

- The Global Environment Facility (GEF) is the largest funder of projects that specifically seek to improve the global environment through support for the additional costs of transforming projects with national benefits into projects with global environmental benefits.

- Yet, long-standing commitments from developed countries to improve access to finance for developing countries remain largely unfulfilled, and insufficient and unpredictable financial resources continue to constrain effective environmental governance at all levels.

- It is currently difficult to identify the financial flows for environmental responses as there is no tracking system to monitor resources invested in environmental activities by the United Nations and other international institutions.

- ***The Environment Fund***
- The Environment Fund is the principal source of financing for the implementation of UNEP's programme, and was established by the UN General Assembly in 1972.
- Altogether, 181 countries have made at least one voluntary contribution in the period between 1973 and 2011, with 12 countries having maintained their regular annual contributions over the whole period (UNEP 2012).
- ***The Multilateral Fund for the Implementation of the Montreal Protocol***
- Funding for implementation of most multilateral environmental agreements comes through special funds, the largest of which is the Multilateral Fund for the Implementation of the Montreal Protocol.
- Created in 1990 and administered by UNEP, it helps developing countries comply with the protocol's control measures.

- It has been replenished eight times since the beginning of its operation in 1991, with contributions from the industrialized countries, including countries in transition, assessed according to the UN scale of assessment.

- The significant financial resources devoted to the ozone treaty – during 1991–2011 governments pledged US$2.8 billion to the Montreal Protocol – can be seen both as a reason for and an indicator of the treaty's effectiveness in eliminating the production and consumption of most CFCs.

- Significant initial investment was critical to the fund's success, and this initial success stimulated sustained investment in the longer-term.

- ***The Global Environment Facility***
- Established as a US$1 billion pilot programme in the World Bank in 1992, the GEF has evolved to become the financial mechanism for several multilateral environmental agreements, including UNFCCC, the Convention on Biodiversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the Stockholm Convention.
- Over the past 20 years, the GEF has allocated US$10 billion for more than 2 800 projects in more than 168 developing countries and economies in transition, and more than 13 000 small grants totaling US$634 million have been made directly to civil society and community-based organizations.

- Although the GEF was initially a partnership between the World Bank, UNDP and UNEP, today it is in partnership with ten UN agencies, 182 civil society organizations and the private sector.

- This diversity of participation is directly related to the GEF's co-financing requirement, through which it has leveraged more than US$47 billion of funds additional to those available through UN and World Bank channels since 1992.

- The GEF's operational arrangements have also evolved, with a new system for the transparent allocation of resources (STAR) implemented in 2010.

- That same year, donors pledged more than US$4.3 billion in replenishment for the period 2010–2014 (GEF-5), representing a 55 per cent increase in resources over GEF-4 (GEF 2010).

- During 1991–2010, the GEF invested more than US$50 billion, US$40.7 billion of which came from co-financing from development partners – almost half of these funds were used for climate change mitigation and adaptation.

- In 2010 alone, the GEF disbursed a little over US$5 billion for its work; 81 per cent of this amount was from co-financing.

- **Environmental official development assistance**
- Close to US$100 billion of aid, an average of 15 per cent of the global total, was committed to the environment in 1998– 2007, with the most significant source of environmental financing being official development assistance (ODA) from the OECD countries.
- OECD countries' aid commitments targeted at the objectives of the three Rio conventions combined grew from US$5.1 billion in 1999 to US$17.4 billion in 2009, largely because of increases in funds targeted at climate change.
- The challenges of proliferation of institutional mechanisms, however, are acute in the environmental field.